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Behavior, strength and DSM-based design of cold-formed steel pin-ended columns buckling in flexural-torsional modes

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Abstract

Recently, the authors (Dinis *et al.* 2022, Cerqueira *et al.* 2023) studied the post-buckling behavior, strength and Direct Strength Method (DSM) design of cold-formed steel (CFS) fixed-ended singly symmetric columns buckling in major-axis flexural-torsional modes (F_MT) and possibly experiencing interaction with minor-axis flexural (F_m) buckling − F_MT-F_m interaction. They developed an efficient DSM-based design approach to predict the failure loads of those columns, regardless of their failure nature (pure F_MT or F_MT-F_m interactive). The purpose of this work is to extend the scope of the above investigation to singly symmetric columns with three types of pin-ended support conditions, all fixed with respect to torsion and have warping fully prevented. Columns with seven cross-section shapes are considered and their wall dimensions, lengths and yield stresses are selected to ensure covering wide F_MT slenderness ranges and various ratios between the F_m and F_MT buckling loads. After investigating the elastic and elastic-plastic post-buckling behaviors of the selected pin-ended columns, namely those affected by F_MT-F_m interaction, a fairly extensive parametric study is carried out to gather pin-ended column failure load data, most of which are supposedly associated F_MT-F_m interactive collapses. Then, the assembled numerical failure load data, together with failure loads previously reported by Dinis *et al.* (2020), are used (i) to show that none of the available DSM-based strength curves are able to predict all of them adequately and (ii) to develop and assess the merits of DSM-based design approaches to estimate the failure loads of pin-ended singly symmetric columns buckling in F_MT modes and failing in either pure F_MT or F_MT-F_m interactive modes – since no single design curve/approach can handle all the pin-ended columns considered, different strength curves are proposed for columns exhibiting each type of pin-ended support conditions.

1. Introduction and Background

Due to its inherent advantages, such as high strength-to-weight ratio, easy shipping and handling, durability, cost-effectiveness, sustainability and architectural flexibility, cold-formed steel (CFS) is nowadays viewed by the construction industry as one of the most advantageous building materials. However, the fact that CFS members are very often made of high-strength steels and exhibit slender cross-sections, is responsible for their enormous susceptibility to the occurrence of several instability phenomena – Figs. 1(a)-(d) show web-stiffened lipped channel (WSC) column cross-sections buckled in some

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of them, namely local, distortional, major-axis flexural-torsional (F_MT) and minor-axis flexural (F_m) modes. Naturally, the behavior, strength and failure of such columns are invariably affected, to a greater or lesser extent, by the above instability phenomena, as well as by the possible interaction between two or more of them. This is why provisions dealing with failures prompted by pure or coupled instabilities must be included in the CFS specifications. Although this has already been done for all the pure instability failures, the same is not true for coupled instability ones – indeed, only the failures caused by local-global (F_MT or F_m) interaction are currently handled by the CFS specifications.

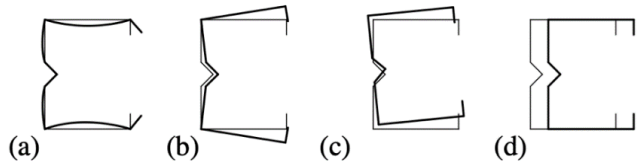


Figure 1: Column web-stiffened lipped channel cross-sections buckled in (a) local, (b) distortional, (c) major-axis flexural-torsional and (d) minor-axis flexural modes.

Nowadays, it is fair to claim that the Direct Strength Method (DSM – *e.g.*, Schafer 2008, 2019 or Camotim *et al.* 2016), first proposed by Schafer & Peköz (1998) and based on an original idea of Hancock *et al.* (1994), is the most rational and efficient approach for the design of cold-formed steel members (columns and beams, to be more precise) – this explains its fast growing and widespread popularity around the world. Moreover, it should be noted that the domain of application of the DSM has been recently extended to cover also beam-columns (Torabian & Schafer 2018), even if this research effort did not yet reach the codification stage. The currently codified design/strength curves are able to handle local, distortional, global (F_MT or F_m) and local-global interactive failures. In the context of this investigation, the relevant column nominal strength is the global one (P_{nG}), given by (AISI 2022)

$$P_{nG} = \begin{cases} P_y \left(0.658^{\lambda_G^2} \right) & if \quad \lambda_G \le 1.5 \\ P_y \left(\dfrac{0.877}{\lambda_G^2} \right) & if \quad \lambda_G > 1.5 \end{cases} \qquad \text{with} \qquad \lambda_G = \sqrt{\frac{P_y}{P_{crG}}} \quad , \quad (1)$$

where P_{crG} and λ_G are the column global critical buckling load and slenderness, and $P_y = A f_y$ is the column squash load (A and f_y are the cross-sectional area and steel yield stress, respectively).

Dinis *et al.* (2019a, 2020) carried out extensive numerical investigations on CFS singly symmetric (with respect to the major axis) fixed-ended columns buckling in F_MT modes, intended to assess the merits of Eq. (1) in predicting their failure loads. They considered columns with seven cross-section shapes, namely plain (U) and lipped (C) channels, hat-sections (H), rack-sections (R), and return-lip (RLC), web-stiffened (WSC) and web-flange-stiffened (WFSC) lipped channels (see Fig. 2), and showed that the failure load prediction

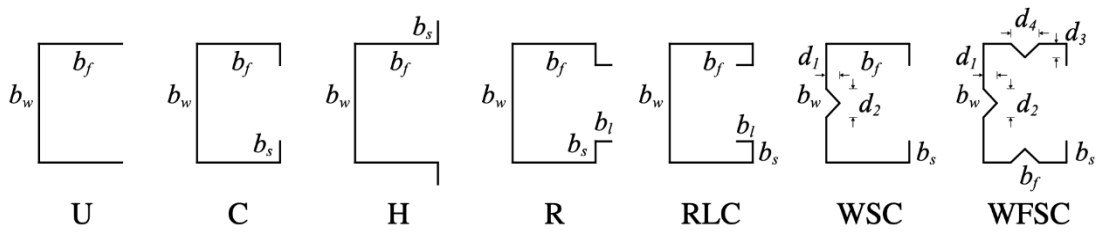


Figure 2: Column cross-section shapes and dimensions considered by Dinis *et al.* (2019a, 2020) and in this work.

quality of the P_{nG} values is only adequate for columns in the low-to-moderate slenderness range ($\lambda_G \leq 1.5$). Indeed, it was clearly shown that the P_{nG} values substantially underestimate the column failure loads for columns with moderate and high slenderness ($\lambda_G > 1.5$) – moreover, it was also shown that the underestimation grows significantly with the slenderness and that the P_u/P_{nG} ratio can exceed 3.0 (see Fig. 4(a)). After observing that this underestimation stemmed from the dependence of the column F_MT post-buckling strength on the cross-section geometry, Dinis *et al.* (2019a) concluded that a novel DSM-based design approach was necessary, involving strength curves dependent on a cross-section geometric parameter. Concerning the choice of this parameter, the first attempt (Dinis *et al.* 2019a) was only moderately successful (the parameter chosen depended on the cross-section shape) and full success was only achieved with the second attempt (Dinis *et al.* 2020), who proposed a DSM-based strength curve set dependent on the non-dimensional cross-section geometric parameter

$$\beta_{FT} = \frac{I_I + I_w/A}{I_{II}} \quad , \quad (2)$$

where A, I_I, I_{II} and I_w are the cross-sectional area, major and minor moments of inertia, and warping constant. This strength curve set, termed P_{nFT}, is defined by

$$P_{nFT} = \begin{cases} P_y \left(0.658^{\lambda_{FT}^2} \right) & if \quad \lambda_{FT} \leq 1.5 \\ P_y \left(\dfrac{a}{\lambda_{FT}^b} \right) & if \quad \lambda_{FT} > 1.5 \end{cases} \qquad \text{with} \qquad \lambda_{FT} = \sqrt{\frac{P_y}{P_{cr.FT}}} \quad , \quad (3)$$

where subscript "G" is replaced by "FT", in order to avoid confusion with the current DSM global design curve, and the β_{FT} dependence is felt through parameters a and b, obtained by means of a "trial-and-error curve fitting procedure", which read

$$a = 0.39 \times 1.5^b \qquad b = 0.06\beta_{FT} + 0.71 \leq 2.0 \quad . \quad (4)$$

It should be noted that Eqs. (3) and (1) only differ for $\lambda_{FT} > 1.5$ (moderate and high slenderness ranges) – the exponential expression is kept in the low-to-moderate slenderness range ($\lambda_{FT} \leq 1.5$). Each β_{FT} value leads to a and b values defining a different strength curve. For $\beta_{FT} \geq 21.5$, one has $b=2.0$ and $a=0.877$, which means that Eq. (3) and (1) coincide.

Subsequent investigations on the post-buckling behavior and failure of CFS fixed-ended singly symmetric columns buckling in F_MT modes revealed some unexpected behavioral features which raised the suspicion, and eventually convinced the authors, that the so-called column F_MT post-buckling behavior and failure may be affected by coupling between F_MT and F_m buckling – the closeness between the corresponding bifurcation loads ($P_{b.Fm}$ and $P_{cr.FT}$) quantifies the relevance of this (never unveiled before) global-global interaction phenomenon. The confirmation of the above suspicion came through the comparison between the P_{nFT} predictions of the failure loads of two sets of CFS fixed-ended plain (U) and lipped (C) channel columns buckling in critical F_MT modes and having slenderness values above 1.5 (Dinis *et al.* 2022): the columns in each set only differed in their $R_G = P_{b.Fm}/P_{cr.FT}$ values, which were either (i) well above 1.0 (first set) and (ii) much closer to 1.0 (second set). Figs. 3(a)-(b) show the plots P_u/P_{nFT} vs λ_{FT} for the fixed-ended U and C column sets, where the white and gray circles stand for columns with $R_G \geq 1.45$ and $R_G < 1.45$, respectively – this quite arbitrary "border" was intended to separate columns likely or unlikely to experience F_MT-F_m interaction. The gray circles fall consistently clearly below the white ones, thus evidencing the presence of a failure load erosion due to F_MT-F_m interaction – moreover, the P_{nFT} estimation of the gray dots

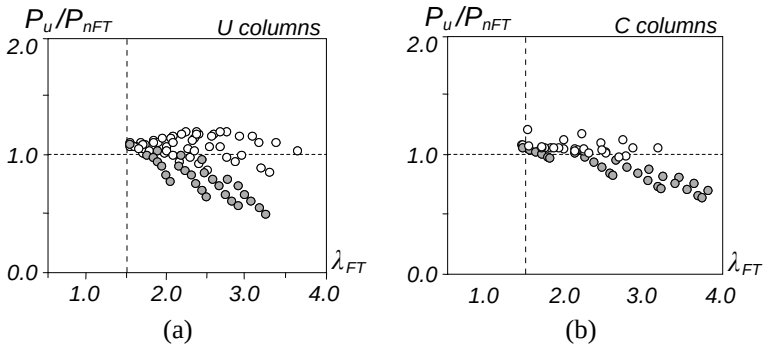


Figure 3: Plots P_u/P_{nFT} *vs.* λ_{FT} of (a) U and (b) C columns with $R_G \leq 1.45$ (gray dots) and $R_G > 1.45$ (white dots).

is both inaccurate and unsafe (substantially so in many cases), while the same estimation of the white dots is quite good. It could be readily concluded that F_MT-F_m (global-global) interaction exists and is not adequately captured by the P_{nFT} values.

This finding/confirmation motivated Dinis *et al.* (2022) to investigate the behavior and DSM-based design of fixed-ended U and C columns undergoing F_MT-F_m interaction. They found that (i) this interaction is only relevant for columns in the moderate and high slenderness ranges ($\lambda_{FT} > 1.5$) and (ii) that it was possible to predict adequately the failure loads of such columns (*i.e.*, those associated with F_MT-F_m interactive failures) by making the P_{nFT} strength curve set dependent on the buckling load ratio R_G. On the basis of the 835 U and C failure loads gathered, Dinis *et al.* (2022) proposed the following modification: replacing the expression providing parameter *b* (see Eq. (4)) by

$$b = 0.06\beta_{FT} + c \leq 2.0 \quad , \quad (5)$$

where the dependence of R_G is felt through parameter *c*, which reads

$$c = -19.5\ R_G^3 + 73.6\ R_G^2 - 94.1\ R_G + 42\ \geq\ 0.71 \quad . \quad (6)$$

It is worth noting that the *b* value provided by Eq. (4) is retrieved for $R_G \geq 1.49$ (one has then $c = 0.71$), which means that F_MT-F_m interaction is deemed only meaningful for columns with $R_G < 1.49$. Moreover, it was also shown that the proposed DSM-based design approach provides a very good failure load prediction quality for fixed-ended U and C columns buckling in F_MT modes, regardless of their cross-section geometry and F_MT-F_m interaction level – these two aspects are handled by the parameters β_{FT} and R_G, respectively.

Very recently, Cerqueira *et al.* (2023), extended the scope of the above investigation to CFS fixed-ended columns with five additional cross-section shapes, namely (i) return-lip (RLC), web-stiffened (WSC) and web/flange-stiffened (WFSC) lipped channels, (ii) hat-sections (H) and (iii) rack-sections (R) – together with the U and C columns previously analyzed by Dinis *et al.* (2022), they are deemed representative of any arbitrary singly-symmetric cross-section. On the basis of about 2000 fixed-ended column failure loads (including those reported by Dinis *et al.* 2022), Cerqueira *et al.* (2023) showed that the DSM-based design approach proposed earlier, in the context of U and C columns, predicts equally well the failure loads of the other five column sets (H, R, RLC, WSC, WFSC) and, for that matter, any fixed-ended singly symmetric (with respect to the major axis) column buckling in an F_MT mode. Moreover, these authors also showed that the expression providing parameter *c* (see Eq. (6)) can be simplified without sacrificing the column failure load prediction quality – therefore, they proposed the following DSM-based design approach to predict the failure loads of arbitrary CFS fixed-ended singly symmetric column buckling in F_MT modes:

$$P_{nFT-Fm} = \begin{cases} P_y \left(0.658^{\lambda_{FT}^2} \right) & \text{if} \quad \lambda_{FT} \le 1.5 \\ P_y \left(\dfrac{a}{\lambda_{FT}^b} \right) & \text{if} \quad \lambda_{FT} > 1.5 \end{cases} \qquad \text{with} \qquad \lambda_{FT} = \sqrt{\frac{P_y}{P_{cr.FT}}} \quad , \quad (7)$$

$$a = 0.39 \times 1.5^b \qquad b = 0.06\beta_{FT} + 0.71 \le 2.0 \qquad c = -1.9R_G + 3.65 \ge 0.71 \quad , \quad (8)$$

where (i) subscript "FT-Fm" indicates that F_MT-F_m interactive failures are also handled, (ii) β_{FT} is still given by Eq. (2) and, as mentioned before, (iii) R_G=$P_{b.Fm}$/$P_{cr.FT}$ is the ratio between the F_m (non-critical – $P_{b.Fm}$) and F_MT (critical – $P_{cr.FT}$) buckling loads, and (iv) it should be noted that Eqs. (3)-(4) are now retrieved for $R_G \ge 1.55$ (instead of $R_G \ge 1.49$). Finally, recall that the failure loads of columns with $\lambda_{FT} \le 1.5$ are still predicted by the (single) DSM global design curve prescribed by AISI (2022) – see Eq. (1). In order to enable the assessment of the benefits obtained by replacing the current design curve (P_{nG}) with the proposed strength curve set (P_{nFT-Fm}), Figs. 4(a)-(b) show the P_u/P_{nG} *vs.* λ_{FT} ($\equiv\lambda_G$) and P_u/P_{nFT-Fm} *vs.* λ_{FT} plots for all the CFS fixed-ended singly symmetric columns buckling in F_MT modes that were analyzed by Dinis *et al.* (2019a, 2020, 2022) and Cerqueira *et al.* (2023), regardless of their failure nature (pure F_MT or F_MT-F_m interactive). The very significant improvement in failure load prediction quality is clearly attested by comparing the P_u/P_{nG} and P_u/P_{nFT-Fm} statistical indicators (means, standard deviations, maximum and minimum values) – recall that these values coincide for $\lambda_G \equiv \lambda_{FT} \le 1.5$. Naturally, a possible codification of this DSM-based design approach must be preceded by an adequate experimental validation.

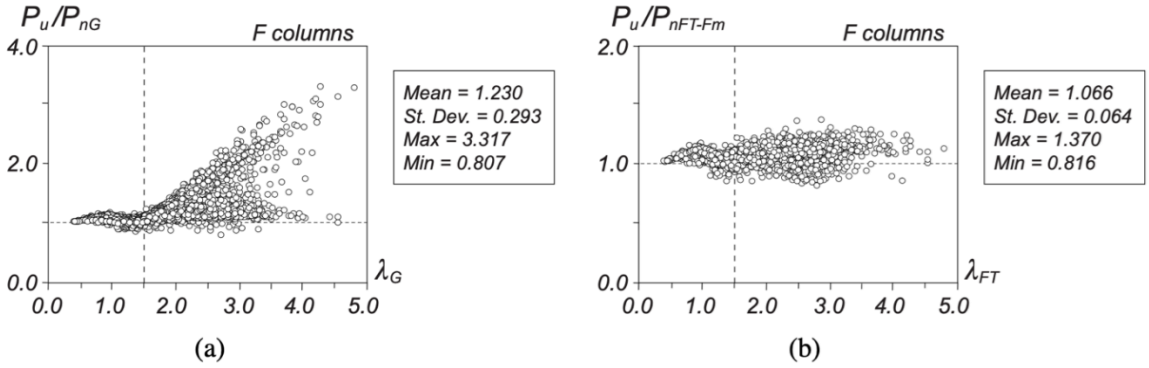
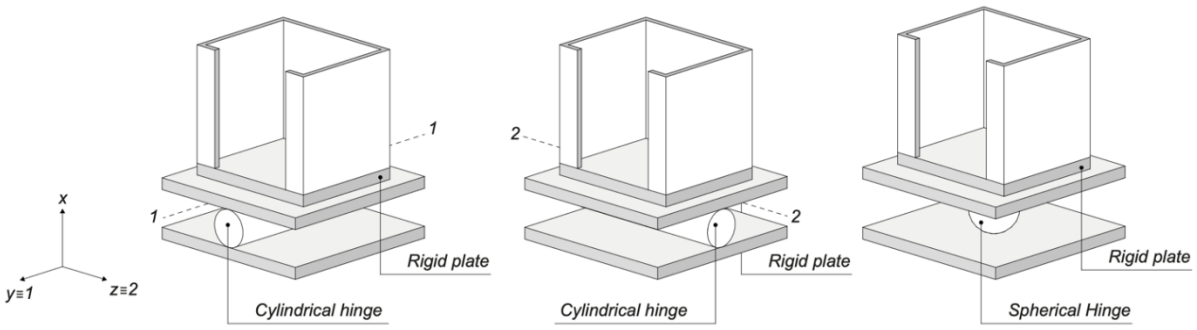


Figure 4: Plots (a) P_u/P_{nG} *vs.* λ_G and (b) P_u/P_{nFT-Fm} *vs.* λ_{FT} for the whole set of fixed-ended singly symmetric columns analyzed by Dinis *et al.* (2019a, 2020, 2022) and Cerqueira *et al.* (2023) (note the different vertical scales).

The purpose of this work is to extend the scope of the research effort described above, by considering singly symmetric columns with other than fixed-ended support conditions, namely columns with the three types of pin-ended support conditions illustrated in Figs. 5(a)-(c) – all of them are fixed with respect to torsion and have warping fully prevented. They correspond to column end cross-sections rigidly attached to rigid plates resting on hinges that may be either (i) cylindrical along the major axis (pinned with respect to the major axis and fixed with respect to the minor axis – PC_M columns), (ii) cylindrical along the minor axis (pinned with respect to the minor axis and fixed with respect to the major axis – PC_m columns) or (iii) spherical (pinned with respect to the major and minor axes – PS columns)[4]. At this stage, it is worth noting that Dinis *et al.* (2019b, 2020) obtained failure load data concerning PC_M, PC_m and PS columns and developed DSM-based design approaches to predict them – however, the possible presence of F_MT-F_m

[4] Naturally, the spherical hinges must be prevented from rotating about the column longitudinal axis (see, for instance, Dinis *et al.* 2021).



(a) (b) (c)

Figure 5: Column pin-ended support conditions considered in this work: (a) PC_M, (b) PC_m and (c) PS (1 and 2 are the cross-section major and minor axes, respectively).

interaction was never investigated (this coupling phenomenon had not yet been unveiled), which casts doubts on their usefulness for the purpose of the present work. Nevertheless, these failure loads and DSM-based design approaches will be taken into account in this investigation.

The paper begins with the column geometry selection (Section 2), carried out by means of "trial-and-error" sequences of buckling analyses and aimed at identifying CFS pin-ended (PC_M, PC_m and PS) singly symmetric columns with the cross-section shapes indicated in Fig. 2, several wall dimensions and lengths and prone to various F_MT-F_m interaction levels (*i.e.*, with a wide variety of R_G values) – all the selected columns buckle in critical F_MT modes and the associated buckling loads are as lower as possible than their local and distortional counterparts, in order to minimize couplings with these instability phenomena. Next, the elastic and elastic-plastic post-buckling behaviors of the CFS pin-ended (PC_M, PC_m and PS) columns affected by F_MT-F_m interaction are investigated in Section 3, adopting the approach previously followed by Cerqueira *et. al.* (2023) for fixed-ended columns. Then, Section 4 reports the results of a fairly extensive parametric study carried out to gather failure loads concerning the selected PC_M, PC_m and PS columns, most of which are supposed to collapse in F_MT-F_m interactive modes – in order to cover wide F_MT slenderness ranges, several yield stresses are considered. The assembled numerical failure load data, together with the CFS pin-ended column failure loads obtained by Dinis *et al.* (2020), are subsequently used, in Section 5, to show that neither (i) the current DSM global design curve (P_{nG} – see Eq. (1)) nor (ii) the DSM-based design curve set proposed by Cerqueira *et al.* (2023) for fixed-ended columns ($P_{nFT\text{-}Fm}$ – see Eqs. (7)-(8)) are able to predict them adequately. Next, these failure loads are used to propose and assess the merits and reliability of DSM-based design approaches to estimate the failure loads of CFS PC_M, PC_m and PS singly symmetric columns buckling in F_MT modes and failing in either pure F_MT or F_MT-F_m interactive modes – since it is shown that a single design approach cannot handle all the pin-ended columns considered in this work, different strength curve sets are proposed for PC_M, PC_m and PS columns. After summarizing and briefly discussing the merits and drawbacks of the various DSM-based design curves proposed in this work, at the end of Section 5, the paper closes, in Section 6, with a few concluding remarks that include the most relevant findings obtained from this research effort.

2. Column Geometry Selection – Buckling Behavior

The first task of this work consists of carefully selecting the cross-section dimensions and lengths of the CFS PC_M, PC_m and PS columns to be analyzed (see Fig. 2), in order to ensure that they exhibit a wide variety of buckling loads ratios $R_G=P_{b.Fm}/P_{cr.FT}$. It is worth noting that the WCS and WFSC column "V-shaped" intermediate stiffeners are such that $d_1=d_3=10$ mm and $d_2=d_4=20$ mm. As done previously, the

selection procedure involves "trial-and-error" sequences of buckling analyses (i) performed in the code GBTUL (Bebiano *et al.* 2018), based on Generalized Beam Theory (GBT) and (ii) intended to identify columns buckling in F_MT modes and having R_G values comprised between 1.0 and 1.50 (PC_M), 1.46 (PC_m) and 1.50 (PS), so that the majority of their failures possibly occur in F_MT-F_m interactive modes – for the sake of completion, some of them should fail in pure F_MT modes.

The output of the above effort consists of 756 columns whose cross-section shapes, wall dimensions (b_w, b_f, b_s, b_l, t) and lengths (L_i) are given in Tables 1 (PC_M columns), 2 (PC_m columns) and 3 (PS columns). These tables also provide the column cross-section areas (A), major (I_I) and minor (I_{II}) moments of inertia, warping constants (I_w) and β_{FT} values – these geometrical properties were calculated on the basis of the cross-section mid-line dimensions. In addition, the 21 tables included in Annex A (Tables A1.1 to A3.7) provide the buckling loads ($P_{cr} \equiv P_{cr.FT}$, $P_{b.Fm}$), R_G and $R_{LD}=Min(P_{b.L}/P_{b.Fm}; P_{b.D}/P_{b.Fm})$ values – $P_{b.L}$ and $P_{b.D}$ are the column lowest local and distortional bifurcation loads. Note that these tables are divided in three sets (A1 to A3, respectively for PC_M, PC_m and PS columns), each comprising the seven cross-sections shapes considered in this work (U, C, H, R, RLC, WSC, WFSC). These tables also include the column numerical failure loads, addressed in Section 4, and their DSM-based predictions, addressed in Section 5.

It is worth noting that the column cross-sections dimensions are such that (i) $2.75 \geq b_w/b_f \geq 1.54$ (PC_M), $1.14 \geq b_w/b_f \geq 1.00$ (PC_m) and $1.29 \geq b_w/b_f \geq 1.00$ (PS), and (ii) $12.88 \geq \beta_{FT} \geq 5.20$ (PC_M), $7.45 \geq \beta_{FT} \geq 3.02$ (PC_m) and $8.05 \geq \beta_{FT} \geq 3.28$(PS), and are combined with six lengths varying from 2000mm to 9000mm (PC_M), 2500mm to 9000mm (PC_m), and 2000mm to 9000mm (PS), so that wide R_G ranges are covered: $1.50 \geq R_G \geq 1.00$ (PC_M), $1.46 \geq R_G \geq 1.00$ (PC_m) and $1.50 \geq R_G \geq 1.00$ (PS). It was ensured that the R_{LD} ratio is as large as possible, in order to minimize the occurrence of couplings with local (L) or distortional (D) buckling – the lowest R_{LD} ratios are comprised between (i) 1.75 ($WFSC_5$ with L_1 and R_G=1.44) and 8.52 (C_5 with L_1 and R_G=1.27), for PC_M columns, (ii) 1.07 (U_6 with L_1 and R_G=1.12) and 1.76 (RLC_5 with L_1 and R_G=1.25), for PC_m columns, and (iii) 1.43 (C_4 and WSC_3 with L_1, whose R_G values are 1.20 and 1.16, respectively) and 1.93 (R_5 with L_1 and R_G=1.21), for PS columns[5].

Figure 6(a) displays illustrative signature curves, providing the variation of f_{cr} (elastic critical buckling stress) with the column length L (logarithmic scale) for CFS (E=210GPa, ν=0.3) WSC (b_w=110mm, b_f=100mm, b_l=10mm, t=3mm) columns with four end support conditions: fixed-ended (F) and the three pin-ended (PC_M, PC_m, PS). Each solid line concerns one end support condition and was obtained through GBT bifurcation analyses carried out in the code GBTUL (Bebiano *et al.* 2018) including the following deformation modes: 4 global (**1-4**), 2 distortional (**5-6**) and 11 local (**7-17**)[6]. As for Fig. 6(b), it displays the GBT modal participation diagrams corresponding to each f_{cr} *vs.* L curve, providing the contributions of each GBT deformation mode to the WSC column buckling modes – *e.g.*, the WSC columns with L=450cm buckle in modes combining the following contributions from deformation modes **2** and **4**: 10.2% + 88.9% (F), 34.3% + 65.3% (PC_M), 10.1% + 88.9% (PC_m), and 34.3% + 65.3% (PS). Lastly, Fig. 6(c) shows the in-plane shapes of the WSC GBT deformation modes **2-6 + 11** and critically buckled cross-sections of WSC columns with lengths L=150+600cm (F, PC_M) and L=150+400+1200cm (PS, PC_m). These buckling results prompt the following comments:

[5] Although some PC_m column R_{LD} and R_G ratios are only slightly larger than 1.0, which indicates that the lowest local or distortional buckling loads are not far apart from the corresponding minor-axis flexural-torsional buckling load, no local or distortional deformations were observed along their post-buckling equilibrium paths.

[6] At this stage, it is worth noting note that, as done by Landesmann *et al.* (2016), all the WSC column buckling modes involving dominant contributions from deformation modes with numbers higher than **6** are viewed as local. In other words, the "false distortional deformation modes", stemming from motions of the stiffener nodes, are treated as local deformation modes.

Table 1: Selected CFS PC_M columns: cross-section mid-line dimensions and geometrical properties (b_w, b_f, b_s, b_l, t, A, L, I_I, I_{II}, I_w – values in mm, mm^2, $10^4 mm^4$, $10^6 mm^6$), β_{FT} values and lengths (in mm).

Column	b_w	b_f	b_s	b_l	t	A	I_I	I_{II}	I_w	β_{FT}	L_1	L_2	L_3	L_4	L_5	L_6
U_1	100	60	-	-	5.0	1100	191.79	42.65	748.30	6.09	4000	4500	5000	6000	6500	7000
U_2	90	50	-	-	2.5	475	65.83	12.62	178.85	8.20	4500	5000	5500	6000	6500	7000
U_3	100	65	-	-	5.0	1150	204.30	52.84	928.38	5.39	6000	6500	7000	7500	8000	8500
U_4	120	60	-	-	3.0	720	172.83	27.03	681.55	9.90	4500	5000	5500	6000	6250	6500
U_5	130	65	-	-	3.0	780	219.73	34.36	1016.72	10.19	5250	5500	6000	6500	7000	7500
U_6	80	50			3.5	630	70.97	17.04	191.29	5.95	4500	5000	5500	6000	6500	7000
C_1	100	50	15	-	5.0	1150	194.15	44.52	1033.29	6.38	4000	4500	5000	5500	6000	6500
C_2	90	45	15	-	5.0	1050	142.97	33.75	667.96	6.12	3500	4000	4500	5000	5500	6000
C_3	100	55	10	-	5.0	1150	199.61	48.84	985.65	5.84	5000	5500	6000	7000	7500	8000
C_4	120	60	15	-	5.0	1350	329.75	72.16	2243.07	6.87	6000	6500	7000	8000	8500	9000
C_5	130	65	15	-	5.0	1450	416.18	89.34	3175.24	7.11	6000	6500	7000	8000	8500	9000
C_6	80	45	10	-	5.0	950	105.76	28.21	388.89	5.20	5000	5500	6000	7000	7500	8000
H_1	100	40	10	-	3.0	600	103.22	13.79	204.63	9.96	2500	2750	3000	3250	3500	4000
H_2	110	50	10	-	3.0	690	145.70	24.05	445.26	8.74	4000	4500	5000	5500	6000	6500
H_3	110	50	10	-	4.0	920	194.29	32.10	594.67	8.07	3000	3250	3500	4000	4500	5000
H_4	90	40	10	-	2.0	380	54.59	8.88	104.69	9.25	4500	5000	5500	6000	6500	7000
H_5	120	50	15	-	4.0	1000	256.55	37.81	761.96	8.80	3500	3750	4000	4500	4750	5000
H_6	80	30	10	-	1.2	192	21.52	2.63	23.32	12.78	3500	4000	4500	5000	5500	6000
R_1	100	40	10	10	4.0	880	142.45	26.40	630.06	8.11	2000	2500	3000	3500	4000	4500
R_2	110	40	10	10	3.0	690	133.10	20.42	568.03	10.55	3000	3250	3500	4000	4250	4500
R_3	110	50	10	10	4.0	1000	201.70	43.81	1215.17	7.38	4000	4500	5000	6000	7000	8000
R_4	90	40	10	10	3.0	630	83.85	19.07	386.79	7.62	4000	4500	5000	6000	7000	8000
R_5	120	50	15	15	5.0	1400	324.14	70.67	2708.98	7.32	4000	4500	5000	6000	7000	8000
R_6	80	30	10	10	3.0	540	54.42	10.16	172.55	8.50	2000	2500	2750	3000	3500	4000
RLC_1	100	50	10	10	5.0	1200	203.13	46.79	1112.31	6.32	4000	5000	6000	7000	8000	9000
RLC_2	110	50	10	10	5.0	1250	252.17	48.42	1336.53	7.42	2500	3000	3500	4000	5000	5500
RLC_3	120	60	12	12	5.5	1584	386.06	88.90	3042.19	6.50	4500	5000	6000	7000	8000	9000
RLC_4	120	50	10	10	5.0	1300	307.46	49.92	1587.76	8.61	2500	2750	3000	3500	4000	4250
RLC_5	140	70	10	10	6.0	1920	643.09	138.79	5688.85	6.77	5000	5500	6000	7000	8000	9000
RLC_6	100	40	10	10	2.0	440	71.21	11.14	265.85	11.82	3000	3500	4000	4500	5000	6000
WSC_1	110	50	10	-	3.0	715	139.18	23.62	590.15	9.39	3000	3500	4000	4500	5000	5500
WSC_2	100	50	10	-	3.0	685	112.31	22.88	481.73	7.98	3500	4000	5000	6000	7000	8000
WSC_3	90	40	10	-	2.0	397	51.04	8.61	154.58	10.45	2500	3000	3500	4000	5000	5500
WSC_4	120	60	15	-	4.0	1113	263.88	57.12	1814.01	7.47	4500	5000	6000	7000	8000	9000
WSC_5	120	50	10	-	2.0	497	113.00	16.18	474.25	12.88	3500	4000	4500	5000	6000	7000
WSC_6	140	70	15	-	4.0	1273	413.16	86.64	3549.85	7.99	5500	6000	6500	7000	8000	9000
$WFSC_1$	110	50	10	-	3.0	765	145.45	24.23	523.89	8.83	3000	3500	4000	4500	5000	6000
$WFSC_2$	100	50	10	-	3.0	735	116.81	23.43	421.56	7.43	4000	4500	5000	6000	7000	8000
$WFSC_3$	90	40	10	-	2.0	430	53.04	8.88	128.48	9.34	3000	3500	4000	4500	5000	5500
$WFSC_4$	120	60	15	-	4.0	1179	274.91	57.99	1643.07	7.14	4500	5000	6000	7000	8000	9000
$WFSC_5$	120	50	10	-	2.0	530	118.51	16.63	426.07	11.97	3500	4000	4500	5000	6000	7000
$WFSC_6$	140	70	15	-	5.0	1674	538.23	109.91	4132.38	7.14	5000	5500	6000	7000	8000	9000

Table 2: Selected CFS PC_m columns: cross-section mid-line dimensions and geometrical properties (b_w, b_f, b_s, b_l, t, A, L, I_I, I_{II}, I_w – values in mm, mm^2, $10^4 mm^4$, $10^6 mm^6$), β_{FT} values and lengths (in mm).

Column	b_w	b_f	b_s	b_t	t	A	I_I	I_{II}	I_w	β_{FT}	L_1	L_2	L_3	L_4	L_5	L_6
U_1	130	130	-	-	3.0	1170	384.53	219.73	6639.99	4.33	7000	7250	7500	7750	8000	8250
U_2	100	100	-	-	2.5	750	145.86	83.35	1490.67	4.13	4750	5000	5250	5500	5750	6000
U_3	90	90	-	-	2.0	540	85.06	48.61	703.92	4.43	4750	5000	5250	5500	5750	6000
U_4	110	110	-	-	2.0	660	155.30	88.74	1919.03	5.03	7000	7250	7500	8000	8750	9000
U_5	125	125	-	-	2.5	938	284.86	162.78	4546.33	4.73	7250	7500	8000	8500	8750	9000
U_6	120	120			3.5	1260	352.89	201.64	5196.19	3.80	4750	5000	5250	5500	5750	6000
C_1	95	95	15	-	2.5	788	137.20	98.68	2068.17	4.05	5000	5500	6000	6500	7000	7500
C_2	80	80	12	-	2.0	528	65.35	46.55	676.90	4.16	4000	4500	5000	5500	6000	6500
C_3	110	110	20	-	4.0	1480	343.62	254.29	7664.99	3.39	4500	4750	5000	5500	5750	6000
C_4	100	100	20	-	2.0	680	129.75	98.05	2578.88	5.19	5500	6000	6500	7000	7500	8000
C_5	120	120	15	-	5.0	1950	545.87	376.77	11579.3	3.02	3500	3750	4000	4500	5000	5500
C_6	100	100	20	-	3.0	1020	194.65	147.09	3871.37	3.90	3500	4000	4500	5000	6000	6500
H_1	100	100	10	-	3.0	960	193.25	125.03	2050.95	3.25	4500	5000	5500	6000	7000	7500
H_2	100	90	15	-	3.0	930	189.97	105.85	1576.30	3.40	3000	3500	4000	4500	5000	6000
H_3	90	90	10	-	3.0	870	142.67	93.04	1216.74	3.04	3500	4000	4500	5000	5500	6000
H_4	90	80	10	-	2.0	540	86.99	46.47	595.98	4.25	3500	4000	4500	5000	5500	6000
H_5	110	100	15	-	3.0	1020	250.15	140.91	2601.10	3.58	4000	4500	5000	5500	6000	7000
H_6	80	70	10	-	1.5	360	46.10	24.20	238.99	4.65	3500	4000	4500	5000	5500	6000
R_1	100	100	10	10	3.0	1020	196.85	150.81	3565.73	3.62	5000	5000	6000	6500	7000	7500
R_2	100	90	15	15	1.5	510	93.73	69.11	2069.00	7.23	5000	5500	6000	7000	8000	9000
R_3	90	90	10	10	3.0	930	144.62	113.88	2293.22	3.44	4000	4500	5000	5500	6000	6500
R_4	80	80	10	10	3.0	840	102.44	83.41	1416.25	3.25	3000	3250	3500	4000	4500	5000
R_5	110	110	15	15	3.0	1170	267.86	224.05	7583.83	4.09	5000	5500	6000	7000	8000	9000
R_6	70	70	10	10	1.2	300	27.69	23.52	332.40	5.89	4000	5000	6000	7000	8000	9000
RLC_1	110	110	10	15	3.0	1140	266.26	195.22	5585.12	3.87	6000	6500	7000	7500	8000	8500
RLC_2	120	120	15	15	3.0	1260	345.66	262.96	10009.0	4.34	5000	5500	6000	7000	8000	9000
RLC_3	100	100	10	10	3.0	1020	196.85	143.75	3379.20	3.67	4000	4500	5000	5500	6000	7000
RLC_4	90	90	10	10	3.0	930	144.62	107.61	2156.69	3.50	3500	4000	4500	5000	5500	6000
RLC_5	80	80	10	10	3.0	840	102.44	77.93	1320.02	3.33	2500	3000	3250	3500	4000	4500
RLC_6	90	80	10	12	1.2	353	53.56	33.12	681.12	7.45	5000	5500	6000	6500	7000	8000
WSC_1	100	100	10	-	3.0	985	187.33	125.60	2539.05	3.54	4000	4500	5000	5500	5750	6000
WSC_2	110	110	15	-	3.0	1105	253.54	178.66	4732.14	3.82	4500	5000	5500	6000	6500	7000
WSC_3	90	90	15	-	2.0	617	93.67	68.33	1318.92	4.50	4000	4500	5000	5500	6000	7000
WSC_4	120	120	20	-	2.5	1021	277.44	203.19	6929.28	4.71	5000	5500	6000	7000	8000	9000
WSC_5	80	80	10	-	1.2	322	38.84	26.79	369.01	5.73	5000	5500	6000	7000	8000	9000
WSC_6	140	140	20	-	4.0	1873	698.67	497.26	21616.7	3.73	5500	6000	6500	7000	8000	9000
$WFSC_1$	100	100	10	-	3.0	1035	191.84	126.57	2367.43	3.32	4000	4500	5000	5500	6000	6250
$WFSC_2$	110	110	15	-	3.0	1155	259.80	179.61	4449.15	3.59	4500	5000	5500	6000	7000	8000
$WFSC_3$	90	90	15	-	2.0	650	95.66	68.73	1205.08	4.09	3500	4000	5000	6000	7000	8000
$WFSC_4$	120	120	20	-	3.0	1275	341.21	244.78	7886.04	3.92	5000	5500	6000	7000	8000	9000
$WFSC_5$	80	80	10	-	1.2	342	39.53	27.03	331.34	5.05	4000	5000	6000	7000	8000	9000
$WFSC_6$	140	140	20	-	4.0	1939	716.05	499.11	20774.0	3.58	5500	6000	6500	7000	8000	9000

(i) Each f_{cr} *vs.* L curve exhibits two distinct zones, one with a slight downward slope and associated with pure distortional (p_5 practically equal to 100%) buckling in modes with increasing half-wave numbers and the other consisting of a very pronounced descending branch associated with single half-wave global buckling. Its nature is (i_1) F_MT ($p_2 + p_4$) for all the F and PC_M columns and the shorter PC_m and

Table 3: Selected CFS PS columns: cross-section mid-line dimensions and geometrical properties (b_w, b_f, b_s, b_l, t, A, L, I_I, I_{II}, I_w – values in mm, mm^2, 10^4mm^4, 10^6mm^6), β_{FT} values and lengths (in mm).

Column	b_w	b_f	b_s	b_t	t	A	I_I	I_{II}	I_w	β_{FT}	L_1	L_2	L_3	L_4	L_5	L_6
U_1	60	60	-	-	1.5	270	18.90	10.80	69.55	4.13	3500	3750	4000	4500	5000	5500
U_2	80	80	-	-	1.5	360	44.80	25.60	292.86	4.93	6500	6750	7000	7500	7750	8000
U_3	90	90	-	-	2.0	540	85.06	48.61	703.92	4.43	6000	6500	7000	7500	8000	8500
U_4	70	70	-	-	2.0	420	40.03	22.87	200.53	3.84	3500	4000	4500	5000	5500	6000
U_5	100	100	-	-	3.0	900	175.05	100.02	1790.16	3.74	4750	5000	5500	6000	6500	7000
U_6	110	110			3.5	1155	271.82	155.32	3364.62	3.63	5000	5250	5500	6000	6750	7000
C_1	100	80	15	-	2.0	580	107.63	53.27	1214.65	5.95	3000	4000	4500	5000	5500	6000
C_2	60	55	11	-	1.5	288	19.57	12.61	113.84	4.69	3500	4000	4500	5000	5500	6000
C_3	100	80	15	-	3.0	870	161.46	79.92	1823.55	4.64	2500	3000	3500	3750	4000	4250
C_4	120	100	15	-	3.0	1050	284.22	145.18	4452.72	4.88	3500	4500	5000	5500	6000	7000
C_5	140	120	15	-	3.5	1435	532.93	277.88	11105.8	4.70	5000	5500	6000	7000	7500	8000
C_6	80	70	15	-	3.0	750	89.71	53.92	879.02	3.84	2500	3000	3500	4000	4500	5000
H_1	80	70	10	-	3.0	720	92.23	48.41	479.30	3.28	2000	2500	3000	3500	4000	5000
H_2	90	70	10	-	2.0	500	78.89	33.59	422.61	4.87	3000	3500	4000	4500	5000	5500
H_3	100	80	15	-	2.0	580	116.63	53.27	775.20	4.70	3500	4000	5000	6000	7000	8000
H_4	100	85	15	-	3.0	900	182.46	92.33	1360.24	3.61	4000	4500	5000	5500	6000	7000
H_5	95	75	10	-	2.0	530	93.05	40.44	573.86	4.98	3000	3500	4000	4500	5000	6000
H_6	70	60	10	-	1.5	315	31.17	15.95	116.59	4.28	3500	4000	4500	5000	6000	7000
R_1	80	70	10	15	3.0	810	95.54	69.59	1260.23	3.61	4000	5000	6000	7000	7500	8500
R_2	90	80	15	15	4.0	1240	181.90	137.07	3616.02	3.45	3000	4000	5000	6000	7000	8500
R_3	100	80	15	20	5.0	1650	293.75	196.50	6194.58	3.41	2500	3000	3500	4000	5000	5500
R_4	100	85	10	10	4.0	1240	232.50	138.08	3272.66	3.60	3500	4000	4500	5000	5500	6000
R_5	90	70	10	15	2.0	560	82.64	48.35	1031.07	5.52	3500	4000	5000	6000	7000	8000
R_6	70	60	10	10	1.5	345	30.94	20.84	295.56	5.60	3500	4000	5000	6000	7000	8000
RLC_1	80	70	10	15	2.0	540	63.68	39.39	717.00	4.99	3000	4000	5000	6000	7000	8000
RLC_2	90	80	10	15	2.0	600	136.14	84.77	1806.92	5.16	3000	4000	5000	6000	7000	8000
RLC_3	100	80	10	15	3.0	930	171.64	88.11	2184.44	4.61	2500	3000	3500	4000	4500	5000
RLC_4	95	85	10	10	4.0	1220	207.87	127.62	2779.88	3.41	3000	3500	4000	4500	5000	6000
RLC_5	90	70	10	15	2.0	560	82.64	41.15	877.84	5.82	3000	3500	4000	4500	5000	5250
RLC_6	70	60	10	10	1.2	276	24.75	15.04	214.44	6.81	4000	5000	6000	7000	8000	9000
WSC_1	110	90	10	-	2.0	636.56	141.18	66.44	1594.33	5.89	4500	5000	5500	5750	6000	6500
WSC_2	110	100	10	-	3.0	1014.8	229.96	129.58	3105.39	4.14	4500	5000	5500	6000	7000	8000
WSC_3	120	100	15	-	3.0	1074.8	284.31	145.71	4480.35	4.81	3500	4000	4500	5000	6000	7000
WSC_4	120	110	15	-	3.0	1134.8	305.91	183.86	5636.82	4.37	5000	5500	6000	7000	8000	9000
WSC_5	90	80	10	-	2.0	556.56	83.45	46.43	783.72	4.83	3500	4000	4500	5000	6000	7000
WSC_6	100	80	10	-	1.2	345.94	62.92	28.84	585.80	8.05	4500	5000	5500	6000	6500	7000
$WFSC_1$	110	90	10	-	2.0	669.68	145.36	67.12	1486.43	5.47	4000	4500	5000	5500	6000	7000
$WFSC_2$	110	100	10	-	3.0	1064.5	236.22	130.70	2914.24	3.90	4000	5000	6000	7000	8000	8500
$WFSC_3$	120	100	15	-	3.0	1124.5	292.58	146.73	4211.58	4.55	3500	4000	4500	5000	6000	7000
$WFSC_4$	120	110	15	-	4.0	1579.4	418.97	246.65	7109.28	3.52	4000	5000	6000	7000	8000	9000
$WFSC_5$	90	80	10	-	2.0	589.68	85.45	46.90	711.78	4.40	3000	4000	5000	6000	7000	8000
$WFSC_6$	100	80	10	-	1.2	365.81	64.72	29.17	537.22	7.25	4500	5000	6000	7000	8000	9000

PS ones, and (i_2) F_m (p_3), only for the longer PC_m and PS columns[7]. Naturally, the length for which the transition from distortional to global buckling occurs depends on the end support conditions: L_T=280cm (PC_M, PS columns) and L_T=310cm (F, PC_m columns) – the latter/former are fixed/pinned with respect to major-axis flexure.

[7] Minute participations from the anti-symmetric distortional mode (**6**) also appear in the "F_MT" buckling modes of the shorter F and PC_M columns.

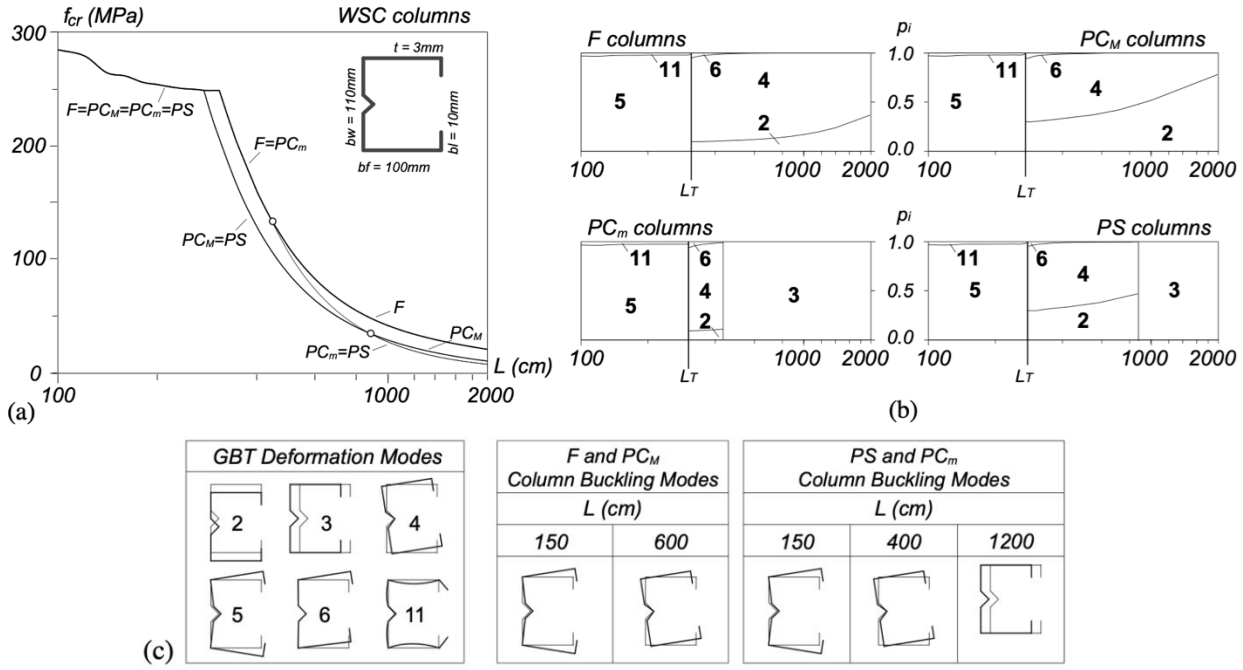


Figure 6: (a) Signature curves and (b) modal participation diagrams of F, PC_M, PC_m, PS WSC (b_w=110, b_f=100, b_l=100, t=3mm) columns, and (c) in-plane shapes of deformation modes **2**-**6** + **11**, and F+PC_M and PS+PC_m column buckled cross-sections.

(ii) The length associated with F_MT buckling goes beyond 2000cm (maximum length considered – F and PC_M columns), 875cm (PS columns) and 430cm (PC_m columns) – note the very short F_MT length range of the PC_m columns, which combine the highest F_MT stiffness with the lowest F_m one.

(iii) For all the column support conditions, the participation of major-axis flexure (p_2) in the F_MT buckling mode grows with the length L. This participation is significantly larger in the PC_M and PS columns (pinned w.r.t. major-axis flexure) than in the F and PC_m ones (fixed w.r.t. major-axis flexure).

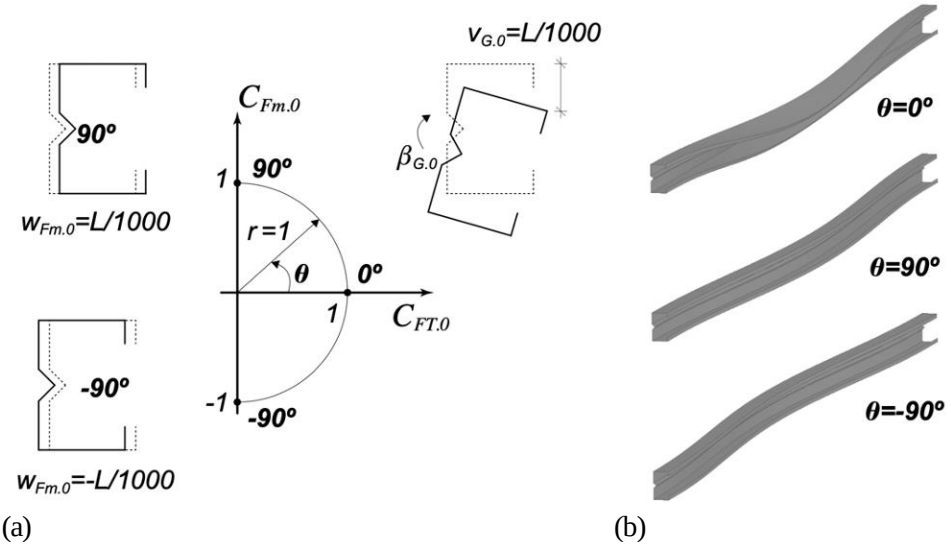
(iv) In PC_M columns with small R_G values (longer than the maximum length considered in Fig. 6(b)), p_2 can reach quite large values (in the sense of close to 1.0 – 100%), which means that major-axis flexure highly dominates the F_MT buckling modes – this dominance may have impact on the column (elastic and elastic-plastic) post-buckling behavior.

(v) In the length range associated with distortional buckling, the four f_{cr} *vs.* L curves coincide – due to the end rigid plates, their distortional support conditions are identical. In addition, the F and PC_m curves coincide up to L=430cm, after which the latter falls below and moves towards the PS curve (they coincide for L≥875cm). Finally, the PC_M and PS curves coincide up to L=875cm, after which the former moves up towards the F one (but does not reach it in the length range considered).

(vi) For L in the vicinity of L_T, the ratios R_G between the critical flexural-torsional ($P_{cr.FT}$) and lowest flexural ($P_{b.fm}$) buckling loads are (vi_1) very far apart for the F (4.74) and PC_M (5.51) columns, (vi_2) not far apart for the PS column (1.38) and (vi_3) close for the PC_m column (1.11). The closeness to 1.0 of the last R_G value, together with the small length range corresponding to F_MT buckling, indicates that will be very difficult (or even impossible) to find a PC_m column with this cross-section that has an R_G value visibly higher than 1.0 – although to a lesser extent, the same assertion applies also to the PS columns.

3. Post-Buckling Behavior and Strength under Global-Global (F_MT-F_m) Interaction

When investigating the post-buckling behavior and strength of structural systems undergoing mode coupling phenomena, a fundamental issue is to identify the most detrimental initial imperfection shape, in the sense that it leads to the lowest strengths. Recently, in the context of CFS fixed-ended columns undergoing F_MT-F_m interaction, it was shown by Dinis *et al.* (2022) and Cerqueira *et al.* (2023) that, depending on the column R_G value, the most detrimental initial geometrical imperfection shape may be either (i) the pure (critical) F_MT buckling mode or the (ii) pure (non-critical) F_m buckling mode – they correspond to θ=0° and θ=±90°, respectively, in Fig. 7[8]. The above potential most detrimental initial geometrical imperfection shapes (θ=0° and θ=±90°), all with amplitude L/1000, are considered to obtain the elastic and elastic-plastic PC_M, PC_m and PS column post-buckling results presented and discussed in Sections 3.1 and 3.2, respectively. It should be noted that these results, as well as the failure load data gathered in Section 4, were obtained by means of ANSYS (SAS 2009) non-linear shell finite element analyses (SFEA), using models previously employed by Dinis *et al.* (2022) and Cerqueira *et al.* (2023) – rounded corner and residual stress effects were disregarded, since they are known to practically cancel each other in CFS members (*e.g.*, Ellobody & Young 2005).



(a) (b)

Figure 7: (a) Initial imperfection representation in the $C_{FT.0}$-$C_{Fm.0}$ plane and (b) initial imperfection shapes for θ=0°, ±90°.

3.1 Elastic Post-Buckling Behavior and Strength

Four trios of lipped channel F, PC_M, PC_m and PS columns are analyzed, whose cross-sections dimensions (b_w×b_f×b_s×t in *mm*) and lengths (L_1-L_2-L_3 in *mm*) read: (i) 80×45×11×2 and 3500-5500-6500 (R_G values 1.62-1.28-1.04), for the F columns, (ii) 150×70×10×5 and 3250-4500-7000 (R_G values 1.51-1.32-1.03), for the PC_M columns, (iii) 100×100×10×2 and 4500-5000-9000 (R_G values 1.34-1.30-1.05), for the PC_m columns, and (iv) 60×55×11×1.2 and 2000-4000-9000 (R_G values 1.43-1.31-1.01), for the PS columns – an attempt was made to have similar R_G values in each column trio[9]. Figures 8(a)-(c) and 9(a)-(c) display, respectively, the equilibrium paths P/P_{cr} *vs.* (γ_0+γ) and P/P_{cr} *vs.* (d_0+d_m)/t of the above 12 columns containing pure θ=0° (F_MT) or θ=±90° (F_m) initial geometrical imperfections with L/1000 amplitude –

[8] These authors also reported that, in all the fixed-ended columns they analyzed, the equilibrium paths associated with θ=90° and θ=–90° initial imperfection always coincide.

[9] This was not achieved in the PC_m columns (and, to a lesser extent, also in the PS ones), due to the difficulty of finding columns with R_G values visibly higher than 1.0 – see the PC_m column modal participation diagram in Fig. 6(b).

γ and d_m stand for the mid-span torsional rotation and minor-axis flexural displacement (γ_0 and d_{m0} are their initial values) and the white dots identify the equilibrium path limit points (*i.e.*, the peak loads). The joint observation of these various column elastic post-buckling equilibrium paths prompts the following remarks:

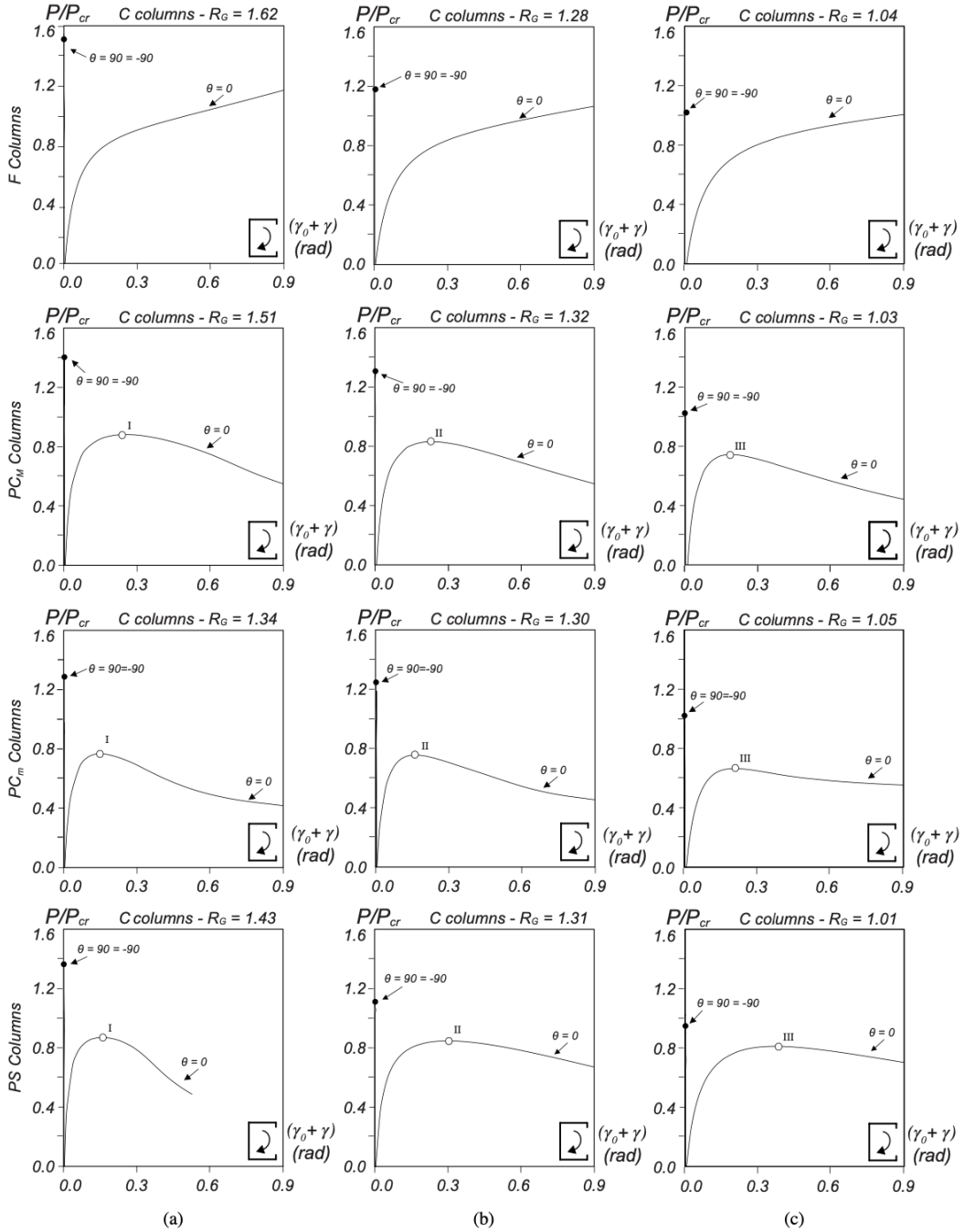


Figure 8: *P*/P_{cr} *vs.* (γ_0+γ) elastic equilibrium paths of F, PC_M, PC_m and PS lipped channel columns with R_G values not far from 1.0 and in descending order: (a) around 1.50, (b) around 1.30 and (c) around 1.0.

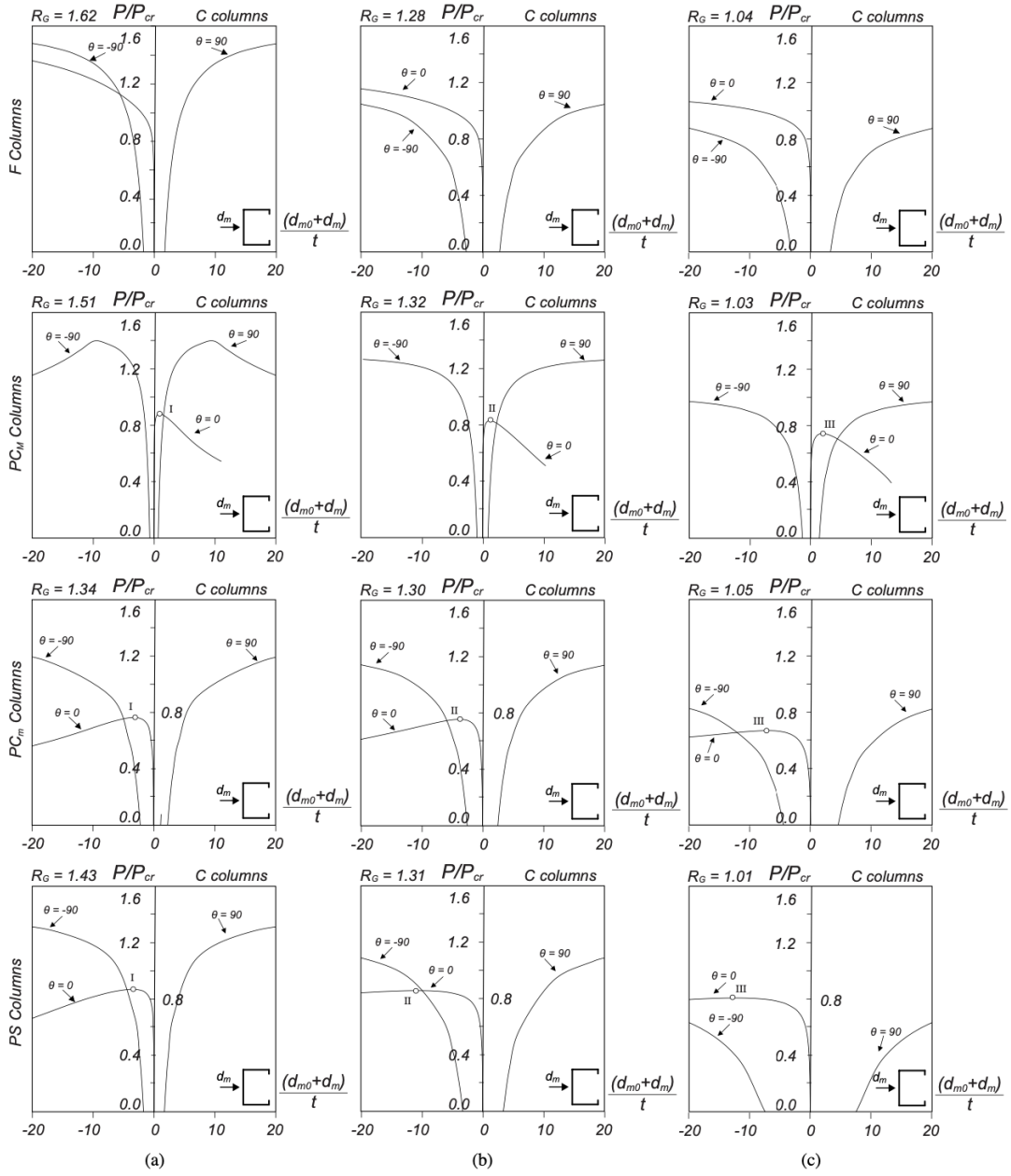


Figure 9: P/P_{cr} *vs.* $(d_{m0}+d_m)/t$ elastic equilibrium paths of F, PC_M, PC_m and PS lipped channel columns with R_G values not far from 1.0 and in descending order: (a) around 1.50, (b) around 1.30 and (c) around 1.0.

(i) Dinis *et al.* (2022) and Cerqueira *et al.* (2023) reported that the equilibrium paths P/P_{cr} *vs.* $(\gamma_0+\gamma)$ and P/P_{cr} *vs.* $(d_{m0}+d_m)/t$ of F columns containing θ=90° and θ=−90° (pure F_m initial geometrical imperfections) are identical (*i.e.*, "mirror images" of each other) and differ clearly from their θ=0° (pure F_MT initial geometrical imperfections) counterparts. It can now be stated that this feature applies also to the three pin-ended (PC_M, PC_m and PS) columns considered in this work. Once again, such θ=±90° equilibrium paths correspond to a "singular" post-buckling behavior, as they exhibit virtually no F_MT deformations (only F_m ones) – recall that, due to the absence of F_MT deformations, no major-

axis load eccentricity occurs and, therefore, the minor-axis flexural displacements stem exclusively from the amplification of the initial geometrical imperfection component.

(ii) Except for the longer F column, the common θ=90° and θ=−90° (F_m) column post-critical strength is always higher than its θ=0° (F_MT) counterpart. Due to this finding, only F_MT initial geometrical imperfections will be considered in the parametric study reported in Section 4, which involves exclusively pin-ended columns.

(iii) Regardless of the R_G value, all F column θ=0° equilibrium paths correspond to stable F_MT post-buckling behaviors and exhibit no limit points (within the γ and d_m ranges considered). Naturally, the post-critical strength decreases with R_G, due to the strength erosion caused by the growth of the minor-axis flexural displacements.

(iv) Conversely, and also regardless of the R_G value, all pin-ended (PC_M, PC_m and PS) column θ=0° equilibrium paths exhibit limit points occurring at moderate γ values and small-to-moderate d_m/t values (very small in the PC_M columns) As R_G decreases, the peak load ratio P_u/P_{cr} drops a bit and the equilibrium path descending branch becomes slightly less pronounced.

(v) Figure 10 displays the mid-height cross-section deformed configurations of the nine θ=0° pin-ended columns analyzed at their (elastic) collapses, *i.e.*, at the equilibrium path limit points previously indicated in Figs. 8(a)-(c) and 9(a)-(c). It is observed that:

(v.1) As it would be logical to expect and regardless of the column pin-ended support conditions (PC_M, PC_m or PS), the amount of minor-axis flexural displacements (d_m) at collapse grows as R_G decreases, thus reflecting increasingly relevant F_MT-F_m interaction effects.

(v.2) The d_m values at collapse vary visibly with the column pin-ended support conditions: smallest in the PC_M columns, largest in the PS columns and in-between in the PC_m columns.

(v.3) While the d_m values are negative (web in tension moving to the left) in the PC_m and PS columns, they are positive in the PC_M columns (web in compression moving to the right) – note that all columns exhibit clockwise torsional rotations and downward major-axis flexural displacements.

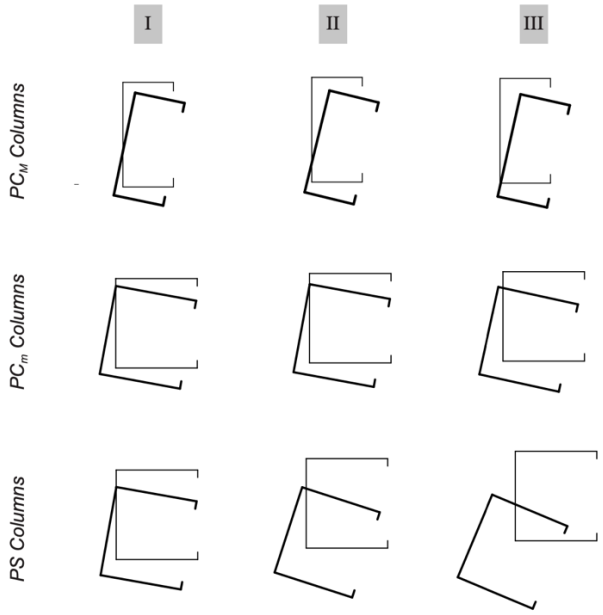


Figure 10: Mid-height cross-section deformed configurations of the nine pin-ended columns analyzed at their limit points, indicated on the θ=0° elastic equilibrium paths P/P_{cr} *vs.* ($\gamma_0+\gamma$) and P/P_{cr} *vs.* ($d_{m0}+d_m$) (see Figs. 8(a)-(c) and 9(a)-(c)).

(v.4) The amounts of major-axis flexural displacements (mostly) and torsional rotations at collapse are visibly larger in the PS columns.

(vi) While F_MT-F_m interaction, associated with the closeness between R_G and 1.0 and reflected in the growing presence of minor-axis flexural displacements, was found to have a quite relevant influence on the behavior of fixed-ended columns, namely by visibly eroding their elastic post-critical strengths (Dinis *et al.* 2022, Cerqueira *et al.* 2023), no similar influence was detected in the pin-ended columns analyzed in this work. Indeed, regardless of the end support conditions (PC_M, PC_m or PS) and the closeness between R_G and 1.0, the emergence of minor-axis flexural displacements occurs virtually at the onset of collapse (PC_M columns) or very close to the occurrence of failure (PC_m and PS columns) – in other words, these displacements are either minute (PC_M columns) or very small (PC_m and PS columns) up to elastic failure.

(vii) The differences in post-buckling strength exhibited by the F, PC_M, PC_m and PS singly symmetric columns buckling in F_MT modes, which are not adequately reflected by the corresponding critical buckling loads, suggest the need to have different DSM-based design approaches for columns with distinct end support conditions.

3.2 Elastic-Plastic Post-Buckling and Strength

In order to provide information on how the CFS pin-ended singly symmetric column failure load data reported in this work were obtained, the elastic-plastic post-buckling behavior and strength of the three trios of lipped channel PC_M, PC_m and PS columns considered in Section 3.1 are now determined. Each of the nine columns is analyzed with both pure F_MT and pure F_m initial geometrical imperfections (amplitude $L/1000$), in order to confirm that, as found in Section 3.1 and in contrast with what happens in F columns (Dinis *et al.* 2022, Cerqueira *et al.* 2023), the lowest failure loads always correspond to the F_MT initial geometrical imperfections. Figures 11, 12 and 13 show, respectively for the PC_M, PC_m and PS column trios, the P/P_{cr} *vs.* $(d_m+d_{m0})/t$ elastic-plastic equilibrium paths concerning columns with pure F_MT or F_m initial imperfections and three yield stresses, selected to ensure $f_y/f_{cr.FT}$ ratios approximately equal to 1.10, 2.20 and 3.30 (the elastic equilibrium paths, already shown in Fig. 9, correspond to $f_y/f_{cr.FT}=\infty$) – the failure loads are identified by the white circles. These figures also include the column deformed configurations and von Mises stresses at collapse of the columns with $f_y/f_{cr.FT}\approx 2.20$ – those of the columns containing F_MT and F_m initial imperfections are identified by letters "**A**" and "**B**", respectively. The observation of these elastic-plastic post-buckling results makes it possible to conclude that:

(i) As expected, and regardless of the pin-ended support conditions (PC_M, PC_m or PS) and R_G value, the elastic-plastic strengths and failure loads obtained with F_MT initial imperfections are always visibly smaller than those determined with F_m initial imperfections. Naturally, the differences grow as the column yield stress and/or R_G value increase.

(ii) The failure modes of the columns with F_MT initial imperfections combine torsion and both major and minor-axis flexure – the participation of the minor-axis flexural displacements increases as R_G becomes closer to 1.0. On the other hand, and as expected, all the columns containing F_m initial imperfections fail in pure minor-axis flexural modes. Naturally, the von Mises stress distributions associated with the above two failure mode types are quite different, as can be seen in Figs. 11 to 13.

(iii) In the columns with the most detrimental (F_MT) initial geometrical imperfections, the failure loads associated with $f_y/f_{cr.FT}\approx 2.20$ and $f_y/f_{cr.FT}\approx 3.30$ are either identical or very close to each other – this stems from the occurrence of the elastic limit points addressed in Section 3.1.

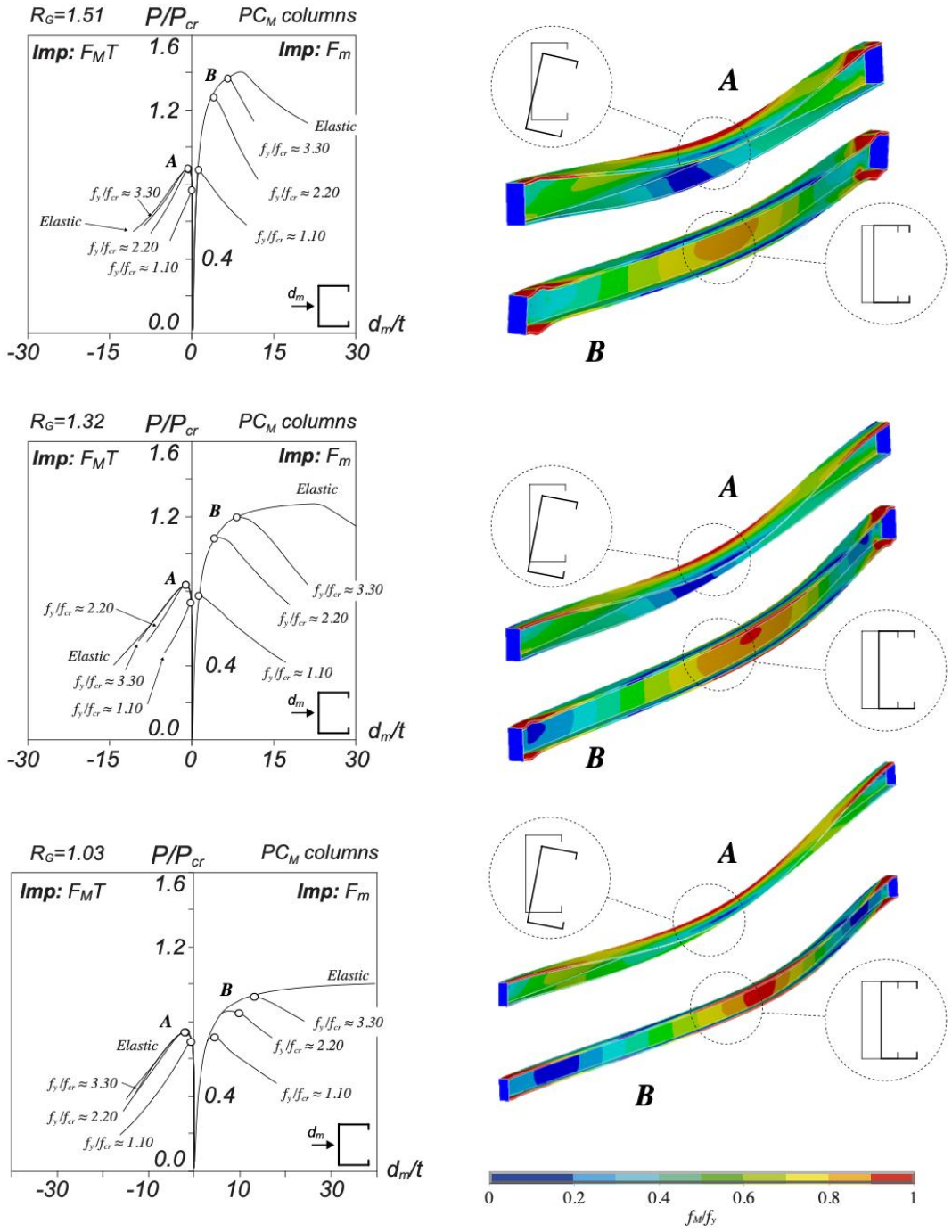


Figure 11: Elastic-plastic P/P_{cr} *vs.* d_m/t equilibrium paths and failure modes plus von Mises stresses at collapse (for $f_y/f_{cr.FT}\approx 2.2$) of PC_M lipped channel columns with F_MT or F_m initial imperfections and having (i) R_G values equal to 1.51, 1.32 and 1.03, and (ii) yield stresses such that $f_y/f_{cr.FT}\approx 1.1\text{-}2.2\text{-}3.3\text{-}\infty$.

