SESAM TUTORIAL

GeniE

Tension/Compression Analysis

Valid from program version 8.2

Sesam Tutorial

GeniE – Tension/Compression Analysis

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Valid from GeniE version 8.2

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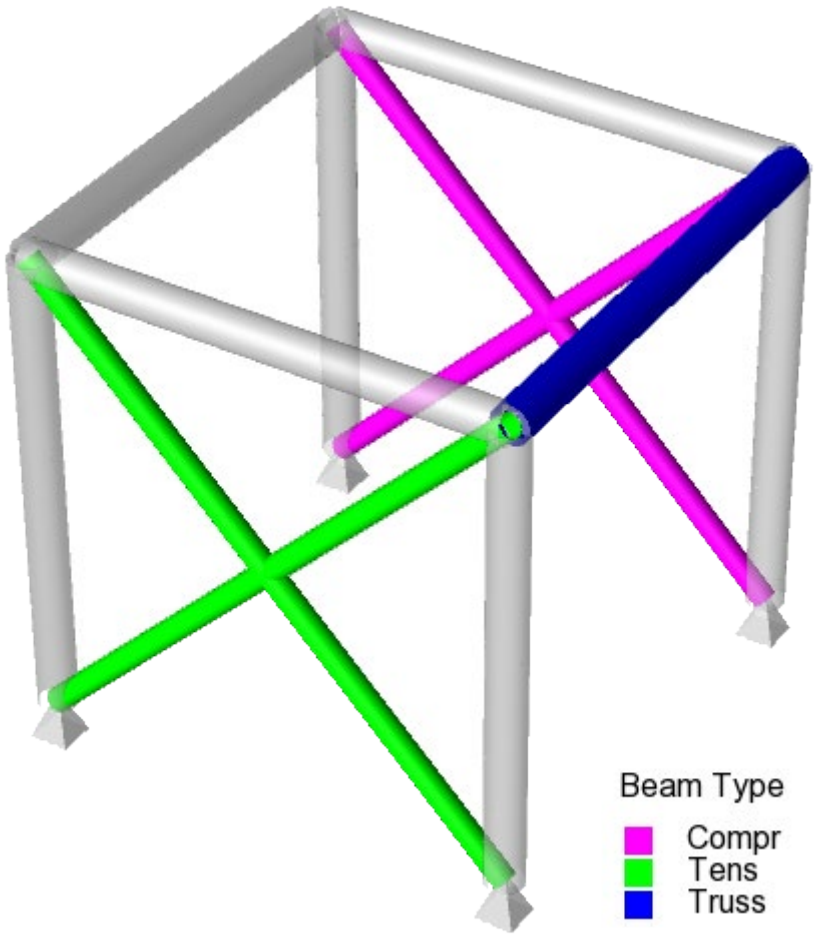
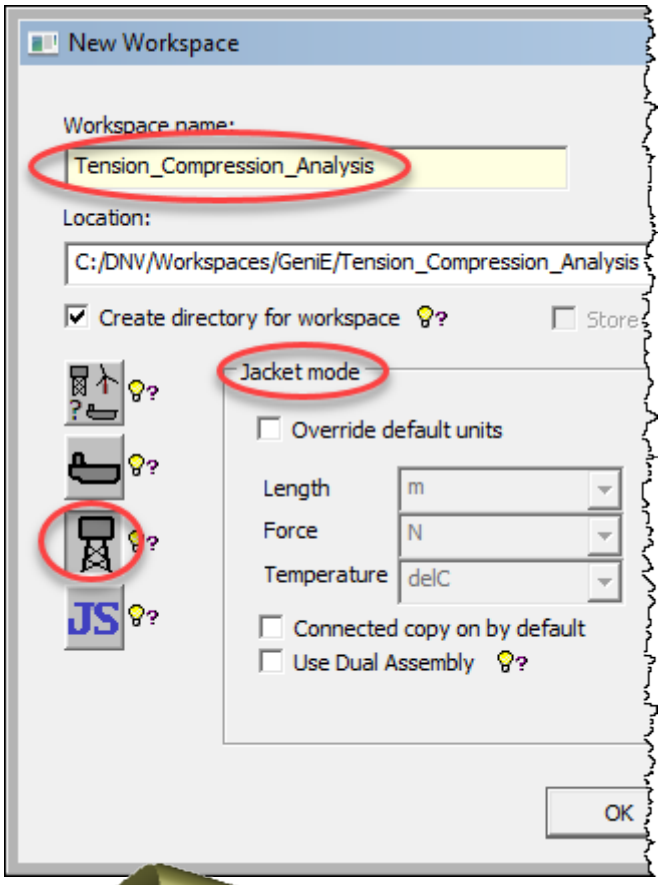
1 INTRODUCTION

- This tutorial explains how to perform a tension/compression analysis. This is a non-linear analysis in which selected beam elements are assigned properties of a truss element that can only take compression or tension.
  - Note that a truss is a beam with properties so that it can only take axial force (tension and compression) but no bending.
  - Compression-only trusses can for example be used for cases when a member loses contact (is lifted off) other members for deformations that would otherwise cause a tensile force in the member.
  - Tension-only trusses can for example be used for wires.



