T-Beam - Exercises

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Exercises

Exercise 1:

For the analysis performed in the tutorial, use the PATH OPERATION tool to compare the deformed shape of the neutral axis with that predicted by simple beam theory.

Exercise 2:

Repeat the analysis in the tutorial replacing the end boundary condition at one end with a simple support condition at all nodes located along the knife edge support as in the tutorial, but allowing for axial displacement, i.e. a roller condition as depicted in most texts.

a) Report on substantive changes in the FEA predictions for the normalized mid-span normalized axial stress. Comment on why such changes occur. Note that texts often prescribe a roller end boundary condition when discussing Euler-Bernoulli beam theory, yet this simple beam theory does NOT exhibit coupling between bending and axial deformations. Thereby, Euler-Bernoulli beam theory does not predict any axial deformation under purely transverse point loading as prescribed in this problem. What repercussions does this have for your three-dimensional analysis that requires coupling of bending and axial deformation?

b) Using the PATH OPERATION tool, compare the deformed shape of the neutral axis with that predicted by simple beam theory.

Exercise 3:

Locate the actual neutral axis of the T-Beam cross section. Repeat the analysis in the tutorial replacing the end boundary condition with a simple support condition at all nodes located along the neutral axis along the knife edge support.
a) Report on substantive changes in the FEA predictions for the normalized mid-span axial stress. Comment on why such changes occur.

b) Using the PATH OPERATION tool, compare the deformed shape of the neutral axis with that predicted by simple beam theory.

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