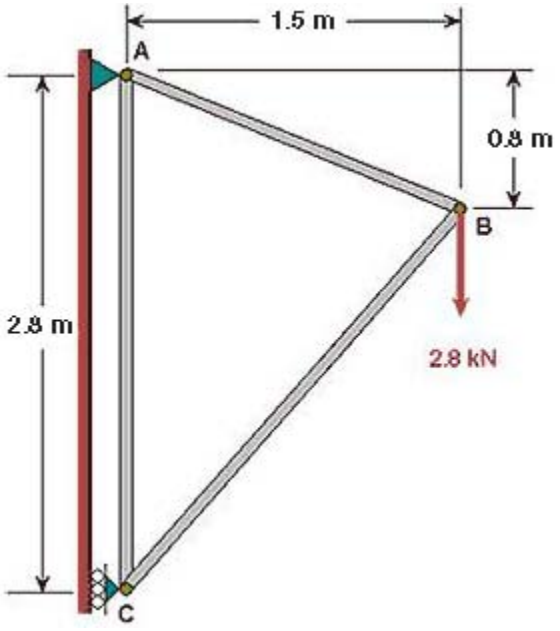
ANSYS - Truss Step 4

Problem Specification
Problem Specification
1. Start-up and preliminary set-up
2. Specify element type and constants
3. Specify material properties
4. Specify geometry
5. Mesh geometry
6. Specify boundary conditions
7. Solve!
8. Postprocess the results
9. Validate the results
Problem Set 1
Problem Set 2

Step 4: Specify geometry

Overview

Since we are using the 2D Spar element, we can represent each truss member by a line. A line can be created by joining two keypoints (ANSYS terminology for vertices). So we'll need three keypoints, located at A, B and C in the figure below. We'll locate the origin of the coordinate system at C and number the keypoints at A, B and C as 1, 2 and 3, respectively.



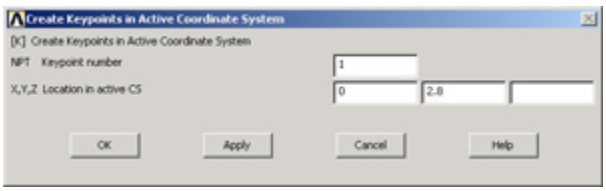
Create Keypoints

Main Menu > Preprocessor > Modeling > Create > Keypoints > In Active CS

The active CS (i.e. Coordinate System) is the global Cartesian system by default and we'll work only in this coordinate system in our friendly introduction. ANSYS offers the capability to switch between various types of coordinate systems which will be necessary when you move on to solving super-duper problems.

In the *Create Keypoints in Active Coordinate System* dialog box,

Enter `1` for ***Keypoint number***
Enter `0` for X and `2.8` for Y
(The Z value defaults to zero)
Click ***Apply*** (which accepts the input and then brings back the dialog box for further input)



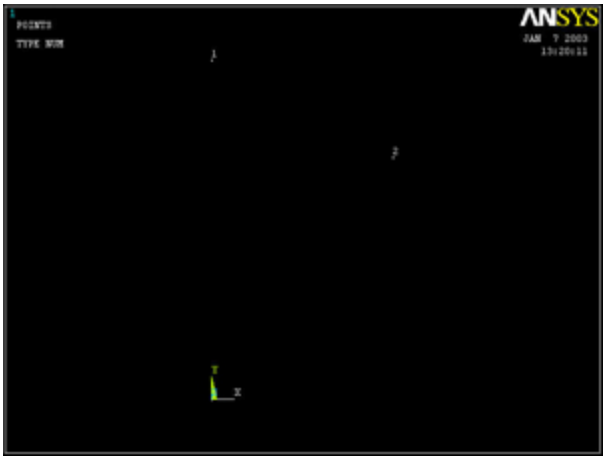
Note that you can move to the next field using the *Tab* key.

Enter 2 for ***Keypoint number***
Enter `1.5` for X and `2.0` for Y
Click ***Apply***

Enter 3 for ***Keypoint number***
Enter `0` for X and `0` for Y
Click ***OK*** (which accepts the input and then closes the dialog box)

Note the difference between Apply and OK which holds throughout ANSYS.

The keypoints will now be displayed in the Graphics window along with a triad that indicates the origin of the coordinate system (coincident with keypoint 3 in our case) and the axes.



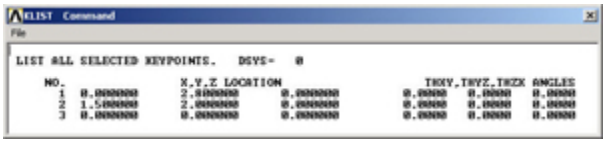
Higher Resolution Image

Check Keypoints

To check if the keypoints have been created correctly:

Utility Menu > List > Keypoints > Coordinates only

This brings up a window listing the coordinates and rotation angles for the keypoints. Verify that you have the following:



You can rotate the coordinate system associated with each keypoint and that is what the rotation angles THXY, THYZ and THZX refer to. In our case, we don't need to rotate the keypoint coordinate system and so the rotation angles are identically zero.

