

## Technical Note

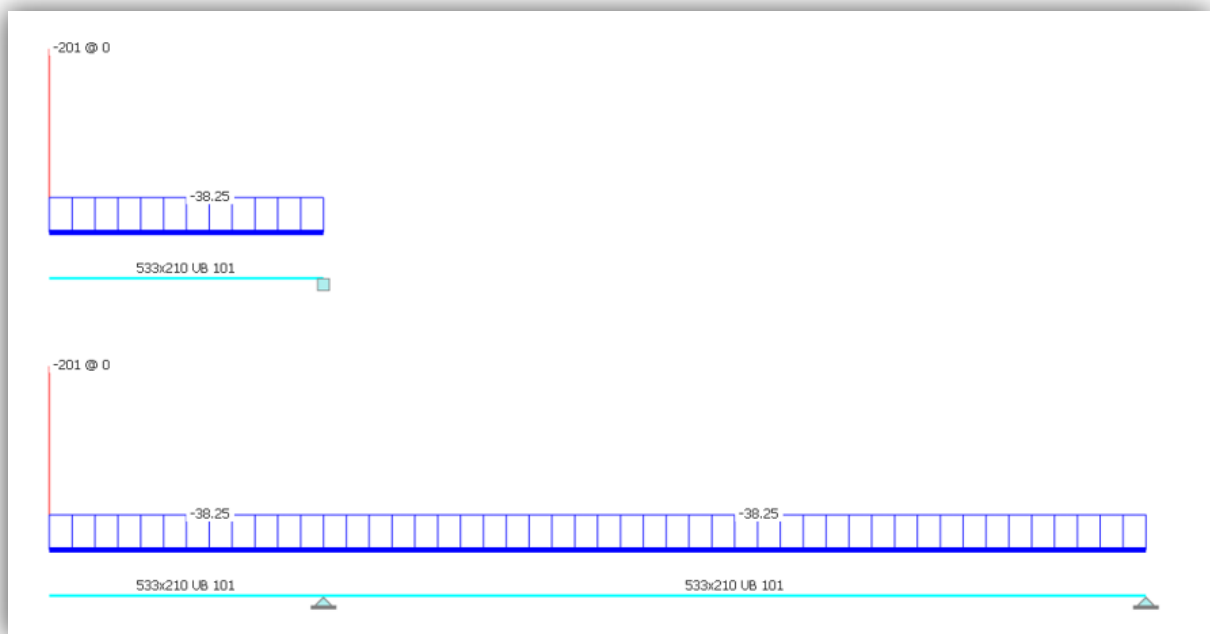
**Title:** Cantilever deflections  
**Date:** 06/12/2018  
**Versions:** All  
**Program:** MasterFrame, PowerPad, Beam Designers

### Introduction

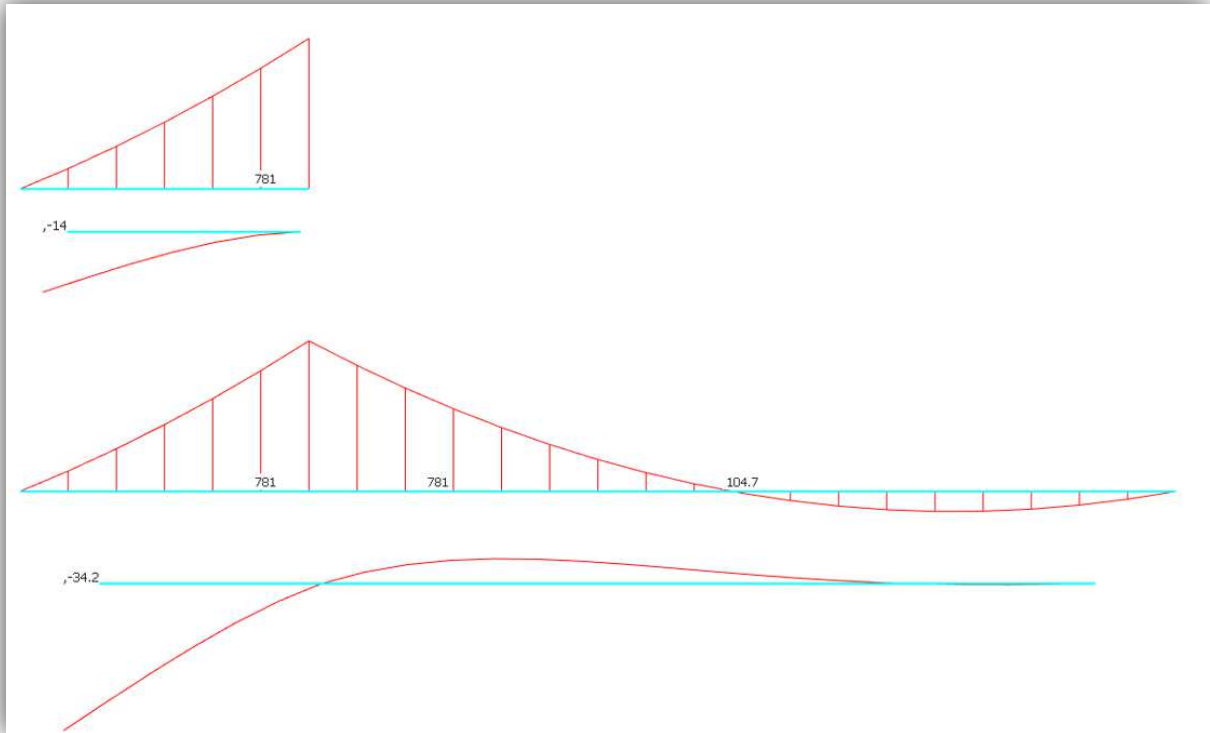
Pure “encastre” cantilevers rarely exist outside the classroom. Modelling your beam as having a fixed support, can grossly underestimate deflections.

