CUSTOMER SUPPORT NOTE

Beam Fleshing - Defining the Cross Section

Note Number:	**CSN/LUSAS/1015**

This support note is issued as a guideline only.

LUSAS

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1. Introduction

Definition of beam cross section shape is only actually required for Cross Section Beam elements with quadrilateral cross section such as BMX3 (2D Kirchhoff Thin Beam), BSX4 (3D Kirchhoff Thin Beam) and BXL4 (3D Semiloof Thin Beam), but the cross section information is also used to visualise the beam's fleshing in V14. For other line mesh elements, it is necessary to enter the geometric properties, but specifying the cross-section is merely for fleshing visualisation and is therefore optional. The user can use the Section Library or Section Property Calculator to calculate the geometric properties, or calculate them outside of LUSAS and enter them manually. The cross section is automatically defined for existing sections that are extracted from the Section Library, and for those created by the Standard Section Property Calculator. When using the Arbitrary Section Property calculator, only the geometric properties are calculated and stored in the library. The fleshing visualisation of the section is, by default, a one by one square section. There is a development request to expand the Section Property Calculator so that it generates a visualisation of the arbitrary cross section as well as calculating the properties. Due to the arbitrary nature of the cross sections that the user can define, visualisation of these through fleshing is currently not automated for this tool.

2. Description

The section shape that is fleshed can be manually specified in the geometric properties by clicking on the **Cross section...** button as shown below in Figure 1.

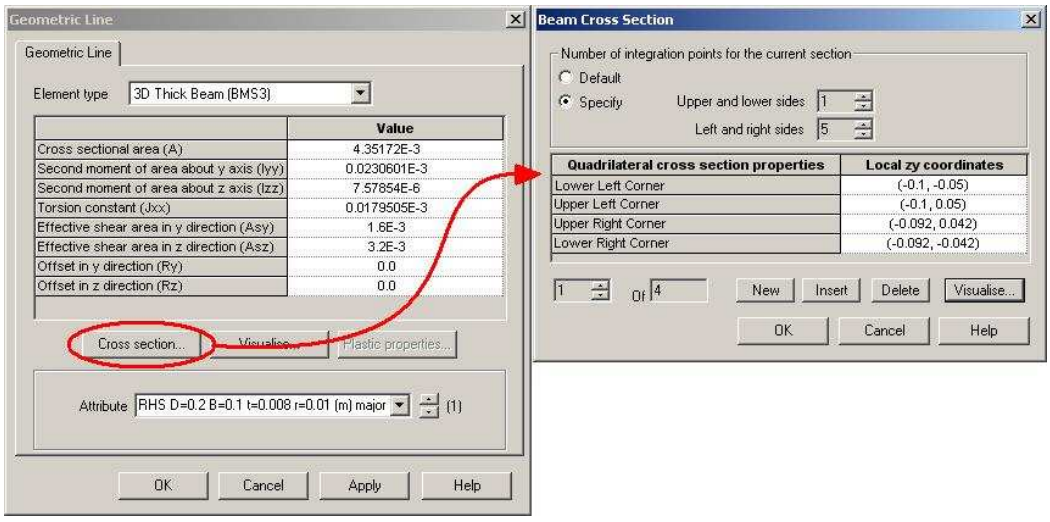

Figure 1

The cross section shape used for the fleshing is defined by specifying coordinates of quadrilaterals. A series of quadrilaterals can be specified to define more complex cross section shapes. The coordinates of each quadrilateral must be defined in local cross section coordinate pairs at each node y1, z1, y2, z2, y3, z3, y4, z4, working round the quadrilateral in a clockwise order. For example a rectangular hollow section is defined by 4 quadrilaterals. The coordinates of each quadrilateral are entered, clicking the **New** button to define additional quadrilaterals as required. The quadrilaterals defined can be checked by clicking the up and down buttons to the left of the **New** button.

The **Visualise...** button will display the shape defined by the quadrilaterals that you have input as shown below in Figure 2.