2 CREATE THE MODEL

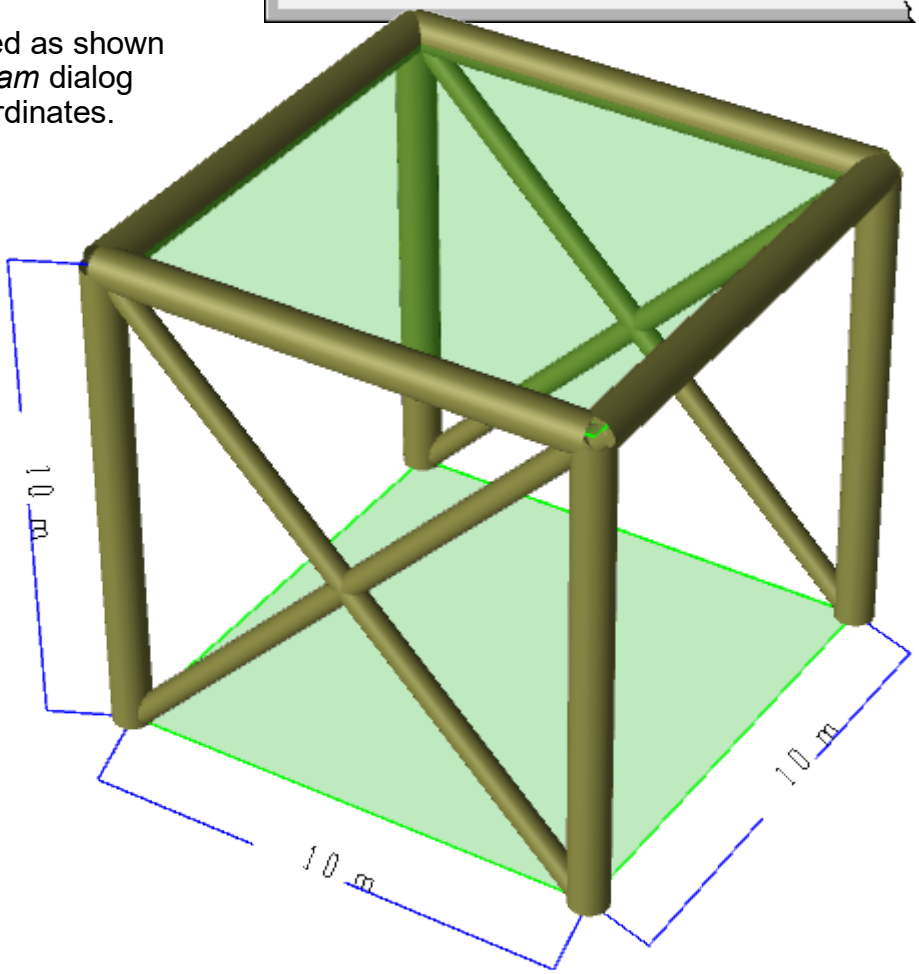
- Start GeniE and open a new workspace.
  - Give a *Workspace name*.
  - Accept default units m and N and click *OK*.
    - Unless otherwise specified, all values in this tutorial are in these units.
  - Select *Jacket mode* to limit menus to those relevant for beam modelling.



