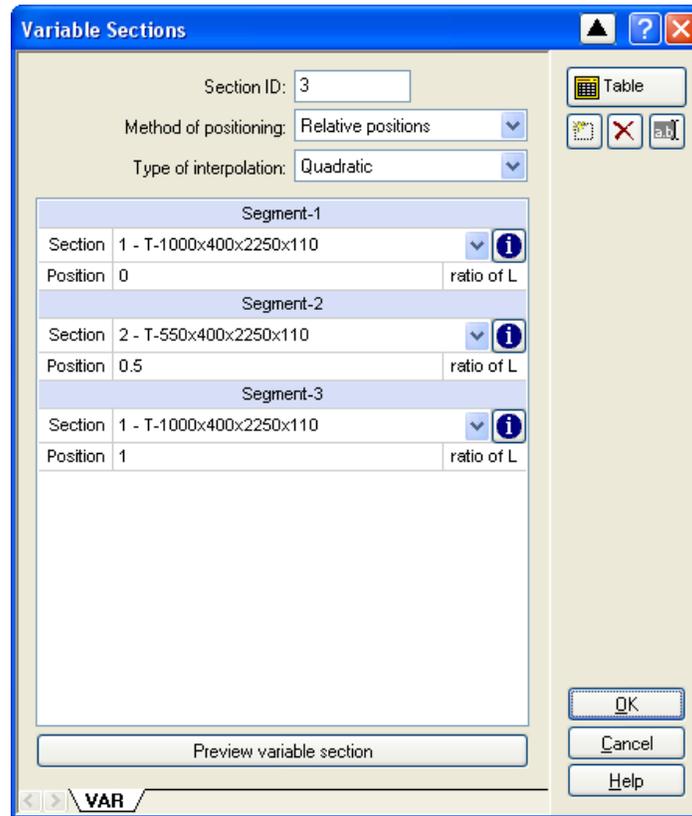


The variable sections are sections for which the dimensions vary according to the position on the physical member. Each dimension of the section is interpolated and the corresponding properties are recalculated based on the interpolated dimensions. If the properties of the source sections have been modified by the user, the recalculated properties will be corrected appropriately.



The method of defining a variable section is simple. Define non-standard sections corresponding to known dimensions of the variable section and the assign these sections to their corresponding positions. The number of non-standard sections required depends on the type of interpolation.

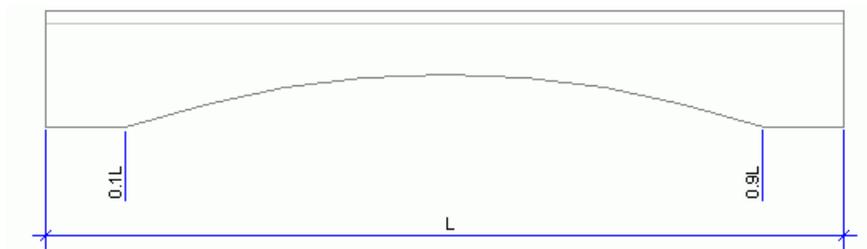
The method used to position the source sections may be either *Relative* or *Absolute*. If *Relative positions* are selected, the positions are specified as a ratio of the member length. In this case, the profile of the variable section depends on the length of the members to which the section is assigned. If *Absolute positions* are selected, the

positions are specified in length units from the beginning of the member. In this case, the profile of the section is independent from the length of the member.

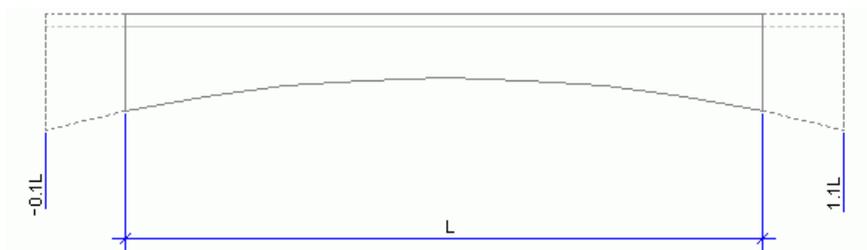
The type of interpolation allows to specify in which way the dimensions of the source sections are interpolated. Three options are available which are *Linear*, *Quadratic* and *Cubic*. The number of source sections required for quadratic and cubic interpolation is 3 and 4 respectively. The minimum number of source sections for a linear interpolation is 2. For a linear interpolation, it is possible to define more than 2 sections. In this case, the variable section is composed of several linear segments.

