How to input proportional partial fixity for joined members in A3D MAX

When you specify partial fixity by either of the `proportional' options, the spring stiffness is calculated from the section properties and length of the currently selected member.
This is fine for single span members like members 15 and 18 in the diagram below but overestimates the stiffness if the span is divided into sub-members because of incoming secondary beams etc. eg: the typical primary beam consisting of members 9,11,13.

Versions of the program prior to v 3.53 do not `know' when the current member is only a segment of a longer full span. The members marked red in fig 1 are only a small portion of the span between columns so a calculation based on their stiffness 4EI/L is incorrect . The beams which are not so divided (15 and 18) return correct values for spring stiffness based on proportional fixity. The notes below explain how to get correct results with A3D MAX versions prior up to 3.52 and v 3.53 and later.
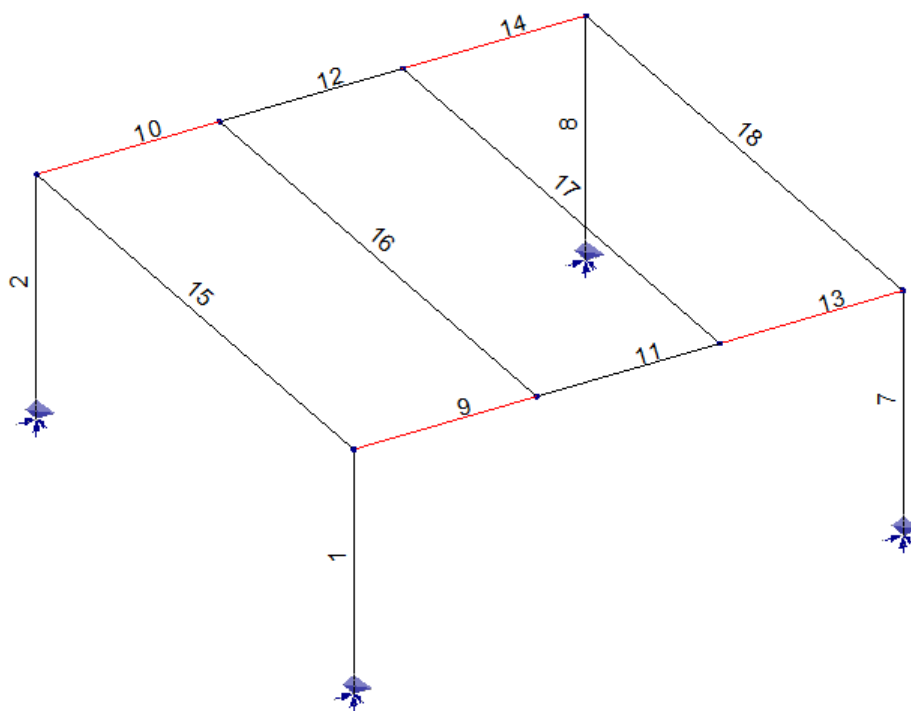

Fig 1:   Frame stick model with primary and secondary beams.