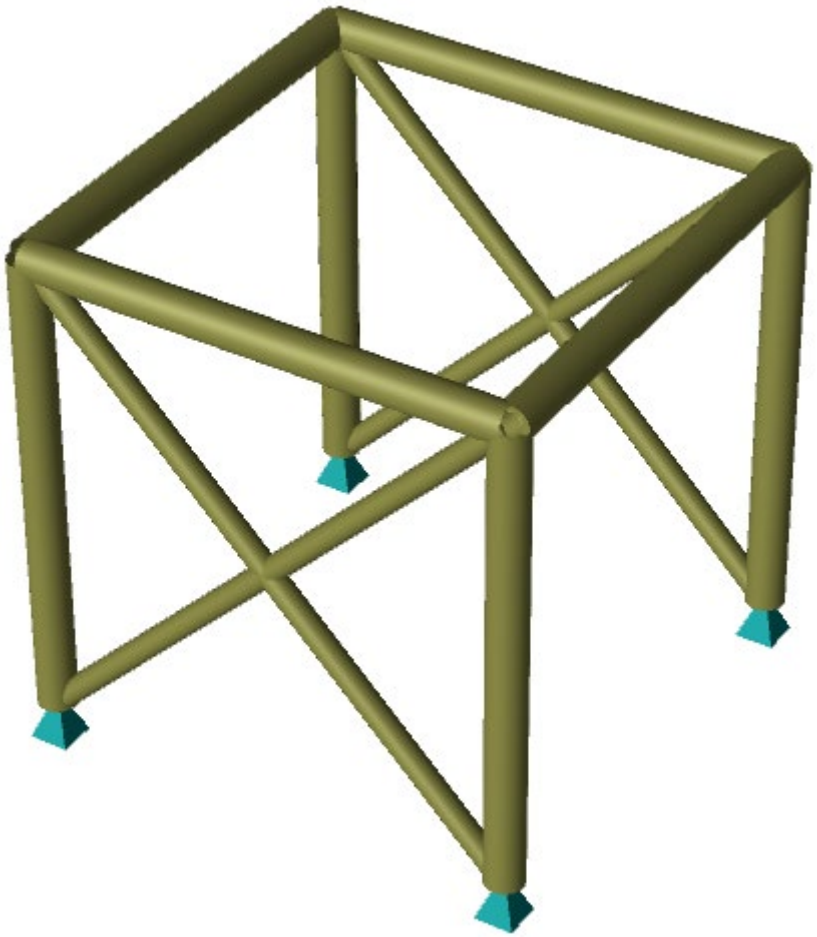
- Define a steel material with default properties. The *Yield* value has no relevance.

- Define the beam cross sections below.
  - Pipe1: D = 0.8 m, t = 0.02 m
  - Pipe2: D = 0.5 m, t = 0.02 m

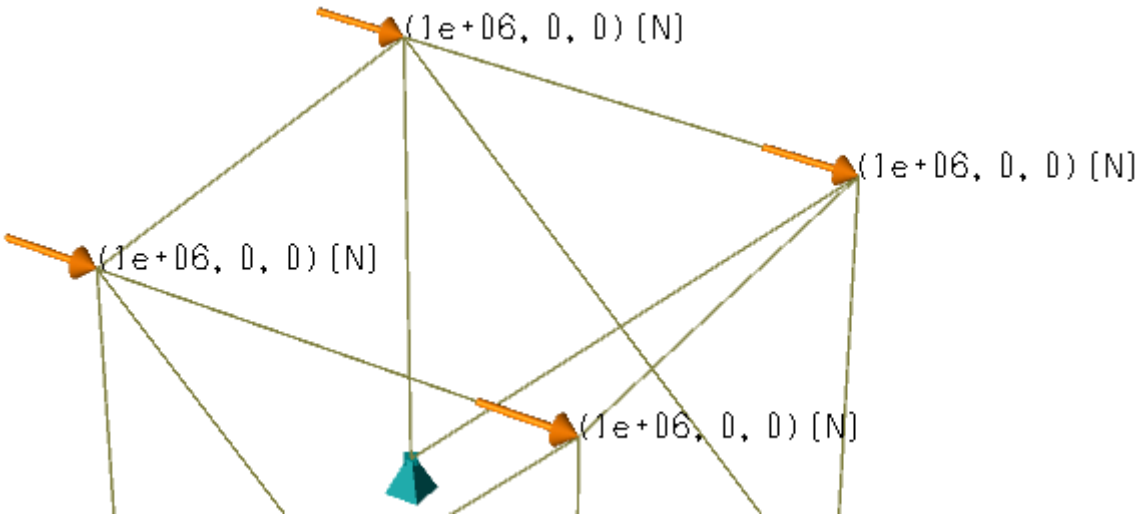
- Create the 10x10x10 model displayed below.
  - Guide planes may be used as shown or the *Create Straight Beam* dialog may be used to fill in coordinates.