4. Failure Load Data for Columns Undergoing Global-Global (F_MT-F_m) Interaction

This section reports the output of the parametric study carried out in this work to gather the failure load data that will be used to assess the merits of the available and developed DSM-based design approaches intended to handle CFS PC_M, PC_m and PS singly symmetric columns undergoing F_MT-F_m interaction. A total of 3780 columns are analyzed, corresponding to all possible combinations of (i) the 252 geometries associated

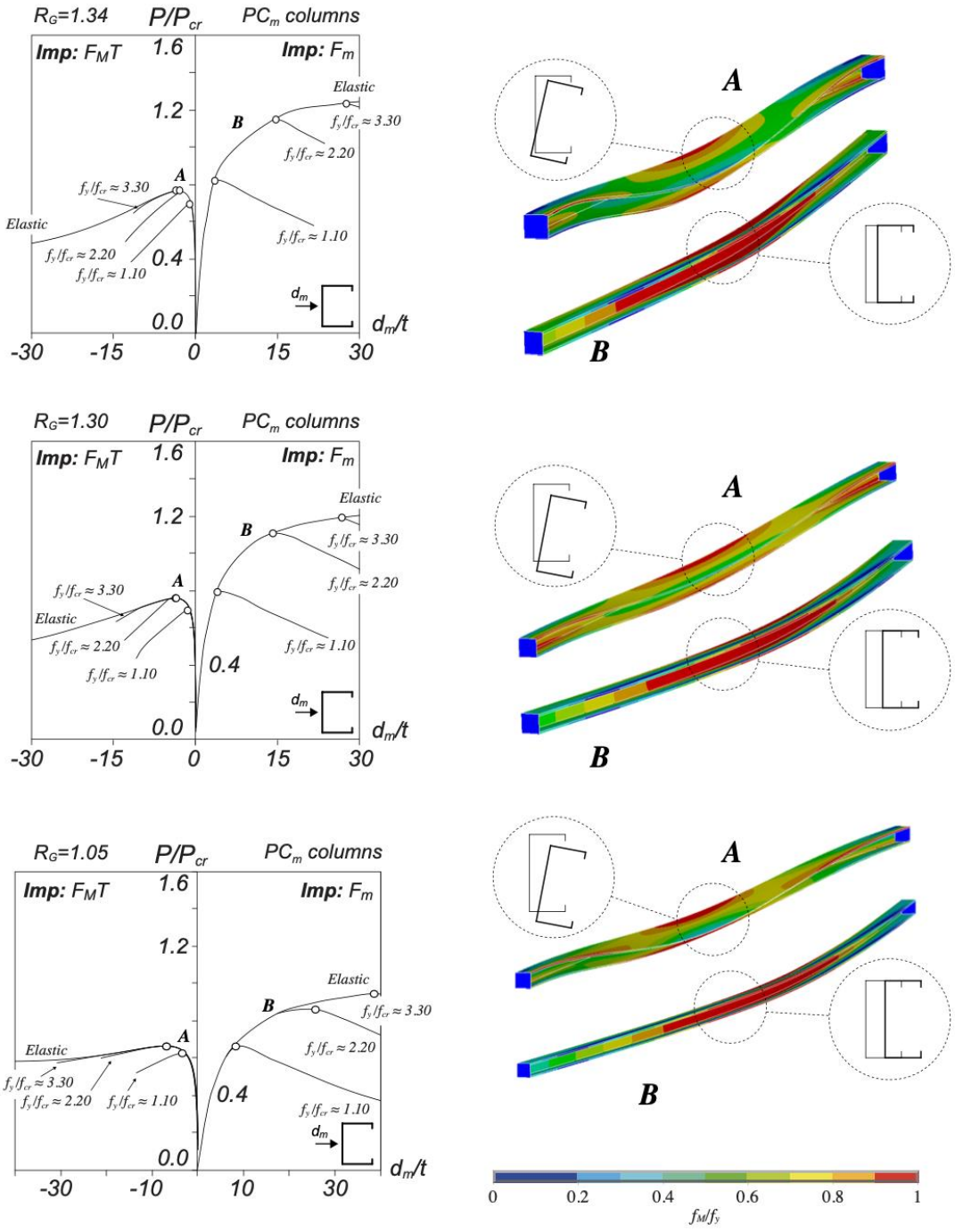


Figure 12: Elastic-plastic P/P_{cr} *vs.* d_m/t equilibrium paths and failure modes plus von Mises stresses at collapse (for $f_y/f_{cr.FT}\approx 2.2$) of PC_m lipped channel columns with F_MT or F_m initial imperfections and having (i) R_G values equal to 1.34, 1.30 and 1.05, and (ii) yield stresses such that $f_y/f_{cr.FT}\approx 1.1\text{-}2.2\text{-}3.3\text{-}\infty$.

with the seven cross-sections shapes considered, given in Tables 1 to 3, respectively for the PC_M, PC_m and PS columns, and (ii) five yield stresses (f_y=150-300-450-600-750MPa), which enable covering wide FT slenderness ranges (0.59-4.89, 0.76-6.32, 0.69-7.50, respectively for PC_M, PC_m and PS columns). Note that there are a few PC_m (13) and PS (49) columns with slenderness values significantly higher than 5.0 not shown in Figs. 14(a)-(c) – nevertheless, their failure loads are included in all the statistical indicators

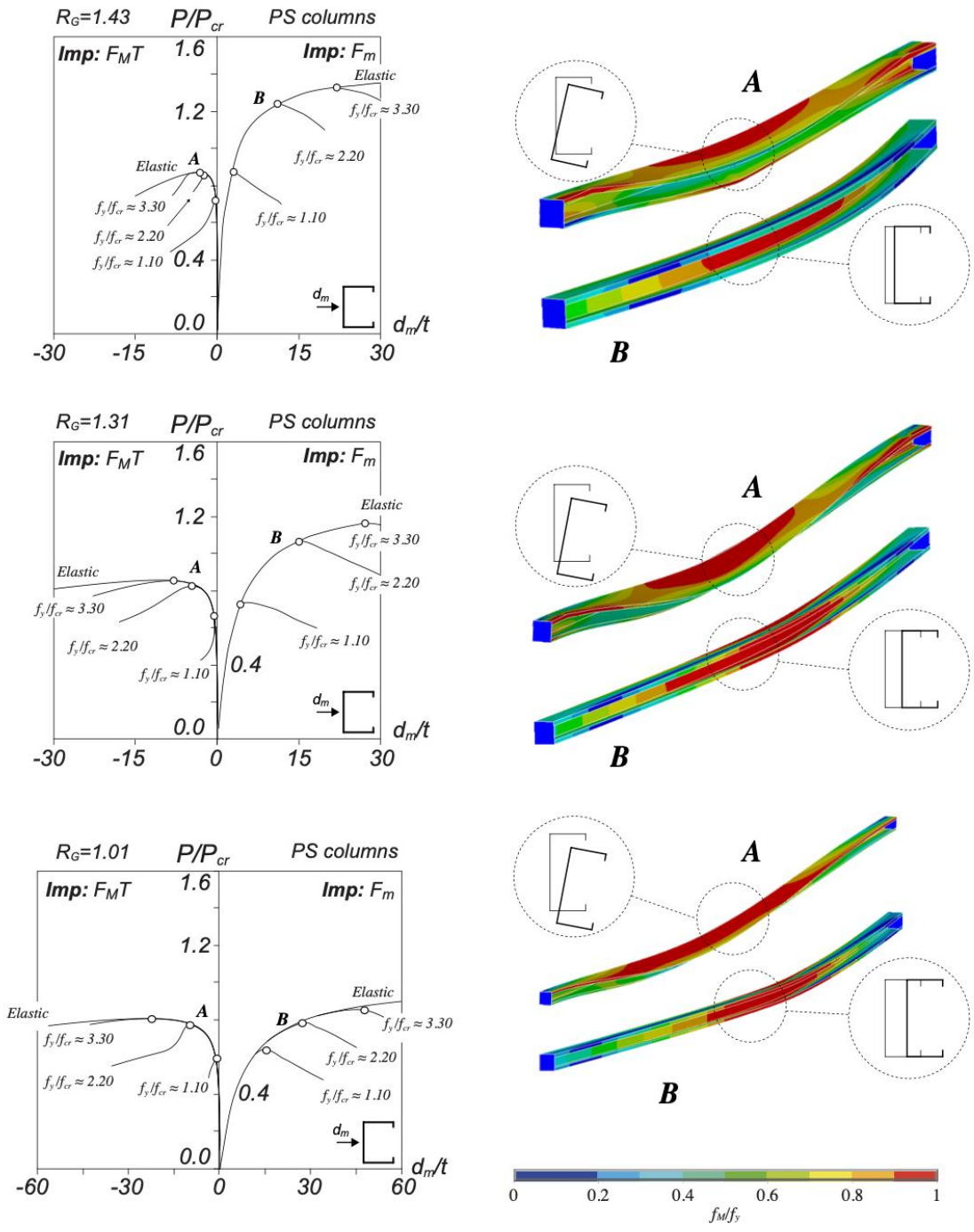


Figure 13: Elastic-plastic P/P_{cr} *vs.* d_m/t equilibrium paths and failure modes plus von Mises stresses at collapse (for $f_y/f_{cr.FT}$≈2.2) of PS lipped channel columns with F_MT or F_m initial imperfections and having (i) R_G values equal to 1.43, 1.31 and 1.01, and (ii) yield stresses such that $f_y/f_{cr.FT}$≈1.1-2.2-3.3-∞.

concerning the failure-to-predicted failure load ratios presented in Section 5. Following the findings of Sections 3.1 and 3.2, every column was analyzed only with F_MT initial geometrical imperfections (L/1000 amplitude) – just for confirmation purposes, some columns with R_G values very close to 1.0 were also analyzed with F_m initial geometrical imperfections and, in all cases, larger failure loads were obtained (recall that, in the fixed-ended columns analyzed by Dinis *et al.* (2022) and Cerqueira *et al.* (2023), several $P_{u.Fm}$

values were smaller than the $P_{u.FT}$ ones). The whole set of failure loads assembled is presented, in tabular form, in Annex A: Tables A1 (PC_M columns), A2 (PC_m columns) and A3 (PS columns). These tables also provide several values related to the DSM-based predictions of the numerical failure loads, which are addressed in Section 5.

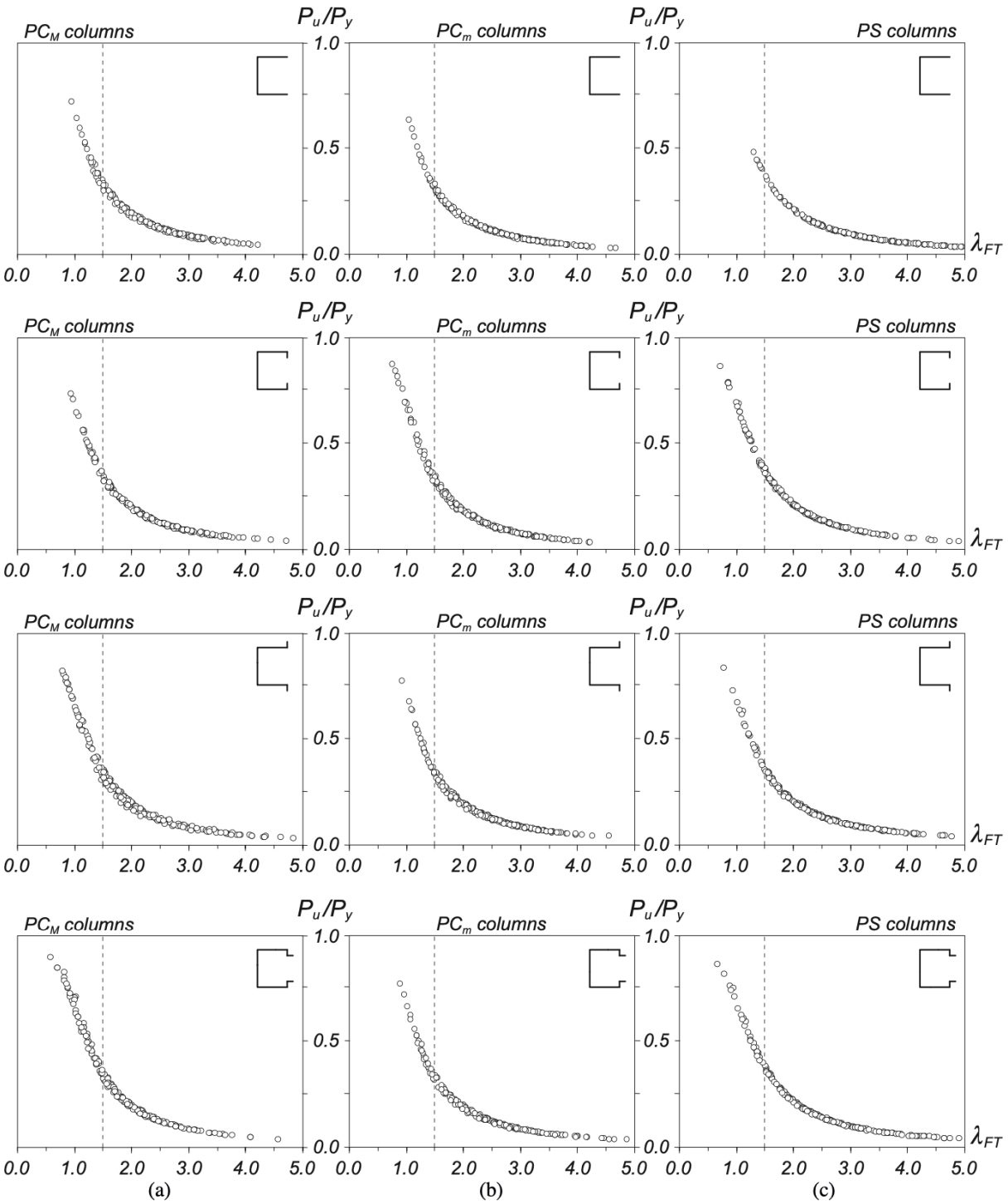


Figure 14 (to be continued)**:** Plots P_u/P_y *vs.* λ_{FT} for the (a) PC_M, (b) PC_m and (c) PS columns analyzed in this work (U, C, H, R, RLC, WSC, WFSC cross-sections).

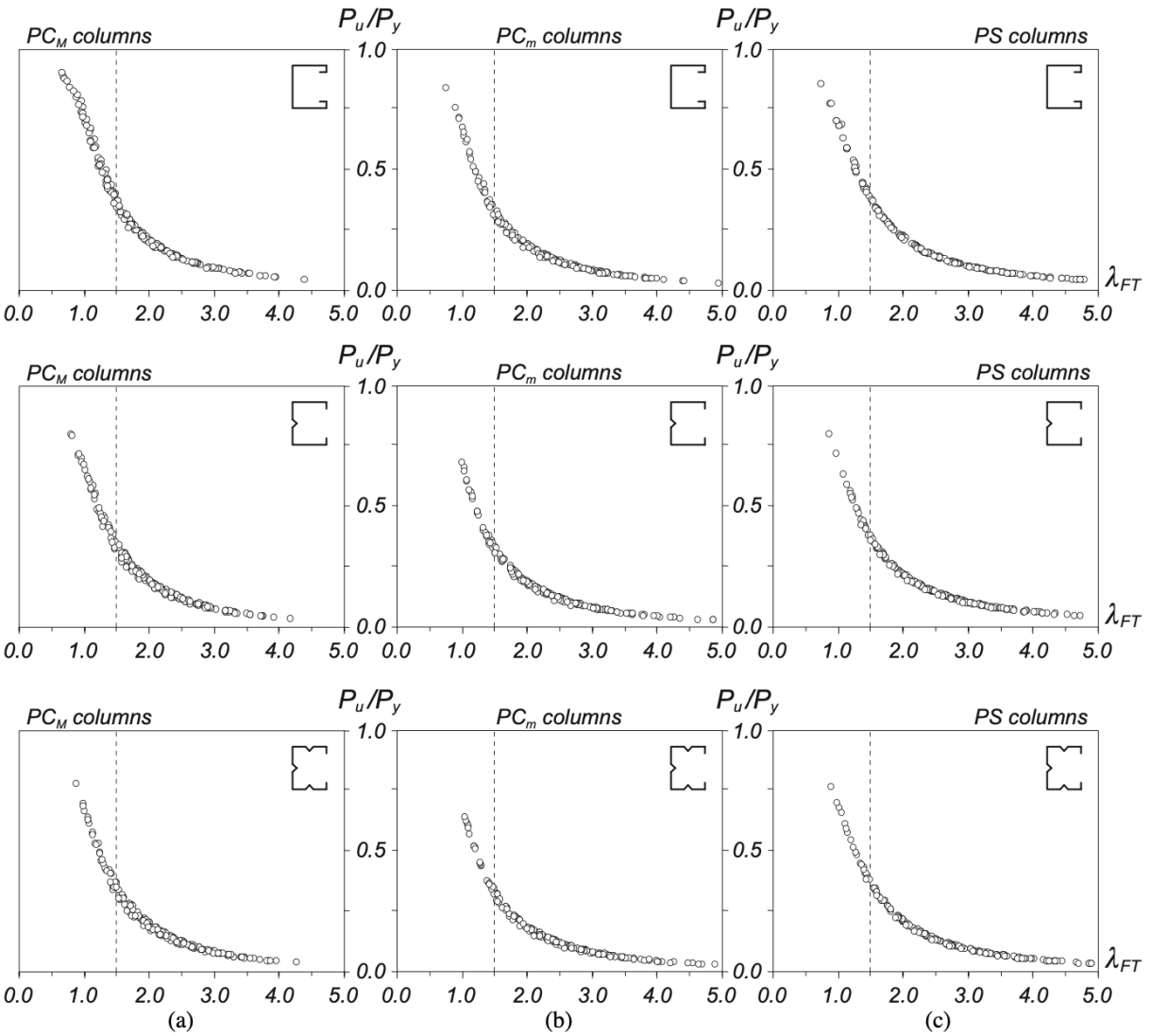


Figure 14 (continuation)**:** Plots P_u/P_y *vs.* λ_{FT} for the (a) PC_M, (b) PC_m and (c) PS columns analyzed in this work (U, C, H, R, RLC, WSC, WFSC cross-sections).

5. DSM Design Considerations

Besides the failure load data obtained in this work, which were presented in Section 4, this section considers also the 800 PC_M, 800 PC_m and 800 PS column numerical failure loads reported by Dinis *et al.* (2019b, 2020). However, because these authors did not consider the possible occurrence of F_MT-F_m interaction[10], no data was provided concerning the closeness between their critical (major-axis flexural-torsional) and non-critical (local, distortional and minor-axis flexural)[11] – in other words, no R_{LD} and R_G values (see Tables 1-3) were given. Therefore, the first task to be carried out in this section is to obtain the R_{LD} and R_G values of all the pin-ended columns analyzed by Dinis *et al.* (2019b, 2020). Table 4 provides a summary of these values for all the seven cross-section shapes (see Fig. 2) and pin-ended support conditions

[10] Although this coupling phenomenon was first mentioned by Dinis *et al.* (2020), the first investigation dealing with F_MT-F_m interaction was only reported about two years later (Dinis *et al.* 2022).

[11] In all but the U columns, R_{LD} corresponds to the lowest distortional buckling load – this is true for both the columns analyzed by Dinis *et al.* (2019b, 2020) and those analyzed in this work.

Table 4: Columns analyzed by Dinis *et al.* (2019b, 2020): numbers and minimum and maximum R_{LD} and R_G values.

C.S. Shape	PC_M					PC_m					PS				
	n	R_{LD}		R_G		n	R_{LD}		R_G		n	R_{LD}		R_G	
		min	max	min	max		min	max	min	max		min	max	min	max
U	80	0.18	0.41	5.38	7.90	80	0.73	1.64	1.09	1.61	80	0.73	1.64	1.34	1.97
C	120	0.18	0.98	5.24	9.25	120	0.71	3.91	1.00	1.40	120	0.87	3.91	1.28	1.67
H	120	0.18	1.00	5.67	10.22	120	0.72	4.00	1.17	2.16	120	0.72	4.00	1.42	2.55
R	120	0.21	0.64	5.22	7.31	120	0.86	2.56	1.05	1.41	120	0.86	2.56	1.30	1.83
RLC	120	0.31	0.89	5.07	6.78	120	1.23	3.58	1.00	1.30	120	1.23	3.58	1.00	1.69
WSC	120	0.21	0.44	5.13	6.74	120	0.86	1.76	1.05	1.38	120	0.86	1.76	1.28	1.69
WFSC	120	0.22	0.41	5.27	6.85	120	0.88	1.65	1.09	1.42	120	0.88	1.65	1.32	1.71
All	800	0.18	1.00	5.07	10.22	800	0.71	4.00	1.00	2.16	800	0.72	4.00	1.00	2.55

considered. Indeed, for each combination of cross-section shape and pin-end support condition, the table provides the number of columns analyzed (n) and the minimum and maximum R_{LD} and R_G values exhibited by them. After observing the values presented in Table 4, it can be concluded that:

(i) As expected, all columns have $R_{LD} \times R_G$ values above 1.0, which means that their critical buckling load is flexural-torsional (as it should be, since these columns were selected to buckle in critical F_MT modes). However, several columns have R_{LD} values below 1.0, which means that the lowest local or distortional buckling load is lower than its minor-axis counterpart (R_{LD}<1.0) and, thus, the occurrence of F_MT-F_m interaction is precluded. Indeed, such columns might be prone to "secondary-global (flexural-torsional) bifurcation L-F_MT or D-F_MT interaction", which have been shown to have very little impact on the column F_MT post-buckling behavior and failure load (*e.g.*, Martins *et al.* 2018a) – therefore, their failure modes are appropriately treated as "pure F_MT"[12].

(ii) Since, in theory, the occurrence of F_MT-F_m interaction requires the combination of (ii_1) R_G values closely above 1.0 and (ii_2) R_{LD} values visibly above 1.0, it can be readily concluded that all the PC_M columns analyzed by Dinis *et al.* (2019b, 2020), which have R_G values above 5.0 (much higher than those exhibited by the columns considered in this work), are certainly not affected by the above coupling phenomenon – *i.e.*, they fail in pure F_MT modes (as was intended when they were selected, without checking about a possible F_MT-F_m interaction)[13]. Moreover, it was found that, in virtually all the PC_M columns analyzed by Dinis *et al.* (2019b, 2020), the F_m buckling load is not the second one (in many cases, not even the third or fourth one) – indeed, due to fact that the end support conditions concerning major- and minor-axis flexure are pinned and fixed, respectively, the second (and often also the third or fourth) buckling loads are F_MT[14].

(iii) Concerning the PC_m and PS columns analyzed by Dinis *et al.* (2019b, 2020), a large number of them exhibit R_G values similar to those considered in this work – although some of them have higher R_G values, they are still much smaller than the PC_M column ones (maximum values of 2.16 and 2.55, respectively for the PC_m and PS columns). This is because, unlike in the F and PC_M columns, it is virtually impossible to select PC_m and PS columns with R_G values much higher than 1.0 (these values tend to be lower in the latter). Thus, these columns are supposedly quite prone to F_MT-F_m interaction

[12] Moreover, no trace of local and/or distortional deformations was detected in the failure modes of these columns.

[13] At this stage, note that the pin-ended column geometry selection carried out by Dinis *et al.* (2019b, 2020) aimed at finding columns buckling in critical F_MT modes with the three support conditions dealt with (PC_M, PC_m and PS). This goal considerably restricted the column geometry selection and, therefore, led to columns that may not cover adequately the whole R_G ranges.

[14] Conversely, in all the PC_M columns analyzed in this work the F_m buckling load is always the second one – a column selection pre-requisite.

– *i.e.*, they fail in modes combining F_MT and F_m deformations. The PC_m and PS column mid-height cross-section deformed configurations at elastic failure, depicted in Fig. 10, confirm this assertion.

Next, the whole available pin-ended column failure load data, combining the failure loads obtained in this work and those reported by Dinis *et al.* (2019b, 2020), are used (i) to assess the merits of the available DSM strength curves in predicting them and, if necessary, also (ii) to develop and calibrate new ones, specifically intended for CFS pin-ended singly symmetric columns. At this stage, it is worth recalling that while (i) practically all the PC_M, PC_m and PS column failure loads obtained in this work have R_G values comprised between 1.0 and 1.50, (ii) those reported by Dinis *et al.* (2019b, 2020) cover quite distinct R_G ranges: 5.07-10.22 *vs.* 1.00-1.50, in the PC_M columns, 1.00-2.16 *vs.* 1.00-1.50, in the PC_m columns, and 1.00-2.55 *vs.* 1.00-1.50, in the PS columns.

5.1 Available DSM-Based Strength Curves

The first step consists of assessing the merits of the existing DSM strength curves, namely (i) the current global design curve (P_{nG} – see Eq. (1)) and (ii) the strength curve set proposed by Cerqueira *et al.* (2023) for fixed-ended singly symmetric columns ($P_{nFT\text{-}Fm}$ – see Eqs. (7)-(8)), in predicting the available CFS pin-ended column failure load data. Figures 15(a)-(b) show, respectively, three plots P_u/P_{nG} *vs.* λ_G and three plots $P_u/P_{nFT\text{-}Fm}$ *vs.* λ_{FT} for the whole sets of PC_M, PC_m and PS column numerical failure loads. In order to distinguish between the columns analyzed in this work and those analyzed by Dinis *et al.* (2019b, 2020), the former are represented by white dots and the latter by gray dots. Recall that similar plots were shown for the fixed-ended (F) columns in Figs. 4(a)-(b). As before, the P_u/P_{nG} or $P_u/P_{nFT\text{-}Fm}$ statistical indicators (averages, standard deviations and maximum/minimum values) are provided next to each plot. The observation of the four pairs of plots shown in Figs. 4(a)-(b) and 13(a)-(b), as well as the comparison between them, prompts the following remarks:

(i) First of all, it is clear that the four pairs of plots exhibit different features, both qualitatively and quantitatively. Indeed, the P_{nG} values (i_1) underestimate virtually all the F column failure loads, (i_2) underestimate virtually all the PC_M column failure loads obtained by Dinis *et al.* (2019b, 2020), while overestimating all the PC_M column failure loads obtained in this work, (i_3) overestimate the vast majority of PC_m column failure loads and (i_4) predict fairly well all the PS column failure loads (even if the P_u/P_{nG} average is slightly below 1.00) – the statistical indicators concerning the P_u/P_{nG} values obtained in this work (0.967-0.035-1.117-0.872) and reported by Dinis *et al.* (2019b, 2020) (0.973-0.030-1.080-0.904) are very similar. Concerning the $P_{nFT\text{-}Fm}$ values, they (i_1) predict quite well the F column failure loads (not surprising, since the strength curves were developed on the basis of these failure loads), but (i_2) overestimate the overwhelming majority of the pin-ended column failure loads (the amount of overestimation, which is not the same for the PC_M, PC_m and PS columns, grows with the column slenderness λ_{FT} in the three cases).

(ii) In view of the content of the previous item, it can be concluded that novel DSM-based design approaches are only needed to predict the failure loads of the pin-ended PC_M and PC_m columns. Indeed, it seems fair to argue that, regardless of the cross-section shape and R_G value, the PS column failure loads are adequately predicted by the current DSM global design curve P_{nG} (this same conclusion was reached by Dinis *et al.* 2020, on the sole basis of the gray P_u/P_{nG} "cloud") – this is not surprising, since this design curve was developed almost exclusively on the basis of experimental and numerical failure loads of columns with these end support conditions. Moreover, this fact also means that the failure load erosion stemming from F_MT-F_m interaction (recall that the PS column failure modes combine F_MT and F_m deformations) is not relevant.

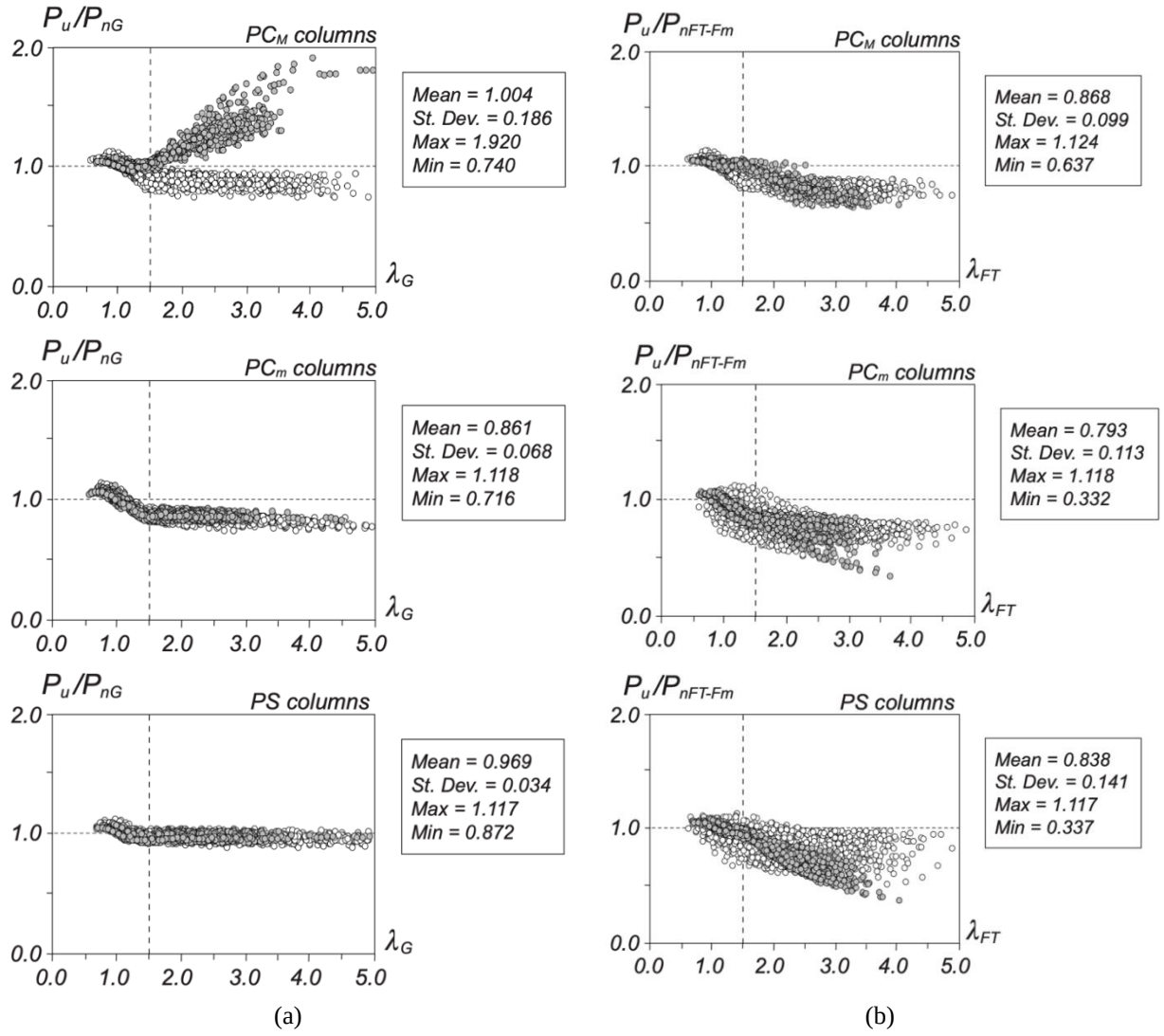


Figure 15: Plots (a) P_u/P_{nG} *vs.* λ_G and (b) P_u/P_{nFT-Fm} *vs.* λ_{FT} for the whole sets of PC_M, PC_m and PS pin-ended singly symmetric columns analyzed in this work (white dots) and by Dinis *et al.* (2019b, 2020) (gray dots).

(iii) While the numerical failure load ratios P_u/P_{nG} concerning the PC_m columns analyzed in this work and by Dinis *et al.* (2019b, 2020) "mingle" quite well (note that the gray and white P_u/P_{nG} "clouds" virtually coincide and exhibit a reasonably small "vertical dispersion"), the same does not happen for those concerning the PC_M columns. Indeed, for $\lambda_G \geq 1.5$, the gray and white P_u/P_{nG} "clouds" are completely separate and both exhibit some degree of "vertical dispersion" (higher for the gray dots) – while the former corresponds to failure load underestimations whose amount grows with λ_G, the latter corresponds to fairly constant failure load overestimations.

(iv) The development of DSM-based design approaches to predict the failure loads of PC_M and PC_m columns buckling in critical F_MT modes will be addressed next, in Sections 5.2 (PC_m columns) and 5.3 (PC_M columns). Since the design approach to handle PC_m column is clearly the most straightforward, it will be addressed first.

5.2 DSM-Based Design Approach for PC_m Columns

The first task consists of assessing whether the DSM strength curve proposed by Dinis *et al.* (2020), in the context of PC_m columns failing in pure F_MT modes, can be extended to adequately predict also the failure loads obtained in this work and presented in Section 4. The fact that these failure loads "mingle" extremely well with those obtained by Dinis *et al.* (2019b, 2020) (see Fig. 15(a)) makes it very likely that the above DSM strength curve can provide efficient (safe, accurate and reliable) estimates for all the available failure loads of CFS PC_m singly symmetric columns, regardless of their cross-section shape and R_G value. This strength curve reads

$$P_{nFT} = \begin{cases} P_y \left(0.658^{\lambda_{FT}^2} \right) & \text{if} \quad \lambda_{FT} \leq 1.0 \\ P_y \left(\dfrac{0.658}{\lambda_{FT}^2} \right) & \text{if} \quad \lambda_{FT} > 1.0 \end{cases} \qquad \text{with} \qquad \lambda_{FT} = \sqrt{\frac{P_y}{P_{cr.FT}}} \qquad , \quad (9)$$

and it should be noted that it merely consists of (i) considering the exponential expression of the current global curve only up to λ_{FT}=1.0 and (ii) lowering the Euler curve to match its end value. The P_u/P_{nFT} *vs.* λ_{FT} plot displayed in Fig. 16, concerning the whole set of 2040 PC_m singly symmetric column failure loads either obtained in this work or reported by Dinis *et al.* (2019b, 2020), clearly shows the high failure load prediction quality achieved, as attested by the P_u/P_{nFT} statistical indicators also given in this figure. Moreover, the statistical indicators concerning the P_u/P_{nFT} values obtained in this work (1.105-0.047-1.221-0.954) and reported by Dinis *et al.* (2019b, 2020) (1.098-0.050-1.200-0.920) are very similar. It is still worth noting that, like for the PS columns, the failure load erosion stemming from F_MT-F_m interaction (recall that the PC_m column failure modes also combine F_MT and F_m deformations) is again not relevant – a single design curve is able to handle adequately all the PC_m columns analyzed.

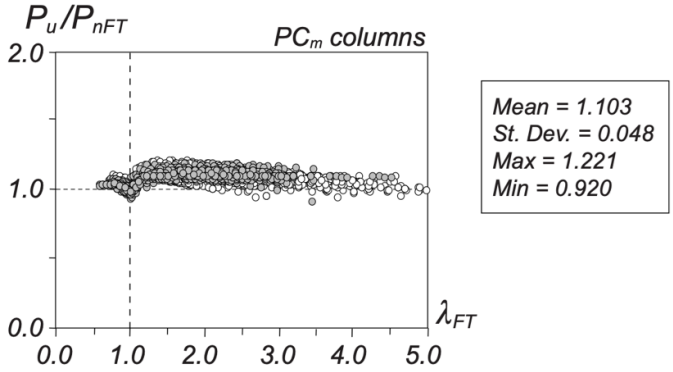


Figure 16: Plot P_u/P_{nFT} *vs.* λ_{FT} for the whole set of available PC_m singly symmetric column failure loads either obtained in this work (white dots) or reported by Dinis *et al.* (2019b, 2020) (gray dots).

5.3 DSM-Based Design Approach for PC_M Columns

Attention is now turned to the DSM-based design of the PC_M singly symmetric columns buckling in (critical) F_MT modes. Unlike in the case of the PC_m columns, it is certain that the DSM-based strength curve set proposed by Dinis *et al.* (2020), in the context of PC_M columns failing in pure F_MT modes, which only differs from Eqs. (3)-(4) (developed for fixed-ended columns) in the fact that parameter *b* is given by

$$b = 0.06\beta_{FT} + 1.25 \leq 2.0 \qquad , \quad (10)$$

is not able to predict adequately the PC_M column failure loads obtained in this work – note that these strength curves coincide with the currently codified one (see Eq. (1)) for high β_{FT} values (*i.e.*, when a=0.877 and b=2). Indeed, the plot P_u/P_{nFT} *vs.* λ_{FT} displayed in Fig. 17, concerning the whole set of 2040 PC_M singly symmetric column failure loads either obtained in this work or reported by Dinis *et al.* (2019b, 2020), clearly shows that:

(i) There is a significant disparity between the failure load prediction quality provided by the P_{nFT} values for the column analyzed in this work and by Dinis *et al.* (2019b, 2020) – this disparity is reflected by the corresponding P_u/P_{nFT} statistical indicators: they read 0.823-0.114-1.124-0.556 and 1.032-0.043-1.220-0.870, respectively. While the latter are quite logical (the design curve set was developed on the basis of these numerical failure loads), the fact that the former are so different is very surprising and a proper mechanics-based explanation needs to be sought.

(ii) As mentioned before, all the PC_M columns analyzed by Dinis *et al.* (2019b, 2020) (ii_1) exhibit very large R_G values (comprised between 5.07 and 10.22 – see Table 4) and, moreover, (ii_2) have several F_MT buckling loads lower than the lowest F_m buckling load (recall that these columns are pinned with respect to major-axis flexure and fixed with respect to minor-axis flexure). Since it was found that their post-buckling behaviors exhibit sizeable post-critical strengths (even if smaller than the fixed-ended column ones). This is why Dinis *et al.* (2020) proposed for the PC_M columns a DSM-design approach similar to that successfully developed for the fixed-ended (F) columns – the only difference was the replacement of the expression providing the β_{FT}-dependent b parameter.

(iii) Conversely, all the PC_M columns analyzed in this work (iii_1) exhibit R_G values fairly close to 1.0 (comprised between 1.00 and 1.50 – see Tables A1 in Annex A) and, moreover, (iii_2) the lowest F_m buckling load is always the second one. These features were found to influence their post-buckling behaviors, which exhibit (iii_1) quite small post-critical strengths (very similar to the PS and PC_m column ones) and (iii_2) limit points associated with small-to-moderate torsional rotations and very small minor-axis flexural displacements. Therefore, it is clear that the DSM-design approach mentioned in the previous item is not adequate to predict these PC_M column failure loads – indeed, by looking at Fig. 15(a), it seems that a single strength curve very close (or even identical) to that proposed for the PC_m columns (see Eq. (9)) would predict adequately the PC_M column failure loads obtained in this work. Of course, this means that, for these PC_M columns and like for all PS and PC_m columns, the failure load erosion due to F_MT-F_m interaction (the failure modes of the PC_M columns analyzed in this work combine F_MT and F_m deformations, even if the latter are very small) is not relevant once more.

In view of the content of the above items, before a DSM-based design approach able to predict adequately the failure loads of arbitrary PC_M singly symmetric columns buckling in F_MT modes can be developed, it

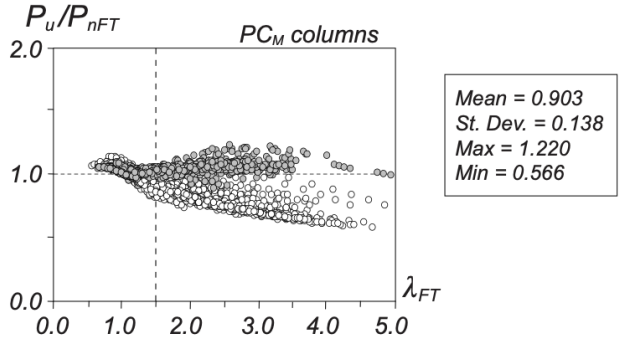


Figure 17: Plot P_u/P_{nFT} *vs.* λ_{FT} for the whole set of available PC_M singly symmetric column failure loads either obtained in this work (white dots) or reported by Dinis *et al.* (2019b, 2020) (gray dots).

is indispensable to perform two tasks, namely (i) to investigate the behavior and gather failure load data concerning PC_M columns with R_G values inside the interval [1.50, 5.07], which have not been considered either in this work or by Dinis *et al.* (2019b, 2020), and (ii) to provide a mechanics-based explanation for the behavioral differences existing between different PC_M columns buckling in F_MT modes, namely those analyzed in this work and by Dinis *et al.* (2019b, 2020). Due to time constraints, the completion of these two tasks cannot be reported in this work – indeed, only the first set of (preliminary) results is presented and discussed here. However, it should be noted that there is an ongoing research effort aimed at completing the above two tasks, thus paving the way for the development of a rational, general and efficient DSM-based design approach for PC_M singly symmetric columns buckling in F_MT modes.

While the PC_M columns analyzed in this work so far, all with R_G values not much higher than 1.0 (and the F_m buckling load is always the second one), exhibit fairly small post-critical strengths and minute minor-axis flexural displacements at (elastic) collapse, those analyzed by Dinis *et al.* (2019b, 2020), all with R_G values above 5.07 (and the lowest F_m buckling load is always a high-order one), exhibit quite sizeable post-critical strengths and considerable minor-axis flexural displacements at (elastic) collapse. In order to shed fresh light on the transition between these two so distinct post-buckling behaviors, it was possible to identify a sequence of six lipped channel columns sharing the same cross-section (80×80×10×4mm) and with lengths 4000-5000-6000-7000-8000-9000mm, corresponding to R_G values 5.00-4.50-4.14-3.85-3.65-3.50 (inside the interval not covered previously). It should be pointed out that the lowest F_m buckling load is either the third (longest column) or the fourth (remaining five columns) one. Figures 18(a)-(b) display the elastic equilibrium paths P/P_{cr} *vs.* $(\gamma_0+\gamma)$ and P/P_{cr} *vs.* $(d_{m0}+d_m)/t$ of the above 6 columns containing pure F_MT initial geometrical imperfections with $L/1000$ amplitude. On the other hand, Fig. 19(a) shows the mid-height cross-section deformed configurations (i) at failure (equilibrium points I to VI indicated on the paths shown in Figs. 18(b))[15] and (ii) at the shortest column equilibrium point with the largest minor-axis flexural displacement "towards the left/web" (indicated by an asterisk) – Fig. 19(b) depicts "zoomed views" of the shortest column mid-height cross-section deformed configurations at equilibrium points * and I. The joint observation of these various column elastic post-buckling results prompts the following remarks:

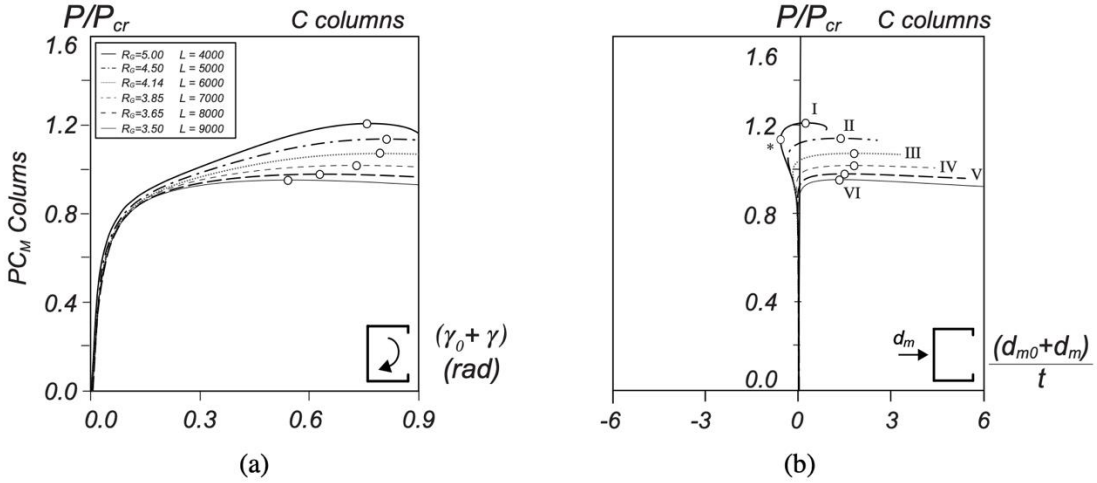


Figure 18: (a) P/P_{cr} *vs.* $(\gamma_0+\gamma)$ and (b) P/P_{cr} *vs.* $(d_0+d_m)/t$ elastic equilibrium paths of PC_M lipped channel columns with R_G values ranging from 5.0 to 3.50.

[15] To improve visibility, the minor-axis flexural displacements are increased 20 times with respect to the torsional rotations and minor-axis flexural displacements.

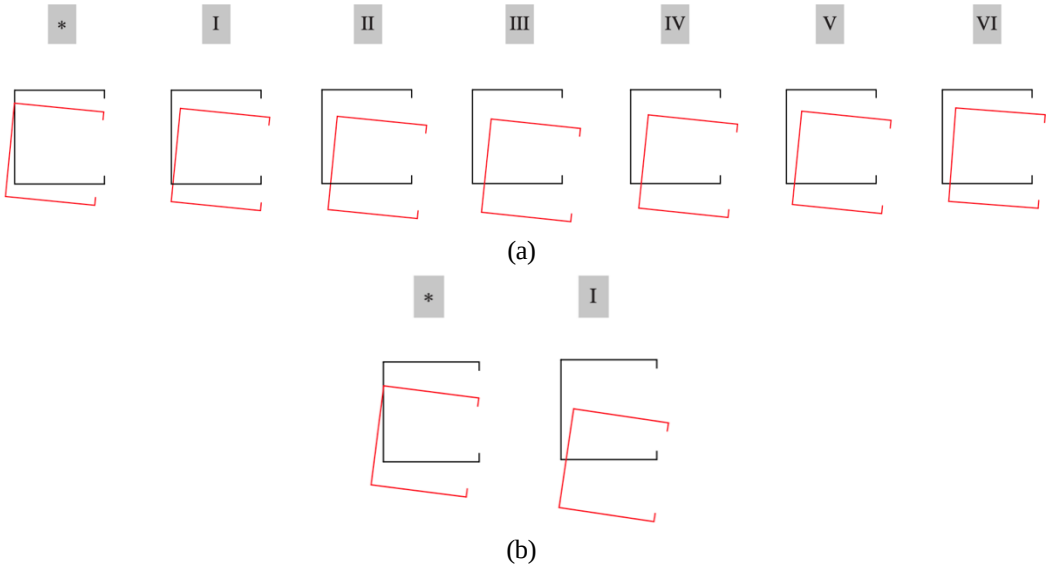


Figure 19: (a) PC_M lipped channel column mid-height cross-section deformed configurations at the equilibrium points indicated on the paths displayed in Fig. 18(b) and (b) zoomed views of those concerning equilibrium points * and I.

(i) In all the columns, minor-axis flexural displacements "towards the left/web" emerge, grow a little bit and then reverse (*i.e.*, become "towards the right/lips") and grow more visibly until and beyond the occurrence of the limit point (elastic failure/peak load). As the column length increases, the amount of minor-axis flexural displacements "towards the left/web" decreases and the reversal is less perceptible – they practically vanish for the three longest columns. Moreover, the d_m values associated with the limit points are always "towards the right/lips", increase for the three shortest columns and then decrease for the remaining three columns. Recall that the limit points of the three PC_M columns whose equilibrium paths are shown in Figs. 9(a)-(c) (R_G values 1.51-1.32-1.03) are associated with minute d_m values "towards the right/lips", which in agreement with the trend observed in Fig. 18(b).

(ii) The observation of Fig. 19(a) shows that both the major- and minor-axis flexural displacements exhibited by the column mid-height cross-section deformed configurations at failure increase up to L=6000mm and gradually decrease for the longer columns.

(iii) No satisfactory mechanics-based explanation has yet been found for the distinct features exhibited by the post-buckling behaviors of PC_M columns with different R_G values. Hopefully, such an explanation will emerge from the in-depth study currently under way, which involves geometrically non-linear analyses based on Generalized Beam Theory (GBT) (Martins *et al.* 2018b) and should be reported in the not too distant future. In any case, the above behavioral differences must certainly be related, to a larger or lesser extent, to a combination of several issues, namely (iii_1) the participation of major-axis flexure (mode **2**) in the column critical F_MT buckling mode, (iii_2) the existence of one or more higher-order F_MT buckling loads smaller than the lowest F_m buckling load or (iii_3) the evolution, along the column post-buckling equilibrium path, of the axial load eccentricity stemming from the cross-section lack of symmetry with respect to the minor-axis (and causing minor-axis flexure).

Next, a necessarily limited (due to time constraints) number of PC_M column geometries corresponding to R_G values inside the interval [1.50, 5.07], not yet covered, are identified. They are given in Table 5, together with the corresponding R_G values, comprised between 1.41 and 5.15, and the F_m buckling load order (m). It is worth noting that only for columns with three cross-section shapes (U_7, C_8 and $WFSC_8$) is the F_m buckling load the second one – not surprisingly, all these columns exhibit R_G values relatively close to 1.0

Table 5: Additional PC_M columns ($1.41 \leq R_G \leq 5.15$): cross-section mid-line dimensions and geometrical properties (b_w, b_f, b_s, b_l, t, A, L, I_I, I_{II}, I_w – values in mm, mm^2, $10^4 mm^4$, $10^6 mm^6$), β_{FT} values, lengths (in mm), R_G values and F_m buckling load order (m).

Column	b_w	b_f	b_s	b_l	t	A	I_I	I_{II}	I_w	β_{FT}	L_1 R_G+m	L_2 R_G+m	L_3 R_G+m	L_4 R_G+m	L_5 R_G+m	L_6 R_G+m
U_7	70	50	-	-	2.5	425	37.78	11.65	100.35	5.27	4000 1.95+2	5000 1.74+2	6000 1.60+2	7000 1.51+2	8000 1.45+2	9000 1.41+2
U_8	80	80	-	-	5.0	1200	146.35	106.27	962.05	2.13	3000 4.17+4	4000 3.59+4	5000 3.21+4	6000 2.97+3	7000 2.81+3	8000 2.70+3
C_7	90	80	15	-	5.0	1400	213.92	128.51	2493.56	3.05	3000 4.50+4	4000 4.05+4	5000 3.69+4	7000 3.21+3	8000 3.06+3	9000 2.94+3
C_8	100	65	10	-	4.0	1000	179.67	58.26	1170.77	5.09	3500 2.43+3	4000 2.30+3	5000 2.06+2	6000 1.89+2	8000 1.67+2	9000 1.60+2
H_7	90	90	10	-	5.0	1450	237.90	155.13	2038.55	2.44	4000 5.15+5	5000 4.53+5	6000 4.08+4	7000 3.76+4	8000 3.52+4	9000 3.35+4
H_8	110	70	20	-	4.0	1160	281.97	88.17	1404.39	4.57	3000 3.65+4	4000 3.13+4	5000 2.71+4	6000 2.38+3	7000 2.13+3	8000 1.94+3
R_7	110	90	15	15	5.0	1750	386.05	238.41	8117.04	3.56	4500 4.37+4	5000 4.24+4	6000 4.00+4	7000 3.79+4	8000 3.60+4	9000 3.45+3
R_8	100	90	15	15	5.0	1700	312.64	230.49	6922.01	3.12	4500 5.04+4	5000 4.89+4	6000 4.61+4	7000 4.36+4	8000 4.16+4	9000 3.99+4
RLC_7	110	90	15	15	5.0	1750	386.05	215.27	7354.76	3.75	4000 4.13+4	5000 3.87+4	6000 3.63+4	7000 3.43+4	8000 3.25+3	9000 3.10+3
RLC_8	100	90	10	10	5.0	1600	303.21	186.21	4392.29	3.10	4000 4.63+4	5000 4.24+4	6000 3.92+4	7000 3.66+4	8000 3.45+4	9000 3.29+3
WSC_7	80	80	10	-	5.0	1341	161.99	111.71	1548.45	2.48	4000 4.30+4	5000 3.90+4	6000 3.63+4	7000 3.44+3	8000 3.30+3	9000 3.20+3
WSC_8	140	100	15	-	5.0	1891	663.57	255.71	10274.05	4.72	5000 3.01+3	5500 2.91+3	6000 2.82+3	7000 2.64+3	8000 2.49+3	9000 2.36+3
$WFSC_7$	100	100	15	-	6.5	2307	425.16	299.10	6312.28	2.34	4000 4.90+4	5000 4.43+4	6000 4.07+4	7000 3.81+4	8000 3.62+4	9000 3.48+3
$WFSC_8$	130	70	15	-	3.0	975	272.95	64.22	2107.78	7.62	4000 2.11+2	5000 1.97+2	6000 1.84+2	7000 1.72+2	8000 1.61+2	9000 1.51+2

(1.95 to 1.41, 2.43 to 1.60 and 2.11 to 1.51, respectively). On the other hand, in all the remaining columns, whose R_G values vary from 5.15 to 1.94, the F_m buckling load is either the third or the fourth one.

The failure loads of the additional 420 PC_M columns were determined following the procedure described in Section 4 – once again, they correspond to all possible combinations of (i) the 84 geometries given in Table 5 with (ii) the five yield stresses f_y=150-300-450-600-750MPa. As before, every column analyzed contained F_MT initial geometrical imperfections with L/1000 amplitude. The whole failure load set gathered is presented in Table A4 of Annex A, together with the values related to their DSM-based predictions.

The plots P_u/P_{nG} *vs.* λ_G shown in Figs. 20(a)-(b) make it possible to compare the P_u/P_{nG} values concerning this last set of PC_M column failures ($1.41 \leq R_G \leq 5.15$ – black dots) with those (i) previously analyzed in this work ($1.00 \leq R_G \leq 1.50$ – white dots) and (ii) analyzed by Dinis *et al.* (2019b, 2020) ($5.07 \leq R_G \leq 10.22$ – gray dots) – note that the last two sets were already shown in Fig. 15(a). It is observed that, as anticipated, the black dots fall right in-between the white and gray ones. Moreover, the vast majority of the corresponding failure loads are underestimated by the P_{nG} values – the exceptions concern the columns with the cross-sections U_7 and $WFSC_8$ (see Table 5), which exhibit the lowest R_G values (they vary from 1.95 to 1.41 and from 2.11 to 1.51, respectively).

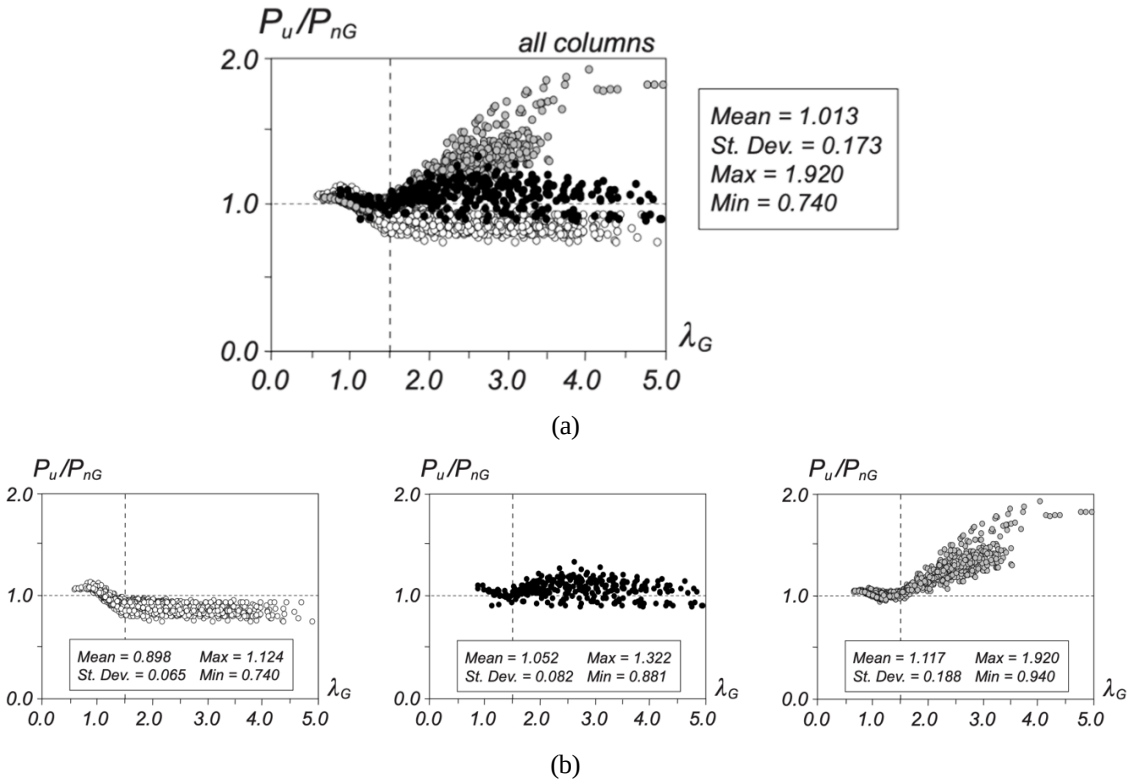


Figure 20: Plots P_u/P_{nG} *vs.* λ_G showing (a) together and (b) individually the whole sets of PC_M singly symmetric columns first analyzed in this work (white dots), last analyzed in this work (black dots) and analyzed by Dinis *et al.* (2019b, 2020) (gray dots).

By merely looking at the plots in Fig. 20(b), it is readily concluded/confirmed (see Fig. 15(a)) that the P_u/P_{nG} values differ considerably for the three sets of PC_M columns analyzed (white, black and gray dots). This fact makes it clear that it is necessary to search for a single DSM-based design approach able to handle jointly all these columns – alternatively, different DSM-based design approaches may also be considered. Even if this task won't be carried out in this work (due to time constraints), some preliminary considerations are reported next. Firstly, it is noted that the P_{nG} values adequately predict the failure loads of the columns with λ_G not higher than 1.5 (R_G>1.5 – gray and all but two black dots) or 1.0 (1.0≤R_G≤1.5 – white dots) – the two black dot exceptions correspond to R_G=1.45-1.41, *i.e.*, could also be white dots. Then, it is recalled that efficient DSM-based design approaches were developed (i) by Dinis *et al.* (2022) and Cerqueira *et al.* (2023), for CFS fixed-ended singly symmetric columns buckling in F_MT modes, and (ii) by Dinis *et al.* (2020), for CFS PC_M singly symmetric columns buckling in F_MT modes and having very large R_G values (R_G≥5.07 – gray dots in Figs. 20(a)-(b)) – while the former depends on the cross-section geometric parameter β_{FT} and buckling load ratio R_G, the latter depends only on β_{FT}. In view of these facts, it was decided to plot the PC_M column P_u/P_{nG} values against R_G (Fig. 21) and β_{FT} (Fig. 22) – for the sake of clarity, the three P_u/P_{nG} value sets are plotted separately and only for columns with λ_G≥1.5 (gray and black dots) or λ_G≥1.0 (white dots). The observation of these two sets of plots prompts the following remarks:

(i) There is a visible dependence of the P_u/P_{nG} values on R_G for the three sets of columns[16] – they increase as R_G grows. This trend is (i_1) quite clear in the columns analyzed in this work (white and black dots), which exhibit a fairly low P_u/P_{nG} value scatter, and (i_2) less clear in those analyzed by Dinis *et al.* (2020) (gray dots), whose P_u/P_{nG} values are much more scattered.

[16] Note that the column length always increases when R_G decreases.

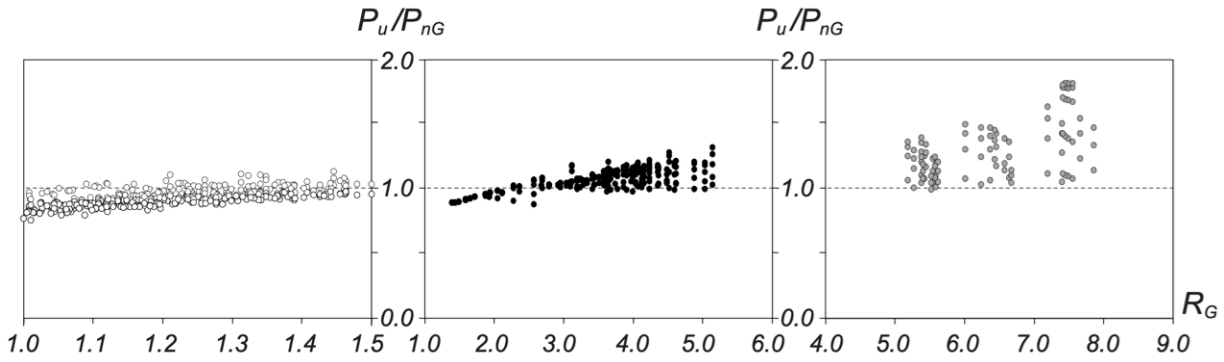


Figure 21: Plots P_u/P_{nG} *vs.* R_G for the three sets of PC_M singly symmetric analyzed in this work (white and black dots) and by Dinis *et al.* (2019b, 2020) (gray dots) – note the different horizontal scales.

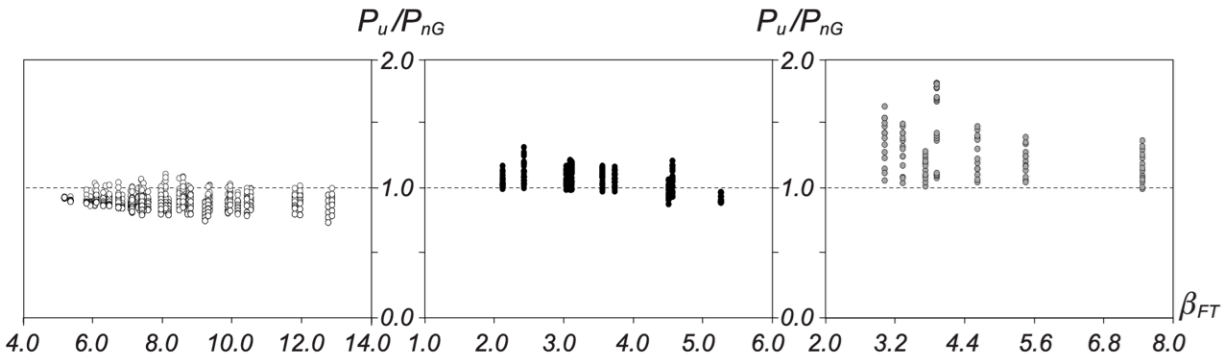


Figure 22: Plots P_u/P_{nG} *vs.* β_{FT} for the three sets of PC_M singly symmetric analyzed in this work (white and black dots) and by Dinis *et al.* (2019b, 2020) (gray dots) – note the different horizontal scales.

(ii) There is also a visible dependence of the P_u/P_{nG} values on β_{FT}, even if not as clear as its R_G counterpart – they tend to decrease as β_{FT} grows. This trend is more clear in the columns analyzed by Dinis *et al.* (2020) (gray dots), which is not all surprising – recall that the β_{FT}-dependent DSM-based design approach developed by these same authors predicts quite well the failure loads of these columns (see the gray dots in Fig. 17, whose statistical indicators read 1.049-0.049-1.216-0.874).

(iii) In view of the two above items, and even if additional column failure load data is needed, it seems fair to argue that the sought DSM-based design approach for CFS PC_M singly symmetric columns buckling in F_MT modes should also depend on the cross-section geometric parameter β_{FT} and buckling load ratio R_G. Due to time constraints, it won't be possible to include in this paper such a DSM-based design approach – it will be reported in the not too distant (hopefully near) future.

6. Summary of the DSM Design Approaches for Pin-Ended Columns

It was concluded that no single DSM-based design approach can predict adequately the failure loads of all the CFS pin-ended singly symmetric columns buckling in F_MT modes and exhibiting the three types of end support conditions considered in this work (PC_M, PC_m and PS columns). For PS columns, it was found that the current DSM global design curve (AISI 2022), which reads

$$P_{nG} = \begin{cases} P_y \left(0.658^{\lambda_G^2} \right) & if \quad \lambda_G \leq 1.5 \\ P_y \left(\dfrac{0.877}{\lambda_G^2} \right) & if \quad \lambda_G > 1.5 \end{cases} \qquad \text{with} \qquad \lambda_G = \sqrt{\frac{P_y}{P_{crG}}} \quad , \quad (11)$$

predicts quite efficiently all the numerical failure loads obtained in this work and reported by Dinis *et al.* (2019b, 2020) – this finding is not particularly surprising, since the vast majority of experimental and numerical column failure loads used to develop this design curve exhibited these end support conditions. However, the same does not hold true for the PC_M and PC_m columns. Concerning the latter, it was found that a high failure load prediction quality was achieved by slightly lowering the above current DSM global design curve – this lowered DSM design curve is given by the expression

$$P_{nFT} = \begin{cases} P_y \left(0.658^{\lambda_{FT}^2} \right) & \text{if} \quad \lambda_{FT} \leq 1.0 \\ P_y \left(\dfrac{0.658}{\lambda_{FT}^2} \right) & \text{if} \quad \lambda_{FT} > 1.0 \end{cases} \qquad \text{with} \qquad \lambda_{FT} = \sqrt{\frac{P_y}{P_{cr.FT}}} \quad , \quad (12)$$

which (i) considers the current exponential only up to λ_{FT}=1.0 and (ii) lowers the Euler curve to match its end value – Fig. 23 makes it possible to compare the two design curves. At this stage, it is worth noting that both the PS and PC_m column failure loads are efficiently estimated by single design curves not depending on either the cross-section geometry or the closeness between the F_MT (critical) and F_m (non-critical) buckling loads. This means that the occurrence of F_MT-F_m interaction (recall the presence of relatively small minor-axis flexural displacements in the PS and PC_m column failure modes – see Figs. 12 and 13) does not entail any visible failure load erosion, even if many R_G values are very close to 1.0.

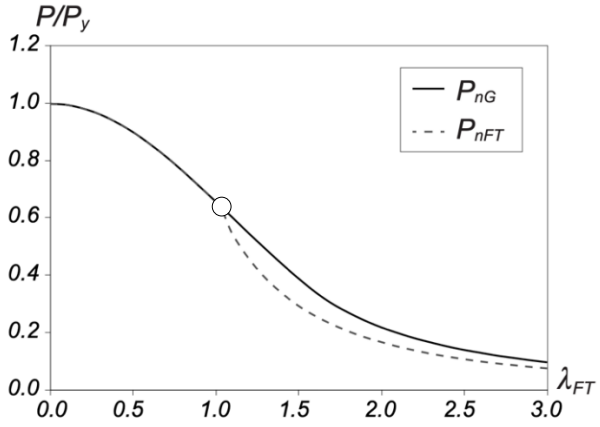


Figure 23: DSM-based design curves proposed to predict the failure loads of singly symmetric for the PS and PC_m columns – the former is the currently codified (AISI 2022) DSM global design curve.

Concerning the PC_M columns, a much more complex situation was encountered – so complex that it was not possible to develop a satisfactory DSM-based design approach for this type of CFS pin-ended singly symmetric columns in this work. Further research is required before such a design approach can be found – the authors are currently working towards achieving this goal. Preliminary studies indicate that, like its fixed-ended column counterpart (see Dinis *et al.* 2022 and Cerqueira *et al.* 2023), this DSM-based design approach should depend on the cross-section geometric parameter β_{FT} and buckling load ratio R_G.

7. Concluding Remarks

This work reported the available numerical results of an ongoing investigation dealing with the post-buckling behavior, strength and DSM design of singly symmetric cold-formed steel columns buckling in major-axis flexural-torsional (F_MT) modes and possibly experiencing interaction with minor-axis flexural (F_m) buckling – F_MT-F_m interaction. Following the recent development (Dinis *et al.* 2022 and Cerqueira *et al.* 2023) of an efficient DSM-based design approach to predict the failure loads of fixed-ended columns, regardless of their failure nature (pure F_MT or F_MT-F_m interactive), this work extended the scope of the above study to columns with three types of pin-ended support conditions, all fixed with respect to torsion and have warping fully prevented, namely columns whose end supports consist of cylindrical (PC) or spherical (PS) hinges – the former may be aligned the major (PC_M) or minor (PC_m) axis. Columns with seven cross-section shapes were considered and their wall dimensions, lengths and yield stresses were selected to ensure covering wide F_MT slenderness ranges and various ratios between the F_m and F_MT buckling loads (R_G values).

Initially, the elastic and elastic-plastic post-buckling behaviors of the selected pin-ended columns, namely those affected by F_MT-F_m interaction, were investigated and it was concluded that, unlike in the fixed-ended columns analyzed by Dinis *et al.* (2022) and Cerqueira *et al.* (2023), F_MT-F_m interaction (defined as the presence of minor-axis displacements in the failure modes of columns buckling in F_MT modes and containing solely F_MT initial geometrical imperfections) does not stem from the closeness between the F_m and F_MT buckling loads – instead, it is caused by the evolution, along the column post-buckling equilibrium path, of the axial load eccentricity due to the cross-section lack of symmetry with respect to the minor-axis. Then, a fairly extensive parametric study was carried out to gather pin-ended column failure load data, the overwhelming majority of which associated with R_G values comprised between 1.0 and 1.5. These failure load data, together with the pin-ended columns failure loads reported by Dinis *et al.* (2020), were subsequently used to assess the merits of (i) the current DSM global design curve (AISI 2022) and (ii) the DSM-based design approach proposed by Cerqueira *et al.* (2023) in predicting them – it was found that the former predicts adequately the PS column failure loads, whereas none of them can handle the PC_M and PC_m columns satisfactorily. Concerning the PC_m columns, it was also found that a single DSM-based strength curve, obtained by slightly lowering the current one for non-stocky columns (λ_{FT}>1.0), is able to predict adequately their failure loads. Therefore, it can be concluded that the PS and PC_M column failure loads, unlike their fixed-ended counterparts, are not visibly affected by either (i) F_MT-F_m interaction or (ii) the cross-section geometry – indeed, they can be adequately predicted by single strength curves that do not depend on either the buckling load ratio R_G or the cross-section geometric parameter β_{FT}.

The DSM-based design of the PC_M columns constitutes a much more challenging problem, due to (i) the wide variety of R_G values they exhibit and (ii) the non-negligible dependence of their post-buckling behavior and strength on both R_G and β_{FT} – together with the time constraints, these behavioral features explain why it was not possible to propose a DSM-based design approach for such columns in this paper (the authors are currently working towards achieving this goal – the fruits of this research effort will be reported as soon as possible). The challenge started with the very different post-buckling behaviors and strengths exhibited by the columns originally analyzed in this work and those analyzed by Dinis *et al.* (2020). Although no satisfactory mechanics-based explanation for this (unexpected) difference was yet found, it was concluded that it is certainly linked to the huge disparity between the R_G values of the two sets of columns – this fact prompted a "last minute" (and, therefore, not very careful) selection of several additional PC_M columns with R_G values filling the above (surprising) gap. After determining the failure loads of these additional columns, failure load data covering the whole R_G spectrum was gathered (even if the authors are fully aware that it is still necessary to obtain further failures loads of carefully selected

columns) and provided preliminary evidence that an efficient (safe, accurate and reliable) DSM-based design approach to predict the failure loads of PC_M singly symmetric columns buckling in F_MT modes must take into account their dependence on both the buckling load ratio R_G and the cross-section geometric parameter β_{FT} – this is the starting point of the search for such a design approach (already under way).

Once an efficient DSM-based design approach for PC_M columns is available, it should be possible to propose and assess the merits and reliability of a general and unified DSM-based approach for the design of CFS singly-symmetric columns buckling in F_MT modes. Moreover, the authors are also aware that experimental validation is indispensable before codification can be considered – in this regard, they plan (i) to revisit the available failure load data concerning CFS singly-symmetric columns buckling in F_MT modes and, if possible, (ii) also conduct an experimental test campaign involving such columns.

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ANNEX A: Data Concerning the CFS Pin-Ended Columns Analyzed in this Work

Table A1.1 (to be continued): PC_M U column (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM failure load predictions and numerical-to-predicted failure load ratios (mm and kN).

Column	*Geometry*			*Buckling*					*SFEA*		*DSM Design*							
	$b_w \times b_f \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
U1_L1	100x60x5	6.09	4000	173.1	221.1	1285.9	1.28	5.82	150	120.2	165.0	0.98	110.7	110.7	110.7	1.09	1.09	1.09
									300	140.5	330.0	1.38	148.6	148.6	148.6	0.95	0.95	0.95
									450	140.5	495.0	1.69	151.8	159.1	169.7	0.93	0.88	0.83
									600	140.5	660.0	1.95	151.8	168.2	193.8	0.93	0.84	0.72
									750	140.5	825.0	2.18	151.8	175.6	214.9	0.93	0.80	0.65
U1_L2	100x60x5	6.09	4500	145.1	174.7	1285.9	1.20	7.36	150	107.1	165.0	1.07	102.5	102.5	102.5	1.04	1.04	1.04
									300	115.7	330.0	1.51	127.3	127.5	128.0	0.91	0.91	0.90
									450	115.7	495.0	1.85	127.3	134.8	154.3	0.91	0.86	0.75
									600	115.7	660.0	2.13	127.3	140.2	176.3	0.91	0.83	0.66
									750	115.7	825.0	2.38	127.3	144.5	195.4	0.91	0.80	0.59
U1_L3	100x60x5	6.09	5000	123.3	141.5	1285.9	1.15	9.09	150	93.5	165.0	1.16	94.2	94.2	94.2	0.99	0.99	0.99
									300	96.9	330.0	1.64	108.1	109.7	117.2	0.90	0.88	0.83
									450	96.9	495.0	2.00	108.1	113.5	141.4	0.90	0.85	0.69
									600	96.9	660.0	2.31	108.1	116.2	161.5	0.90	0.83	0.60
									750	96.9	825.0	2.59	108.1	118.4	179.0	0.90	0.82	0.54
U1_L4	100x60x5	6.09	6000	91.7	98.3	1285.9	1.07	13.09	150	70.7	165.0	1.34	77.7	77.7	77.7	0.91	0.91	0.91
									300	70.8	330.0	1.90	80.4	80.4	100.0	0.88	0.88	0.71
									450	70.8	495.0	2.32	80.4	80.4	120.6	0.88	0.88	0.59
									600	70.8	660.0	2.68	80.4	80.4	137.7	0.88	0.88	0.51
									750	70.8	825.0	3.00	80.4	80.4	152.7	0.88	0.88	0.46
U1_L5	100x60x5	6.09	6500	80.1	83.7	1285.9	1.05	15.36	150	61.5	165.0	1.44	69.6	69.6	69.6	0.88	0.88	0.88
									300	61.5	330.0	2.03	70.2	70.3	92.9	0.88	0.88	0.66
									450	61.5	495.0	2.49	70.2	70.3	112.1	0.88	0.88	0.55
									600	61.5	660.0	2.87	70.2	70.3	128.0	0.88	0.88	0.48
									750	61.5	825.0	3.21	70.2	70.3	142.0	0.88	0.88	0.43
U1_L6	100x60x5	6.09	7000	70.4	72.2	1285.9	1.02	17.81	150	53.9	165.0	1.53	61.8	61.8	63.0	0.87	0.87	0.86
									300	53.9	330.0	2.16	61.8	61.8	86.8	0.87	0.87	0.62
									450	53.9	495.0	2.65	61.8	61.8	104.6	0.87	0.87	0.52
									600	53.9	660.0	3.06	61.8	61.8	119.5	0.87	0.87	0.45
									750	53.9	825.0	3.42	61.8	61.8	132.5	0.87	0.87	0.41
U2_L1	90x50x2.5	8.20	4500	39.8	51.7	224.2	1.30	4.34	150	31.0	71.3	1.34	33.7	33.7	33.7	0.92	0.92	0.92
									300	31.2	142.5	1.89	34.9	37.4	42.1	0.89	0.83	0.74
									450	31.2	213.8	2.32	34.9	39.7	49.4	0.89	0.79	0.63
									600	31.2	285.0	2.67	34.9	41.4	55.5	0.89	0.75	0.56
									750	31.2	356.3	2.99	34.9	42.8	60.6	0.89	0.73	0.51
U2_L2	90x50x2.5	8.20	5000	34.4	41.9	224.2	1.22	5.35	150	26.1	71.3	1.44	29.9	29.9	29.9	0.87	0.87	0.87
									300	26.1	142.5	2.04	30.1	31.8	38.5	0.87	0.82	0.68
									450	26.1	213.8	2.49	30.1	32.9	45.2	0.87	0.79	0.58
									600	26.1	285.0	2.88	30.1	33.7	50.7	0.87	0.78	0.52
									750	26.1	356.3	3.22	30.1	34.3	55.5	0.87	0.76	0.47
U2_L3	90x50x2.5	8.20	5500	30.0	34.6	224.2	1.15	6.48	150	22.3	71.3	1.54	26.3	26.4	26.9	0.85	0.84	0.83
									300	22.3	142.5	2.18	26.3	26.8	35.5	0.85	0.83	0.63
									450	22.3	213.8	2.67	26.3	27.1	41.7	0.85	0.82	0.53
									600	22.3	285.0	3.08	26.3	27.3	46.8	0.85	0.82	0.48
									750	22.3	356.3	3.44	26.3	27.5	51.2	0.85	0.81	0.44
U2_L4	90x50x2.5	8.20	6000	26.5	29.1	224.2	1.10	7.71	150	19.2	71.3	1.64	23.2	23.2	25.0	0.83	0.83	0.77
									300	19.2	142.5	2.32	23.2	23.2	32.9	0.83	0.83	0.58
									450	19.2	213.8	2.84	23.2	23.2	38.7	0.83	0.83	0.50
									600	19.2	285.0	3.28	23.2	23.2	43.4	0.83	0.83	0.44
									750	19.2	356.3	3.67	23.2	23.2	47.4	0.83	0.83	0.40
U2_L5	90x50x2.5	8.20	6500	23.5	24.8	224.2	1.05	9.05	150	16.7	71.3	1.74	20.6	20.7	23.3	0.81	0.81	0.72
									300	16.7	142.5	2.46	20.6	20.7	30.7	0.81	0.81	0.55
									450	16.7	213.8	3.01	20.6	20.7	36.0	0.81	0.81	0.46
									600	16.7	285.0	3.48	20.6	20.7	40.4	0.81	0.81	0.41
									750	16.7	356.3	3.89	20.6	20.7	44.2	0.81	0.81	0.38
U2_L6	90x50x2.5	8.20	7000	21.0	21.4	224.2	1.01	10.49	150	14.7	71.3	1.84	18.5	18.5	21.7	0.80	0.80	0.68
									300	14.7	142.5	2.60	18.5	18.5	28.7	0.80	0.80	0.51
									450	14.7	213.8	3.19	18.5	18.5	33.7	0.80	0.80	0.44
									600	14.7	285.0	3.68	18.5	18.5	37.8	0.80	0.80	0.39
									750	14.7	356.3	4.11	18.5	18.5	41.3	0.80	0.80	0.36

Table A1.1 (continuation): PC_M U column (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM failure load predictions and numerical-to-predicted failure load ratios (mm and kN).