### Example

A typical example is a cantilever beam with a back beam to provide fixity and supported on 2 knife-edge walls.



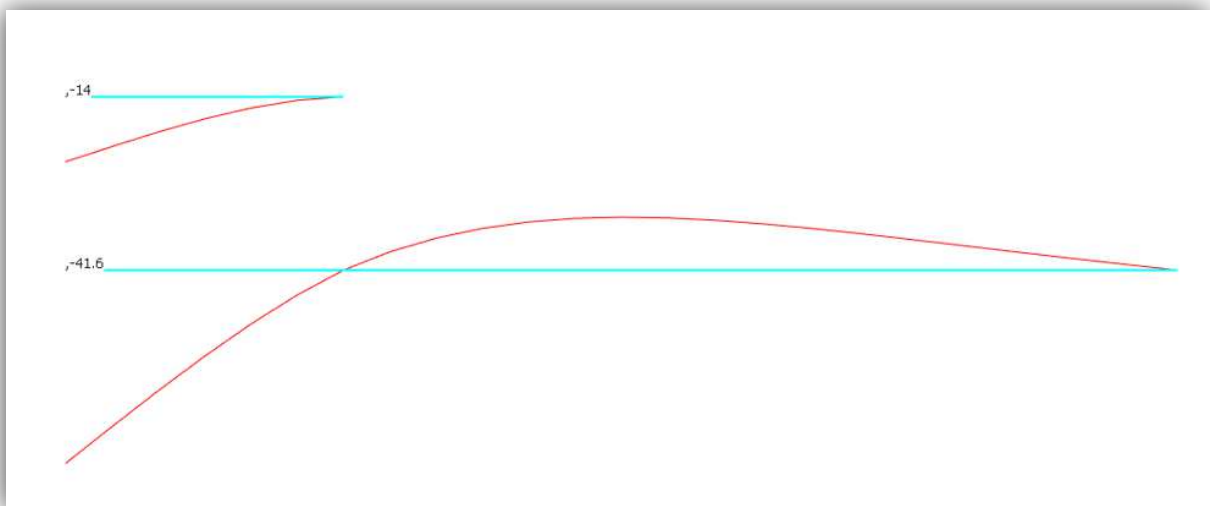
LOADING at ULS (All Spans Loaded)



#### BM at ULS and Deflection at SLS (all spans Loaded)

Notice, that while the cantilever moments are the same, the end of cantilever Deflection is over twice as large (1:2.44 ratio) due to the rotation of the support.

Now if we then factor in the use of patterned loading with max on the cantilever & minimum on the back span, things get worse.