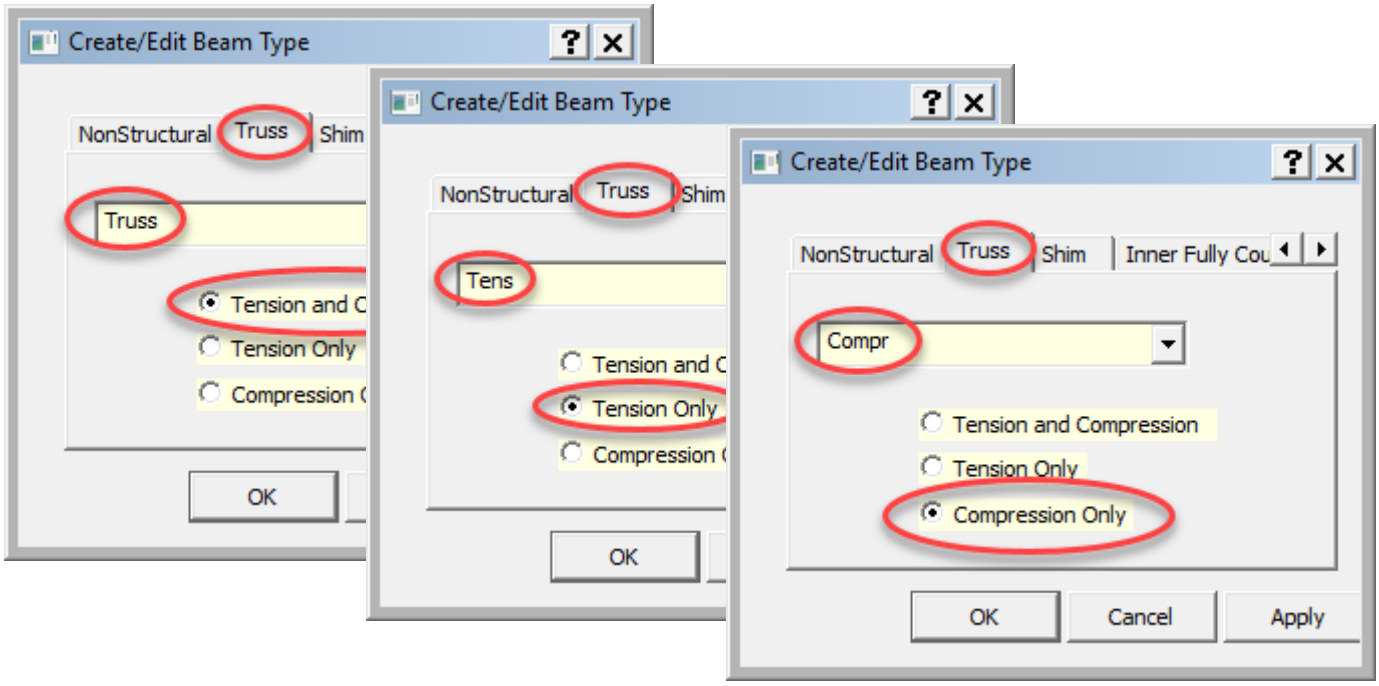
- Add pinned supports as shown.



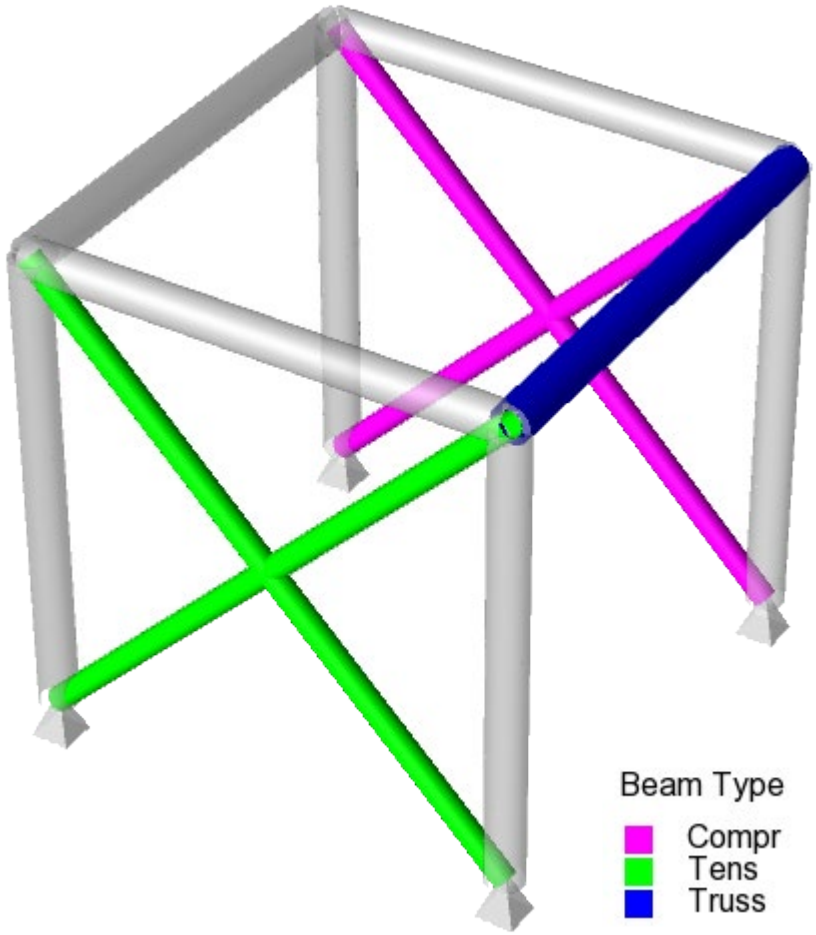
- The model is subjected to two load cases:
  - LC1 is four point loads of 1000 kN in X-direction as shown below.
  - LC2 is four point loads of −1000 kN in X-direction in the same points as for LC1.