The **Section** fields allow to specify the non-standard (source) sections defining the variable section. Note that each dimension is interpolated which implies that the dimensions of each non-standard section must be compatible. Thus, all non-standard sections defining a variable section must be of the same type. The type of section defining the variable section is controlled by the type of section #1.

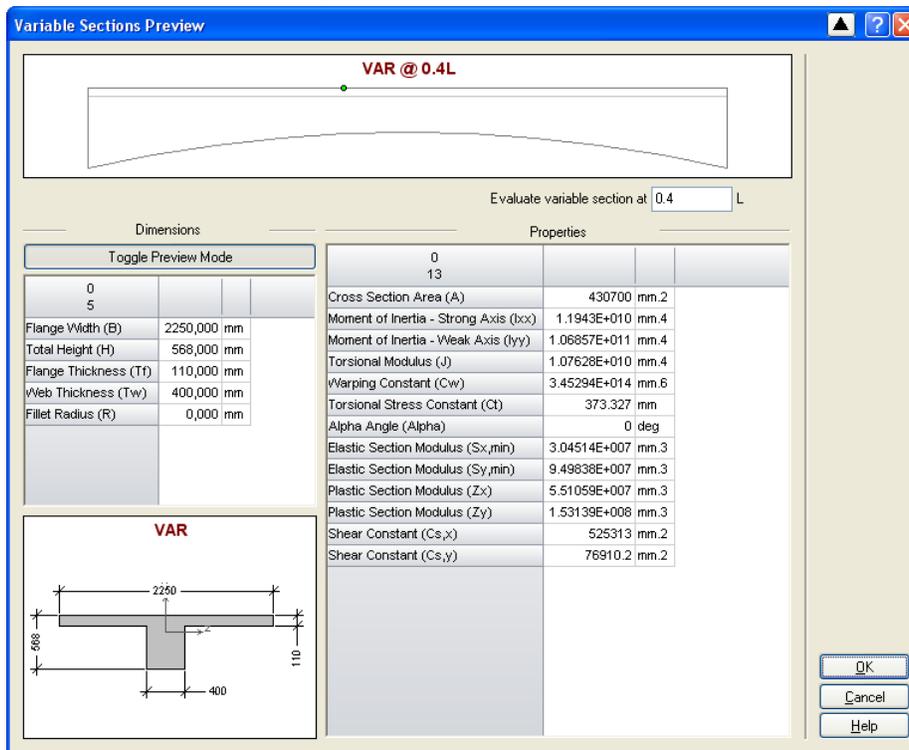
The **Position** fields allow to specify the position of each non-standard section defining the variable section. These positions are specified in ratio of the physical member length or in distance from the beginning of the physical member according to the selected **Method of positioning**. Note that it is permitted to specify negative values or values larger than the length of the physical member. The same way, it is not necessary to specify sections at the ends of the member.