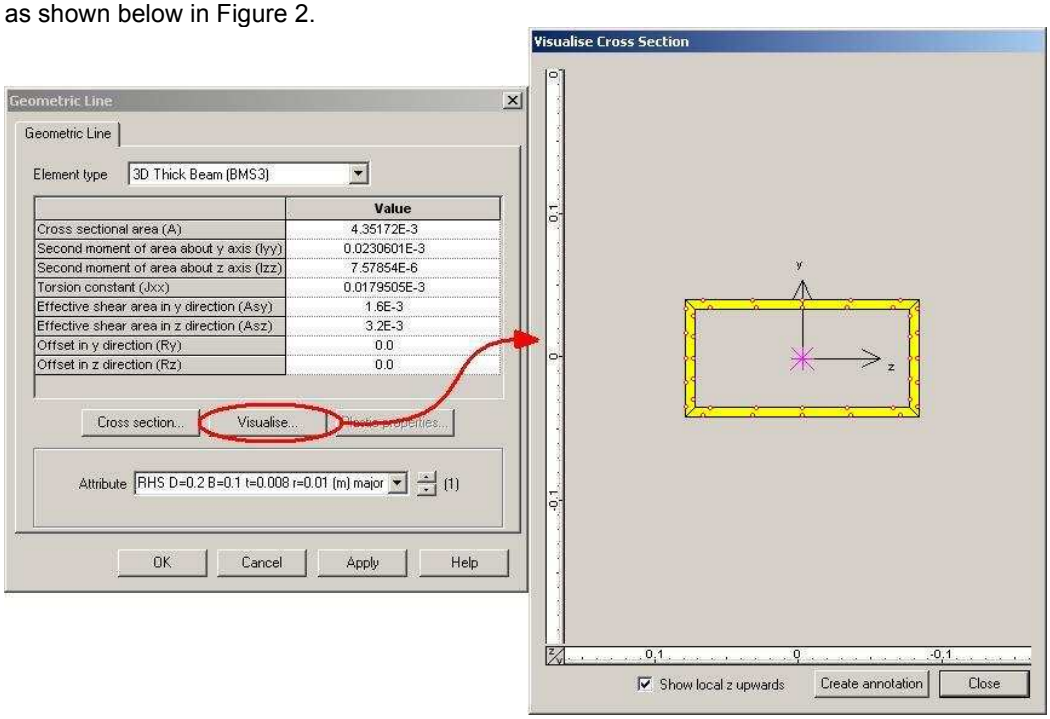

Figure 2

This cross section definition then controls the fleshing for the model as shown below in Figure 3.

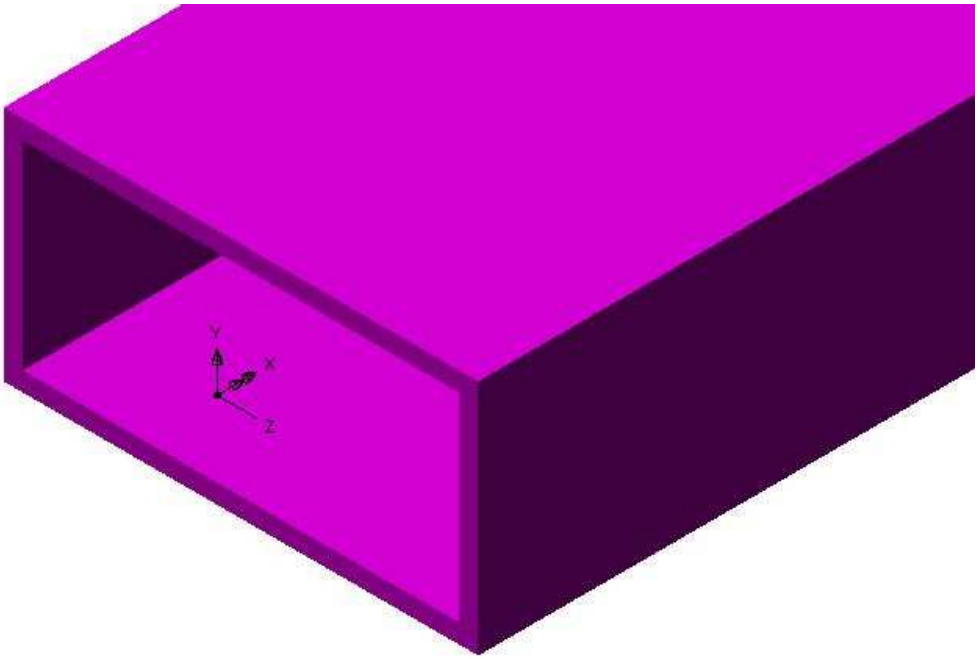

Figure 3