Column	*Geometry*			*Buckling*					*SFEA*		*DSM Design*							
	$b_w \times b_f \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
U3_L1	100x65x5	5.39	6000	94.3	121.7	1462.9	1.29	12.02	150	75.3	172.5	1.35	80.2	80.2	80.2	0.94	0.94	0.94
									300	75.7	345.0	1.91	82.7	92.3	104.6	0.92	0.82	0.72
									450	75.7	517.5	2.34	82.7	101.1	127.3	0.92	0.75	0.59
									600	75.7	690.0	2.71	82.7	107.9	146.3	0.92	0.70	0.52
									750	75.7	862.5	3.03	82.7	113.4	162.9	0.92	0.67	0.46
U3_L2	100x65x5	5.39	6500	82.6	103.7	1462.9	1.26	14.10	150	65.9	172.5	1.45	72.0	72.0	72.0	0.92	0.92	0.92
									300	66.0	345.0	2.04	72.4	81.9	97.7	0.91	0.81	0.68
									450	66.0	517.5	2.50	72.4	88.8	118.9	0.91	0.74	0.56
									600	66.0	690.0	2.89	72.4	94.0	136.6	0.91	0.70	0.48
									750	66.0	862.5	3.23	72.4	98.2	152.2	0.91	0.67	0.43
U3_L3	100x65x5	5.39	7000	72.9	89.4	1462.9	1.23	16.36	150	58.0	172.5	1.54	63.9	64.5	65.5	0.91	0.90	0.89
									300	58.0	345.0	2.18	63.9	72.9	91.6	0.91	0.80	0.63
									450	58.0	517.5	2.66	63.9	78.3	111.5	0.91	0.74	0.52
									600	58.0	690.0	3.08	63.9	82.4	128.1	0.91	0.70	0.45
									750	58.0	862.5	3.44	63.9	85.7	142.7	0.91	0.68	0.41
U3_L4	100x65x5	5.39	7500	64.8	77.9	1462.9	1.20	18.78	150	51.4	172.5	1.63	56.8	58.3	61.7	0.90	0.88	0.83
									300	51.4	345.0	2.31	56.8	65.0	86.2	0.90	0.79	0.60
									450	51.4	517.5	2.83	56.8	69.3	104.8	0.90	0.74	0.49
									600	51.4	690.0	3.26	56.8	72.5	120.5	0.90	0.71	0.43
									750	51.4	862.5	3.65	56.8	75.1	134.2	0.90	0.68	0.38
U3_L5	100x65x5	5.39	8000	57.9	68.5	1462.9	1.18	21.36	150	45.8	172.5	1.73	50.7	52.8	58.2	0.90	0.87	0.79
									300	45.8	345.0	2.44	50.7	58.2	81.3	0.90	0.79	0.56
									450	45.8	517.5	2.99	50.7	61.6	98.9	0.90	0.74	0.46
									600	45.8	690.0	3.45	50.7	64.1	113.6	0.90	0.72	0.40
									750	45.8	862.5	3.86	50.7	66.1	126.6	0.90	0.69	0.36
U3_L6	100x65x5	5.39	8500	52.0	60.7	1462.9	1.17	24.12	150	41.1	172.5	1.82	45.6	47.9	55.0	0.90	0.86	0.75
									300	41.1	345.0	2.58	45.6	52.2	76.9	0.90	0.79	0.53
									450	41.1	517.5	3.16	45.6	54.9	93.6	0.90	0.75	0.44
									600	41.1	690.0	3.64	45.6	56.8	107.5	0.90	0.72	0.38
									750	41.1	862.5	4.07	45.6	58.4	119.8	0.90	0.70	0.34
U4_L1	120x60x3	9.90	4500	87.2	110.7	281.7	1.27	2.54	150	65.1	108.0	1.11	64.3	64.3	64.3	1.01	1.01	1.01
									300	70.0	216.0	1.57	76.5	77.0	79.1	0.92	0.91	0.89
									450	70.0	324.0	1.93	76.5	79.4	91.1	0.92	0.88	0.77
									600	70.0	432.0	2.23	76.5	81.1	100.7	0.92	0.86	0.70
									750	70.0	540.0	2.49	76.5	82.4	108.8	0.92	0.85	0.64
U4_L2	120x60x3	9.90	5000	75.0	89.7	281.7	1.20	3.14	150	56.9	108.0	1.20	59.1	59.1	59.1	0.96	0.96	0.96
									300	58.5	216.0	1.70	65.8	66.1	71.7	0.89	0.88	0.82
									450	58.5	324.0	2.08	65.8	66.5	82.6	0.89	0.88	0.71
									600	58.5	432.0	2.40	65.8	66.8	91.3	0.89	0.88	0.64
									750	58.5	540.0	2.68	65.8	67.0	98.7	0.89	0.87	0.59
U4_L3	120x60x3	9.90	5500	65.7	74.1	281.7	1.13	3.80	150	49.3	108.0	1.28	54.3	54.3	54.3	0.91	0.91	0.91
									300	49.7	216.0	1.81	57.6	57.7	65.8	0.86	0.86	0.76
									450	49.7	324.0	2.22	57.6	57.7	75.8	0.86	0.86	0.66
									600	49.7	432.0	2.56	57.6	57.7	83.8	0.86	0.86	0.59
									750	49.7	540.0	2.87	57.6	57.7	90.5	0.86	0.86	0.55
U4_L4	120x60x3	9.90	6000	58.3	62.3	281.7	1.07	4.52	150	42.8	108.0	1.36	49.8	49.8	49.8	0.86	0.86	0.86
									300	42.8	216.0	1.92	51.2	51.2	60.9	0.84	0.84	0.70
									450	42.8	324.0	2.36	51.2	51.2	70.1	0.84	0.84	0.61
									600	42.8	432.0	2.72	51.2	51.2	77.5	0.84	0.84	0.55
									750	42.8	540.0	3.04	51.2	51.2	83.8	0.84	0.84	0.51
U4_L5	120x60x3	9.90	6250	55.2	57.4	281.7	1.04	4.91	150	39.9	108.0	1.40	47.6	47.6	47.6	0.84	0.84	0.84
									300	39.9	216.0	1.98	48.4	48.4	58.7	0.83	0.83	0.68
									450	39.9	324.0	2.42	48.4	48.4	67.6	0.83	0.83	0.59
									600	39.9	432.0	2.80	48.4	48.4	74.7	0.83	0.83	0.53
									750	39.9	540.0	3.13	48.4	48.4	80.8	0.83	0.83	0.49
U4_L6	120x60x3	9.90	6500	52.3	53.1	281.7	1.01	5.31	150	37.4	108.0	1.44	45.5	45.5	45.5	0.82	0.82	0.82
									300	37.4	216.0	2.03	45.9	45.9	56.7	0.81	0.81	0.66
									450	37.4	324.0	2.49	45.9	45.9	65.3	0.81	0.81	0.57
									600	37.4	432.0	2.87	45.9	45.9	72.2	0.81	0.81	0.52
									750	37.4	540.0	3.21	45.9	45.9	78.0	0.81	0.81	0.48

Table A1.2 (continuation): PC_M C columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
C3_L1	100x55x10x5	5.84	5000	125.6	162.0	1719.2	9186.2	1.29	10.61	150	96.3	172.5	1.17	97.1	97.1	97.1	0.99	0.99	0.99
										300	100.7	345.0	1.66	110.2	115.0	121.1	0.91	0.88	0.83
										450	100.7	517.5	2.03	110.2	125.2	146.5	0.91	0.80	0.69
										600	100.7	690.0	2.34	110.2	133.0	167.7	0.91	0.76	0.60
										750	100.7	862.5	2.62	110.2	139.4	186.2	0.91	0.72	0.54
C3_L2	100x55x10x5	5.84	5500	107.9	133.9	1719.2	9186.2	1.24	12.84	150	84.2	172.5	1.26	88.3	88.3	88.3	0.95	0.95	0.95
										300	85.6	345.0	1.79	94.6	100.6	111.7	0.90	0.85	0.77
										450	85.7	517.5	2.19	94.6	108.0	135.1	0.91	0.79	0.63
										600	85.7	690.0	2.53	94.6	113.5	154.6	0.91	0.75	0.55
										750	85.7	862.5	2.83	94.6	118.0	171.7	0.91	0.73	0.50
C3_L3	100x55x10x5	5.84	6000	93.5	112.5	1719.2	9186.2	1.20	15.28	150	73.4	172.5	1.36	79.7	79.7	79.7	0.92	0.92	0.92
										300	73.8	345.0	1.92	82.0	88.1	103.5	0.90	0.84	0.71
										450	73.8	517.5	2.35	82.0	93.4	125.2	0.90	0.79	0.59
										600	73.8	690.0	2.72	82.0	97.3	143.4	0.90	0.76	0.51
										750	73.8	862.5	3.04	82.0	100.5	159.2	0.90	0.73	0.46
C3_L4	100x55x10x5	5.84	7000	72.0	82.7	1719.2	9186.2	1.15	20.79	150	56.3	172.5	1.55	63.2	63.6	65.1	0.89	0.89	0.87
										300	56.3	345.0	2.19	63.2	67.7	90.1	0.89	0.83	0.63
										450	56.3	517.5	2.68	63.2	70.2	109.0	0.89	0.80	0.52
										600	56.3	690.0	3.10	63.2	72.0	124.8	0.89	0.78	0.45
										750	56.4	862.5	3.46	63.2	73.5	138.6	0.89	0.77	0.41
C3_L5	100x55x10x5	5.84	7500	63.9	72.0	1719.2	9186.2	1.13	23.87	150	49.9	172.5	1.64	56.0	56.7	61.1	0.89	0.88	0.82
										300	49.9	345.0	2.32	56.0	59.4	84.6	0.89	0.84	0.59
										450	49.9	517.5	2.85	56.0	61.0	102.3	0.89	0.82	0.49
										600	49.9	690.0	3.29	56.0	62.2	117.1	0.89	0.80	0.43
										750	49.9	862.5	3.67	56.0	63.1	130.1	0.89	0.79	0.38
C3_L6	100x55x10x5	5.84	8000	57.0	63.3	1719.2	9186.2	1.11	27.16	150	44.4	172.5	1.74	50.0	50.7	57.5	0.89	0.88	0.77
										300	44.4	345.0	2.46	50.0	52.2	79.6	0.89	0.85	0.56
										450	44.4	517.5	3.01	50.0	53.2	96.3	0.89	0.84	0.46
										600	44.4	690.0	3.48	50.0	53.9	110.3	0.89	0.83	0.40
										750	44.4	862.5	3.89	50.0	54.4	122.4	0.89	0.82	0.36
C4_L1	120x60x15x5	6.87	6000	137.7	166.2	1719.2	9186.2	1.21	10.34	150	104.3	202.5	1.21	109.4	109.4	109.4	0.95	0.95	0.95
										300	107.3	405.0	1.71	120.8	124.6	135.9	0.89	0.86	0.79
										450	107.3	607.5	2.10	120.8	130.6	162.4	0.89	0.82	0.66
										600	107.3	810.0	2.43	120.8	135.1	184.2	0.89	0.79	0.58
										750	107.3	1012.5	2.71	120.8	138.6	203.2	0.89	0.77	0.53
C4_L2	120x60x15x5	6.87	6500	121.5	141.6	1719.2	9186.2	1.17	12.14	150	92.6	202.5	1.29	100.8	100.8	100.8	0.92	0.92	0.92
										300	93.6	405.0	1.83	106.6	110.0	126.7	0.88	0.85	0.74
										450	93.6	607.5	2.24	106.6	113.5	151.4	0.88	0.82	0.62
										600	93.6	810.0	2.58	106.6	116.1	171.7	0.88	0.81	0.55
										750	93.6	1012.5	2.89	106.6	118.1	189.4	0.88	0.79	0.49
C4_L3	120x60x15x5	6.87	7000	108.0	122.1	1719.2	9186.2	1.13	14.08	150	82.3	202.5	1.37	92.4	92.4	92.4	0.89	0.89	0.89
										300	82.4	405.0	1.94	94.7	96.7	118.6	0.87	0.85	0.69
										450	82.4	607.5	2.37	94.7	98.3	141.7	0.87	0.84	0.58
										600	82.4	810.0	2.74	94.7	99.4	160.8	0.87	0.83	0.51
										750	82.4	1012.5	3.06	94.7	100.3	177.3	0.87	0.82	0.46
C4_L4	120x60x15x5	6.87	8000	86.9	93.5	1719.2	9186.2	1.08	18.38	150	65.3	202.5	1.53	76.2	76.2	77.4	0.86	0.86	0.84
										300	65.3	405.0	2.16	76.2	76.2	104.9	0.86	0.86	0.62
										450	65.3	607.5	2.64	76.2	76.2	125.4	0.86	0.86	0.52
										600	65.3	810.0	3.05	76.2	76.2	142.2	0.86	0.86	0.46
										750	65.3	1012.5	3.41	76.2	76.2	156.9	0.86	0.86	0.42
C4_L5	120x60x15x5	6.87	8500	78.5	82.8	1719.2	9186.2	1.06	20.75	150	58.7	202.5	1.61	68.8	68.9	73.1	0.85	0.85	0.80
										300	58.7	405.0	2.27	68.8	68.9	99.1	0.85	0.85	0.59
										450	58.7	607.5	2.78	68.8	68.9	118.4	0.85	0.85	0.50
										600	58.7	810.0	3.21	68.8	68.9	134.4	0.85	0.85	0.44
										750	58.7	1012.5	3.59	68.8	68.9	148.2	0.85	0.85	0.40
C4_L6	120x60x15x5	6.87	9000	71.2	73.9	1719.2	9186.2	1.04	23.27	150	53.0	202.5	1.69	62.5	62.5	69.3	0.85	0.85	0.77
										300	53.0	405.0	2.38	62.5	62.5	93.9	0.85	0.85	0.56
										450	53.0	607.5	2.92	62.5	62.5	112.2	0.85	0.85	0.47
										600	53.0	810.0	3.37	62.5	62.5	127.2	0.85	0.85	0.42
										750	53.0	1012.5	3.77	62.5	62.5	140.3	0.85	0.85	0.38

Table A1.2 (continuation): PC_M C columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
C5_L1	130x65x15x5	7.11	6000	161.4	205.8	1775.1	6282.3	1.27	8.62	150	121.7	217.5	1.16	123.8	123.8	123.8	0.98	0.98	0.98
										300	127.2	435.0	1.64	141.6	145.8	153.1	0.90	0.87	0.83
										450	127.3	652.5	2.01	141.6	155.7	182.4	0.90	0.82	0.70
										600	127.3	870.0	2.32	141.6	163.0	206.6	0.90	0.78	0.62
										750	127.3	1087.5	2.60	141.6	169.0	227.4	0.90	0.75	0.56
C5_L2	130x65x15x5	7.11	6500	143.0	175.4	1775.1	6282.3	1.23	10.12	150	108.8	217.5	1.23	115.1	115.1	115.1	0.95	0.95	0.95
										300	111.1	435.0	1.74	125.4	130.3	143.0	0.89	0.85	0.78
										450	111.1	652.5	2.14	125.4	137.0	170.3	0.89	0.81	0.65
										600	111.1	870.0	2.47	125.4	142.0	192.8	0.89	0.78	0.58
										750	111.1	1087.5	2.76	125.4	146.0	212.3	0.89	0.76	0.52
C5_L3	130x65x15x5	7.11	7000	127.7	151.2	1775.1	6282.3	1.18	11.74	150	97.4	217.5	1.31	106.6	106.6	106.6	0.91	0.91	0.91
										300	98.0	435.0	1.85	112.0	116.3	134.0	0.87	0.84	0.73
										450	98.0	652.5	2.26	112.0	120.5	159.7	0.87	0.81	0.61
										600	98.0	870.0	2.61	112.0	123.6	180.8	0.87	0.79	0.54
										750	98.0	1087.5	2.92	112.0	126.1	199.1	0.87	0.78	0.49
C5_L4	130x65x15x5	7.11	8000	103.6	115.8	1775.1	6282.3	1.12	15.33	150	77.9	217.5	1.45	90.3	90.3	90.3	0.86	0.86	0.86
										300	77.9	435.0	2.05	90.9	91.8	119.0	0.86	0.85	0.65
										450	77.9	652.5	2.51	90.9	92.4	141.8	0.86	0.84	0.55
										600	77.9	870.0	2.90	90.9	92.8	160.5	0.86	0.84	0.49
										750	77.9	1087.5	3.24	90.9	93.1	176.8	0.86	0.84	0.44
C5_L5	130x65x15x5	7.11	8500	94.0	102.6	1775.1	6282.3	1.09	17.31	150	70.1	217.5	1.52	82.5	82.5	83.5	0.85	0.85	0.84
										300	70.1	435.0	2.15	82.5	82.5	112.6	0.85	0.85	0.62
										450	70.1	652.5	2.63	82.5	82.5	134.2	0.85	0.85	0.52
										600	70.1	870.0	3.04	82.5	82.5	151.9	0.85	0.85	0.46
										750	70.1	1087.5	3.40	82.5	82.5	167.3	0.85	0.85	0.42
C5_L6	130x65x15x5	7.11	9000	85.7	91.5	1775.1	6282.3	1.07	19.40	150	63.4	217.5	1.59	75.1	75.2	79.2	0.84	0.84	0.80
										300	63.5	435.0	2.25	75.1	75.2	106.8	0.84	0.84	0.59
										450	63.5	652.5	2.76	75.1	75.2	127.2	0.84	0.84	0.50
										600	63.5	870.0	3.19	75.1	75.2	144.1	0.84	0.84	0.44
										750	63.5	1087.5	3.56	75.1	75.2	158.6	0.84	0.84	0.40
C6_L1	80x45x10x5	5.20	5000	75.9	93.6	2159.1	17184.4	1.23	23.06	150	61.1	142.5	1.37	64.9	64.9	64.9	0.94	0.94	0.94
										300	61.9	285.0	1.94	66.5	73.3	85.5	0.93	0.84	0.72
										450	61.9	427.5	2.37	66.5	79.1	104.3	0.93	0.78	0.59
										600	61.9	570.0	2.74	66.5	83.4	120.0	0.93	0.74	0.52
										750	61.9	712.5	3.06	66.5	87.0	133.9	0.93	0.71	0.46
C6_L2	80x45x10x5	5.20	5500	64.1	77.4	2159.1	17184.4	1.21	27.91	150	52.1	142.5	1.49	56.2	56.2	56.2	0.93	0.93	0.93
										300	52.3	285.0	2.11	56.2	63.0	78.5	0.93	0.83	0.67
										450	52.3	427.5	2.58	56.2	67.4	95.7	0.93	0.78	0.55
										600	52.3	570.0	2.98	56.2	70.7	110.1	0.93	0.74	0.47
										750	52.3	712.5	3.33	56.2	73.3	122.8	0.93	0.71	0.43
C6_L3	80x45x10x5	5.20	6000	54.8	65.0	2159.1	17184.4	1.19	33.21	150	44.7	142.5	1.61	48.1	49.1	51.6	0.93	0.91	0.87
										300	44.7	285.0	2.28	48.1	54.4	72.4	0.93	0.82	0.62
										450	44.7	427.5	2.79	48.1	57.8	88.3	0.93	0.77	0.51
										600	44.7	570.0	3.23	48.1	60.3	101.7	0.93	0.74	0.44
										750	44.7	712.5	3.61	48.1	62.4	113.4	0.93	0.72	0.39
C6_L4	80x45x10x5	5.20	7000	41.3	47.8	2159.1	17184.4	1.16	45.20	150	33.7	142.5	1.86	36.2	38.1	44.7	0.93	0.89	0.76
										300	33.8	285.0	2.63	36.2	41.4	62.7	0.93	0.81	0.54
										450	33.8	427.5	3.22	36.2	43.5	76.4	0.93	0.78	0.44
										600	33.8	570.0	3.72	36.2	45.0	88.0	0.93	0.75	0.38
										750	33.8	712.5	4.15	36.2	46.2	98.1	0.93	0.73	0.34
C6_L5	80x45x10x5	5.20	7500	36.3	41.6	2159.1	17184.4	1.15	51.89	150	29.7	142.5	1.98	31.8	33.8	41.8	0.93	0.88	0.71
										300	29.7	285.0	2.80	31.8	36.4	58.7	0.93	0.82	0.51
										450	29.7	427.5	3.43	31.8	38.1	71.6	0.93	0.78	0.42
										600	29.7	570.0	3.96	31.8	39.3	82.4	0.93	0.76	0.36
										750	29.7	712.5	4.43	31.8	40.2	91.9	0.93	0.74	0.32
C6_L6	80x45x10x5	5.20	8000	32.2	36.6	2159.1	17184.4	1.14	59.04	150	26.4	142.5	2.10	28.2	30.1	39.3	0.93	0.87	0.67
										300	26.4	285.0	2.98	28.2	32.2	55.2	0.93	0.82	0.48
										450	26.4	427.5	3.65	28.2	33.5	67.3	0.93	0.79	0.39
										600	26.4	570.0	4.21	28.2	34.5	77.4	0.93	0.76	0.34
										750	26.4	712.5	4.71	28.2	35.2	86.4	0.93	0.75	0.31
							Max	1.294	59.040							Mean	0.903	0.845	0.636
							Min	1.037	8.624							Sd.Dv.	0.037	0.064	0.185
																Max	1.065	1.065	1.065
																Min	0.845	0.711	0.305

Table A1.3 (to be continued): PC_M H columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
H1_L1	100x40x10x3	9.96	2500	130.0	183.0	632.3	760.2	1.41	3.46	150	72.6	90.0	0.83	67.4	67.4	67.4	1.08	1.08	1.08
										300	104.8	180.0	1.18	100.8	100.8	100.8	1.04	1.04	1.04
										450	110.8	270.0	1.44	113.2	113.2	113.2	0.98	0.98	0.98
										600	110.9	360.0	1.66	114.0	119.1	122.6	0.97	0.93	0.90
										750	110.9	450.0	1.86	114.0	124.7	132.4	0.97	0.89	0.84
H1_L2	100x40x10x3	9.96	2750	113.9	151.2	632.3	760.2	1.33	4.18	150	69.8	90.0	0.89	64.7	64.7	64.7	1.08	1.08	1.08
										300	92.7	180.0	1.26	92.9	92.9	92.9	1.00	1.00	1.00
										450	94.7	270.0	1.54	99.9	100.6	101.8	0.95	0.94	0.93
										600	94.7	360.0	1.78	99.9	104.1	112.5	0.95	0.91	0.84
										750	94.7	450.0	1.99	99.9	106.8	121.5	0.95	0.89	0.78
H1_L3	100x40x10x3	9.96	3000	101.5	127.1	632.3	760.2	1.25	4.98	150	66.4	90.0	0.94	62.1	62.1	62.1	1.07	1.07	1.07
										300	82.0	180.0	1.33	85.7	85.7	85.7	0.96	0.96	0.96
										450	82.2	270.0	1.63	89.0	89.9	94.4	0.92	0.91	0.87
										600	82.2	360.0	1.88	89.0	91.4	104.2	0.92	0.90	0.79
										750	82.2	450.0	2.11	89.0	92.6	112.6	0.92	0.89	0.73
H1_L4	100x40x10x3	9.96	3250	91.5	108.3	632.3	760.2	1.18	5.84	150	62.6	90.0	0.99	59.6	59.6	59.6	1.05	1.05	1.05
										300	72.2	180.0	1.40	79.0	79.0	79.0	0.91	0.91	0.91
										450	72.2	270.0	1.72	80.3	80.4	88.2	0.90	0.90	0.82
										600	72.2	360.0	1.98	80.3	80.4	97.5	0.90	0.90	0.74
										750	72.2	450.0	2.22	80.3	80.4	105.3	0.90	0.90	0.69
H1_L5	100x40x10x3	9.96	3500	83.4	93.3	632.3	760.2	1.12	6.77	150	58.6	90.0	1.04	57.3	57.3	57.3	1.02	1.02	1.02
										300	64.1	180.0	1.47	73.0	73.0	73.0	0.88	0.88	0.88
										450	64.1	270.0	1.80	73.2	73.2	83.0	0.88	0.88	0.77
										600	64.1	360.0	2.08	73.2	73.2	91.7	0.88	0.88	0.70
										750	64.1	450.0	2.32	73.2	73.2	99.1	0.88	0.88	0.65
H1_L6	100x40x10x3	9.96	4000	70.9	71.5	632.3	760.2	1.01	8.85	150	50.4	90.0	1.13	52.9	52.9	52.9	0.95	0.95	0.95
										300	51.6	180.0	1.59	62.2	62.2	64.9	0.83	0.83	0.80
										450	51.6	270.0	1.95	62.2	62.2	74.7	0.83	0.83	0.69
										600	51.6	360.0	2.25	62.2	62.2	82.5	0.83	0.83	0.63
										750	51.6	450.0	2.52	62.2	62.2	89.1	0.83	0.83	0.58
H2_L1	110x50x10x3	8.74	4000	85.3	124.7	550.2	1083.1	1.46	4.41	150	63.7	103.5	1.10	62.3	62.3	62.3	1.02	1.02	1.02
										300	70.6	207.0	1.56	74.8	76.8	77.0	0.94	0.92	0.92
										450	70.6	310.5	1.91	74.8	87.9	90.0	0.94	0.80	0.78
										600	70.6	414.0	2.20	74.8	96.8	100.4	0.94	0.73	0.70
										750	70.6	517.5	2.46	74.8	104.3	109.4	0.94	0.68	0.65
H2_L2	110x50x10x3	8.74	4500	72.8	98.5	550.2	1083.1	1.35	5.59	150	55.9	103.5	1.19	57.1	57.1	57.1	0.98	0.98	0.98
										300	58.2	207.0	1.69	63.8	66.6	69.9	0.91	0.87	0.83
										450	58.2	310.5	2.07	63.8	71.6	81.6	0.91	0.81	0.71
										600	58.2	414.0	2.38	63.8	75.4	91.1	0.91	0.77	0.64
										750	58.2	517.5	2.67	63.8	78.5	99.2	0.91	0.74	0.59
H2_L3	110x50x10x3	8.74	5000	63.5	79.8	550.2	1083.1	1.26	6.90	150	48.6	103.5	1.28	52.3	52.3	52.3	0.93	0.93	0.93
										300	49.0	207.0	1.81	55.7	57.8	64.2	0.88	0.85	0.76
										450	49.0	310.5	2.21	55.7	60.1	75.0	0.88	0.82	0.65
										600	49.0	414.0	2.55	55.7	61.9	83.7	0.88	0.79	0.59
										750	49.0	517.5	2.86	55.7	63.2	91.2	0.88	0.78	0.54
H2_L4	110x50x10x3	8.74	5500	56.2	65.9	550.2	1083.1	1.17	8.34	150	42.0	103.5	1.36	47.8	47.8	47.8	0.88	0.88	0.88
										300	42.0	207.0	1.92	49.2	50.0	59.5	0.85	0.84	0.71
										450	42.0	310.5	2.35	49.2	50.7	69.5	0.85	0.83	0.60
										600	42.0	414.0	2.72	49.2	51.1	77.6	0.85	0.82	0.54
										750	42.0	517.5	3.04	49.2	51.5	84.5	0.85	0.82	0.50
H2_L5	110x50x10x3	8.74	6000	50.2	55.4	550.2	1083.1	1.10	9.93	150	36.4	103.5	1.44	43.7	43.7	43.7	0.83	0.83	0.83
										300	36.4	207.0	2.03	44.0	44.1	55.6	0.83	0.83	0.66
										450	36.4	310.5	2.49	44.0	44.1	64.9	0.83	0.83	0.56
										600	36.4	414.0	2.87	44.0	44.1	72.4	0.83	0.83	0.50
										750	36.4	517.5	3.21	44.0	44.1	78.9	0.83	0.83	0.46
H2_L6	110x50x10x3	8.74	6500	45.3	47.2	550.2	1083.1	1.04	11.65	150	31.9	103.5	1.51	39.7	39.7	40.0	0.80	0.80	0.80
										300	31.9	207.0	2.14	39.7	39.7	52.1	0.80	0.80	0.61
										450	31.9	310.5	2.62	39.7	39.7	60.9	0.80	0.80	0.52
										600	31.9	414.0	3.02	39.7	39.7	67.9	0.80	0.80	0.47
										750	31.9	517.5	3.38	39.7	39.7	74.0	0.80	0.80	0.43

Table A1.3 (continuation): PC_M H columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,D}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT,Fm}$	P_{nFT}	$\frac{P_y}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
H3_L1	110x50x10x4	8.07	3000	202.3	295.8	1068.4	1803.0	1.46	3.61	150	113.7	138.0	0.83	103.7	103.7	103.7	1.10	1.10	1.10
										300	162.3	276.0	1.17	155.9	155.9	155.9	1.04	1.04	1.04
										450	171.4	414.0	1.43	175.8	175.8	175.8	0.97	0.97	0.97
										600	171.4	552.0	1.65	177.4	190.1	191.9	0.97	0.90	0.89
										750	171.4	690.0	1.85	177.4	205.8	209.9	0.97	0.83	0.82
H3_L2	110x50x10x4	8.07	3250	181.6	252.1	1068.4	1803.0	1.39	4.24	150	109.7	138.0	0.87	100.4	100.4	100.4	1.09	1.09	1.09
										300	147.6	276.0	1.23	146.1	146.1	146.1	1.01	1.01	1.01
										450	150.8	414.0	1.51	159.2	159.8	160.2	0.95	0.94	0.94
										600	150.8	552.0	1.74	159.2	171.2	179.9	0.95	0.88	0.84
										750	150.8	690.0	1.95	159.2	180.6	196.8	0.95	0.84	0.77
H3_L3	110x50x10x4	8.07	3500	164.6	217.3	1068.4	1803.0	1.32	4.92	150	105.4	138.0	0.92	97.2	97.2	97.2	1.09	1.09	1.09
										300	133.3	276.0	1.29	136.8	136.8	136.8	0.97	0.97	0.97
										450	134.0	414.0	1.59	144.4	147.2	151.1	0.93	0.91	0.89
										600	134.0	552.0	1.83	144.4	154.5	169.7	0.93	0.87	0.79
										750	134.0	690.0	2.05	144.4	160.4	185.6	0.93	0.84	0.72
H3_L4	110x50x10x4	8.07	4000	138.5	166.4	1068.4	1803.0	1.20	6.42	150	96.0	138.0	1.00	91.0	91.0	91.0	1.06	1.06	1.06
										300	108.4	276.0	1.41	119.9	119.9	119.9	0.90	0.90	0.90
										450	108.5	414.0	1.73	121.5	124.2	136.3	0.89	0.87	0.80
										600	108.5	552.0	2.00	121.5	126.9	153.1	0.89	0.86	0.71
										750	108.5	690.0	2.23	121.5	129.0	167.5	0.89	0.84	0.65
H3_L5	110x50x10x4	8.07	4500	119.1	131.5	1068.4	1803.0	1.10	8.13	150	85.6	138.0	1.08	85.0	85.0	85.0	1.01	1.01	1.01
										300	89.9	276.0	1.52	104.5	104.5	105.8	0.86	0.86	0.85
										450	89.9	414.0	1.86	104.5	104.5	124.5	0.86	0.86	0.72
										600	89.9	552.0	2.15	104.5	104.5	139.8	0.86	0.86	0.64
										750	89.9	690.0	2.41	104.5	104.5	153.0	0.86	0.86	0.59
H3_L6	110x50x10x4	8.07	5000	103.8	106.5	1068.4	1803.0	1.03	10.03	150	75.0	138.0	1.15	79.1	79.1	79.1	0.95	0.95	0.95
										300	75.9	276.0	1.63	91.0	91.1	97.4	0.83	0.83	0.78
										450	75.9	414.0	2.00	91.0	91.1	114.7	0.83	0.83	0.66
										600	75.9	552.0	2.31	91.0	91.1	128.8	0.83	0.83	0.59
										750	75.9	690.0	2.58	91.0	91.1	141.0	0.83	0.83	0.54
H4_L1	90x40x10x2	9.25	4500	26.2	36.4	277.3	658.9	1.39	7.63	150	20.6	57.0	1.48	22.9	22.9	22.9	0.90	0.90	0.90
										300	20.6	114.0	2.09	23.0	26.3	29.3	0.90	0.78	0.70
										450	20.6	171.0	2.56	23.0	28.5	34.0	0.90	0.72	0.61
										600	20.6	228.0	2.95	23.0	30.3	37.8	0.90	0.68	0.54
										750	20.6	285.0	3.30	23.0	31.7	41.0	0.90	0.65	0.50
H4_L2	90x40x10x2	9.25	5000	22.9	29.5	277.3	658.9	1.28	9.41	150	17.3	57.0	1.58	20.1	20.3	20.9	0.86	0.85	0.83
										300	17.3	114.0	2.23	20.1	21.8	26.9	0.86	0.79	0.64
										450	17.3	171.0	2.73	20.1	22.8	31.2	0.86	0.76	0.55
										600	17.3	228.0	3.15	20.1	23.5	34.7	0.86	0.74	0.50
										750	17.3	285.0	3.53	20.1	24.0	37.7	0.86	0.72	0.46
H4_L3	90x40x10x2	9.25	5500	20.4	24.3	277.3	658.9	1.20	11.39	150	14.8	57.0	1.67	17.8	18.0	19.4	0.83	0.82	0.77
										300	14.8	114.0	2.37	17.8	18.4	25.0	0.83	0.80	0.59
										450	14.8	171.0	2.90	17.8	18.7	29.0	0.83	0.79	0.51
										600	14.8	228.0	3.35	17.8	18.9	32.2	0.83	0.78	0.46
										750	14.8	285.0	3.74	17.8	19.0	35.0	0.83	0.78	0.42
H4_L4	90x40x10x2	9.25	6000	18.3	20.5	277.3	658.9	1.12	13.56	150	12.8	57.0	1.77	16.0	16.0	18.1	0.80	0.80	0.71
										300	12.8	114.0	2.50	16.0	16.0	23.3	0.80	0.80	0.55
										450	12.8	171.0	3.06	16.0	16.0	27.1	0.80	0.80	0.47
										600	12.8	228.0	3.53	16.0	16.0	30.1	0.80	0.80	0.43
										750	12.8	285.0	3.95	16.0	16.0	32.7	0.80	0.80	0.39
H4_L5	90x40x10x2	9.25	6500	16.5	17.4	277.3	658.9	1.05	15.92	150	11.2	57.0	1.86	14.5	14.5	17.0	0.78	0.78	0.66
										300	11.3	114.0	2.63	14.5	14.5	21.9	0.78	0.78	0.51
										450	11.3	171.0	3.22	14.5	14.5	25.4	0.78	0.78	0.44
										600	11.3	228.0	3.72	14.5	14.5	28.2	0.78	0.78	0.40
										750	11.3	285.0	4.15	14.5	14.5	30.6	0.78	0.78	0.37
H4_L6	90x40x10x2	9.25	7000	15.0	15.0	277.3	658.9	1.00	18.46	150	9.9	57.0	1.95	13.2	13.2	16.0	0.75	0.75	0.62
										300	9.9	114.0	2.75	13.2	13.2	20.6	0.75	0.75	0.48
										450	9.9	171.0	3.37	13.2	13.2	23.9	0.75	0.75	0.42
										600	9.9	228.0	3.90	13.2	13.2	26.6	0.75	0.75	0.37
										750	9.9	285.0	4.36	13.2	13.2	28.9	0.75	0.75	0.34

Table A1.3 (continuation): PC_M H columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_{cr}}{P_{cr_G}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
H5_L1	120x50x15x4	8.80	3500	182.1	256.0	1320.0	1812.0	1.41	5.16	150	115.1	150.0	0.91	106.3	106.3	106.3	1.08	1.08	1.08
										300	149.6	300.0	1.28	150.5	150.5	150.5	0.99	0.99	0.99
										450	151.9	450.0	1.57	159.7	163.4	165.6	0.95	0.93	0.92
										600	152.0	600.0	1.82	159.7	175.1	184.8	0.95	0.87	0.82
										750	152.0	750.0	2.03	159.7	184.8	201.2	0.95	0.82	0.76
H5_L2	120x50x15x4	8.80	3750	166.9	223.0	1320.0	1812.0	1.34	5.92	150	110.3	150.0	0.95	103.0	103.0	103.0	1.07	1.07	1.07
										300	135.9	300.0	1.34	141.4	141.4	141.4	0.96	0.96	0.96
										450	136.4	450.0	1.64	146.4	150.8	156.9	0.93	0.90	0.87
										600	136.4	600.0	1.90	146.4	157.9	175.1	0.93	0.86	0.78
										750	136.4	750.0	2.12	146.4	163.7	190.6	0.93	0.83	0.72
H5_L3	120x50x15x4	8.80	4000	154.1	196.0	1320.0	1812.0	1.27	6.73	150	105.2	150.0	0.99	99.8	99.8	99.8	1.05	1.05	1.05
										300	123.3	300.0	1.40	132.8	132.8	132.8	0.93	0.93	0.93
										450	123.3	450.0	1.71	135.2	139.1	149.4	0.91	0.89	0.83
										600	123.3	600.0	1.97	135.2	143.5	166.7	0.91	0.86	0.74
										750	123.3	750.0	2.21	135.2	147.0	181.4	0.91	0.84	0.68
H5_L4	120x50x15x4	8.80	4500	133.8	154.9	1320.0	1812.0	1.16	8.52	150	95.6	150.0	1.06	93.8	93.8	93.8	1.02	1.02	1.02
										300	102.6	300.0	1.50	117.3	117.3	117.3	0.87	0.87	0.87
										450	102.7	450.0	1.83	117.3	118.0	136.8	0.88	0.87	0.75
										600	102.7	600.0	2.12	117.3	118.4	152.7	0.88	0.87	0.67
										750	102.7	750.0	2.37	117.3	118.7	166.2	0.88	0.86	0.62
H5_L5	120x50x15x4	8.80	4750	125.5	139.0	1320.0	1812.0	1.11	9.50	150	90.4	150.0	1.09	90.9	90.9	90.9	0.99	0.99	0.99
										300	94.3	300.0	1.55	110.0	110.1	112.7	0.86	0.86	0.84
										450	94.3	450.0	1.89	110.0	110.1	131.5	0.86	0.86	0.72
										600	94.3	600.0	2.19	110.0	110.1	146.7	0.86	0.86	0.64
										750	94.3	750.0	2.45	110.0	110.1	159.7	0.86	0.86	0.59
H5_L6	120x50x15x4	8.80	5000	118.0	125.5	1320.0	1812.0	1.06	10.52	150	85.0	150.0	1.13	88.1	88.1	88.1	0.97	0.97	0.97
										300	87.0	300.0	1.59	103.5	103.6	108.5	0.84	0.84	0.80
										450	87.0	450.0	1.95	103.5	103.6	126.6	0.84	0.84	0.69
										600	87.0	600.0	2.25	103.5	103.6	141.3	0.84	0.84	0.62
										750	87.0	750.0	2.52	103.5	103.6	153.8	0.84	0.84	0.57
H6_L1	80x30x10x1.2	12.78	3500	11.9	17.8	107.0	129.2	1.50	6.00	150	9.9	28.8	1.56	10.4	10.6	10.6	0.95	0.93	0.93
										300	9.9	57.6	2.20	10.4	12.7	12.7	0.95	0.78	0.78
										450	9.9	86.4	2.70	10.4	14.2	14.2	0.95	0.70	0.70
										600	9.9	115.2	3.12	10.4	15.3	15.3	0.95	0.65	0.65
										750	9.9	144.0	3.48	10.4	16.2	16.2	0.95	0.61	0.61
H6_L2	80x30x10x1.2	12.78	4000	9.9	13.7	107.0	129.2	1.38	7.84	150	7.8	28.8	1.71	8.6	8.9	9.3	0.91	0.89	0.85
										300	7.8	57.6	2.42	8.6	9.5	11.1	0.91	0.83	0.71
										450	7.8	86.4	2.96	8.6	9.8	12.3	0.91	0.80	0.64
										600	7.8	115.2	3.42	8.6	10.1	13.3	0.91	0.78	0.59
										750	7.8	144.0	3.82	8.6	10.3	14.1	0.91	0.76	0.56
H6_L3	80x30x10x1.2	12.78	4500	8.5	10.8	107.0	129.2	1.28	9.92	150	6.4	28.8	1.85	7.4	7.4	8.3	0.86	0.86	0.77
										300	6.4	57.6	2.61	7.4	7.4	9.9	0.86	0.86	0.64
										450	6.4	86.4	3.20	7.4	7.4	11.0	0.86	0.86	0.58
										600	6.4	115.2	3.69	7.4	7.4	11.9	0.86	0.86	0.54
										750	6.4	144.0	4.13	7.4	7.4	12.6	0.86	0.86	0.51
H6_L4	80x30x10x1.2	12.78	5000	7.4	8.7	107.0	129.2	1.18	12.25	150	5.3	28.8	1.97	6.5	6.5	7.5	0.82	0.82	0.71
										300	5.3	57.6	2.79	6.5	6.5	9.0	0.82	0.82	0.59
										450	5.3	86.4	3.41	6.5	6.5	10.0	0.82	0.82	0.53
										600	5.3	115.2	3.94	6.5	6.5	10.8	0.82	0.82	0.49
										750	5.3	144.0	4.41	6.5	6.5	11.4	0.82	0.82	0.47
H6_L5	80x30x10x1.2	12.78	5500	6.6	7.2	107.0	129.2	1.09	14.82	150	4.5	28.8	2.08	5.8	5.8	6.9	0.78	0.78	0.65
										300	4.5	57.6	2.95	5.8	5.8	8.3	0.78	0.78	0.55
										450	4.5	86.4	3.61	5.8	5.8	9.2	0.78	0.78	0.49
										600	4.5	115.2	4.17	5.8	5.8	9.9	0.78	0.78	0.46
										750	4.5	144.0	4.66	5.8	5.8	10.5	0.78	0.78	0.43
H6_L6	80x30x10x1.2	12.78	6000	6.0	6.1	107.0	129.2	1.01	17.63	150	3.9	28.8	2.19	5.3	5.3	6.4	0.74	0.74	0.61
										300	3.9	57.6	3.10	5.3	5.3	7.7	0.74	0.74	0.51
										450	3.9	86.4	3.79	5.3	5.3	8.6	0.74	0.74	0.46
										600	3.9	115.2	4.38	5.3	5.3	9.2	0.74	0.74	0.42
										750	3.9	144.0	4.89	5.3	5.3	9.8	0.74	0.74	0.40
							Max	1.502	18.459							Mean	0.891	0.858	0.722
							Min	1.000	3.456							Sd.Dv.	0.083	0.095	0.194
																Max	1.096	1.096	1.096
																Min	0.740	0.614	0.345

Table A1.4 (to be continued): PC_M R columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,D}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{p_s}{p_{sG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
R1_L1	100x40x10x10x4	8.11	2000	378.8	547.4	1056.4	1765.6	1.44	1.93	150	120.2	132.0	0.59	114.1	114.1	114.1	1.05	1.05	1.05
										300	220.7	264.0	0.83	197.2	197.2	197.2	1.12	1.12	1.12
										450	284.7	396.0	1.02	255.7	255.7	255.7	1.11	1.11	1.11
										600	313.4	528.0	1.18	294.6	294.6	294.6	1.06	1.06	1.06
										750	322.5	660.0	1.32	318.3	318.3	318.3	1.01	1.01	1.01
R1_L2	100x40x10x10x4	8.11	2500	261.5	350.3	1056.4	1765.6	1.34	3.02	150	113.0	132.0	0.71	106.9	106.9	106.9	1.06	1.06	1.06
										300	188.4	264.0	1.00	173.0	173.0	173.0	1.09	1.09	1.09
										450	213.6	396.0	1.23	210.1	210.1	210.1	1.02	1.02	1.02
										600	218.1	528.0	1.42	226.8	226.8	226.8	0.96	0.96	0.96
										750	218.1	660.0	1.59	229.3	234.4	240.3	0.95	0.93	0.91
R1_L3	100x40x10x10x4	8.11	3000	195.6	243.3	1056.4	1765.6	1.24	4.34	150	107.1	132.0	0.82	99.5	99.5	99.5	1.08	1.08	1.08
										300	151.0	264.0	1.16	150.1	150.1	150.1	1.01	1.01	1.01
										450	158.0	396.0	1.42	169.7	169.7	169.7	0.93	0.93	0.93
										600	158.1	528.0	1.64	171.6	175.1	184.7	0.92	0.90	0.86
										750	158.1	660.0	1.84	171.6	179.3	202.0	0.92	0.88	0.78
R1_L4	100x40x10x10x4	8.11	3500	154.1	178.7	1056.4	1765.6	1.16	5.91	150	96.7	132.0	0.93	92.2	92.2	92.2	1.05	1.05	1.05
										300	119.7	264.0	1.31	128.9	128.9	128.9	0.93	0.93	0.93
										450	120.8	396.0	1.60	135.1	135.8	142.6	0.89	0.89	0.85
										600	120.8	528.0	1.85	135.1	137.2	160.1	0.89	0.88	0.75
										750	120.8	660.0	2.07	135.1	138.3	175.1	0.89	0.87	0.69
R1_L5	100x40x10x10x4	8.11	4000	125.5	136.8	1056.4	1765.6	1.09	7.72	150	86.6	132.0	1.03	85.0	85.0	85.0	1.02	1.02	1.02
										300	95.8	264.0	1.45	109.5	109.5	109.5	0.88	0.88	0.88
										450	95.8	396.0	1.78	110.1	110.1	126.2	0.87	0.87	0.76
										600	95.8	528.0	2.05	110.1	110.1	141.6	0.87	0.87	0.68
										750	95.8	660.0	2.29	110.1	110.1	154.9	0.87	0.87	0.62
R1_L6	100x40x10x10x4	8.11	4500	104.6	108.1	1056.4	1765.6	1.03	9.77	150	74.7	132.0	1.12	77.8	77.8	77.8	0.96	0.96	0.96
										300	78.0	264.0	1.59	91.8	91.8	96.1	0.85	0.85	0.81
										450	78.1	396.0	1.95	91.8	91.8	113.1	0.85	0.85	0.69
										600	78.1	528.0	2.25	91.8	91.8	127.0	0.85	0.85	0.61
										750	78.1	660.0	2.51	91.8	91.8	138.9	0.85	0.85	0.56
R2_L1	110x40x10x10x3	10.55	3000	152.4	188.2	501.1	840.2	1.24	2.66	150	82.6	103.5	0.82	77.9	77.9	77.9	1.06	1.06	1.06
										300	118.1	207.0	1.17	117.2	117.2	117.2	1.01	1.01	1.01
										450	123.2	310.5	1.43	132.3	132.3	132.3	0.93	0.93	0.93
										600	123.4	414.0	1.65	133.6	134.4	142.3	0.92	0.92	0.87
										750	123.4	517.5	1.84	133.6	135.2	153.1	0.92	0.91	0.81
R2_L2	110x40x10x10x3	10.55	3250	133.5	160.4	501.1	840.2	1.20	3.12	150	78.7	103.5	0.88	74.8	74.8	74.8	1.05	1.05	1.05
										300	104.5	207.0	1.24	108.2	108.2	108.2	0.97	0.97	0.97
										450	106.6	310.5	1.52	117.1	117.2	118.5	0.91	0.91	0.90
										600	106.6	414.0	1.76	117.1	117.2	130.2	0.91	0.91	0.82
										750	106.6	517.5	1.97	117.1	117.2	140.1	0.91	0.91	0.76
R2_L3	110x40x10x10x3	10.55	3500	118.6	138.3	501.1	840.2	1.17	3.62	150	74.8	103.5	0.93	71.8	71.8	71.8	1.04	1.04	1.04
										300	92.2	207.0	1.32	99.7	99.7	99.7	0.92	0.92	0.92
										450	93.1	310.5	1.62	104.0	104.1	109.4	0.89	0.89	0.85
										600	93.1	414.0	1.87	104.0	104.1	120.3	0.89	0.89	0.77
										750	93.1	517.5	2.09	104.0	104.1	129.4	0.89	0.89	0.72
R2_L4	110x40x10x10x3	10.55	4000	96.2	105.9	501.1	840.2	1.10	4.73	150	65.9	103.5	1.04	66.0	66.0	66.0	1.00	1.00	1.00
										300	73.0	207.0	1.47	84.1	84.1	84.1	0.87	0.87	0.87
										450	73.1	310.5	1.80	84.3	84.4	95.0	0.87	0.87	0.77
										600	73.1	414.0	2.07	84.3	84.4	104.4	0.87	0.87	0.70
										750	73.1	517.5	2.32	84.3	84.4	112.4	0.87	0.87	0.65
R2_L5	110x40x10x10x3	10.55	4250	87.6	93.8	501.1	840.2	1.07	5.34	150	61.4	103.5	1.09	63.1	63.1	63.1	0.97	0.97	0.97
										300	65.5	207.0	1.54	76.8	76.9	78.1	0.85	0.85	0.84
										450	65.5	310.5	1.88	76.8	76.9	89.3	0.85	0.85	0.73
										600	65.5	414.0	2.17	76.8	76.9	98.1	0.85	0.85	0.67
										750	65.5	517.5	2.43	76.8	76.9	105.6	0.85	0.85	0.62
R2_L6	110x40x10x10x3	10.55	4500	80.3	83.7	501.1	840.2	1.04	5.99	150	56.8	103.5	1.14	60.4	60.4	60.4	0.94	0.94	0.94
										300	59.1	207.0	1.61	70.4	70.5	73.7	0.84	0.84	0.80
										450	59.1	310.5	1.97	70.4	70.5	84.2	0.84	0.84	0.70
										600	59.1	414.0	2.27	70.4	70.5	92.5	0.84	0.84	0.64
										750	59.1	517.5	2.54	70.4	70.5	99.6	0.84	0.84	0.59

Table A1.4 (continuation): PC_M R columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_y}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
R3_L1	110x50x10x10x4	7.38	4000	155.5	227.1	1011.2	2987.3	1.46	4.45	150	105.1	150.0	0.98	100.2	100.2	100.2	1.05	1.05	1.05
										300	127.6	300.0	1.39	133.8	133.8	133.8	0.95	0.95	0.95
										450	128.1	450.0	1.70	136.3	149.9	151.8	0.94	0.85	0.84
										600	128.1	600.0	1.96	136.3	166.9	171.5	0.94	0.77	0.75
										750	128.1	750.0	2.20	136.3	181.4	188.5	0.94	0.71	0.68
R3_L2	110x50x10x10x4	7.38	4500	129.5	179.4	1011.2	2987.3	1.39	5.64	150	93.5	150.0	1.08	92.4	92.4	92.4	1.01	1.01	1.01
										300	104.5	300.0	1.52	113.6	114.5	115.1	0.92	0.91	0.91
										450	104.5	450.0	1.86	113.6	127.0	136.6	0.92	0.82	0.76
										600	104.5	600.0	2.15	113.6	136.7	154.3	0.92	0.76	0.68
										750	104.5	750.0	2.41	113.6	144.8	169.6	0.92	0.72	0.62
R3_L3	110x50x10x10x4	7.38	5000	110.2	145.3	1011.2	2987.3	1.32	6.96	150	82.7	150.0	1.17	84.8	84.8	84.8	0.98	0.98	0.98
										300	87.2	300.0	1.65	96.6	100.2	104.8	0.90	0.87	0.83
										450	87.2	450.0	2.02	96.6	108.2	124.5	0.90	0.81	0.70
										600	87.2	600.0	2.33	96.6	114.2	140.6	0.90	0.76	0.62
										750	87.2	750.0	2.61	96.6	119.1	154.5	0.90	0.73	0.56
R3_L4	110x50x10x10x4	7.38	6000	83.2	100.9	1011.2	2987.3	1.21	10.02	150	63.3	150.0	1.34	70.5	70.5	70.5	0.90	0.90	0.90
										300	63.7	300.0	1.90	72.9	76.7	89.1	0.87	0.83	0.71
										450	63.7	450.0	2.33	72.9	80.1	105.8	0.87	0.80	0.60
										600	63.7	600.0	2.69	72.9	82.6	119.6	0.87	0.77	0.53
										750	63.7	750.0	3.00	72.9	84.6	131.4	0.87	0.75	0.48
R3_L5	110x50x10x10x4	7.38	7000	65.2	74.2	1011.2	2987.3	1.14	13.64	150	48.8	150.0	1.52	57.2	57.3	57.8	0.85	0.85	0.84
										300	48.8	300.0	2.14	57.2	58.6	77.5	0.85	0.83	0.63
										450	48.8	450.0	2.63	57.2	59.3	92.0	0.85	0.82	0.53
										600	48.8	600.0	3.03	57.2	59.9	103.9	0.85	0.82	0.47
										750	48.8	750.0	3.39	57.2	60.3	114.2	0.85	0.81	0.43
R3_L6	110x50x10x10x4	7.38	8000	52.5	56.8	1011.2	2987.3	1.08	17.81	150	38.6	150.0	1.69	46.0	46.0	51.0	0.84	0.84	0.76
										300	38.6	300.0	2.39	46.0	46.0	68.4	0.84	0.84	0.57
										450	38.6	450.0	2.93	46.0	46.0	81.2	0.84	0.84	0.48
										600	38.6	600.0	3.38	46.0	46.0	91.7	0.84	0.84	0.42
										750	38.6	750.0	3.78	46.0	46.0	100.8	0.84	0.84	0.38
R4_L1	90x40x10x10x3	7.62	4000	68.8	98.8	591.8	2176.6	1.44	5.99	150	52.0	94.5	1.17	53.2	53.2	53.2	0.98	0.98	0.98
										300	55.6	189.0	1.66	60.3	64.4	65.6	0.92	0.86	0.85
										450	55.6	283.5	2.03	60.3	73.4	77.7	0.92	0.76	0.72
										600	55.6	378.0	2.34	60.3	80.5	87.6	0.92	0.69	0.64
										750	55.6	472.5	2.62	60.3	86.5	96.1	0.92	0.64	0.58
R4_L2	90x40x10x10x3	7.62	4500	57.1	78.1	591.8	2176.6	1.37	7.58	150	44.2	94.5	1.29	47.3	47.3	47.3	0.94	0.94	0.94
										300	45.2	189.0	1.82	50.1	54.7	58.9	0.90	0.83	0.77
										450	45.2	283.5	2.23	50.1	60.0	69.7	0.90	0.75	0.65
										600	45.2	378.0	2.57	50.1	64.1	78.6	0.90	0.71	0.58
										750	45.2	472.5	2.88	50.1	67.4	86.2	0.90	0.67	0.52
R4_L3	90x40x10x10x3	7.62	5000	48.4	63.3	591.8	2176.6	1.31	9.36	150	37.5	94.5	1.40	41.7	41.7	41.7	0.90	0.90	0.90
										300	37.6	189.0	1.98	42.4	46.7	53.4	0.89	0.81	0.70
										450	37.6	283.5	2.42	42.4	50.0	63.3	0.89	0.75	0.60
										600	37.6	378.0	2.80	42.4	52.5	71.3	0.89	0.72	0.53
										750	37.6	472.5	3.12	42.4	54.6	78.2	0.89	0.69	0.48
R4_L4	90x40x10x10x3	7.62	6000	36.2	43.9	591.8	2176.6	1.21	13.47	150	27.4	94.5	1.62	31.8	32.2	33.8	0.86	0.85	0.81
										300	27.4	189.0	2.28	31.8	34.5	45.1	0.86	0.79	0.61
										450	27.4	283.5	2.80	31.8	35.9	53.4	0.86	0.76	0.51
										600	27.4	378.0	3.23	31.8	36.9	60.2	0.86	0.74	0.45
										750	27.4	472.5	3.61	31.8	37.8	66.1	0.86	0.72	0.41
R4_L5	90x40x10x10x3	7.62	7000	28.2	32.3	591.8	2176.6	1.15	18.34	150	20.9	94.5	1.83	24.7	25.1	29.2	0.85	0.83	0.72
										300	20.9	189.0	2.59	24.7	25.7	39.0	0.85	0.81	0.54
										450	20.9	283.5	3.17	24.7	26.0	46.1	0.85	0.80	0.45
										600	20.9	378.0	3.66	24.7	26.3	52.0	0.85	0.79	0.40
										750	20.9	472.5	4.10	24.7	26.5	57.1	0.85	0.79	0.37
R4_L6	90x40x10x10x3	7.62	8000	22.5	24.7	591.8	2176.6	1.10	23.95	150	16.5	94.5	2.05	19.7	19.8	25.6	0.83	0.83	0.64
										300	16.5	189.0	2.90	19.7	19.8	34.2	0.83	0.83	0.48
										450	16.5	283.5	3.55	19.7	19.8	40.5	0.83	0.83	0.41
										600	16.5	378.0	4.10	19.7	19.8	45.6	0.83	0.83	0.36
										750	16.5	472.5	4.58	19.7	19.8	50.1	0.83	0.83	0.33

Table A1.4 (continuation): PC_M R columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_l}{P_u} / \frac{P_l}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
R5_L1	120x50x15x15x5	7.32	4000	266.1	366.3	1764.4	4945.6	1.38	4.82	150	160.7	210.0	0.89	150.9	150.9	150.9	1.06	1.06	1.06
										300	213.1	420.0	1.26	216.9	216.9	216.9	0.98	0.98	0.98
										450	218.8	630.0	1.54	233.4	236.5	238.6	0.94	0.93	0.92
										600	218.8	840.0	1.78	233.4	253.9	269.7	0.94	0.86	0.81
										750	218.8	1050.0	1.99	233.4	268.3	296.5	0.94	0.82	0.74
R5_L2	120x50x15x15x5	7.32	4500	220.3	289.5	1764.4	4945.6	1.31	6.10	150	146.7	210.0	0.98	140.9	140.9	140.9	1.04	1.04	1.04
										300	177.5	420.0	1.38	189.1	189.1	189.1	0.94	0.94	0.94
										450	177.9	630.0	1.69	193.2	202.1	214.0	0.92	0.88	0.83
										600	177.9	840.0	1.95	193.2	213.2	241.9	0.92	0.83	0.74
										750	177.9	1050.0	2.18	193.2	222.2	266.0	0.92	0.80	0.67
R5_L3	120x50x15x15x5	7.32	5000	186.2	234.5	1764.4	4945.6	1.26	7.53	150	131.3	210.0	1.06	131.0	131.0	131.0	1.00	1.00	1.00
										300	147.9	420.0	1.50	163.3	163.4	163.5	0.91	0.90	0.90
										450	147.9	630.0	1.84	163.3	173.2	194.3	0.91	0.85	0.76
										600	147.9	840.0	2.12	163.3	180.4	219.6	0.91	0.82	0.67
										750	147.9	1050.0	2.37	163.3	186.3	241.5	0.91	0.79	0.61
R5_L4	120x50x15x15x5	7.32	6000	139.0	162.8	1764.4	4945.6	1.17	10.84	150	104.4	210.0	1.23	111.6	111.6	111.6	0.94	0.94	0.94
										300	107.6	420.0	1.74	121.9	124.5	138.3	0.88	0.86	0.78
										450	107.6	630.0	2.13	121.9	128.1	164.3	0.88	0.84	0.65
										600	107.6	840.0	2.46	121.9	130.7	185.7	0.88	0.82	0.58
										750	107.6	1050.0	2.75	121.9	132.8	204.1	0.88	0.81	0.53
R5_L5	120x50x15x15x5	7.32	7000	108.0	119.6	1764.4	4945.6	1.11	14.75	150	81.9	210.0	1.39	93.1	93.1	93.1	0.88	0.88	0.88
										300	82.0	420.0	1.97	94.7	94.8	119.6	0.87	0.86	0.69
										450	82.0	630.0	2.41	94.7	94.8	142.1	0.87	0.87	0.58
										600	82.0	840.0	2.79	94.7	94.8	160.6	0.87	0.87	0.51
										750	82.0	1050.0	3.12	94.7	94.8	176.6	0.87	0.87	0.46
R5_L6	120x50x15x15x5	7.32	8000	86.4	91.6	1764.4	4945.6	1.06	19.26	150	64.8	210.0	1.56	75.7	75.8	78.3	0.85	0.85	0.83
										300	64.8	420.0	2.21	75.7	75.8	105.2	0.85	0.85	0.62
										450	64.8	630.0	2.70	75.7	75.8	125.0	0.85	0.85	0.52
										600	64.8	840.0	3.12	75.7	75.8	141.2	0.86	0.85	0.46
										750	64.8	1050.0	3.49	75.7	75.8	155.3	0.86	0.85	0.42
R6_L1	80x30x10x10x3	8.50	2000	159.3	210.6	599.5	1125.6	1.32	2.85	150	69.6	81.0	0.71	65.5	65.5	65.5	1.06	1.06	1.06
										300	114.6	162.0	1.01	105.8	105.8	105.8	1.08	1.08	1.08
										450	128.1	243.0	1.24	128.3	128.3	128.3	1.00	1.00	1.00
										600	132.6	324.0	1.43	138.3	138.3	138.3	0.96	0.96	0.96
										750	132.6	405.0	1.59	139.7	142.5	146.6	0.95	0.93	0.90
R6_L2	80x30x10x10x3	8.50	2500	110.2	134.8	599.5	1125.6	1.22	4.45	150	63.4	81.0	0.86	59.6	59.6	59.6	1.07	1.07	1.07
										300	88.5	162.0	1.21	87.6	87.6	87.6	1.01	1.01	1.01
										450	88.5	243.0	1.48	96.6	96.6	96.6	0.92	0.92	0.92
										600	88.5	324.0	1.71	96.7	98.8	107.3	0.92	0.90	0.82
										750	88.6	405.0	1.92	96.7	100.6	117.1	0.92	0.88	0.76
R6_L3	80x30x10x10x3	8.50	2750	94.6	111.4	599.5	1125.6	1.18	5.38	150	59.6	81.0	0.93	56.6	56.6	56.6	1.05	1.05	1.05
										300	74.3	162.0	1.31	79.1	79.1	79.1	0.94	0.94	0.94
										450	74.7	243.0	1.60	82.9	83.4	87.4	0.90	0.89	0.85
										600	74.7	324.0	1.85	82.9	84.4	97.8	0.90	0.88	0.76
										750	74.7	405.0	2.07	82.9	85.2	106.7	0.90	0.88	0.70
R6_L4	80x30x10x10x3	8.50	3000	82.3	93.6	599.5	1125.6	1.14	6.41	150	55.3	81.0	0.99	53.7	53.7	53.7	1.03	1.03	1.03
										300	63.9	162.0	1.40	71.1	71.1	71.1	0.90	0.90	0.90
										450	63.9	243.0	1.72	72.2	72.3	80.3	0.88	0.88	0.80
										600	64.0	324.0	1.98	72.2	72.3	89.9	0.89	0.89	0.71
										750	64.0	405.0	2.22	72.2	72.3	98.0	0.89	0.89	0.65
R6_L5	80x30x10x10x3	8.50	3500	64.5	68.8	599.5	1125.6	1.07	8.72	150	46.4	81.0	1.12	47.9	47.9	47.9	0.97	0.97	0.97
										300	48.6	162.0	1.58	56.6	56.6	59.1	0.86	0.86	0.82
										450	48.6	243.0	1.94	56.6	56.6	69.2	0.86	0.86	0.70
										600	48.6	324.0	2.24	56.6	56.6	77.4	0.86	0.86	0.63
										750	48.7	405.0	2.51	56.6	56.6	84.5	0.86	0.86	0.58
R6_L6	80x30x10x10x3	8.50	4000	52.2	52.6	599.5	1125.6	1.01	11.39	150	38.1	81.0	1.25	42.3	42.3	42.3	0.90	0.90	0.90
										300	38.4	162.0	1.76	45.8	45.8	51.9	0.84	0.84	0.74
										450	38.4	243.0	2.16	45.8	45.8	60.8	0.84	0.84	0.63
										600	38.4	324.0	2.49	45.8	45.8	68.0	0.84	0.84	0.56
										750	38.4	405.0	2.79	45.8	45.8	74.2	0.84	0.84	0.52
							Max	1.461	23.952							Mean	0.915	0.883	0.765
							Min	1.009	1.930							Sd.Dv.	0.068	0.094	0.197
																Max	1.119	1.119	1.119
																Min	0.834	0.643	0.329

Table A1.5 (to be continued): PC_M RLC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,D}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{p_{-s}}{p_{-G}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
RLC1_L1	100x50x10x10x5	6.32	4000	181.5	242.6	2221.0	7589.4	1.34	9.16	150	125.1	180.0	1.00	118.8	118.8	118.8	1.05	1.05	1.05
										300	147.2	360.0	1.41	156.9	156.9	156.9	0.94	0.94	0.94
										450	147.3	540.0	1.73	159.1	170.1	180.8	0.93	0.87	0.81
										600	147.3	720.0	1.99	159.1	182.0	206.2	0.93	0.81	0.71
										750	147.3	900.0	2.23	159.1	191.8	228.2	0.93	0.77	0.65
RLC1_L2	100x50x10x10x5	6.32	5000	127.9	155.2	2221.0	7589.4	1.21	14.31	150	97.0	180.0	1.19	99.9	99.9	99.9	0.97	0.97	0.97
										300	101.0	360.0	1.68	112.2	115.8	124.3	0.90	0.87	0.81
										450	101.0	540.0	2.05	112.2	122.4	149.5	0.90	0.83	0.68
										600	101.0	720.0	2.37	112.2	127.3	170.4	0.90	0.79	0.59
										750	101.0	900.0	2.65	112.2	131.3	188.7	0.90	0.77	0.54
RLC1_L3	100x50x10x10x5	6.32	6000	95.0	107.8	2221.0	7589.4	1.13	20.60	150	73.6	180.0	1.38	81.4	81.4	81.4	0.90	0.90	0.90
										300	73.8	360.0	1.95	83.3	86.1	105.7	0.89	0.86	0.70
										450	73.8	540.0	2.38	83.3	88.2	127.1	0.89	0.84	0.58
										600	73.8	720.0	2.75	83.3	89.8	144.9	0.89	0.82	0.51
										750	73.8	900.0	3.08	83.3	91.0	160.4	0.89	0.81	0.46
RLC1_L4	100x50x10x10x5	6.32	7000	73.1	79.2	2221.0	7589.4	1.08	28.04	150	56.3	180.0	1.57	64.1	64.2	66.8	0.88	0.88	0.84
										300	56.3	360.0	2.22	64.1	64.2	91.6	0.88	0.88	0.61
										450	56.3	540.0	2.72	64.1	64.2	110.2	0.88	0.88	0.51
										600	56.3	720.0	3.14	64.1	64.2	125.7	0.88	0.88	0.45
										750	56.3	900.0	3.51	64.1	64.2	139.1	0.88	0.88	0.40
RLC1_L5	100x50x10x10x5	6.32	8000	57.8	60.6	2221.0	7589.4	1.05	36.63	150	44.3	180.0	1.76	50.7	50.8	58.8	0.87	0.87	0.75
										300	44.3	360.0	2.49	50.7	50.8	80.7	0.87	0.87	0.55
										450	44.3	540.0	3.06	50.7	50.8	97.0	0.87	0.87	0.46
										600	44.3	720.0	3.53	50.7	50.8	110.6	0.87	0.87	0.40
										750	44.3	900.0	3.94	50.7	50.8	122.4	0.87	0.87	0.36
RLC1_L6	100x50x10x10x5	6.32	9000	46.8	47.9	2221.0	7589.4	1.02	46.35	150	35.8	180.0	1.96	41.1	41.1	52.4	0.87	0.87	0.68
										300	35.8	360.0	2.77	41.1	41.1	71.9	0.87	0.87	0.50
										450	35.8	540.0	3.40	41.1	41.1	86.5	0.87	0.87	0.41
										600	35.8	720.0	3.92	41.1	41.1	98.6	0.87	0.87	0.36
										750	35.8	900.0	4.38	41.1	41.1	109.1	0.87	0.87	0.33
RLC2_L1	110x50x10x10x5	7.42	2500	440.2	642.5	2033.6	3415.2	1.46	3.17	150	166.5	187.5	0.65	156.9	156.9	156.9	1.06	1.06	1.06
										300	294.7	375.0	0.92	262.5	262.5	262.5	1.12	1.12	1.12
										450	351.2	562.5	1.13	329.5	329.5	329.5	1.07	1.07	1.07
										600	373.1	750.0	1.31	367.6	367.6	367.6	1.02	1.02	1.02
										750	376.2	937.5	1.46	384.4	384.4	384.4	0.98	0.98	0.98
RLC2_L2	110x50x10x10x5	7.42	3000	331.2	446.2	2033.6	3415.2	1.35	4.56	150	158.4	187.5	0.75	147.9	147.9	147.9	1.07	1.07	1.07
										300	251.0	375.0	1.06	233.5	233.5	233.5	1.08	1.08	1.08
										450	269.9	562.5	1.30	276.3	276.3	276.3	0.98	0.98	0.98
										600	274.6	750.0	1.50	290.4	291.0	291.4	0.95	0.94	0.94
										750	274.9	937.5	1.68	290.4	305.2	320.2	0.95	0.90	0.86
RLC2_L3	110x50x10x10x5	7.42	3500	262.2	327.8	2033.6	3415.2	1.25	6.20	150	150.9	187.5	0.85	139.0	139.0	139.0	1.09	1.09	1.09
										300	206.4	375.0	1.20	206.1	206.1	206.1	1.00	1.00	1.00
										450	211.6	562.5	1.46	229.2	229.2	229.2	0.92	0.92	0.92
										600	211.6	750.0	1.69	230.0	237.6	254.6	0.92	0.89	0.83
										750	211.7	937.5	1.89	230.0	244.7	279.8	0.92	0.86	0.76
RLC2_L4	110x50x10x10x5	7.42	4000	214.7	251.0	2033.6	3415.2	1.17	8.10	150	138.4	187.5	0.93	130.1	130.1	130.1	1.06	1.06	1.06
										300	168.8	375.0	1.32	180.5	180.5	180.5	0.94	0.94	0.94
										450	168.8	562.5	1.62	188.3	190.2	200.9	0.90	0.89	0.84
										600	168.8	750.0	1.87	188.3	193.9	226.9	0.90	0.87	0.74
										750	168.8	937.5	2.09	188.3	196.7	249.3	0.90	0.86	0.68
HLC2_L5	110x50x10x10x5	7.42	5000	153.0	160.6	2033.6	3415.2	1.05	12.66	150	110.5	187.5	1.11	112.2	112.2	112.2	0.98	0.98	0.98
										300	115.6	375.0	1.57	134.1	134.2	139.2	0.86	0.86	0.83
										450	115.6	562.5	1.92	134.1	134.2	165.2	0.86	0.86	0.70
										600	115.6	750.0	2.21	134.1	134.2	186.5	0.86	0.86	0.62
										750	115.6	937.5	2.48	134.1	134.2	205.0	0.86	0.86	0.56
RLC2_L6	110x50x10x10x5	7.42	5500	131.8	132.8	2033.6	3415.2	1.01	15.32	150	96.0	187.5	1.19	103.4	103.4	103.4	0.93	0.93	0.93
										300	98.1	375.0	1.69	115.5	115.6	127.7	0.85	0.85	0.77
										450	98.1	562.5	2.07	115.5	115.6	151.5	0.85	0.85	0.65
										600	98.1	750.0	2.39	115.5	115.6	171.1	0.85	0.85	0.57
										750	98.1	937.5	2.67	115.5	115.6	188.0	0.85	0.85	0.52

Table A1.5 (continuation): PC_M RLC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_y}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
RLC3_L1	120x60x12x12x5.5	6.50	4500	253.9	364.1	2560.7	7629.8	1.43	7.03	150	169.5	237.6	0.97	160.6	160.6	160.6	1.06	1.06	1.06
										300	207.4	475.2	1.37	217.1	217.1	217.1	0.96	0.96	0.96
										450	208.8	712.8	1.68	222.6	240.8	246.1	0.94	0.87	0.85
										600	208.8	950.4	1.93	222.6	266.5	280.1	0.94	0.78	0.75
										750	208.8	1188.0	2.16	222.6	288.3	309.7	0.94	0.72	0.67
RLC3_L2	120x60x12x12x5.5	6.50	5000	216.0	294.9	2560.7	7629.8	1.37	8.68	150	154.6	237.6	1.05	149.9	149.9	149.9	1.03	1.03	1.03
										300	174.8	475.2	1.48	189.2	189.2	189.2	0.92	0.92	0.92
										450	174.8	712.8	1.82	189.5	209.3	225.2	0.92	0.84	0.78
										600	174.8	950.4	2.10	189.5	225.5	256.3	0.92	0.78	0.68
										750	174.8	1188.0	2.35	189.5	238.9	283.4	0.92	0.73	0.62
RLC3_L3	120x60x12x12x5.5	6.50	6000	162.8	204.8	2560.7	7629.8	1.26	12.50	150	123.6	237.6	1.21	129.0	129.0	129.0	0.96	0.96	0.96
										300	128.5	475.2	1.71	142.8	149.2	160.6	0.90	0.86	0.80
										450	128.5	712.8	2.09	142.8	159.6	192.8	0.90	0.80	0.67
										600	128.5	950.4	2.42	142.8	167.4	219.4	0.90	0.77	0.59
										750	128.5	1188.0	2.70	142.8	173.8	242.6	0.90	0.74	0.53
RLC3_L4	120x60x12x12x5.5	6.50	7000	127.3	150.5	2560.7	7629.8	1.18	17.02	150	98.3	237.6	1.37	108.8	108.8	108.8	0.90	0.90	0.90
										300	98.7	475.2	1.93	111.7	117.8	140.3	0.88	0.84	0.70
										450	98.7	712.8	2.37	111.7	122.9	168.4	0.88	0.80	0.59
										600	98.7	950.4	2.73	111.7	126.7	191.6	0.88	0.78	0.51
										750	98.7	1188.0	3.05	111.7	129.7	211.9	0.88	0.76	0.47
RLC3_L5	120x60x12x12x5.5	6.50	8000	102.2	115.2	2560.7	7629.8	1.13	22.23	150	78.3	237.6	1.52	89.6	89.8	91.0	0.87	0.87	0.86
										300	78.3	475.2	2.16	89.6	92.8	124.3	0.87	0.84	0.63
										450	78.3	712.8	2.64	89.6	94.5	149.2	0.87	0.83	0.52
										600	78.3	950.4	3.05	89.6	95.8	169.8	0.87	0.82	0.46
										750	78.3	1188.0	3.41	89.6	96.8	187.7	0.87	0.81	0.42
RLC3_L6	120x60x12x12x5.5	6.50	9000	83.6	91.0	2560.7	7629.8	1.09	28.13	150	63.6	237.6	1.69	73.4	73.4	81.5	0.87	0.87	0.78
										300	63.6	475.2	2.38	73.4	73.4	111.3	0.87	0.87	0.57
										450	63.6	712.8	2.92	73.4	73.4	133.6	0.87	0.87	0.48
										600	63.6	950.4	3.37	73.4	73.4	152.1	0.87	0.87	0.42
										750	63.6	1188.0	3.77	73.4	73.4	168.1	0.87	0.87	0.38
RLC4_L1	120x50x10x10x5	8.61	2500	505.0	662.4	1965.6	2712.4	1.31	2.97	150	176.3	195.0	0.62	165.9	165.9	165.9	1.06	1.06	1.06
										300	317.2	390.0	0.88	282.3	282.3	282.3	1.12	1.12	1.12
										450	394.0	585.0	1.08	360.2	360.2	360.2	1.09	1.09	1.09
										600	420.6	780.0	1.24	408.6	408.6	408.6	1.03	1.03	1.03
										750	423.6	975.0	1.39	434.6	434.6	434.6	0.97	0.97	0.97
RLC4_L2	120x50x10x10x5	8.61	2750	434.6	547.5	1965.6	2712.4	1.26	3.59	150	171.7	195.0	0.67	161.6	161.6	161.6	1.06	1.06	1.06
										300	297.7	390.0	0.95	267.9	267.9	267.9	1.11	1.11	1.11
										450	348.7	585.0	1.16	333.0	333.0	333.0	1.05	1.05	1.05
										600	357.6	780.0	1.34	368.0	368.0	368.0	0.97	0.97	0.97
										750	360.0	975.0	1.50	381.2	381.2	381.2	0.94	0.94	0.94
RLC4_L3	120x50x10x10x5	8.61	3000	380.1	460.0	1965.6	2712.4	1.21	4.27	150	169.9	195.0	0.72	157.3	157.3	157.3	1.08	1.08	1.08
										300	276.2	390.0	1.01	253.8	253.8	253.8	1.09	1.09	1.09
										450	306.3	585.0	1.24	307.2	307.2	307.2	1.00	1.00	1.00
										600	309.7	780.0	1.43	330.4	330.4	330.4	0.94	0.94	0.94
										750	309.7	975.0	1.60	333.3	336.4	350.9	0.93	0.92	0.88
RLC4_L4	120x50x10x10x5	8.61	3500	301.7	338.0	1965.6	2712.4	1.12	5.82	150	161.2	195.0	0.80	148.8	148.8	148.8	1.08	1.08	1.08
										300	231.2	390.0	1.14	227.0	227.0	227.0	1.02	1.02	1.02
										450	237.5	585.0	1.39	259.8	259.8	259.8	0.91	0.91	0.91
										600	237.5	780.0	1.61	264.6	264.7	279.4	0.90	0.90	0.85
										750	237.5	975.0	1.80	264.6	264.7	304.5	0.90	0.90	0.78
RLC4_L5	120x50x10x10x5	8.61	4000	248.0	258.8	1965.6	2712.4	1.04	7.60	150	150.3	195.0	0.89	140.3	140.3	140.3	1.07	1.07	1.07
										300	189.0	390.0	1.25	201.9	201.9	201.9	0.94	0.94	0.94
										450	189.2	585.0	1.54	217.5	217.6	221.6	0.87	0.87	0.85
										600	189.3	780.0	1.77	217.5	217.6	247.7	0.87	0.87	0.76
										750	189.3	975.0	1.98	217.5	217.6	270.1	0.87	0.87	0.70
RLC4_L6	120x50x10x10x5	8.61	4250	227.0	229.2	1965.6	2712.4	1.01	8.58	150	144.0	195.0	0.93	136.1	136.1	136.1	1.06	1.06	1.06
										300	170.6	390.0	1.31	190.0	190.0	190.0	0.90	0.90	0.90
										450	170.6	585.0	1.61	199.1	199.2	209.9	0.86	0.86	0.81
										600	170.6	780.0	1.85	199.1	199.2	234.6	0.86	0.86	0.73
										750	170.6	975.0	2.07	199.1	199.2	255.8	0.86	0.86	0.67

Table A1.5 (continuation): PC_M RLC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
RLC5_L1	140x70x10x10x6	6.77	5000	325.2	460.4	2511.8	7559.6	1.42	5.46	150	211.4	288.0	0.94	198.8	198.8	198.8	1.06	1.06	1.06
										300	265.1	576.0	1.33	274.4	274.4	274.4	0.97	0.97	0.97
										450	266.6	864.0	1.63	285.2	300.7	307.1	0.93	0.89	0.87
										600	266.6	1152.0	1.88	285.2	329.3	348.7	0.93	0.81	0.76
										750	266.6	1440.0	2.10	285.2	353.3	384.9	0.93	0.75	0.69
RLC5_L2	140x70x10x10x6	6.77	5500	282.3	380.5	2511.8	7559.6	1.35	6.60	150	197.2	288.0	1.01	187.9	187.9	187.9	1.05	1.05	1.05
										300	227.4	576.0	1.43	245.2	245.2	245.2	0.93	0.93	0.93
										450	227.5	864.0	1.75	247.6	266.1	283.8	0.92	0.85	0.80
										600	227.5	1152.0	2.02	247.6	284.6	322.3	0.92	0.80	0.71
										750	227.5	1440.0	2.26	247.6	299.8	355.7	0.92	0.76	0.64
RLC5_L3	140x70x10x10x6	6.77	6000	248.1	319.7	2511.8	7559.6	1.29	7.86	150	179.4	288.0	1.08	177.2	177.2	177.2	1.01	1.01	1.01
										300	196.8	576.0	1.52	217.5	218.9	220.7	0.90	0.90	0.89
										450	196.8	864.0	1.87	217.5	235.7	264.0	0.90	0.83	0.75
										600	196.8	1152.0	2.16	217.5	248.4	299.8	0.90	0.79	0.66
										750	196.8	1440.0	2.41	217.5	258.7	330.9	0.90	0.76	0.59
RLC5_L4	140x70x10x10x6	6.77	7000	196.6	234.9	2511.8	7559.6	1.20	10.69	150	148.6	288.0	1.21	156.0	156.0	156.0	0.95	0.95	0.95
										300	152.0	576.0	1.71	172.4	177.5	193.8	0.88	0.86	0.78
										450	152.0	864.0	2.10	172.4	185.5	231.9	0.88	0.82	0.66
										600	152.0	1152.0	2.42	172.4	191.4	263.3	0.88	0.79	0.58
										750	152.0	1440.0	2.71	172.4	196.1	290.6	0.88	0.78	0.52
RLC5_L5	140x70x10x10x6	6.77	8000	159.7	179.9	2511.8	7559.6	1.13	13.97	150	120.9	288.0	1.34	135.4	135.4	135.4	0.89	0.89	0.89
										300	121.1	576.0	1.90	140.0	142.6	172.6	0.87	0.85	0.70
										450	121.1	864.0	2.33	140.0	144.8	206.5	0.87	0.84	0.59
										600	121.1	1152.0	2.69	140.0	146.4	234.5	0.87	0.83	0.52
										750	121.2	1440.0	3.00	140.0	147.6	258.8	0.87	0.82	0.47
RLC5_L6	140x70x10x10x6	6.77	9000	132.1	142.1	2511.8	7559.6	1.08	17.67	150	98.9	288.0	1.48	115.6	115.6	115.6	0.86	0.86	0.86
										300	98.9	576.0	2.09	115.8	115.9	155.3	0.85	0.85	0.64
										450	98.9	864.0	2.56	115.8	115.9	185.7	0.85	0.85	0.53
										600	98.9	1152.0	2.95	115.8	115.9	210.9	0.85	0.85	0.47
										750	98.9	1440.0	3.30	115.8	115.9	232.8	0.85	0.85	0.42
RLC6_L1	100x40x10x10x2	11.82	3000	74.1	102.6	293.6	315.7	1.38	2.86	150	47.5	66.0	0.94	45.5	45.5	45.5	1.05	1.05	1.05
										300	60.5	132.0	1.33	62.6	62.6	62.6	0.97	0.97	0.97
										450	61.3	198.0	1.63	65.0	66.4	68.4	0.94	0.92	0.90
										600	61.3	264.0	1.89	65.0	68.8	74.3	0.94	0.89	0.82
										750	61.3	330.0	2.11	65.0	70.7	79.3	0.94	0.87	0.77
RLC6_L2	100x40x10x10x2	11.82	3500	56.7	75.4	293.6	315.7	1.33	3.89	150	40.6	66.0	1.08	40.6	40.6	40.6	1.00	1.00	1.00
										300	45.7	132.0	1.53	49.8	49.9	50.3	0.92	0.92	0.91
										450	45.7	198.0	1.87	49.8	51.2	56.6	0.92	0.89	0.81
										600	45.8	264.0	2.16	49.8	52.1	61.5	0.92	0.88	0.74
										750	45.8	330.0	2.41	49.8	52.9	65.6	0.92	0.87	0.70
RLC6_L3	100x40x10x10x2	11.82	4000	45.4	57.7	293.6	315.7	1.27	5.09	150	34.1	66.0	1.21	35.9	35.9	35.9	0.95	0.95	0.95
										300	35.6	132.0	1.71	39.8	40.0	42.9	0.90	0.89	0.83
										450	35.6	198.0	2.09	39.8	40.3	48.3	0.90	0.88	0.74
										600	35.6	264.0	2.41	39.8	40.5	52.5	0.90	0.88	0.68
										750	35.6	330.0	2.70	39.8	40.7	56.0	0.90	0.88	0.64
RLC6_L4	100x40x10x10x2	11.82	4500	37.5	45.6	293.6	315.7	1.22	6.44	150	28.4	66.0	1.33	31.6	31.6	31.6	0.90	0.90	0.90
										300	28.6	132.0	1.88	32.9	32.9	37.5	0.87	0.87	0.76
										450	28.6	198.0	2.30	32.9	32.9	42.1	0.87	0.87	0.68
										600	28.6	264.0	2.65	32.9	32.9	45.8	0.87	0.87	0.63
										750	28.6	330.0	2.97	32.9	32.9	48.9	0.87	0.87	0.59
RLC6_L5	100x40x10x10x2	11.82	5000	31.7	36.9	293.6	315.7	1.16	7.95	150	23.6	66.0	1.44	27.6	27.6	27.6	0.85	0.85	0.85
										300	23.6	132.0	2.04	27.8	27.8	33.3	0.85	0.85	0.71
										450	23.6	198.0	2.50	27.8	27.8	37.4	0.85	0.85	0.63
										600	23.6	264.0	2.88	27.8	27.8	40.7	0.85	0.85	0.58
										750	23.6	330.0	3.22	27.8	27.8	43.4	0.85	0.85	0.54
RLC6_L6	100x40x10x10x2	11.82	6000	24.0	25.7	293.6	315.7	1.07	11.44	150	16.9	66.0	1.66	21.1	21.1	22.3	0.80	0.80	0.76
										300	16.9	132.0	2.34	21.1	21.1	27.3	0.80	0.80	0.62
										450	16.9	198.0	2.87	21.1	21.1	30.7	0.80	0.80	0.55
										600	16.9	264.0	3.31	21.1	21.1	33.4	0.80	0.80	0.51
										750	16.9	330.0	3.71	21.1	21.1	35.7	0.80	0.80	0.47
							Max	1.460	46.354							Mean	0.923	0.897	0.767
							Min	1.008	2.861							Sd.Dv.	0.072	0.090	0.206
																Max	1.124	1.124	1.124
																Min	0.804	0.724	0.328