➢ Use *Edit* | *Properties* to open the *Properties* dialog. In the *Beam Type* tab click *Create/Edit Beam Type* to define the following truss properties:

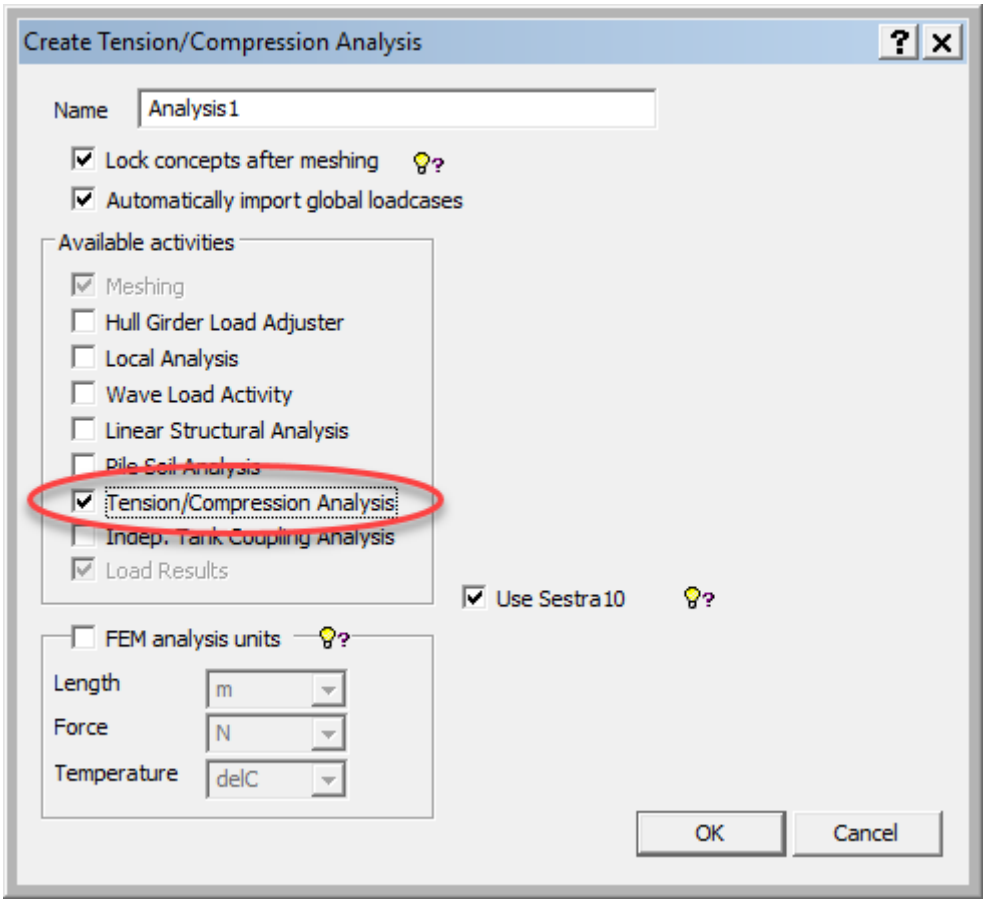


➢ The property Truss will be a member taking both tension and compression but no bending.