Close the window listing the keypoints.

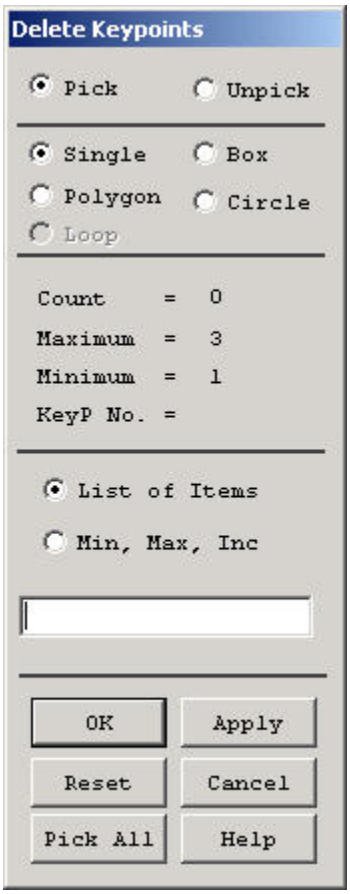
Close the *Keypoints* and *Create* menus.

Modifying Keypoints (If Necessary)

If you are like me, you made a mistake while creating keypoints and cursed that there is no undo button. To correct your mistake(s), you can delete keypoints and re-create them. In case you need to delete a keypoint, do the following:

Main Menu > Preprocessor > Modeling >Delete > Keypoints

This brings up the so-called pick menu.



Click on the keypoint you want to delete. A square appears around that keypoint indicating that it is selected. (Repeat for other keypoints as necessary.) Click ***OK*** in the pick menu.

You should see the keypoint disappear in the Graphics window. You can also check that the keypoint has been deleted using **Utility Menu > List > Keypoints**. You can then re-create the keypoint.

Save your work

Once you have successfully created the keypoints, save your work using

Toolbar > SAVE_DB

This is a short-cut for

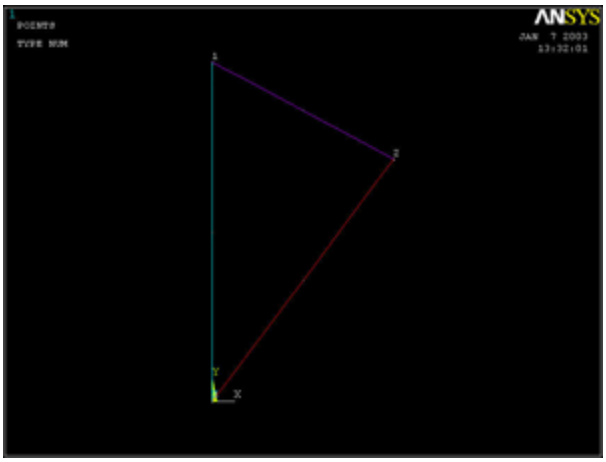
Utility Menu > File > Save as Jobname. db

Create Lines from Keypoints

Main Menu > Preprocessor > Modeling > Create > Lines > Lines >In Active Coord

This will bring up the *Lines in Active Coord* pick menu.

To create the line between keypoints 1 and 3, click on keypoint 1 and then keypoint 3. Similarly, create lines between keypoints 1 & 2 and keypoints 2 & 3.



Higher Resolution Image

Close the *Lines in Active Coord* pick menu by clicking on ***Cancel***.

Close the *Lines and Create* menus.

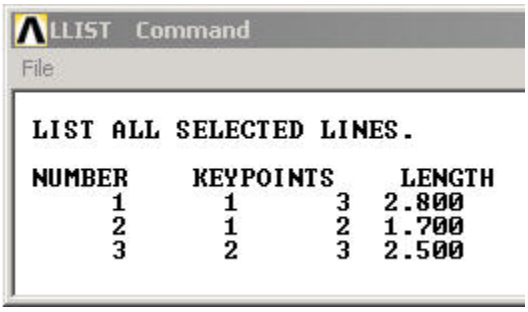
Check Lines

Take a look at the list of lines that have been created:

Utility Menu > List > Lines

Click ***OK*** to accept the default output format.

The first four columns in the list should be:



The order of the keypoints for a line doesn't matter i.e. line *l1* could go from keypoint *k1* to *k2* or equivalently, *k2* to *k1*.

Close the window listing lines.

Modifying Lines (If Necessary)

If a line doesn't look right, you can delete and re-create it. To delete a line:

Main Menu > Preprocessor > Modeling > Delete > Lines Only

This brings up the pick menu.

Click on the line you want to delete in the Graphics window. Click ***OK***. This deletes the line.

Save your work

Once you have successfully created the lines, click on **Toolbar > SAVE_DB** to save the database.

Go to Step 5: Mesh geometry

See and rate the complete Learning Module

Go to all ANSYS Learning Modules