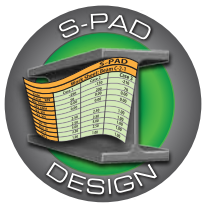


# S-PAD™

## *Steel Member Design and Optimization Tool*

**S-PAD is a stand-alone steel member design and optimization application that lets you quickly code-check a member's capacity (beam, column, or brace) without the need to build a complete detailed model.**

- Features exactly the same superb output as S-STEEL as well as the same comprehensive set of design constraints giving the engineer full control of ALL design parameters.
- Quickly and easily input strength and stability design forces, effective lengths in compression and unsupported lengths in bending of a steel element (beam, column or brace) and run a quick code check or even an auto-design to help identify an optimum section.
- Least weight, cost, depth and surface area design criteria.
- Input can be copied in from external spreadsheet programs.
- Support for AISC 360-10 & 360-05 LRF/ASD, AISC ASD 89, AISC LRF/ASD 94, CSA-S16-2001 & 2009 & 2014, CSA-S16.1-M94, EC3:2005, EC3:2005 Singapore Annex, BS 5950:1990 & 2000, AS 4100-1998, NZS 3404:1997, Hong Kong Structural Use of Steel 2005, 2011.
- Support for American, Canadian, British, European and other international section sizes.
- Code relaxation available for more conservative designs.
- Uses a simple, intuitive spreadsheet layout which allows up to 20 design cases to be evaluated simultaneously.
- Input files can be saved and can contain multiple worksheets each with up to 20 design cases.
- Detailed design calculations can be viewed for all section shapes.
- For auto-design an automatically sorted list of adequate sections is produced to easily identify optimum sections and detailed design calculations can be viewed for all sections.
- Code check or automatic redesign options for steel member strength.
- Material listing for weight, surface area and costs.
- User defined constraints for accurate design criteria.
- Unparalleled informational quality of printed results – complete breakdown of code results for members that pass or fail.
- Flexible design to customize your output reports.
- Online help system.



**Work Sheet:**  
Beam C-2-1  
Code Check Section: W250x45

	1	2	3
Title	Case 1	Case 2	Case 3
Axial (kN)	-290.00	-150.00	
Mx (kNm)	50.00	200.00	
My (kNm)			
Vy (kN)			
Vx (kN)			
Lu (m)			
kLx (m)	5.00	5.00	
kLy (m)	2.50	2.50	
w1x	1.00	1.00	
w1y	1.00	1.00	
w2	1.00	1.00	

**Design Code:** CAN/CSA S16-01    **Steel Table:** Canadian 2005 [CISC]

**Title: Case 1 (Bending + Compression)**

Section classification ( $f_y=345$  MPa); Section Class = 1

Governing geometrical slenderness ratio  
 $kL_x=5.00$  m;  $kL_y=2.50$  m;  $k_x L/r_x=44.8$ ;  $\frac{k_y L/r_y}{200} = \frac{71}{200} = 0.357$

Equivalent slenderness parameter based on buckling stress  $F_e$   
 $F_e=371$  MPa;  $\lambda_e = \left[ \frac{F_y}{F_e} \right]^{1/2} = 0.964$

Factored Compressive Resistance Check  
 $n=1.34$ ;  $\lambda_e=0.964$      $\frac{C_f}{C_{ry}} = \frac{C_f}{\phi A F_y (1 + \lambda_e^2)^{-1/4}} = \frac{C_f}{\phi A (213 \text{ MPa})} = \frac{290}{1098} = 0.264$

Strong axis section capacity in bending  
 $\frac{M_{rx}}{M_{rx}} = \frac{M_{rx}}{\phi F_y Z_x} = \frac{50}{187} = 0.267$

Bending Stability Check  
 $L_u=2.50$  m;  $\omega_2=1.000$ ; 279

Axial Compression and Bending overstrength  
 $\omega_{1x}=1.00$ ;  $U_{1x}=1.05$ ;  $C_{rx} \phi Z_x F_y$  0.432

Axial Compression and Bending lateral torsional buckling strength check  
 $\omega_{1x}=1.00$ ;  $U_{1x}=1.05$ ;  $\frac{C_f}{C_{ry}} + \frac{0.85 U_{1x} M_{rx \max}}{M_{rx}}$  0.509

**Clause 11**

[Clause 10.4.2.1](#)

[Clause 13.3.2](#)

[Clause 13.3.2](#)

[Clause 13.5\(a\)](#)

[Clause 13.6\(a\)](#)

[Clause 13.8.2\(b\)](#)

[Clause 13.8.2\(c\)](#)

Easily input design forces and effective lengths

Results include detailed code equations, intermediate results, capacities & clause references

**Design Sections For Study ...**

Section Shapes	Section Type	Section Name
<input type="checkbox"/>	W1100 - W1000	<input checked="" type="checkbox"/> W250x167
<input type="checkbox"/>	W920 - W800	<input type="checkbox"/> W250x140
<input type="checkbox"/>	W610 - W500	<input type="checkbox"/> W250x113
<input type="checkbox"/>	W460 - W400	<input type="checkbox"/> W250x80
<input type="checkbox"/>	W360 - W300	<input type="checkbox"/> W250x73
<input type="checkbox"/>	W310 - W250	<input type="checkbox"/> W250x67
<input checked="" type="checkbox"/>	W250 - W200	<input checked="" type="checkbox"/> W250x58
<input checked="" type="checkbox"/>	W150	<input type="checkbox"/>
<input type="checkbox"/>	S	<input type="checkbox"/>
<input type="checkbox"/>	HP	<input type="checkbox"/>

Choose from multiple steel section databases

**Selection Criteria**

- (\*) Weight
- ( ) Cost
- ( ) Surface Area
- ( ) Depth
- ( ) Width
- ( ) Ix
- ( ) Iy
- ( ) rx

**Constraints ...**

Slenderness Limits:  
 Slenderness does not govern  
 In compression,  $KL/r \leq$  200  
 In tension,  $L/r \leq$  300

**Consider Sections of Class:**

- 1 (plastic)
- 2 (compact)
- 3 (non compact)
- 4 (slender)

Treat slender sections as non-compact

Member in unbraced frame or detailed analysis performed ( $U_1$  set as unity)

With Camber = L / 1000

Define Constraints

Extensive range of Design Constraints

**Admissible/Inadmissible sections ...**

Admissible  
 InAdmissible

**View:**

- Admissible
- InAdmissible

**Sort by:**

- Weight
- Cost
- Surface Area
- Depth
- Width

W200x31  
 W250x33  
 W200x36  
 W150x37  
 S250x38  
 W250x39  
 W200x42  
 W250x45  
 W200x46  
 S310x47

Auto Design

Select From Acceptable Sections List