Table A1.6 (to be continued): PC_M WSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_y}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WSC1_L1	110x50x10x3	9.39	3000	158.6	217.6	515.4	7068.5	1.37	2.37	150	87.1	107.2	0.82	80.8	80.8	80.8	1.08	1.08	1.08
										300	125.5	214.5	1.16	121.8	121.8	121.8	1.03	1.03	1.03
										450	132.2	321.7	1.42	137.7	137.7	137.7	0.96	0.96	0.96
										600	132.6	428.9	1.64	139.1	143.9	148.8	0.95	0.92	0.89
										750	132.6	536.1	1.84	139.1	149.8	161.4	0.95	0.89	0.82
WSC1_L2	110x50x10x3	9.39	3500	123.5	159.9	515.4	7068.5	1.29	3.22	150	78.9	107.2	0.93	74.5	74.5	74.5	1.06	1.06	1.06
										300	98.7	214.5	1.32	103.7	103.7	103.7	0.95	0.95	0.95
										450	100.4	321.7	1.61	108.3	110.1	114.3	0.93	0.91	0.88
										600	100.4	428.9	1.86	108.3	113.5	126.9	0.93	0.88	0.79
										750	100.4	536.1	2.08	108.3	116.3	137.6	0.93	0.86	0.73
WSC1_L3	110x50x10x3	9.39	4000	100.2	122.4	515.4	7068.5	1.22	4.21	150	70.1	107.2	1.03	68.5	68.5	68.5	1.02	1.02	1.02
										300	79.1	214.5	1.46	87.5	87.5	87.5	0.90	0.90	0.90
										450	79.1	321.7	1.79	87.8	89.5	100.0	0.90	0.88	0.79
										600	79.1	428.9	2.07	87.8	90.9	111.0	0.90	0.87	0.71
										750	79.1	536.1	2.31	87.8	92.0	120.4	0.90	0.86	0.66
WSC1_L4	110x50x10x3	9.39	4500	83.7	96.7	515.4	7068.5	1.16	5.33	150	61.0	107.2	1.13	62.7	62.7	62.7	0.97	0.97	0.97
										300	64.2	214.5	1.60	73.4	73.5	77.0	0.87	0.87	0.83
										450	64.2	321.7	1.96	73.4	73.5	89.2	0.87	0.87	0.72
										600	64.2	428.9	2.26	73.4	73.5	99.1	0.87	0.87	0.65
										750	64.2	536.1	2.53	73.4	73.5	107.4	0.87	0.87	0.60
WSC1_L5	110x50x10x3	9.39	5000	71.5	78.3	515.4	7068.5	1.10	6.58	150	52.4	107.2	1.22	57.2	57.2	57.2	0.92	0.92	0.92
										300	53.2	214.5	1.73	62.7	62.7	69.6	0.85	0.85	0.76
										450	53.3	321.7	2.12	62.7	62.7	80.7	0.85	0.85	0.66
										600	53.3	428.9	2.45	62.7	62.7	89.6	0.85	0.85	0.59
										750	53.3	536.1	2.74	62.7	62.7	97.2	0.85	0.85	0.55
WSC1_L6	110x50x10x3	9.39	5500	62.1	64.7	515.4	7068.5	1.04	7.96	150	45.0	107.2	1.31	52.0	52.0	52.0	0.86	0.86	0.86
										300	45.0	214.5	1.86	54.4	54.5	63.7	0.83	0.83	0.71
										450	45.0	321.7	2.28	54.4	54.5	73.8	0.83	0.83	0.61
										600	45.1	428.9	2.63	54.4	54.5	81.9	0.83	0.83	0.55
										750	45.1	536.1	2.94	54.4	54.5	88.8	0.83	0.83	0.51
WSC2_L1	100x50x10x3	7.98	3500	106.1	154.9	546.8	9203.6	1.46	3.53	150	72.2	102.7	0.98	68.5	68.5	68.5	1.05	1.05	1.05
										300	87.5	205.5	1.39	91.3	91.3	91.3	0.96	0.96	0.96
										450	87.9	308.2	1.70	93.0	101.9	103.2	0.95	0.86	0.85
										600	88.0	410.9	1.97	93.0	112.9	116.0	0.95	0.78	0.76
										750	88.0	513.6	2.20	93.0	122.2	127.0	0.95	0.72	0.69
WSC2_L2	100x50x10x3	7.98	4000	86.0	118.6	546.8	9203.6	1.38	4.61	150	63.0	102.7	1.09	62.3	62.3	62.3	1.01	1.01	1.01
										300	69.5	205.5	1.55	75.4	76.5	77.3	0.92	0.91	0.90
										450	69.5	308.2	1.89	75.4	84.0	91.2	0.92	0.83	0.76
										600	69.5	410.9	2.19	75.4	89.7	102.4	0.92	0.77	0.68
										750	69.5	513.6	2.44	75.4	94.5	112.1	0.92	0.74	0.62
WSC2_L3	100x50x10x3	7.98	5000	61.1	75.9	546.8	9203.6	1.24	7.20	150	46.6	102.7	1.30	50.9	50.9	50.9	0.92	0.92	0.92
										300	47.1	205.5	1.83	53.6	56.1	63.1	0.88	0.84	0.75
										450	47.1	308.2	2.24	53.6	58.6	74.4	0.88	0.80	0.63
										600	47.1	410.9	2.59	53.6	60.5	83.6	0.88	0.78	0.56
										750	47.1	513.6	2.90	53.6	62.0	91.5	0.88	0.76	0.51
WSC2_L4	100x50x10x3	7.98	6000	46.3	52.7	546.8	9203.6	1.14	10.37	150	34.3	102.7	1.49	40.6	40.6	40.6	0.84	0.84	0.84
										300	34.3	205.5	2.11	40.6	41.1	53.5	0.84	0.84	0.64
										450	34.3	308.2	2.58	40.6	41.3	63.1	0.84	0.83	0.54
										600	34.3	410.9	2.98	40.6	41.5	70.9	0.84	0.83	0.48
										750	34.3	513.6	3.33	40.6	41.7	77.6	0.84	0.82	0.44
WSC2_L5	100x50x10x3	7.98	7000	36.4	38.7	546.8	9203.6	1.07	14.12	150	26.2	102.7	1.68	31.9	31.9	35.0	0.82	0.82	0.75
										300	26.2	205.5	2.38	31.9	31.9	46.3	0.82	0.82	0.56
										450	26.2	308.2	2.91	31.9	31.9	54.6	0.82	0.82	0.48
										600	26.2	410.9	3.36	31.9	31.9	61.4	0.82	0.82	0.43
										750	26.2	513.6	3.76	31.9	31.9	67.2	0.82	0.82	0.39
WSC2_L6	100x50x10x3	7.98	8000	29.3	29.7	546.8	9203.6	1.01	18.44	150	20.6	102.7	1.87	25.7	25.7	30.8	0.80	0.80	0.67
										300	20.7	205.5	2.65	25.7	25.7	40.8	0.80	0.80	0.51
										450	20.7	308.2	3.24	25.7	25.7	48.0	0.80	0.80	0.43
										600	20.7	410.9	3.75	25.7	25.7	54.0	0.80	0.80	0.38
										750	20.7	513.6	4.19	25.7	25.7	59.1	0.80	0.80	0.35

Table A1.6 (continuation): PC_M WSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*						
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{p_z}{p_{zG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WSC3_L1	90x40x10x2	10.45	2500	83.2	114.3	253.1	2809.2	1.37	2.21	150	47.1	59.5	0.85	44.1	44.1	44.1	1.07	1.07	1.07
										300	65.8	119.0	1.20	65.4	65.4	65.4	1.01	1.01	1.01
										450	69.3	178.5	1.46	72.7	72.7	72.7	0.95	0.95	0.95
										600	69.4	237.9	1.69	73.0	75.7	79.0	0.95	0.92	0.88
										750	69.4	297.4	1.89	73.0	78.3	85.1	0.95	0.89	0.82
WSC3_L2	90x40x10x2	10.45	3000	60.8	79.4	253.1	2809.2	1.31	3.19	150	40.9	59.5	0.99	39.5	39.5	39.5	1.03	1.03	1.03
										300	49.1	119.0	1.40	52.5	52.5	52.5	0.94	0.94	0.94
										450	49.3	178.5	1.71	53.3	54.6	58.3	0.92	0.90	0.85
										600	49.3	237.9	1.98	53.3	55.9	64.1	0.92	0.88	0.77
										750	49.3	297.4	2.21	53.3	57.0	69.0	0.92	0.86	0.71
WSC3_L3	90x40x10x2	10.45	3500	47.1	58.3	253.1	2809.2	1.24	4.34	150	34.4	59.5	1.12	35.1	35.1	35.1	0.98	0.98	0.98
										300	37.0	119.0	1.59	41.3	41.5	43.0	0.90	0.89	0.86
										450	37.0	178.5	1.95	41.3	42.1	49.1	0.90	0.88	0.75
										600	37.0	237.9	2.25	41.3	42.4	54.1	0.90	0.87	0.68
										750	37.0	297.4	2.51	41.3	42.8	58.2	0.90	0.87	0.64
WSC3_L4	90x40x10x2	10.45	4000	38.1	44.6	253.1	2809.2	1.17	5.67	150	28.4	59.5	1.25	30.9	30.9	30.9	0.92	0.92	0.92
										300	29.0	119.0	1.77	33.4	33.4	37.2	0.87	0.87	0.78
										450	29.0	178.5	2.17	33.4	33.4	42.6	0.87	0.87	0.68
										600	29.0	237.9	2.50	33.4	33.4	46.9	0.87	0.87	0.62
										750	29.0	297.4	2.80	33.4	33.4	50.5	0.87	0.87	0.57
WSC3_L5	90x40x10x2	10.45	5000	26.9	28.6	253.1	2809.2	1.06	8.86	150	19.3	59.5	1.49	23.6	23.6	23.6	0.82	0.82	0.82
										300	19.3	119.0	2.10	23.6	23.6	29.6	0.82	0.82	0.65
										450	19.3	178.5	2.57	23.6	23.6	33.8	0.82	0.82	0.57
										600	19.3	237.9	2.97	23.6	23.6	37.2	0.82	0.82	0.52
										750	19.3	297.4	3.32	23.6	23.6	40.1	0.82	0.82	0.48
WSC3_L6	90x40x10x2	10.45	5500	23.3	23.6	253.1	2809.2	1.01	10.72	150	16.2	59.5	1.60	20.4	20.4	21.3	0.80	0.79	0.76
										300	16.3	119.0	2.26	20.4	20.4	26.8	0.80	0.79	0.61
										450	16.3	178.5	2.77	20.4	20.4	30.7	0.80	0.79	0.53
										600	16.3	237.9	3.20	20.4	20.4	33.8	0.80	0.79	0.48
										750	16.3	297.4	3.57	20.4	20.4	36.4	0.80	0.79	0.45
WSC4_L1	120x60x15x4	7.47	4500	160.8	233.9	1065.0	19546.3	1.45	4.55	150	112.8	167.0	1.02	108.1	108.1	108.1	1.04	1.04	1.04
										300	132.1	333.9	1.44	140.0	140.0	140.0	0.94	0.94	0.94
										450	132.2	500.9	1.76	141.1	158.6	161.8	0.94	0.83	0.82
										600	132.3	667.9	2.04	141.1	175.8	182.7	0.94	0.75	0.72
										750	132.3	834.8	2.28	141.1	190.4	200.6	0.94	0.69	0.66
WSC4_L2	120x60x15x4	7.47	5000	136.5	189.5	1065.0	19546.3	1.39	5.62	150	100.7	167.0	1.11	100.1	100.1	100.1	1.01	1.01	1.01
										300	110.1	333.9	1.56	119.7	122.4	124.1	0.92	0.90	0.89
										450	110.1	500.9	1.92	119.7	135.8	147.1	0.92	0.81	0.75
										600	110.1	667.9	2.21	119.7	146.2	166.1	0.92	0.75	0.66
										750	110.1	834.8	2.47	119.7	154.8	182.4	0.92	0.71	0.60
WSC4_L3	120x60x15x4	7.47	6000	103.0	131.6	1065.0	19546.3	1.28	8.09	150	79.0	167.0	1.27	84.7	84.7	84.7	0.93	0.93	0.93
										300	80.2	333.9	1.80	90.4	95.6	105.4	0.89	0.84	0.76
										450	80.2	500.9	2.20	90.4	101.6	125.0	0.89	0.79	0.64
										600	80.2	667.9	2.55	90.4	106.1	141.1	0.89	0.76	0.57
										750	80.2	834.8	2.85	90.4	109.8	155.0	0.89	0.73	0.52
WSC4_L4	120x60x15x4	7.47	7000	81.1	96.7	1065.0	19546.3	1.19	11.02	150	61.4	167.0	1.43	70.5	70.5	70.5	0.87	0.87	0.87
										300	61.4	333.9	2.03	71.1	74.9	91.8	0.86	0.82	0.67
										450	61.4	500.9	2.48	71.1	77.5	108.9	0.86	0.79	0.56
										600	61.4	667.9	2.87	71.1	79.4	122.9	0.86	0.77	0.50
										750	61.4	834.8	3.21	71.1	81.0	135.0	0.86	0.76	0.46
WSC4_L5	120x60x15x4	7.47	8000	65.6	74.0	1065.0	19546.3	1.13	14.39	150	48.7	167.0	1.59	57.6	57.7	60.7	0.85	0.84	0.80
										300	48.7	333.9	2.26	57.6	58.4	81.2	0.85	0.83	0.60
										450	48.7	500.9	2.76	57.6	58.8	96.3	0.85	0.83	0.51
										600	48.7	667.9	3.19	57.6	59.1	108.7	0.85	0.82	0.45
										750	48.7	834.8	3.57	57.6	59.4	119.4	0.85	0.82	0.41
WSC4_L6	120x60x15x4	7.47	9000	54.2	58.5	1065.0	19546.3	1.08	18.21	150	39.5	167.0	1.76	47.5	47.6	54.3	0.83	0.83	0.73
										300	39.5	333.9	2.48	47.5	47.6	72.7	0.83	0.83	0.54
										450	39.5	500.9	3.04	47.5	47.6	86.2	0.83	0.83	0.46
										600	39.5	667.9	3.51	47.5	47.6	97.3	0.83	0.83	0.41
										750	39.5	834.8	3.92	47.5	47.6	106.8	0.83	0.83	0.37

Table A1.6 (continuation): PC_M WSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WSC5_L1	120x50x10x2	12.88	3500	82.7	109.6	197.1	2619.7	1.32	1.80	150	53.2	74.5	0.95	51.1	51.1	51.1	1.04	1.04	1.04
										300	67.0	149.0	1.34	70.1	70.1	70.1	0.96	0.96	0.96
										450	68.2	223.5	1.64	72.5	72.9	76.1	0.94	0.93	0.90
										600	68.2	297.9	1.90	72.5	73.5	82.0	0.94	0.93	0.83
										750	68.2	372.4	2.12	72.5	74.0	86.8	0.94	0.92	0.79
WSC5_L2	120x50x10x2	12.88	4000	65.5	83.9	197.1	2619.7	1.28	2.35	150	46.4	74.5	1.07	46.3	46.3	46.3	1.00	1.00	1.00
										300	52.8	149.0	1.51	57.4	57.5	57.6	0.92	0.92	0.92
										450	52.9	223.5	1.85	57.4	57.5	64.0	0.92	0.92	0.83
										600	52.9	297.9	2.13	57.4	57.5	68.9	0.92	0.92	0.77
										750	52.9	372.4	2.38	57.4	57.5	73.0	0.92	0.92	0.72
WSC5_L3	120x50x10x2	12.88	4500	53.6	66.3	197.1	2619.7	1.24	2.97	150	39.8	74.5	1.18	41.6	41.6	41.6	0.96	0.96	0.96
										300	42.3	149.0	1.67	47.0	47.1	49.7	0.90	0.90	0.85
										450	42.3	223.5	2.04	47.0	47.1	55.2	0.90	0.90	0.77
										600	42.3	297.9	2.36	47.0	47.1	59.4	0.90	0.90	0.71
										750	42.3	372.4	2.64	47.0	47.1	63.0	0.90	0.90	0.67
WSC5_L4	120x50x10x2	12.88	5000	45.1	53.7	197.1	2619.7	1.19	3.67	150	33.9	74.5	1.29	37.3	37.3	37.3	0.91	0.91	0.91
										300	34.6	149.0	1.82	39.5	39.6	43.7	0.88	0.88	0.79
										450	34.6	223.5	2.23	39.5	39.6	48.5	0.88	0.88	0.71
										600	34.6	297.9	2.57	39.5	39.6	52.3	0.88	0.88	0.66
										750	34.7	372.4	2.87	39.5	39.6	55.4	0.88	0.88	0.63
WSC5_L5	120x50x10x2	12.88	6000	33.8	37.3	197.1	2619.7	1.10	5.29	150	24.7	74.5	1.48	29.6	29.6	29.6	0.83	0.83	0.83
										300	24.7	149.0	2.10	29.6	29.6	35.3	0.83	0.83	0.70
										450	24.7	223.5	2.57	29.6	29.6	39.2	0.83	0.83	0.63
										600	24.7	297.9	2.97	29.6	29.6	42.2	0.83	0.83	0.58
										750	24.7	372.4	3.32	29.6	29.6	44.7	0.83	0.83	0.55
WSC5_L6	120x50x10x2	12.88	7000	26.8	27.4	197.1	2619.7	1.02	7.20	150	18.5	74.5	1.67	23.5	23.5	24.8	0.79	0.79	0.75
										300	18.5	149.0	2.36	23.5	23.5	29.7	0.79	0.79	0.62
										450	18.5	223.5	2.89	23.5	23.5	33.0	0.79	0.79	0.56
										600	18.5	297.9	3.34	23.5	23.5	35.5	0.79	0.79	0.52
										750	18.5	372.4	3.73	23.5	23.5	37.6	0.79	0.79	0.49
WSC6_L1	140x70x15x4	7.99	5500	158.5	237.5	936.6	18353.1	1.50	3.94	150	117.1	191.0	1.10	115.3	115.3	115.3	1.02	1.02	1.02
										300	130.5	381.9	1.55	139.0	143.0	143.0	0.94	0.91	0.91
										450	130.5	572.9	1.90	139.0	168.5	168.5	0.94	0.77	0.77
										600	130.5	763.9	2.20	139.0	189.4	189.4	0.94	0.69	0.69
										750	130.5	954.8	2.45	139.0	207.3	207.3	0.94	0.63	0.63
WSC6_L2	140x70x15x4	7.99	6000	138.4	199.6	936.6	18353.1	1.44	4.69	150	105.3	191.0	1.17	107.2	107.2	107.2	0.98	0.98	0.98
										300	112.0	381.9	1.66	121.4	129.7	131.9	0.92	0.86	0.85
										450	112.0	572.9	2.03	121.4	147.7	155.5	0.92	0.76	0.72
										600	112.0	763.9	2.35	121.4	161.9	174.7	0.92	0.69	0.64
										750	112.0	954.8	2.63	121.4	173.9	191.3	0.92	0.64	0.59
WSC6_L3	140x70x15x4	7.99	6500	122.4	170.1	936.6	18353.1	1.39	5.51	150	94.6	191.0	1.25	99.4	99.4	99.4	0.95	0.95	0.95
										300	97.4	381.9	1.77	107.4	116.3	122.7	0.91	0.84	0.79
										450	97.4	572.9	2.16	107.4	128.3	144.6	0.91	0.76	0.67
										600	97.4	763.9	2.50	107.4	137.5	162.4	0.91	0.71	0.60
										750	97.4	954.8	2.79	107.4	145.2	177.8	0.91	0.67	0.55
WSC6_L4	140x70x15x4	7.99	7000	109.4	146.6	936.6	18353.1	1.34	6.39	150	84.6	191.0	1.32	92.0	92.0	92.0	0.92	0.92	0.92
										300	85.6	381.9	1.87	95.9	104.3	114.7	0.89	0.82	0.75
										450	85.6	572.9	2.29	95.9	112.6	135.2	0.89	0.76	0.63
										600	85.6	763.9	2.64	95.9	118.9	151.9	0.89	0.72	0.56
										750	85.6	954.8	2.95	95.9	124.0	166.3	0.89	0.69	0.51
WSC6_L5	140x70x15x4	7.99	8000	89.4	112.3	936.6	18353.1	1.26	8.34	150	67.9	191.0	1.46	78.1	78.1	78.1	0.87	0.87	0.87
										300	67.9	381.9	2.07	78.4	84.7	101.7	0.87	0.80	0.67
										450	67.9	572.9	2.53	78.4	89.0	119.9	0.87	0.76	0.57
										600	67.9	763.9	2.92	78.4	92.1	134.7	0.87	0.74	0.50
										750	67.9	954.8	3.27	78.4	94.6	147.5	0.87	0.72	0.46
WSC6_L6	140x70x15x4	7.99	9000	74.7	88.7	936.6	18353.1	1.19	10.56	150	55.4	191.0	1.60	65.5	66.1	69.1	0.84	0.84	0.80
										300	55.4	381.9	2.26	65.5	69.2	91.5	0.84	0.80	0.61
										450	55.4	572.9	2.77	65.5	71.0	107.8	0.84	0.78	0.51
										600	55.4	763.9	3.20	65.5	72.3	121.1	0.84	0.77	0.46
										750	55.4	954.8	3.57	65.5	73.4	132.6	0.84	0.75	0.42
							Max	1.499	18.442							Mean	0.893	0.852	0.716
							Min	1.012	1.799							Sd.Dv.	0.063	0.085	0.180
																Max	1.078	1.078	1.078
																Min	0.790	0.630	0.349

Table A1.7 (to be continued): PC_M WFSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{p_u}{p_{uG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WFSC1_L1	110x50x10x3	8.83	3000	152.7	223.3	651.4	22986.1	1.46	2.92	150	89.8	114.7	0.87	83.7	83.7	83.7	1.07	1.07	1.07
										300	122.8	229.4	1.23	122.3	122.3	122.3	1.00	1.00	1.00
										450	128.5	344.0	1.50	133.9	134.0	134.1	0.96	0.96	0.96
										600	128.7	458.7	1.73	133.9	147.5	149.5	0.96	0.87	0.86
										750	128.7	573.4	1.94	133.9	158.9	162.8	0.96	0.81	0.79
WFSC1_L2	110x50x10x3	8.83	3500	120.2	164.0	651.4	22986.1	1.36	3.97	150	80.4	114.7	0.98	76.9	76.9	76.9	1.05	1.05	1.05
										300	97.6	229.4	1.38	103.2	103.2	103.2	0.95	0.95	0.95
										450	98.1	344.0	1.69	105.4	110.4	115.6	0.93	0.89	0.85
										600	98.1	458.7	1.95	105.4	116.5	128.9	0.93	0.84	0.76
										750	98.1	573.4	2.18	105.4	121.5	140.4	0.93	0.81	0.70
WFSC1_L3	110x50x10x3	8.83	4000	98.6	125.6	651.4	22986.1	1.27	5.19	150	70.7	114.7	1.08	70.5	70.5	70.5	1.00	1.00	1.00
										300	77.9	229.4	1.53	86.4	86.8	87.6	0.90	0.90	0.89
										450	77.9	344.0	1.87	86.4	90.7	102.2	0.90	0.86	0.76
										600	77.9	458.7	2.16	86.4	93.6	114.0	0.90	0.83	0.68
										750	77.9	573.4	2.41	86.4	95.9	124.1	0.90	0.81	0.63
WFSC1_L4	110x50x10x3	8.83	4500	83.2	99.2	651.4	22986.1	1.19	6.56	150	61.2	114.7	1.17	64.4	64.4	64.4	0.95	0.95	0.95
										300	63.6	229.4	1.66	73.0	73.7	78.9	0.87	0.86	0.81
										450	63.7	344.0	2.03	73.0	75.0	92.0	0.87	0.85	0.69
										600	63.7	458.7	2.35	73.0	76.0	102.6	0.87	0.84	0.62
										750	63.7	573.4	2.63	73.0	76.8	111.7	0.87	0.83	0.57
WFSC1_L5	110x50x10x3	8.83	5000	71.7	80.4	651.4	22986.1	1.12	8.10	150	52.8	114.7	1.26	58.7	58.7	58.7	0.90	0.90	0.90
										300	53.2	229.4	1.79	62.9	62.9	71.9	0.85	0.85	0.74
										450	53.2	344.0	2.19	62.9	62.9	83.9	0.85	0.85	0.63
										600	53.2	458.7	2.53	62.9	62.9	93.6	0.85	0.85	0.57
										750	53.2	573.4	2.83	62.9	62.9	101.9	0.85	0.85	0.52
WFSC1_L6	110x50x10x3	8.83	6000	55.4	55.8	651.4	22986.1	1.01	11.67	150	39.0	114.7	1.44	48.2	48.2	48.2	0.81	0.81	0.81
										300	39.0	229.4	2.03	48.6	48.6	61.3	0.80	0.80	0.64
										450	39.0	344.0	2.49	48.6	48.6	71.5	0.80	0.80	0.54
										600	39.0	458.7	2.88	48.6	48.6	79.8	0.80	0.80	0.49
										750	39.0	573.4	3.22	48.6	48.6	86.8	0.80	0.80	0.45
WFSC2_L1	100x50x10x3	7.43	4000	85.2	121.5	546.8	699.0	1.43	4.50	150	63.6	110.2	1.14	64.1	64.1	64.1	0.99	0.99	0.99
										300	68.7	220.4	1.61	74.7	78.1	79.3	0.92	0.88	0.87
										450	68.7	330.5	1.97	74.7	88.5	94.1	0.92	0.78	0.73
										600	68.7	440.7	2.27	74.7	96.8	106.2	0.92	0.71	0.65
										750	68.7	550.9	2.54	74.7	103.7	116.7	0.92	0.66	0.59
WSC2_L2	100x50x10x3	7.43	4500	71.8	96.0	546.8	699.0	1.34	5.70	150	54.5	110.2	1.24	58.0	58.0	58.0	0.94	0.94	0.94
										300	56.3	220.4	1.75	63.0	67.1	71.8	0.89	0.84	0.78
										450	56.3	330.5	2.15	63.0	72.8	85.2	0.89	0.77	0.66
										600	56.3	440.7	2.48	63.0	77.2	96.2	0.89	0.73	0.58
										750	56.3	550.9	2.77	63.0	80.8	105.7	0.89	0.70	0.53
WFSC2_L3	100x50x10x3	7.43	5000	61.7	77.7	546.8	699.0	1.26	7.03	150	46.9	110.2	1.34	52.2	52.2	52.2	0.90	0.90	0.90
										300	47.1	220.4	1.89	54.1	57.7	65.8	0.87	0.82	0.72
										450	47.1	330.5	2.32	54.1	61.1	78.0	0.87	0.77	0.60
										600	47.1	440.7	2.67	54.1	63.7	88.1	0.87	0.74	0.53
										750	47.1	550.9	2.99	54.1	65.7	96.8	0.87	0.72	0.49
WSC2_L4	100x50x10x3	7.43	6000	47.2	54.0	546.8	699.0	1.14	10.13	150	34.6	110.2	1.53	41.4	41.5	42.1	0.84	0.83	0.82
										300	34.6	220.4	2.16	41.4	42.6	56.4	0.84	0.81	0.61
										450	34.6	330.5	2.65	41.4	43.2	66.9	0.84	0.80	0.52
										600	34.6	440.7	3.06	41.4	43.7	75.5	0.84	0.79	0.46
										750	34.6	550.9	3.42	41.4	44.1	83.0	0.84	0.79	0.42
WFSC2_L5	100x50x10x3	7.43	7000	37.4	39.7	546.8	699.0	1.06	13.79	150	26.6	110.2	1.72	32.8	32.8	36.8	0.81	0.81	0.72
										300	26.6	220.4	2.43	32.8	32.8	49.2	0.81	0.81	0.54
										450	26.6	330.5	2.97	32.8	32.8	58.4	0.81	0.81	0.46
										600	26.6	440.7	3.43	32.8	32.8	66.0	0.81	0.81	0.40
										750	26.6	550.9	3.84	32.8	32.8	72.5	0.81	0.81	0.37
WFSC2_L6	100x50x10x3	7.43	8000	30.2	30.4	546.8	699.0	1.00	18.01	150	21.1	110.2	1.91	26.5	26.5	32.5	0.79	0.79	0.65
										300	21.1	220.4	2.70	26.5	26.5	43.6	0.79	0.79	0.48
										450	21.1	330.5	3.31	26.5	26.5	51.7	0.79	0.79	0.41
										600	21.1	440.7	3.82	26.5	26.5	58.4	0.79	0.79	0.36
										750	21.1	550.9	4.27	26.5	26.5	64.1	0.79	0.79	0.33

Table A1.7 (continuation): PC_M WFSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_y}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WFSC3_L1	90x40x10x2	9.34	3000	57.5	81.9	335.5	14850.3	1.42	4.10	150	40.9	64.5	1.06	40.3	40.3	40.3	1.01	1.01	1.01
										300	47.2	128.9	1.50	50.4	50.4	50.4	0.94	0.94	0.94
										450	47.3	193.4	1.83	50.4	55.8	58.4	0.94	0.85	0.81
										600	47.3	257.8	2.12	50.4	60.0	64.9	0.94	0.79	0.73
										750	47.3	322.3	2.37	50.4	63.5	70.4	0.94	0.74	0.67
WFSC3_L2	90x40x10x2	9.34	3500	45.2	60.1	335.5	14850.3	1.33	5.58	150	34.0	64.5	1.19	35.5	35.5	35.5	0.96	0.96	0.96
										300	35.9	128.9	1.69	39.6	41.0	43.3	0.91	0.88	0.83
										450	35.9	193.4	2.07	39.6	43.4	50.2	0.91	0.83	0.72
										600	35.9	257.8	2.39	39.6	45.2	55.7	0.91	0.80	0.64
										750	35.9	322.3	2.67	39.6	46.6	60.4	0.91	0.77	0.59
WFSC3_L3	90x40x10x2	9.34	4000	37.0	46.0	335.5	14850.3	1.24	7.29	150	28.1	64.5	1.32	31.1	31.1	31.1	0.90	0.90	0.90
										300	28.4	128.9	1.87	32.5	33.5	38.1	0.87	0.85	0.75
										450	28.4	193.4	2.28	32.5	34.5	44.2	0.87	0.82	0.64
										600	28.4	257.8	2.64	32.5	35.2	49.1	0.87	0.81	0.58
										750	28.4	322.3	2.95	32.5	35.7	53.2	0.87	0.79	0.53
WFSC3_L4	90x40x10x2	9.34	4500	31.2	36.4	335.5	14850.3	1.17	9.22	150	23.1	64.5	1.44	27.2	27.2	27.2	0.85	0.85	0.85
										300	23.1	128.9	2.03	27.4	27.5	34.2	0.84	0.84	0.68
										450	23.1	193.4	2.49	27.4	27.5	39.6	0.84	0.84	0.58
										600	23.1	257.8	2.87	27.4	27.5	44.0	0.84	0.84	0.53
										750	23.1	322.3	3.21	27.4	27.6	47.8	0.84	0.84	0.48
WFSC3_L5	90x40x10x2	9.34	5000	26.8	29.5	335.5	14850.3	1.10	11.38	150	19.2	64.5	1.55	23.5	23.6	24.1	0.82	0.82	0.80
										300	19.2	128.9	2.19	23.5	23.6	31.1	0.82	0.82	0.62
										450	19.2	193.4	2.68	23.5	23.6	36.0	0.82	0.82	0.53
										600	19.2	257.8	3.10	23.5	23.6	40.0	0.82	0.82	0.48
										750	19.2	322.3	3.46	23.5	23.6	43.4	0.82	0.82	0.44
WFSC3_L6	90x40x10x2	9.34	5500	23.4	24.4	335.5	14850.3	1.04	13.77	150	16.3	64.5	1.66	20.6	20.6	22.1	0.79	0.79	0.74
										300	16.3	128.9	2.35	20.6	20.6	28.5	0.79	0.79	0.57
										450	16.3	193.4	2.87	20.6	20.6	33.0	0.79	0.79	0.49
										600	16.3	257.8	3.32	20.6	20.6	36.7	0.79	0.79	0.44
										750	16.3	322.3	3.71	20.6	20.6	39.8	0.79	0.79	0.41
WFSC4_L1	120x60x15x4	7.14	4500	160.6	237.5	1214.7	89217.0	1.48	5.11	150	113.8	176.9	1.05	111.6	111.6	111.6	1.02	1.02	1.02
										300	131.0	353.8	1.48	140.7	140.7	140.7	0.93	0.93	0.93
										450	131.1	530.7	1.82	140.8	165.5	166.3	0.93	0.79	0.79
										600	131.1	707.6	2.10	140.8	186.6	188.2	0.93	0.70	0.70
										750	131.1	884.5	2.35	140.8	204.8	207.2	0.93	0.64	0.63
WFSC4_L2	120x60x15x4	7.14	5000	137.2	192.4	1214.7	89217.0	1.40	6.31	150	101.5	176.9	1.14	103.1	103.1	103.1	0.98	0.98	0.98
										300	109.6	353.8	1.61	120.3	125.2	127.7	0.91	0.88	0.86
										450	109.6	530.7	1.97	120.3	140.5	152.0	0.91	0.78	0.72
										600	109.6	707.6	2.27	120.3	152.4	172.1	0.91	0.72	0.64
										750	109.6	884.5	2.54	120.3	162.4	189.5	0.91	0.67	0.58
WFSC4_L3	120x60x15x4	7.14	6000	104.7	133.6	1214.7	89217.0	1.28	9.09	150	79.6	176.9	1.30	87.2	87.2	87.2	0.91	0.91	0.91
										300	80.5	353.8	1.84	91.9	98.1	109.5	0.88	0.82	0.74
										450	80.5	530.7	2.25	91.9	104.7	130.4	0.88	0.77	0.62
										600	80.5	707.6	2.60	91.9	109.6	147.6	0.88	0.73	0.55
										750	80.5	884.5	2.91	91.9	113.6	162.5	0.88	0.71	0.50
WFSC4_L4	120x60x15x4	7.14	7000	83.1	98.1	1214.7	89217.0	1.18	12.38	150	62.0	176.9	1.46	72.6	72.6	72.6	0.85	0.85	0.85
										300	62.0	353.8	2.06	72.9	77.0	96.0	0.85	0.81	0.65
										450	62.0	530.7	2.53	72.9	79.7	114.3	0.85	0.78	0.54
										600	62.0	707.6	2.92	72.9	81.6	129.4	0.85	0.76	0.48
										750	62.0	884.5	3.26	72.9	83.2	142.4	0.85	0.75	0.44
WFSC4_L5	120x60x15x4	7.14	8000	67.6	75.1	1214.7	89217.0	1.11	16.16	150	49.3	176.9	1.62	59.3	59.4	63.3	0.83	0.83	0.78
										300	49.3	353.8	2.29	59.3	59.6	85.3	0.83	0.83	0.58
										450	49.3	530.7	2.80	59.3	59.8	101.6	0.83	0.82	0.49
										600	49.3	707.6	3.24	59.3	59.9	115.0	0.83	0.82	0.43
										750	49.3	884.5	3.62	59.3	60.0	126.6	0.83	0.82	0.39
WFSC4_L6	120x60x15x4	7.14	9000	56.0	59.4	1214.7	89217.0	1.06	20.46	150	40.2	176.9	1.78	49.1	49.1	56.9	0.82	0.82	0.71
										300	40.2	353.8	2.51	49.1	49.1	76.7	0.82	0.82	0.52
										450	40.2	530.7	3.08	49.1	49.1	91.3	0.82	0.82	0.44
										600	40.2	707.6	3.55	49.1	49.1	103.3	0.82	0.82	0.39
										750	40.2	884.5	3.97	49.1	49.1	113.7	0.82	0.82	0.35

Table A1.7 (continuation): PC_M WFSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT.Fm}$	P_{nFT}	$\frac{P_y}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WFSC5_L1	120x50x10x2	11.97	3500	78.2	112.6	197.1	251.4	1.44	1.75	150	53.3	79.5	1.01	51.9	51.9	51.9	1.03	1.03	1.03
										300	65.0	158.9	1.43	67.8	67.8	67.8	0.96	0.96	0.96
										450	65.8	238.4	1.75	68.5	72.8	74.8	0.96	0.90	0.88
										600	65.8	317.8	2.02	68.5	77.1	81.2	0.96	0.85	0.81
										750	65.8	397.3	2.25	68.5	80.6	86.6	0.96	0.82	0.76
WFSC5_L2	120x50x10x2	11.97	4000	62.3	86.2	197.1	251.4	1.38	2.29	150	46.0	79.5	1.13	46.6	46.6	46.6	0.99	0.99	0.99
										300	51.2	158.9	1.60	54.7	55.5	56.7	0.94	0.92	0.90
										450	51.2	238.4	1.96	54.7	58.1	63.6	0.94	0.88	0.80
										600	51.2	317.8	2.26	54.7	60.1	69.1	0.94	0.85	0.74
										750	51.2	397.3	2.52	54.7	61.7	73.7	0.94	0.83	0.70
WFSC5_L3	120x50x10x2	11.97	4500	51.4	68.1	197.1	251.4	1.33	2.89	150	39.3	79.5	1.24	41.6	41.6	41.6	0.94	0.94	0.94
										300	41.2	158.9	1.76	45.1	45.9	49.4	0.91	0.90	0.83
										450	41.2	238.4	2.15	45.1	46.9	55.5	0.91	0.88	0.74
										600	41.2	317.8	2.49	45.1	47.7	60.2	0.91	0.86	0.68
										750	41.2	397.3	2.78	45.1	48.3	64.2	0.91	0.85	0.64
WFSC5_L4	120x50x10x2	11.97	5000	43.5	55.2	197.1	251.4	1.27	3.57	150	33.4	79.5	1.35	37.0	37.0	37.0	0.90	0.90	0.90
										300	33.9	158.9	1.91	38.1	38.3	43.8	0.89	0.89	0.77
										450	33.9	238.4	2.34	38.1	38.5	49.2	0.89	0.88	0.69
										600	33.9	317.8	2.70	38.1	38.6	53.4	0.89	0.88	0.64
										750	33.9	397.3	3.02	38.1	38.7	57.0	0.89	0.88	0.60
WFSC5_L5	120x50x10x2	11.97	6000	33.0	38.3	197.1	251.4	1.16	5.15	150	24.4	79.5	1.55	29.0	29.0	29.5	0.84	0.84	0.83
										300	24.4	158.9	2.19	29.0	29.0	36.0	0.84	0.84	0.68
										450	24.4	238.4	2.69	29.0	29.0	40.4	0.84	0.84	0.60
										600	24.4	317.8	3.10	29.0	29.0	43.9	0.84	0.84	0.56
										750	24.4	397.3	3.47	29.0	29.0	46.8	0.84	0.84	0.52
WFSC5_L6	120x50x10x2	11.97	7000	26.5	28.1	197.1	251.4	1.06	7.00	150	18.5	79.5	1.73	23.2	23.3	25.2	0.80	0.79	0.73
										300	18.5	158.9	2.45	23.2	23.3	30.8	0.80	0.80	0.60
										450	18.5	238.4	3.00	23.2	23.3	34.6	0.80	0.80	0.53
										600	18.5	317.8	3.46	23.2	23.3	37.5	0.80	0.80	0.49
										750	18.5	397.3	3.87	23.2	23.3	40.0	0.80	0.80	0.46
WFSC6_L1	140x70x15x5	7.14	5000	254.9	364.6	1768.7	121479.0	1.43	4.85	150	173.0	251.1	0.99	166.3	166.3	166.3	1.04	1.04	1.04
										300	206.1	502.3	1.40	220.2	220.2	220.2	0.94	0.94	0.94
										450	206.8	753.4	1.72	223.5	244.5	251.6	0.92	0.85	0.82
										600	206.8	1004.5	1.99	223.5	268.6	284.7	0.93	0.77	0.73
										750	206.8	1255.7	2.22	223.5	288.9	313.5	0.93	0.72	0.66
WFSC6_L2	140x70x15x5	7.14	5500	221.6	301.3	1768.7	121479.0	1.36	5.87	150	158.1	251.1	1.06	156.3	156.3	156.3	1.01	1.01	1.01
										300	176.3	502.3	1.51	194.3	194.8	195.1	0.91	0.90	0.90
										450	176.3	753.4	1.84	194.3	214.2	232.3	0.91	0.82	0.76
										600	176.3	1004.5	2.13	194.3	229.1	262.9	0.91	0.77	0.67
										750	176.3	1255.7	2.38	194.3	241.4	289.5	0.91	0.73	0.61
WFSC6_L3	140x70x15x5	7.14	6000	195.2	253.2	1768.7	121479.0	1.30	6.99	150	143.6	251.1	1.13	146.6	146.6	146.6	0.98	0.98	0.98
										300	152.4	502.3	1.60	171.2	175.4	181.5	0.89	0.87	0.84
										450	152.4	753.4	1.96	171.2	188.5	216.1	0.89	0.81	0.71
										600	152.4	1004.5	2.27	171.2	198.3	244.6	0.89	0.77	0.62
										750	152.4	1255.7	2.54	171.2	206.3	269.3	0.89	0.74	0.57
WFSC6_L4	140x70x15x5	7.14	7000	155.7	186.0	1768.7	121479.0	1.20	9.51	150	116.5	251.1	1.27	127.8	127.8	127.8	0.91	0.91	0.91
										300	117.7	502.3	1.80	136.5	141.5	159.5	0.86	0.83	0.74
										450	117.7	753.4	2.20	136.5	147.2	190.0	0.86	0.80	0.62
										600	117.7	1004.5	2.54	136.5	151.4	215.0	0.86	0.78	0.55
										750	117.7	1255.7	2.84	136.5	154.7	236.7	0.86	0.76	0.50
WFSC6_L5	140x70x15x5	7.14	8000	127.4	142.4	1768.7	121479.0	1.12	12.42	150	93.9	251.1	1.40	110.0	110.0	110.0	0.85	0.85	0.85
										300	93.9	502.3	1.99	111.7	112.7	142.3	0.84	0.83	0.66
										450	93.9	753.4	2.43	111.7	113.5	169.5	0.84	0.83	0.55
										600	93.9	1004.5	2.81	111.7	114.0	191.8	0.84	0.82	0.49
										750	93.9	1255.7	3.14	111.7	114.4	211.2	0.84	0.82	0.44
WFSC6_L6	140x70x15x5	7.14	9000	106.1	112.5	1768.7	121479.0	1.06	15.72	150	76.7	251.1	1.54	93.0	93.1	95.1	0.82	0.82	0.81
										300	76.8	502.3	2.18	93.0	93.1	128.2	0.83	0.82	0.60
										450	76.8	753.4	2.66	93.0	93.1	152.7	0.83	0.82	0.50
										600	76.8	1004.5	3.08	93.0	93.1	172.9	0.83	0.82	0.44
										750	76.8	1255.7	3.44	93.0	93.1	190.3	0.83	0.82	0.40
							Max	1.479	20.458							Mean	0.882	0.837	0.684
							Min	1.004	1.751							Sd.Dv.	0.061	0.075	0.180
																Max	1.072	1.072	1.072
																Min	0.793	0.640	0.329

Table A2.1 (to be continued): PC_m U columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling					SFEA		DSM Design							
	$b_w \times b_f \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{p_u}{p_{uG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
U1_L1	130x130x3	4.33	7000	85.2	92.9	116.1	1.09	1.25	150	62.0	175.5	1.44	74.1	74.1	74.1	0.84	0.84	0.84
									300	62.0	351.0	2.03	74.7	77.5	102.1	0.83	0.80	0.61
									450	62.0	526.5	2.49	74.7	79.5	125.8	0.83	0.78	0.49
									600	62.0	702.0	2.87	74.7	80.8	145.9	0.83	0.77	0.42
									750	62.0	877.5	3.21	74.7	81.9	163.7	0.83	0.76	0.38
U1_L2	130x130x3	4.33	7250	80.5	86.6	116.1	1.08	1.34	150	58.2	175.5	1.48	70.5	70.5	70.5	0.82	0.82	0.82
									300	58.2	351.0	2.09	70.6	72.4	99.3	0.82	0.80	0.59
									450	58.2	526.5	2.56	70.6	73.4	122.4	0.82	0.79	0.48
									600	58.2	702.0	2.95	70.6	74.2	142.0	0.82	0.78	0.41
									750	58.2	877.5	3.30	70.6	74.7	159.2	0.82	0.78	0.37
U1_L3	130x130x3	4.33	7500	76.3	81.0	116.1	1.06	1.43	150	54.7	175.5	1.52	66.9	67.0	67.7	0.82	0.82	0.81
									300	54.7	351.0	2.14	66.9	67.4	96.8	0.82	0.81	0.57
									450	54.7	526.5	2.63	66.9	67.6	119.3	0.82	0.81	0.46
									600	54.7	702.0	3.03	66.9	67.8	138.3	0.82	0.81	0.40
									750	54.7	877.5	3.39	66.9	67.9	155.1	0.82	0.81	0.35
U1_L4	130x130x3	4.33	7750	72.5	75.8	116.1	1.05	1.53	150	51.5	175.5	1.56	63.6	63.6	66.1	0.81	0.81	0.78
									300	51.5	351.0	2.20	63.6	63.6	94.4	0.81	0.81	0.55
									450	51.5	526.5	2.70	63.6	63.6	116.3	0.81	0.81	0.44
									600	51.5	702.0	3.11	63.6	63.6	134.9	0.81	0.81	0.38
									750	51.5	877.5	3.48	63.6	63.6	151.3	0.81	0.81	0.34
U1_L5	130x130x3	4.33	8000	69.0	71.2	116.1	1.03	1.63	150	48.6	175.5	1.59	60.5	60.5	64.5	0.80	0.80	0.75
									300	48.6	351.0	2.26	60.5	60.5	92.2	0.80	0.80	0.53
									450	48.6	526.5	2.76	60.5	60.5	113.6	0.80	0.80	0.43
									600	48.6	702.0	3.19	60.5	60.5	131.7	0.80	0.80	0.37
									750	48.7	877.5	3.57	60.5	60.5	147.7	0.80	0.80	0.33
U1_L6	130x130x3	4.33	8250	65.8	66.9	116.1	1.02	1.74	150	46.1	175.5	1.63	57.7	57.7	63.0	0.80	0.80	0.73
									300	46.1	351.0	2.31	57.7	57.7	90.1	0.80	0.80	0.51
									450	46.1	526.5	2.83	57.7	57.7	111.0	0.80	0.80	0.42
									600	46.1	702.0	3.27	57.7	57.7	128.7	0.80	0.80	0.36
									750	46.1	877.5	3.65	57.7	57.7	144.4	0.80	0.80	0.32
U2_L1	100x100x2.5	4.13	4750	68.5	76.6	86.6	1.12	1.13	150	51.2	112.5	1.28	56.6	56.6	56.6	0.91	0.91	0.91
									300	51.2	225.0	1.81	60.1	62.6	73.2	0.85	0.82	0.70
									450	51.2	337.5	2.22	60.1	65.3	90.4	0.85	0.78	0.57
									600	51.2	450.0	2.56	60.1	67.3	105.1	0.85	0.76	0.49
									750	51.2	562.5	2.87	60.1	68.9	118.0	0.85	0.74	0.43
U2_L2	100x100x2.5	4.13	5000	63.1	69.1	86.6	1.10	1.25	150	46.7	112.5	1.34	53.3	53.3	53.3	0.88	0.88	0.88
									300	46.7	225.0	1.89	55.3	57.3	70.4	0.84	0.82	0.66
									450	46.7	337.5	2.31	55.3	59.0	86.9	0.84	0.79	0.54
									600	46.7	450.0	2.67	55.3	60.3	101.0	0.84	0.78	0.46
									750	46.7	562.5	2.99	55.3	61.3	113.4	0.84	0.76	0.41
U2_L3	100x100x2.5	4.13	5250	58.3	62.7	86.6	1.07	1.38	150	42.7	112.5	1.39	50.2	50.2	50.2	0.85	0.85	0.85
									300	42.7	225.0	1.96	51.2	52.3	67.8	0.84	0.82	0.63
									450	42.8	337.5	2.41	51.2	53.1	83.7	0.84	0.81	0.51
									600	42.8	450.0	2.78	51.2	53.7	97.3	0.84	0.80	0.44
									750	42.8	562.5	3.11	51.2	54.2	109.3	0.84	0.79	0.39
U2_L4	100x100x2.5	4.13	5500	54.2	57.1	86.6	1.05	1.52	150	39.3	112.5	1.44	47.2	47.2	47.2	0.83	0.83	0.83
									300	39.3	225.0	2.04	47.6	47.6	65.5	0.83	0.83	0.60
									450	39.3	337.5	2.49	47.6	47.6	80.8	0.83	0.83	0.49
									600	39.3	450.0	2.88	47.6	47.6	93.9	0.83	0.83	0.42
									750	39.3	562.5	3.22	47.6	47.6	105.5	0.83	0.83	0.37
U2_L5	100x100x2.5	4.13	5750	50.6	52.2	86.6	1.03	1.66	150	36.3	112.5	1.49	44.4	44.4	44.4	0.82	0.82	0.82
									300	36.3	225.0	2.11	44.4	44.4	63.3	0.82	0.82	0.57
									450	36.3	337.5	2.58	44.4	44.4	78.2	0.82	0.82	0.46
									600	36.3	450.0	2.98	44.4	44.4	90.9	0.82	0.82	0.40
									750	36.3	562.5	3.33	44.4	44.4	102.1	0.82	0.82	0.36
U2_L6	100x100x2.5	4.13	6000	47.4	48.0	86.6	1.01	1.81	150	33.7	112.5	1.54	41.6	41.6	42.8	0.81	0.81	0.79
									300	33.7	225.0	2.18	41.6	41.6	61.4	0.81	0.81	0.55
									450	33.7	337.5	2.67	41.6	41.6	75.8	0.81	0.81	0.44
									600	33.7	450.0	3.08	41.6	41.6	88.1	0.81	0.81	0.38
									750	33.7	562.5	3.44	41.6	41.6	98.9	0.81	0.81	0.34

Table A2.1 (continuation): PC_m U columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*					*SFEA*		*DSM Design*							
	$b_w \times b_f \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
U3_L1	90x90x2	4.43	4750	40.1	44.7	49.5	1.11	1.11	150	29.3	81.0	1.42	34.8	34.8	34.8	0.84	0.84	0.84
									300	29.3	162.0	2.01	35.2	37.1	47.5	0.83	0.79	0.62
									450	29.3	243.0	2.46	35.2	38.5	58.4	0.83	0.76	0.50
									600	29.3	324.0	2.84	35.2	39.5	67.7	0.83	0.74	0.43
									750	29.3	405.0	3.18	35.2	40.3	75.9	0.83	0.73	0.39
U3_L2	90x90x2	4.43	5000	36.9	40.3	49.5	1.09	1.23	150	26.7	81.0	1.48	32.3	32.3	32.3	0.83	0.83	0.83
									300	26.7	162.0	2.10	32.3	33.7	45.6	0.83	0.79	0.59
									450	26.7	243.0	2.57	32.3	34.5	56.1	0.83	0.77	0.48
									600	26.7	324.0	2.96	32.3	35.1	65.0	0.83	0.76	0.41
									750	26.7	405.0	3.31	32.3	35.6	72.9	0.83	0.75	0.37
U3_L3	90x90x2	4.43	5250	34.1	36.6	49.5	1.07	1.36	150	24.4	81.0	1.54	29.9	29.9	30.8	0.82	0.82	0.79
									300	24.4	162.0	2.18	29.9	30.5	43.9	0.82	0.80	0.56
									450	24.4	243.0	2.67	29.9	30.8	54.0	0.82	0.79	0.45
									600	24.4	324.0	3.08	29.9	31.1	62.5	0.82	0.79	0.39
									750	24.4	405.0	3.45	29.9	31.3	70.1	0.82	0.78	0.35
U3_L4	90x90x2	4.43	5500	31.7	33.3	49.5	1.05	1.49	150	22.4	81.0	1.60	27.8	27.8	29.7	0.81	0.81	0.76
									300	22.4	162.0	2.26	27.8	27.8	42.3	0.81	0.81	0.53
									450	22.4	243.0	2.77	27.8	27.8	52.1	0.81	0.81	0.43
									600	22.4	324.0	3.20	27.8	27.8	60.3	0.81	0.81	0.37
									750	22.4	405.0	3.58	27.8	27.8	67.6	0.81	0.81	0.33
U3_L5	90x90x2	4.43	5750	29.5	30.5	49.5	1.03	1.63	150	20.7	81.0	1.66	25.9	25.9	28.7	0.80	0.80	0.72
									300	20.7	162.0	2.34	25.9	25.9	40.9	0.80	0.80	0.51
									450	20.7	243.0	2.87	25.9	25.9	50.3	0.80	0.80	0.41
									600	20.7	324.0	3.31	25.9	25.9	58.3	0.80	0.80	0.36
									750	20.7	405.0	3.70	25.9	25.9	65.4	0.80	0.80	0.32
U3_L6	90x90x2	4.43	6000	27.7	28.0	49.5	1.01	1.77	150	19.2	81.0	1.71	24.3	24.3	27.8	0.79	0.79	0.69
									300	19.2	162.0	2.42	24.3	24.3	39.6	0.79	0.79	0.48
									450	19.2	243.0	2.96	24.3	24.3	48.8	0.79	0.79	0.39
									600	19.2	324.0	3.42	24.3	24.3	56.5	0.79	0.79	0.34
									750	19.2	405.0	3.83	24.3	24.3	63.3	0.79	0.79	0.30
U4_L1	110x110x2	5.03	7000	33.6	37.5	43.1	1.12	1.15	150	23.8	99.0	1.72	29.4	30.1	33.7	0.81	0.79	0.71
									300	23.8	198.0	2.43	29.4	31.8	47.4	0.81	0.75	0.50
									450	23.8	297.0	2.97	29.4	32.8	58.0	0.81	0.73	0.41
									600	23.8	396.0	3.43	29.4	33.6	66.8	0.81	0.71	0.36
									750	23.8	495.0	3.84	29.4	34.2	74.6	0.81	0.70	0.32
U4_L2	110x110x2	5.03	7250	31.7	35.0	43.1	1.10	1.23	150	22.3	99.0	1.77	27.8	28.4	32.7	0.80	0.79	0.68
									300	22.3	198.0	2.50	27.8	29.6	46.1	0.80	0.76	0.48
									450	22.3	297.0	3.06	27.8	30.3	56.3	0.80	0.74	0.40
									600	22.3	396.0	3.54	27.8	30.8	64.9	0.80	0.72	0.34
									750	22.3	495.0	3.95	27.8	31.2	72.4	0.80	0.71	0.31
U4_L3	110x110x2	5.03	7500	30.0	32.7	43.1	1.09	1.32	150	21.0	99.0	1.82	26.3	26.7	31.8	0.80	0.78	0.66
									300	21.0	198.0	2.57	26.3	27.4	44.8	0.80	0.76	0.47
									450	21.0	297.0	3.15	26.3	27.9	54.7	0.80	0.75	0.38
									600	21.0	396.0	3.63	26.3	28.2	63.1	0.80	0.74	0.33
									750	21.0	495.0	4.06	26.3	28.4	70.4	0.80	0.74	0.30
U4_L4	110x110x2	5.03	8000	27.0	28.7	43.1	1.06	1.50	150	18.6	99.0	1.91	23.7	23.7	30.2	0.78	0.78	0.62
									300	18.6	198.0	2.71	23.7	23.7	42.5	0.78	0.78	0.44
									450	18.6	297.0	3.32	23.7	23.7	51.9	0.78	0.78	0.36
									600	18.6	396.0	3.83	23.7	23.7	59.9	0.78	0.78	0.31
									750	18.6	495.0	4.28	23.7	23.7	66.8	0.78	0.78	0.28
U4_L5	110x110x2	5.03	8750	23.5	24.0	43.1	1.02	1.79	150	15.8	99.0	2.05	20.6	20.6	28.1	0.77	0.77	0.56
									300	15.8	198.0	2.90	20.6	20.6	39.6	0.77	0.77	0.40
									450	15.8	297.0	3.56	20.6	20.6	48.4	0.77	0.77	0.33
									600	15.8	396.0	4.11	20.6	20.6	55.8	0.77	0.77	0.28
									750	15.8	495.0	4.59	20.6	20.6	62.3	0.77	0.77	0.25
U4_L6	110x110x2	5.03	9000	22.5	22.7	43.1	1.01	1.90	150	15.0	99.0	2.10	19.7	19.7	27.5	0.76	0.76	0.55
									300	15.0	198.0	2.97	19.7	19.7	38.7	0.76	0.76	0.39
									450	15.0	297.0	3.63	19.7	19.7	47.3	0.76	0.76	0.32
									600	15.0	396.0	4.19	19.7	19.7	54.6	0.76	0.76	0.28
									750	15.0	495.0	4.69	19.7	19.7	60.9	0.76	0.76	0.25

Table A2.1 (continuation): PC_m U columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*					*SFEA*		*DSM Design*							
	$b_w \times b_f \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT.Fm}$	P_{nFT}	$\frac{P_y}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
U5_L1	125x125x2.5	4.73	7250	56.8	64.2	71.3	1.13	1.11	150	41.4	140.6	1.57	49.8	50.3	52.3	0.76	0.82	0.79
									300	41.4	281.3	2.22	49.8	54.1	74.1	0.00	0.77	0.56
									450	41.4	421.9	2.72	49.8	56.4	90.9	0.00	0.73	0.46
									600	41.4	562.5	3.15	49.8	58.0	105.1	0.83	0.71	0.39
									750	41.4	703.1	3.52	49.8	59.4	117.6	0.83	0.70	0.35
U5_L2	125x125x2.5	4.73	7500	53.8	60.0	71.3	1.12	1.19	150	38.9	140.6	1.62	47.1	47.8	50.9	0.83	0.81	0.76
									300	38.9	281.3	2.29	47.1	50.7	72.1	0.83	0.77	0.54
									450	38.9	421.9	2.80	47.1	52.4	88.4	0.83	0.74	0.44
									600	38.9	562.5	3.23	47.1	53.7	102.2	0.82	0.72	0.38
									750	38.9	703.1	3.62	47.1	54.7	114.4	0.82	0.71	0.34
U5_L3	125x125x2.5	4.73	8000	48.4	52.7	71.3	1.09	1.35	150	34.5	140.6	1.70	42.5	43.0	48.3	0.82	0.80	0.71
									300	34.5	281.3	2.41	42.5	44.3	68.5	0.82	0.78	0.50
									450	34.5	421.9	2.95	42.5	45.1	84.0	0.82	0.76	0.41
									600	34.5	562.5	3.41	42.5	45.7	97.1	0.81	0.75	0.36
									750	34.5	703.1	3.81	42.5	46.2	108.6	0.81	0.75	0.32
U5_L4	125x125x2.5	4.73	8500	44.0	46.7	71.3	1.06	1.53	150	30.9	140.6	1.79	38.6	38.6	46.1	0.81	0.80	0.67
									300	30.9	281.3	2.53	38.6	38.6	65.3	0.81	0.80	0.47
									450	30.9	421.9	3.10	38.6	38.6	80.1	0.81	0.80	0.39
									600	30.9	562.5	3.58	38.6	38.6	92.5	0.80	0.80	0.33
									750	30.9	703.1	4.00	38.6	38.6	103.5	0.80	0.80	0.30
U5_L5	125x125x2.5	4.73	8750	42.0	44.1	71.3	1.05	1.62	150	29.3	140.6	1.83	36.9	36.9	45.0	0.80	0.79	0.65
									300	29.3	281.3	2.59	36.9	36.9	63.8	0.80	0.79	0.46
									450	29.3	421.9	3.17	36.9	36.9	78.3	0.80	0.79	0.37
									600	29.3	562.5	3.66	36.9	36.9	90.5	0.80	0.79	0.32
									750	29.3	703.1	4.09	36.9	36.9	101.2	0.80	0.79	0.29
U5_L6	125x125x2.5	4.73	9000	40.2	41.7	71.3	1.03	1.71	150	27.9	140.6	1.87	35.3	35.3	44.1	0.80	0.79	0.63
									300	27.9	281.3	2.64	35.3	35.3	62.5	0.80	0.79	0.45
									450	27.9	421.9	3.24	35.3	35.3	76.6	0.80	0.79	0.36
									600	27.9	562.5	3.74	35.3	35.3	88.5	0.79	0.79	0.31
									750	27.9	703.1	4.18	35.3	35.3	99.0	0.79	0.79	0.28
U6_L1	120x120x3.5	3.80	4750	164.9	185.2	197.4	1.12	1.07	150	121.1	189.0	1.07	117.0	117.0	117.0	0.79	1.04	1.04
									300	125.6	378.0	1.51	144.6	145.1	146.2	0.79	0.87	0.86
									450	125.6	567.0	1.85	144.6	152.4	181.3	0.79	0.82	0.69
									600	125.6	756.0	2.14	144.6	157.9	211.2	1.04	0.80	0.59
									750	125.6	945.0	2.39	144.6	162.3	237.8	0.87	0.77	0.53
U6_L2	120x120x3.5	3.80	5000	151.7	167.2	197.4	1.10	1.18	150	112.5	189.0	1.12	112.2	112.2	112.2	0.87	1.00	1.00
									300	114.7	378.0	1.58	133.1	134.4	140.6	0.87	0.85	0.82
									450	114.7	567.0	1.93	133.1	139.6	174.3	0.87	0.82	0.66
									600	114.7	756.0	2.23	133.1	143.4	203.1	1.00	0.80	0.56
									750	114.7	945.0	2.50	133.1	146.4	228.7	0.86	0.78	0.50
U6_L3	120x120x3.5	3.80	5250	140.3	151.6	197.4	1.08	1.30	150	105.1	189.0	1.16	107.6	107.6	107.6	0.86	0.98	0.98
									300	105.1	378.0	1.64	123.1	124.5	135.5	0.86	0.84	0.78
									450	105.1	567.0	2.01	123.1	127.5	168.0	0.86	0.82	0.63
									600	105.1	756.0	2.32	123.1	129.7	195.8	0.98	0.81	0.54
									750	105.1	945.0	2.60	123.1	131.5	220.4	0.85	0.80	0.48
U6_L4	120x120x3.5	3.80	5500	130.4	138.2	197.4	1.06	1.43	150	96.2	189.0	1.20	103.0	103.0	103.0	0.85	0.93	0.93
									300	96.6	378.0	1.70	114.3	115.1	130.9	0.85	0.84	0.74
									450	96.7	567.0	2.09	114.3	116.1	162.3	0.85	0.83	0.60
									600	96.7	756.0	2.41	114.3	116.9	189.1	0.93	0.83	0.51
									750	96.7	945.0	2.69	114.3	117.5	212.9	0.85	0.82	0.45
U6_L5	120x120x3.5	3.80	5750	121.6	126.4	197.4	1.04	1.56	150	89.3	189.0	1.25	98.6	98.6	98.6	0.85	0.91	0.91
									300	89.4	378.0	1.76	106.7	106.7	126.7	0.85	0.84	0.71
									450	89.4	567.0	2.16	106.7	106.7	157.1	0.85	0.84	0.57
									600	89.4	756.0	2.49	106.7	106.7	183.1	0.91	0.84	0.49
									750	89.4	945.0	2.79	106.7	106.7	206.1	0.84	0.84	0.43
U6_L6	120x120x3.5	3.80	6000	113.9	116.1	197.4	1.02	1.70	150	82.9	189.0	1.29	94.4	94.4	94.4	0.84	0.88	0.88
									300	82.9	378.0	1.82	99.9	100.0	122.9	0.84	0.83	0.67
									450	82.9	567.0	2.23	99.9	100.0	152.4	0.84	0.83	0.54
									600	82.9	756.0	2.58	99.9	100.0	177.6	0.88	0.83	0.47
									750	82.9	945.0	2.88	99.9	100.0	199.9	0.83	0.83	0.41
						Max	1.130	1.899							Mean	0.821	0.798	0.515
						Min	1.009	1.066							Sd.Dv.	0.037	0.045	0.179
															Max	1.035	1.035	1.035
															Min	0.761	0.697	0.246

Table A2.2 (to be continued): PC_m C columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,D}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{p_z}{p_{zG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
C1_L1	95x95x15x2.5	4.05	5000	69.3	81.8	234.2	943.3	1.18	2.86	150	51.6	118.1	1.31	57.9	57.9	57.9	0.89	0.89	0.89
										300	51.9	236.3	1.85	60.8	65.5	75.6	0.85	0.79	0.69
										450	51.9	354.4	2.26	60.8	70.3	93.4	0.85	0.74	0.56
										600	51.9	472.5	2.61	60.8	74.0	108.6	0.85	0.70	0.48
										750	51.9	590.6	2.92	60.8	77.0	122.1	0.85	0.67	0.43
C1_L2	95x95x15x2.5	4.05	5500	59.0	67.6	234.2	943.3	1.15	3.46	150	43.4	118.1	1.41	51.1	51.1	51.1	0.85	0.85	0.85
										300	43.5	236.3	2.00	51.8	56.2	70.0	0.84	0.77	0.62
										450	43.5	354.4	2.45	51.8	59.5	86.6	0.84	0.73	0.50
										600	43.5	472.5	2.83	51.8	62.0	100.6	0.84	0.70	0.43
										750	43.5	590.6	3.16	51.8	64.0	113.1	0.84	0.68	0.38
C1_L3	95x95x15x2.5	4.05	6000	51.2	56.8	234.2	943.3	1.11	4.12	150	37.0	118.1	1.52	44.9	45.0	45.5	0.82	0.82	0.81
										300	37.0	236.3	2.15	44.9	48.2	65.4	0.82	0.77	0.57
										450	37.0	354.4	2.63	44.9	50.1	80.9	0.82	0.74	0.46
										600	37.0	472.5	3.04	44.9	51.5	94.0	0.82	0.72	0.39
										750	37.0	590.6	3.40	44.9	52.6	105.7	0.82	0.70	0.35
C1_L4	95x95x15x2.5	4.05	6500	45.1	48.4	234.2	943.3	1.07	4.84	150	32.0	118.1	1.62	39.5	39.8	42.8	0.81	0.80	0.75
										300	32.0	236.3	2.29	39.5	41.0	61.6	0.81	0.78	0.52
										450	32.0	354.4	2.80	39.5	41.7	76.1	0.81	0.77	0.42
										600	32.0	472.5	3.24	39.5	42.2	88.5	0.81	0.76	0.36
										750	32.0	590.6	3.62	39.5	42.6	99.5	0.81	0.75	0.32
C1_L5	95x95x15x2.5	4.05	7000	40.2	41.7	234.2	943.3	1.04	5.61	150	28.0	118.1	1.72	35.2	35.2	40.5	0.79	0.79	0.69
										300	28.0	236.3	2.43	35.2	35.2	58.3	0.79	0.79	0.48
										450	28.0	354.4	2.97	35.2	35.2	72.1	0.79	0.79	0.39
										600	28.0	472.5	3.43	35.2	35.2	83.8	0.79	0.79	0.33
										750	28.0	590.6	3.83	35.2	35.2	94.2	0.79	0.79	0.30
C1_L6	95x95x15x2.5	4.05	7500	36.2	36.4	234.2	943.3	1.00	6.44	150	24.8	118.1	1.81	31.7	31.8	38.6	0.78	0.78	0.64
										300	24.8	236.3	2.55	31.7	31.8	55.5	0.78	0.78	0.45
										450	24.8	354.4	3.13	31.7	31.8	68.6	0.78	0.78	0.36
										600	24.8	472.5	3.61	31.7	31.8	79.7	0.78	0.78	0.31
										750	24.8	590.6	4.04	31.7	31.8	89.6	0.78	0.78	0.28
C2_L1	80x80x12x2	4.16	4000	49.4	60.3	147.7	663.6	1.22	2.45	150	36.8	79.2	1.27	40.5	40.5	40.5	0.91	0.91	0.91
										300	37.4	158.4	1.79	43.3	46.7	52.1	0.86	0.80	0.72
										450	37.4	237.6	2.19	43.3	50.8	64.4	0.86	0.74	0.58
										600	37.4	316.8	2.53	43.3	53.9	74.8	0.86	0.69	0.50
										750	37.4	396.0	2.83	43.3	56.5	84.0	0.86	0.66	0.45
C2_L2	80x80x12x2	4.16	4500	40.4	47.6	147.7	663.6	1.18	3.10	150	29.9	79.2	1.40	34.9	34.9	34.9	0.86	0.86	0.86
										300	30.0	158.4	1.98	35.4	39.0	47.3	0.85	0.77	0.63
										450	30.0	237.6	2.42	35.4	41.9	58.4	0.85	0.72	0.51
										600	30.0	316.8	2.80	35.4	44.0	67.9	0.85	0.68	0.44
										750	30.0	396.0	3.13	35.4	45.7	76.2	0.85	0.66	0.39
C2_L3	80x80x12x2	4.16	5000	33.9	38.6	147.7	663.6	1.14	3.83	150	24.6	79.2	1.53	29.7	29.9	30.3	0.83	0.82	0.81
										300	24.6	158.4	2.16	29.7	32.7	43.5	0.83	0.75	0.57
										450	24.6	237.6	2.65	29.7	34.5	53.7	0.83	0.71	0.46
										600	24.6	316.8	3.06	29.7	35.8	62.4	0.83	0.69	0.39
										750	24.6	396.0	3.42	29.7	36.9	70.1	0.83	0.67	0.35
C2_L4	80x80x12x2	4.16	5500	29.1	31.9	147.7	663.6	1.10	4.63	150	20.7	79.2	1.65	25.5	25.9	28.2	0.81	0.80	0.73
										300	20.7	158.4	2.33	25.5	27.3	40.4	0.81	0.76	0.51
										450	20.7	237.6	2.86	25.5	28.1	49.9	0.81	0.74	0.41
										600	20.7	316.8	3.30	25.5	28.7	58.0	0.81	0.72	0.36
										750	20.7	396.0	3.69	25.5	29.2	65.1	0.81	0.71	0.32
C2_L5	80x80x12x2	4.16	6000	25.4	26.8	147.7	663.6	1.06	5.51	150	17.7	79.2	1.77	22.2	22.3	26.4	0.79	0.79	0.67
										300	17.7	158.4	2.50	22.2	22.4	37.9	0.79	0.79	0.47
										450	17.7	237.6	3.06	22.2	22.4	46.7	0.79	0.79	0.38
										600	17.7	316.8	3.53	22.2	22.5	54.3	0.79	0.79	0.33
										750	17.7	396.0	3.95	22.2	22.5	61.0	0.79	0.79	0.29
C2_L6	80x80x12x2	4.16	6500	22.5	22.8	147.7	663.6	1.02	6.47	150	15.3	79.2	1.88	19.7	19.7	24.9	0.78	0.78	0.61
										300	15.3	158.4	2.65	19.7	19.7	35.7	0.78	0.78	0.43
										450	15.3	237.6	3.25	19.7	19.7	44.1	0.78	0.78	0.35
										600	15.3	316.8	3.75	19.7	19.7	51.2	0.78	0.78	0.30
										750	15.3	396.0	4.20	19.7	19.7	57.5	0.78	0.78	0.27

Table A2.2 (continuation): PC_m C columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_y}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
C3_L1	110x110x20x4	3.39	4500	228.1	260.3	752.9	2455.3	1.14	2.89	150	155.5	222.0	0.99	147.7	147.7	147.7	1.05	1.05	1.05
										300	176.4	444.0	1.40	196.6	196.6	196.6	0.90	0.90	0.90
										450	176.4	666.0	1.71	200.0	208.5	230.6	0.88	0.85	0.76
										600	176.4	888.0	1.97	200.0	218.1	269.6	0.88	0.81	0.65
										750	176.4	1110.0	2.21	200.0	225.8	304.3	0.88	0.78	0.58
C3_L2	110x110x20x4	3.39	4750	208.3	233.6	752.9	2455.3	1.12	3.22	150	146.5	222.0	1.03	142.1	142.1	142.1	1.03	1.03	1.03
										300	159.8	444.0	1.46	182.0	182.0	182.0	0.88	0.88	0.88
										450	159.8	666.0	1.79	182.7	191.5	221.3	0.87	0.83	0.72
										600	159.8	888.0	2.06	182.7	198.9	258.7	0.87	0.80	0.62
										750	159.8	1110.0	2.31	182.7	204.9	292.0	0.87	0.78	0.55
C3_L3	110x110x20x4	3.39	5000	191.4	210.8	752.9	2455.3	1.10	3.57	150	137.0	222.0	1.08	136.6	136.6	136.6	1.00	1.00	1.00
										300	145.3	444.0	1.52	167.9	168.5	170.8	0.87	0.86	0.85
										450	145.3	666.0	1.87	167.9	175.8	212.9	0.87	0.83	0.68
										600	145.4	888.0	2.15	167.9	181.2	248.9	0.87	0.80	0.58
										750	145.4	1110.0	2.41	167.9	185.5	281.0	0.87	0.78	0.52
C3_L4	110x110x20x4	3.39	5500	164.1	174.2	752.9	2455.3	1.06	4.32	150	119.0	222.0	1.16	126.0	126.0	126.0	0.94	0.94	0.94
										300	122.3	444.0	1.64	143.9	145.0	159.2	0.85	0.84	0.77
										450	122.3	666.0	2.01	143.9	147.3	198.4	0.85	0.83	0.62
										600	122.3	888.0	2.33	143.9	149.0	232.0	0.85	0.82	0.53
										750	122.3	1110.0	2.60	143.9	150.3	261.9	0.85	0.81	0.47
C3_L5	110x110x20x4	3.39	5750	153.0	159.4	752.9	2455.3	1.04	4.72	150	110.9	222.0	1.20	120.9	120.9	120.9	0.92	0.92	0.92
										300	112.8	444.0	1.70	134.2	134.2	154.1	0.84	0.84	0.73
										450	112.9	666.0	2.09	134.2	134.2	192.1	0.84	0.84	0.59
										600	113.0	888.0	2.41	134.2	134.2	224.7	0.84	0.84	0.50
										750	113.0	1110.0	2.69	134.2	134.2	253.6	0.84	0.84	0.45
C3_L6	110x110x20x4	3.39	6000	143.2	146.4	752.9	2455.3	1.02	5.14	150	103.7	222.0	1.25	116.0	116.0	116.0	0.89	0.89	0.89
										300	104.6	444.0	1.76	125.6	125.6	149.6	0.83	0.83	0.70
										450	104.7	666.0	2.16	125.6	125.6	186.4	0.83	0.83	0.56
										600	104.7	888.0	2.49	125.6	125.6	218.0	0.83	0.83	0.48
										750	104.7	1110.0	2.78	125.6	125.6	246.1	0.83	0.83	0.43
C4_L1	100x100x20x2	5.19	5500	55.7	67.2	31.8	179.3	1.21	0.47	150	41.3	102.0	1.35	47.4	47.4	47.4	0.87	0.87	0.87
										300	41.6	204.0	1.91	48.8	53.0	62.0	0.85	0.79	0.67
										450	41.6	306.0	2.34	48.8	56.7	75.6	0.85	0.73	0.55
										600	41.6	408.0	2.71	48.8	59.4	87.1	0.85	0.70	0.48
										750	41.6	510.0	3.03	48.8	61.7	97.1	0.85	0.67	0.43
C4_L2	100x100x20x2	5.19	6000	47.6	56.5	31.8	179.3	1.19	0.56	150	35.1	102.0	1.46	41.6	41.6	41.6	0.84	0.84	0.84
										300	35.1	204.0	2.07	41.7	45.9	57.2	0.84	0.76	0.61
										450	35.1	306.0	2.54	41.7	48.8	69.8	0.84	0.72	0.50
										600	35.1	408.0	2.93	41.7	50.9	80.4	0.84	0.69	0.44
										750	35.1	510.0	3.27	41.7	52.6	89.6	0.84	0.67	0.39
C4_L3	100x100x20x2	5.19	6500	41.3	48.1	31.8	179.3	1.17	0.66	150	30.0	102.0	1.57	36.2	36.6	37.9	0.83	0.82	0.79
										300	30.0	204.0	2.22	36.2	40.1	53.2	0.83	0.75	0.56
										450	30.0	306.0	2.72	36.2	42.2	64.9	0.83	0.71	0.46
										600	30.0	408.0	3.14	36.2	43.8	74.7	0.83	0.68	0.40
										750	30.0	510.0	3.52	36.2	45.1	83.3	0.83	0.67	0.36
C4_L4	100x100x20x2	5.19	7000	36.2	41.5	31.8	179.3	1.15	0.77	150	26.0	102.0	1.68	31.8	32.6	35.5	0.82	0.80	0.73
										300	26.0	204.0	2.37	31.8	35.1	49.8	0.82	0.74	0.52
										450	26.0	306.0	2.91	31.8	36.6	60.7	0.82	0.71	0.43
										600	26.0	408.0	3.36	31.8	37.8	69.9	0.82	0.69	0.37
										750	26.0	510.0	3.75	31.8	38.7	78.0	0.82	0.67	0.33
C4_L5	100x100x20x2	5.19	7500	32.1	36.1	31.8	179.3	1.12	0.88	150	22.7	102.0	1.78	28.2	29.0	33.4	0.81	0.78	0.68
										300	22.7	204.0	2.52	28.2	30.7	46.8	0.81	0.74	0.48
										450	22.7	306.0	3.09	28.2	31.7	57.1	0.81	0.72	0.40
										600	22.7	408.0	3.56	28.2	32.5	65.8	0.81	0.70	0.35
										750	22.7	510.0	3.98	28.2	33.1	73.3	0.81	0.69	0.31
C4_L6	100x100x20x2	5.19	8000	28.8	31.8	31.8	179.3	1.10	1.00	150	20.1	102.0	1.88	25.2	25.9	31.5	0.79	0.78	0.64
										300	20.1	204.0	2.66	25.2	26.8	44.3	0.79	0.75	0.45
										450	20.1	306.0	3.26	25.2	27.4	54.0	0.79	0.73	0.37
										600	20.1	408.0	3.76	25.2	27.8	62.2	0.79	0.72	0.32
										750	20.1	510.0	4.21	25.2	28.2	69.3	0.79	0.71	0.29