Version 3.52 and earlier

You can adjust the partial fixity inputs for joined members as follows using the *Partial fixity page* in the *Member Attributes* dialog. (fig 2) After inputting partial fixity as a proportion of member stiffness or as a proportion of fully fixed, select the `absolute stiffness' option. This causes the equivalent spring stiffness to be displayed in kNm/radian. Multiply this value by the local member length, then divide by the span length and input the result into the absolute stiffness field.
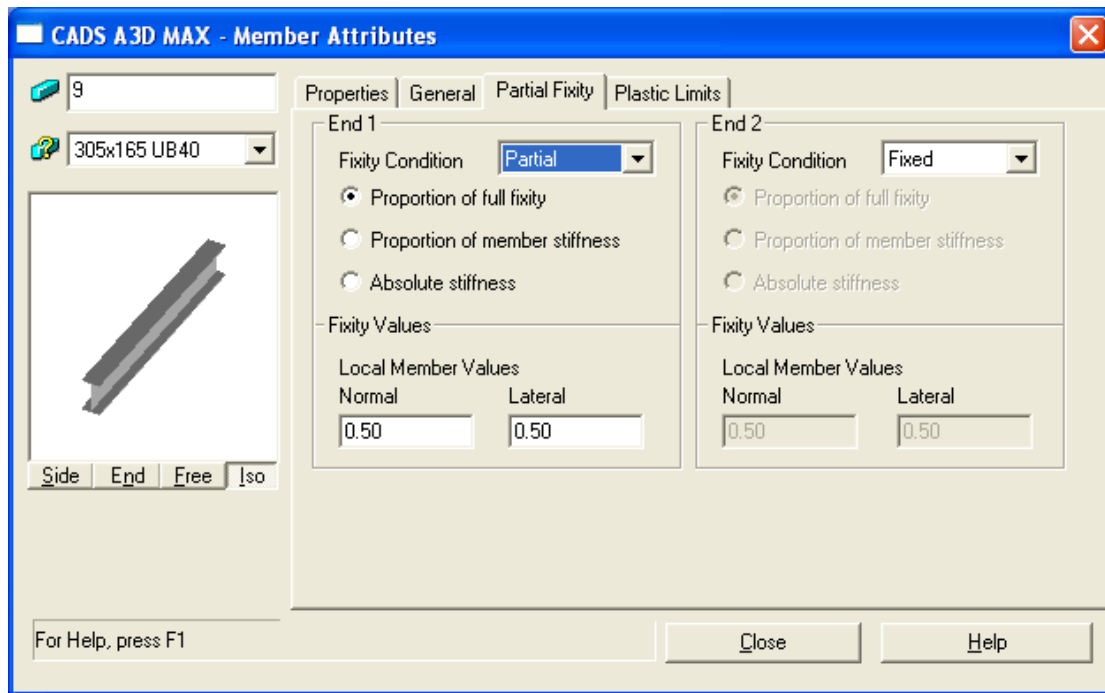
Fig 2: Partial fixity input page – v 3.52 and earlier.

Version 3.53 and later

Fig 3 below shows the new partial fixity page in the member attributes dialog. This allows you to input the overall design member length if this is greater than the analysis sub-member length. In the example, the analysis sub-members are 3.0 m long and the span length is 9.0 m. The software calculates the partial fixity spring stiffness based on the design member length (span) and the input proportional fixity. No manual adjustment is required.
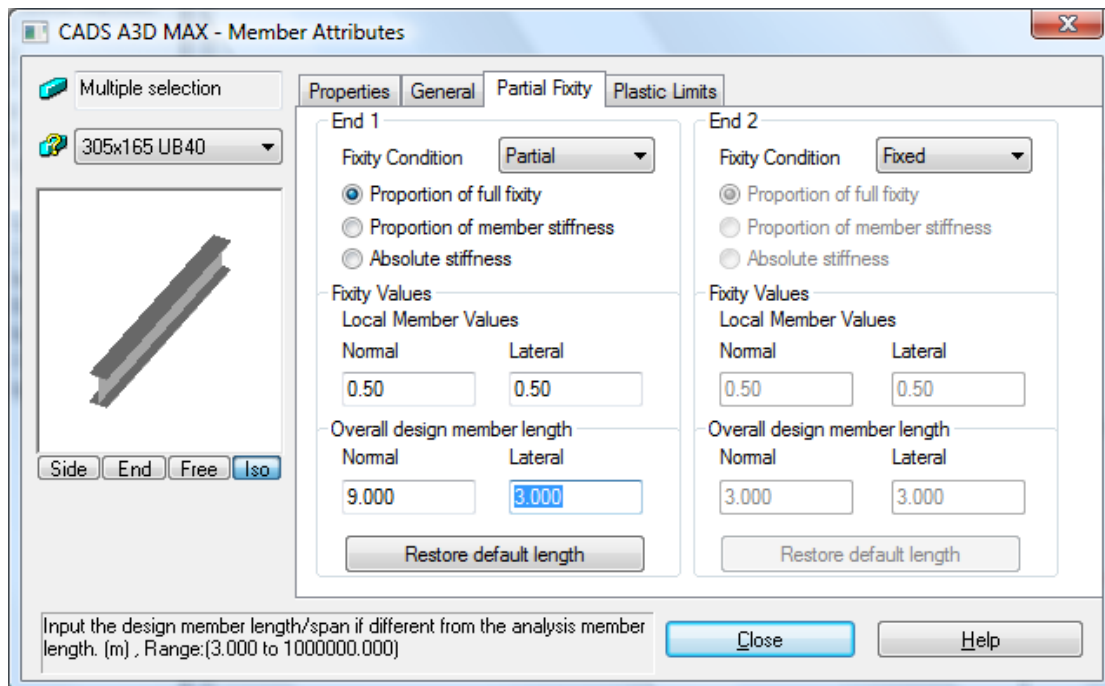

Fig 3:   Partial fixity input page – v 3.53 and later

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