Result when the section is defined between $0.1L$ and $0.9L$

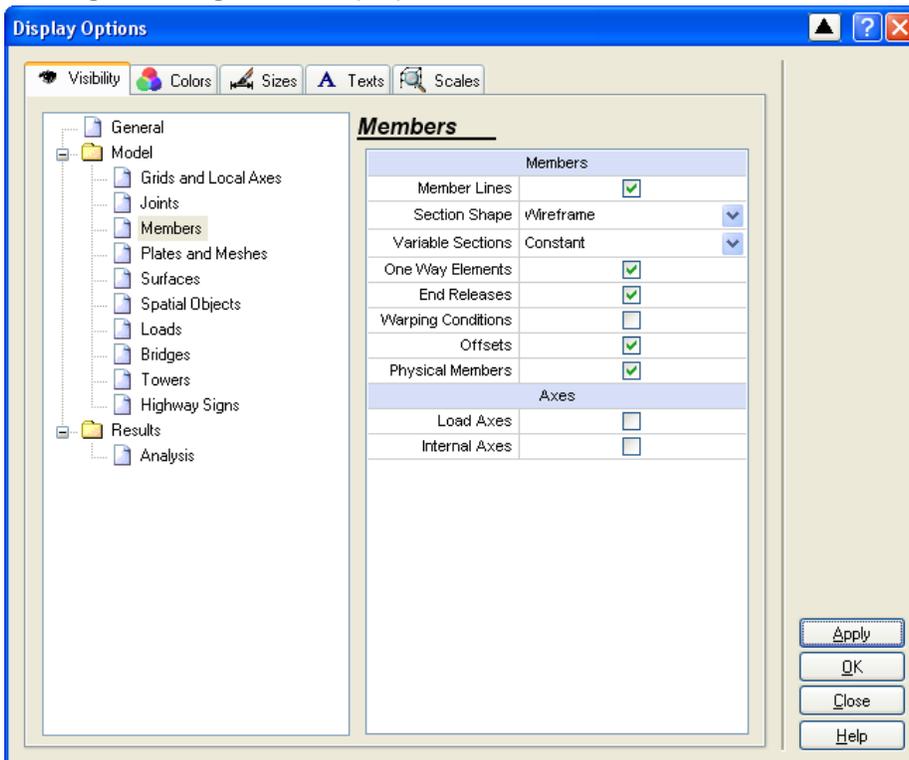


It is possible to preview the variable section in its whole and to view the dimensions and properties at various positions along the span.

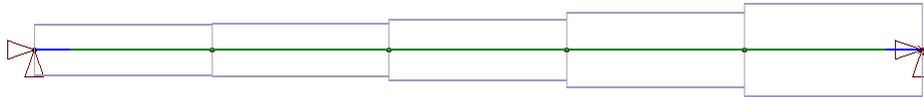


To view the dimensions and properties in specific locations, click on the graph showing the profile of the section or specify the position in the appropriate edition field.

A display option allows to display the section as segments of constant inertia sections or interpolated along the length of the physical member



During the structural analysis or the calculation of the resistance of steel and aluminum members, the properties of the members are calculated at the center of each member composing the physical member. This corresponds to displaying the variable sections using the **Constant** option. When calculating the resistance of a reinforced concrete member, the section properties are linearly interpolated along each member composing the physical member. This corresponds to displaying the variable sections using the **Interpolate** option

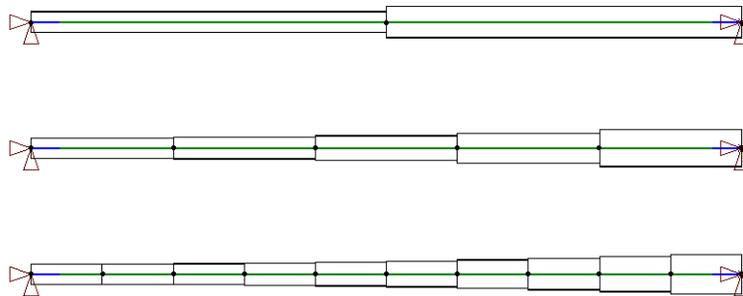


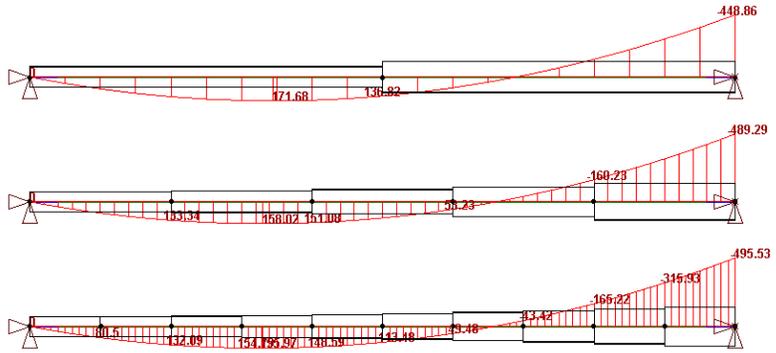
Constant display option



Interpolate display option

When assigning this section to a physical member, the user must subdivide the member. Note that the Subdivide Member command may be performed at any time before analysis. In the example below, we present a beam using 2, 5 and 10 divisions respectively. As a comparison, the bending moment diagram is presented for these three cases.





SAFI QUALITY SOFTWARE INC.

All rights reserved.
 3393 Sainte-Foy Road | QC | Canada
 G1X1S7 | info@safi.com
 T.F.1.800.810.9454 | W.418.654.9454