Table A2.2 (continuation): PC_m C columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_y}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
C5_L1	120x120x15x5	3.02	3500	510.6	637.5	258.2	915.9	1.25	0.40	150	257.3	292.5	0.76	230.1	230.1	230.1	1.12	1.12	1.12
										300	387.4	585.0	1.07	362.2	362.2	362.2	1.07	1.07	1.07
										450	407.9	877.5	1.31	427.4	427.4	427.4	0.95	0.95	0.95
										600	409.4	1170.0	1.51	447.8	450.2	452.6	0.91	0.91	0.90
										750	409.4	1462.5	1.69	447.8	477.5	512.2	0.91	0.86	0.80
C5_L2	120x120x15x5	3.02	3750	455.3	555.3	258.2	915.9	1.22	0.46	150	248.1	292.5	0.80	223.5	223.5	223.5	1.11	1.11	1.11
										300	352.6	585.0	1.13	341.7	341.7	341.7	1.03	1.03	1.03
										450	361.2	877.5	1.39	391.7	391.7	391.7	0.92	0.92	0.92
										600	361.2	1170.0	1.60	399.3	412.6	430.1	0.90	0.88	0.84
										750	361.2	1462.5	1.79	399.3	435.4	486.7	0.90	0.83	0.74
C5_L3	120x120x15x5	3.02	4000	409.4	488.1	258.2	915.9	1.19	0.53	150	240.0	292.5	0.85	216.9	216.9	216.9	1.11	1.11	1.11
										300	319.4	585.0	1.20	321.7	321.7	321.7	0.99	0.99	0.99
										450	322.7	877.5	1.46	357.8	357.8	357.8	0.90	0.90	0.90
										600	323.8	1170.0	1.69	359.0	378.5	410.1	0.90	0.86	0.79
										750	323.8	1462.5	1.89	359.0	397.4	464.1	0.90	0.81	0.70
C5_L4	120x120x15x5	3.02	4500	338.4	385.7	258.2	915.9	1.14	0.67	150	222.6	292.5	0.93	203.7	203.7	203.7	1.09	1.09	1.09
										300	262.6	585.0	1.31	283.7	283.7	283.7	0.93	0.93	0.93
										450	262.6	877.5	1.61	296.7	304.0	321.2	0.88	0.86	0.82
										600	262.6	1170.0	1.86	296.7	318.8	376.8	0.89	0.82	0.70
										750	262.6	1462.5	2.08	296.7	330.8	426.4	0.89	0.79	0.62
C5_L5	120x120x15x5	3.02	5000	286.9	312.4	258.2	915.9	1.09	0.83	150	202.3	292.5	1.01	190.9	190.9	190.9	1.06	1.06	1.06
										300	218.3	585.0	1.43	249.2	249.2	249.2	0.88	0.88	0.88
										450	218.7	877.5	1.75	251.6	259.3	298.4	0.87	0.84	0.73
										600	218.7	1170.0	2.02	251.6	266.6	350.0	0.87	0.82	0.62
										750	218.7	1462.5	2.26	251.6	272.4	396.1	0.87	0.80	0.55
C5_L6	120x120x15x5	3.02	5500	248.4	258.2	258.2	915.9	1.04	1.00	150	179.0	292.5	1.09	178.7	178.7	178.7	1.00	1.00	1.00
										300	185.4	585.0	1.53	217.8	218.0	223.5	0.85	0.85	0.83
										450	185.4	877.5	1.88	217.8	218.4	279.9	0.85	0.85	0.66
										600	185.4	1170.0	2.17	217.8	218.7	328.3	0.85	0.85	0.56
										750	185.5	1462.5	2.43	217.8	218.9	371.5	0.85	0.85	0.50
C6_L1	100x100x20x3	3.90	3500	203.1	248.9	72.2	438.4	1.23	0.29	150	120.4	153.0	0.87	111.6	111.6	111.6	1.08	1.08	1.08
										300	157.0	306.0	1.23	162.9	162.9	162.9	0.96	0.96	0.96
										450	159.2	459.0	1.50	178.2	178.4	178.7	0.89	0.89	0.89
										600	160.3	612.0	1.74	178.2	190.0	208.0	0.90	0.84	0.77
										750	160.3	765.0	1.94	178.2	199.6	234.0	0.90	0.80	0.69
C6_L2	100x100x20x3	3.90	4000	160.3	190.5	72.2	438.4	1.19	0.38	150	106.9	153.0	0.98	102.6	102.6	102.6	1.04	1.04	1.04
										300	124.2	306.0	1.38	137.6	137.6	137.6	0.90	0.90	0.90
										450	124.8	459.0	1.69	140.5	147.2	159.7	0.89	0.85	0.78
										600	124.8	612.0	1.95	140.5	155.4	185.9	0.89	0.80	0.67
										750	124.8	765.0	2.18	140.5	162.1	209.2	0.89	0.77	0.60
C6_L3	100x100x20x3	3.90	4500	130.3	150.6	72.2	438.4	1.16	0.48	150	92.5	153.0	1.08	93.6	93.6	93.6	0.99	0.99	0.99
										300	99.7	306.0	1.53	114.3	115.1	117.0	0.87	0.87	0.85
										450	99.8	459.0	1.88	114.3	122.7	144.9	0.87	0.81	0.69
										600	99.8	612.0	2.17	114.3	128.3	168.6	0.87	0.78	0.59
										750	99.8	765.0	2.42	114.3	132.9	189.7	0.87	0.75	0.53
C6_L4	100x100x20x3	3.90	5000	108.7	121.9	72.2	438.4	1.12	0.59	150	79.3	153.0	1.19	84.9	84.9	84.9	0.93	0.93	0.93
										300	81.7	306.0	1.68	95.3	97.9	107.3	0.86	0.83	0.76
										450	81.7	459.0	2.06	95.3	102.7	133.0	0.86	0.80	0.61
										600	81.8	612.0	2.37	95.3	106.2	154.8	0.86	0.77	0.53
										750	81.8	765.0	2.65	95.3	109.1	174.1	0.86	0.75	0.47
C6_L5	100x100x20x3	3.90	6000	80.2	84.7	72.2	438.4	1.06	0.85	150	58.1	153.0	1.38	68.9	68.9	68.9	0.84	0.84	0.84
										300	58.2	306.0	1.95	70.4	70.8	93.0	0.83	0.82	0.63
										450	58.2	459.0	2.39	70.4	71.2	115.2	0.83	0.82	0.51
										600	58.2	612.0	2.76	70.4	71.4	134.1	0.83	0.82	0.43
										750	58.2	765.0	3.09	70.4	71.6	150.9	0.83	0.81	0.39
C6_L6	100x100x20x3	3.90	6500	70.6	72.2	72.2	438.4	1.02	1.00	150	50.3	153.0	1.47	61.8	61.8	61.8	0.81	0.81	0.81
										300	50.3	306.0	2.08	61.9	61.9	87.6	0.81	0.81	0.57
										450	50.3	459.0	2.55	61.9	61.9	108.5	0.81	0.81	0.46
										600	50.3	612.0	2.94	61.9	61.9	126.2	0.81	0.81	0.40
										750	50.3	765.0	3.29	61.9	61.9	142.0	0.81	0.81	0.35
							Max	1.249	6.467							Mean	0.861	0.814	0.624
							Min	1.005	0.290							Sd.Dv.	0.070	0.097	0.224
																Max	1.118	1.118	1.118
																Min	0.777	0.655	0.266

Table A2.3 (to be continued): PC_m H columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{p_s}{p_{sG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
H1_L1	100x100x10x3	3.25	4500	94.2	128.0	252.6	1216.3	1.36	1.97	150	72.3	144.0	1.24	75.9	75.9	75.9	0.95	0.95	0.95
										300	72.5	288.0	1.75	82.6	92.0	97.8	0.88	0.79	0.74
										450	72.5	432.0	2.14	82.6	106.0	122.1	0.88	0.68	0.59
										600	72.5	576.0	2.47	82.6	117.2	142.9	0.88	0.62	0.51
										750	72.5	720.0	2.76	82.6	126.7	161.4	0.88	0.57	0.45
H1_L2	100x100x10x3	3.25	5000	80.0	103.7	252.6	1216.3	1.30	2.44	150	60.4	144.0	1.34	67.8	67.8	67.8	0.89	0.89	0.89
										300	60.4	288.0	1.90	70.2	80.6	90.8	0.86	0.75	0.67
										450	60.4	432.0	2.32	70.2	90.7	113.4	0.86	0.67	0.53
										600	60.5	576.0	2.68	70.2	98.7	132.7	0.86	0.61	0.46
										750	60.5	720.0	3.00	70.2	105.3	149.9	0.86	0.57	0.40
H1_L3	100x100x10x3	3.25	5500	69.4	85.7	252.6	1216.3	1.23	2.95	150	51.4	144.0	1.44	60.4	60.4	60.4	0.85	0.85	0.85
										300	51.4	288.0	2.04	60.9	70.8	85.1	0.84	0.73	0.60
										450	51.4	432.0	2.49	60.9	78.2	106.3	0.84	0.66	0.48
										600	51.4	576.0	2.88	60.9	83.9	124.4	0.84	0.61	0.41
										750	51.4	720.0	3.22	60.9	88.7	140.6	0.84	0.58	0.37
H1_L4	100x100x10x3	3.25	6000	61.3	72.0	252.6	1216.3	1.17	3.51	150	44.5	144.0	1.53	53.8	54.2	55.1	0.83	0.82	0.81
										300	44.5	288.0	2.17	53.8	62.1	80.5	0.83	0.72	0.55
										450	44.5	432.0	2.65	53.8	67.2	100.5	0.83	0.66	0.44
										600	44.5	576.0	3.07	53.8	71.1	117.6	0.83	0.63	0.38
										750	44.5	720.0	3.43	53.8	74.3	132.9	0.83	0.60	0.33
H1_L5	100x100x10x3	3.25	7000	49.8	52.9	252.6	1216.3	1.06	4.78	150	34.7	144.0	1.70	43.7	44.2	50.1	0.79	0.78	0.69
										300	34.7	288.0	2.40	43.7	45.5	73.3	0.79	0.76	0.47
										450	34.7	432.0	2.94	43.7	46.3	91.5	0.79	0.75	0.38
										600	34.7	576.0	3.40	43.7	46.9	107.1	0.79	0.74	0.32
										750	34.7	720.0	3.80	43.7	47.3	121.0	0.79	0.73	0.29
H1_L6	100x100x10x3	3.25	7500	45.7	46.1	252.6	1216.3	1.01	5.48	150	31.1	144.0	1.78	40.1	40.1	48.2	0.78	0.78	0.64
										300	31.1	288.0	2.51	40.1	40.1	70.5	0.78	0.78	0.44
										450	31.1	432.0	3.08	40.1	40.1	88.0	0.78	0.78	0.35
										600	31.1	576.0	3.55	40.1	40.1	103.0	0.78	0.78	0.30
										750	31.1	720.0	3.97	40.1	40.1	116.3	0.78	0.78	0.27
H2_L1	100x90x15x3	3.40	3000	167.4	243.8	389.1	938.1	1.46	1.60	150	108.0	139.5	0.91	98.4	98.4	98.4	1.10	1.10	1.10
										300	133.1	279.0	1.29	138.9	138.9	138.9	0.96	0.96	0.96
										450	133.3	418.5	1.58	146.8	154.6	155.6	0.91	0.86	0.86
										600	133.3	558.0	1.83	146.8	177.7	181.9	0.91	0.75	0.73
										750	133.3	697.5	2.04	146.8	197.9	205.3	0.91	0.67	0.65
H2_L2	100x90x15x3	3.40	3500	130.2	179.1	389.1	938.1	1.38	2.17	150	94.3	139.5	1.04	89.1	89.1	89.1	1.06	1.06	1.06
										300	101.9	279.0	1.46	113.7	113.7	113.7	0.90	0.90	0.90
										450	101.9	418.5	1.79	114.1	130.1	138.6	0.89	0.78	0.74
										600	102.0	558.0	2.07	114.1	144.4	162.1	0.89	0.71	0.63
										750	102.0	697.5	2.31	114.1	156.7	183.0	0.89	0.65	0.56
H2_L3	100x90x15x3	3.40	4000	105.2	137.1	389.1	938.1	1.30	2.84	150	79.5	139.5	1.15	80.1	80.1	80.1	0.99	0.99	0.99
										300	80.7	279.0	1.63	92.2	96.9	100.9	0.88	0.83	0.80
										450	80.8	418.5	1.99	92.2	109.2	125.8	0.88	0.74	0.64
										600	80.8	558.0	2.30	92.2	118.9	147.1	0.88	0.68	0.55
										750	80.8	697.5	2.58	92.2	127.0	166.0	0.88	0.64	0.49
H2_L4	100x90x15x3	3.40	4500	87.7	108.4	389.1	938.1	1.23	3.59	150	65.9	139.5	1.26	71.7	71.7	71.7	0.92	0.92	0.92
										300	65.9	279.0	1.78	76.9	83.7	92.9	0.86	0.79	0.71
										450	65.9	418.5	2.18	76.9	92.4	115.8	0.86	0.71	0.57
										600	65.9	558.0	2.52	76.9	99.0	135.4	0.86	0.67	0.49
										750	66.0	697.5	2.82	76.9	104.5	152.8	0.86	0.63	0.43
H2_L5	100x90x15x3	3.40	5000	75.1	87.8	389.1	938.1	1.17	4.43	150	55.2	139.5	1.36	64.1	64.1	64.1	0.86	0.86	0.86
										300	55.2	279.0	1.93	65.9	72.3	86.6	0.84	0.76	0.64
										450	55.2	418.5	2.36	65.9	78.0	107.9	0.84	0.71	0.51
										600	55.2	558.0	2.73	65.9	82.2	126.1	0.84	0.67	0.44
										750	55.2	697.5	3.05	65.9	85.7	142.4	0.84	0.64	0.39
H2_L6	100x90x15x3	3.40	6000	58.5	60.9	389.1	938.1	1.04	6.38	150	41.0	139.5	1.54	51.3	51.3	53.0	0.80	0.80	0.77
										300	41.0	279.0	2.18	51.3	51.3	77.2	0.80	0.80	0.53
										450	41.0	418.5	2.67	51.3	51.3	96.2	0.80	0.80	0.43
										600	41.0	558.0	3.09	51.3	51.3	112.5	0.80	0.80	0.36
										750	41.0	697.5	3.45	51.3	51.3	127.0	0.80	0.80	0.32

Table A2.3 (continuation): PC_m H columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_y}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
H3_L1	90x90x10x3	3.04	3500	110.7	157.4	280.0	1149.9	1.42	1.78	150	83.1	130.5	1.09	79.7	79.7	79.7	1.04	1.04	1.04
										300	87.0	261.0	1.54	97.1	99.1	99.7	0.90	0.88	0.87
										450	87.1	391.5	1.88	97.1	118.3	124.8	0.90	0.74	0.70
										600	87.1	522.0	2.17	97.1	134.2	146.3	0.90	0.65	0.59
										750	87.1	652.5	2.43	97.1	147.9	165.6	0.90	0.59	0.53
H3_L2	90x90x10x3	3.04	4000	89.9	120.5	280.0	1149.9	1.34	2.32	150	69.0	130.5	1.20	71.1	71.1	71.1	0.97	0.97	0.97
										300	69.3	261.0	1.70	78.9	86.0	90.9	0.88	0.81	0.76
										450	69.3	391.5	2.09	78.9	98.6	113.7	0.88	0.70	0.61
										600	69.3	522.0	2.41	78.9	108.6	133.4	0.88	0.64	0.52
										750	69.3	652.5	2.69	78.9	117.1	150.9	0.88	0.59	0.46
H3_L3	90x90x10x3	3.04	4500	75.5	95.2	280.0	1149.9	1.26	2.94	150	56.9	130.5	1.31	63.3	63.3	63.3	0.90	0.90	0.90
										300	56.9	261.0	1.86	66.2	74.5	84.0	0.86	0.76	0.68
										450	56.9	391.5	2.28	66.2	83.2	105.2	0.86	0.68	0.54
										600	56.9	522.0	2.63	66.2	90.0	123.4	0.86	0.63	0.46
										750	56.9	652.5	2.94	66.2	95.6	139.6	0.86	0.60	0.41
H3_L4	90x90x10x3	3.04	5000	65.1	77.1	280.0	1149.9	1.19	3.63	150	47.9	130.5	1.42	56.4	56.4	56.4	0.85	0.85	0.85
										300	47.9	261.0	2.00	57.1	64.5	78.6	0.84	0.74	0.61
										450	47.9	391.5	2.45	57.1	70.3	98.4	0.84	0.68	0.49
										600	47.9	522.0	2.83	57.1	74.8	115.5	0.84	0.64	0.41
										750	47.9	652.5	3.17	57.1	78.4	130.6	0.84	0.61	0.37
H3_L5	90x90x10x3	3.04	5500	57.3	63.8	280.0	1149.9	1.11	4.39	150	41.1	130.5	1.51	50.2	50.3	50.6	0.82	0.82	0.81
										300	41.1	261.0	2.14	50.2	55.2	74.3	0.82	0.75	0.55
										450	41.1	391.5	2.62	50.2	58.2	93.0	0.82	0.71	0.44
										600	41.1	522.0	3.02	50.2	60.5	109.1	0.82	0.68	0.38
										750	41.1	652.5	3.38	50.2	62.3	123.4	0.82	0.66	0.33
H3_L6	90x90x10x3	3.04	6000	51.3	53.6	280.0	1149.9	1.05	5.23	150	35.9	130.5	1.60	44.9	45.1	48.2	0.80	0.80	0.74
										300	35.9	261.0	2.26	44.9	45.6	70.7	0.80	0.79	0.51
										450	35.9	391.5	2.76	44.9	45.9	88.5	0.80	0.78	0.41
										600	35.9	522.0	3.19	44.9	46.1	103.8	0.80	0.78	0.35
										750	35.9	652.5	3.57	44.9	46.2	117.5	0.80	0.78	0.31
H4_L1	90x80x10x2	4.25	3500	61.0	78.6	126.6	390.4	1.29	1.61	150	45.9	81.0	1.15	46.5	46.5	46.5	0.99	0.99	0.99
										300	46.4	162.0	1.63	53.5	55.9	58.3	0.87	0.83	0.80
										450	46.4	243.0	2.00	53.5	62.0	71.9	0.87	0.75	0.65
										600	46.4	324.0	2.30	53.5	66.8	83.5	0.87	0.69	0.56
										750	46.5	405.0	2.58	53.5	70.7	93.7	0.87	0.66	0.50
H4_L2	90x80x10x2	4.25	4000	48.7	60.2	126.6	390.4	1.24	2.10	150	36.5	81.0	1.29	40.4	40.4	40.4	0.90	0.90	0.90
										300	36.5	162.0	1.82	42.7	46.5	52.3	0.85	0.78	0.70
										450	36.5	243.0	2.23	42.7	50.8	64.5	0.85	0.72	0.57
										600	36.5	324.0	2.58	42.7	54.1	74.9	0.85	0.67	0.49
										750	36.5	405.0	2.88	42.7	56.8	84.1	0.85	0.64	0.43
H4_L3	90x80x10x2	4.25	4500	40.1	47.6	126.6	390.4	1.19	2.66	150	29.4	81.0	1.42	34.8	34.8	34.8	0.85	0.85	0.85
										300	29.4	162.0	2.01	35.2	39.0	47.7	0.84	0.75	0.62
										450	29.4	243.0	2.46	35.2	41.9	58.8	0.84	0.70	0.50
										600	29.4	324.0	2.84	35.2	44.1	68.2	0.84	0.67	0.43
										750	29.4	405.0	3.18	35.2	45.8	76.6	0.84	0.64	0.38
H4_L4	90x80x10x2	4.25	5000	33.9	38.5	126.6	390.4	1.14	3.29	150	24.3	81.0	1.55	29.7	30.0	30.7	0.82	0.81	0.79
										300	24.3	162.0	2.19	29.7	32.7	43.9	0.82	0.74	0.55
										450	24.3	243.0	2.68	29.7	34.4	54.2	0.82	0.71	0.45
										600	24.3	324.0	3.09	29.7	35.6	62.9	0.82	0.68	0.39
										750	24.3	405.0	3.46	29.7	36.6	70.6	0.82	0.66	0.34
H4_L5	90x80x10x2	4.25	5500	29.3	31.8	126.6	390.4	1.09	3.97	150	20.6	81.0	1.66	25.7	26.0	28.6	0.80	0.79	0.72
										300	20.6	162.0	2.35	25.7	27.1	40.9	0.80	0.76	0.50
										450	20.6	243.0	2.88	25.7	27.7	50.5	0.80	0.74	0.41
										600	20.6	324.0	3.33	25.7	28.1	58.6	0.80	0.73	0.35
										750	20.6	405.0	3.72	25.7	28.5	65.8	0.80	0.72	0.31
H4_L6	90x80x10x2	4.25	6000	25.7	26.8	126.6	390.4	1.04	4.73	150	17.6	81.0	1.77	22.6	22.6	26.9	0.78	0.78	0.66
										300	17.7	162.0	2.51	22.6	22.6	38.5	0.78	0.78	0.46
										450	17.7	243.0	3.07	22.6	22.6	47.4	0.78	0.78	0.37
										600	17.7	324.0	3.55	22.6	22.6	55.1	0.78	0.78	0.32
										750	17.7	405.0	3.97	22.6	22.6	61.8	0.78	0.78	0.29

Table A2.3 (continuation): PC_m H columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{p_e}{p_{eG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
H5_L1	110x100x15x3	3.58	4000	132.1	182.5	348.1	997.3	1.38	1.91	150	97.9	153.0	1.08	94.2	94.2	94.2	1.04	1.04	1.04
										300	103.0	306.0	1.52	115.8	117.1	117.7	0.89	0.88	0.87
										450	103.0	459.0	1.86	115.8	135.9	146.4	0.89	0.76	0.70
										600	103.0	612.0	2.15	115.8	150.9	170.9	0.89	0.68	0.60
										750	103.0	765.0	2.41	115.8	163.8	192.7	0.89	0.63	0.53
H5_L2	110x100x15x3	3.58	4500	109.0	144.2	348.1	997.3	1.32	2.41	150	82.8	153.0	1.18	85.0	85.0	85.0	0.97	0.97	0.97
										300	83.5	306.0	1.68	95.6	102.3	107.7	0.87	0.82	0.78
										450	83.5	459.0	2.05	95.6	115.8	133.9	0.87	0.72	0.62
										600	83.5	612.0	2.37	95.6	126.5	156.3	0.87	0.66	0.53
										750	83.5	765.0	2.65	95.6	135.4	176.3	0.87	0.62	0.47
H5_L3	110x100x15x3	3.58	5000	92.2	116.8	348.1	997.3	1.27	2.98	150	69.4	153.0	1.29	76.4	76.4	76.4	0.91	0.91	0.91
										300	69.5	306.0	1.82	80.8	89.5	99.7	0.86	0.78	0.70
										450	69.5	459.0	2.23	80.8	99.5	123.9	0.86	0.70	0.56
										600	69.5	612.0	2.58	80.8	107.3	144.7	0.86	0.65	0.48
										750	69.5	765.0	2.88	80.8	113.7	163.1	0.86	0.61	0.43
H5_L4	110x100x15x3	3.58	5500	79.6	96.6	348.1	997.3	1.21	3.61	150	58.8	153.0	1.39	68.4	68.4	68.4	0.86	0.86	0.86
										300	58.8	306.0	1.96	69.8	78.5	93.1	0.84	0.75	0.63
										450	58.8	459.0	2.40	69.8	85.9	115.8	0.84	0.69	0.51
										600	58.8	612.0	2.77	69.8	91.5	135.2	0.84	0.64	0.44
										750	58.8	765.0	3.10	69.8	96.0	152.4	0.84	0.61	0.39
H5_L5	110x100x15x3	3.58	6000	69.9	81.1	348.1	997.3	1.16	4.29	150	50.7	153.0	1.48	61.2	61.2	61.2	0.83	0.83	0.83
										300	50.7	306.0	2.09	61.3	68.8	87.7	0.83	0.74	0.58
										450	50.7	459.0	2.56	61.3	73.7	109.1	0.83	0.69	0.46
										600	50.7	612.0	2.96	61.3	77.4	127.3	0.83	0.66	0.40
										750	50.7	765.0	3.31	61.3	80.5	143.6	0.83	0.63	0.35
H5_L6	110x100x15x3	3.58	7000	56.3	59.6	348.1	997.3	1.06	5.84	150	39.2	153.0	1.65	49.4	49.7	54.7	0.79	0.79	0.72
										300	39.2	306.0	2.33	49.4	50.6	79.4	0.79	0.78	0.49
										450	39.2	459.0	2.85	49.4	51.1	98.7	0.79	0.77	0.40
										600	39.2	612.0	3.30	49.4	51.5	115.2	0.79	0.76	0.34
										750	39.2	765.0	3.68	49.4	51.8	129.9	0.79	0.76	0.30
H6_L1	80x70x10x1.5	4.65	3500	31.2	40.9	79.3	220.2	1.31	1.94	150	23.4	54.0	1.32	26.2	26.2	26.2	0.90	0.90	0.90
										300	23.4	108.0	1.86	27.3	30.7	34.0	0.86	0.76	0.69
										450	23.4	162.0	2.28	27.3	34.2	41.8	0.86	0.69	0.56
										600	23.4	216.0	2.63	27.3	36.9	48.3	0.86	0.64	0.48
										750	23.4	270.0	2.94	27.3	39.1	54.1	0.86	0.60	0.43
H6_L2	80x70x10x1.5	4.65	4000	24.8	31.3	79.3	220.2	1.26	2.53	150	18.3	54.0	1.48	21.7	21.7	21.7	0.84	0.84	0.84
										300	18.3	108.0	2.09	21.8	25.3	30.4	0.84	0.72	0.60
										450	18.3	162.0	2.55	21.8	27.7	37.3	0.84	0.66	0.49
										600	18.3	216.0	2.95	21.8	29.5	43.2	0.84	0.62	0.42
										750	18.3	270.0	3.30	21.8	31.1	48.3	0.84	0.59	0.38
H6_L3	80x70x10x1.5	4.65	4500	20.4	24.8	79.3	220.2	1.21	3.20	150	14.7	54.0	1.63	17.9	18.5	19.4	0.82	0.80	0.76
										300	14.7	108.0	2.30	17.9	21.0	27.6	0.82	0.70	0.53
										450	14.7	162.0	2.82	17.9	22.7	33.9	0.82	0.65	0.43
										600	14.7	216.0	3.25	17.9	24.0	39.2	0.82	0.61	0.38
										750	14.7	270.0	3.64	17.9	25.0	43.8	0.82	0.59	0.34
H6_L4	80x70x10x1.5	4.65	5000	17.2	20.1	79.3	220.2	1.17	3.95	150	12.1	54.0	1.77	15.1	15.8	17.9	0.80	0.76	0.68
										300	12.1	108.0	2.51	15.1	17.5	25.4	0.80	0.69	0.48
										450	12.1	162.0	3.07	15.1	18.6	31.1	0.80	0.65	0.39
										600	12.1	216.0	3.54	15.1	19.4	36.0	0.80	0.63	0.34
										750	12.1	270.0	3.96	15.1	20.0	40.3	0.80	0.61	0.30
H6_L5	80x70x10x1.5	4.65	5500	14.8	16.6	79.3	220.2	1.12	4.78	150	10.2	54.0	1.91	13.0	13.6	16.6	0.79	0.75	0.62
										300	10.4	108.0	2.70	13.0	14.5	23.6	0.80	0.72	0.44
										450	10.5	162.0	3.31	13.0	15.0	28.9	0.81	0.70	0.36
										600	10.5	216.0	3.82	13.0	15.4	33.4	0.81	0.68	0.32
										750	10.5	270.0	4.27	13.0	15.7	37.4	0.81	0.67	0.28
H6_L6	80x70x10x1.5	4.65	6000	13.0	13.9	79.3	220.2	1.07	5.69	150	8.7	54.0	2.04	11.4	11.5	15.6	0.77	0.76	0.56
										300	9.4	108.0	2.88	11.4	11.7	22.1	0.83	0.81	0.43
										450	9.5	162.0	3.53	11.4	11.8	27.1	0.83	0.81	0.35
										600	9.5	216.0	4.08	11.4	11.8	31.3	0.83	0.80	0.30
										750	9.5	270.0	4.56	11.4	11.9	35.1	0.83	0.80	0.27
							Max	1.456	6.384							Mean	0.848	0.742	0.565
							Min	1.009	1.596							Sd.Dv.	0.053	0.103	0.201
																Max	1.097	1.097	1.097
																Min	0.767	0.572	0.267

Table A2.4 (to be continued): PC_m R columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
R1_L1	100x100x10x10x3	3.62	5000	101.6	125.0	303.9	2085.7	1.23	2.43	150	75.7	153.0	1.23	81.4	81.4	81.4	0.93	0.93	0.93
										300	77.1	306.0	1.74	89.1	95.4	104.2	0.87	0.81	0.74
										450	77.1	459.0	2.13	89.1	104.8	129.6	0.87	0.74	0.60
										600	77.1	612.0	2.45	89.1	112.0	151.2	0.87	0.69	0.51
										750	77.1	765.0	2.74	89.1	118.0	170.4	0.87	0.65	0.45
R1_L2	100x100x10x10x3	3.62	5000	86.7	103.3	303.9	2085.7	1.19	2.94	150	64.6	153.0	1.33	73.1	73.1	73.1	0.88	0.88	0.88
										300	64.7	306.0	1.88	76.1	83.3	96.9	0.85	0.78	0.67
										450	64.7	459.0	2.30	76.1	90.3	120.4	0.85	0.72	0.54
										600	64.7	612.0	2.66	76.1	95.6	140.5	0.85	0.68	0.46
										750	64.7	765.0	2.97	76.1	100.0	158.4	0.85	0.65	0.41
R1_L3	100x100x10x10x3	3.62	6000	75.4	86.8	303.9	2085.7	1.15	3.50	150	55.3	153.0	1.42	65.4	65.4	65.4	0.84	0.84	0.84
										300	55.3	306.0	2.01	66.1	72.8	90.8	0.84	0.76	0.61
										450	55.3	459.0	2.47	66.1	77.7	112.8	0.84	0.71	0.49
										600	55.3	612.0	2.85	66.1	81.4	131.6	0.84	0.68	0.42
										750	55.3	765.0	3.19	66.1	84.4	148.4	0.84	0.66	0.37
R1_L4	100x100x10x10x3	3.62	6500	66.5	74.0	303.9	2085.7	1.11	4.11	150	47.9	153.0	1.52	58.3	58.5	59.1	0.82	0.82	0.81
										300	47.9	306.0	2.15	58.3	63.3	85.6	0.82	0.76	0.56
										450	47.9	459.0	2.63	58.3	66.3	106.4	0.82	0.72	0.45
										600	47.9	612.0	3.03	58.3	68.5	124.2	0.82	0.70	0.39
										750	47.9	765.0	3.39	58.3	70.2	140.0	0.82	0.68	0.34
R1_L5	100x100x10x10x3	3.62	7000	59.4	63.8	303.9	2085.7	1.07	4.76	150	42.0	153.0	1.60	52.1	52.5	56.0	0.81	0.80	0.75
										300	42.0	306.0	2.27	52.1	54.5	81.3	0.81	0.77	0.52
										450	42.0	459.0	2.78	52.1	55.7	101.0	0.81	0.75	0.42
										600	42.0	612.0	3.21	52.1	56.5	117.9	0.81	0.74	0.36
										750	42.0	765.0	3.59	52.1	57.2	132.9	0.81	0.73	0.32
R1_L6	100x100x10x10x3	3.62	7500	53.7	55.6	303.9	2085.7	1.04	5.47	150	37.2	153.0	1.69	47.1	47.1	53.5	0.79	0.79	0.70
										300	37.2	306.0	2.39	47.1	47.1	77.5	0.79	0.79	0.48
										450	37.2	459.0	2.92	47.1	47.1	96.4	0.79	0.79	0.39
										600	37.2	612.0	3.38	47.1	47.1	112.4	0.79	0.79	0.33
										750	37.2	765.0	3.78	47.1	47.1	126.7	0.79	0.79	0.29
R2_L1	100x90x15x15x1.5	7.23	5000	51.5	57.3	96.7	294.1	1.11	1.69	150	37.1	76.5	1.22	41.1	41.1	41.1	0.90	0.90	0.90
										300	37.8	153.0	1.72	45.1	45.2	50.9	0.84	0.83	0.74
										450	37.8	229.5	2.11	45.1	45.4	60.5	0.84	0.83	0.62
										600	37.8	306.0	2.44	45.1	45.4	68.5	0.84	0.83	0.55
										750	37.8	382.5	2.73	45.1	45.5	75.3	0.84	0.83	0.50
R2_L2	100x90x15x15x1.5	7.23	5500	43.1	47.4	96.7	294.1	1.10	2.04	150	31.2	76.5	1.33	36.4	36.4	36.4	0.86	0.86	0.86
										300	31.3	153.0	1.88	37.8	37.8	46.0	0.83	0.83	0.68
										450	31.3	229.5	2.31	37.8	37.8	54.7	0.83	0.83	0.57
										600	31.3	306.0	2.66	37.8	37.8	61.9	0.83	0.83	0.51
										750	31.3	382.5	2.98	37.8	37.8	68.1	0.83	0.83	0.46
R2_L3	100x90x15x15x1.5	7.23	6000	36.6	39.8	96.7	294.1	1.09	2.43	150	26.3	76.5	1.44	31.9	31.9	31.9	0.82	0.82	0.82
										300	26.3	153.0	2.04	32.1	32.2	41.9	0.82	0.82	0.63
										450	26.3	229.5	2.50	32.1	32.2	49.8	0.82	0.82	0.53
										600	26.3	306.0	2.89	32.1	32.2	56.4	0.82	0.82	0.47
										750	26.3	382.5	3.23	32.1	32.2	62.0	0.82	0.82	0.42
R2_L4	100x90x15x15x1.5	7.23	7000	27.5	29.2	96.7	294.1	1.06	3.31	150	19.2	76.5	1.67	24.1	24.2	26.4	0.80	0.80	0.73
										300	19.2	153.0	2.36	24.1	24.2	35.6	0.80	0.80	0.54
										450	19.2	229.5	2.89	24.1	24.2	42.3	0.80	0.80	0.45
										600	19.2	306.0	3.33	24.1	24.2	47.9	0.80	0.80	0.40
										750	19.2	382.5	3.73	24.1	24.2	52.7	0.80	0.80	0.37
R2_L5	100x90x15x15x1.5	7.23	8000	21.6	22.4	96.7	294.1	1.04	4.32	150	14.7	76.5	1.88	18.9	18.9	23.0	0.78	0.78	0.64
										300	14.7	153.0	2.66	18.9	18.9	30.9	0.78	0.78	0.47
										450	14.7	229.5	3.26	18.9	18.9	36.8	0.78	0.78	0.40
										600	14.7	306.0	3.77	18.9	18.9	41.6	0.78	0.78	0.35
										750	14.7	382.5	4.21	18.9	18.9	45.8	0.78	0.78	0.32
R2_L6	100x90x15x15x1.5	7.23	9000	17.5	17.7	96.7	294.1	1.01	5.47	150	11.6	76.5	2.09	15.3	15.3	20.4	0.76	0.75	0.57
										300	11.6	153.0	2.96	15.3	15.3	27.4	0.76	0.75	0.42
										450	11.6	229.5	3.63	15.3	15.3	32.6	0.76	0.75	0.35
										600	11.6	306.0	4.19	15.3	15.3	36.9	0.76	0.75	0.31
										750	11.6	382.5	4.68	15.3	15.3	40.6	0.76	0.75	0.28

Table A2.4 (continuation): PC_m R columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
R3_L1	90x90x10x10x3	3.44	4000	119.4	147.5	334.1	1956.2	1.24	2.26	150	86.5	139.5	1.08	85.5	85.5	85.5	1.01	1.01	1.01
										300	92.2	279.0	1.53	104.7	105.7	106.9	0.88	0.87	0.86
										450	92.3	418.5	1.87	104.7	116.6	133.2	0.88	0.79	0.69
										600	92.3	558.0	2.16	104.7	125.0	155.7	0.88	0.74	0.59
										750	92.3	697.5	2.42	104.7	131.9	175.7	0.88	0.70	0.53
R3_L2	90x90x10x10x3	3.44	4500	98.0	116.6	334.1	1956.2	1.19	2.87	150	72.8	139.5	1.19	76.9	76.9	76.9	0.95	0.95	0.95
										300	74.3	279.0	1.69	86.0	90.2	97.7	0.86	0.82	0.76
										450	74.3	418.5	2.07	86.0	98.0	121.7	0.86	0.76	0.61
										600	74.3	558.0	2.39	86.0	103.9	142.2	0.86	0.72	0.52
										750	74.3	697.5	2.67	86.0	108.7	160.5	0.86	0.68	0.46
R3_L3	90x90x10x10x3	3.44	5000	82.6	94.4	334.1	1956.2	1.14	3.54	150	61.2	139.5	1.30	68.8	68.8	68.8	0.89	0.89	0.89
										300	61.4	279.0	1.84	72.4	77.3	90.3	0.85	0.79	0.68
										450	61.4	418.5	2.25	72.4	82.3	112.5	0.85	0.75	0.55
										600	61.4	558.0	2.60	72.4	86.1	131.5	0.85	0.71	0.47
										750	61.4	697.5	2.91	72.4	89.2	148.4	0.85	0.69	0.41
R3_L4	90x90x10x10x3	3.44	5500	71.1	78.0	334.1	1956.2	1.10	4.28	150	51.8	139.5	1.40	61.4	61.4	61.4	0.84	0.84	0.84
										300	51.8	279.0	1.98	62.4	65.9	84.4	0.83	0.79	0.61
										450	51.8	418.5	2.43	62.4	68.5	105.1	0.83	0.76	0.49
										600	51.8	558.0	2.80	62.4	70.4	122.8	0.83	0.73	0.42
										750	51.8	697.5	3.13	62.4	72.0	138.6	0.83	0.72	0.37
R3_L5	90x90x10x10x3	3.44	6000	62.3	65.6	334.1	1956.2	1.05	5.10	150	44.4	139.5	1.50	54.7	54.7	54.7	0.81	0.81	0.81
										300	44.4	279.0	2.12	54.7	55.4	79.4	0.81	0.80	0.56
										450	44.4	418.5	2.59	54.7	55.8	98.9	0.81	0.80	0.45
										600	44.4	558.0	2.99	54.7	56.0	115.6	0.81	0.79	0.38
										750	44.4	697.5	3.34	54.7	56.3	130.5	0.81	0.79	0.34
R3_L6	90x90x10x10x3	3.44	6500	55.5	55.9	334.1	1956.2	1.01	5.98	150	38.6	139.5	1.59	48.6	48.7	51.7	0.79	0.79	0.75
										300	38.6	279.0	2.24	48.6	48.7	75.3	0.79	0.79	0.51
										450	38.6	418.5	2.75	48.6	48.7	93.8	0.79	0.79	0.41
										600	38.6	558.0	3.17	48.6	48.7	109.6	0.79	0.79	0.35
										750	38.6	697.5	3.55	48.6	48.7	123.7	0.79	0.79	0.31
R4_L1	80x80x10x10x3	3.25	3000	153.7	192.1	369.7	1766.7	1.25	1.92	150	96.7	126.0	0.91	89.4	89.4	89.4	1.08	1.08	1.08
										300	120.7	252.0	1.28	126.9	126.9	126.9	0.95	0.95	0.95
										450	121.5	378.0	1.57	134.8	138.0	141.6	0.90	0.88	0.86
										600	121.5	504.0	1.81	134.8	148.6	165.8	0.90	0.82	0.73
										750	121.5	630.0	2.02	134.8	157.4	187.3	0.90	0.77	0.65
R4_L2	80x80x10x10x3	3.25	3250	134.0	163.7	369.7	1766.7	1.22	2.26	150	90.4	126.0	0.97	85.0	85.0	85.0	1.06	1.06	1.06
										300	104.7	252.0	1.37	114.7	114.7	114.7	0.91	0.91	0.91
										450	104.8	378.0	1.68	117.5	124.0	133.1	0.89	0.84	0.79
										600	104.8	504.0	1.94	117.5	132.8	155.8	0.89	0.79	0.67
										750	104.8	630.0	2.17	117.5	139.9	176.0	0.89	0.75	0.60
R4_L3	80x80x10x10x3	3.25	3500	118.2	141.1	369.7	1766.7	1.19	2.62	150	83.6	126.0	1.03	80.7	80.7	80.7	1.04	1.04	1.04
										300	91.5	252.0	1.46	103.3	103.3	103.3	0.89	0.89	0.89
										450	91.5	378.0	1.79	103.7	111.8	125.8	0.88	0.82	0.73
										600	91.5	504.0	2.06	103.7	118.9	147.2	0.88	0.77	0.62
										750	91.5	630.0	2.31	103.7	124.7	166.3	0.88	0.73	0.55
R4_L4	80x80x10x10x3	3.25	4000	94.9	108.1	369.7	1766.7	1.14	3.42	150	69.8	126.0	1.15	72.3	72.3	72.3	0.97	0.97	0.97
										300	71.7	252.0	1.63	83.2	85.5	91.2	0.86	0.84	0.79
										450	71.7	378.0	2.00	83.2	91.1	113.8	0.86	0.79	0.63
										600	71.7	504.0	2.30	83.2	95.4	133.2	0.86	0.75	0.54
										750	71.7	630.0	2.58	83.2	98.8	150.6	0.86	0.73	0.48
R4_L5	80x80x10x10x3	3.25	4500	78.7	85.4	369.7	1766.7	1.08	4.33	150	57.7	126.0	1.27	64.5	64.5	64.5	0.89	0.89	0.89
										300	58.1	252.0	1.79	69.0	71.1	83.8	0.84	0.82	0.69
										450	58.1	378.0	2.19	69.0	73.6	104.6	0.84	0.79	0.56
										600	58.1	504.0	2.53	69.0	75.3	122.5	0.84	0.77	0.47
										750	58.1	630.0	2.83	69.0	76.7	138.4	0.84	0.76	0.42
R4_L6	80x80x10x10x3	3.25	5000	67.1	69.2	369.7	1766.7	1.03	5.35	150	48.2	126.0	1.37	57.4	57.4	57.4	0.84	0.84	0.84
										300	48.2	252.0	1.94	58.8	58.8	77.9	0.82	0.82	0.62
										450	48.3	378.0	2.37	58.8	58.8	97.3	0.82	0.82	0.50
										600	48.3	504.0	2.74	58.8	58.8	113.9	0.82	0.82	0.42
										750	48.3	630.0	3.07	58.8	58.8	128.7	0.82	0.82	0.37

Table A2.4 (continuation): PC_m R columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
R5_L1	110x110x15x15x3	4.09	5000	145.9	185.8	364.9	1687.4	1.27	1.96	150	105.4	175.5	1.10	106.1	106.1	106.1	0.99	0.99	0.99
										300	112.7	351.0	1.55	128.0	130.2	132.6	0.88	0.87	0.85
										450	112.7	526.5	1.90	128.0	144.1	163.9	0.88	0.78	0.69
										600	112.8	702.0	2.19	128.0	154.9	190.4	0.88	0.73	0.59
										750	112.8	877.5	2.45	128.0	163.7	214.0	0.88	0.69	0.53
R5_L2	110x110x15x15x3	4.09	5500	123.2	153.5	364.9	1687.4	1.25	2.38	150	91.4	175.5	1.19	96.7	96.7	96.7	0.95	0.95	0.95
										300	94.1	351.0	1.69	108.0	114.1	122.3	0.87	0.82	0.77
										450	94.1	526.5	2.07	108.0	125.3	151.1	0.87	0.75	0.62
										600	94.1	702.0	2.39	108.0	133.9	175.6	0.87	0.70	0.54
										750	94.1	877.5	2.67	108.0	140.9	197.3	0.87	0.67	0.48
R5_L3	110x110x15x15x3	4.09	6000	105.7	129.0	364.9	1687.4	1.22	2.83	150	79.1	175.5	1.29	87.6	87.6	87.6	0.90	0.90	0.90
										300	79.7	351.0	1.82	92.7	100.7	113.7	0.86	0.79	0.70
										450	79.7	526.5	2.23	92.7	109.6	140.5	0.86	0.73	0.57
										600	79.7	702.0	2.58	92.7	116.4	163.3	0.86	0.68	0.49
										750	79.7	877.5	2.88	92.7	122.0	183.5	0.86	0.65	0.43
R5_L4	110x110x15x15x3	4.09	7000	81.2	94.8	364.9	1687.4	1.17	3.85	150	59.5	175.5	1.47	71.0	71.0	71.0	0.84	0.84	0.84
										300	59.5	351.0	2.08	71.2	79.3	100.2	0.84	0.75	0.59
										450	59.5	526.5	2.55	71.2	84.7	123.9	0.84	0.70	0.48
										600	59.5	702.0	2.94	71.2	88.8	143.9	0.84	0.67	0.41
										750	59.5	877.5	3.29	71.2	92.1	161.7	0.84	0.65	0.37
R5_L5	110x110x15x15x3	4.09	8000	65.1	72.6	364.9	1687.4	1.11	5.03	150	46.4	175.5	1.64	57.1	58.2	62.8	0.81	0.80	0.74
										300	46.4	351.0	2.32	57.1	62.5	90.2	0.81	0.74	0.51
										450	46.4	526.5	2.84	57.1	65.1	111.5	0.81	0.71	0.42
										600	46.4	702.0	3.28	57.1	67.0	129.6	0.81	0.69	0.36
										750	46.4	877.5	3.67	57.1	68.5	145.6	0.81	0.68	0.32
R5_L6	110x110x15x15x3	4.09	9000	54.1	57.3	364.9	1687.4	1.06	6.36	150	37.4	175.5	1.80	47.4	47.7	57.4	0.79	0.78	0.65
										300	37.4	351.0	2.55	47.4	48.2	82.5	0.79	0.78	0.45
										450	37.4	526.5	3.12	47.4	48.5	102.0	0.79	0.77	0.37
										600	37.4	702.0	3.60	47.4	48.7	118.5	0.79	0.77	0.32
										750	37.4	877.5	4.03	47.4	48.9	133.2	0.79	0.77	0.28
R6_L1	70x70x10x10x1.2	5.89	4000	23.3	30.5	56.6	244.6	1.31	1.86	150	17.4	45.0	1.39	20.0	20.0	20.0	0.87	0.87	0.87
										300	17.4	90.0	1.97	20.4	23.1	26.3	0.85	0.76	0.66
										450	17.4	135.0	2.41	20.4	25.3	31.8	0.85	0.69	0.55
										600	17.4	180.0	2.78	20.4	27.0	36.4	0.85	0.65	0.48
										750	17.4	225.0	3.11	20.4	28.3	40.4	0.85	0.61	0.43
R6_L2	70x70x10x10x1.2	5.89	5000	15.4	19.5	56.6	244.6	1.26	2.90	150	11.2	45.0	1.71	13.5	14.2	15.3	0.83	0.79	0.73
										300	11.2	90.0	2.41	13.5	16.2	21.2	0.83	0.69	0.53
										450	11.2	135.0	2.96	13.5	17.5	25.6	0.83	0.64	0.44
										600	11.2	180.0	3.41	13.5	18.5	29.3	0.83	0.61	0.38
										750	11.2	225.0	3.82	13.5	19.3	32.5	0.83	0.58	0.34
R6_L3	70x70x10x10x1.2	5.89	6000	11.1	13.5	56.6	244.6	1.22	4.18	150	7.8	45.0	2.01	9.8	10.7	12.9	0.80	0.73	0.61
										300	7.8	90.0	2.84	9.8	11.9	17.8	0.80	0.66	0.44
										450	7.8	135.0	3.48	9.8	12.6	21.5	0.80	0.62	0.36
										600	7.8	180.0	4.02	9.8	13.2	24.6	0.80	0.59	0.32
										750	7.8	225.0	4.50	9.8	13.7	27.3	0.80	0.57	0.29
R6_L4	70x70x10x10x1.2	5.89	7000	8.5	10.0	56.6	244.6	1.17	5.69	150	5.8	45.0	2.30	7.5	8.2	11.1	0.77	0.70	0.52
										300	5.8	90.0	3.25	7.5	8.9	15.4	0.77	0.65	0.37
										450	5.8	135.0	3.98	7.5	9.3	18.7	0.77	0.62	0.31
										600	5.8	180.0	4.60	7.5	9.6	21.3	0.77	0.60	0.27
										750	5.8	225.0	5.14	7.5	9.8	23.7	0.77	0.59	0.24
R6_L5	70x70x10x10x1.2	5.89	8000	6.8	7.6	56.6	244.6	1.12	7.43	150	4.4	45.0	2.57	6.0	6.3	9.9	0.74	0.70	0.45
										300	4.4	90.0	3.64	6.0	6.6	13.7	0.74	0.68	0.32
										450	4.4	135.0	4.45	6.0	6.7	16.6	0.74	0.66	0.27
										600	4.5	180.0	5.14	6.0	6.8	18.9	0.75	0.65	0.24
										750	4.5	225.0	5.75	6.0	6.9	21.0	0.75	0.65	0.21
R6_L6	70x70x10x10x1.2	5.89	9000	5.6	6.0	56.6	244.6	1.07	9.40	150	3.6	45.0	2.82	4.9	4.9	9.0	0.72	0.72	0.40
										300	3.6	90.0	3.99	4.9	4.9	12.4	0.74	0.74	0.29
										450	3.7	135.0	4.89	4.9	4.9	15.0	0.75	0.75	0.25
										600	3.8	180.0	5.65	4.9	4.9	17.1	0.76	0.76	0.22
										750	3.8	225.0	6.32	4.9	4.9	19.0	0.76	0.76	0.20
							Max	1.310	9.402							Mean	0.836	0.771	0.556
							Min	1.007	1.688							Sd.Dv.	0.057	0.089	0.205
																Max	1.082	1.082	1.082
																Min	0.720	0.570	0.198

Table A2.5 (to be continued): PC_m RLC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
RLC1_L1	110x110x10x15x3	3.87	6000	91.7	112.4	336.7	2213.4	1.23	3.00	150	69.0	171.0	1.37	78.4	78.4	78.4	0.88	0.88	0.88
										300	69.0	342.0	1.93	80.5	90.0	105.1	0.86	0.77	0.66
										450	69.0	513.0	2.36	80.5	98.4	130.3	0.86	0.70	0.53
										600	69.0	684.0	2.73	80.5	104.8	151.7	0.86	0.66	0.45
										750	69.0	855.0	3.05	80.5	110.1	170.7	0.86	0.63	0.40
RLC1_L2	110x110x10x15x3	3.87	6500	80.3	95.8	336.7	2213.4	1.19	3.52	150	59.5	171.0	1.46	70.2	70.2	70.2	0.85	0.85	0.85
										300	59.5	342.0	2.06	70.5	79.7	98.8	0.84	0.75	0.60
										450	59.5	513.0	2.53	70.5	86.2	122.4	0.84	0.69	0.49
										600	59.5	684.0	2.92	70.5	91.1	142.5	0.84	0.65	0.42
										750	59.5	855.0	3.26	70.5	95.1	160.3	0.84	0.63	0.37
RLC1_L3	110x110x10x15x3	3.87	7000	71.2	82.6	336.7	2213.4	1.16	4.08	150	52.0	171.0	1.55	62.5	63.2	64.7	0.83	0.82	0.80
										300	52.0	342.0	2.19	62.5	70.7	93.3	0.83	0.74	0.56
										450	52.0	513.0	2.68	62.5	75.4	115.6	0.83	0.69	0.45
										600	52.0	684.0	3.10	62.5	79.0	134.7	0.83	0.66	0.39
										750	52.0	855.0	3.46	62.5	81.9	151.5	0.83	0.63	0.34
RLC1_L4	110x110x10x15x3	3.87	7500	63.9	71.9	336.7	2213.4	1.13	4.68	150	45.9	171.0	1.64	56.0	57.3	61.4	0.82	0.80	0.75
										300	45.9	342.0	2.31	56.0	62.4	88.7	0.82	0.74	0.52
										450	45.9	513.0	2.83	56.0	65.6	109.9	0.82	0.70	0.42
										600	45.9	684.0	3.27	56.0	68.0	127.9	0.82	0.68	0.36
										750	45.9	855.0	3.66	56.0	69.9	143.9	0.82	0.66	0.32
RLC1_L5	110x110x10x15x3	3.87	8000	57.8	63.2	336.7	2213.4	1.09	5.33	150	40.9	171.0	1.72	50.7	51.8	58.6	0.81	0.79	0.70
										300	40.9	342.0	2.43	50.7	54.7	84.6	0.81	0.75	0.48
										450	40.9	513.0	2.98	50.7	56.5	104.8	0.81	0.72	0.39
										600	40.9	684.0	3.44	50.7	57.8	122.0	0.81	0.71	0.34
										750	40.9	855.0	3.85	50.7	58.8	137.3	0.81	0.70	0.30
RLC1_L6	110x110x10x15x3	3.87	8500	52.8	56.0	336.7	2213.4	1.06	6.01	150	36.8	171.0	1.80	46.3	46.7	56.2	0.79	0.79	0.65
										300	36.8	342.0	2.55	46.3	47.4	81.0	0.79	0.77	0.45
										450	36.8	513.0	3.12	46.3	47.9	100.4	0.79	0.77	0.37
										600	36.8	684.0	3.60	46.3	48.2	116.9	0.79	0.76	0.31
										750	36.8	855.0	4.02	46.3	48.4	131.5	0.79	0.76	0.28
RLC2_L1	120x120x15x15x3	4.34	5000	170.8	218.0	410.1	1353.6	1.28	1.88	150	120.7	189.0	1.05	119.0	119.0	119.0	1.01	1.01	1.01
										300	133.1	378.0	1.49	149.7	149.7	149.7	0.89	0.89	0.89
										450	133.1	567.0	1.82	149.8	164.9	183.1	0.89	0.81	0.73
										600	133.2	756.0	2.10	149.8	176.9	212.4	0.89	0.75	0.63
										750	133.2	945.0	2.35	149.8	186.9	238.2	0.89	0.71	0.56
RLC2_L2	120x120x15x15x3	4.34	5500	144.0	180.2	410.1	1353.6	1.25	2.28	150	106.2	189.0	1.15	109.1	109.1	109.1	0.97	0.97	0.97
										300	111.0	378.0	1.62	126.3	130.8	136.8	0.88	0.85	0.81
										450	111.0	567.0	1.98	126.3	143.4	168.6	0.88	0.77	0.66
										600	111.0	756.0	2.29	126.3	153.1	195.5	0.88	0.73	0.57
										750	111.0	945.0	2.56	126.3	161.0	219.3	0.88	0.69	0.51
RLC2_L3	120x120x15x15x3	4.34	6000	123.3	151.4	410.1	1353.6	1.23	2.71	150	92.4	189.0	1.24	99.5	99.5	99.5	0.93	0.93	0.93
										300	93.9	378.0	1.75	108.2	115.4	126.9	0.87	0.81	0.74
										450	93.9	567.0	2.14	108.2	125.6	156.4	0.87	0.75	0.60
										600	93.9	756.0	2.48	108.2	133.3	181.3	0.87	0.70	0.52
										750	93.9	945.0	2.77	108.2	139.7	203.4	0.87	0.67	0.46
RLC2_L4	120x120x15x15x3	4.34	7000	94.2	111.2	410.1	1353.6	1.18	3.69	150	69.9	189.0	1.42	81.6	81.6	81.6	0.86	0.86	0.86
										300	69.9	378.0	2.00	82.6	91.1	111.4	0.85	0.77	0.63
										450	69.9	567.0	2.45	82.6	97.6	137.2	0.85	0.72	0.51
										600	69.9	756.0	2.83	82.6	102.5	159.1	0.85	0.68	0.44
										750	69.9	945.0	3.17	82.6	106.4	178.5	0.85	0.66	0.39
HLC2_L5	120x120x15x15x3	4.34	8000	75.1	85.2	410.1	1353.6	1.13	4.82	150	54.3	189.0	1.59	65.9	66.8	69.8	0.82	0.81	0.78
										300	54.3	378.0	2.24	65.9	72.6	99.8	0.82	0.75	0.54
										450	54.3	567.0	2.75	65.9	76.1	123.0	0.82	0.71	0.44
										600	54.3	756.0	3.17	65.9	78.8	142.6	0.82	0.69	0.38
										750	54.3	945.0	3.55	65.9	80.9	159.9	0.82	0.67	0.34
RLC2_L6	120x120x15x15x3	4.34	9000	62.0	67.3	410.1	1353.6	1.09	6.09	150	43.6	189.0	1.75	54.4	55.3	63.6	0.80	0.79	0.69
										300	43.6	378.0	2.47	54.4	57.3	90.9	0.80	0.76	0.48
										450	43.6	567.0	3.02	54.4	58.5	112.0	0.80	0.75	0.39
										600	43.6	756.0	3.49	54.4	59.3	129.9	0.80	0.74	0.34
										750	43.6	945.0	3.90	54.4	60.0	145.7	0.80	0.73	0.30

Table A2.5 (continuation): PC_m RLC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
RLC3_L1	100x100x10x10x3	3.67	4000	145.8	186.2	346.0	1505.6	1.28	1.86	150	103.2	153.0	1.02	98.6	98.6	98.6	1.05	1.05	1.05
										300	114.1	306.0	1.45	127.2	127.2	127.2	0.90	0.90	0.90
										450	114.1	459.0	1.77	127.9	139.9	153.1	0.89	0.82	0.74
										600	114.1	612.0	2.05	127.9	151.0	178.6	0.89	0.76	0.64
										750	114.1	765.0	2.29	127.9	160.2	201.2	0.89	0.71	0.57
RLC3_L2	100x100x10x10x3	3.67	4500	119.1	147.1	346.0	1505.6	1.24	2.35	150	88.2	153.0	1.13	89.4	89.4	89.4	0.99	0.99	0.99
										300	91.7	306.0	1.60	104.4	107.8	112.2	0.88	0.85	0.82
										450	91.7	459.0	1.96	104.4	118.5	139.4	0.88	0.77	0.66
										600	91.7	612.0	2.27	104.4	126.8	162.5	0.88	0.72	0.56
										750	91.7	765.0	2.53	104.4	133.6	183.1	0.88	0.69	0.50
RLC3_L3	100x100x10x10x3	3.67	5000	99.7	119.2	346.0	1505.6	1.20	2.90	150	74.8	153.0	1.24	80.5	80.5	80.5	0.93	0.93	0.93
										300	75.5	306.0	1.75	87.4	93.1	103.3	0.86	0.81	0.73
										450	75.5	459.0	2.15	87.4	101.1	128.3	0.86	0.75	0.59
										600	75.5	612.0	2.48	87.4	107.1	149.6	0.86	0.70	0.50
										750	75.5	765.0	2.77	87.4	112.1	168.6	0.86	0.67	0.45
RLC3_L4	100x100x10x10x3	3.67	5500	85.2	98.5	346.0	1505.6	1.16	3.51	150	63.4	153.0	1.34	72.2	72.2	72.2	0.88	0.88	0.88
										300	63.4	306.0	1.89	74.8	80.7	96.0	0.85	0.78	0.66
										450	63.4	459.0	2.32	74.8	86.3	119.3	0.85	0.73	0.53
										600	63.4	612.0	2.68	74.8	90.4	139.1	0.85	0.70	0.46
										750	63.4	765.0	3.00	74.8	93.8	156.8	0.85	0.68	0.40
RLC3_L5	100x100x10x10x3	3.67	6000	74.2	82.8	346.0	1505.6	1.12	4.18	150	54.2	153.0	1.44	64.5	64.5	64.5	0.84	0.84	0.84
										300	54.2	306.0	2.03	65.1	69.8	90.0	0.83	0.78	0.60
										450	54.2	459.0	2.49	65.1	73.2	111.8	0.83	0.74	0.48
										600	54.2	612.0	2.87	65.1	75.7	130.4	0.83	0.72	0.42
										750	54.2	765.0	3.21	65.1	77.7	146.9	0.83	0.70	0.37
RLC3_L6	100x100x10x10x3	3.67	7000	58.6	60.8	346.0	1505.6	1.04	5.69	150	41.2	153.0	1.62	51.4	51.4	55.7	0.80	0.80	0.74
										300	41.2	306.0	2.28	51.4	51.4	80.7	0.80	0.80	0.51
										450	41.2	459.0	2.80	51.4	51.4	100.2	0.80	0.80	0.41
										600	41.2	612.0	3.23	51.4	51.4	116.9	0.80	0.80	0.35
										750	41.2	765.0	3.61	51.4	51.4	131.7	0.80	0.80	0.31
RLC4_L1	90x90x10x10x3	3.50	3500	146.8	182.1	387.4	1626.5	1.24	2.13	150	100.1	139.5	0.97	93.7	93.7	93.7	1.07	1.07	1.07
										300	115.2	279.0	1.38	125.9	125.9	125.9	0.92	0.92	0.92
										450	115.3	418.5	1.69	128.8	136.5	146.4	0.90	0.84	0.79
										600	115.3	558.0	1.95	128.8	146.3	171.0	0.90	0.79	0.67
										750	115.3	697.5	2.18	128.8	154.5	192.9	0.90	0.75	0.60
RLC4_L2	90x90x10x10x3	3.50	4000	116.9	139.4	387.4	1626.5	1.19	2.78	150	85.7	139.5	1.09	84.7	84.7	84.7	1.01	1.01	1.01
										300	90.0	279.0	1.54	102.5	103.8	105.9	0.88	0.87	0.85
										450	90.1	418.5	1.89	102.5	112.8	131.8	0.88	0.80	0.68
										600	90.1	558.0	2.18	102.5	119.6	154.0	0.88	0.75	0.58
										750	90.1	697.5	2.44	102.5	125.2	173.7	0.88	0.72	0.52
RLC4_L3	90x90x10x10x3	3.50	4500	96.1	110.1	387.4	1626.5	1.15	3.52	150	71.6	139.5	1.20	76.0	76.0	76.0	0.94	0.94	0.94
										300	72.6	279.0	1.70	84.3	87.8	96.8	0.86	0.83	0.75
										450	72.6	418.5	2.09	84.3	93.6	120.5	0.86	0.77	0.60
										600	72.6	558.0	2.41	84.3	98.0	140.7	0.86	0.74	0.52
										750	72.6	697.5	2.69	84.3	101.5	158.8	0.86	0.71	0.46
RLC4_L4	90x90x10x10x3	3.50	5000	81.2	89.2	387.4	1626.5	1.10	4.34	150	59.9	139.5	1.31	67.9	67.9	67.9	0.88	0.88	0.88
										300	60.0	279.0	1.85	71.2	74.2	89.5	0.84	0.81	0.67
										450	60.0	418.5	2.27	71.2	77.3	111.5	0.84	0.78	0.54
										600	60.0	558.0	2.62	71.2	79.5	130.2	0.84	0.75	0.46
										750	60.0	697.5	2.93	71.2	81.2	146.9	0.84	0.74	0.41
RLC4_L5	90x90x10x10x3	3.50	5500	70.0	73.7	387.4	1626.5	1.05	5.25	150	50.6	139.5	1.41	60.6	60.6	60.6	0.84	0.84	0.84
										300	50.6	279.0	2.00	61.4	62.1	83.7	0.82	0.81	0.60
										450	50.6	418.5	2.44	61.4	62.6	104.1	0.82	0.81	0.49
										600	50.6	558.0	2.82	61.4	62.9	121.6	0.82	0.80	0.42
										750	50.6	697.5	3.16	61.4	63.1	137.2	0.82	0.80	0.37
RLC4_L6	90x90x10x10x3	3.50	6000	61.5	62.0	387.4	1626.5	1.01	6.25	150	43.4	139.5	1.51	53.9	54.0	54.2	0.81	0.81	0.80
										300	43.4	279.0	2.13	53.9	54.0	78.8	0.81	0.81	0.55
										450	43.4	418.5	2.61	53.9	54.0	98.1	0.81	0.81	0.44
										600	43.4	558.0	3.01	53.9	54.0	114.6	0.81	0.81	0.38
										750	43.4	697.5	3.37	53.9	54.0	129.3	0.81	0.81	0.34

Table A2.5 (continuation): PC_m RLC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,D}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
RLC5_L1	80x80x10x10x3	3.33	2500	206.1	258.4	438.9	1441.3	1.25	1.70	150	106.1	126.0	0.78	97.6	97.6	97.6	1.09	1.09	1.09
										300	157.7	252.0	1.11	151.1	151.1	151.1	1.04	1.04	1.04
										450	165.6	378.0	1.35	175.4	175.4	175.4	0.94	0.94	0.94
										600	165.6	504.0	1.56	180.7	184.8	189.2	0.92	0.90	0.87
										750	165.6	630.0	1.75	180.7	195.7	213.7	0.92	0.85	0.77
RLC5_L2	80x80x10x10x3	3.33	3000	150.2	179.5	438.9	1441.3	1.20	2.45	150	95.8	126.0	0.92	88.7	88.7	88.7	1.08	1.08	1.08
										300	117.7	252.0	1.30	124.8	124.8	124.8	0.94	0.94	0.94
										450	118.3	378.0	1.59	131.7	134.9	140.1	0.90	0.88	0.84
										600	118.3	504.0	1.83	131.7	143.4	163.9	0.90	0.82	0.72
										750	118.3	630.0	2.05	131.7	150.4	185.0	0.90	0.79	0.64
RLC5_L3	80x80x10x10x3	3.33	3250	131.0	152.9	438.9	1441.3	1.17	2.87	150	89.7	126.0	0.98	84.2	84.2	84.2	1.06	1.06	1.06
										300	101.9	252.0	1.39	112.6	112.6	112.6	0.90	0.90	0.90
										450	101.9	378.0	1.70	114.9	120.4	131.6	0.89	0.85	0.77
										600	101.9	504.0	1.96	114.9	127.0	154.0	0.89	0.80	0.66
										750	102.0	630.0	2.19	114.9	132.4	173.9	0.89	0.77	0.59
RLC5_L4	80x80x10x10x3	3.33	3500	115.7	131.9	438.9	1441.3	1.14	3.33	150	82.8	126.0	1.04	79.9	79.9	79.9	1.04	1.04	1.04
										300	89.1	252.0	1.48	101.3	101.3	101.3	0.88	0.88	0.88
										450	89.1	378.0	1.81	101.5	107.6	124.4	0.88	0.83	0.72
										600	89.1	504.0	2.09	101.5	112.6	145.5	0.88	0.79	0.61
										750	89.1	630.0	2.33	101.5	116.6	164.3	0.88	0.76	0.54
RLC5_L5	80x80x10x10x3	3.33	4000	93.0	100.9	438.9	1441.3	1.09	4.35	150	68.6	126.0	1.16	71.5	71.5	71.5	0.96	0.96	0.96
										300	69.9	252.0	1.65	81.6	82.9	90.3	0.86	0.84	0.77
										450	69.9	378.0	2.02	81.6	85.6	112.7	0.86	0.82	0.62
										600	69.9	504.0	2.33	81.6	87.7	131.8	0.86	0.80	0.53
										750	69.9	630.0	2.60	81.6	89.3	148.8	0.86	0.78	0.47
RLC5_L6	80x80x10x10x3	3.33	4500	77.4	79.8	438.9	1441.3	1.03	5.50	150	56.6	126.0	1.28	63.7	63.7	63.7	0.89	0.89	0.89
										300	56.6	252.0	1.80	67.9	67.9	83.1	0.83	0.83	0.68
										450	56.6	378.0	2.21	67.9	67.9	103.6	0.83	0.83	0.55
										600	56.6	504.0	2.55	67.9	67.9	121.2	0.83	0.83	0.47
										750	56.6	630.0	2.85	67.9	67.9	136.9	0.83	0.83	0.41
RLC6_L1	90x80x10x12x1.2	7.45	5000	25.2	27.5	64.2	195.8	1.09	2.34	150	18.1	52.9	1.45	21.9	21.9	21.9	0.83	0.83	0.83
										300	18.1	105.8	2.05	22.1	22.1	28.7	0.82	0.82	0.63
										450	18.1	158.8	2.51	22.1	22.1	34.1	0.82	0.82	0.53
										600	18.1	211.7	2.90	22.1	22.1	38.5	0.82	0.82	0.47
										750	18.1	264.6	3.24	22.1	22.1	42.3	0.82	0.82	0.43
RLC6_L2	90x80x10x12x1.2	7.45	5500	21.1	22.7	64.2	195.8	1.08	2.83	150	15.0	52.9	1.58	18.5	18.5	19.4	0.81	0.81	0.77
										300	15.0	105.8	2.24	18.5	18.5	25.9	0.81	0.81	0.58
										450	15.0	158.8	2.74	18.5	18.5	30.8	0.81	0.81	0.49
										600	15.0	211.7	3.17	18.5	18.5	34.8	0.81	0.81	0.43
										750	15.0	264.6	3.54	18.5	18.5	38.2	0.81	0.81	0.39
RLC6_L3	90x80x10x12x1.2	7.45	6000	18.0	19.1	64.2	195.8	1.06	3.37	150	12.5	52.9	1.72	15.7	15.8	17.7	0.80	0.80	0.71
										300	12.5	105.8	2.43	15.7	15.8	23.6	0.80	0.80	0.53
										450	12.5	158.8	2.97	15.7	15.8	28.1	0.80	0.80	0.45
										600	12.5	211.7	3.43	15.7	15.8	31.7	0.80	0.80	0.40
										750	12.5	264.6	3.84	15.7	15.8	34.8	0.80	0.80	0.36
RLC6_L4	90x80x10x12x1.2	7.45	6500	15.5	16.2	64.2	195.8	1.05	3.95	150	10.7	52.9	1.85	13.6	13.6	16.2	0.78	0.78	0.66
										300	10.7	105.8	2.61	13.6	13.6	21.7	0.78	0.78	0.49
										450	10.7	158.8	3.20	13.6	13.6	25.8	0.78	0.78	0.41
										600	10.7	211.7	3.69	13.6	13.6	29.1	0.78	0.78	0.37
										750	10.7	264.6	4.13	13.6	13.6	32.0	0.78	0.78	0.33
RLC6_L5	90x80x10x12x1.2	7.45	7000	13.6	14.0	64.2	195.8	1.03	4.58	150	9.2	52.9	1.98	11.9	11.9	15.0	0.77	0.77	0.61
										300	9.2	105.8	2.79	11.9	11.9	20.1	0.77	0.77	0.46
										450	9.2	158.8	3.42	11.9	11.9	23.9	0.77	0.77	0.38
										600	9.2	211.7	3.95	11.9	11.9	26.9	0.77	0.77	0.34
										750	9.2	264.6	4.42	11.9	11.9	29.6	0.77	0.77	0.31
RLC6_L6	90x80x10x12x1.2	7.45	8000	10.7	10.7	64.2	195.8	1.00	5.98	150	7.0	52.9	2.22	9.4	9.4	13.1	0.75	0.75	0.54
										300	7.0	105.8	3.15	9.4	9.4	17.5	0.75	0.75	0.40
										450	7.0	158.8	3.85	9.4	9.4	20.8	0.75	0.75	0.34
										600	7.0	211.7	4.45	9.4	9.4	23.5	0.75	0.75	0.30
										750	7.0	264.6	4.98	9.4	9.4	25.8	0.75	0.75	0.27
							Max	1.277	6.253							Mean	0.854	0.796	0.600
							Min	1.003	1.699							Sd.Dv.	0.063	0.090	0.210
																Max	1.088	1.088	1.088
																Min	0.749	0.626	0.272

Table A2.6 (to be continued): PC_m WSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WSC1_L1	100x100x10x3	3.54	4000	137.7	162.7	252.7	1670.8	1.18	1.55	150	98.0	147.7	1.04	94.3	94.3	94.3	1.04	1.04	1.04
										300	105.4	295.5	1.46	120.4	120.4	120.4	0.88	0.88	0.88
										450	105.5	443.2	1.79	120.8	129.5	146.5	0.87	0.81	0.72
										600	105.5	590.9	2.07	120.8	136.9	171.1	0.87	0.77	0.62
										750	105.6	738.6	2.32	120.8	142.9	193.0	0.87	0.74	0.55
WSC1_L2	100x100x10x3	3.54	4500	113.3	128.6	252.7	1670.8	1.13	1.97	150	83.3	147.7	1.14	85.6	85.6	85.6	0.97	0.97	0.97
										300	85.2	295.5	1.62	99.3	101.5	107.6	0.86	0.84	0.79
										450	85.2	443.2	1.98	99.3	107.7	133.9	0.86	0.79	0.64
										600	85.3	590.9	2.28	99.3	112.2	156.3	0.86	0.76	0.55
										750	85.3	738.6	2.55	99.3	115.9	176.3	0.86	0.74	0.48
WSC1_L3	100x100x10x3	3.54	5000	95.5	104.1	252.7	1670.8	1.09	2.43	150	70.1	147.7	1.24	77.3	77.3	77.3	0.91	0.91	0.91
										300	70.5	295.5	1.76	83.8	86.1	99.5	0.84	0.82	0.71
										450	70.5	443.2	2.15	83.8	89.0	123.8	0.84	0.79	0.57
										600	70.5	590.9	2.49	83.8	91.1	144.5	0.84	0.77	0.49
										750	70.5	738.6	2.78	83.8	92.8	163.0	0.84	0.76	0.43
WSC1_L4	100x100x10x3	3.54	5500	82.3	86.1	252.7	1670.8	1.05	2.94	150	59.4	147.7	1.34	69.7	69.7	69.7	0.85	0.85	0.85
										300	59.4	295.5	1.89	72.2	72.3	92.9	0.82	0.82	0.64
										450	59.4	443.2	2.32	72.2	72.4	115.5	0.82	0.82	0.51
										600	59.4	590.9	2.68	72.2	72.4	134.9	0.82	0.82	0.44
										750	59.4	738.6	3.00	72.2	72.5	152.1	0.82	0.82	0.39
WSC1_L5	100x100x10x3	3.54	5750	76.9	78.7	252.7	1670.8	1.02	3.21	150	54.9	147.7	1.39	66.1	66.1	66.1	0.83	0.83	0.83
										300	54.9	295.5	1.96	67.4	67.5	90.0	0.81	0.81	0.61
										450	54.9	443.2	2.40	67.4	67.5	112.0	0.81	0.81	0.49
										600	54.9	590.9	2.77	67.4	67.5	130.8	0.81	0.81	0.42
										750	54.9	738.6	3.10	67.4	67.5	147.5	0.81	0.81	0.37
WSC1_L6	100x100x10x3	3.54	6000	72.1	72.3	252.7	1670.8	1.00	3.50	150	50.9	147.7	1.43	62.7	62.7	62.7	0.81	0.81	0.81
										300	50.9	295.5	2.02	63.3	63.3	87.4	0.81	0.80	0.58
										450	50.9	443.2	2.48	63.3	63.3	108.7	0.81	0.80	0.47
										600	50.9	590.9	2.86	63.3	63.3	127.0	0.81	0.80	0.40
										750	50.9	738.6	3.20	63.3	63.3	143.2	0.81	0.80	0.36
WSC2_L1	110x110x15x3	3.82	4500	150.3	182.9	311.6	1593.8	1.22	1.70	150	106.7	165.7	1.05	104.5	104.5	104.5	1.02	1.02	1.02
										300	115.6	331.5	1.48	131.7	131.7	131.7	0.88	0.88	0.88
										450	115.6	497.2	1.82	131.8	143.3	161.8	0.88	0.81	0.71
										600	115.6	662.9	2.10	131.8	152.5	188.5	0.88	0.76	0.61
										750	115.6	828.6	2.35	131.8	159.9	212.2	0.88	0.72	0.54
WSC2_L2	110x110x15x3	3.82	5000	125.4	148.1	311.6	1593.8	1.18	2.10	150	92.2	165.7	1.15	95.3	95.3	95.3	0.97	0.97	0.97
										300	95.2	331.5	1.63	110.0	113.4	119.9	0.87	0.84	0.79
										450	95.3	497.2	1.99	110.0	122.2	148.6	0.87	0.78	0.64
										600	95.3	662.9	2.30	110.0	128.9	173.1	0.87	0.74	0.55
										750	95.3	828.6	2.57	110.0	134.3	194.9	0.87	0.71	0.49
WSC2_L3	110x110x15x3	3.82	5500	106.7	122.4	311.6	1593.8	1.15	2.55	150	79.1	165.7	1.25	86.5	86.5	86.5	0.91	0.91	0.91
										300	79.9	331.5	1.76	93.6	98.3	111.1	0.85	0.81	0.72
										450	79.9	497.2	2.16	93.6	104.5	137.8	0.85	0.76	0.58
										600	79.9	662.9	2.49	93.6	109.1	160.5	0.85	0.73	0.50
										750	79.9	828.6	2.79	93.6	112.8	180.7	0.85	0.71	0.44
WSC2_L4	110x110x15x3	3.82	6000	92.4	102.9	311.6	1593.8	1.11	3.03	150	67.9	165.7	1.34	78.2	78.2	78.2	0.87	0.87	0.87
										300	68.1	331.5	1.89	81.0	85.3	103.8	0.84	0.80	0.66
										450	68.1	497.2	2.32	81.0	89.1	128.8	0.84	0.76	0.53
										600	68.1	662.9	2.68	81.0	92.0	150.0	0.84	0.74	0.45
										750	68.1	828.6	2.99	81.0	94.2	168.8	0.84	0.72	0.40
WSC2_L5	110x110x15x3	3.82	6500	81.2	87.6	311.6	1593.8	1.08	3.56	150	58.3	165.7	1.43	70.5	70.5	70.5	0.83	0.83	0.83
										300	58.3	331.5	2.02	71.2	73.7	97.7	0.82	0.79	0.60
										450	58.3	497.2	2.48	71.2	75.5	121.2	0.82	0.77	0.48
										600	58.3	662.9	2.86	71.2	76.7	141.1	0.82	0.76	0.41
										750	58.3	828.6	3.20	71.2	77.7	158.9	0.82	0.75	0.37
WSC2_L6	110x110x15x3	3.82	7000	72.2	75.6	311.6	1593.8	1.05	4.12	150	50.6	165.7	1.51	63.3	63.4	64.0	0.80	0.80	0.79
										300	50.6	331.5	2.14	63.3	63.4	92.5	0.80	0.80	0.55
										450	50.6	497.2	2.62	63.3	63.4	114.7	0.80	0.80	0.44
										600	50.6	662.9	3.03	63.3	63.4	133.6	0.80	0.80	0.38
										750	50.6	828.6	3.39	63.3	63.4	150.4	0.80	0.80	0.34

