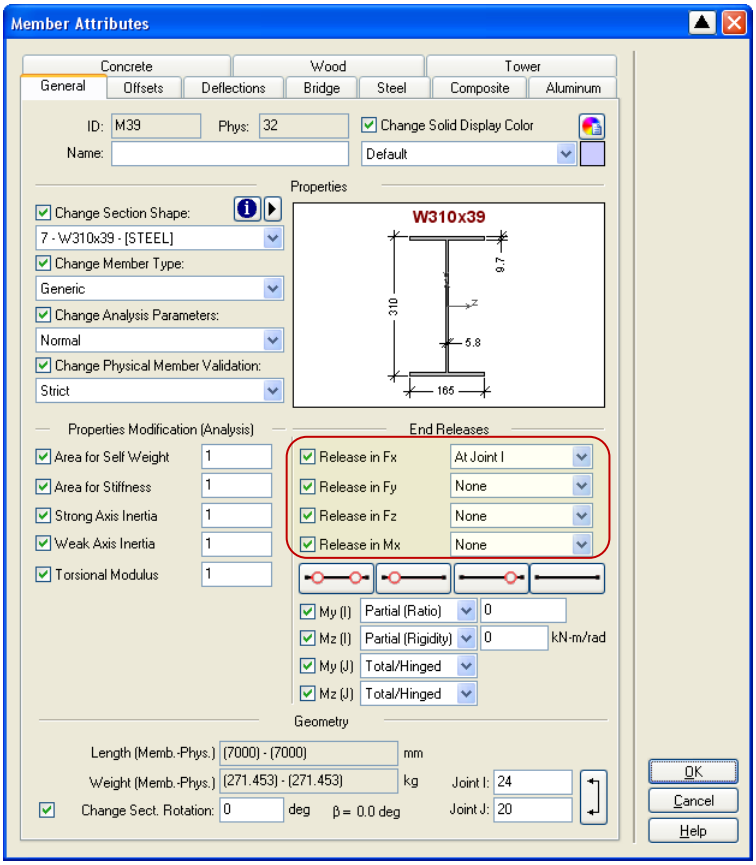
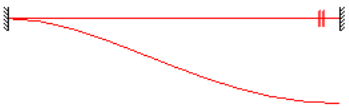
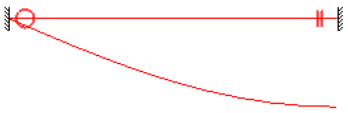
Axial, Shear and Torsion Releases - Partial Releases

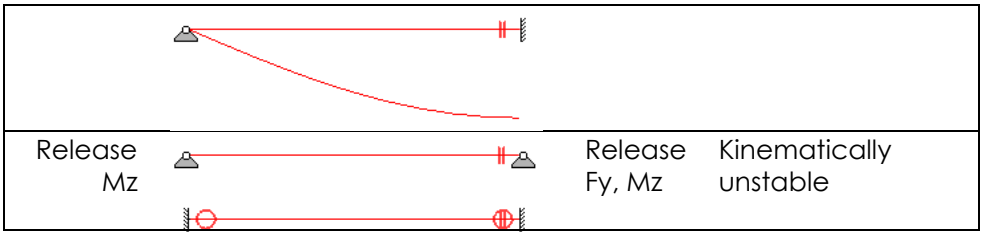
SAFI allows specifying member end releases on all six degrees of freedom.



It is possible to define translational releases and torsional releases at either end of the member (but not both ends). Select the appropriate option in the list (*None*, *At Joint I* or *At Joint J*).

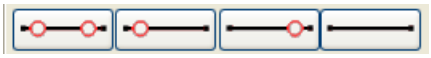
Although the available options prevent most unstable situations, there are still some combinations that lead to instabilities.

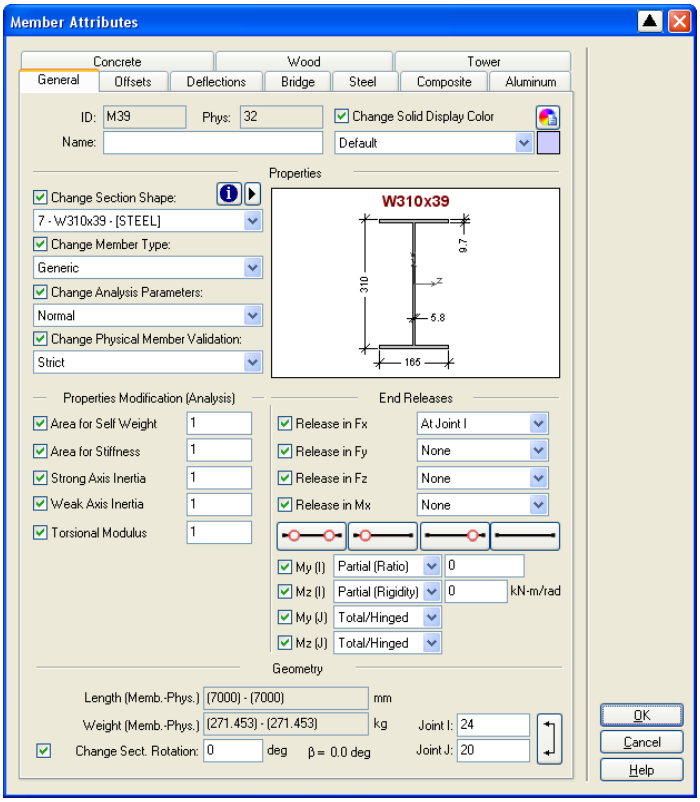
1st End	Graphic representation	2nd End	Stability
Fixed		Release Fy	Kinematically stable
Release Mz		Release Fy	Kinematically stable



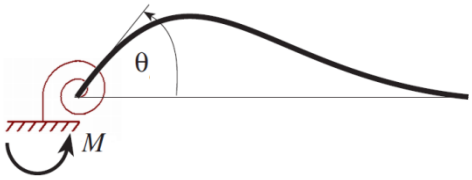
In addition, it is not allowed to have partial flexural fixities along with Fx, Fy, Fz or Mx releases.

Partial fixities may be defined either by a rigidity ratio or directly by the rotational stiffness of the connection. Bending releases at member ends may be defined by simply clicking one of the buttons shown below.





The fixed end moment at a joint having a given rotational rigidity (k) follows the following relation: $M = k \cdot \theta$, where θ is the rotation of the joint. When the rigidity $k = 0$ the member end is hinged. When the rigidity $k = \infty$, the member end is fixed.



There is a direct relation between rotational rigidity (*k*) and the ratio of transferred moment (□).

$$k = \frac{3 \cdot EI}{L} \frac{\gamma}{1-\gamma}$$

Where	*EI*	Elastic modulus times the inertia of the member.
	L	Length of the member.
	□	Ratio of transferred moments between 0 and 1
	k	Rotational rigidity (in units of moment per radian)

When the rigidity ratio □ = *0* (*k = 0*) the member is hinged. When the rigidity ratio □ = *1* ($k = \infty$), the member is fixed. Note that if a member is subdivided, it will have the effect of increasing the rigidity (*k*) as the member length *L* is decreased.

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