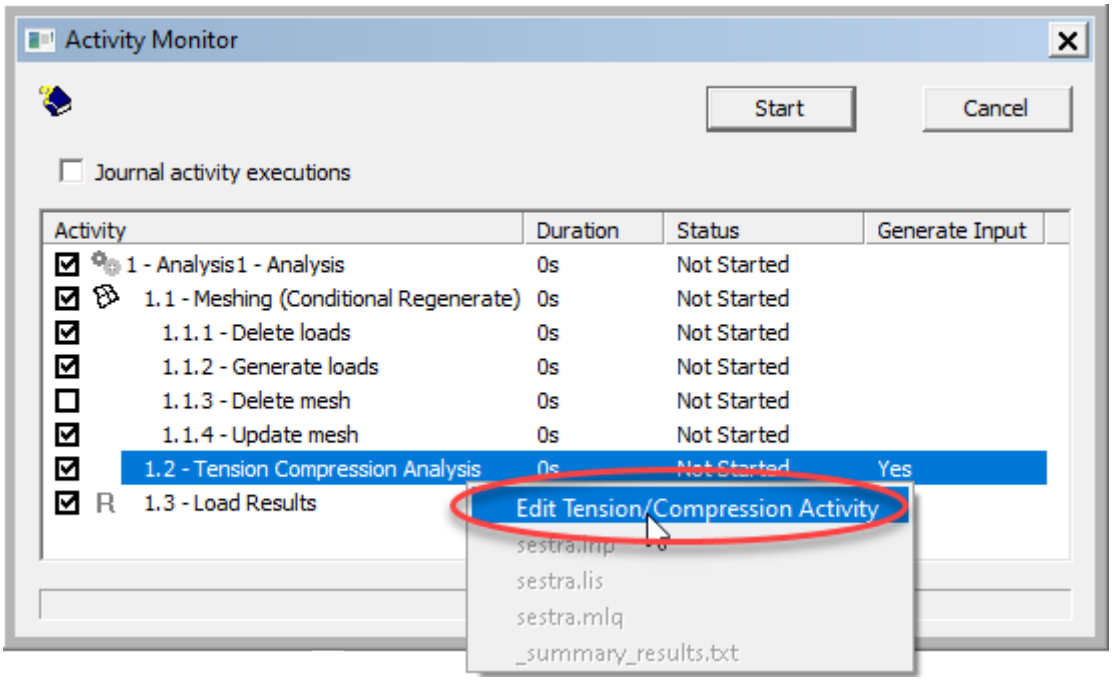


3 PERFORM THE NON-LINEAR TENSION/COMPRESSION ANALYSIS

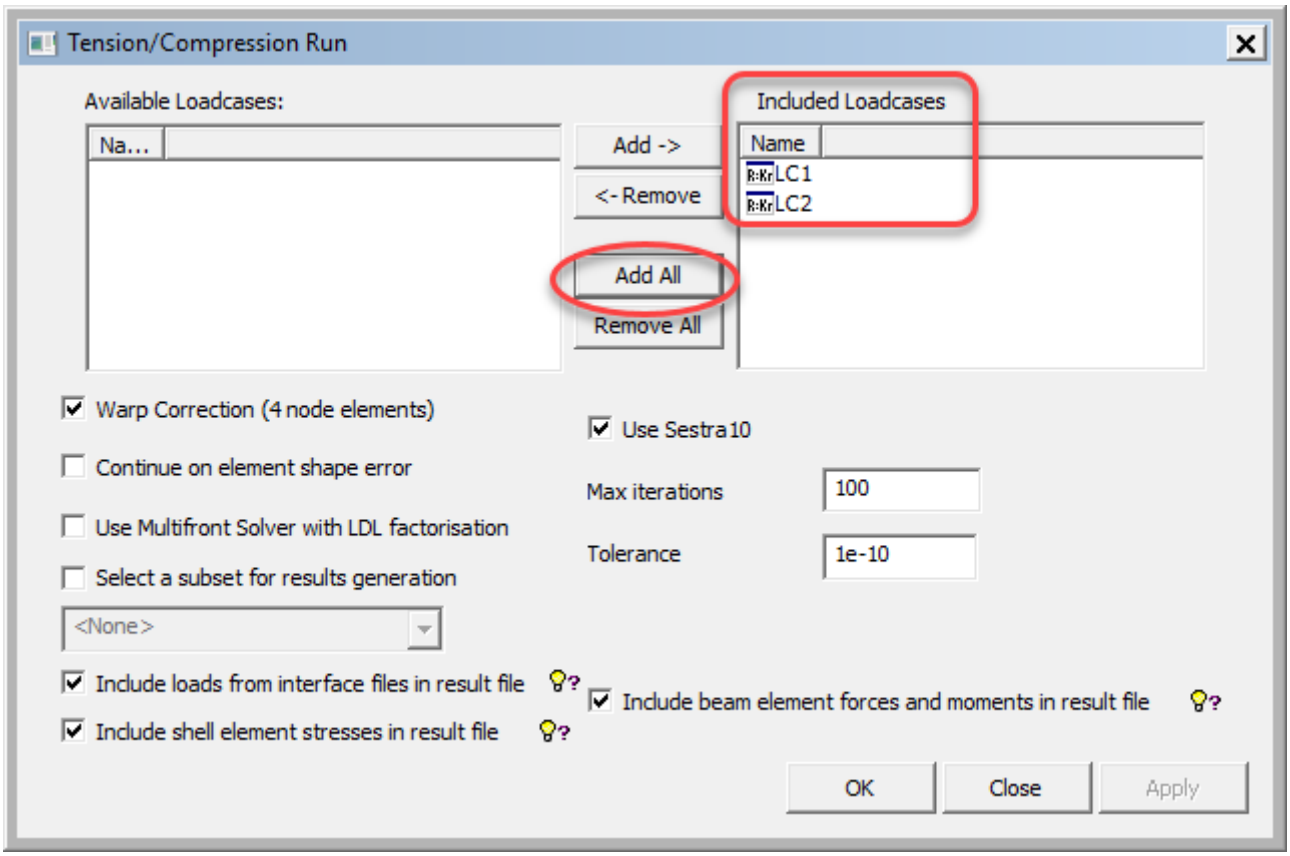
➢ Use Alt+D to create a *Tension/Compression Analysis* shown.