Table A2.6 (continuation): PC_m WSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WSC3_L1	90x90x15x2	4.50	4000	73.5	88.5	159.4	662.6	1.20	1.80	150	52.7	92.5	1.12	54.6	54.6	54.6	0.96	0.96	0.96
										300	55.8	185.0	1.59	64.5	65.8	68.3	0.87	0.85	0.82
										450	55.8	277.5	1.94	64.5	71.0	84.0	0.87	0.79	0.66
										600	55.8	369.9	2.24	64.5	74.8	97.2	0.87	0.75	0.57
										750	55.8	462.4	2.51	64.5	78.0	109.0	0.87	0.72	0.51
WSC3_L2	90x90x15x2	4.50	4500	59.6	69.9	159.4	662.6	1.17	2.28	150	43.8	92.5	1.25	48.3	48.3	48.3	0.91	0.91	0.91
										300	44.6	185.0	1.76	52.3	55.0	61.6	0.85	0.81	0.72
										450	44.6	277.5	2.16	52.3	58.6	75.8	0.85	0.76	0.59
										600	44.6	369.9	2.49	52.3	61.3	87.7	0.85	0.73	0.51
										750	44.6	462.4	2.79	52.3	63.5	98.3	0.85	0.70	0.45
WSC3_L3	90x90x15x2	4.50	5000	49.5	56.7	159.4	662.6	1.14	2.81	150	36.3	92.5	1.37	42.3	42.3	42.3	0.86	0.86	0.86
										300	36.4	185.0	1.93	43.4	46.3	56.3	0.84	0.79	0.65
										450	36.4	277.5	2.37	43.4	48.8	69.2	0.84	0.75	0.53
										600	36.4	369.9	2.73	43.4	50.6	80.1	0.84	0.72	0.45
										750	36.4	462.4	3.06	43.4	52.0	89.8	0.84	0.70	0.41
WSC3_L4	90x90x15x2	4.50	5500	42.0	46.8	159.4	662.6	1.12	3.40	150	30.3	92.5	1.48	36.8	36.8	36.8	0.82	0.82	0.82
										300	30.3	185.0	2.10	36.8	39.2	51.9	0.82	0.77	0.58
										450	30.3	277.5	2.57	36.8	40.6	63.8	0.82	0.75	0.48
										600	30.3	369.9	2.97	36.8	41.7	73.9	0.82	0.73	0.41
										750	30.3	462.4	3.32	36.8	42.5	82.8	0.82	0.71	0.37
WSC3_L5	90x90x15x2	4.50	6000	36.2	39.3	159.4	662.6	1.09	4.05	150	25.7	92.5	1.60	31.8	32.0	33.9	0.81	0.80	0.76
										300	25.7	185.0	2.26	31.8	33.0	48.3	0.81	0.78	0.53
										450	25.7	277.5	2.77	31.8	33.7	59.4	0.81	0.76	0.43
										600	25.7	369.9	3.20	31.8	34.2	68.8	0.81	0.75	0.37
										750	25.7	462.4	3.57	31.8	34.5	77.0	0.81	0.74	0.33
WSC3_L6	90x90x15x2	4.50	7000	28.1	28.9	159.4	662.6	1.03	5.51	150	19.2	92.5	1.81	24.7	24.7	30.0	0.78	0.78	0.64
										300	19.2	185.0	2.56	24.7	24.7	42.7	0.78	0.78	0.45
										450	19.2	277.5	3.14	24.7	24.7	52.5	0.78	0.78	0.37
										600	19.2	369.9	3.63	24.7	24.7	60.7	0.78	0.78	0.32
										750	19.2	462.4	4.05	24.7	24.7	68.1	0.78	0.78	0.28
WSC4_L1	120x120x20x2.5	4.71	5000	133.0	168.5	244.6	873.9	1.27	1.45	150	92.8	153.1	1.07	94.6	94.6	94.6	0.98	0.98	0.98
										300	101.8	306.2	1.52	116.6	117.3	118.1	0.87	0.87	0.86
										450	101.8	459.3	1.86	116.6	128.6	144.8	0.87	0.79	0.70
										600	101.8	612.4	2.15	116.6	137.3	167.4	0.87	0.74	0.61
										750	101.9	765.5	2.40	116.6	144.4	187.3	0.87	0.71	0.54
WSC4_L2	120x120x20x2.5	4.71	5500	112.1	139.2	244.6	873.9	1.24	1.76	150	81.1	153.1	1.17	86.4	86.4	86.4	0.94	0.94	0.94
										300	85.1	306.2	1.65	98.3	102.4	108.5	0.87	0.83	0.78
										450	85.1	459.3	2.02	98.3	111.4	133.0	0.87	0.76	0.64
										600	85.1	612.4	2.34	98.3	118.3	153.8	0.87	0.72	0.55
										750	85.1	765.5	2.61	98.3	124.0	172.1	0.87	0.69	0.49
WSC4_L3	120x120x20x2.5	4.71	6000	95.9	117.0	244.6	873.9	1.22	2.09	150	70.8	153.1	1.26	78.5	78.5	78.5	0.90	0.90	0.90
										300	72.0	306.2	1.79	84.1	90.0	100.4	0.86	0.80	0.72
										450	72.0	459.3	2.19	84.1	97.2	123.1	0.86	0.74	0.59
										600	72.0	612.4	2.53	84.1	102.7	142.3	0.86	0.70	0.51
										750	72.0	765.5	2.83	84.1	107.2	159.3	0.86	0.67	0.45
WSC4_L4	120x120x20x2.5	4.71	7000	73.0	85.9	244.6	873.9	1.18	2.85	150	53.5	153.1	1.45	63.6	63.6	63.6	0.84	0.84	0.84
										300	53.5	306.2	2.05	64.0	70.5	87.6	0.84	0.76	0.61
										450	53.5	459.3	2.51	64.0	75.1	107.5	0.84	0.71	0.50
										600	53.5	612.4	2.90	64.0	78.5	124.3	0.84	0.68	0.43
										750	53.5	765.5	3.24	64.0	81.3	139.1	0.84	0.66	0.38
WSC4_L5	120x120x20x2.5	4.71	8000	57.9	65.8	244.6	873.9	1.14	3.72	150	41.4	153.1	1.63	50.8	51.7	55.1	0.81	0.80	0.75
										300	41.4	306.2	2.30	50.8	55.9	78.1	0.82	0.74	0.53
										450	41.4	459.3	2.82	50.8	58.5	95.8	0.82	0.71	0.43
										600	41.4	612.4	3.25	50.8	60.4	110.8	0.82	0.69	0.37
										750	41.4	765.5	3.64	50.8	61.9	124.0	0.82	0.67	0.33
WSC4_L6	120x120x20x2.5	4.71	9000	47.5	52.0	244.6	873.9	1.09	4.70	150	33.1	153.1	1.80	41.6	42.5	50.0	0.79	0.78	0.66
										300	33.1	306.2	2.54	41.6	44.2	70.8	0.79	0.75	0.47
										450	33.1	459.3	3.11	41.6	45.2	86.9	0.79	0.73	0.38
										600	33.1	612.4	3.59	41.6	45.9	100.4	0.79	0.72	0.33
										750	33.1	765.5	4.02	41.6	46.5	112.4	0.79	0.71	0.29

Table A2.6 (continuation): PC_m WSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WSC5_L1	80x80x10x1.2	5.73	5000	18.4	22.2	197.1	2619.7	1.21	8.87	150	13.2	48.3	1.62	16.1	16.5	17.3	0.82	0.80	0.76
										300	13.2	96.6	2.29	16.1	18.3	24.1	0.82	0.72	0.55
										450	13.2	144.9	2.81	16.1	19.5	29.2	0.82	0.68	0.45
										600	13.2	193.2	3.24	16.1	20.4	33.4	0.82	0.65	0.40
										750	13.2	241.5	3.63	16.1	21.1	37.1	0.82	0.63	0.36
WSC5_L2	80x80x10x1.2	5.73	5500	15.5	18.4	197.1	2619.7	1.19	10.74	150	10.9	48.3	1.77	13.6	14.2	15.9	0.81	0.77	0.69
										300	10.9	96.6	2.50	13.6	15.5	22.0	0.81	0.70	0.50
										450	10.9	144.9	3.06	13.6	16.4	26.7	0.81	0.67	0.41
										600	10.9	193.2	3.53	13.6	17.0	30.5	0.81	0.64	0.36
										750	10.9	241.5	3.95	13.6	17.5	33.9	0.81	0.62	0.32
WSC5_L3	80x80x10x1.2	5.73	6000	13.3	15.4	197.1	2619.7	1.16	12.78	150	9.2	48.3	1.91	11.6	12.3	14.6	0.79	0.75	0.63
										300	9.2	96.6	2.70	11.6	13.2	20.3	0.79	0.70	0.45
										450	9.2	144.9	3.30	11.6	13.8	24.6	0.79	0.67	0.38
										600	9.2	193.2	3.82	11.6	14.3	28.2	0.79	0.65	0.33
										750	9.2	241.5	4.27	11.6	14.6	31.3	0.79	0.63	0.29
WSC5_L4	80x80x10x1.2	5.73	7000	10.2	11.3	197.1	2619.7	1.11	17.39	150	6.8	48.3	2.18	8.9	9.3	12.7	0.77	0.74	0.54
										300	6.8	96.6	3.08	8.9	9.6	17.6	0.77	0.71	0.39
										450	6.8	144.9	3.78	8.9	9.8	21.4	0.77	0.69	0.32
										600	6.8	193.2	4.36	8.9	10.0	24.5	0.77	0.68	0.28
										750	6.8	241.5	4.87	8.9	10.1	27.2	0.77	0.68	0.25
WSC5_L5	80x80x10x1.2	5.73	8000	8.1	8.7	197.1	2619.7	1.07	22.72	150	5.3	48.3	2.44	7.1	7.1	11.3	0.74	0.74	0.47
										300	5.3	96.6	3.44	7.1	7.1	15.7	0.74	0.74	0.34
										450	5.3	144.9	4.22	7.1	7.1	19.0	0.74	0.74	0.28
										600	5.3	193.2	4.87	7.1	7.1	21.8	0.74	0.74	0.24
										750	5.3	241.5	5.45	7.1	7.1	24.2	0.74	0.74	0.22
WSC5_L6	80x80x10x1.2	5.73	9000	6.7	6.9	197.1	2619.7	1.02	28.75	150	4.2	48.3	2.68	5.9	5.9	10.2	0.72	0.72	0.41
										300	4.2	96.6	3.79	5.9	5.9	14.2	0.72	0.72	0.30
										450	4.3	144.9	4.64	5.9	5.9	17.2	0.72	0.72	0.25
										600	4.4	193.2	5.35	5.9	5.9	19.7	0.74	0.74	0.22
										750	4.4	241.5	5.98	5.9	5.9	21.9	0.75	0.75	0.20
WSC6_L1	140x140x20x4	3.73	5500	276.5	340.7	579.1	2793.4	1.23	1.70	150	191.4	281.0	1.01	183.6	183.6	183.6	1.04	1.04	1.04
										300	213.9	561.9	1.43	240.1	240.1	240.1	0.89	0.89	0.89
										450	214.1	842.9	1.75	242.5	260.2	285.3	0.88	0.82	0.75
										600	214.2	1123.9	2.02	242.5	278.0	332.6	0.88	0.77	0.64
										750	214.2	1404.8	2.25	242.5	292.7	374.6	0.88	0.73	0.57
WSC6_L2	140x140x20x4	3.73	6000	238.0	286.3	579.1	2793.4	1.20	2.02	150	171.7	281.0	1.09	171.4	171.4	171.4	1.00	1.00	1.00
										300	182.2	561.9	1.54	208.7	210.9	214.3	0.87	0.86	0.85
										450	182.2	842.9	1.88	208.7	229.4	266.0	0.87	0.79	0.68
										600	182.2	1123.9	2.17	208.7	243.4	310.1	0.87	0.75	0.59
										750	182.3	1404.8	2.43	208.7	254.9	349.3	0.87	0.72	0.52
WSC6_L3	140x140x20x4	3.73	6500	207.7	243.9	579.1	2793.4	1.17	2.37	150	152.5	281.0	1.16	159.5	159.5	159.5	0.96	0.96	0.96
										300	156.9	561.9	1.64	182.1	188.4	201.1	0.86	0.83	0.78
										450	157.0	842.9	2.01	182.1	202.8	249.6	0.86	0.77	0.63
										600	157.0	1123.9	2.33	182.1	213.7	291.0	0.86	0.73	0.54
										750	157.0	1404.8	2.60	182.1	222.5	327.7	0.86	0.71	0.48
WSC6_L4	140x140x20x4	3.73	7000	183.4	210.3	579.1	2793.4	1.15	2.75	150	135.1	281.0	1.24	148.0	148.0	148.0	0.91	0.91	0.91
										300	137.0	561.9	1.75	160.8	168.7	189.7	0.85	0.81	0.72
										450	137.0	842.9	2.14	160.8	179.5	235.5	0.85	0.76	0.58
										600	137.0	1123.9	2.48	160.8	187.6	274.6	0.85	0.73	0.50
										750	137.0	1404.8	2.77	160.8	194.1	309.3	0.85	0.71	0.44
WSC6_L5	140x140x20x4	3.73	8000	147.5	161.0	579.1	2793.4	1.09	3.60	150	107.2	281.0	1.38	126.6	126.6	126.6	0.85	0.85	0.85
										300	107.2	561.9	1.95	129.3	135.0	171.4	0.83	0.79	0.63
										450	107.2	842.9	2.39	129.3	139.5	212.8	0.83	0.77	0.50
										600	107.2	1123.9	2.76	129.3	142.7	248.0	0.83	0.75	0.43
										750	107.2	1404.8	3.09	129.3	145.3	279.4	0.83	0.74	0.38
WSC6_L6	140x140x20x4	3.73	9000	122.7	127.2	579.1	2793.4	1.04	4.55	150	86.7	281.0	1.51	107.6	107.6	108.7	0.81	0.81	0.80
										300	86.7	561.9	2.14	107.6	107.6	157.3	0.81	0.81	0.55
										450	86.7	842.9	2.62	107.6	107.6	195.2	0.81	0.81	0.44
										600	86.7	1123.9	3.03	107.6	107.6	227.6	0.81	0.81	0.38
										750	86.7	1404.8	3.38	107.6	107.6	256.3	0.81	0.81	0.34
							Max	1.267	28.751							Mean	0.838	0.778	0.568
							Min	1.003	1.452							Sd.Dv.	0.054	0.078	0.202
																Max	1.042	1.042	1.042
																Min	0.716	0.625	0.202

Table A2.7 (to be continued): PC_m WFSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WFSC1_L1	100x100x10x3	3.32	4000	131.7	164.0	301.0	60556.6	1.24	1.84	150	96.2	155.2	1.09	94.8	94.8	94.8	1.02	1.02	1.02
										300	101.4	310.4	1.53	115.5	116.9	118.5	0.88	0.87	0.86
										450	101.4	465.5	1.88	115.5	129.5	147.9	0.88	0.78	0.69
										600	101.4	620.7	2.17	115.5	139.2	173.0	0.88	0.73	0.59
										750	101.4	775.9	2.43	115.5	147.3	195.4	0.88	0.69	0.52
WFSC1_L2	100x100x10x3	3.32	4500	108.8	129.6	301.0	60556.6	1.19	2.32	150	81.0	155.2	1.19	85.4	85.4	85.4	0.95	0.95	0.95
										300	82.2	310.4	1.69	95.4	100.3	108.6	0.86	0.82	0.76
										450	82.2	465.5	2.07	95.4	109.1	135.5	0.86	0.75	0.61
										600	82.2	620.7	2.39	95.4	115.9	158.5	0.86	0.71	0.52
										750	82.2	775.9	2.67	95.4	121.4	179.1	0.86	0.68	0.46
WFSC1_L3	100x100x10x3	3.32	5000	92.1	104.9	301.0	60556.6	1.14	2.87	150	68.0	155.2	1.30	76.7	76.7	76.7	0.89	0.89	0.89
										300	68.2	310.4	1.84	80.8	86.1	100.7	0.84	0.79	0.68
										450	68.2	465.5	2.25	80.8	91.7	125.7	0.84	0.74	0.54
										600	68.2	620.7	2.60	80.8	95.9	147.0	0.84	0.71	0.46
										750	68.2	775.9	2.90	80.8	99.3	166.0	0.84	0.69	0.41
WFSC1_L4	100x100x10x3	3.32	5500	79.6	86.7	301.0	60556.6	1.09	3.47	150	57.7	155.2	1.40	68.7	68.7	68.7	0.84	0.84	0.84
										300	57.7	310.4	1.97	69.9	73.3	94.3	0.83	0.79	0.61
										450	57.7	465.5	2.42	69.9	76.0	117.6	0.83	0.76	0.49
										600	57.7	620.7	2.79	69.9	77.9	137.6	0.83	0.74	0.42
										750	57.7	775.9	3.12	69.9	79.4	155.4	0.83	0.73	0.37
WFSC1_L5	100x100x10x3	3.32	6000	70.1	72.9	301.0	60556.6	1.04	4.13	150	49.7	155.2	1.49	61.4	61.4	61.4	0.81	0.81	0.81
										300	49.7	310.4	2.10	61.5	61.5	89.0	0.81	0.81	0.56
										450	49.7	465.5	2.58	61.5	61.5	111.0	0.81	0.81	0.45
										600	49.7	620.7	2.98	61.5	61.5	129.8	0.81	0.81	0.38
										750	49.7	775.9	3.33	61.5	61.5	146.6	0.81	0.81	0.34
WFSC1_L6	100x100x10x3	3.32	6250	66.1	67.2	301.0	60556.6	1.02	4.48	150	46.3	155.2	1.53	58.0	58.0	59.4	0.80	0.80	0.78
										300	46.3	310.4	2.17	58.0	58.0	86.6	0.80	0.80	0.53
										450	46.3	465.5	2.65	58.0	58.0	108.1	0.80	0.80	0.43
										600	46.3	620.7	3.06	58.0	58.0	126.4	0.80	0.80	0.37
										750	46.3	775.9	3.43	58.0	58.0	142.8	0.80	0.80	0.32
WFSC2_L1	110x110x15x3	3.59	4500	144.4	183.8	335.8	41768.1	1.27	1.83	150	104.9	173.2	1.10	104.8	104.8	104.8	1.00	1.00	1.00
										300	111.4	346.4	1.55	126.7	128.9	131.1	0.88	0.86	0.85
										450	111.4	519.5	1.90	126.7	143.5	163.1	0.88	0.78	0.68
										600	111.4	692.7	2.19	126.7	154.9	190.3	0.88	0.72	0.59
										750	111.4	865.9	2.45	126.7	164.3	214.6	0.88	0.68	0.52
WSC2_L2	110x110x15x3	3.59	5000	120.8	148.9	335.8	41768.1	1.23	2.25	150	89.4	173.2	1.20	95.0	95.0	95.0	0.94	0.94	0.94
										300	91.8	346.4	1.69	105.9	112.2	120.7	0.87	0.82	0.76
										450	91.8	519.5	2.07	105.9	123.4	150.1	0.87	0.74	0.61
										600	91.8	692.7	2.39	105.9	132.0	175.2	0.87	0.70	0.52
										750	91.8	865.9	2.68	105.9	139.1	197.5	0.87	0.66	0.46
WFSC2_L3	110x110x15x3	3.59	5500	103.1	123.1	335.8	41768.1	1.19	2.73	150	76.6	173.2	1.30	85.7	85.7	85.7	0.89	0.89	0.89
										300	77.0	346.4	1.83	90.4	98.1	112.2	0.85	0.79	0.69
										450	77.1	519.5	2.25	90.4	106.5	139.5	0.85	0.72	0.55
										600	77.1	692.7	2.59	90.4	113.0	162.8	0.85	0.68	0.47
										750	77.1	865.9	2.90	90.4	118.2	183.5	0.85	0.65	0.42
WSC2_L4	110x110x15x3	3.59	6000	89.5	103.4	335.8	41768.1	1.16	3.25	150	65.8	173.2	1.39	77.0	77.0	77.0	0.85	0.85	0.85
										300	65.8	346.4	1.97	78.5	85.9	105.1	0.84	0.77	0.63
										450	65.8	519.5	2.41	78.5	91.9	130.7	0.84	0.72	0.50
										600	65.8	692.7	2.78	78.5	96.5	152.5	0.84	0.68	0.43
										750	65.8	865.9	3.11	78.5	100.1	171.9	0.84	0.66	0.38
WFSC2_L5	110x110x15x3	3.59	7000	70.3	76.0	335.8	41768.1	1.08	4.42	150	49.9	173.2	1.57	61.7	62.1	64.8	0.81	0.80	0.77
										300	49.9	346.4	2.22	61.7	65.0	94.0	0.81	0.77	0.53
										450	49.9	519.5	2.72	61.7	66.7	116.9	0.81	0.75	0.43
										600	49.9	692.7	3.14	61.7	68.0	136.4	0.81	0.73	0.37
										750	49.9	865.9	3.51	61.7	69.0	153.8	0.81	0.72	0.32
WFSC2_L6	110x110x15x3	3.59	8000	57.7	58.2	335.8	41768.1	1.01	5.77	150	39.5	173.2	1.73	50.6	50.7	59.1	0.78	0.78	0.67
										300	39.5	346.4	2.45	50.6	50.7	85.8	0.78	0.78	0.46
										450	39.5	519.5	3.00	50.6	50.7	106.7	0.78	0.78	0.37
										600	39.5	692.7	3.46	50.6	50.7	124.5	0.78	0.78	0.32
										750	39.5	865.9	3.87	50.6	50.7	140.4	0.78	0.78	0.28

Table A2.7 (continuation): PC_m WFSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WFSC3_L1	90x90x15x2	4.09	3500	87.5	116.3	173.9	9649.5	1.33	1.50	150	61.5	97.5	1.06	61.2	61.2	61.2	1.01	1.01	1.01
										300	67.7	194.9	1.49	76.7	76.7	76.7	0.88	0.88	0.88
										450	67.7	292.4	1.83	76.8	86.3	94.4	0.88	0.78	0.72
										600	67.7	389.8	2.11	76.8	94.0	109.7	0.88	0.72	0.62
										750	67.8	487.3	2.36	76.8	100.4	123.3	0.88	0.68	0.55
WFSC3_L2	90x90x15x2	4.09	4000	69.2	89.0	173.9	9649.5	1.29	1.95	150	50.9	97.5	1.19	54.0	54.0	54.0	0.94	0.94	0.94
										300	52.9	194.9	1.68	60.7	64.4	68.3	0.87	0.82	0.77
										450	52.9	292.4	2.06	60.7	71.6	84.4	0.87	0.74	0.63
										600	52.9	389.8	2.37	60.7	77.1	98.1	0.87	0.69	0.54
										750	52.9	487.3	2.65	60.7	81.7	110.2	0.87	0.65	0.48
WFSC3_L3	90x90x15x2	4.09	5000	46.9	57.0	173.9	9649.5	1.21	3.05	150	34.7	97.5	1.44	40.9	40.9	40.9	0.85	0.85	0.85
										300	34.7	194.9	2.04	41.1	46.7	56.7	0.84	0.74	0.61
										450	34.7	292.4	2.50	41.1	50.7	70.1	0.84	0.68	0.50
										600	34.7	389.8	2.88	41.1	53.8	81.4	0.84	0.64	0.43
										750	34.7	487.3	3.22	41.1	56.4	91.5	0.84	0.62	0.38
WFSC3_L4	90x90x15x2	4.09	6000	34.6	39.6	173.9	9649.5	1.15	4.40	150	24.7	97.5	1.68	30.3	31.3	34.1	0.81	0.79	0.72
										300	24.7	194.9	2.37	30.3	34.5	49.0	0.81	0.72	0.50
										450	24.7	292.4	2.91	30.3	36.5	60.6	0.81	0.68	0.41
										600	24.7	389.8	3.36	30.3	38.0	70.4	0.81	0.65	0.35
										750	24.7	487.3	3.75	30.3	39.2	79.1	0.81	0.63	0.31
WFSC3_L5	90x90x15x2	4.09	7000	27.0	29.1	173.9	9649.5	1.08	5.98	150	18.6	97.5	1.90	23.7	24.2	30.3	0.78	0.77	0.61
										300	18.6	194.9	2.69	23.7	24.9	43.6	0.78	0.75	0.43
										450	18.6	292.4	3.29	23.7	25.4	53.9	0.78	0.73	0.35
										600	18.6	389.8	3.80	23.7	25.7	62.6	0.78	0.72	0.30
										750	18.6	487.3	4.25	23.7	25.9	70.3	0.78	0.72	0.26
WFSC3_L6	90x90x15x2	4.09	8000	22.1	22.3	173.9	9649.5	1.01	7.81	150	14.6	97.5	2.10	19.4	19.4	27.6	0.76	0.75	0.53
										300	14.6	194.9	2.97	19.4	19.4	39.6	0.76	0.75	0.37
										450	14.6	292.4	3.64	19.4	19.4	48.9	0.76	0.75	0.30
										600	14.6	389.8	4.20	19.4	19.4	56.8	0.76	0.75	0.26
										750	14.6	487.3	4.70	19.4	19.4	63.9	0.76	0.75	0.23
WFSC4_L1	120x120x20x3	3.92	5000	159.4	202.9	377.7	25327.6	1.27	1.86	150	114.2	191.2	1.09	115.7	115.7	115.7	0.99	0.99	0.99
										300	123.0	382.4	1.55	139.8	142.2	144.7	0.88	0.86	0.85
										450	123.0	573.5	1.90	139.8	157.7	179.2	0.88	0.78	0.69
										600	123.0	764.7	2.19	139.8	169.7	208.5	0.88	0.72	0.59
										750	123.0	955.9	2.45	139.8	179.6	234.6	0.88	0.68	0.52
WFSC4_L2	120x120x20x3	3.92	5500	135.0	167.7	377.7	25327.6	1.24	2.25	150	99.3	191.2	1.19	105.7	105.7	105.7	0.94	0.94	0.94
										300	102.8	382.4	1.68	118.4	124.9	133.7	0.87	0.82	0.77
										450	102.8	573.5	2.06	118.4	137.3	165.6	0.87	0.75	0.62
										600	102.8	764.7	2.38	118.4	146.8	192.8	0.87	0.70	0.53
										750	102.8	955.9	2.66	118.4	154.6	216.8	0.87	0.67	0.47
WFSC4_L3	120x120x20x3	3.92	6000	116.1	140.9	377.7	25327.6	1.21	2.68	150	86.2	191.2	1.28	96.0	96.0	96.0	0.90	0.90	0.90
										300	87.3	382.4	1.81	101.8	110.4	124.6	0.86	0.79	0.70
										450	87.3	573.5	2.22	101.8	120.2	154.3	0.86	0.73	0.57
										600	87.3	764.7	2.57	101.8	127.6	179.5	0.86	0.68	0.49
										750	87.3	955.9	2.87	101.8	133.7	201.9	0.86	0.65	0.43
WFSC4_L4	120x120x20x3	3.92	7000	89.5	103.5	377.7	25327.6	1.16	3.65	150	65.4	191.2	1.46	78.2	78.2	78.2	0.84	0.84	0.84
										300	65.4	382.4	2.07	78.5	86.9	110.1	0.83	0.75	0.59
										450	65.4	573.5	2.53	78.5	92.6	136.4	0.83	0.71	0.48
										600	65.4	764.7	2.92	78.5	96.9	158.8	0.83	0.68	0.41
										750	65.4	955.9	3.27	78.5	100.4	178.6	0.83	0.65	0.37
WFSC4_L5	120x120x20x3	3.92	8000	72.1	79.3	377.7	25327.6	1.10	4.77	150	51.2	191.2	1.63	63.2	64.2	69.0	0.81	0.80	0.74
										300	51.2	382.4	2.30	63.2	68.1	99.4	0.81	0.75	0.51
										450	51.2	573.5	2.82	63.2	70.5	123.1	0.81	0.73	0.42
										600	51.2	764.7	3.26	63.2	72.3	143.3	0.81	0.71	0.36
										750	51.2	955.9	3.64	63.2	73.7	161.2	0.81	0.69	0.32
WFSC4_L6	120x120x20x3	3.92	9000	60.0	62.6	377.7	25327.6	1.04	6.03	150	41.3	191.2	1.78	52.6	52.7	63.3	0.79	0.78	0.65
										300	41.3	382.4	2.52	52.6	52.7	91.2	0.79	0.78	0.45
										450	41.3	573.5	3.09	52.6	52.7	112.9	0.79	0.78	0.37
										600	41.3	764.7	3.57	52.6	52.7	131.4	0.79	0.78	0.31
										750	41.3	955.9	3.99	52.6	52.7	147.8	0.79	0.78	0.28

Table A2.7 (continuation): PC_m WFSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WFSC5_L1	80x80x10x1.2	5.05	4000	25.3	35.0	52.4	7292.1	1.38	1.50	150	18.9	51.3	1.42	22.0	22.0	22.0	0.86	0.86	0.86
										300	18.9	102.5	2.01	22.2	26.9	29.7	0.85	0.70	0.64
										450	18.9	153.8	2.46	22.2	30.6	36.3	0.85	0.62	0.52
										600	18.9	205.1	2.85	22.2	33.6	41.8	0.85	0.56	0.45
										750	18.9	256.4	3.18	22.2	36.1	46.7	0.85	0.52	0.41
WFSC5_L2	80x80x10x1.2	5.05	5000	17.0	22.4	52.4	7292.1	1.32	2.34	150	12.4	51.3	1.73	14.9	16.1	17.3	0.83	0.77	0.72
										300	12.4	102.5	2.45	14.9	19.2	24.3	0.83	0.64	0.51
										450	12.4	153.8	3.01	14.9	21.3	29.7	0.83	0.58	0.42
										600	12.4	205.1	3.47	14.9	22.9	34.2	0.83	0.54	0.36
										750	12.4	256.4	3.88	14.9	24.3	38.2	0.83	0.51	0.32
WFSC5_L3	80x80x10x1.2	5.05	6000	12.4	15.6	52.4	7292.1	1.26	3.37	150	8.7	51.3	2.03	10.9	12.3	14.7	0.80	0.71	0.59
										300	8.7	102.5	2.88	10.9	14.3	20.7	0.80	0.61	0.42
										450	8.7	153.8	3.52	10.9	15.5	25.3	0.80	0.56	0.34
										600	8.7	205.1	4.07	10.9	16.5	29.1	0.80	0.53	0.30
										750	8.7	256.4	4.55	10.9	17.3	32.5	0.80	0.50	0.27
WFSC5_L4	80x80x10x1.2	5.05	7000	9.6	11.4	52.4	7292.1	1.20	4.58	150	6.5	51.3	2.32	8.4	9.6	12.9	0.77	0.67	0.50
										300	6.5	102.5	3.28	8.4	10.8	18.1	0.77	0.60	0.36
										450	6.5	153.8	4.01	8.4	11.5	22.1	0.77	0.56	0.29
										600	6.5	205.1	4.63	8.4	12.1	25.5	0.77	0.54	0.25
										750	6.5	256.4	5.18	8.4	12.5	28.5	0.77	0.52	0.23
WFSC5_L5	80x80x10x1.2	5.05	8000	7.7	8.8	52.4	7292.1	1.14	5.98	150	5.1	51.3	2.58	6.8	7.5	11.5	0.75	0.67	0.44
										300	5.1	102.5	3.65	6.8	8.1	16.3	0.75	0.62	0.31
										450	5.1	153.8	4.47	6.8	8.4	19.9	0.75	0.60	0.26
										600	5.2	205.1	5.16	6.8	8.7	22.9	0.77	0.60	0.23
										750	5.3	256.4	5.77	6.8	8.9	25.5	0.78	0.59	0.21
WFSC5_L6	80x80x10x1.2	5.05	9000	6.4	6.9	52.4	7292.1	1.08	7.57	150	4.1	51.3	2.83	5.6	5.7	10.5	0.72	0.71	0.39
										300	4.2	102.5	4.00	5.6	5.8	14.8	0.74	0.72	0.28
										450	4.3	153.8	4.89	5.6	5.8	18.1	0.76	0.74	0.24
										600	4.4	205.1	5.65	5.6	5.9	20.9	0.78	0.75	0.21
										750	4.5	256.4	6.32	5.6	5.9	23.3	0.79	0.76	0.19
WFSC6_L1	140x140x20x4	3.58	5500	269.6	342.0	597.7	61414.2	1.27	1.75	150	186.7	290.9	1.04	185.2	185.2	185.2	1.01	1.01	1.01
										300	205.3	581.8	1.47	235.8	235.8	235.8	0.87	0.87	0.87
										450	205.3	872.7	1.80	236.4	260.2	287.7	0.87	0.79	0.71
										600	205.3	1163.6	2.08	236.4	280.6	335.8	0.87	0.73	0.61
										750	205.5	1454.5	2.32	236.4	297.5	378.6	0.87	0.69	0.54
WFSC6_L2	140x140x20x4	3.58	6000	232.4	287.4	597.7	61414.2	1.24	2.08	150	166.2	290.9	1.12	172.3	172.3	172.3	0.97	0.97	0.97
										300	175.4	581.8	1.58	203.8	209.2	216.0	0.86	0.84	0.81
										450	175.4	872.7	1.94	203.8	230.3	268.6	0.86	0.76	0.65
										600	175.4	1163.6	2.24	203.8	246.7	313.5	0.86	0.71	0.56
										750	175.4	1454.5	2.50	203.8	260.1	353.4	0.86	0.67	0.50
WFSC6_L3	140x140x20x4	3.58	6500	203.0	244.9	597.7	61414.2	1.21	2.44	150	148.8	290.9	1.20	159.7	159.7	159.7	0.93	0.93	0.93
										300	152.5	581.8	1.69	178.1	187.6	202.9	0.86	0.81	0.75
										450	152.5	872.7	2.07	178.1	204.6	252.3	0.86	0.75	0.60
										600	152.5	1163.6	2.39	178.1	217.5	294.5	0.86	0.70	0.52
										750	152.5	1454.5	2.68	178.1	228.2	332.1	0.86	0.67	0.46
WFSC6_L4	140x140x20x4	3.58	7000	179.6	211.1	597.7	61414.2	1.18	2.83	150	132.6	290.9	1.27	147.7	147.7	147.7	0.90	0.90	0.90
										300	133.9	581.8	1.80	157.5	168.7	191.7	0.85	0.79	0.70
										450	133.9	872.7	2.20	157.5	181.9	238.4	0.85	0.74	0.56
										600	133.9	1163.6	2.55	157.5	192.0	278.3	0.85	0.70	0.48
										750	133.9	1454.5	2.85	157.5	200.2	313.7	0.85	0.67	0.43
WFSC6_L5	140x140x20x4	3.58	8000	144.9	161.6	597.7	61414.2	1.12	3.70	150	105.0	290.9	1.42	125.5	125.5	125.5	0.84	0.84	0.84
										300	105.0	581.8	2.00	127.1	136.2	173.6	0.83	0.77	0.61
										450	105.0	872.7	2.45	127.1	142.9	215.9	0.83	0.73	0.49
										600	105.1	1163.6	2.83	127.1	147.9	252.0	0.83	0.71	0.42
										750	105.1	1454.5	3.17	127.1	151.9	284.1	0.83	0.69	0.37
WFSC6_L6	140x140x20x4	3.58	9000	120.9	127.7	597.7	61414.2	1.06	4.68	150	85.1	290.9	1.55	106.0	106.2	110.0	0.80	0.80	0.77
										300	85.1	581.8	2.19	106.0	107.9	159.6	0.80	0.79	0.53
										450	85.1	872.7	2.69	106.0	109.0	198.5	0.80	0.78	0.43
										600	85.1	1163.6	3.10	106.0	109.7	231.7	0.80	0.78	0.37
										750	85.1	1454.5	3.47	106.0	110.2	261.2	0.80	0.77	0.33
							Max	1.383	7.814							Mean	0.837	0.745	0.545
							Min	1.007	1.496							Sd.Dv.	0.052	0.099	0.206
																Max	1.015	1.015	1.015
																Min	0.723	0.505	0.191

Table A3.1 (to be continued): PS U columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*					*SFEA*		*DSM Design*							
	$b_w \times b_f \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
U1_L1	60x60x1.5	4.13	3500	14.2	18.3	32.1	1.28	1.76	150	12.1	40.5	1.69	12.5	13.3	14.1	0.97	0.91	0.86
									300	12.1	81.0	2.38	12.5	15.9	20.3	0.97	0.76	0.60
									450	12.1	121.5	2.92	12.5	17.6	25.0	0.97	0.69	0.48
									600	12.1	162.0	3.37	12.5	18.9	29.1	0.97	0.64	0.42
									750	12.1	202.5	3.77	12.5	20.1	32.7	0.97	0.60	0.37
U1_L2	60x60x1.5	4.13	3750	12.7	15.9	32.1	1.25	2.02	150	10.8	40.5	1.78	11.2	12.1	13.4	0.96	0.89	0.80
									300	10.8	81.0	2.52	11.2	14.2	19.2	0.96	0.76	0.56
									450	10.8	121.5	3.09	11.2	15.6	23.7	0.96	0.69	0.45
									600	10.8	162.0	3.57	11.2	16.7	27.5	0.96	0.64	0.39
									750	10.8	202.5	3.99	11.2	17.6	30.9	0.96	0.61	0.35
U1_L3	60x60x1.5	4.13	4000	11.5	14.0	32.1	1.22	2.30	150	9.6	40.5	1.88	10.0	11.1	12.7	0.96	0.87	0.76
									300	9.6	81.0	2.66	10.0	12.8	18.3	0.96	0.75	0.53
									450	9.6	121.5	3.26	10.0	13.9	22.5	0.96	0.69	0.43
									600	9.6	162.0	3.76	10.0	14.8	26.2	0.96	0.65	0.37
									750	9.6	202.5	4.20	10.0	15.5	29.4	0.96	0.62	0.33
U1_L4	60x60x1.5	4.13	4500	9.5	11.1	32.1	1.16	2.91	150	7.9	40.5	2.06	8.3	9.2	11.6	0.95	0.86	0.68
									300	7.9	81.0	2.92	8.3	10.3	16.7	0.95	0.77	0.47
									450	7.9	121.5	3.57	8.3	11.0	20.6	0.95	0.72	0.38
									600	7.9	162.0	4.13	8.3	11.5	24.0	0.95	0.69	0.33
									750	7.9	202.5	4.61	8.3	11.9	26.9	0.95	0.67	0.29
U1_L5	60x60x1.5	4.13	5000	8.1	9.0	32.1	1.11	3.59	150	6.7	40.5	2.24	7.1	7.6	10.8	0.94	0.87	0.62
									300	6.7	81.0	3.16	7.1	8.1	15.4	0.94	0.82	0.43
									450	6.7	121.5	3.88	7.1	8.4	19.1	0.94	0.79	0.35
									600	6.7	162.0	4.48	7.1	8.7	22.2	0.94	0.77	0.30
									750	6.7	202.5	5.00	7.1	8.8	24.9	0.94	0.76	0.27
U1_L6	60x60x1.5	4.13	5500	7.0	7.4	32.1	1.06	4.34	150	5.7	40.5	2.40	6.1	6.2	10.1	0.93	0.93	0.57
									300	5.7	81.0	3.40	6.1	6.2	14.4	0.93	0.92	0.40
									450	5.7	121.5	4.16	6.1	6.2	17.8	0.93	0.92	0.32
									600	5.7	162.0	4.81	6.1	6.2	20.7	0.93	0.92	0.28
									750	5.7	202.5	5.38	6.1	6.2	23.2	0.93	0.92	0.25
U2_L1	80x80x1.5	4.93	6500	9.9	12.6	29.8	1.26	2.38	150	8.2	54.0	2.33	8.7	10.6	13.5	0.94	0.77	0.61
									300	8.2	108.0	3.30	8.7	12.3	19.1	0.94	0.67	0.43
									450	8.2	162.0	4.04	8.7	13.4	23.3	0.94	0.61	0.35
									600	8.2	216.0	4.66	8.7	14.3	26.9	0.94	0.57	0.30
									750	8.2	270.0	5.21	8.7	15.0	30.1	0.94	0.55	0.27
U2_L2	80x80x1.5	4.93	6750	9.3	11.6	29.8	1.25	2.56	150	7.7	54.0	2.40	8.2	9.9	13.1	0.94	0.77	0.59
									300	7.7	108.0	3.40	8.2	11.5	18.5	0.94	0.67	0.41
									450	7.7	162.0	4.16	8.2	12.5	22.6	0.94	0.62	0.34
									600	7.7	216.0	4.81	8.2	13.2	26.1	0.94	0.58	0.29
									750	7.7	270.0	5.38	8.2	13.8	29.2	0.94	0.55	0.26
U2_L3	80x80x1.5	4.93	7000	8.8	10.8	29.8	1.23	2.76	150	7.2	54.0	2.48	7.7	9.4	12.7	0.93	0.77	0.57
									300	7.2	108.0	3.50	7.7	10.7	18.0	0.93	0.67	0.40
									450	7.2	162.0	4.29	7.7	11.6	22.0	0.93	0.62	0.33
									600	7.2	216.0	4.95	7.7	12.2	25.3	0.93	0.59	0.28
									750	7.2	270.0	5.54	7.7	12.8	28.3	0.93	0.56	0.25
U2_L4	80x80x1.5	4.93	7500	7.9	9.4	29.8	1.20	3.16	150	6.4	54.0	2.62	6.9	8.3	12.0	0.93	0.77	0.53
									300	6.4	108.0	3.70	6.9	9.3	17.0	0.93	0.69	0.38
									450	6.4	162.0	4.53	6.9	10.0	20.8	0.93	0.64	0.31
									600	6.4	216.0	5.23	6.9	10.4	24.0	0.93	0.61	0.27
									750	6.4	270.0	5.85	6.9	10.8	26.8	0.93	0.59	0.24
U2_L5	80x80x1.5	4.93	7750	7.5	8.8	29.8	1.18	3.38	150	6.1	54.0	2.68	6.6	7.8	11.7	0.92	0.78	0.52
									300	6.1	108.0	3.80	6.6	8.7	16.6	0.92	0.70	0.37
									450	6.1	162.0	4.65	6.6	9.2	20.3	0.92	0.66	0.30
									600	6.1	216.0	5.37	6.6	9.6	23.4	0.92	0.63	0.26
									750	6.1	270.0	6.00	6.6	10.0	26.1	0.92	0.61	0.23
U2_L6	80x80x1.5	4.93	8000	7.1	8.3	29.8	1.16	3.60	150	5.8	54.0	2.75	6.3	7.4	11.4	0.92	0.78	0.50
									300	5.8	108.0	3.89	6.3	8.1	16.1	0.92	0.71	0.36
									450	5.8	162.0	4.77	6.3	8.5	19.8	0.92	0.68	0.29
									600	5.8	216.0	5.50	6.3	8.9	22.8	0.92	0.65	0.25
									750	5.8	270.0	6.15	6.3	9.1	25.5	0.92	0.63	0.23

Table A3.1 (continuation): PS U columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*					*SFEA*		*DSM Design*							
	$b_w \times b_f \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
U3_L1	90x90x2	4.43	6000	21.9	28.0	54.1	1.28	1.93	150	18.4	81.0	1.92	19.2	21.7	24.8	0.96	0.85	0.74
									300	18.4	162.0	2.72	19.2	25.7	35.4	0.96	0.72	0.52
									450	18.4	243.0	3.33	19.2	28.3	43.5	0.96	0.65	0.42
									600	18.4	324.0	3.84	19.2	30.4	50.4	0.96	0.61	0.37
									750	18.4	405.0	4.30	19.2	32.0	56.5	0.96	0.57	0.33
U3_L2	90x90x2	4.43	6500	19.2	23.8	54.1	1.24	2.27	150	16.1	81.0	2.05	16.9	19.3	23.3	0.95	0.83	0.69
									300	16.1	162.0	2.90	16.9	22.4	33.2	0.95	0.72	0.48
									450	16.1	243.0	3.55	16.9	24.4	40.8	0.95	0.66	0.39
									600	16.1	324.0	4.10	16.9	26.0	47.3	0.95	0.62	0.34
									750	16.1	405.0	4.59	16.9	27.3	53.0	0.95	0.59	0.30
U3_L3	90x90x2	4.43	7000	17.1	20.6	54.1	1.20	2.63	150	14.2	81.0	2.18	15.0	17.2	22.0	0.95	0.82	0.65
									300	14.2	162.0	3.08	15.0	19.6	31.3	0.95	0.72	0.45
									450	14.2	243.0	3.77	15.0	21.1	38.5	0.95	0.67	0.37
									600	14.2	324.0	4.36	15.0	22.3	44.7	0.95	0.64	0.32
									750	14.2	405.0	4.87	15.0	23.2	50.1	0.95	0.61	0.28
U3_L4	90x90x2	4.43	7500	15.3	17.9	54.1	1.17	3.02	150	12.6	81.0	2.30	13.4	15.3	20.8	0.94	0.82	0.61
									300	12.6	162.0	3.25	13.4	17.1	29.7	0.94	0.74	0.43
									450	12.6	243.0	3.98	13.4	18.2	36.5	0.94	0.69	0.35
									600	12.6	324.0	4.60	13.4	19.0	42.3	0.94	0.66	0.30
									750	12.6	405.0	5.14	13.4	19.7	47.5	0.94	0.64	0.27
U3_L5	90x90x2	4.43	8000	13.9	15.7	54.1	1.14	3.43	150	11.4	81.0	2.42	12.2	13.6	19.8	0.93	0.83	0.57
									300	11.4	162.0	3.42	12.2	14.8	28.3	0.93	0.77	0.40
									450	11.4	243.0	4.19	12.2	15.5	34.8	0.93	0.73	0.33
									600	11.4	324.0	4.83	12.2	16.1	40.3	0.93	0.71	0.28
									750	11.4	405.0	5.41	12.2	16.5	45.2	0.93	0.69	0.25
U3_L6	90x90x2	4.43	8500	12.6	13.9	54.1	1.10	3.88	150	10.3	81.0	2.53	11.1	12.0	19.0	0.93	0.86	0.54
									300	10.3	162.0	3.58	11.1	12.7	27.0	0.93	0.81	0.38
									450	10.3	243.0	4.39	11.1	13.1	33.3	0.93	0.79	0.31
									600	10.3	324.0	5.06	11.1	13.4	38.5	0.93	0.77	0.27
									750	10.3	405.0	5.66	11.1	13.6	43.2	0.93	0.76	0.24
U4_L1	70x70x2	3.84	3500	29.9	38.7	63.4	1.29	1.64	150	25.5	63.0	1.45	26.1	26.1	26.1	0.98	0.98	0.98
									300	25.8	126.0	2.05	26.3	31.2	36.6	0.98	0.83	0.70
									450	25.8	189.0	2.51	26.3	34.8	45.4	0.98	0.74	0.57
									600	25.8	252.0	2.90	26.3	37.6	52.9	0.98	0.68	0.49
									750	25.8	315.0	3.24	26.3	40.0	59.5	0.98	0.64	0.43
U4_L2	70x70x2	3.84	4000	24.1	29.6	63.4	1.23	2.14	150	20.5	63.0	1.62	21.1	21.9	22.9	0.97	0.94	0.90
									300	20.5	126.0	2.29	21.1	25.6	33.0	0.97	0.80	0.62
									450	20.5	189.0	2.80	21.1	28.0	41.0	0.97	0.73	0.50
									600	20.5	252.0	3.24	21.1	29.9	47.7	0.97	0.69	0.43
									750	20.5	315.0	3.62	21.1	31.4	53.7	0.97	0.65	0.38
U4_L3	70x70x2	3.84	4500	20.0	23.4	63.4	1.17	2.71	150	16.9	63.0	1.78	17.5	18.6	21.0	0.96	0.91	0.81
									300	16.9	126.0	2.51	17.5	21.0	30.3	0.96	0.80	0.56
									450	16.9	189.0	3.08	17.5	22.6	37.5	0.96	0.75	0.45
									600	16.9	252.0	3.55	17.5	23.7	43.7	0.96	0.71	0.39
									750	16.9	315.0	3.97	17.5	24.7	49.2	0.96	0.68	0.34
U4_L4	70x70x2	3.84	5000	17.0	19.0	63.4	1.12	3.34	150	14.2	63.0	1.93	14.9	15.8	19.4	0.96	0.90	0.73
									300	14.2	126.0	2.73	14.9	17.1	28.0	0.96	0.83	0.51
									450	14.2	189.0	3.34	14.9	17.9	34.7	0.96	0.80	0.41
									600	14.2	252.0	3.85	14.9	18.5	40.5	0.96	0.77	0.35
									750	14.2	315.0	4.31	14.9	18.9	45.5	0.96	0.75	0.31
U4_L5	70x70x2	3.84	5500	14.7	15.7	63.4	1.07	4.04	150	12.2	63.0	2.07	12.9	13.2	18.1	0.95	0.93	0.67
									300	12.2	126.0	2.93	12.9	13.5	26.2	0.95	0.90	0.47
									450	12.2	189.0	3.59	12.9	13.7	32.5	0.95	0.89	0.38
									600	12.2	252.0	4.14	12.9	13.8	37.8	0.95	0.88	0.32
									750	12.2	315.0	4.63	12.9	14.0	42.6	0.95	0.87	0.29
U4_L6	70x70x2	3.84	6000	12.9	13.2	63.4	1.02	4.81	150	10.6	63.0	2.21	11.3	11.3	17.1	0.94	0.94	0.62
									300	10.6	126.0	3.13	11.3	11.3	24.6	0.94	0.94	0.43
									450	10.6	189.0	3.83	11.3	11.3	30.5	0.94	0.94	0.35
									600	10.6	252.0	4.42	11.3	11.3	35.6	0.94	0.94	0.30
									750	10.6	315.0	4.94	11.3	11.3	40.0	0.94	0.94	0.27

Table A3.1 (continuation): PS U columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*					*SFEA*		*DSM Design*								
	$b_w \times b_f \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
U5_L1	100x100x3	3.74	4750	71.1	91.9	149.7	1.29	1.63	150	60.0	135.0	1.38	60.9	60.9	60.9	0.98	0.98	0.98
									300	61.3	270.0	1.95	62.3	72.1	82.4	0.98	0.85	0.74
									450	61.3	405.0	2.39	62.3	80.6	102.3	0.98	0.76	0.60
									600	61.3	540.0	2.76	62.3	87.3	119.3	0.98	0.70	0.51
									750	61.3	675.0	3.08	62.3	92.8	134.3	0.98	0.66	0.46
U5_L2	100x100x3	3.74	5000	65.3	82.9	149.7	1.27	1.80	150	55.5	135.0	1.44	56.8	56.8	56.8	0.98	0.98	0.98
									300	56.2	270.0	2.03	57.2	67.0	79.2	0.98	0.84	0.71
									450	56.2	405.0	2.49	57.2	74.5	98.3	0.98	0.75	0.57
									600	56.2	540.0	2.88	57.2	80.2	114.6	0.98	0.70	0.49
									750	56.2	675.0	3.22	57.2	85.0	129.1	0.98	0.66	0.44
U5_L3	100x100x3	3.74	5500	55.9	68.5	149.7	1.23	2.18	150	47.8	135.0	1.55	49.0	49.8	50.9	0.97	0.96	0.94
									300	47.8	270.0	2.20	49.0	58.3	73.7	0.98	0.82	0.65
									450	47.8	405.0	2.69	49.0	63.8	91.5	0.98	0.75	0.52
									600	47.8	540.0	3.11	49.0	68.1	106.6	0.98	0.70	0.45
									750	47.8	675.0	3.47	49.0	71.6	120.1	0.98	0.67	0.40
U5_L4	100x100x3	3.74	6000	48.7	57.6	149.7	1.18	2.60	150	41.4	135.0	1.67	42.7	44.4	47.8	0.97	0.93	0.87
									300	41.4	270.0	2.35	42.7	50.7	69.1	0.97	0.82	0.60
									450	41.4	405.0	2.88	42.7	54.7	85.7	0.97	0.76	0.48
									600	41.4	540.0	3.33	42.7	57.7	100.0	0.97	0.72	0.41
									750	41.4	675.0	3.72	42.7	60.2	112.6	0.97	0.69	0.37
U5_L5	100x100x3	3.74	6500	43.0	49.1	149.7	1.14	3.05	150	36.3	135.0	1.77	37.7	39.6	45.1	0.96	0.92	0.81
									300	36.3	270.0	2.51	37.7	43.8	65.2	0.96	0.83	0.56
									450	36.3	405.0	3.07	37.7	46.5	80.9	0.96	0.78	0.45
									600	36.3	540.0	3.54	37.7	48.5	94.3	0.96	0.75	0.39
									750	36.3	675.0	3.96	37.7	50.1	106.2	0.96	0.72	0.34
U5_L6	100x100x3	3.74	7000	38.4	42.3	149.7	1.10	3.54	150	32.2	135.0	1.88	33.6	35.1	42.7	0.96	0.92	0.75
									300	32.2	270.0	2.65	33.6	37.6	61.8	0.96	0.86	0.52
									450	32.2	405.0	3.25	33.6	39.1	76.7	0.96	0.82	0.42
									600	32.2	540.0	3.75	33.6	40.2	89.4	0.96	0.80	0.36
									750	32.2	675.0	4.19	33.6	41.0	100.7	0.96	0.79	0.32
U6_L1	110x110x3.5	3.63	5000	100.1	128.8	216.1	1.29	1.68	150	83.7	173.3	1.32	83.9	83.9	83.9	1.00	1.00	1.00
									300	86.7	346.5	1.86	87.8	98.9	110.7	0.99	0.88	0.78
									450	86.7	519.8	2.28	87.8	110.5	137.5	0.99	0.78	0.63
									600	86.7	693.0	2.63	87.8	119.6	160.5	0.99	0.72	0.54
									750	86.7	866.3	2.94	87.8	127.1	180.9	0.99	0.68	0.48
U6_L2	110x110x3.5	3.63	5250	92.4	116.8	216.1	1.26	1.85	150	78.0	173.3	1.37	79.0	79.0	79.0	0.99	0.99	0.99
									300	79.8	346.5	1.94	81.0	92.5	106.6	0.99	0.86	0.75
									450	79.8	519.8	2.37	81.0	102.6	132.5	0.99	0.78	0.60
									600	79.8	693.0	2.74	81.0	110.5	154.6	0.99	0.72	0.52
									750	79.8	866.3	3.06	81.0	117.1	174.2	0.99	0.68	0.46
U6_L3	110x110x3.5	3.63	5500	85.6	106.4	216.1	1.24	2.03	150	72.8	173.3	1.42	74.3	74.3	74.3	0.98	0.98	0.98
									300	73.8	346.5	2.01	75.1	86.6	102.9	0.98	0.85	0.72
									450	73.8	519.8	2.46	75.1	95.5	127.9	0.98	0.77	0.58
									600	73.8	693.0	2.85	75.1	102.3	149.3	0.98	0.72	0.49
									750	73.8	866.3	3.18	75.1	108.0	168.2	0.98	0.68	0.44
U6_L4	110x110x3.5	3.63	6000	74.5	89.4	216.1	1.20	2.42	150	63.6	173.3	1.53	65.3	65.8	66.5	0.97	0.97	0.96
									300	63.8	346.5	2.16	65.3	76.0	96.5	0.98	0.84	0.66
									450	63.8	519.8	2.64	65.3	82.7	119.9	0.98	0.77	0.53
									600	63.8	693.0	3.05	65.3	87.8	139.9	0.98	0.73	0.46
									750	63.8	866.3	3.41	65.3	92.0	157.7	0.98	0.69	0.40
U6_L5	110x110x3.5	3.63	6750	61.9	70.7	216.1	1.14	3.06	150	52.6	173.3	1.67	54.3	56.1	61.1	0.97	0.94	0.86
									300	52.6	346.5	2.37	54.3	62.2	88.6	0.97	0.84	0.59
									450	52.6	519.8	2.90	54.3	66.1	110.1	0.97	0.80	0.48
									600	52.6	693.0	3.35	54.3	69.0	128.4	0.97	0.76	0.41
									750	52.6	866.3	3.74	54.3	71.4	144.8	0.97	0.74	0.36
U6_L6	110x110x3.5	3.63	7000	58.6	65.7	216.1	1.12	3.29	150	49.6	173.3	1.72	51.4	53.2	59.5	0.97	0.93	0.83
									300	49.6	346.5	2.43	51.4	58.0	86.3	0.97	0.85	0.57
									450	49.6	519.8	2.98	51.4	61.1	107.3	0.97	0.81	0.46
									600	49.6	693.0	3.44	51.4	63.3	125.2	0.97	0.78	0.40
									750	49.6	866.3	3.85	51.4	65.1	141.1	0.97	0.76	0.35
						Max	1.293	4.811							Mean	0.956	0.763	0.482
						Min	1.021	1.629							Sd.Dv.	0.020	0.110	0.188
															Max	0.997	0.997	0.997
															Min	0.920	0.545	0.226

Table A3.2 (to be continued): PS C columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
C1_L1	100x80x15x2	5.95	3000	107.8	122.7	176.5	294.6	1.14	1.44	150	66.6	87.0	0.90	62.1	62.1	62.1	1.07	1.07	1.07
										300	88.1	174.0	1.27	88.5	88.5	88.5	0.99	0.99	0.99
										450	91.1	261.0	1.56	94.5	95.1	97.9	0.96	0.96	0.93
										600	91.1	348.0	1.80	94.5	97.2	111.9	0.96	0.94	0.81
										750	91.1	435.0	2.01	94.5	98.9	124.2	0.96	0.92	0.73
C1_L2	100x80x15x2	5.95	4000	63.0	69.0	176.5	294.6	1.09	2.56	150	48.8	87.0	1.17	48.8	48.8	48.8	1.00	1.00	1.00
										300	53.4	174.0	1.66	55.3	55.5	60.8	0.97	0.96	0.88
										450	53.4	261.0	2.04	55.3	55.9	73.5	0.97	0.95	0.73
										600	53.4	348.0	2.35	55.3	56.2	84.1	0.97	0.95	0.64
										750	53.4	435.0	2.63	55.3	56.4	93.3	0.97	0.95	0.57
C1_L3	100x80x15x2	5.95	4500	50.7	54.5	176.5	294.6	1.08	3.24	150	40.9	87.0	1.31	42.4	42.4	42.4	0.96	0.96	0.96
										300	42.7	174.0	1.85	44.4	44.5	54.2	0.96	0.96	0.79
										450	42.7	261.0	2.27	44.4	44.5	65.4	0.96	0.96	0.65
										600	42.7	348.0	2.62	44.4	44.5	74.8	0.96	0.96	0.57
										750	42.7	435.0	2.93	44.4	44.5	83.0	0.96	0.96	0.51
C1_L4	100x80x15x2	5.95	5000	41.8	44.2	176.5	294.6	1.06	4.00	150	34.3	87.0	1.44	36.4	36.4	36.4	0.94	0.94	0.94
										300	34.9	174.0	2.04	36.6	36.7	48.9	0.95	0.95	0.71
										450	34.9	261.0	2.50	36.6	36.7	59.0	0.95	0.95	0.59
										600	34.9	348.0	2.89	36.6	36.7	67.5	0.95	0.95	0.52
										750	34.9	435.0	3.23	36.6	36.7	74.9	0.95	0.95	0.47
C1_L5	100x80x15x2	5.95	5500	35.2	36.5	176.5	294.6	1.04	4.84	150	29.0	87.0	1.57	30.8	30.8	32.2	0.94	0.94	0.90
										300	29.2	174.0	2.22	30.8	30.8	44.6	0.95	0.95	0.65
										450	29.2	261.0	2.72	30.8	30.8	53.8	0.95	0.95	0.54
										600	29.2	348.0	3.15	30.8	30.8	61.6	0.95	0.95	0.47
										750	29.2	435.0	3.52	30.8	30.8	68.3	0.95	0.95	0.43
C1_L6	100x80x15x2	5.95	6000	30.1	30.7	176.5	294.6	1.02	5.76	150	24.8	87.0	1.70	26.4	26.4	29.7	0.94	0.94	0.83
										300	24.8	174.0	2.40	26.4	26.4	41.0	0.94	0.94	0.60
										450	24.8	261.0	2.94	26.4	26.4	49.6	0.94	0.94	0.50
										600	24.8	348.0	3.40	26.4	26.4	56.7	0.94	0.94	0.44
										750	24.8	435.0	3.80	26.4	26.4	62.9	0.94	0.94	0.39
C2_L1	60x55x11x1.5	4.69	3500	16.6	21.3	107.7	435.4	1.28	5.05	150	14.2	43.2	1.61	14.6	15.1	15.7	0.97	0.94	0.91
										300	14.5	86.4	2.28	14.6	17.8	22.3	0.99	0.81	0.65
										450	14.5	129.6	2.79	14.6	19.7	27.3	0.99	0.74	0.53
										600	14.5	172.8	3.22	14.6	21.1	31.6	0.99	0.69	0.46
										750	14.5	216.0	3.60	14.6	22.2	35.3	0.99	0.65	0.41
C2_L2	60x55x11x1.5	4.69	4000	13.2	16.3	107.7	435.4	1.24	6.59	150	11.3	43.2	1.81	11.5	12.5	14.0	0.98	0.90	0.81
										300	11.3	86.4	2.56	11.5	14.4	19.8	0.98	0.79	0.57
										450	11.3	129.6	3.14	11.5	15.7	24.3	0.98	0.72	0.47
										600	11.3	172.8	3.62	11.5	16.7	28.1	0.98	0.68	0.40
										750	11.3	216.0	4.05	11.5	17.5	31.5	0.98	0.65	0.36
C2_L3	60x55x11x1.5	4.69	4500	10.7	12.9	107.7	435.4	1.20	8.34	150	9.2	43.2	2.01	9.4	10.4	12.6	0.98	0.88	0.73
										300	9.2	86.4	2.84	9.4	11.8	17.9	0.98	0.78	0.51
										450	9.2	129.6	3.47	9.4	12.7	22.0	0.98	0.72	0.42
										600	9.2	172.8	4.01	9.4	13.4	25.4	0.98	0.69	0.36
										750	9.2	216.0	4.49	9.4	13.9	28.4	0.98	0.66	0.32
C2_L4	60x55x11x1.5	4.69	5000	9.0	10.5	107.7	435.4	1.16	10.30	150	7.6	43.2	2.19	7.9	8.8	11.6	0.97	0.87	0.66
										300	7.6	86.4	3.10	7.9	9.7	16.4	0.97	0.79	0.47
										450	7.6	129.6	3.80	7.9	10.3	20.1	0.97	0.74	0.38
										600	7.6	172.8	4.38	7.9	10.7	23.3	0.97	0.72	0.33
										750	7.6	216.0	4.90	7.9	11.0	26.0	0.97	0.69	0.29
C2_L5	60x55x11x1.5	4.69	5500	7.7	8.6	107.7	435.4	1.13	12.46	150	6.5	43.2	2.37	6.7	7.4	10.7	0.96	0.88	0.61
										300	6.5	86.4	3.35	6.7	7.9	15.2	0.96	0.82	0.43
										450	6.5	129.6	4.11	6.7	8.2	18.6	0.96	0.79	0.35
										600	6.5	172.8	4.74	6.7	8.5	21.5	0.96	0.77	0.30
										750	6.5	216.0	5.30	6.7	8.6	24.1	0.96	0.75	0.27
C2_L6	60x55x11x1.5	4.69	6000	6.7	7.3	107.7	435.4	1.09	14.83	150	5.6	43.2	2.55	5.8	6.2	10.0	0.96	0.91	0.56
										300	5.6	86.4	3.60	5.8	6.4	14.1	0.96	0.88	0.40
										450	5.6	129.6	4.41	5.8	6.5	17.4	0.96	0.86	0.32
										600	5.6	172.8	5.09	5.8	6.6	20.1	0.96	0.85	0.28
										750	5.6	216.0	5.69	5.8	6.6	22.5	0.96	0.84	0.25

Table A3.2 (continuation): PS C columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
C3_L1	100x80x15x3	4.64	2500	238.3	265.0	430.1	873.8	1.11	1.62	150	112.6	130.5	0.74	103.8	103.8	103.8	1.09	1.09	1.09
										300	180.2	261.0	1.05	165.0	165.0	165.0	1.09	1.09	1.09
										450	200.8	391.5	1.28	196.8	196.8	196.8	1.02	1.02	1.02
										600	205.3	522.0	1.48	208.7	208.7	208.7	0.98	0.98	0.98
										750	205.6	652.5	1.65	209.0	212.5	231.0	0.98	0.97	0.89
C3_L2	100x80x15x3	4.64	3000	170.6	184.1	430.1	873.8	1.08	2.34	150	103.0	130.5	0.87	94.7	94.7	94.7	1.09	1.09	1.09
										300	140.9	261.0	1.24	137.6	137.6	137.6	1.02	1.02	1.02
										450	147.1	391.5	1.51	149.6	149.8	151.2	0.98	0.98	0.97
										600	147.4	522.0	1.75	149.6	151.2	174.9	0.98	0.97	0.84
										750	147.4	652.5	1.96	149.6	152.2	195.8	0.98	0.97	0.75
C3_L3	100x80x15x3	4.64	3500	128.9	135.2	430.1	873.8	1.05	3.18	150	90.8	130.5	1.01	85.4	85.4	85.4	1.06	1.06	1.06
										300	109.5	261.0	1.42	111.8	111.8	111.8	0.98	0.98	0.98
										450	110.7	391.5	1.74	113.1	113.1	131.6	0.98	0.98	0.84
										600	110.7	522.0	2.01	113.1	113.1	152.3	0.98	0.98	0.73
										750	110.7	652.5	2.25	113.1	113.1	170.5	0.98	0.98	0.65
C3_L4	100x80x15x3	4.64	3750	113.9	117.8	430.1	873.8	1.03	3.65	150	84.5	130.5	1.07	80.8	80.8	80.8	1.05	1.05	1.05
										300	97.1	261.0	1.51	99.9	100.0	100.9	0.97	0.97	0.96
										450	97.4	391.5	1.85	99.9	100.0	123.8	0.97	0.97	0.79
										600	97.4	522.0	2.14	99.9	100.0	143.2	0.97	0.97	0.68
										750	97.4	652.5	2.39	99.9	100.0	160.3	0.97	0.97	0.61
C3_L5	100x80x15x3	4.64	4000	101.6	103.5	430.1	873.8	1.02	4.15	150	78.2	130.5	1.13	76.2	76.2	76.2	1.03	1.03	1.03
										300	86.3	261.0	1.60	89.1	89.1	95.3	0.97	0.97	0.91
										450	86.4	391.5	1.96	89.1	89.1	117.0	0.97	0.97	0.74
										600	86.4	522.0	2.27	89.1	89.1	135.3	0.97	0.97	0.64
										750	86.4	652.5	2.53	89.1	89.1	151.5	0.97	0.97	0.57
C3_L6	100x80x15x3	4.64	4250	91.3	91.7	430.1	873.8	1.00	4.69	150	72.3	130.5	1.20	71.7	71.7	71.7	1.01	1.01	1.01
										300	77.3	261.0	1.69	80.1	80.1	90.4	0.97	0.96	0.85
										450	77.3	391.5	2.07	80.1	80.1	111.0	0.97	0.96	0.70
										600	77.3	522.0	2.39	80.1	80.1	128.4	0.97	0.96	0.60
										750	77.3	652.5	2.67	80.1	80.1	143.7	0.97	0.96	0.54
C4_L1	120x100x15x3	4.88	3500	204.5	245.6	341.9	783.6	1.20	1.39	150	123.7	157.5	0.88	114.1	114.1	114.1	1.08	1.08	1.08
										300	166.7	315.0	1.24	165.3	165.3	165.3	1.01	1.01	1.01
										450	174.4	472.5	1.52	179.4	180.3	181.9	0.97	0.97	0.96
										600	174.8	630.0	1.76	179.4	189.4	209.9	0.97	0.92	0.83
										750	174.8	787.5	1.96	179.4	196.7	234.6	0.97	0.89	0.75
C4_L2	120x100x15x3	4.88	4500	129.1	148.6	341.9	783.6	1.15	2.30	150	97.6	157.5	1.10	94.5	94.5	94.5	1.03	1.03	1.03
										300	110.3	315.0	1.56	113.2	114.4	118.0	0.97	0.96	0.94
										450	110.7	472.5	1.91	113.2	120.3	144.4	0.98	0.92	0.77
										600	110.7	630.0	2.21	113.2	124.6	166.7	0.98	0.89	0.66
										750	110.7	787.5	2.47	113.2	128.0	186.3	0.98	0.86	0.59
C4_L3	120x100x15x3	4.88	5000	106.7	120.4	341.9	783.6	1.13	2.84	150	84.7	157.5	1.21	84.9	84.9	84.9	1.00	1.00	1.00
										300	91.1	315.0	1.72	93.6	96.1	107.2	0.97	0.95	0.85
										450	91.1	472.5	2.10	93.6	99.9	131.3	0.97	0.91	0.69
										600	91.1	630.0	2.43	93.6	102.7	151.5	0.97	0.89	0.60
										750	91.1	787.5	2.72	93.6	104.9	169.3	0.97	0.87	0.54
C4_L4	120x100x15x3	4.88	5500	90.1	99.5	341.9	783.6	1.10	3.44	150	73.8	157.5	1.32	75.7	75.7	75.7	0.97	0.97	0.97
										300	76.4	315.0	1.87	79.0	81.3	98.5	0.97	0.94	0.78
										450	76.4	472.5	2.29	79.0	83.5	120.5	0.97	0.92	0.63
										600	76.4	630.0	2.64	79.0	85.0	139.1	0.97	0.90	0.55
										750	76.4	787.5	2.96	79.0	86.3	155.5	0.97	0.89	0.49
C4_L5	120x100x15x3	4.88	6000	77.3	83.6	341.9	783.6	1.08	4.09	150	64.1	157.5	1.43	67.1	67.1	67.1	0.96	0.96	0.96
										300	65.1	315.0	2.02	67.8	69.0	91.2	0.96	0.94	0.71
										450	65.1	472.5	2.47	67.8	69.8	111.6	0.96	0.93	0.58
										600	65.1	630.0	2.86	67.8	70.4	128.9	0.96	0.93	0.51
										750	65.1	787.5	3.19	67.8	70.8	144.0	0.96	0.92	0.45
C4_L6	120x100x15x3	4.88	7000	59.3	61.4	341.9	783.6	1.04	5.57	150	49.2	157.5	1.63	52.0	52.0	56.5	0.95	0.95	0.87
										300	49.3	315.0	2.30	52.0	52.0	79.9	0.95	0.95	0.62
										450	49.3	472.5	2.82	52.0	52.0	97.8	0.95	0.95	0.50
										600	49.3	630.0	3.26	52.0	52.0	112.8	0.95	0.95	0.44
										750	49.3	787.5	3.64	52.0	52.0	126.1	0.95	0.95	0.39

Table A3.2 (continuation): PS C columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
C5_L1	140x120x15x3.5	4.70	5000	189.2	230.4	398.6	1254.1	1.22	1.73	150	139.6	215.3	1.07	133.7	133.7	133.7	1.04	1.04	1.04
										300	161.0	430.5	1.51	165.9	166.4	167.0	0.97	0.97	0.96
										450	162.3	645.8	1.85	165.9	179.6	204.8	0.98	0.90	0.79
										600	162.3	861.0	2.13	165.9	189.7	236.7	0.98	0.86	0.69
										750	162.4	1076.3	2.39	165.9	197.9	264.9	0.98	0.82	0.61
C5_L2	140x120x15x3.5	4.70	5500	159.2	190.4	398.6	1254.1	1.20	2.09	150	124.2	215.3	1.16	122.2	122.2	122.2	1.02	1.02	1.02
										300	136.3	430.5	1.64	139.6	144.2	153.3	0.98	0.95	0.89
										450	136.5	645.8	2.01	139.6	154.6	188.0	0.98	0.88	0.73
										600	136.5	861.0	2.33	139.6	162.4	217.3	0.98	0.84	0.63
										750	136.5	1076.3	2.60	139.6	168.7	243.2	0.98	0.81	0.56
C5_L3	140x120x15x3.5	4.70	6000	136.2	160.0	398.6	1254.1	1.17	2.49	150	110.0	215.3	1.26	111.1	111.1	111.1	0.99	0.99	0.99
										300	116.4	430.5	1.78	119.5	125.9	141.9	0.97	0.92	0.82
										450	116.4	645.8	2.18	119.5	133.9	174.0	0.97	0.87	0.67
										600	116.4	861.0	2.51	119.5	139.8	201.2	0.97	0.83	0.58
										750	116.4	1076.3	2.81	119.5	144.7	225.1	0.97	0.80	0.52
C5_L4	140x120x15x3.5	4.70	7000	103.9	117.5	398.6	1254.1	1.13	3.39	150	86.6	215.3	1.44	90.4	90.4	90.4	0.96	0.96	0.96
										300	87.9	430.5	2.04	91.1	97.2	124.0	0.96	0.90	0.71
										450	87.9	645.8	2.49	91.1	101.5	152.1	0.96	0.87	0.58
										600	87.9	861.0	2.88	91.1	104.6	175.9	0.96	0.84	0.50
										750	87.9	1076.3	3.22	91.1	107.1	196.8	0.96	0.82	0.45
C5_L5	140x120x15x3.5	4.70	7500	92.2	102.4	398.6	1254.1	1.11	3.89	150	77.1	215.3	1.53	80.9	81.2	82.4	0.95	0.95	0.94
										300	77.6	430.5	2.16	80.9	85.7	116.9	0.96	0.91	0.66
										450	77.6	645.8	2.65	80.9	88.4	143.4	0.96	0.88	0.54
										600	77.6	861.0	3.06	80.9	90.4	165.8	0.96	0.86	0.47
										750	77.6	1076.3	3.42	80.9	92.0	185.5	0.96	0.84	0.42
C5_L6	140x120x15x3.5	4.70	8000	82.7	90.0	398.6	1254.1	1.09	4.43	150	69.0	215.3	1.61	72.5	73.0	78.1	0.95	0.95	0.88
										300	69.1	430.5	2.28	72.5	75.4	110.7	0.95	0.92	0.62
										450	69.1	645.8	2.80	72.5	76.8	135.8	0.95	0.90	0.51
										600	69.1	861.0	3.23	72.5	77.8	157.0	0.95	0.89	0.44
										750	69.1	1076.3	3.61	72.5	78.6	175.7	0.95	0.88	0.39
C6_L1	80x70x15x3	3.84	2500	146.0	178.8	490.9	1263.3	1.22	2.75	150	88.5	112.5	0.88	81.5	81.5	81.5	1.09	1.09	1.09
										300	121.9	225.0	1.24	118.1	118.1	118.1	1.03	1.03	1.03
										450	128.8	337.5	1.52	128.1	128.9	130.0	1.01	1.00	0.99
										600	130.0	450.0	1.76	128.1	137.4	151.4	1.01	0.95	0.86
										750	130.0	562.5	1.96	128.1	144.3	170.4	1.01	0.90	0.76
C6_L2	80x70x15x3	3.84	3000	105.1	124.2	490.9	1263.3	1.18	3.95	150	75.9	112.5	1.03	71.9	71.9	71.9	1.06	1.06	1.06
										300	91.4	225.0	1.46	91.9	91.9	91.9	1.00	1.00	1.00
										450	93.1	337.5	1.79	92.2	98.5	111.4	1.01	0.95	0.84
										600	93.1	450.0	2.07	92.2	103.9	129.7	1.01	0.90	0.72
										750	93.1	562.5	2.31	92.2	108.2	146.0	1.01	0.86	0.64
C6_L3	80x70x15x3	3.84	3500	80.2	91.2	490.9	1263.3	1.14	5.38	150	63.5	112.5	1.18	62.5	62.5	62.5	1.01	1.01	1.01
										300	70.3	225.0	1.68	70.3	72.6	79.1	1.00	0.97	0.89
										450	70.5	337.5	2.05	70.3	76.8	98.0	1.00	0.92	0.72
										600	70.5	450.0	2.37	70.3	79.9	114.2	1.00	0.88	0.62
										750	70.5	562.5	2.65	70.3	82.4	128.5	1.00	0.86	0.55
C6_L4	80x70x15x3	3.84	4000	63.8	69.9	490.9	1263.3	1.10	7.03	150	53.0	112.5	1.33	53.8	53.8	53.8	0.99	0.99	0.99
										300	55.6	225.0	1.88	55.9	58.1	71.0	0.99	0.96	0.78
										450	55.6	337.5	2.30	55.9	60.0	88.0	0.99	0.93	0.63
										600	55.6	450.0	2.66	55.9	61.5	102.5	1.00	0.90	0.54
										750	55.6	562.5	2.97	55.9	62.6	115.4	1.00	0.89	0.48
C6_L5	80x70x15x3	3.84	4500	52.3	55.2	490.9	1263.3	1.05	8.89	150	44.5	112.5	1.47	45.7	45.7	45.7	0.97	0.97	0.97
										300	45.3	225.0	2.07	45.9	46.3	64.7	0.99	0.98	0.70
										450	45.3	337.5	2.54	45.9	46.5	80.2	0.99	0.97	0.56
										600	45.3	450.0	2.93	45.9	46.6	93.4	0.99	0.97	0.48
										750	45.3	562.5	3.28	45.9	46.8	105.2	0.99	0.97	0.43
C6_L6	80x70x15x3	3.84	5000	44.0	44.7	490.9	1263.3	1.02	10.98	150	37.6	112.5	1.60	38.6	38.6	41.3	0.97	0.97	0.91
										300	37.8	225.0	2.26	38.6	38.6	59.7	0.98	0.98	0.63
										450	37.8	337.5	2.77	38.6	38.6	73.9	0.98	0.98	0.51
										600	37.8	450.0	3.20	38.6	38.6	86.1	0.98	0.98	0.44
										750	37.8	562.5	3.58	38.6	38.6	96.9	0.98	0.98	0.39
							Max	1.282	14.830							Mean	0.979	0.921	0.694
							Min	1.005	1.392							Sd.Dv.	0.030	0.088	0.225
																Max	1.092	1.092	1.092
																Min	0.938	0.649	0.249