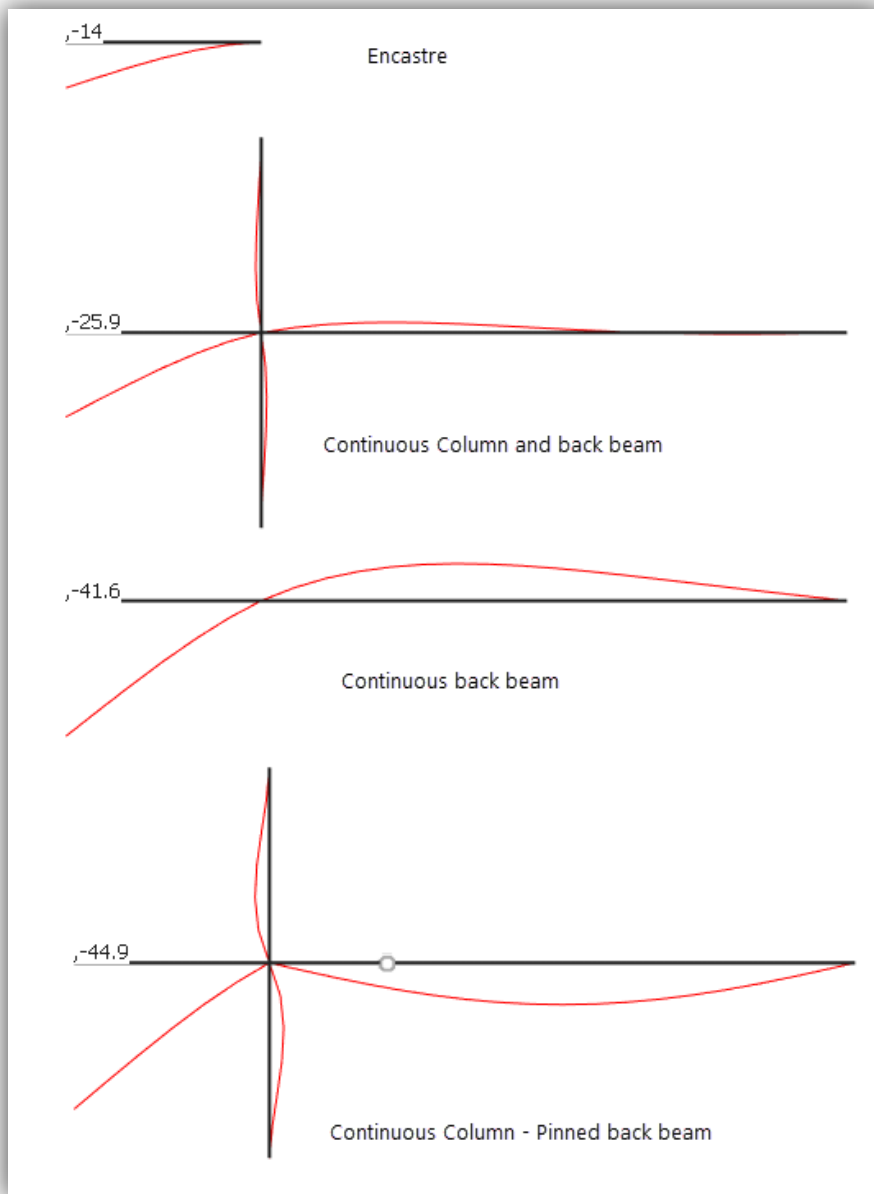
#### Deflection at SLS (Max, Min)

The cantilever deflection increases to 41.6 mm, a 1: 2.97 ratio.

#### **Conclusion.**

Always model all the supporting members of a cantilever.

## Example models



## Steel Design

The MasterSeries tries to identify cantilevers but, in this case, the high free end shear would prevent it from deciding it is a cantilever.

You Must always check if it is set as a cantilever. Modify the Deflection limit as required, and choose an appropriate unrestrained effective length.

Section AutoDesign		Axial with Moment		Lateral Restraints			
C1	0.000	Kt-factor	0.000	Spacing	0	F-Holes No.	0.00
C2	0.000	Lx	0.000	Lv	0.000	F-Diameter	0
C3	0.000	Ly	0.000	FL/UL	1.200	W-Holes No.	0
zg	0.00	Kx-factor	1.000	Def Limit	180	W-Diameter	0
Cantilever Warping Free		Ky-factor	1.000	<input type="checkbox"/> Additional loads		Bolts in Row No.	0
Non-Cantilever		Theta Limit	180.00	<input checked="" type="checkbox"/> Print both Simplified & More Exact		Bolt Pitch P1	0
Cantilever Warping Free		Lamda Limit	180.00	<input checked="" type="checkbox"/> AutoChange Beam to C&M		Bolt edge dist.	0
Cantilever Warping Fixed							

1.5 L	^
As End1	^
AutoSelect	^
Top Flange in Tension	^
Web in Tension	^