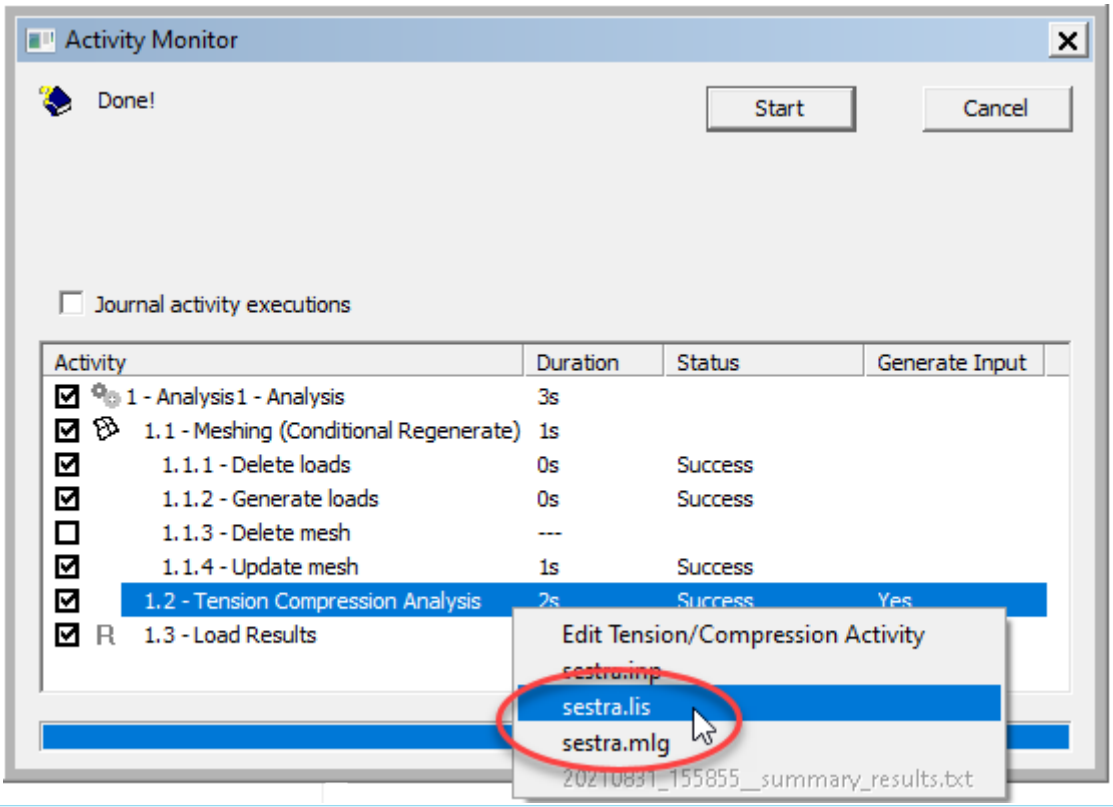
➢ Edit the *Tension Compression Analysis* activity:



➢ Include both load cases in the tension/compression analysis:

