

How can I specify a box section with an attached plate?

Box sections with attached plates are useful for supporting cavity brickwork and for supporting timber joists or precast concrete within the floor depth. Users often attempt to build up these sections from the individual plates using the *Elements* method but this does not produce a correct value for the torsion constant because the elements calculation does not 'know' that the four plates forming the box are a 'closed' section.

The solution is to input the box as one rectangular element corresponding to its outer surface and then deduct the inner void. This can be done by entering either the width or depth of the inner rectangle as a minus value as shown in the screenshot below. The illustration is for a 150 x 100 x 8 mm box with a 270 x 10 mm bottom plate. This solution is available in Analyse 3D version 3.64 and later and A3D MAX version 3.41 and later.

Please note that although frame analysis will produce correct deflection and rotation results, this type of section cannot be checked to BS 5950 using the current version of CADSteelwork Member Designer (SWMD) because it does not handle non-standard section shapes or torsion moments. New software is in preparation to cover these points.

150x100 box + plate UK-S275

Section Properties(cm)

ElemSect1

Area 64.440 Section Zx 195.144

Inertia Ixx 2109.512 Modulus Zy 182.324

Inertia Iyy 3361.794 Shear Area Ax 0.010

Torsional Constant 1304.407 Shear Area Ay 0.010

Elements Data(mm)

	Width	Height	Vertical Offset	Lateral Offset
1	100.000	150.000	0.000	0.000
2	-84.000	134.000	0.000	0.000
3	270.000	10.000	-79.000	-85.000
*				

Help OK Cancel