Table A3.3 (to be continued): PS H columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT.Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
H1_L1	80x70x10x3	3.28	2000	167.7	250.9	368.0	1048.5	1.50	1.47	150	90.7	108.0	0.80	82.5	82.5	82.5	1.10	1.10	1.10
										300	136.0	216.0	1.13	126.0	126.0	126.0	1.08	1.08	1.08
										450	145.9	324.0	1.39	144.3	144.3	144.3	1.01	1.01	1.01
										600	146.3	432.0	1.60	147.1	158.5	158.5	0.99	0.92	0.92
										750	146.3	540.0	1.79	147.1	179.0	179.0	0.99	0.82	0.82
H1_L2	80x70x10x3	3.28	2500	115.2	160.6	368.0	1048.5	1.39	2.29	150	79.1	108.0	0.97	72.9	72.9	72.9	1.08	1.08	1.08
										300	99.4	216.0	1.37	98.5	98.5	98.5	1.01	1.01	1.01
										450	100.4	324.0	1.68	101.0	110.3	114.2	0.99	0.91	0.88
										600	100.5	432.0	1.94	101.0	123.3	133.6	0.99	0.81	0.75
										750	100.5	540.0	2.17	101.0	134.5	151.0	0.99	0.75	0.67
H1_L3	80x70x10x3	3.28	3000	85.6	111.5	368.0	1048.5	1.30	3.30	150	66.3	108.0	1.12	63.7	63.7	63.7	1.04	1.04	1.04
										300	74.1	216.0	1.59	75.1	77.7	80.0	0.99	0.95	0.93
										450	74.1	324.0	1.95	75.1	87.7	99.8	0.99	0.85	0.74
										600	74.1	432.0	2.25	75.1	95.5	116.8	0.99	0.78	0.63
										750	74.1	540.0	2.51	75.1	102.0	132.0	0.99	0.73	0.56
H1_L4	80x70x10x3	3.28	3500	67.4	81.9	368.0	1048.5	1.22	4.49	150	55.4	108.0	1.27	55.2	55.2	55.2	1.00	1.00	1.00
										300	57.7	216.0	1.79	59.1	64.1	71.7	0.98	0.90	0.80
										450	57.7	324.0	2.19	59.1	70.4	89.5	0.98	0.82	0.64
										600	57.7	432.0	2.53	59.1	75.3	104.8	0.98	0.77	0.55
										750	57.7	540.0	2.83	59.1	79.2	118.4	0.98	0.73	0.49
H1_L5	80x70x10x3	3.28	4000	55.2	62.7	368.0	1048.5	1.14	5.87	150	46.3	108.0	1.40	47.6	47.6	47.6	0.97	0.97	0.97
										300	46.7	216.0	1.98	48.4	52.7	65.5	0.97	0.89	0.71
										450	46.7	324.0	2.42	48.4	56.1	81.8	0.97	0.83	0.57
										600	46.7	432.0	2.80	48.4	58.7	95.7	0.97	0.80	0.49
										750	46.7	540.0	3.13	48.4	60.8	108.1	0.97	0.77	0.43
H1_L6	80x70x10x3	3.28	5000	40.1	40.1	368.0	1048.5	1.00	9.17	150	33.1	108.0	1.64	35.1	35.2	38.8	0.94	0.94	0.85
										300	33.1	216.0	2.32	35.1	35.2	56.7	0.94	0.94	0.58
										450	33.1	324.0	2.84	35.1	35.2	70.7	0.94	0.94	0.47
										600	33.1	432.0	3.28	35.1	35.2	82.8	0.94	0.94	0.40
										750	33.1	540.0	3.67	35.1	35.2	93.5	0.94	0.94	0.35
H2_L1	90x70x10x2	4.87	3000	63.6	77.4	147.0	355.6	1.22	1.90	150	47.8	75.0	1.09	45.8	45.8	45.8	1.04	1.04	1.04
										300	53.3	150.0	1.54	55.8	56.3	57.1	0.95	0.95	0.93
										450	53.3	225.0	1.88	55.8	60.6	70.0	0.95	0.88	0.76
										600	53.3	300.0	2.17	55.8	63.9	80.8	0.95	0.83	0.66
										750	53.3	375.0	2.43	55.8	66.6	90.3	0.95	0.80	0.59
H2_L2	90x70x10x2	4.87	3500	48.6	56.8	147.0	355.6	1.17	2.59	150	39.0	75.0	1.24	39.3	39.3	39.3	0.99	0.99	0.99
										300	40.4	150.0	1.76	42.6	44.6	49.9	0.95	0.91	0.81
										450	40.4	225.0	2.15	42.6	47.2	61.1	0.95	0.85	0.66
										600	40.4	300.0	2.49	42.6	49.2	70.5	0.95	0.82	0.57
										750	40.4	375.0	2.78	42.6	50.8	78.8	0.95	0.79	0.51
H2_L3	90x70x10x2	4.87	4000	38.6	43.5	147.0	355.6	1.13	3.38	150	31.6	75.0	1.39	33.3	33.3	33.3	0.95	0.95	0.95
										300	31.8	150.0	1.97	33.9	35.7	44.5	0.94	0.89	0.71
										450	31.8	225.0	2.41	33.9	37.1	54.5	0.94	0.86	0.58
										600	31.8	300.0	2.79	33.9	38.1	62.9	0.94	0.83	0.51
										750	31.8	375.0	3.12	33.9	38.9	70.3	0.94	0.82	0.45
H2_L4	90x70x10x2	4.87	4500	31.7	34.4	147.0	355.6	1.08	4.28	150	25.8	75.0	1.54	27.8	27.9	28.5	0.93	0.92	0.90
										300	25.8	150.0	2.17	27.8	28.5	40.3	0.93	0.90	0.64
										450	25.8	225.0	2.66	27.8	28.9	49.4	0.93	0.89	0.52
										600	25.8	300.0	3.08	27.8	29.2	57.0	0.93	0.88	0.45
										750	25.8	375.0	3.44	27.8	29.4	63.7	0.93	0.88	0.40
H2_L5	90x70x10x2	4.87	5000	26.7	27.9	147.0	355.6	1.04	5.28	150	21.4	75.0	1.68	23.4	23.4	26.2	0.91	0.91	0.82
										300	21.4	150.0	2.37	23.4	23.4	37.0	0.91	0.91	0.58
										450	21.4	225.0	2.90	23.4	23.4	45.3	0.91	0.91	0.47
										600	21.4	300.0	3.35	23.4	23.4	52.3	0.91	0.91	0.41
										750	21.4	375.0	3.75	23.4	23.4	58.5	0.91	0.91	0.37
H2_L6	90x70x10x2	4.87	5500	23.0	23.0	147.0	355.6	1.00	6.39	150	18.2	75.0	1.81	20.2	20.2	24.3	0.90	0.90	0.75
										300	18.2	150.0	2.55	20.2	20.2	34.3	0.90	0.90	0.53
										450	18.2	225.0	3.13	20.2	20.2	42.0	0.90	0.90	0.43
										600	18.2	300.0	3.61	20.2	20.2	48.5	0.90	0.90	0.37
										750	18.2	375.0	4.04	20.2	20.2	54.2	0.90	0.90	0.34

Table A3.3 (continuation): PS H columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
H3_L1	100x80x15x2	4.70	3500	63.2	90.1	182.7	343.4	1.43	2.03	150	49.5	87.0	1.17	48.9	48.9	48.9	1.01	1.01	1.01
										300	53.3	174.0	1.66	55.4	60.0	61.4	0.96	0.89	0.87
										450	53.3	261.0	2.03	55.4	70.4	75.3	0.96	0.76	0.71
										600	53.3	348.0	2.35	55.4	78.9	87.1	0.96	0.68	0.61
										750	53.3	435.0	2.62	55.4	86.1	97.4	0.96	0.62	0.55
H3_L2	100x80x15x2	4.70	4000	49.9	69.0	182.7	343.4	1.38	2.65	150	40.9	87.0	1.32	41.9	41.9	41.9	0.97	0.97	0.97
										300	41.9	174.0	1.87	43.8	50.7	54.6	0.96	0.83	0.77
										450	41.9	261.0	2.29	43.8	58.0	67.0	0.96	0.72	0.63
										600	41.9	348.0	2.64	43.8	63.8	77.5	0.96	0.66	0.54
										750	41.9	435.0	2.95	43.8	68.8	86.7	0.96	0.61	0.48
H3_L3	100x80x15x2	4.70	5000	34.0	44.2	182.7	343.4	1.30	4.14	150	28.1	87.0	1.60	29.8	30.8	31.8	0.94	0.91	0.88
										300	28.1	174.0	2.26	29.8	36.7	45.1	0.94	0.76	0.62
										450	28.1	261.0	2.77	29.8	40.7	55.4	0.94	0.69	0.51
										600	28.1	348.0	3.20	29.8	43.7	64.0	0.94	0.64	0.44
										750	28.1	435.0	3.58	29.8	46.3	71.6	0.94	0.61	0.39
H3_L4	100x80x15x2	4.70	6000	25.1	30.7	182.7	343.4	1.22	5.96	150	20.4	87.0	1.86	22.0	24.0	27.4	0.93	0.85	0.74
										300	20.4	174.0	2.63	22.0	27.4	38.9	0.93	0.75	0.52
										450	20.4	261.0	3.22	22.0	29.6	47.7	0.93	0.69	0.43
										600	20.4	348.0	3.72	22.0	31.2	55.1	0.93	0.65	0.37
										750	20.4	435.0	4.16	22.0	32.6	61.7	0.93	0.63	0.33
H3_L5	100x80x15x2	4.70	7000	19.7	22.5	182.7	343.4	1.14	8.11	150	15.7	87.0	2.10	17.3	18.7	24.3	0.91	0.84	0.65
										300	15.7	174.0	2.97	17.3	20.4	34.5	0.91	0.77	0.46
										450	15.7	261.0	3.64	17.3	21.4	42.3	0.91	0.74	0.37
										600	15.7	348.0	4.20	17.3	22.1	48.9	0.91	0.71	0.32
										750	15.7	435.0	4.70	17.3	22.7	54.7	0.91	0.69	0.29
H3_L6	100x80x15x2	4.70	8000	16.1	17.3	182.7	343.4	1.07	10.59	150	12.6	87.0	2.32	14.1	14.3	22.0	0.89	0.88	0.57
										300	12.6	174.0	3.28	14.1	14.5	31.2	0.89	0.87	0.40
										450	12.6	261.0	4.02	14.1	14.5	38.3	0.89	0.87	0.33
										600	12.6	348.0	4.64	14.1	14.6	44.2	0.89	0.86	0.28
										750	12.6	435.0	5.19	14.1	14.6	49.5	0.89	0.86	0.25
H4_L1	100x85x15x3	3.61	4000	86.9	119.6	413.2	1308.1	1.38	3.45	150	70.6	135.0	1.25	70.5	70.5	70.5	1.00	1.00	1.00
										300	74.4	270.0	1.76	76.2	85.6	90.7	0.98	0.87	0.82
										450	74.4	405.0	2.16	76.2	99.0	112.7	0.98	0.75	0.66
										600	74.4	540.0	2.49	76.2	109.7	131.5	0.98	0.68	0.57
										750	74.4	675.0	2.79	76.2	118.9	148.2	0.98	0.63	0.50
H4_L2	100x85x15x3	3.61	4500	71.9	94.5	413.2	1308.1	1.31	4.37	150	59.9	135.0	1.37	61.5	61.5	61.5	0.97	0.97	0.97
										300	61.1	270.0	1.94	63.0	73.5	83.0	0.97	0.83	0.74
										450	61.1	405.0	2.37	63.0	82.9	103.2	0.97	0.74	0.59
										600	61.1	540.0	2.74	63.0	90.3	120.5	0.97	0.68	0.51
										750	61.1	675.0	3.06	63.0	96.5	135.8	0.97	0.63	0.45
H4_L3	100x85x15x3	3.61	5000	61.0	76.6	413.2	1308.1	1.26	5.40	150	51.2	135.0	1.49	53.5	53.5	53.5	0.96	0.96	0.96
										300	51.3	270.0	2.10	53.5	63.4	77.0	0.96	0.81	0.67
										450	51.3	405.0	2.58	53.5	70.2	95.7	0.96	0.73	0.54
										600	51.3	540.0	2.98	53.5	75.5	111.6	0.96	0.68	0.46
										750	51.4	675.0	3.33	53.5	79.8	125.8	0.96	0.64	0.41
H4_L4	100x85x15x3	3.61	5500	52.8	63.3	413.2	1308.1	1.20	6.53	150	44.1	135.0	1.60	46.3	47.6	49.6	0.95	0.93	0.89
										300	44.1	270.0	2.26	46.3	54.9	72.0	0.95	0.80	0.61
										450	44.1	405.0	2.77	46.3	59.6	89.5	0.95	0.74	0.49
										600	44.1	540.0	3.20	46.3	63.3	104.4	0.95	0.70	0.42
										750	44.1	675.0	3.58	46.3	66.3	117.7	0.95	0.66	0.37
H4_L5	100x85x15x3	3.61	6000	46.5	53.2	413.2	1308.1	1.14	7.77	150	38.4	135.0	1.70	40.7	42.4	46.8	0.94	0.91	0.82
										300	38.4	270.0	2.41	40.7	47.2	67.8	0.94	0.81	0.57
										450	38.4	405.0	2.95	40.7	50.2	84.3	0.94	0.77	0.46
										600	38.4	540.0	3.41	40.7	52.4	98.4	0.94	0.73	0.39
										750	38.4	675.0	3.81	40.7	54.3	110.9	0.94	0.71	0.35
H4_L6	100x85x15x3	3.61	7000	37.3	39.1	413.2	1308.1	1.05	10.58	150	30.3	135.0	1.90	32.7	32.8	42.2	0.93	0.92	0.72
										300	30.3	270.0	2.69	32.7	32.9	61.3	0.93	0.92	0.49
										450	30.3	405.0	3.30	32.7	32.9	76.2	0.93	0.92	0.40
										600	30.3	540.0	3.80	32.7	32.9	88.9	0.93	0.92	0.34
										750	30.3	675.0	4.25	32.7	33.0	100.2	0.93	0.92	0.30

Table A3.3 (continuation): PS H columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
H5_L1	95x75x10x2	4.98	3000	73.9	93.1	135.7	315.8	1.26	1.46	150	53.6	79.5	1.04	50.7	50.7	50.7	1.06	1.06	1.06
										300	61.7	159.0	1.47	64.6	64.6	64.6	0.95	0.95	0.95
										450	61.7	238.5	1.80	64.8	70.1	77.6	0.95	0.88	0.80
										600	61.7	318.0	2.07	64.8	74.5	89.4	0.95	0.83	0.69
										750	61.7	397.5	2.32	64.8	78.1	99.9	0.95	0.79	0.62
H5_L2	95x75x10x2	4.98	3500	56.2	68.4	135.7	315.8	1.22	1.98	150	44.4	79.5	1.19	44.0	44.0	44.0	1.01	1.01	1.01
										300	46.9	159.0	1.68	49.3	51.4	55.3	0.95	0.91	0.85
										450	46.9	238.5	2.06	49.3	55.3	67.6	0.95	0.85	0.69
										600	46.9	318.0	2.38	49.3	58.3	77.9	0.95	0.81	0.60
										750	46.9	397.5	2.66	49.3	60.7	87.0	0.95	0.77	0.54
H5_L3	95x75x10x2	4.98	4000	44.5	52.4	135.7	315.8	1.18	2.59	150	36.4	79.5	1.34	37.6	37.6	37.6	0.97	0.97	0.97
										300	36.9	159.0	1.89	39.0	41.8	49.1	0.95	0.88	0.75
										450	36.9	238.5	2.32	39.0	44.3	60.0	0.95	0.83	0.61
										600	36.9	318.0	2.67	39.0	46.3	69.2	0.95	0.80	0.53
										750	36.9	397.5	2.99	39.0	47.8	77.3	0.95	0.77	0.48
H5_L4	95x75x10x2	4.98	4500	36.3	41.4	135.7	315.8	1.14	3.28	150	29.8	79.5	1.48	31.8	31.8	31.8	0.94	0.94	0.94
										300	29.8	159.0	2.09	31.9	34.2	44.3	0.94	0.87	0.67
										450	29.8	238.5	2.56	31.9	35.8	54.2	0.94	0.83	0.55
										600	29.8	318.0	2.96	31.9	36.9	62.5	0.94	0.81	0.48
										750	29.8	397.5	3.31	31.9	37.8	69.8	0.94	0.79	0.43
H5_L5	95x75x10x2	4.98	5000	30.4	33.5	135.7	315.8	1.10	4.05	150	24.7	79.5	1.62	26.7	26.9	28.8	0.93	0.92	0.86
										300	24.7	159.0	2.29	26.7	28.0	40.5	0.93	0.88	0.61
										450	24.7	238.5	2.80	26.7	28.7	49.6	0.93	0.86	0.50
										600	24.7	318.0	3.23	26.7	29.2	57.2	0.93	0.85	0.43
										750	24.7	397.5	3.61	26.7	29.6	63.9	0.93	0.84	0.39
H5_L6	95x75x10x2	4.98	6000	22.7	23.3	135.7	315.8	1.03	5.83	150	18.0	79.5	1.87	19.9	19.9	24.8	0.90	0.90	0.73
										300	18.0	159.0	2.65	19.9	19.9	34.9	0.90	0.90	0.51
										450	18.0	238.5	3.24	19.9	19.9	42.7	0.90	0.90	0.42
										600	18.0	318.0	3.75	19.9	19.9	49.3	0.90	0.90	0.36
										750	18.0	397.5	4.19	19.9	19.9	55.0	0.90	0.90	0.33
H6_L1	70x60x10x1.5	4.28	3500	18.9	27.0	92.3	313.2	1.43	3.42	150	15.9	47.3	1.58	16.5	17.3	17.5	0.96	0.92	0.91
										300	15.9	94.5	2.24	16.5	23.0	25.0	0.96	0.69	0.63
										450	15.9	141.8	2.74	16.5	27.2	30.9	0.96	0.58	0.51
										600	15.9	189.0	3.16	16.5	30.6	35.8	0.96	0.52	0.44
										750	15.9	236.3	3.54	16.5	33.6	40.2	0.96	0.47	0.39
H6_L2	70x60x10x1.5	4.28	4000	15.1	20.7	92.3	313.2	1.37	4.47	150	12.6	47.3	1.77	13.2	14.8	15.7	0.95	0.85	0.80
										300	12.6	94.5	2.50	13.2	18.6	22.5	0.95	0.68	0.56
										450	12.6	141.8	3.06	13.2	21.2	27.7	0.95	0.59	0.45
										600	12.6	189.0	3.54	13.2	23.3	32.2	0.95	0.54	0.39
										750	12.6	236.3	3.96	13.2	25.1	36.1	0.95	0.50	0.35
H6_L3	70x60x10x1.5	4.28	4500	12.5	16.3	92.3	313.2	1.31	5.66	150	10.3	47.3	1.95	11.0	12.6	14.3	0.94	0.81	0.72
										300	10.3	94.5	2.75	11.0	15.2	20.5	0.94	0.68	0.50
										450	10.3	141.8	3.37	11.0	17.0	25.3	0.94	0.61	0.41
										600	10.3	189.0	3.89	11.0	18.4	29.3	0.94	0.56	0.35
										750	10.3	236.3	4.35	11.0	19.5	32.9	0.94	0.53	0.31
H6_L4	70x60x10x1.5	4.28	5000	10.6	13.2	92.3	313.2	1.25	6.98	150	8.6	47.3	2.11	9.3	10.8	13.2	0.93	0.80	0.65
										300	8.6	94.5	2.99	9.3	12.7	18.9	0.93	0.68	0.46
										450	8.6	141.8	3.66	9.3	13.9	23.4	0.93	0.62	0.37
										600	8.6	189.0	4.22	9.3	14.8	27.1	0.93	0.58	0.32
										750	8.6	236.3	4.72	9.3	15.6	30.4	0.93	0.55	0.28
H6_L5	70x60x10x1.5	4.28	6000	8.1	9.2	92.3	313.2	1.14	10.05	150	6.4	47.3	2.42	7.1	8.0	11.6	0.91	0.81	0.55
										300	6.4	94.5	3.42	7.1	8.7	16.6	0.91	0.74	0.39
										450	6.4	141.8	4.19	7.1	9.2	20.5	0.91	0.70	0.31
										600	6.4	189.0	4.84	7.1	9.5	23.8	0.91	0.68	0.27
										750	6.4	236.3	5.41	7.1	9.8	26.7	0.91	0.66	0.24
H6_L6	70x60x10x1.5	4.28	7000	6.5	6.7	92.3	313.2	1.04	13.69	150	5.1	47.3	2.70	5.7	5.7	10.4	0.89	0.89	0.49
										300	5.1	94.5	3.82	5.7	5.7	14.9	0.89	0.89	0.34
										450	5.1	141.8	4.68	5.7	5.7	18.4	0.89	0.89	0.28
										600	5.1	189.0	5.40	5.7	5.7	21.4	0.89	0.89	0.24
										750	5.1	236.3	6.04	5.7	5.7	24.0	0.89	0.89	0.21
							Max	1.496	13.694							Mean	0.948	0.821	0.597
							Min	1.001	1.457							Sd.Dv.	0.036	0.128	0.223
																Max	1.099	1.099	1.099
																Min	0.891	0.473	0.211

Table A3.4 (to be continued): PS R columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
R1_L1	80x70x10x15x3	3.61	4000	67.8	90.2	380.9	3026.9	1.33	4.23	150	56.4	121.5	1.34	57.4	57.4	57.4	0.98	0.98	0.98
										300	60.5	243.0	1.89	59.5	68.8	76.4	1.02	0.88	0.79
										450	60.5	364.5	2.32	59.5	78.0	95.0	1.02	0.78	0.64
										600	60.6	486.0	2.68	59.5	85.2	110.8	1.02	0.71	0.55
										750	60.6	607.5	2.99	59.5	91.3	124.9	1.02	0.66	0.48
R1_L2	80x70x10x15x3	3.61	5000	46.2	57.7	380.9	3026.9	1.25	6.60	150	40.2	121.5	1.62	40.5	42.1	44.1	0.99	0.95	0.91
										300	40.9	243.0	2.29	40.5	50.0	63.9	1.01	0.82	0.64
										450	40.9	364.5	2.81	40.5	55.2	79.5	1.01	0.74	0.51
										600	40.9	486.0	3.24	40.5	59.3	92.8	1.01	0.69	0.44
										750	40.9	607.5	3.63	40.5	62.6	104.6	1.01	0.65	0.39
R1_L3	80x70x10x15x3	3.61	6000	34.1	40.1	380.9	3026.9	1.18	9.51	150	30.0	121.5	1.89	29.9	32.6	38.3	1.00	0.92	0.78
										300	30.0	243.0	2.67	29.9	37.1	55.5	1.00	0.81	0.54
										450	30.0	364.5	3.27	29.9	40.0	69.0	1.00	0.75	0.43
										600	30.0	486.0	3.78	29.9	42.2	80.6	1.00	0.71	0.37
										750	30.0	607.5	4.22	29.9	44.0	90.8	1.00	0.68	0.33
R1_L4	80x70x10x15x3	3.61	7000	26.5	29.4	380.9	3026.9	1.11	12.94	150	23.2	121.5	2.14	23.2	25.2	34.1	1.00	0.92	0.68
										300	23.2	243.0	3.03	23.2	27.2	49.4	1.00	0.85	0.47
										450	23.2	364.5	3.71	23.2	28.5	61.4	1.00	0.81	0.38
										600	23.2	486.0	4.28	23.2	29.4	71.7	1.00	0.79	0.32
										750	23.2	607.5	4.79	23.2	30.2	80.8	1.00	0.77	0.29
R1_L5	80x70x10x15x3	3.61	7500	23.7	25.6	380.9	3026.9	1.08	14.86	150	20.7	121.5	2.27	20.8	22.0	32.3	1.00	0.94	0.64
										300	20.7	243.0	3.20	20.8	23.1	46.9	1.00	0.90	0.44
										450	20.7	364.5	3.92	20.8	23.7	58.3	1.00	0.87	0.36
										600	20.7	486.0	4.53	20.8	24.2	68.1	1.00	0.85	0.30
										750	20.7	607.5	5.07	20.8	24.6	76.7	1.00	0.84	0.27
R1_L6	80x70x10x15x3	3.61	8500	19.3	20.0	380.9	3026.9	1.03	19.08	150	16.9	121.5	2.51	17.0	17.0	29.4	0.99	0.99	0.57
										300	16.9	243.0	3.55	17.0	17.0	42.7	0.99	0.99	0.39
										450	16.9	364.5	4.34	17.0	17.0	53.1	0.99	0.99	0.32
										600	16.9	486.0	5.01	17.0	17.0	62.0	0.99	0.99	0.27
										750	16.9	607.5	5.61	17.0	17.0	69.8	0.99	0.99	0.24
R2_L1	90x80x15x15x4	3.45	3000	231.1	315.7	859.5	3592.2	1.37	2.72	150	142.8	186.0	0.90	132.8	132.8	132.8	1.08	1.08	1.08
										300	195.5	372.0	1.27	189.6	189.6	189.6	1.03	1.03	1.03
										450	207.3	558.0	1.55	202.6	207.9	210.7	1.02	1.00	0.98
										600	209.7	744.0	1.79	202.6	230.0	246.2	1.03	0.91	0.85
										750	209.7	930.0	2.01	202.6	248.7	277.8	1.03	0.84	0.75
R2_L2	90x80x15x15x4	3.45	4000	137.0	177.6	859.5	3592.2	1.30	4.84	150	107.0	186.0	1.17	105.4	105.4	105.4	1.02	1.02	1.02
										300	122.5	372.0	1.65	120.2	126.9	133.1	1.02	0.97	0.92
										450	124.0	558.0	2.02	120.2	142.5	165.8	1.03	0.87	0.75
										600	124.0	744.0	2.33	120.2	154.8	193.7	1.03	0.80	0.64
										750	124.0	930.0	2.61	120.2	165.0	218.6	1.03	0.75	0.57
R2_L3	90x80x15x15x4	3.45	5000	92.6	113.6	859.5	3592.2	1.23	7.56	150	78.6	186.0	1.42	80.3	80.3	80.3	0.98	0.98	0.98
										300	83.3	372.0	2.00	81.2	93.1	111.2	1.03	0.90	0.75
										450	83.3	558.0	2.45	81.2	102.4	138.5	1.03	0.81	0.60
										600	83.3	744.0	2.83	81.2	109.5	161.9	1.03	0.76	0.51
										750	83.3	930.0	3.17	81.2	115.4	182.6	1.03	0.72	0.46
R2_L4	90x80x15x15x4	3.45	6000	67.9	78.9	859.5	3592.2	1.16	10.89	150	59.6	186.0	1.66	59.5	61.7	66.3	1.00	0.97	0.90
										300	60.7	372.0	2.34	59.5	69.8	96.4	1.02	0.87	0.63
										450	60.7	558.0	2.87	59.5	75.0	120.1	1.02	0.81	0.51
										600	60.7	744.0	3.31	59.5	78.9	140.3	1.02	0.77	0.43
										750	60.7	930.0	3.70	59.5	82.1	158.4	1.02	0.74	0.38
R2_L5	90x80x15x15x4	3.45	7000	52.4	58.0	859.5	3592.2	1.11	14.82	150	46.6	186.0	1.88	46.0	48.4	58.9	1.01	0.96	0.79
										300	46.8	372.0	2.66	46.0	52.2	85.7	1.02	0.90	0.55
										450	46.8	558.0	3.26	46.0	54.5	106.7	1.02	0.86	0.44
										600	46.8	744.0	3.77	46.0	56.3	124.7	1.02	0.83	0.38
										750	46.8	930.0	4.21	46.0	57.7	140.7	1.02	0.81	0.33
R2_L6	90x80x15x15x4	3.45	8500	38.0	39.3	859.5	3592.2	1.04	21.86	150	33.8	186.0	2.21	33.3	33.3	50.8	1.01	1.01	0.67
										300	33.8	372.0	3.13	33.3	33.3	73.9	1.01	1.01	0.46
										450	33.8	558.0	3.83	33.3	33.3	92.0	1.01	1.01	0.37
										600	33.8	744.0	4.43	33.3	33.3	107.5	1.01	1.01	0.31
										750	33.8	930.0	4.95	33.3	33.3	121.3	1.01	1.01	0.28

Table A3.4 (continuation): PS R columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,D}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
R3_L1	100x80x15x20x5	3.41	2500	527.0	651.7	1329.2	4972.9	1.24	2.04	150	214.6	247.5	0.69	203.3	203.3	203.3	1.06	1.06	1.06
										300	373.1	495.0	0.97	334.1	334.1	334.1	1.12	1.12	1.12
										450	442.8	742.5	1.19	411.7	411.7	411.7	1.08	1.08	1.08
										600	466.7	990.0	1.37	451.0	451.0	451.0	1.03	1.03	1.03
										750	474.4	1237.5	1.53	462.2	467.3	473.3	1.03	1.02	1.00
R3_L2	100x80x15x20x5	3.41	3000	377.1	452.6	1329.2	4972.9	1.20	2.94	150	203.3	247.5	0.81	188.0	188.0	188.0	1.08	1.08	1.08
										300	302.9	495.0	1.15	285.7	285.7	285.7	1.06	1.06	1.06
										450	332.3	742.5	1.40	325.7	325.7	325.7	1.02	1.02	1.02
										600	340.1	990.0	1.62	330.7	342.0	359.8	1.03	0.99	0.95
										750	340.5	1237.5	1.81	330.7	358.7	406.1	1.03	0.95	0.84
R3_L3	100x80x15x20x5	3.41	3500	285.5	332.5	1329.2	4972.9	1.16	4.00	150	184.4	247.5	0.93	172.2	172.2	172.2	1.07	1.07	1.07
										300	244.6	495.0	1.32	239.5	239.5	239.5	1.02	1.02	1.02
										450	256.4	742.5	1.61	250.3	257.2	271.0	1.02	1.00	0.95
										600	257.2	990.0	1.86	250.3	270.9	316.8	1.03	0.95	0.81
										750	257.2	1237.5	2.08	250.3	282.1	357.6	1.03	0.91	0.72
R3_L4	100x80x15x20x5	3.41	4000	225.3	254.6	1329.2	4972.9	1.13	5.22	150	163.4	247.5	1.05	156.3	156.3	156.3	1.05	1.05	1.05
										300	198.5	495.0	1.48	197.4	197.4	197.4	1.01	1.01	1.01
										450	202.3	742.5	1.82	197.6	208.8	243.2	1.02	0.97	0.83
										600	202.3	990.0	2.10	197.6	217.5	284.3	1.02	0.93	0.71
										750	202.3	1237.5	2.34	197.6	224.5	320.9	1.02	0.90	0.63
R3_L5	100x80x15x20x5	3.41	5000	153.3	162.9	1329.2	4972.9	1.06	8.16	150	125.1	247.5	1.27	125.9	125.9	125.9	0.99	0.99	0.99
										300	136.4	495.0	1.80	134.4	136.5	163.6	1.01	1.00	0.83
										450	136.4	742.5	2.20	134.4	138.7	203.9	1.01	0.98	0.67
										600	136.4	990.0	2.54	134.4	140.3	238.4	1.01	0.97	0.57
										750	136.4	1237.5	2.84	134.4	141.6	269.1	1.01	0.96	0.51
R3_L6	100x80x15x20x5	3.41	5500	130.5	134.6	1329.2	4972.9	1.03	9.87	150	109.7	247.5	1.38	111.9	111.9	111.9	0.98	0.98	0.98
										300	115.6	495.0	1.95	114.4	114.5	152.0	1.01	1.01	0.76
										450	115.6	742.5	2.39	114.4	114.5	189.5	1.01	1.01	0.61
										600	115.6	990.0	2.75	114.4	114.5	221.5	1.01	1.01	0.52
										750	115.6	1237.5	3.08	114.4	114.5	250.0	1.01	1.01	0.46
R4_L1	100x85x10x10x4	3.60	3500	194.2	233.6	673.8	3244.9	1.20	2.88	150	133.2	186.0	0.98	124.6	124.6	124.6	1.07	1.07	1.07
										300	167.5	372.0	1.38	166.8	166.8	166.8	1.00	1.00	1.00
										450	171.4	558.0	1.70	170.3	179.4	194.3	1.01	0.96	0.88
										600	171.5	744.0	1.96	170.3	190.6	226.8	1.01	0.90	0.76
										750	171.5	930.0	2.19	170.3	199.8	255.7	1.01	0.86	0.67
R4_L2	100x85x10x10x4	3.60	4000	153.9	178.9	673.8	3244.9	1.16	3.77	150	116.3	186.0	1.10	112.2	112.2	112.2	1.04	1.04	1.04
										300	134.5	372.0	1.55	135.0	136.8	140.4	1.00	0.98	0.96
										450	135.2	558.0	1.90	135.0	146.7	174.5	1.00	0.92	0.77
										600	135.2	744.0	2.20	135.0	154.2	203.7	1.00	0.88	0.66
										750	135.2	930.0	2.46	135.0	160.2	229.6	1.00	0.84	0.59
R4_L3	100x85x10x10x4	3.60	4500	126.0	141.3	673.8	3244.9	1.12	4.77	150	101.1	186.0	1.21	100.3	100.3	100.3	1.01	1.01	1.01
										300	110.0	372.0	1.72	110.5	114.4	127.9	1.00	0.96	0.86
										450	110.0	558.0	2.10	110.5	120.4	159.1	1.00	0.91	0.69
										600	110.0	744.0	2.43	110.5	124.9	185.7	1.00	0.88	0.59
										750	110.0	930.0	2.72	110.5	128.5	209.3	1.00	0.86	0.53
R4_L4	100x85x10x10x4	3.60	5000	105.8	114.5	673.8	3244.9	1.08	5.89	150	87.8	186.0	1.33	89.1	89.1	89.1	0.99	0.99	0.99
										300	91.7	372.0	1.88	92.7	95.7	118.0	0.99	0.96	0.78
										450	91.7	558.0	2.30	92.7	98.4	146.7	0.99	0.93	0.63
										600	91.7	744.0	2.65	92.7	100.4	171.2	0.99	0.91	0.54
										750	91.7	930.0	2.97	92.7	102.0	193.0	0.99	0.90	0.48
R4_L5	100x85x10x10x4	3.60	5500	90.5	94.6	673.8	3244.9	1.05	7.12	150	76.6	186.0	1.43	78.7	78.7	78.7	0.97	0.97	0.97
										300	77.9	372.0	2.03	79.4	79.4	109.8	0.98	0.98	0.71
										450	77.9	558.0	2.48	79.4	79.4	136.5	0.98	0.98	0.57
										600	77.9	744.0	2.87	79.4	79.4	159.3	0.98	0.98	0.49
										750	77.9	930.0	3.21	79.4	79.4	179.6	0.98	0.98	0.43
R4_L6	100x85x10x10x4	3.60	6000	78.7	79.5	673.8	3244.9	1.01	8.48	150	67.0	186.0	1.54	69.0	69.0	70.9	0.97	0.97	0.94
										300	67.3	372.0	2.17	69.0	69.0	102.9	0.97	0.97	0.65
										450	67.3	558.0	2.66	69.0	69.0	127.9	0.97	0.97	0.53
										600	67.3	744.0	3.07	69.0	69.0	149.3	0.97	0.97	0.45
										750	67.3	930.0	3.44	69.0	69.0	168.3	0.97	0.97	0.40

Table A3.4 (continuation): PS R columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) Yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
R5_L1	90x70x10x15x2	5.52	3500	67.4	81.8	154.5	552.4	1.21	1.89	150	50.7	84.0	1.12	49.9	49.9	49.9	1.02	1.02	1.02
										300	58.2	168.0	1.58	59.1	60.2	62.1	0.98	0.97	0.94
										450	58.3	252.0	1.93	59.1	64.2	75.5	0.99	0.91	0.77
										600	58.3	336.0	2.23	59.1	67.3	86.6	0.99	0.87	0.67
										750	58.3	420.0	2.50	59.1	69.7	96.4	0.99	0.84	0.60
R5_L2	90x70x10x15x2	5.52	4000	52.5	62.6	154.5	552.4	1.19	2.47	150	42.1	84.0	1.26	43.0	43.0	43.0	0.98	0.98	0.98
										300	45.4	168.0	1.79	46.1	48.5	54.6	0.99	0.94	0.83
										450	45.4	252.0	2.19	46.1	51.4	66.3	0.99	0.88	0.69
										600	45.4	336.0	2.53	46.1	53.6	76.1	0.99	0.85	0.60
										750	45.4	420.0	2.83	46.1	55.3	84.7	0.99	0.82	0.54
R5_L3	90x70x10x15x2	5.52	5000	34.8	40.1	154.5	552.4	1.15	3.86	150	29.5	84.0	1.55	30.5	30.8	31.6	0.97	0.96	0.93
										300	29.8	168.0	2.20	30.5	33.1	44.0	0.98	0.90	0.68
										450	29.8	252.0	2.69	30.5	34.5	53.5	0.98	0.86	0.56
										600	29.8	336.0	3.11	30.5	35.6	61.4	0.98	0.84	0.49
										750	29.8	420.0	3.47	30.5	36.4	68.3	0.98	0.82	0.44
R5_L4	90x70x10x15x2	5.52	6000	25.1	27.8	154.5	552.4	1.11	5.55	150	21.2	84.0	1.83	22.0	22.5	26.6	0.96	0.94	0.80
										300	21.2	168.0	2.59	22.0	23.3	37.1	0.96	0.91	0.57
										450	21.2	252.0	3.17	22.0	23.8	45.1	0.96	0.89	0.47
										600	21.2	336.0	3.66	22.0	24.2	51.8	0.96	0.88	0.41
										750	21.2	420.0	4.09	22.0	24.5	57.6	0.96	0.87	0.37
R5_L5	90x70x10x15x2	5.52	7000	19.2	20.5	154.5	552.4	1.07	7.56	150	16.0	84.0	2.09	16.8	16.8	23.1	0.95	0.95	0.69
										300	16.0	168.0	2.96	16.8	16.8	32.3	0.95	0.95	0.50
										450	16.0	252.0	3.63	16.8	16.8	39.2	0.95	0.95	0.41
										600	16.0	336.0	4.19	16.8	16.8	45.0	0.95	0.95	0.36
										750	16.0	420.0	4.68	16.8	16.8	50.1	0.95	0.95	0.32
R5_L6	90x70x10x15x2	5.52	8000	15.3	15.7	154.5	552.4	1.03	9.87	150	12.6	84.0	2.35	13.4	13.4	20.6	0.94	0.94	0.61
										300	12.6	168.0	3.32	13.4	13.4	28.7	0.94	0.94	0.44
										450	12.6	252.0	4.06	13.4	13.4	34.8	0.94	0.94	0.36
										600	12.6	336.0	4.69	13.4	13.4	40.0	0.94	0.94	0.32
										750	12.6	420.0	5.25	13.4	13.4	44.5	0.94	0.94	0.28
R6_L1	70x60x10x10x1.5	5.60	3500	26.6	35.3	101.0	427.5	1.32	2.87	150	22.2	51.8	1.39	23.0	23.0	23.0	0.97	0.97	0.97
										300	23.3	103.5	1.97	23.4	26.7	30.3	1.00	0.87	0.77
										450	23.3	155.3	2.41	23.4	29.5	36.8	1.00	0.79	0.63
										600	23.3	207.0	2.79	23.4	31.7	42.2	1.00	0.74	0.55
										750	23.3	258.8	3.12	23.4	33.5	47.0	1.00	0.70	0.50
R6_L2	70x60x10x10x1.5	5.60	4000	20.8	27.0	101.0	427.5	1.30	3.74	150	17.7	51.8	1.58	18.2	18.6	19.1	0.97	0.95	0.93
										300	18.1	103.5	2.23	18.2	21.8	26.6	1.00	0.83	0.68
										450	18.1	155.3	2.74	18.2	23.9	32.3	1.00	0.76	0.56
										600	18.1	207.0	3.16	18.2	25.5	37.1	1.00	0.71	0.49
										750	18.1	258.8	3.53	18.2	26.8	41.2	1.00	0.68	0.44
R6_L3	70x60x10x10x1.5	5.60	5000	13.8	17.3	101.0	427.5	1.25	5.85	150	11.9	51.8	1.94	12.1	13.3	15.4	0.98	0.89	0.77
										300	11.9	103.5	2.74	12.1	15.2	21.5	0.98	0.78	0.55
										450	11.9	155.3	3.36	12.1	16.4	26.1	0.98	0.72	0.46
										600	11.9	207.0	3.88	12.1	17.4	29.9	0.98	0.69	0.40
										750	11.9	258.8	4.33	12.1	18.1	33.3	0.98	0.66	0.36
R6_L4	70x60x10x10x1.5	5.60	6000	10.0	12.0	101.0	427.5	1.21	8.42	150	8.5	51.8	2.28	8.7	9.9	13.0	0.97	0.86	0.65
										300	8.5	103.5	3.22	8.7	11.0	18.1	0.97	0.77	0.47
										450	8.5	155.3	3.95	8.7	11.7	22.0	0.97	0.72	0.39
										600	8.5	207.0	4.56	8.7	12.3	25.2	0.97	0.69	0.34
										750	8.5	258.8	5.10	8.7	12.7	28.1	0.97	0.67	0.30
R6_L5	70x60x10x10x1.5	5.60	7000	7.6	8.8	101.0	427.5	1.16	11.46	150	6.4	51.8	2.61	6.7	7.5	11.3	0.96	0.86	0.57
										300	6.4	103.5	3.69	6.7	8.1	15.8	0.96	0.79	0.41
										450	6.4	155.3	4.51	6.7	8.5	19.1	0.96	0.76	0.34
										600	6.4	207.0	5.21	6.7	8.7	21.9	0.96	0.74	0.29
										750	6.4	258.8	5.83	6.7	8.9	24.4	0.96	0.72	0.26
R6_L6	70x60x10x10x1.5	5.60	8000	6.1	6.7	101.0	427.5	1.11	14.97	150	5.1	51.8	2.92	5.3	5.7	10.1	0.96	0.89	0.51
										300	5.1	103.5	4.13	5.3	5.9	14.0	0.96	0.86	0.36
										450	5.1	155.3	5.06	5.3	6.0	17.0	0.96	0.84	0.30
										600	5.1	207.0	5.84	5.3	6.1	19.5	0.96	0.83	0.26
										750	5.1	258.8	6.53	5.3	6.2	21.7	0.96	0.82	0.23
							Max	1.366	21.857							Mean	0.999	0.899	0.633
							Min	1.010	1.889							Sd.Dv.	0.029	0.106	0.244
																Max	1.117	1.117	1.117
																Min	0.942	0.653	0.235

Table A3.5 (to be continued): PS RLC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,D}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT,Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
RLC1_L1	80x70x10x15x2	4.99	3000	69.1	90.7	230.7	585.9	1.31	2.54	150	51.3	81.0	1.08	49.6	49.6	49.6	1.03	1.03	1.03
										300	60.7	162.0	1.53	60.6	61.3	61.9	1.00	0.99	0.98
										450	61.1	243.0	1.88	60.6	67.9	75.6	1.01	0.90	0.81
										600	61.1	324.0	2.17	60.6	73.1	87.2	1.01	0.84	0.70
										750	61.1	405.0	2.42	60.6	77.4	97.4	1.01	0.79	0.63
RLC1_L2	80x70x10x15x2	4.99	4000	40.5	51.0	230.7	585.9	1.26	4.52	150	34.1	81.0	1.41	35.0	35.0	35.0	0.97	0.97	0.97
										300	35.5	162.0	2.00	35.5	40.2	47.2	1.00	0.88	0.75
										450	35.5	243.0	2.45	35.5	43.8	57.7	1.00	0.81	0.62
										600	35.5	324.0	2.83	35.5	46.6	66.6	1.00	0.76	0.53
										750	35.5	405.0	3.16	35.5	48.9	74.4	1.00	0.73	0.48
RLC1_L3	80x70x10x15x2	4.99	5000	27.0	32.7	230.7	585.9	1.21	7.07	150	23.4	81.0	1.73	23.7	24.9	27.3	0.99	0.94	0.86
										300	23.5	162.0	2.45	23.7	28.1	38.5	0.99	0.84	0.61
										450	23.5	243.0	3.00	23.7	30.1	47.1	0.99	0.78	0.50
										600	23.5	324.0	3.46	23.7	31.7	54.3	0.99	0.74	0.43
										750	23.5	405.0	3.87	23.7	32.9	60.7	0.99	0.71	0.39
RLC1_L4	80x70x10x15x2	4.99	6000	19.7	22.7	230.7	585.9	1.15	10.17	150	16.9	81.0	2.03	17.2	18.6	23.3	0.98	0.91	0.72
										300	16.9	162.0	2.87	17.2	20.2	32.8	0.98	0.83	0.51
										450	16.9	243.0	3.52	17.2	21.2	40.1	0.98	0.79	0.42
										600	16.9	324.0	4.06	17.2	22.0	46.3	0.98	0.77	0.36
										750	16.9	405.0	4.54	17.2	22.6	51.7	0.98	0.75	0.33
RLC1_L5	80x70x10x15x2	4.99	7000	15.1	16.7	230.7	585.9	1.10	13.85	150	12.8	81.0	2.31	13.3	13.9	20.4	0.97	0.92	0.63
										300	12.8	162.0	3.27	13.3	14.5	28.8	0.97	0.89	0.45
										450	12.8	243.0	4.01	13.3	14.8	35.2	0.97	0.87	0.37
										600	12.8	324.0	4.63	13.3	15.0	40.5	0.97	0.85	0.32
										750	12.8	405.0	5.17	13.3	15.2	45.3	0.97	0.84	0.28
RLC1_L6	80x70x10x15x2	4.99	8000	12.1	12.8	230.7	585.9	1.05	18.09	150	10.2	81.0	2.58	10.6	10.7	18.3	0.96	0.96	0.56
										300	10.2	162.0	3.65	10.6	10.7	25.7	0.96	0.96	0.40
										450	10.2	243.0	4.47	10.6	10.7	31.5	0.96	0.96	0.32
										600	10.2	324.0	5.17	10.6	10.7	36.3	0.96	0.96	0.28
										750	10.2	405.0	5.78	10.6	10.7	40.5	0.96	0.96	0.25
RLC2_L1	90x80x10x15x2	5.16	3000	92.6	130.1	475.8	1484.0	1.41	3.66	150	63.5	90.0	0.99	59.9	59.9	59.9	1.06	1.06	1.06
										300	79.8	180.0	1.39	79.8	79.8	79.8	1.00	1.00	1.00
										450	81.1	270.0	1.71	81.2	88.9	92.3	1.00	0.91	0.88
										600	81.1	360.0	1.97	81.2	98.3	106.2	1.00	0.83	0.76
										750	81.1	450.0	2.20	81.2	106.3	118.5	1.00	0.76	0.68
RLC2_L2	90x80x10x15x2	5.16	4000	53.9	73.2	475.8	1484.0	1.36	6.50	150	44.1	90.0	1.29	44.8	44.8	44.8	0.98	0.98	0.98
										300	47.3	180.0	1.83	47.3	53.1	57.4	1.00	0.89	0.82
										450	47.3	270.0	2.24	47.3	59.7	70.0	1.00	0.79	0.68
										600	47.3	360.0	2.58	47.3	64.9	80.7	1.00	0.73	0.59
										750	47.3	450.0	2.89	47.3	69.3	90.0	1.00	0.68	0.53
RLC2_L3	90x80x10x15x2	5.16	5000	35.7	46.8	475.8	1484.0	1.31	10.16	150	30.7	90.0	1.59	31.3	32.2	33.1	0.98	0.95	0.93
										300	31.1	180.0	2.25	31.3	38.3	46.5	0.99	0.81	0.67
										450	31.1	270.0	2.75	31.3	42.4	56.8	0.99	0.73	0.55
										600	31.1	360.0	3.18	31.3	45.5	65.4	0.99	0.68	0.48
										750	31.1	450.0	3.55	31.3	48.1	72.9	0.99	0.65	0.43
RLC2_L4	90x80x10x15x2	5.16	6000	25.7	32.5	475.8	1484.0	1.27	14.63	150	22.2	90.0	1.87	22.5	24.8	28.0	0.98	0.89	0.79
										300	22.2	180.0	2.65	22.5	28.7	39.4	0.98	0.77	0.56
										450	22.2	270.0	3.24	22.5	31.3	48.0	0.98	0.71	0.46
										600	22.2	360.0	3.74	22.5	33.3	55.3	0.98	0.67	0.40
										750	22.2	450.0	4.18	22.5	34.9	61.7	0.98	0.64	0.36
HLC2_L5	90x80x10x15x2	5.16	7000	19.6	23.9	475.8	1484.0	1.22	19.91	150	16.7	90.0	2.14	17.2	19.5	24.4	0.97	0.86	0.69
										300	16.7	180.0	3.03	17.2	22.1	34.3	0.97	0.76	0.49
										450	16.7	270.0	3.71	17.2	23.7	41.8	0.97	0.71	0.40
										600	16.7	360.0	4.28	17.2	24.9	48.2	0.97	0.67	0.35
										750	16.7	450.0	4.79	17.2	25.9	53.7	0.97	0.65	0.31
RLC2_L6	90x80x10x15x2	5.16	8000	15.6	18.3	475.8	1484.0	1.17	26.00	150	13.2	90.0	2.40	13.7	15.6	21.7	0.96	0.85	0.61
										300	13.2	180.0	3.39	13.7	17.1	30.5	0.96	0.77	0.43
										450	13.2	270.0	4.16	13.7	18.1	37.2	0.96	0.73	0.35
										600	13.2	360.0	4.80	13.7	18.8	42.9	0.96	0.70	0.31
										750	13.2	450.0	5.37	13.7	19.3	47.8	0.96	0.68	0.28

Table A3.5 (continuation): PS RLC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
RLC3_L1	100x80x10x15x3	4.61	2500	250.2	292.2	471.8	1015.3	1.17	1.61	150	119.7	139.5	0.75	110.5	110.5	110.5	1.08	1.08	1.08
										300	192.2	279.0	1.06	174.9	174.9	174.9	1.10	1.10	1.10
										450	214.8	418.5	1.29	207.8	207.8	207.8	1.03	1.03	1.03
										600	218.0	558.0	1.49	219.4	219.4	219.4	0.99	0.99	0.99
										750	218.1	697.5	1.67	219.4	226.6	244.7	0.99	0.96	0.89
RLC3_L2	100x80x10x15x3	4.61	3000	178.7	202.9	471.8	1015.3	1.14	2.33	150	108.6	139.5	0.88	100.6	100.6	100.6	1.08	1.08	1.08
										300	150.1	279.0	1.25	145.1	145.1	145.1	1.03	1.03	1.03
										450	156.0	418.5	1.53	156.7	157.5	160.0	1.00	0.99	0.97
										600	156.0	558.0	1.77	156.7	162.7	185.1	1.00	0.96	0.84
										750	156.0	697.5	1.98	156.7	166.9	207.3	1.00	0.93	0.75
RLC3_L3	100x80x10x15x3	4.61	3500	134.7	149.1	471.8	1015.3	1.11	3.16	150	95.4	139.5	1.02	90.4	90.4	90.4	1.06	1.06	1.06
										300	116.5	279.0	1.44	117.2	117.2	117.2	0.99	0.99	0.99
										450	117.1	418.5	1.76	118.1	121.1	139.2	0.99	0.97	0.84
										600	117.2	558.0	2.04	118.1	123.8	161.0	0.99	0.95	0.73
										750	117.2	697.5	2.28	118.1	125.9	180.3	0.99	0.93	0.65
RLC3_L4	100x80x10x15x3	4.61	4000	105.9	114.1	471.8	1015.3	1.08	4.13	150	82.0	139.5	1.15	80.4	80.4	80.4	1.02	1.02	1.02
										300	91.5	279.0	1.62	92.8	93.4	100.6	0.99	0.98	0.91
										450	91.5	418.5	1.99	92.8	94.5	123.6	0.99	0.97	0.74
										600	91.5	558.0	2.30	92.8	95.4	143.0	0.99	0.96	0.64
										750	91.5	697.5	2.57	92.8	96.1	160.1	0.99	0.95	0.57
RLC3_L5	100x80x10x15x3	4.61	4500	85.9	90.2	471.8	1015.3	1.05	5.23	150	70.2	139.5	1.27	70.7	70.7	70.7	0.99	0.99	0.99
										300	73.6	279.0	1.80	75.4	75.4	90.8	0.98	0.98	0.81
										450	73.6	418.5	2.21	75.4	75.4	111.5	0.98	0.98	0.66
										600	73.6	558.0	2.55	75.4	75.4	129.0	0.98	0.98	0.57
										750	73.6	697.5	2.85	75.4	75.4	144.4	0.98	0.98	0.51
RLC3_L6	100x80x10x15x3	4.61	5000	71.6	73.1	471.8	1015.3	1.02	6.46	150	59.8	139.5	1.40	61.7	61.7	61.7	0.97	0.97	0.97
										300	60.8	279.0	1.97	62.8	62.8	83.0	0.97	0.97	0.73
										450	60.8	418.5	2.42	62.8	62.8	101.9	0.97	0.97	0.60
										600	60.8	558.0	2.79	62.8	62.8	117.9	0.97	0.97	0.52
										750	60.8	697.5	3.12	62.8	62.8	132.0	0.97	0.97	0.46
RLC4_L1	95x85x10x10x4	3.41	3000	227.8	293.9	781.7	3009.3	1.29	2.66	150	142.0	183.0	0.90	130.8	130.8	130.8	1.09	1.09	1.09
										300	193.0	366.0	1.27	186.8	186.8	186.8	1.03	1.03	1.03
										450	202.7	549.0	1.55	199.8	203.9	207.5	1.01	0.99	0.98
										600	203.2	732.0	1.79	199.8	221.2	242.6	1.02	0.92	0.84
										750	203.2	915.0	2.00	199.8	235.6	273.8	1.02	0.86	0.74
RLC4_L2	95x85x10x10x4	3.41	3500	173.8	215.9	781.7	3009.3	1.24	3.62	150	124.8	183.0	1.03	117.8	117.8	117.8	1.06	1.06	1.06
										300	151.8	366.0	1.45	151.6	151.6	151.6	1.00	1.00	1.00
										450	154.4	549.0	1.78	152.4	165.9	183.3	1.01	0.93	0.84
										600	154.4	732.0	2.05	152.4	178.1	214.3	1.01	0.87	0.72
										750	154.4	915.0	2.29	152.4	188.2	241.9	1.01	0.82	0.64
RLC4_L3	95x85x10x10x4	3.41	4000	138.3	165.3	781.7	3009.3	1.20	4.73	150	108.0	183.0	1.15	105.2	105.2	105.2	1.03	1.03	1.03
										300	121.9	366.0	1.63	121.3	125.5	132.5	1.01	0.97	0.92
										450	122.1	549.0	1.99	121.3	136.7	165.1	1.01	0.89	0.74
										600	122.1	732.0	2.30	121.3	145.2	193.0	1.01	0.84	0.63
										750	122.1	915.0	2.57	121.3	152.2	217.9	1.01	0.80	0.56
RLC4_L4	95x85x10x10x4	3.41	4500	113.5	130.6	781.7	3009.3	1.15	5.98	150	93.1	183.0	1.27	93.2	93.2	93.2	1.00	1.00	1.00
										300	99.7	366.0	1.80	99.6	105.8	121.1	1.00	0.94	0.82
										450	99.7	549.0	2.20	99.6	113.1	150.9	1.00	0.88	0.66
										600	99.7	732.0	2.54	99.6	118.7	176.4	1.00	0.84	0.57
										750	99.7	915.0	2.84	99.6	123.1	199.1	1.00	0.81	0.50
RLC4_L5	95x85x10x10x4	3.41	5000	95.6	105.8	781.7	3009.3	1.11	7.39	150	80.6	183.0	1.38	82.1	82.1	82.1	0.98	0.98	0.98
										300	83.4	366.0	1.96	83.8	89.0	111.9	0.99	0.94	0.74
										450	83.4	549.0	2.40	83.8	93.2	139.4	0.99	0.89	0.60
										600	83.4	732.0	2.77	83.8	96.2	163.0	0.99	0.87	0.51
										750	83.4	915.0	3.09	83.8	98.7	184.0	0.99	0.85	0.45
RLC4_L6	95x85x10x10x4	3.41	6000	71.4	73.5	781.7	3009.3	1.03	10.64	150	61.5	183.0	1.60	62.6	62.7	67.2	0.98	0.98	0.91
										300	61.6	366.0	2.26	62.6	62.7	98.0	0.98	0.98	0.63
										450	61.6	549.0	2.77	62.6	62.7	122.1	0.98	0.98	0.50
										600	61.6	732.0	3.20	62.6	62.7	142.7	0.98	0.98	0.43
										750	61.6	915.0	3.58	62.6	62.7	161.0	0.98	0.98	0.38

Table A3.5 (continuation): PS RLC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
RLC5_L1	90x70x10x15x2	5.82	3000	86.4	94.8	226.8	450.3	1.10	2.39	150	59.3	84.0	0.99	55.9	55.9	55.9	1.06	1.06	1.06
										300	73.9	168.0	1.39	74.5	74.5	74.5	0.99	0.99	0.99
										450	74.5	252.0	1.71	75.8	76.3	85.7	0.98	0.98	0.87
										600	74.5	336.0	1.97	75.8	76.9	98.1	0.98	0.97	0.76
										750	74.5	420.0	2.20	75.8	77.3	109.0	0.98	0.96	0.68
RLC5_L2	90x70x10x15x2	5.82	3500	64.7	69.6	226.8	450.3	1.08	3.26	150	49.8	84.0	1.14	48.8	48.8	48.8	1.02	1.02	1.02
										300	55.6	168.0	1.61	56.8	56.8	60.7	0.98	0.98	0.92
										450	55.6	252.0	1.97	56.8	56.8	73.5	0.98	0.98	0.76
										600	55.6	336.0	2.28	56.8	56.8	84.2	0.98	0.98	0.66
										750	55.6	420.0	2.55	56.8	56.8	93.5	0.98	0.98	0.59
RLC5_L3	90x70x10x15x2	5.82	4000	50.5	53.3	226.8	450.3	1.06	4.25	150	41.2	84.0	1.29	41.9	41.9	41.9	0.98	0.98	0.98
										300	43.1	168.0	1.82	44.3	44.3	53.3	0.97	0.97	0.81
										450	43.1	252.0	2.23	44.3	44.3	64.5	0.97	0.97	0.67
										600	43.1	336.0	2.58	44.3	44.3	73.8	0.97	0.97	0.58
										750	43.1	420.0	2.88	44.3	44.3	82.0	0.97	0.97	0.53
RLC5_L4	90x70x10x15x2	5.82	4500	40.7	42.1	226.8	450.3	1.04	5.38	150	34.0	84.0	1.44	35.4	35.4	35.4	0.96	0.96	0.96
										300	34.4	168.0	2.03	35.7	35.7	47.5	0.96	0.96	0.72
										450	34.4	252.0	2.49	35.7	35.7	57.5	0.96	0.96	0.60
										600	34.4	336.0	2.87	35.7	35.7	65.8	0.96	0.96	0.52
										750	34.4	420.0	3.21	35.7	35.7	73.1	0.96	0.96	0.47
RLC5_L5	90x70x10x15x2	5.82	5000	33.6	34.1	226.8	450.3	1.01	6.65	150	28.2	84.0	1.58	29.5	29.5	31.0	0.96	0.96	0.91
										300	28.2	168.0	2.23	29.5	29.5	43.0	0.96	0.96	0.66
										450	28.2	252.0	2.74	29.5	29.5	52.0	0.96	0.96	0.54
										600	28.2	336.0	3.16	29.5	29.5	59.5	0.96	0.96	0.47
										750	28.2	420.0	3.53	29.5	29.5	66.1	0.96	0.96	0.43
RLC5_L6	90x70x10x15x2	5.82	5250	30.8	30.9	226.8	450.3	1.00	7.33	150	25.7	84.0	1.65	27.0	27.1	29.6	0.95	0.95	0.87
										300	25.7	168.0	2.33	27.0	27.1	41.0	0.95	0.95	0.63
										450	25.7	252.0	2.86	27.0	27.1	49.6	0.95	0.95	0.52
										600	25.7	336.0	3.30	27.0	27.1	56.8	0.95	0.95	0.45
										750	25.8	420.0	3.69	27.0	27.1	63.1	0.95	0.95	0.41
RLC6_L1	70x60x10x10x1.2	6.81	4000	15.8	19.5	82.8	450.3	1.23	4.25	150	13.5	41.4	1.62	13.8	14.1	14.8	0.98	0.95	0.91
										300	13.6	82.8	2.29	13.8	15.6	20.1	0.98	0.87	0.68
										450	13.6	124.2	2.81	13.8	16.5	24.0	0.98	0.83	0.57
										600	13.6	165.6	3.24	13.8	17.2	27.3	0.98	0.79	0.50
										750	13.6	207.0	3.62	13.8	17.7	30.1	0.98	0.77	0.45
RLC6_L2	70x60x10x10x1.2	6.81	5000	10.4	12.5	82.8	450.3	1.20	6.64	150	8.9	41.4	2.00	9.1	9.7	11.7	0.97	0.91	0.76
										300	8.9	82.8	2.82	9.1	10.5	15.9	0.97	0.84	0.56
										450	8.9	124.2	3.46	9.1	11.0	19.0	0.97	0.81	0.47
										600	8.9	165.6	3.99	9.1	11.3	21.6	0.97	0.78	0.41
										750	8.9	207.0	4.46	9.1	11.6	23.8	0.97	0.76	0.37
RLC6_L3	70x60x10x10x1.2	6.81	6000	7.5	8.7	82.8	450.3	1.16	9.56	150	6.3	41.4	2.36	6.5	7.0	9.7	0.96	0.90	0.64
										300	6.3	82.8	3.33	6.5	7.4	13.2	0.96	0.85	0.47
										450	6.3	124.2	4.08	6.5	7.6	15.8	0.96	0.82	0.40
										600	6.3	165.6	4.71	6.5	7.8	17.9	0.96	0.81	0.35
										750	6.3	207.0	5.27	6.5	7.9	19.8	0.96	0.79	0.32
RLC6_L4	70x60x10x10x1.2	6.81	7000	5.7	6.4	82.8	450.3	1.12	13.01	150	4.7	41.4	2.70	5.0	5.2	8.4	0.95	0.91	0.56
										300	4.7	82.8	3.82	5.0	5.3	11.3	0.95	0.89	0.42
										450	4.7	124.2	4.68	5.0	5.3	13.6	0.95	0.88	0.35
										600	4.7	165.6	5.41	5.0	5.4	15.4	0.95	0.87	0.31
										750	4.7	207.0	6.04	5.0	5.4	17.0	0.95	0.87	0.28
RLC6_L5	70x60x10x10x1.2	6.81	8000	4.5	4.9	82.8	450.3	1.08	16.99	150	3.7	41.4	3.03	3.9	3.9	7.3	0.94	0.94	0.50
										300	3.7	82.8	4.29	3.9	3.9	10.0	0.94	0.94	0.37
										450	3.7	124.2	5.26	3.9	3.9	11.9	0.94	0.94	0.31
										600	3.7	165.6	6.07	3.9	3.9	13.5	0.94	0.94	0.27
										750	3.7	207.0	6.79	3.9	3.9	14.9	0.94	0.94	0.25
RLC6_L6	70x60x10x10x1.2	6.81	9000	3.7	3.8	82.8	450.3	1.05	21.50	150	3.0	41.4	3.35	3.2	3.2	6.6	0.93	0.93	0.46
										300	3.0	82.8	4.74	3.2	3.2	8.9	0.93	0.93	0.34
										450	3.0	124.2	5.81	3.2	3.2	10.7	0.93	0.93	0.28
										600	3.0	165.6	6.71	3.2	3.2	12.1	0.93	0.93	0.25
										750	3.0	207.0	7.50	3.2	3.2	13.3	0.93	0.93	0.22
							Max	1.406	26.004							Mean	0.984	0.903	0.642
							Min	1.003	1.615							Sd.Dv.	0.029	0.102	0.241
																Max	1.098	1.098	1.098
																Min	0.926	0.635	0.224

Table A3.6 (to be continued): PS WSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,D}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WSC1_L1	110x90x10x2	5.89	4500	62.7	68.0	113.1	791.3	1.08	1.66	150	49.0	95.5	1.23	50.5	50.5	50.5	0.97	0.97	0.97
										300	51.9	191.0	1.75	55.0	55.1	63.4	0.94	0.94	0.82
										450	51.9	286.5	2.14	55.0	55.2	76.6	0.94	0.94	0.68
										600	51.9	381.9	2.47	55.0	55.2	87.7	0.94	0.94	0.59
										750	51.9	477.4	2.76	55.0	55.3	97.3	0.94	0.94	0.53
WSC1_L2	110x90x10x2	5.89	5000	51.7	55.1	113.1	791.3	1.07	2.05	150	41.6	95.5	1.36	44.1	44.1	44.1	0.94	0.94	0.94
										300	42.6	191.0	1.92	45.3	45.3	57.2	0.94	0.94	0.75
										450	42.7	286.5	2.35	45.3	45.3	69.2	0.94	0.94	0.62
										600	42.7	381.9	2.72	45.3	45.3	79.1	0.94	0.94	0.54
										750	42.7	477.4	3.04	45.3	45.3	87.8	0.94	0.94	0.49
WSC1_L3	110x90x10x2	5.89	5500	43.5	45.5	113.1	791.3	1.05	2.48	150	35.4	95.5	1.48	38.1	38.1	38.1	0.93	0.93	0.93
										300	35.6	191.0	2.10	38.1	38.1	52.2	0.94	0.93	0.68
										450	35.6	286.5	2.57	38.1	38.1	63.1	0.94	0.93	0.57
										600	35.6	381.9	2.96	38.1	38.1	72.2	0.94	0.93	0.49
										750	35.6	477.4	3.31	38.1	38.1	80.1	0.94	0.93	0.44
WSC1_L4	110x90x10x2	5.89	5750	40.1	41.6	113.1	791.3	1.04	2.71	150	32.7	95.5	1.54	35.2	35.2	36.1	0.93	0.93	0.90
										300	32.8	191.0	2.18	35.2	35.2	50.0	0.93	0.93	0.66
										450	32.8	286.5	2.67	35.2	35.2	60.4	0.93	0.93	0.54
										600	32.8	381.9	3.09	35.2	35.2	69.2	0.93	0.93	0.47
										750	32.8	477.4	3.45	35.2	35.2	76.8	0.93	0.93	0.43
WSC1_L5	110x90x10x2	5.89	6000	37.2	38.3	113.1	791.3	1.03	2.96	150	30.2	95.5	1.60	32.6	32.6	34.7	0.93	0.93	0.87
										300	30.3	191.0	2.27	32.6	32.6	48.0	0.93	0.93	0.63
										450	30.3	286.5	2.78	32.6	32.6	58.0	0.93	0.93	0.52
										600	30.3	381.9	3.21	32.6	32.6	66.4	0.93	0.93	0.46
										750	30.3	477.4	3.58	32.6	32.6	73.7	0.93	0.93	0.41
WSC1_L6	110x90x10x2	5.89	6500	32.2	32.6	113.1	791.3	1.01	3.47	150	26.0	95.5	1.72	28.3	28.3	32.2	0.92	0.92	0.81
										300	26.0	191.0	2.43	28.3	28.3	44.5	0.92	0.92	0.58
										450	26.0	286.5	2.98	28.3	28.3	53.8	0.92	0.92	0.48
										600	26.0	381.9	3.44	28.3	28.3	61.6	0.92	0.92	0.42
										750	26.0	477.4	3.85	28.3	28.3	68.4	0.92	0.92	0.38
WSC2_L1	110x100x10x3	4.14	4500	106.3	132.6	255.9	1997.8	1.25	1.93	150	84.5	152.2	1.20	83.6	83.6	83.6	1.01	1.01	1.01
										300	91.4	304.5	1.69	93.2	98.6	105.8	0.98	0.93	0.86
										450	91.5	456.7	2.07	93.2	108.2	130.6	0.98	0.85	0.70
										600	91.5	608.9	2.39	93.2	115.6	151.8	0.98	0.79	0.60
										750	91.5	761.1	2.68	93.2	121.7	170.5	0.98	0.75	0.54
WSC2_L2	110x100x10x3	4.14	5000	88.3	107.4	255.9	1997.8	1.22	2.38	150	72.7	152.2	1.31	74.0	74.0	74.0	0.98	0.98	0.98
										300	75.7	304.5	1.86	77.5	84.6	96.8	0.98	0.90	0.78
										450	75.7	456.7	2.27	77.5	91.9	119.5	0.98	0.82	0.63
										600	75.7	608.9	2.63	77.5	97.5	138.9	0.98	0.78	0.55
										750	75.7	761.1	2.94	77.5	102.1	156.0	0.98	0.74	0.49
WSC2_L3	110x100x10x3	4.14	5500	74.9	88.8	255.9	1997.8	1.19	2.88	150	62.8	152.2	1.43	65.0	65.0	65.0	0.97	0.97	0.97
										300	63.9	304.5	2.02	65.7	73.1	89.4	0.97	0.87	0.71
										450	63.9	456.7	2.47	65.7	78.6	110.5	0.97	0.81	0.58
										600	63.9	608.9	2.85	65.7	82.7	128.3	0.97	0.77	0.50
										750	63.9	761.1	3.19	65.7	86.1	144.2	0.97	0.74	0.44
WSC2_L4	110x100x10x3	4.14	6000	64.6	74.6	255.9	1997.8	1.15	3.43	150	54.5	152.2	1.53	56.7	57.1	58.1	0.96	0.95	0.94
										300	54.8	304.5	2.17	56.7	63.3	83.3	0.97	0.87	0.66
										450	54.8	456.7	2.66	56.7	67.2	102.9	0.97	0.81	0.53
										600	54.8	608.9	3.07	56.7	70.2	119.6	0.97	0.78	0.46
										750	54.8	761.1	3.43	56.7	72.6	134.3	0.97	0.76	0.41
WSC2_L5	110x100x10x3	4.14	7000	50.1	54.8	255.9	1997.8	1.09	4.67	150	41.9	152.2	1.74	43.9	44.9	51.4	0.95	0.93	0.82
										300	41.9	304.5	2.47	43.9	47.2	73.7	0.95	0.89	0.57
										450	41.9	456.7	3.02	43.9	48.6	91.1	0.95	0.86	0.46
										600	41.9	608.9	3.49	43.9	49.6	105.8	0.95	0.84	0.40
										750	41.9	761.1	3.90	43.9	50.5	118.8	0.95	0.83	0.35
WSC2_L6	110x100x10x3	4.14	8000	40.4	42.0	255.9	1997.8	1.04	6.10	150	33.4	152.2	1.94	35.4	35.5	46.4	0.94	0.94	0.72
										300	33.4	304.5	2.75	35.4	35.5	66.5	0.94	0.94	0.50
										450	33.4	456.7	3.36	35.4	35.5	82.2	0.94	0.94	0.41
										600	33.4	608.9	3.88	35.4	35.5	95.5	0.94	0.94	0.35
										750	33.4	761.1	4.34	35.4	35.5	107.2	0.94	0.94	0.31

Table A3.6 (continuation): PS WSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WSC3_L1	120x100x15x3	4.81	3500	211.9	246.5	344.8	1494.3	1.16	1.40	150	127.3	161.2	0.87	117.3	117.3	117.3	1.09	1.09	1.09
										300	172.2	322.5	1.23	170.6	170.6	170.6	1.01	1.01	1.01
										450	179.9	483.7	1.51	185.9	186.3	187.3	0.97	0.97	0.96
										600	180.4	644.9	1.74	185.9	193.9	216.3	0.97	0.93	0.83
										750	180.4	806.1	1.95	185.9	199.9	241.9	0.97	0.90	0.75
WSC3_L2	120x100x15x3	4.81	4000	165.9	188.8	344.8	1494.3	1.14	1.83	150	114.2	161.2	0.99	107.3	107.3	107.3	1.06	1.06	1.06
										300	139.2	322.5	1.39	142.9	142.9	142.9	0.97	0.97	0.97
										450	141.8	483.7	1.71	145.5	149.8	165.7	0.97	0.95	0.86
										600	141.8	644.9	1.97	145.5	154.6	191.4	0.97	0.92	0.74
										750	141.8	806.1	2.20	145.5	158.4	214.0	0.97	0.89	0.66
WSC3_L3	120x100x15x3	4.81	4500	133.8	149.1	344.8	1494.3	1.11	2.31	150	100.6	161.2	1.10	97.4	97.4	97.4	1.03	1.03	1.03
										300	113.8	322.5	1.55	117.3	118.0	121.5	0.97	0.96	0.94
										450	114.1	483.7	1.90	117.3	122.0	148.9	0.97	0.94	0.77
										600	114.1	644.9	2.20	117.3	124.9	171.9	0.97	0.91	0.66
										750	114.1	806.1	2.45	117.3	127.1	192.2	0.97	0.90	0.59
WSC3_L4	120x100x15x3	4.81	5000	110.6	120.8	344.8	1494.3	1.09	2.85	150	87.7	161.2	1.21	87.6	87.6	87.6	1.00	1.00	1.00
										300	93.9	322.5	1.71	97.0	98.3	110.5	0.97	0.96	0.85
										450	93.9	483.7	2.09	97.0	100.2	135.3	0.97	0.94	0.69
										600	93.9	644.9	2.42	97.0	101.6	156.3	0.97	0.92	0.60
										750	93.9	806.1	2.70	97.0	102.7	174.8	0.97	0.91	0.54
WSC3_L5	120x100x15x3	4.81	6000	80.0	83.9	344.8	1494.3	1.05	4.11	150	66.1	161.2	1.42	69.4	69.4	69.4	0.95	0.95	0.95
										300	67.1	322.5	2.01	70.2	70.2	94.0	0.96	0.95	0.71
										450	67.1	483.7	2.46	70.2	70.2	115.2	0.96	0.95	0.58
										600	67.1	644.9	2.84	70.2	70.2	133.0	0.96	0.95	0.50
										750	67.1	806.1	3.17	70.2	70.2	148.7	0.96	0.95	0.45
WSC3_L6	120x100x15x3	4.81	7000	61.4	61.6	344.8	1494.3	1.00	5.59	150	50.6	161.2	1.62	53.8	53.9	58.2	0.94	0.94	0.87
										300	50.6	322.5	2.29	53.8	53.9	82.3	0.94	0.94	0.62
										450	50.6	483.7	2.81	53.8	53.9	100.9	0.94	0.94	0.50
										600	50.6	644.9	3.24	53.8	53.9	116.5	0.94	0.94	0.43
										750	50.7	806.1	3.62	53.8	53.9	130.3	0.94	0.94	0.39
WSC4_L1	120x110x15x3	4.37	5000	115.3	152.4	311.1	1869.8	1.32	2.04	150	89.5	170.2	1.22	91.7	91.7	91.7	0.98	0.98	0.98
										300	98.8	340.5	1.72	101.1	109.2	116.3	0.98	0.90	0.85
										450	99.0	510.7	2.10	101.1	122.4	143.3	0.98	0.81	0.69
										600	99.0	680.9	2.43	101.1	132.7	166.1	0.98	0.75	0.60
										750	99.0	851.1	2.72	101.1	141.3	186.3	0.98	0.70	0.53
WSC4_L2	120x110x15x3	4.37	5500	97.0	126.0	311.1	1869.8	1.30	2.47	150	78.8	170.2	1.32	81.7	81.7	81.7	0.96	0.96	0.96
										300	83.2	340.5	1.87	85.1	95.6	107.0	0.98	0.87	0.78
										450	83.2	510.7	2.29	85.1	106.3	131.8	0.98	0.78	0.63
										600	83.2	680.9	2.65	85.1	114.6	152.8	0.98	0.73	0.54
										750	83.2	851.1	2.96	85.1	121.5	171.4	0.98	0.68	0.49
WSC4_L3	120x110x15x3	4.37	6000	83.1	105.9	311.1	1869.8	1.27	2.94	150	68.9	170.2	1.43	72.2	72.2	72.2	0.95	0.95	0.95
										300	71.0	340.5	2.02	72.9	84.3	99.2	0.97	0.84	0.72
										450	71.0	510.7	2.48	72.9	93.0	122.2	0.97	0.76	0.58
										600	71.0	680.9	2.86	72.9	99.8	141.7	0.97	0.71	0.50
										750	71.0	851.1	3.20	72.9	105.3	158.9	0.97	0.67	0.45
WSC4_L4	120x110x15x3	4.37	7000	63.4	77.8	311.1	1869.8	1.23	4.00	150	53.8	170.2	1.64	55.6	57.7	60.9	0.97	0.93	0.88
										300	54.1	340.5	2.32	55.6	66.6	87.0	0.97	0.81	0.62
										450	54.1	510.7	2.84	55.6	72.4	107.2	0.97	0.75	0.50
										600	54.1	680.9	3.28	55.6	76.8	124.3	0.97	0.70	0.44
										750	54.1	851.1	3.66	55.6	80.4	139.4	0.97	0.67	0.39
WSC4_L5	120x110x15x3	4.37	8000	50.5	59.5	311.1	1869.8	1.18	5.22	150	42.7	170.2	1.84	44.3	47.4	54.6	0.96	0.90	0.78
										300	42.7	340.5	2.60	44.3	53.2	77.9	0.96	0.80	0.55
										450	42.7	510.7	3.18	44.3	56.9	96.0	0.96	0.75	0.44
										600	42.7	680.9	3.67	44.3	59.6	111.3	0.96	0.72	0.38
										750	42.7	851.1	4.10	44.3	61.9	124.8	0.96	0.69	0.34
WSC4_L6	120x110x15x3	4.37	9000	41.6	47.0	311.1	1869.8	1.13	6.61	150	34.8	170.2	2.02	36.5	39.1	49.6	0.95	0.89	0.70
										300	34.8	340.5	2.86	36.5	42.4	70.9	0.95	0.82	0.49
										450	34.8	510.7	3.50	36.5	44.4	87.3	0.95	0.78	0.40
										600	34.8	680.9	4.05	36.5	45.9	101.2	0.95	0.76	0.34
										750	34.8	851.1	4.52	36.5	47.1	113.5	0.95	0.74	0.31