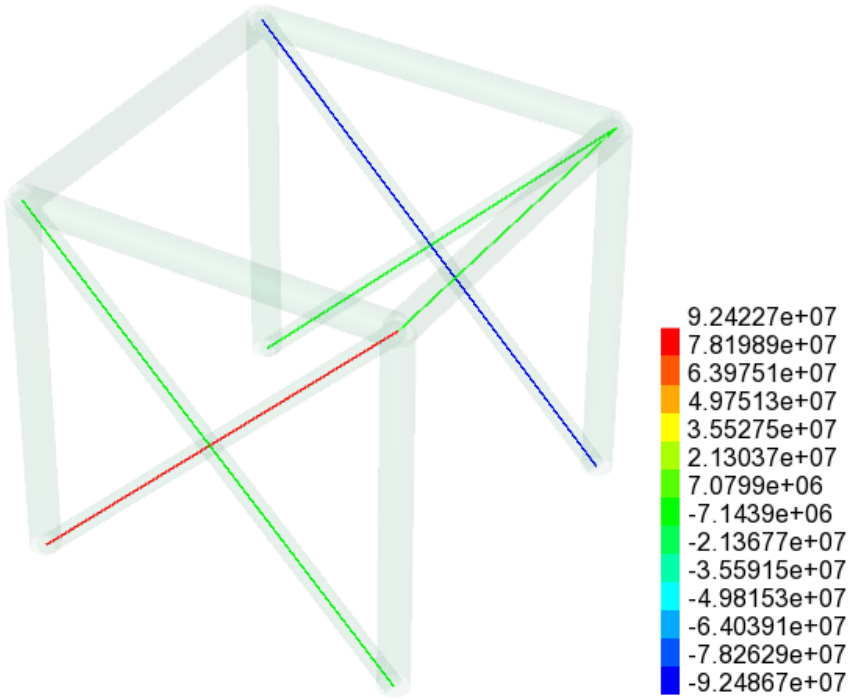


➢ Run the analysis. Thereafter, open the sestra.lis and sestra.mlg files to verify the analysis:

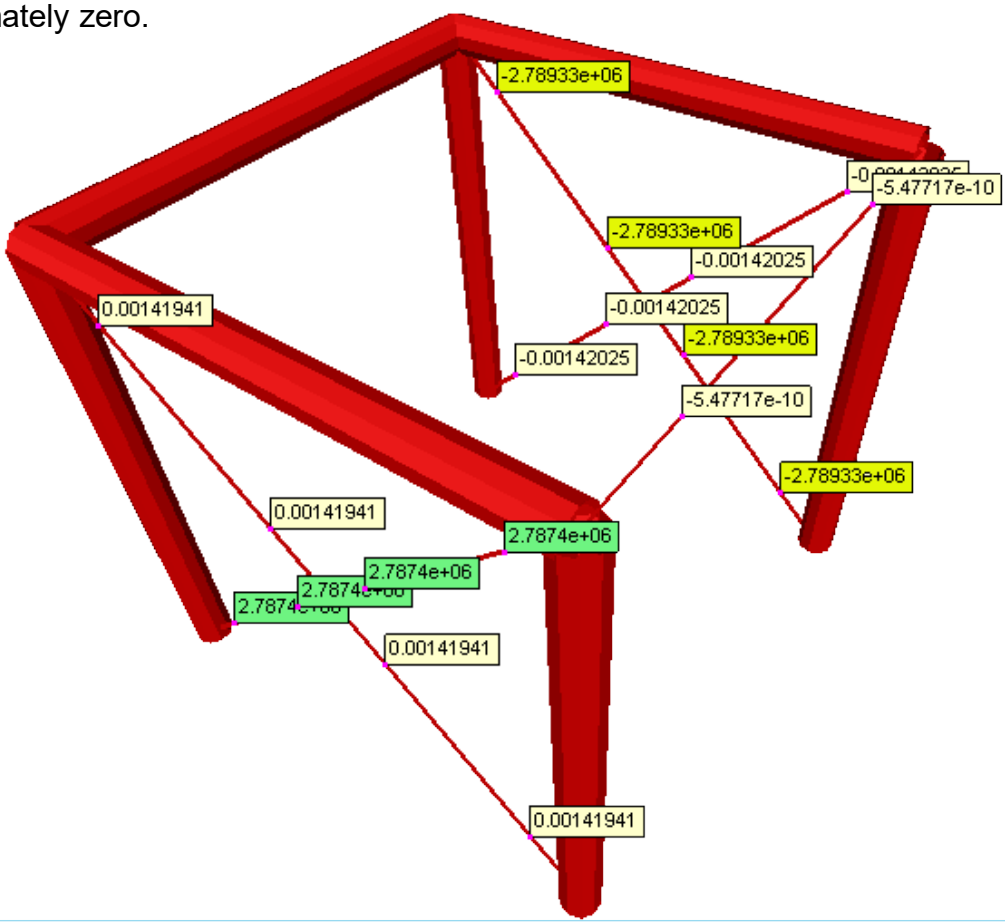


4 VIEW THE RESULTS

- Using the *Results – with Mesh* display configuration the axial stresses in the truss elements for load case LC1 may be colour coded (the mesh is made 95% transparent):



- By presenting the axial stresses for LC1 numerically in Xtract it is seen that the trusses have tension (green labels) and compression (yellow labels) as expected. Other labels are approximately zero.



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