Table A3.6 (continuation): PS WSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WSC5_L1	90x80x10x2	4.83	3500	63.2	78.6	129.2	732.1	1.24	1.65	150	48.6	83.5	1.15	48.0	48.0	48.0	1.01	1.01	1.01
										300	53.9	167.0	1.63	55.4	57.3	60.1	0.97	0.94	0.90
										450	54.0	250.5	1.99	55.4	62.3	73.6	0.97	0.87	0.73
										600	54.0	333.9	2.30	55.4	66.1	85.0	0.97	0.82	0.64
										750	54.0	417.4	2.57	55.4	69.2	95.0	0.97	0.78	0.57
WSC5_L2	90x80x10x2	4.83	4000	49.5	60.1	129.2	732.1	1.21	2.15	150	40.2	83.5	1.30	41.2	41.2	41.2	0.97	0.97	0.97
										300	42.3	167.0	1.84	43.4	46.8	53.2	0.97	0.90	0.79
										450	42.3	250.5	2.25	43.4	50.4	65.2	0.97	0.84	0.65
										600	42.3	333.9	2.60	43.4	53.1	75.3	0.97	0.80	0.56
										750	42.3	417.4	2.90	43.4	55.3	84.1	0.97	0.76	0.50
WSC5_L3	90x80x10x2	4.83	4500	40.1	47.5	129.2	732.1	1.19	2.72	150	33.3	83.5	1.44	34.9	34.9	34.9	0.96	0.96	0.96
										300	34.0	167.0	2.04	35.1	38.8	47.8	0.97	0.88	0.71
										450	34.0	250.5	2.50	35.1	41.4	58.6	0.97	0.82	0.58
										600	34.0	333.9	2.89	35.1	43.3	67.7	0.97	0.79	0.50
										750	34.0	417.4	3.23	35.1	44.9	75.7	0.97	0.76	0.45
WSC5_L4	90x80x10x2	4.83	5000	33.2	38.5	129.2	732.1	1.16	3.36	150	27.9	83.5	1.59	29.1	29.6	30.8	0.96	0.94	0.90
										300	28.0	167.0	2.24	29.1	32.4	43.6	0.96	0.86	0.64
										450	28.0	250.5	2.75	29.1	34.2	53.4	0.96	0.82	0.53
										600	28.0	333.9	3.17	29.1	35.5	61.6	0.96	0.79	0.45
										750	28.0	417.4	3.54	29.1	36.6	68.9	0.96	0.77	0.41
WSC5_L5	90x80x10x2	4.83	6000	24.2	26.7	129.2	732.1	1.10	4.83	150	20.1	83.5	1.86	21.2	21.8	26.3	0.95	0.92	0.77
										300	20.1	167.0	2.63	21.2	22.8	37.2	0.95	0.88	0.54
										450	20.1	250.5	3.22	21.2	23.4	45.6	0.95	0.86	0.44
										600	20.1	333.9	3.71	21.2	23.9	52.6	0.95	0.84	0.38
										750	20.1	417.4	4.15	21.2	24.2	58.8	0.95	0.83	0.34
WSC5_L6	90x80x10x2	4.83	7000	18.7	19.6	129.2	732.1	1.05	6.58	150	15.3	83.5	2.11	16.4	16.4	23.1	0.93	0.93	0.66
										300	15.3	167.0	2.99	16.4	16.4	32.7	0.93	0.93	0.47
										450	15.3	250.5	3.66	16.4	16.4	40.1	0.93	0.93	0.38
										600	15.3	333.9	4.22	16.4	16.4	46.3	0.93	0.93	0.33
										750	15.3	417.4	4.72	16.4	16.4	51.7	0.93	0.93	0.30
WSC6_L1	100x80x10x1.2	8.05	4500	27.5	29.5	42.0	235.8	1.07	1.42	150	21.5	51.9	1.37	23.6	23.6	23.6	0.91	0.91	0.91
										300	22.1	103.8	1.94	24.1	24.2	29.7	0.92	0.91	0.74
										450	22.1	155.7	2.38	24.1	24.2	35.0	0.92	0.91	0.63
										600	22.1	207.6	2.75	24.1	24.2	39.3	0.92	0.91	0.56
										750	22.1	259.5	3.07	24.1	24.2	43.0	0.92	0.91	0.51
WSC6_L2	100x80x10x1.2	8.05	5000	22.6	23.9	42.0	235.8	1.06	1.76	150	18.0	51.9	1.52	19.8	19.8	20.0	0.91	0.91	0.90
										300	18.2	103.8	2.14	19.8	19.8	26.4	0.92	0.92	0.69
										450	18.2	155.7	2.63	19.8	19.8	31.1	0.92	0.92	0.58
										600	18.2	207.6	3.03	19.8	19.8	35.0	0.92	0.92	0.52
										750	18.2	259.5	3.39	19.8	19.8	38.2	0.92	0.92	0.47
WSC6_L3	100x80x10x1.2	8.05	5500	18.9	19.8	42.0	235.8	1.05	2.13	150	15.1	51.9	1.66	16.6	16.6	18.0	0.91	0.91	0.84
										300	15.1	103.8	2.34	16.6	16.6	23.7	0.91	0.91	0.64
										450	15.1	155.7	2.87	16.6	16.6	28.0	0.91	0.91	0.54
										600	15.1	207.6	3.32	16.6	16.6	31.4	0.91	0.91	0.48
										750	15.1	259.5	3.71	16.6	16.6	34.4	0.91	0.91	0.44
WSC6_L4	100x80x10x1.2	8.05	6000	16.0	16.6	42.0	235.8	1.04	2.53	150	12.8	51.9	1.80	14.1	14.1	16.3	0.91	0.91	0.78
										300	12.8	103.8	2.54	14.1	14.1	21.6	0.91	0.91	0.59
										450	12.8	155.7	3.12	14.1	14.1	25.4	0.91	0.91	0.50
										600	12.8	207.6	3.60	14.1	14.1	28.5	0.91	0.91	0.45
										750	12.8	259.5	4.02	14.1	14.1	31.2	0.91	0.91	0.41
WSC6_L5	100x80x10x1.2	8.05	6500	13.8	14.2	42.0	235.8	1.02	2.97	150	10.9	51.9	1.94	12.1	12.1	14.9	0.90	0.90	0.73
										300	10.9	103.8	2.74	12.1	12.1	19.7	0.90	0.90	0.56
										450	10.9	155.7	3.36	12.1	12.1	23.2	0.90	0.90	0.47
										600	10.9	207.6	3.88	12.1	12.1	26.1	0.90	0.90	0.42
										750	10.9	259.5	4.33	12.1	12.1	28.5	0.90	0.90	0.38
WSC6_L6	100x80x10x1.2	8.05	7000	12.1	12.2	42.0	235.8	1.01	3.44	150	9.5	51.9	2.07	10.6	10.6	13.7	0.90	0.90	0.69
										300	9.5	103.8	2.93	10.6	10.6	18.2	0.90	0.90	0.52
										450	9.5	155.7	3.59	10.6	10.6	21.4	0.90	0.90	0.44
										600	9.5	207.6	4.15	10.6	10.6	24.0	0.90	0.90	0.39
										750	9.5	259.5	4.64	10.6	10.6	26.3	0.90	0.90	0.36
							Max	1.322	6.612							Mean	0.952	0.887	0.625
							Min	1.004	1.399							Sd.Dv.	0.029	0.080	0.197
																Max	1.085	1.085	1.085
																Min	0.896	0.673	0.296

Table A3.7 (to be continued): PS WFSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WFSC1_L1	110x90x10x2	5.47	4000	74.9	86.9	113.1	791.3	1.16	1.30	150	57.8	100.5	1.16	57.3	57.3	57.3	1.01	1.01	1.01
										300	62.3	200.9	1.64	65.7	67.1	71.5	0.95	0.93	0.87
										450	62.3	301.4	2.01	65.7	70.3	86.9	0.95	0.89	0.72
										600	62.3	401.8	2.32	65.7	72.6	99.8	0.95	0.86	0.62
										750	62.3	502.3	2.59	65.7	74.5	111.1	0.95	0.84	0.56
WFSC1_L2	110x90x10x2	5.47	4500	60.5	68.7	113.1	791.3	1.14	1.65	150	48.6	100.5	1.29	50.1	50.1	50.1	0.97	0.97	0.97
										300	50.3	200.9	1.82	53.0	54.9	64.0	0.95	0.92	0.79
										450	50.3	301.4	2.23	53.0	56.9	77.8	0.95	0.88	0.65
										600	50.3	401.8	2.58	53.0	58.4	89.3	0.95	0.86	0.56
										750	50.3	502.3	2.88	53.0	59.5	99.4	0.95	0.84	0.51
WFSC1_L3	110x90x10x2	5.47	5000	50.0	55.6	113.1	791.3	1.11	2.03	150	40.9	100.5	1.42	43.3	43.3	43.3	0.94	0.94	0.94
										300	41.4	200.9	2.00	43.8	45.4	58.0	0.94	0.91	0.71
										450	41.4	301.4	2.46	43.8	46.5	70.4	0.94	0.89	0.59
										600	41.4	401.8	2.84	43.8	47.3	80.9	0.94	0.87	0.51
										750	41.4	502.3	3.17	43.8	47.9	90.1	0.94	0.86	0.46
WFSC1_L4	110x90x10x2	5.47	5500	42.1	46.0	113.1	791.3	1.09	2.46	150	34.5	100.5	1.54	37.0	37.0	38.0	0.93	0.93	0.91
										300	34.7	200.9	2.18	37.0	37.7	53.1	0.94	0.92	0.65
										450	34.7	301.4	2.67	37.0	38.1	64.5	0.94	0.91	0.54
										600	34.7	401.8	3.09	37.0	38.4	74.0	0.94	0.90	0.47
										750	34.7	502.3	3.45	37.0	38.7	82.4	0.94	0.90	0.42
WFSC1_L5	110x90x10x2	5.47	6000	36.1	38.6	113.1	791.3	1.07	2.93	150	29.5	100.5	1.67	31.7	31.7	35.1	0.93	0.93	0.84
										300	29.5	200.9	2.36	31.7	31.7	49.0	0.93	0.93	0.60
										450	29.5	301.4	2.89	31.7	31.7	59.5	0.93	0.93	0.50
										600	29.5	401.8	3.33	31.7	31.7	68.4	0.93	0.93	0.43
										750	29.5	502.3	3.73	31.7	31.7	76.1	0.93	0.93	0.39
WFSC1_L6	110x90x10x2	5.47	7000	27.7	28.4	113.1	791.3	1.03	3.98	150	22.2	100.5	1.91	24.3	24.3	30.6	0.92	0.91	0.73
										300	22.2	200.9	2.69	24.3	24.3	42.7	0.92	0.91	0.52
										450	22.2	301.4	3.30	24.3	24.3	51.8	0.92	0.91	0.43
										600	22.2	401.8	3.81	24.3	24.3	59.5	0.92	0.91	0.37
										750	22.2	502.3	4.26	24.3	24.3	66.3	0.92	0.91	0.34
WFSC2_L1	110x100x10x3	3.90	4000	127.5	169.3	255.9	1997.8	1.33	1.51	150	97.3	159.7	1.12	94.5	94.5	94.5	1.03	1.03	1.03
										300	109.5	319.4	1.58	111.8	115.5	118.4	0.98	0.95	0.92
										450	109.9	479.0	1.94	111.8	130.5	146.7	0.98	0.84	0.75
										600	109.9	638.7	2.24	111.8	142.3	170.7	0.98	0.77	0.64
										750	109.9	798.4	2.50	111.8	152.1	192.1	0.98	0.72	0.57
WFSC2_L2	110x100x10x3	3.90	5000	86.4	108.4	255.9	1997.8	1.25	2.36	150	71.6	159.7	1.36	73.7	73.7	73.7	0.97	0.97	0.97
										300	74.0	319.4	1.92	75.8	85.5	98.5	0.98	0.87	0.75
										450	74.0	479.0	2.35	75.8	94.3	122.1	0.98	0.78	0.61
										600	74.0	638.7	2.72	75.8	101.0	142.1	0.98	0.73	0.52
										750	74.0	798.4	3.04	75.8	106.6	159.8	0.98	0.69	0.46
WFSC2_L3	110x100x10x3	3.90	6000	63.6	75.2	255.9	1997.8	1.18	3.40	150	53.6	159.7	1.58	55.8	57.0	59.1	0.96	0.94	0.91
										300	53.8	319.4	2.24	55.8	64.7	85.3	0.96	0.83	0.63
										450	53.8	479.0	2.74	55.8	69.7	105.6	0.96	0.77	0.51
										600	53.8	638.7	3.17	55.8	73.5	123.0	0.96	0.73	0.44
										750	53.8	798.4	3.54	55.8	76.5	138.3	0.96	0.70	0.39
WFSC2_L4	110x100x10x3	3.90	7000	49.6	55.3	255.9	1997.8	1.11	4.63	150	41.4	159.7	1.79	43.5	45.2	52.6	0.95	0.91	0.79
										300	41.4	319.4	2.54	43.5	48.8	75.8	0.95	0.85	0.55
										450	41.4	479.0	3.11	43.5	50.9	93.9	0.95	0.81	0.44
										600	41.4	638.7	3.59	43.5	52.5	109.3	0.95	0.79	0.38
										750	41.4	798.4	4.01	43.5	53.8	123.0	0.95	0.77	0.34
WFSC2_L5	110x100x10x3	3.90	8000	40.2	42.3	255.9	1997.8	1.05	6.04	150	33.1	159.7	1.99	35.3	35.4	47.6	0.94	0.94	0.70
										300	33.1	319.4	2.82	35.3	35.5	68.7	0.94	0.93	0.48
										450	33.1	479.0	3.45	35.3	35.5	85.1	0.94	0.93	0.39
										600	33.1	638.7	3.98	35.3	35.6	99.1	0.94	0.93	0.33
										750	33.1	798.4	4.45	35.3	35.6	111.4	0.94	0.93	0.30
WFSC2_L6	110x100x10x3	3.90	8500	36.7	37.5	255.9	1997.8	1.02	6.82	150	30.0	159.7	2.09	32.2	32.2	45.6	0.93	0.93	0.66
										300	30.0	319.4	2.95	32.2	32.2	65.8	0.93	0.93	0.46
										450	30.0	479.0	3.61	32.2	32.2	81.4	0.93	0.93	0.37
										600	30.0	638.7	4.17	32.2	32.2	94.8	0.93	0.93	0.32
										750	30.0	798.4	4.67	32.2	32.2	106.7	0.93	0.93	0.28

Table A3.7 (continuation): PS WFSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WFSC3_L1	120x100x15x3	4.55	3500	205.8	248.3	344.8	1494.3	1.21	1.39	150	129.2	168.7	0.91	119.7	119.7	119.7	1.08	1.08	1.08
										300	166.0	337.4	1.28	169.9	169.9	169.9	0.98	0.98	0.98
										450	175.2	506.0	1.57	180.5	183.6	188.9	0.97	0.95	0.93
										600	175.2	674.7	1.81	180.5	193.6	218.7	0.97	0.91	0.80
										750	175.3	843.4	2.02	180.5	201.8	245.0	0.97	0.87	0.72
WFSC3_L2	120x100x15x3	4.55	4000	161.5	190.1	344.8	1494.3	1.18	1.81	150	114.6	168.7	1.02	109.0	109.0	109.0	1.05	1.05	1.05
										300	136.5	337.4	1.45	140.7	140.7	140.7	0.97	0.97	0.97
										450	137.9	506.0	1.77	141.7	149.4	167.7	0.97	0.92	0.82
										600	138.0	674.7	2.04	141.7	156.4	194.2	0.97	0.88	0.71
										750	138.0	843.4	2.29	141.7	162.0	217.5	0.97	0.85	0.63
WFSC3_L3	120x100x15x3	4.55	4500	130.6	150.2	344.8	1494.3	1.15	2.30	150	100.0	168.7	1.14	98.2	98.2	98.2	1.02	1.02	1.02
										300	111.2	337.4	1.61	114.5	116.7	122.9	0.97	0.95	0.90
										450	111.3	506.0	1.97	114.5	123.1	151.1	0.97	0.90	0.74
										600	111.3	674.7	2.27	114.5	127.8	174.9	0.97	0.87	0.64
										750	111.3	843.4	2.54	114.5	131.7	195.9	0.97	0.85	0.57
WFSC3_L4	120x100x15x3	4.55	5000	108.2	121.6	344.8	1494.3	1.12	2.83	150	86.6	168.7	1.25	87.9	87.9	87.9	0.99	0.99	0.99
										300	91.8	337.4	1.77	94.9	98.1	112.1	0.97	0.94	0.82
										450	91.8	506.0	2.16	94.9	102.2	137.8	0.97	0.90	0.67
										600	91.8	674.7	2.50	94.9	105.3	159.5	0.97	0.87	0.58
										750	91.8	843.4	2.79	94.9	107.7	178.6	0.97	0.85	0.51
WFSC3_L5	120x100x15x3	4.55	6000	78.7	84.5	344.8	1494.3	1.07	4.08	150	65.2	168.7	1.46	68.8	68.8	68.8	0.95	0.95	0.95
										300	65.9	337.4	2.07	69.1	70.2	95.9	0.95	0.94	0.69
										450	65.9	506.0	2.54	69.1	70.9	117.8	0.95	0.93	0.56
										600	65.9	674.7	2.93	69.1	71.4	136.4	0.95	0.92	0.48
										750	65.9	843.4	3.27	69.1	71.7	152.8	0.95	0.92	0.43
WFSC3_L6	120x100x15x3	4.55	7000	60.7	62.1	344.8	1494.3	1.02	5.56	150	50.0	168.7	1.67	53.2	53.3	59.3	0.94	0.94	0.84
										300	50.0	337.4	2.36	53.2	53.3	84.4	0.94	0.94	0.59
										450	50.0	506.0	2.89	53.2	53.3	103.7	0.94	0.94	0.48
										600	50.0	674.7	3.33	53.2	53.3	120.0	0.94	0.94	0.42
										750	50.0	843.4	3.73	53.2	53.3	134.4	0.94	0.94	0.37
WFSC4_L1	120x110x15x4	3.52	4000	237.9	319.5	311.1	1869.8	1.34	0.97	150	165.7	236.9	1.00	156.2	156.2	156.2	1.06	1.06	1.06
										300	203.8	473.8	1.41	205.9	205.9	205.9	0.99	0.99	0.99
										450	207.7	710.7	1.73	208.7	229.0	243.3	1.00	0.91	0.85
										600	207.9	947.6	2.00	208.7	251.4	284.1	1.00	0.83	0.73
										750	207.9	1184.5	2.23	208.7	270.4	320.4	1.00	0.77	0.65
WFSC4_L2	120x110x15x4	3.52	5000	161.4	204.5	311.1	1869.8	1.27	1.52	150	128.4	236.9	1.21	128.1	128.1	128.1	1.00	1.00	1.00
										300	139.9	473.8	1.71	141.5	151.9	163.5	0.99	0.92	0.86
										450	140.0	710.7	2.10	141.5	168.9	203.4	0.99	0.83	0.69
										600	140.1	947.6	2.42	141.5	182.2	237.5	0.99	0.77	0.59
										750	140.1	1184.5	2.71	141.5	193.2	267.9	0.99	0.73	0.52
WFSC4_L3	120x110x15x4	3.52	6000	118.8	142.0	311.1	1869.8	1.19	2.19	150	99.3	236.9	1.41	102.9	102.9	102.9	0.97	0.97	0.97
										300	102.0	473.8	2.00	104.2	117.3	142.0	0.98	0.87	0.72
										450	102.1	710.7	2.45	104.2	127.5	176.7	0.98	0.80	0.58
										600	102.1	947.6	2.82	104.2	135.3	206.3	0.98	0.75	0.49
										750	102.1	1184.5	3.16	104.2	141.7	232.7	0.98	0.72	0.44
WFSC4_L4	120x110x15x4	3.52	7000	92.6	104.3	311.1	1869.8	1.13	2.98	150	78.3	236.9	1.60	81.2	82.7	87.1	0.96	0.95	0.90
										300	78.6	473.8	2.26	81.2	90.8	126.6	0.97	0.87	0.62
										450	78.6	710.7	2.77	81.2	95.9	157.5	0.97	0.82	0.50
										600	78.6	947.6	3.20	81.2	99.7	183.9	0.97	0.79	0.43
										750	78.6	1184.5	3.58	81.2	102.7	207.5	0.97	0.77	0.38
WFSC4_L5	120x110x15x4	3.52	8000	75.1	79.9	311.1	1869.8	1.06	3.89	150	63.1	236.9	1.78	65.9	66.8	79.1	0.96	0.94	0.80
										300	63.1	473.8	2.51	65.9	68.6	114.9	0.96	0.92	0.55
										450	63.1	710.7	3.08	65.9	69.6	143.0	0.96	0.91	0.44
										600	63.1	947.6	3.55	65.9	70.4	167.0	0.96	0.90	0.38
										750	63.1	1184.5	3.97	65.9	71.0	188.3	0.96	0.89	0.33
WFSC4_L6	120x110x15x4	3.52	9000	62.6	63.1	311.1	1869.8	1.01	4.93	150	52.1	236.9	1.94	54.9	55.0	72.7	0.95	0.95	0.72
										300	52.1	473.8	2.75	54.9	55.0	105.7	0.95	0.95	0.49
										450	52.1	710.7	3.37	54.9	55.0	131.5	0.95	0.95	0.40
										600	52.1	947.6	3.89	54.9	55.0	153.6	0.95	0.95	0.34
										750	52.1	1184.5	4.35	54.9	55.0	173.3	0.95	0.95	0.30

Table A3.7 (continuation): PS WFSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr,FT}$	$P_{b,Fm}$	$P_{b,D}$	$P_{b,L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	P_{nFT-Fm}	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WFSC5_L1	90x80x10x2	4.40	3000	79.7	108.0	129.2	732.1	1.35	1.20	150	57.9	88.5	1.05	55.6	55.6	55.6	1.04	1.04	1.04
										300	67.6	176.9	1.49	69.9	69.9	69.9	0.97	0.97	0.97
										450	68.0	265.4	1.82	69.9	79.0	85.5	0.97	0.86	0.80
										600	68.0	353.8	2.11	69.9	86.4	99.1	0.97	0.79	0.69
										750	68.0	442.3	2.36	69.9	92.6	111.2	0.97	0.73	0.61
WFSC5_L2	90x80x10x2	4.40	4000	47.5	60.8	129.2	732.1	1.28	2.13	150	39.2	88.5	1.36	40.6	40.6	40.6	0.97	0.97	0.97
										300	40.5	176.9	1.93	41.6	47.2	54.0	0.97	0.86	0.75
										450	40.5	265.4	2.36	41.6	52.1	66.5	0.97	0.78	0.61
										600	40.5	353.8	2.73	41.6	55.9	77.0	0.97	0.72	0.53
										750	40.5	442.3	3.05	41.6	59.1	86.4	0.97	0.69	0.47
WFSC5_L3	90x80x10x2	4.40	5000	32.1	38.9	129.2	732.1	1.21	3.32	150	27.0	88.5	1.66	28.2	29.3	31.3	0.96	0.92	0.86
										300	27.1	176.9	2.35	28.2	33.5	44.6	0.96	0.81	0.61
										450	27.1	265.4	2.87	28.2	36.2	54.9	0.96	0.75	0.49
										600	27.1	353.8	3.32	28.2	38.3	63.7	0.96	0.71	0.43
										750	27.1	442.3	3.71	28.2	40.0	71.4	0.96	0.68	0.38
WFSC5_L4	90x80x10x2	4.40	6000	23.6	27.0	129.2	732.1	1.14	4.79	150	19.6	88.5	1.94	20.7	22.1	26.9	0.95	0.89	0.73
										300	19.6	176.9	2.74	20.7	24.2	38.4	0.95	0.81	0.51
										450	19.6	265.4	3.35	20.7	25.5	47.3	0.95	0.77	0.41
										600	19.6	353.8	3.87	20.7	26.5	54.8	0.95	0.74	0.36
										750	19.6	442.3	4.33	20.7	27.2	61.5	0.95	0.72	0.32
WFSC5_L5	90x80x10x2	4.40	7000	18.4	19.8	129.2	732.1	1.08	6.51	150	15.0	88.5	2.19	16.1	16.6	23.8	0.93	0.91	0.63
										300	15.0	176.9	3.10	16.1	17.1	34.0	0.93	0.88	0.44
										450	15.0	265.4	3.80	16.1	17.3	41.9	0.93	0.87	0.36
										600	15.0	353.8	4.39	16.1	17.5	48.5	0.93	0.86	0.31
										750	15.0	442.3	4.90	16.1	17.7	54.4	0.93	0.85	0.28
WFSC5_L6	90x80x10x2	4.40	8000	14.9	15.2	129.2	732.1	1.02	8.51	150	12.0	88.5	2.44	13.1	13.1	21.5	0.92	0.92	0.56
										300	12.0	176.9	3.45	13.1	13.1	30.7	0.92	0.92	0.39
										450	12.0	265.4	4.22	13.1	13.1	37.8	0.92	0.92	0.32
										600	12.0	353.8	4.87	13.1	13.1	43.8	0.92	0.92	0.27
										750	12.0	442.3	5.45	13.1	13.1	49.1	0.92	0.92	0.24
WFSC6_L1	100x80x10x1.2	7.25	4500	26.2	29.9	42.0	235.8	1.14	1.41	150	21.0	54.9	1.45	22.8	22.8	22.8	0.92	0.92	0.92
										300	21.2	109.7	2.05	23.0	23.5	30.0	0.92	0.90	0.71
										450	21.2	164.6	2.51	23.0	23.9	35.6	0.92	0.89	0.59
										600	21.2	219.5	2.90	23.0	24.2	40.3	0.92	0.88	0.53
										750	21.2	274.4	3.24	23.0	24.4	44.3	0.92	0.87	0.48
WFSC6_L2	100x80x10x1.2	7.25	5000	21.5	24.2	42.0	235.8	1.12	1.74	150	17.4	54.9	1.60	18.9	18.9	19.9	0.92	0.92	0.87
										300	17.4	109.7	2.26	18.9	19.2	26.8	0.92	0.91	0.65
										450	17.4	164.6	2.77	18.9	19.3	31.9	0.92	0.90	0.55
										600	17.4	219.5	3.19	18.9	19.5	36.0	0.92	0.90	0.48
										750	17.4	274.4	3.57	18.9	19.5	39.6	0.92	0.89	0.44
WFSC6_L3	100x80x10x1.2	7.25	6000	15.4	16.8	42.0	235.8	1.09	2.50	150	12.3	54.9	1.89	13.5	13.5	16.4	0.91	0.91	0.75
										300	12.3	109.7	2.67	13.5	13.5	22.1	0.91	0.91	0.56
										450	12.3	164.6	3.27	13.5	13.5	26.3	0.91	0.91	0.47
										600	12.3	219.5	3.78	13.5	13.5	29.7	0.91	0.91	0.41
										750	12.3	274.4	4.23	13.5	13.5	32.7	0.91	0.91	0.38
WFSC6_L4	100x80x10x1.2	7.25	7000	11.6	12.3	42.0	235.8	1.06	3.41	150	9.2	54.9	2.18	10.2	10.2	14.0	0.90	0.90	0.65
										300	9.2	109.7	3.08	10.2	10.2	18.8	0.90	0.90	0.49
										450	9.2	164.6	3.77	10.2	10.2	22.4	0.90	0.90	0.41
										600	9.2	219.5	4.35	10.2	10.2	25.3	0.90	0.90	0.36
										750	9.2	274.4	4.87	10.2	10.2	27.8	0.90	0.90	0.33
WFSC6_L5	100x80x10x1.2	7.25	8000	9.1	9.4	42.0	235.8	1.03	4.45	150	7.1	54.9	2.45	8.0	8.0	12.2	0.89	0.89	0.58
										300	7.1	109.7	3.47	8.0	8.0	16.4	0.89	0.89	0.43
										450	7.1	164.6	4.25	8.0	8.0	19.5	0.89	0.89	0.36
										600	7.1	219.5	4.90	8.0	8.0	22.0	0.89	0.89	0.32
										750	7.1	274.4	5.48	8.0	8.0	24.3	0.89	0.89	0.29
WFSC6_L6	100x80x10x1.2	7.25	9000	7.4	7.5	42.0	235.8	1.00	5.63	150	5.7	54.9	2.72	6.5	6.5	10.8	0.87	0.87	0.52
										300	5.7	109.7	3.84	6.5	6.5	14.6	0.87	0.87	0.39
										450	5.7	164.6	4.71	6.5	6.5	17.3	0.87	0.87	0.33
										600	5.7	219.5	5.43	6.5	6.5	19.6	0.87	0.87	0.29
										750	5.7	274.4	6.08	6.5	6.5	21.6	0.87	0.87	0.26
							Max	1.355	8.508							Mean	0.950	0.885	0.596
							Min	1.004	0.974							Sd.Dv.	0.034	0.076	0.216
																Max	1.079	1.079	1.079
																Min	0.872	0.677	0.245

Table A4.1: Additional PC_M U columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*					*SFEA*		*DSM Design*							
	$b_w \times b_f \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
U7_L1	70x50x2.5	5.27	4000	30.9	60.4	213.8	1.95	3.54	150	26.0	63.8	1.44	26.9	26.9	26.9	0.97	0.97	0.97
									300	26.4	127.5	2.03	27.1	36.5	36.5	0.97	0.72	0.72
									450	26.4	191.3	2.49	27.1	44.4	44.4	0.97	0.60	0.60
									600	26.4	255.0	2.87	27.1	51.1	51.1	0.97	0.52	0.52
									750	26.4	318.8	3.21	27.1	57.0	57.0	0.97	0.46	0.46
U7_L2	70x50x2.5	5.27	5000	22.2	38.6	213.8	1.74	5.53	150	18.3	63.8	1.69	19.5	22.0	22.0	0.94	0.83	0.83
									300	18.3	127.5	2.39	19.5	30.8	30.8	0.94	0.59	0.59
									450	18.3	191.3	2.93	19.5	37.5	37.5	0.94	0.49	0.49
									600	18.3	255.0	3.39	19.5	43.1	43.1	0.94	0.42	0.42
									750	18.3	318.8	3.79	19.5	48.1	48.1	0.94	0.38	0.38
U7_L3	70x50x2.5	5.27	6000	16.8	26.8	213.8	1.60	7.97	150	13.4	63.8	1.95	14.7	19.0	19.0	0.91	0.71	0.71
									300	13.4	127.5	2.76	14.7	26.6	26.6	0.91	0.51	0.51
									450	13.4	191.3	3.38	14.7	32.4	32.4	0.91	0.41	0.41
									600	13.4	255.0	3.90	14.7	37.3	37.3	0.91	0.36	0.36
									750	13.4	318.8	4.36	14.7	41.6	41.6	0.91	0.32	0.32
U7_L4	70x50x2.5	5.27	7000	13.1	19.7	213.8	1.51	10.84	150	10.3	63.8	2.21	11.4	16.7	16.7	0.90	0.62	0.62
									300	10.3	127.5	3.13	11.4	23.4	23.4	0.90	0.44	0.44
									450	10.3	191.3	3.83	11.4	28.5	28.5	0.90	0.36	0.36
									600	10.3	255.0	4.42	11.4	32.8	32.8	0.90	0.31	0.31
									750	10.3	318.8	4.94	11.4	36.6	36.6	0.90	0.28	0.28
U7_L5	70x50x2.5	5.27	8000	10.4	15.1	213.8	1.45	14.16	150	8.2	63.8	2.47	9.1	13.9	14.9	0.89	0.59	0.55
									300	8.2	127.5	3.50	9.1	18.5	20.8	0.90	0.44	0.39
									450	8.2	191.3	4.29	9.1	21.9	25.4	0.90	0.37	0.32
									600	8.2	255.0	4.95	9.1	24.7	29.2	0.90	0.33	0.28
									750	8.2	318.8	5.53	9.1	27.1	32.6	0.90	0.30	0.25
U7_L6	70x50x2.5	5.27	9000	8.5	11.9	213.8	1.41	17.92	150	6.6	63.8	2.74	7.4	11.3	13.4	0.89	0.59	0.50
									300	6.6	127.5	3.88	7.4	14.4	18.8	0.89	0.46	0.35
									450	6.6	191.3	4.75	7.4	16.6	22.9	0.89	0.40	0.29
									600	6.6	255.0	5.48	7.4	18.3	26.3	0.89	0.36	0.25
									750	6.6	318.8	6.13	7.4	19.8	29.3	0.89	0.34	0.23
U8_L1	80x80x5	2.13	3000	188.9	787.1	858.0	4.17	1.09	150	132.9	180.0	0.98	120.8	120.8	120.8	1.10	1.10	1.10
									300	169.4	360.0	1.38	162.2	162.2	162.2	1.04	1.04	1.04
									450	181.0	540.0	1.69	165.7	190.5	190.5	1.09	0.95	0.95
									600	189.1	720.0	1.95	165.7	225.2	225.2	1.14	0.84	0.84
									750	195.1	900.0	2.18	165.7	256.4	256.4	1.18	0.76	0.76
U8_L2	80x80x5	2.13	4000	123.4	442.7	858.0	3.59	1.94	150	101.1	180.0	1.21	97.8	97.8	97.8	1.03	1.03	1.03
									300	115.2	360.0	1.71	108.3	125.9	125.9	1.06	0.91	0.91
									450	119.9	540.0	2.09	108.3	159.4	159.4	1.11	0.75	0.75
									600	122.1	720.0	2.42	108.3	188.4	188.4	1.13	0.65	0.65
									750	123.1	900.0	2.70	108.3	214.5	214.5	1.14	0.57	0.57
U8_L3	80x80x5	2.13	5000	88.3	283.3	858.0	3.21	3.03	150	76.5	180.0	1.43	76.7	76.7	76.7	1.00	1.00	1.00
									300	82.3	360.0	2.02	77.4	109.4	109.4	1.06	0.75	0.75
									450	83.3	540.0	2.47	77.4	138.5	138.5	1.08	0.60	0.60
									600	83.3	720.0	2.86	77.4	163.7	163.7	1.08	0.51	0.51
									750	83.3	900.0	3.19	77.4	186.4	186.4	1.08	0.45	0.45
U8_L4	80x80x5	2.13	6000	66.3	196.8	858.0	2.97	4.36	150	58.8	180.0	1.65	58.1	64.9	64.9	1.01	0.91	0.91
									300	60.9	360.0	2.33	58.1	97.1	97.1	1.05	0.63	0.63
									450	60.9	540.0	2.85	58.1	122.9	122.9	1.05	0.50	0.50
									600	60.9	720.0	3.30	58.1	145.2	145.2	1.05	0.42	0.42
									750	60.9	900.0	3.68	58.1	165.3	165.3	1.05	0.37	0.37
U8_L5	80x80x5	2.13	7000	51.5	144.6	858.0	2.81	5.93	150	46.0	180.0	1.87	45.2	58.4	58.4	1.02	0.79	0.79
									300	46.7	360.0	2.64	45.2	87.3	87.3	1.03	0.53	0.53
									450	46.7	540.0	3.24	45.2	110.5	110.5	1.03	0.42	0.42
									600	46.7	720.0	3.74	45.2	130.6	130.6	1.03	0.36	0.36
									750	46.7	900.0	4.18	45.2	148.7	148.7	1.03	0.31	0.31
U8_L6	80x80x5	2.13	8000	41.1	110.7	858.0	2.70	7.75	150	36.8	180.0	2.09	36.0	53.1	53.1	1.02	0.69	0.69
									300	37.0	360.0	2.96	36.0	79.4	79.4	1.03	0.47	0.47
									450	37.0	540.0	3.63	36.0	100.5	100.5	1.03	0.37	0.37
									600	37.0	720.0	4.19	36.0	118.8	118.8	1.03	0.31	0.31
									750	37.0	900.0	4.68	36.0	135.2	135.2	1.03	0.27	0.27
						Max	4.166	17.924							Mean	0.989	0.563	0.550
						Min	1.407	1.090							Sd.Dv.	0.080	0.224	0.235
															Max	1.178	1.100	1.100
															Min	0.892	0.273	0.226

Table A4.2 Additional: PC_M C columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
C7_L1	90x80x15x5	3.05	3000	263.4	1184.1	1394.7	5379.4	4.50	1.18	150	159.7	210.0	0.89	150.4	150.4	150.4	1.06	1.06	1.06
										300	225.6	420.0	1.26	215.5	215.5	215.5	1.05	1.05	1.05
										450	245.1	630.0	1.55	231.0	239.1	239.1	1.06	1.03	1.03
										600	256.0	840.0	1.79	231.0	280.4	280.4	1.11	0.91	0.91
										750	265.3	1050.0	2.00	231.0	317.2	317.2	1.15	0.84	0.84
C7_L2	90x80x15x5	3.05	4000	164.6	666.1	1394.7	5379.4	4.05	2.09	150	127.8	210.0	1.13	123.1	123.1	123.1	1.04	1.04	1.04
										300	151.4	420.0	1.60	144.3	154.8	154.8	1.05	0.98	0.98
										450	160.3	630.0	1.96	144.3	193.8	193.8	1.11	0.83	0.83
										600	166.0	840.0	2.26	144.3	227.3	227.3	1.15	0.73	0.73
										750	169.9	1050.0	2.53	144.3	257.1	257.1	1.18	0.66	0.66
C7_L3	90x80x15x5	3.05	5000	115.7	426.3	1394.7	5379.4	3.69	3.27	150	97.6	210.0	1.35	98.2	98.2	98.2	0.99	0.99	0.99
										300	109.0	420.0	1.91	101.4	132.3	132.3	1.07	0.82	0.82
										450	113.2	630.0	2.33	101.4	165.6	165.6	1.12	0.68	0.68
										600	115.3	840.0	2.70	101.4	194.1	194.1	1.14	0.59	0.59
										750	116.1	1050.0	3.01	101.4	219.6	219.6	1.14	0.53	0.53
C7_L4	90x80x15x5	3.05	7000	67.8	217.5	1394.7	5379.4	3.21	6.41	150	60.5	210.0	1.76	59.5	71.0	71.0	1.02	0.85	0.85
										300	63.2	420.0	2.49	59.5	104.2	104.2	1.06	0.61	0.61
										450	63.3	630.0	3.05	59.5	130.4	130.4	1.06	0.49	0.49
										600	63.3	840.0	3.52	59.5	153.0	153.0	1.06	0.41	0.41
										750	63.3	1050.0	3.93	59.5	173.1	173.1	1.06	0.37	0.37
C7_L5	90x80x15x5	3.05	8000	54.5	166.5	1394.7	5379.4	3.06	8.38	150	49.0	210.0	1.96	47.8	64.4	64.4	1.03	0.76	0.76
										300	50.0	420.0	2.78	47.8	94.5	94.5	1.05	0.53	0.53
										450	50.0	630.0	3.40	47.8	118.3	118.3	1.05	0.42	0.42
										600	50.0	840.0	3.93	47.8	138.7	138.7	1.05	0.36	0.36
										750	50.0	1050.0	4.39	47.8	157.0	157.0	1.05	0.32	0.32
C7_L6	90x80x15x5	3.05	9000	44.7	131.6	1394.7	5379.4	2.94	10.60	150	40.3	210.0	2.17	39.2	59.0	59.0	1.03	0.68	0.68
										300	40.6	420.0	3.06	39.2	86.6	86.6	1.03	0.47	0.47
										450	40.6	630.0	3.75	39.2	108.3	108.3	1.03	0.37	0.37
										600	40.6	840.0	4.33	39.2	127.0	127.0	1.03	0.32	0.32
										750	40.6	1050.0	4.84	39.2	143.7	143.7	1.03	0.28	0.28
C8_L1	90x80x15x5	4.52	3000	207.6	536.8	784.6	2315.2	2.59	1.46	150	121.3	210.0	1.01	137.5	137.5	137.5	0.88	0.88	0.88
										300	173.3	420.0	1.42	180.1	180.1	180.1	0.96	0.96	0.96
										450	187.7	630.0	1.74	182.1	212.2	212.2	1.03	0.88	0.88
										600	193.3	840.0	2.01	182.1	245.7	245.7	1.06	0.79	0.79
										750	195.4	1050.0	2.25	182.1	275.2	275.2	1.07	0.71	0.71
C8_L2	90x80x15x5	4.52	4000	131.5	302.0	784.6	2315.2	2.30	2.60	150	97.9	210.0	1.26	107.6	107.6	107.6	0.91	0.91	0.91
										300	116.2	420.0	1.79	115.3	137.9	137.9	1.01	0.84	0.84
										450	118.5	630.0	2.19	115.3	169.6	169.6	1.03	0.70	0.70
										600	118.5	840.0	2.53	115.3	196.4	196.4	1.03	0.60	0.60
										750	118.5	1050.0	2.83	115.3	220.0	220.0	1.03	0.54	0.54
C8_L3	90x80x15x5	4.52	5000	93.6	193.3	784.6	2315.2	2.06	4.06	150	76.0	210.0	1.50	82.1	82.1	82.1	0.93	0.93	0.93
										300	81.2	420.0	2.12	82.1	116.8	116.8	0.99	0.70	0.70
										450	81.2	630.0	2.59	82.1	143.6	143.6	0.99	0.57	0.57
										600	81.2	840.0	3.00	82.1	166.2	166.2	0.99	0.49	0.49
										750	81.2	1050.0	3.35	82.1	186.2	186.2	0.99	0.44	0.44
C8_L4	90x80x15x5	4.52	6000	71.0	134.2	784.6	2315.2	1.89	5.85	150	58.9	210.0	1.72	62.3	71.6	71.6	0.95	0.82	0.82
										300	59.9	420.0	2.43	62.3	102.0	102.0	0.96	0.59	0.59
										450	59.9	630.0	2.98	62.3	125.4	125.4	0.96	0.48	0.48
										600	59.9	840.0	3.44	62.3	145.2	145.2	0.96	0.41	0.41
										750	59.9	1050.0	3.84	62.3	162.6	162.6	0.96	0.37	0.37
C8_L5	90x80x15x5	4.52	8000	45.3	75.5	784.6	2315.2	1.67	10.39	150	36.9	210.0	2.15	39.7	57.4	57.4	0.93	0.64	0.64
										300	36.9	420.0	3.05	39.7	81.7	81.7	0.93	0.45	0.45
										450	36.9	630.0	3.73	39.7	100.5	100.5	0.93	0.37	0.37
										600	36.9	840.0	4.31	39.7	116.4	116.4	0.93	0.32	0.32
										750	36.9	1050.0	4.82	39.7	130.4	130.4	0.93	0.28	0.28
C8_L6	90x80x15x5	4.52	9000	37.3	59.6	784.6	2315.2	1.60	13.16	150	30.1	210.0	2.37	32.7	52.2	52.2	0.92	0.58	0.58
										300	30.1	420.0	3.36	32.7	74.3	74.3	0.92	0.40	0.40
										450	30.1	630.0	4.11	32.7	91.4	91.4	0.92	0.33	0.33
										600	30.1	840.0	4.75	32.7	105.8	105.8	0.92	0.28	0.28
										750	30.1	1050.0	5.31	32.7	118.6	118.6	0.92	0.25	0.25
							Max	1.177	1.062							Mean	1.016	1.062	1.062
							Min	0.882	0.254							Sd.Dv.	0.071	1.047	1.047
																Max	1.177	1.025	1.025
																Min	0.882	0.913	0.913

Table A4.3 Additional: PC_M H columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
H7_L1	90x90x10x5	2.44	4000	156.1	804.1	991.0	16908.1	5.15	1.23	150	125.4	217.5	1.18	121.4	121.4	121.4	1.03	1.03	1.03
										300	149.6	435.0	1.67	136.9	154.8	154.8	1.09	0.97	0.97
										450	163.3	652.5	2.04	136.9	195.2	195.2	1.19	0.84	0.84
										600	173.6	870.0	2.36	136.9	230.1	230.1	1.27	0.75	0.75
										750	181.1	1087.5	2.64	136.9	261.4	261.4	1.32	0.69	0.69
H7_L2	90x90x10x5	2.44	5000	113.6	514.6	991.0	16908.1	4.53	1.93	150	98.3	217.5	1.38	97.6	97.6	97.6	1.01	1.01	1.01
										300	112.4	435.0	1.96	99.6	135.1	135.1	1.13	0.83	0.83
										450	120.2	652.5	2.40	99.6	170.4	170.4	1.21	0.71	0.71
										600	124.9	870.0	2.77	99.6	200.8	200.8	1.25	0.62	0.62
										750	127.6	1087.5	3.09	99.6	228.2	228.2	1.28	0.56	0.56
H7_L3	90x90x10x5	2.44	6000	87.6	357.4	991.0	16908.1	4.08	2.77	150	78.5	217.5	1.58	76.8	81.3	81.3	1.02	0.97	0.97
										300	86.8	435.0	2.23	76.8	120.9	120.9	1.13	0.72	0.72
										450	90.4	652.5	2.73	76.8	152.4	152.4	1.18	0.59	0.59
										600	92.0	870.0	3.15	76.8	179.7	179.7	1.20	0.51	0.51
										750	92.6	1087.5	3.52	76.8	204.1	204.1	1.21	0.45	0.45
H7_L4	90x90x10x5	2.44	7000	69.9	262.5	991.0	16908.1	3.76	3.77	150	63.6	217.5	1.76	61.3	73.8	73.8	1.04	0.86	0.86
										300	68.2	435.0	2.49	61.3	109.7	109.7	1.11	0.62	0.62
										450	69.5	652.5	3.06	61.3	138.4	138.4	1.13	0.50	0.50
										600	69.7	870.0	3.53	61.3	163.1	163.1	1.14	0.43	0.43
										750	69.7	1087.5	3.94	61.3	185.3	185.3	1.14	0.38	0.38
H7_L5	90x90x10x5	2.44	8000	57.0	201.0	991.0	16908.1	3.52	4.93	150	52.3	217.5	1.95	50.0	67.7	67.7	1.04	0.77	0.77
										300	54.5	435.0	2.76	50.0	100.6	100.6	1.09	0.54	0.54
										450	54.6	652.5	3.38	50.0	126.8	126.8	1.09	0.43	0.43
										600	54.6	870.0	3.91	50.0	149.5	149.5	1.09	0.37	0.37
										750	54.6	1087.5	4.37	50.0	169.9	169.9	1.09	0.32	0.32
H7_L6	90x90x10x5	2.44	9000	47.4	158.8	991.0	16908.1	3.35	6.24	150	43.4	217.5	2.14	41.5	62.5	62.5	1.04	0.69	0.69
										300	44.3	435.0	3.03	41.5	92.9	92.9	1.07	0.48	0.48
										450	44.3	652.5	3.71	41.5	117.1	117.1	1.07	0.38	0.38
										600	44.3	870.0	4.29	41.5	138.1	138.1	1.07	0.32	0.32
										750	44.3	1087.5	4.79	41.5	156.9	156.9	1.07	0.28	0.28
H8_L1	110x70x20x4	4.57	3000	222.5	812.4	1177.6	7092.1	3.65	1.45	150	137.4	174.0	0.88	125.4	125.4	125.4	1.10	1.10	1.10
										300	191.2	348.0	1.25	180.8	180.8	180.8	1.06	1.06	1.06
										450	211.6	522.0	1.53	195.1	199.4	199.4	1.08	1.06	1.06
										600	225.7	696.0	1.77	195.1	230.8	230.8	1.16	0.98	0.98
										750	236.5	870.0	1.98	195.1	258.5	258.5	1.21	0.91	0.91
H8_L2	110x70x20x4	4.57	4000	145.8	457.0	1177.6	7092.1	3.13	2.58	150	111.0	174.0	1.09	105.6	105.6	105.6	1.05	1.05	1.05
										300	135.5	348.0	1.54	127.9	131.8	131.8	1.06	1.03	1.03
										450	145.4	522.0	1.89	127.9	162.0	162.0	1.14	0.90	0.90
										600	150.0	696.0	2.18	127.9	187.5	187.5	1.17	0.80	0.80
										750	151.2	870.0	2.44	127.9	209.9	209.9	1.18	0.72	0.72
H8_L3	110x70x20x4	4.57	5000	108.0	292.5	1177.6	7092.1	2.71	4.03	150	89.4	174.0	1.27	88.7	88.7	88.7	1.01	1.01	1.01
										300	101.1	348.0	1.80	94.7	113.7	113.7	1.07	0.89	0.89
										450	102.8	522.0	2.20	94.7	139.7	139.7	1.09	0.74	0.74
										600	102.8	696.0	2.54	94.7	161.7	161.7	1.09	0.64	0.64
										750	102.8	870.0	2.84	94.7	181.1	181.1	1.09	0.57	0.57
H8_L4	110x70x20x4	4.57	6000	85.5	203.1	1177.6	7092.1	2.38	5.80	150	72.8	174.0	1.43	74.2	74.2	74.2	0.98	0.98	0.98
										300	76.3	348.0	2.02	75.0	101.4	101.4	1.02	0.75	0.75
										450	76.3	522.0	2.47	75.0	124.5	124.5	1.02	0.61	0.61
										600	76.3	696.0	2.85	75.0	144.1	144.1	1.02	0.53	0.53
										750	76.3	870.0	3.19	75.0	161.4	161.4	1.02	0.47	0.47
H8_L5	110x70x20x4	4.57	7000	70.1	149.2	1177.6	7092.1	2.13	7.89	150	59.3	174.0	1.57	61.5	64.7	64.7	0.96	0.92	0.92
										300	59.8	348.0	2.23	61.5	92.0	92.0	0.97	0.65	0.65
										450	59.8	522.0	2.73	61.5	113.0	113.0	0.97	0.53	0.53
										600	59.8	696.0	3.15	61.5	130.8	130.8	0.97	0.46	0.46
										750	59.8	870.0	3.52	61.5	146.5	146.5	0.97	0.41	0.41
H8_L6	110x70x20x4	4.57	8000	58.8	114.2	1177.6	7092.1	1.94	10.31	150	48.5	174.0	1.72	51.6	59.3	59.3	0.94	0.82	0.82
										300	48.5	348.0	2.43	51.6	84.3	84.3	0.94	0.58	0.58
										450	48.5	522.0	2.98	51.6	103.6	103.6	0.94	0.47	0.47
										600	48.5	696.0	3.44	51.6	119.9	119.9	0.94	0.40	0.40
										750	48.5	870.0	3.85	51.6	134.3	134.3	0.94	0.36	0.36
							Max	5.149	10.308							Mean	1.082	0.683	0.683
							Min	1.943	1.232							Sd.Dv.	0.092	0.234	0.234
																Max	1.322	1.096	1.096
																Min	0.940	0.282	0.282

Table A4.4 Additional: PC_M R columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
R7_L1	110x90x15x15x5	3.56	4500	223.3	976.3	1309.8	6675.6	4.37	1.34	150	166.5	262.5	1.08	160.5	160.5	160.5	1.04	1.04	1.04
										300	203.0	525.0	1.53	195.9	200.7	200.7	1.04	1.01	1.01
										450	216.4	787.5	1.88	195.9	249.6	249.6	1.10	0.87	0.87
										600	225.4	1050.0	2.17	195.9	291.4	291.4	1.15	0.77	0.77
										750	229.5	1312.5	2.42	195.9	328.5	328.5	1.17	0.70	0.70
R7_L2	110x90x15x15x5	3.56	5000	186.4	790.8	1309.8	6675.6	4.24	1.66	150	145.8	262.5	1.19	145.6	145.6	145.6	1.00	1.00	1.00
										300	173.1	525.0	1.68	163.5	184.6	184.6	1.06	0.94	0.94
										450	183.7	787.5	2.06	163.5	229.6	229.6	1.12	0.80	0.80
										600	189.8	1050.0	2.37	163.5	268.0	268.0	1.16	0.71	0.71
										750	191.8	1312.5	2.65	163.5	302.2	302.2	1.17	0.63	0.63
R7_L3	110x90x15x15x5	3.56	6000	137.3	549.2	1309.8	6675.6	4.00	2.38	150	115.8	262.5	1.38	117.9	117.9	117.9	0.98	0.98	0.98
										300	131.1	525.0	1.96	120.4	160.3	160.3	1.09	0.82	0.82
										450	137.6	787.5	2.40	120.4	199.3	199.3	1.14	0.69	0.69
										600	139.2	1050.0	2.77	120.4	232.7	232.7	1.16	0.60	0.60
										750	140.3	1312.5	3.09	120.4	262.4	262.4	1.17	0.53	0.53
R7_L4	110x90x15x15x5	3.56	7000	106.6	403.5	1309.8	6675.6	3.79	3.25	150	93.5	262.5	1.57	93.5	98.2	98.2	1.00	0.95	0.95
										300	102.9	525.0	2.22	93.5	142.6	142.6	1.10	0.72	0.72
										450	105.7	787.5	2.72	93.5	177.3	177.3	1.13	0.60	0.60
										600	106.4	1050.0	3.14	93.5	207.0	207.0	1.14	0.51	0.51
										750	106.9	1312.5	3.51	93.5	233.4	233.4	1.14	0.46	0.46
R7_L5	110x90x15x15x5	3.56	8000	85.8	308.9	1309.8	6675.6	3.60	4.24	150	76.9	262.5	1.75	75.2	88.8	88.8	1.02	0.87	0.87
										300	82.6	525.0	2.47	75.2	129.0	129.0	1.10	0.64	0.64
										450	83.5	787.5	3.03	75.2	160.4	160.4	1.11	0.52	0.52
										600	83.9	1050.0	3.50	75.2	187.3	187.3	1.12	0.45	0.45
										750	84.1	1312.5	3.91	75.2	211.1	211.1	1.12	0.40	0.40
R7_L6	110x90x15x15x5	3.56	9000	70.8	244.1	1309.8	6675.6	3.45	5.37	150	64.2	262.5	1.93	62.1	81.3	81.3	1.03	0.79	0.79
										300	67.4	525.0	2.72	62.1	118.1	118.1	1.09	0.57	0.57
										450	67.7	787.5	3.33	62.1	146.8	146.8	1.09	0.46	0.46
										600	67.8	1050.0	3.85	62.1	171.4	171.4	1.09	0.40	0.40
										750	67.9	1312.5	4.30	62.1	193.3	193.3	1.09	0.35	0.35
R8_L1	100x90x15x15x5	3.12	4500	187.3	943.9	1312.8	9246.5	5.04	1.39	150	144.2	255.0	1.17	144.2	144.2	144.2	1.00	1.00	1.00
										300	173.9	510.0	1.65	164.2	182.6	182.6	1.06	0.95	0.95
										450	185.7	765.0	2.02	164.2	228.3	228.3	1.13	0.81	0.81
										600	194.3	1020.0	2.33	164.2	267.5	267.5	1.18	0.73	0.73
										750	197.9	1275.0	2.61	164.2	302.6	302.6	1.20	0.65	0.65
R8_L2	100x90x15x15x5	3.12	5000	156.4	764.5	1312.8	9246.5	4.89	1.72	150	128.6	255.0	1.28	128.9	128.9	128.9	1.00	1.00	1.00
										300	148.4	510.0	1.81	137.2	168.4	168.4	1.08	0.88	0.88
										450	158.2	765.0	2.21	137.2	210.6	210.6	1.15	0.75	0.75
										600	163.7	1020.0	2.55	137.2	246.8	246.8	1.19	0.66	0.66
										750	165.5	1275.0	2.86	137.2	279.1	279.1	1.21	0.59	0.59
R8_L3	100x90x15x15x5	3.12	6000	115.2	530.9	1312.8	9246.5	4.61	2.47	150	100.1	255.0	1.49	101.0	101.0	101.0	0.99	0.99	0.99
										300	112.6	510.0	2.10	101.1	146.8	146.8	1.11	0.77	0.77
										450	118.6	765.0	2.58	101.1	183.6	183.6	1.17	0.65	0.65
										600	120.1	1020.0	2.97	101.1	215.2	215.2	1.19	0.56	0.56
										750	121.3	1275.0	3.33	101.1	243.3	243.3	1.20	0.50	0.50
R8_L4	100x90x15x15x5	3.12	7000	89.4	390.1	1312.8	9246.5	4.36	3.37	150	80.3	255.0	1.69	78.4	89.4	89.4	1.02	0.90	0.90
										300	88.6	510.0	2.39	78.4	131.0	131.0	1.13	0.68	0.68
										450	91.2	765.0	2.93	78.4	163.8	163.8	1.16	0.56	0.56
										600	92.0	1020.0	3.38	78.4	192.0	192.0	1.17	0.48	0.48
										750	92.6	1275.0	3.78	78.4	217.1	217.1	1.18	0.43	0.43
R8_L5	100x90x15x15x5	3.12	8000	71.8	298.7	1312.8	9246.5	4.16	4.40	150	65.8	255.0	1.88	63.0	81.1	81.1	1.04	0.81	0.81
										300	71.3	510.0	2.66	63.0	118.8	118.8	1.13	0.60	0.60
										450	72.2	765.0	3.26	63.0	148.5	148.5	1.15	0.49	0.49
										600	72.7	1020.0	3.77	63.0	174.1	174.1	1.15	0.42	0.42
										750	73.1	1275.0	4.21	63.0	196.9	196.9	1.16	0.37	0.37
R8_L6	100x90x15x15x5	3.12	9000	59.2	236.0	1312.8	9246.5	3.99	5.56	150	54.8	255.0	2.08	51.9	74.3	74.3	1.06	0.74	0.74
										300	58.1	510.0	2.93	51.9	108.9	108.9	1.12	0.53	0.53
										450	58.6	765.0	3.59	51.9	136.2	136.2	1.13	0.43	0.43
										600	58.9	1020.0	4.15	51.9	159.6	159.6	1.13	0.37	0.37
										750	59.1	1275.0	4.64	51.9	180.5	180.5	1.14	0.33	0.33
							Max	5.040	5.563							Mean	1.111	0.673	0.673
							Min	3.446	1.342							Sd.Dv.	0.061	0.203	0.203
																Max	1.207	1.037	1.037
																Min	0.982	0.328	0.328

Table A4.5 Additional: PC_M RLC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times b_l \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
RLC7_L1	110x90x15x15x5	3.75	4000	270.1	1115.7	1710.8	6339.9	4.13	1.53	150	184.3	262.5	0.99	174.8	174.8	174.8	1.05	1.05	1.05
										300	236.2	525.0	1.39	232.8	232.8	232.8	1.01	1.01	1.01
										450	254.8	787.5	1.71	236.9	272.1	272.1	1.08	0.94	0.94
										600	265.1	1050.0	1.97	236.9	317.2	317.2	1.12	0.84	0.84
										750	272.6	1312.5	2.20	236.9	357.2	357.2	1.15	0.76	0.76
RLC7_L2	110x90x15x15x5	3.75	5000	184.5	714.1	1710.8	6339.9	3.87	2.40	150	146.4	262.5	1.19	144.7	144.7	144.7	1.01	1.01	1.01
										300	170.5	525.0	1.69	161.8	183.5	183.5	1.05	0.93	0.93
										450	179.8	787.5	2.07	161.8	227.7	227.7	1.11	0.79	0.79
										600	185.5	1050.0	2.39	161.8	265.4	265.4	1.15	0.70	0.70
										750	189.0	1312.5	2.67	161.8	298.9	298.9	1.17	0.63	0.63
RLC7_L3	110x90x15x15x5	3.75	6000	136.5	495.9	1710.8	6339.9	3.63	3.45	150	114.9	262.5	1.39	117.4	117.4	117.4	0.98	0.98	0.98
										300	128.9	525.0	1.96	119.7	159.4	159.4	1.08	0.81	0.81
										450	134.0	787.5	2.40	119.7	197.8	197.8	1.12	0.68	0.68
										600	136.4	1050.0	2.77	119.7	230.5	230.5	1.14	0.59	0.59
										750	137.3	1312.5	3.10	119.7	259.6	259.6	1.15	0.53	0.53
RLC7_L4	110x90x15x15x5	3.75	7000	106.3	364.3	1710.8	6339.9	3.43	4.70	150	93.0	262.5	1.57	93.3	98.0	98.0	1.00	0.95	0.95
										300	100.8	525.0	2.22	93.3	141.8	141.8	1.08	0.71	0.71
										450	103.0	787.5	2.72	93.3	176.0	176.0	1.10	0.59	0.59
										600	103.4	1050.0	3.14	93.3	205.1	205.1	1.11	0.50	0.50
										750	103.4	1312.5	3.51	93.3	231.0	231.0	1.11	0.45	0.45
RLC7_L5	110x90x15x15x5	3.75	8000	85.8	278.9	1710.8	6339.9	3.25	6.13	150	76.3	262.5	1.75	75.3	88.7	88.7	1.01	0.86	0.86
										300	80.6	525.0	2.47	75.3	128.3	128.3	1.07	0.63	0.63
										450	81.1	787.5	3.03	75.3	159.2	159.2	1.08	0.51	0.51
										600	81.1	1050.0	3.50	75.3	185.6	185.6	1.08	0.44	0.44
										750	81.1	1312.5	3.91	75.3	209.0	209.0	1.08	0.39	0.39
RLC7_L6	110x90x15x15x5	3.75	9000	71.0	220.4	1710.8	6339.9	3.10	7.76	150	63.6	262.5	1.92	62.3	81.2	81.2	1.02	0.78	0.78
										300	65.6	525.0	2.72	62.3	117.4	117.4	1.05	0.56	0.56
										450	65.6	787.5	3.33	62.3	145.7	145.7	1.05	0.45	0.45
										600	65.6	1050.0	3.85	62.3	169.8	169.8	1.05	0.39	0.39
										750	65.6	1312.5	4.30	62.3	191.3	191.3	1.05	0.34	0.34
RLC8_L1	100x90x10x10x5	3.10	4000	208.5	965.1	1261.4	7431.8	4.63	1.31	150	155.0	240.0	1.07	148.3	148.3	148.3	1.05	1.05	1.05
										300	190.0	480.0	1.52	182.9	185.3	185.3	1.04	1.03	1.03
										450	203.8	720.0	1.86	182.9	231.8	231.8	1.11	0.88	0.88
										600	214.1	960.0	2.15	182.9	271.7	271.7	1.17	0.79	0.79
										750	222.0	1200.0	2.40	182.9	307.3	307.3	1.21	0.72	0.72
RLC8_L2	100x90x10x10x5	3.10	5000	145.5	617.7	1261.4	7431.8	4.24	2.04	150	120.6	240.0	1.28	120.4	120.4	120.4	1.00	1.00	1.00
										300	138.2	480.0	1.82	127.6	157.7	157.7	1.08	0.88	0.88
										450	146.9	720.0	2.22	127.6	197.3	197.3	1.15	0.74	0.74
										600	152.5	960.0	2.57	127.6	231.2	231.2	1.19	0.66	0.66
										750	156.0	1200.0	2.87	127.6	261.5	261.5	1.22	0.60	0.60
RLC8_L3	100x90x10x10x5	3.10	6000	109.4	428.9	1261.4	7431.8	3.92	2.94	150	95.1	240.0	1.48	95.8	95.8	95.8	0.99	0.99	0.99
										300	105.7	480.0	2.09	95.9	138.8	138.8	1.10	0.76	0.76
										450	110.4	720.0	2.57	95.9	173.6	173.6	1.15	0.64	0.64
										600	112.7	960.0	2.96	95.9	203.5	203.5	1.17	0.55	0.55
										750	113.7	1200.0	3.31	95.9	230.1	230.1	1.18	0.49	0.49
RLC8_L4	100x90x10x10x5	3.10	7000	86.1	315.1	1261.4	7431.8	3.66	4.00	150	76.8	240.0	1.67	75.5	85.0	85.0	1.02	0.90	0.90
										300	83.1	480.0	2.36	75.5	124.7	124.7	1.10	0.67	0.67
										450	85.1	720.0	2.89	75.5	155.9	155.9	1.13	0.55	0.55
										600	85.6	960.0	3.34	75.5	182.7	182.7	1.13	0.47	0.47
										750	85.6	1200.0	3.73	75.5	206.7	206.7	1.13	0.41	0.41
RLC8_L5	100x90x10x10x5	3.10	8000	69.8	241.3	1261.4	7431.8	3.45	5.23	150	63.1	240.0	1.85	61.3	77.4	77.4	1.03	0.82	0.82
										300	66.5	480.0	2.62	61.3	113.5	113.5	1.09	0.59	0.59
										450	67.0	720.0	3.21	61.3	142.0	142.0	1.09	0.47	0.47
										600	67.0	960.0	3.71	61.3	166.4	166.4	1.09	0.40	0.40
										750	67.0	1200.0	4.14	61.3	188.2	188.2	1.09	0.36	0.36
RLC8_L6	100x90x10x10x5	3.10	9000	57.9	190.6	1261.4	7431.8	3.29	6.62	150	52.6	240.0	2.04	50.8	71.2	71.2	1.03	0.74	0.74
										300	54.1	480.0	2.88	50.8	104.4	104.4	1.07	0.52	0.52
										450	54.1	720.0	3.53	50.8	130.5	130.5	1.07	0.41	0.41
										600	54.1	960.0	4.07	50.8	153.0	153.0	1.07	0.35	0.35
										750	54.1	1200.0	4.55	50.8	173.1	173.1	1.07	0.31	0.31
							Max	4.628	7.762							Mean	1.089	0.676	0.676
							Min	3.105	1.307							Sd.Dv.	0.057	0.215	0.215
																Max	1.222	1.054	1.054
																Min	0.979	0.313	0.313

Table A4.6 Additional: PC_M WSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	Geometry			Buckling						SFEA		DSM Design							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WSC7_L1	80x80x10x5	2.48	4000	134.6	579.0	1179.7	13808.6	4.30	2.04	150	108.9	201.2	1.22	107.6	107.6	107.6	1.01	1.01	1.01
										300	125.6	402.4	1.73	118.0	138.9	138.9	1.06	0.90	0.90
										450	132.7	603.6	2.12	118.0	175.1	175.1	1.12	0.76	0.76
										600	137.5	804.8	2.45	118.0	206.3	206.3	1.16	0.67	0.67
										750	140.6	1006.1	2.73	118.0	234.3	234.3	1.19	0.60	0.60
WSC7_L2	80x80x10x5	2.48	5000	94.9	370.5	1179.7	13808.6	3.90	3.18	150	81.9	201.2	1.46	82.8	82.8	82.8	0.99	0.99	0.99
										300	90.1	402.4	2.06	83.2	119.5	119.5	1.08	0.75	0.75
										450	93.4	603.6	2.52	83.2	150.7	150.7	1.12	0.62	0.62
										600	95.1	804.8	2.91	83.2	177.5	177.5	1.14	0.54	0.54
										750	96.0	1006.1	3.26	83.2	201.6	201.6	1.15	0.48	0.48
WSC7_L3	80x80x10x5	2.48	6000	70.9	257.3	1179.7	13808.6	3.63	4.58	150	63.1	201.2	1.68	62.2	71.0	71.0	1.01	0.89	0.89
										300	67.2	402.4	2.38	62.2	105.5	105.5	1.08	0.64	0.64
										450	68.5	603.6	2.92	62.2	132.9	132.9	1.10	0.52	0.52
										600	68.8	804.8	3.37	62.2	156.6	156.6	1.11	0.44	0.44
										750	68.8	1006.1	3.77	62.2	177.9	177.9	1.11	0.39	0.39
WSC7_L4	80x80x10x5	2.48	7000	55.0	189.1	1179.7	13808.6	3.44	6.24	150	49.6	201.2	1.91	48.2	63.7	63.7	1.03	0.78	0.78
										300	51.7	402.4	2.70	48.2	94.6	94.6	1.07	0.55	0.55
										450	51.9	603.6	3.31	48.2	119.2	119.2	1.08	0.44	0.44
										600	51.9	804.8	3.83	48.2	140.5	140.5	1.08	0.37	0.37
										750	51.9	1006.1	4.28	48.2	159.5	159.5	1.08	0.33	0.33
WSC7_L5	80x80x10x5	2.48	8000	43.9	144.7	1179.7	13808.6	3.30	8.15	150	39.9	201.2	2.14	38.5	57.8	57.8	1.04	0.69	0.69
										300	40.8	402.4	3.03	38.5	85.8	85.8	1.06	0.47	0.47
										450	40.8	603.6	3.71	38.5	108.1	108.1	1.06	0.38	0.38
										600	40.8	804.8	4.28	38.5	127.4	127.4	1.06	0.32	0.32
										750	40.8	1006.1	4.79	38.5	144.7	144.7	1.06	0.28	0.28
WSC7_L6	80x80x10x5	2.48	9000	35.7	114.4	1179.7	13808.6	3.20	10.32	150	32.6	201.2	2.37	31.3	52.9	52.9	1.04	0.62	0.62
										300	32.9	402.4	3.36	31.3	78.6	78.6	1.05	0.42	0.42
										450	32.9	603.6	4.11	31.3	99.0	99.0	1.05	0.33	0.33
										600	32.9	804.8	4.75	31.3	116.7	116.7	1.05	0.28	0.28
										750	32.9	1006.1	5.31	31.3	132.5	132.5	1.05	0.25	0.25
WSC8_L1	140x100x15x5	4.72	5000	281.8	848.2	1123.5	11438.7	3.01	1.32	150	198.6	283.7	1.00	186.2	186.2	186.2	1.07	1.07	1.07
										300	250.0	567.4	1.42	244.3	244.3	244.3	1.02	1.02	1.02
										450	265.3	851.1	1.74	247.1	286.8	286.8	1.07	0.92	0.92
										600	272.2	1134.8	2.01	247.1	331.5	331.5	1.10	0.82	0.82
										750	274.9	1418.6	2.24	247.1	370.9	370.9	1.11	0.74	0.74
WSC8_L2	140x100x15x5	4.72	5500	240.8	701.0	1123.5	11438.7	2.91	1.60	150	180.6	283.7	1.09	173.3	173.3	173.3	1.04	1.04	1.04
										300	217.4	567.4	1.54	211.2	216.3	216.3	1.03	1.01	1.01
										450	227.7	851.1	1.88	211.2	265.2	265.2	1.08	0.86	0.86
										600	231.3	1134.8	2.17	211.2	306.6	306.6	1.10	0.75	0.75
										750	231.7	1418.6	2.43	211.2	343.0	343.0	1.10	0.68	0.68
WSC8_L3	140x100x15x5	4.72	6000	209.1	589.0	1123.5	11438.7	2.82	1.91	150	164.3	283.7	1.16	160.8	160.8	160.8	1.02	1.02	1.02
										300	190.6	567.4	1.65	183.4	201.7	201.7	1.04	0.95	0.95
										450	197.1	851.1	2.02	183.4	247.3	247.3	1.07	0.80	0.80
										600	198.1	1134.8	2.33	183.4	285.9	285.9	1.08	0.69	0.69
										750	198.1	1418.6	2.60	183.4	319.8	319.8	1.08	0.62	0.62
WSC8_L4	140x100x15x5	4.72	7000	163.9	432.8	1123.5	11438.7	2.64	2.60	150	135.9	283.7	1.32	137.4	137.4	137.4	0.99	0.99	0.99
										300	149.4	567.4	1.86	143.7	178.6	178.6	1.04	0.84	0.84
										450	150.5	851.1	2.28	143.7	219.1	219.1	1.05	0.69	0.69
										600	150.5	1134.8	2.63	143.7	253.2	253.2	1.05	0.59	0.59
										750	150.5	1418.6	2.94	143.7	283.3	283.3	1.05	0.53	0.53
WSC8_L5	140x100x15x5	4.72	8000	133.2	331.3	1123.5	11438.7	2.49	3.39	150	113.1	283.7	1.46	116.3	116.3	116.3	0.97	0.97	0.97
										300	119.1	567.4	2.06	116.8	161.2	161.2	1.02	0.74	0.74
										450	119.1	851.1	2.53	116.8	197.7	197.7	1.02	0.60	0.60
										600	119.1	1134.8	2.92	116.8	228.5	228.5	1.02	0.52	0.52
										750	119.1	1418.6	3.26	116.8	255.6	255.6	1.02	0.47	0.47
WSC8_L6	140x100x15x5	4.72	9000	111.1	261.8	1123.5	11438.7	2.36	4.29	150	95.3	283.7	1.60	97.4	103.9	103.9	0.98	0.92	0.92
										300	97.2	567.4	2.26	97.4	147.3	147.3	1.00	0.66	0.66
										450	97.2	851.1	2.77	97.4	180.7	180.7	1.00	0.54	0.54
										600	97.2	1134.8	3.20	97.4	208.8	208.8	1.00	0.47	0.47
										750	97.2	1418.6	3.57	97.4	233.6	233.6	1.00	0.42	0.42
							Max	4.301	10.315							Mean	1.058	0.660	0.660
							Min	2.356	1.325							Sd.Dv.	0.046	0.231	0.231
																Max	1.191	1.067	1.067
																Min	0.972	0.249	0.249

Table A4.7 Additional: PC_M WFSC columns: (i) geometries, (ii) buckling loads and R_{LD} and R_G ratios, (iii) yield stresses and numerical failure loads, and (iv) DSM numerical-to-predicted ultimate strength ratios (mm and kN).

Column	*Geometry*			*Buckling*						*SFEA*		*DSM Design*							
	$b_w \times b_f \times b_s \times t$	β_{FT}	L	$P_{cr.FT}$	$P_{b.Fm}$	$P_{b.D}$	$P_{b.L}$	R_G	R_{LD}	f_y	P_u	P_y	λ_{FT}	P_{nG}	$P_{nFT\text{-}Fm}$	P_{nFT}	$\frac{P_u}{P_{nG}}$	$\frac{P_u}{P_{nFT-Fm}}$	$\frac{P_u}{P_{nFT}}$
WFSC7_L1	100x100x15x6.5	2.34	4000	316.3	1550.3	2274.2	23720.8	4.90	1.47	150	227.8	346.0	1.05	218.9	218.9	218.9	1.04	1.04	1.04
										300	280.9	691.9	1.48	276.9	276.9	276.9	1.01	1.01	1.01
										450	301.3	1037.9	1.81	277.4	344.8	344.8	1.09	0.87	0.87
										600	316.3	1383.9	2.09	277.4	406.8	406.8	1.14	0.78	0.78
										750	328.3	1729.8	2.34	277.4	462.5	462.5	1.18	0.71	0.71
WFSC7_L2	100x100x15x6.5	2.34	5000	224.1	992.2	2274.2	23720.8	4.43	2.29	150	180.0	346.0	1.24	181.3	181.3	181.3	0.99	0.99	0.99
										300	206.7	691.9	1.76	196.5	235.9	235.9	1.05	0.88	0.88
										450	219.2	1037.9	2.15	196.5	297.8	297.8	1.12	0.74	0.74
										600	227.7	1383.9	2.49	196.5	351.4	351.4	1.16	0.65	0.65
										750	232.5	1729.8	2.78	196.5	399.5	399.5	1.18	0.58	0.58
WFSC7_L3	100x100x15x6.5	2.34	6000	169.1	689.0	2274.2	23720.8	4.07	3.30	150	143.1	346.0	1.43	147.0	147.0	147.0	0.97	0.97	0.97
										300	158.8	691.9	2.02	148.3	209.3	209.3	1.07	0.76	0.76
										450	165.8	1037.9	2.48	148.3	264.2	264.2	1.12	0.63	0.63
										600	169.3	1383.9	2.86	148.3	311.8	311.8	1.14	0.54	0.54
										750	170.0	1729.8	3.20	148.3	354.4	354.4	1.15	0.48	0.48
WFSC7_L4	100x100x15x6.5	2.34	7000	132.8	506.2	2274.2	23720.8	3.81	4.49	150	115.7	346.0	1.61	116.4	126.8	126.8	0.99	0.91	0.91
										300	125.1	691.9	2.28	116.4	188.8	188.8	1.07	0.66	0.66
										450	128.6	1037.9	2.80	116.4	238.4	238.4	1.10	0.54	0.54
										600	129.2	1383.9	3.23	116.4	281.3	281.3	1.11	0.46	0.46
										750	129.6	1729.8	3.61	116.4	319.8	319.8	1.11	0.41	0.41
WFSC7_L5	100x100x15x6.5	2.34	8000	107.0	387.6	2274.2	23720.8	3.62	5.87	150	94.9	346.0	1.80	93.9	115.7	115.7	1.01	0.82	0.82
										300	100.5	691.9	2.54	93.9	172.3	172.3	1.07	0.58	0.58
										450	101.7	1037.9	3.11	93.9	217.5	217.5	1.08	0.47	0.47
										600	102.0	1383.9	3.60	93.9	256.7	256.7	1.09	0.40	0.40
										750	102.1	1729.8	4.02	93.9	291.8	291.8	1.09	0.35	0.35
WFSC7_L6	100x100x15x6.5	2.34	9000	88.1	306.2	2274.2	23720.8	3.48	7.43	150	79.0	346.0	1.98	77.2	106.5	106.5	1.02	0.74	0.74
										300	82.2	691.9	2.80	77.2	158.6	158.6	1.06	0.52	0.52
										450	82.5	1037.9	3.43	77.2	200.2	200.2	1.07	0.41	0.41
										600	82.6	1383.9	3.96	77.2	236.2	236.2	1.07	0.35	0.35
										750	82.6	1729.8	4.43	77.2	268.6	268.6	1.07	0.31	0.31
WFSC8_L1	130x70x15x3	7.62	4000	157.9	332.9	526.7	23157.5	2.11	1.58	150	104.9	146.2	0.96	99.2	99.2	99.2	1.06	1.06	1.06
										300	135.3	292.4	1.36	134.7	134.7	134.7	1.00	1.00	1.00
										450	141.8	438.5	1.67	138.4	151.2	151.2	1.02	0.94	0.94
										600	142.7	584.7	1.92	138.4	170.5	170.5	1.03	0.84	0.84
										750	142.7	730.9	2.15	138.4	187.1	187.1	1.03	0.76	0.76
WFSC8_L2	130x70x15x3	7.62	5000	108.1	213.0	526.7	23157.5	1.97	2.47	150	82.9	146.2	1.16	83.0	83.0	83.0	1.00	1.00	1.00
										300	94.3	292.4	1.64	94.8	102.4	102.4	0.99	0.92	0.92
										450	94.8	438.5	2.01	94.8	121.2	121.2	1.00	0.78	0.78
										600	94.8	584.7	2.33	94.8	136.7	136.7	1.00	0.69	0.69
										750	94.8	730.9	2.60	94.8	150.0	150.0	1.00	0.63	0.63
WFSC8_L3	130x70x15x3	7.62	6000	80.5	147.9	526.7	23157.5	1.84	3.56	150	65.2	146.2	1.35	68.3	68.3	68.3	0.95	0.95	0.95
										300	68.3	292.4	1.91	70.6	86.2	86.2	0.97	0.79	0.79
										450	68.3	438.5	2.33	70.6	102.1	102.1	0.97	0.67	0.67
										600	68.3	584.7	2.70	70.6	115.0	115.0	0.97	0.59	0.59
										750	68.3	730.9	3.01	70.6	126.3	126.3	0.97	0.54	0.54
WFSC8_L4	130x70x15x3	7.62	7000	63.3	108.7	526.7	23157.5	1.72	4.85	150	51.6	146.2	1.52	55.5	56.2	56.2	0.93	0.92	0.92
										300	52.0	292.4	2.15	55.5	75.0	75.0	0.94	0.69	0.69
										450	52.0	438.5	2.63	55.5	88.8	88.8	0.94	0.59	0.59
										600	52.0	584.7	3.04	55.5	100.0	100.0	0.94	0.52	0.52
										750	52.0	730.9	3.40	55.5	109.8	109.8	0.94	0.47	0.47
WFSC8_L5	130x70x15x3	7.62	8000	51.8	83.2	526.7	23157.5	1.61	6.33	150	41.2	146.2	1.68	45.4	49.9	49.9	0.91	0.82	0.82
										300	41.2	292.4	2.38	45.4	66.7	66.7	0.91	0.62	0.62
										450	41.2	438.5	2.91	45.4	78.9	78.9	0.91	0.52	0.52
										600	41.2	584.7	3.36	45.4	89.0	89.0	0.91	0.46	0.46
										750	41.2	730.9	3.76	45.4	97.6	97.6	0.91	0.42	0.42
WFSC8_L6	130x70x15x3	7.62	9000	43.5	65.8	526.7	23157.5	1.51	8.01	150	33.6	146.2	1.83	38.1	45.1	45.1	0.88	0.75	0.75
										300	33.6	292.4	2.59	38.1	60.2	60.2	0.88	0.56	0.56
										450	33.6	438.5	3.18	38.1	71.2	71.2	0.88	0.47	0.47
										600	33.6	584.7	3.67	38.1	80.3	80.3	0.88	0.42	0.42
										750	33.6	730.9	4.10	38.1	88.1	88.1	0.88	0.38	0.38
							Max	4.902	8.011							Mean	1.017	0.673	0.673
							Min	1.513	1.467							Sd.Dv.	0.084	0.208	0.208
																Max	1.184	1.057	1.057
																Min	0.881	0.307	0.307