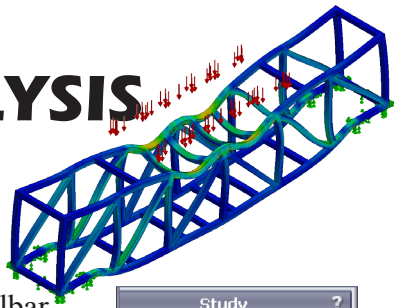
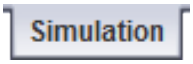
Beam Combine ANALYSIS



A. New Study.

Step 1. If necessary, open your **Beam1** part file.

Step 2. Click **Simulation**  on the Command Manager toolbar.

Step 3. Click the **drop down** of **Study Advisor** on the Simulation toolbar and click **New Study**.

Step 4. In the Study Property Manager:
under Name, **Fig. 1**
key-in **Beam Combine**
under Type
select **Static**
click OK .

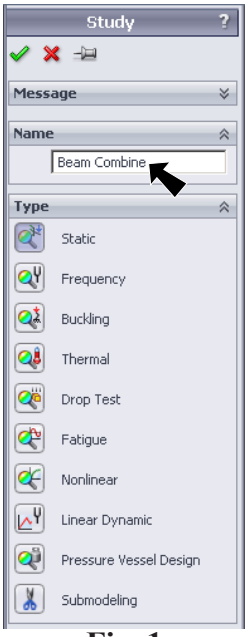


Fig. 1

B. Fixture.

Step 1. Click **Bottom** on the Standard Views toolbar. (**Ctrl-6**)

Step 2. Click the **drop down** of **Fixtures Advisor** on the Simulation toolbar and click **Fixed Geometry**.

Step 3. In the Fixture Property Manager:
under Standard, **Fig. 2**
select **Fixed Geometry**
in the Face, Edges, Vertices for Fixture field
click the **two bottom split faces** on Beam, **Fig. 3**
click OK .

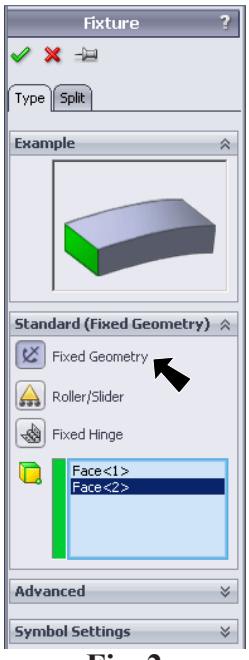


Fig. 2

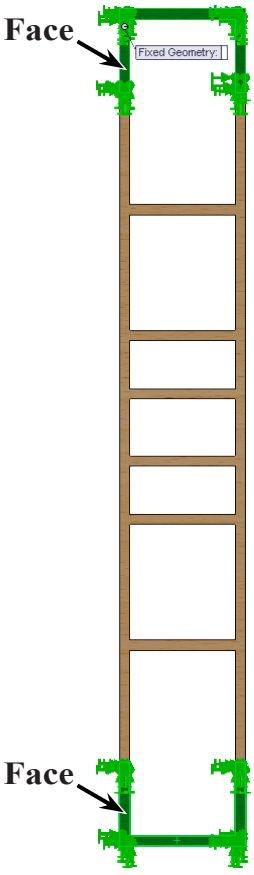


Fig. 3

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C. Force.

Step 1. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

Step 2. Click the **drop down** of **External Loads** on the Simulation toolbar and click **Force**.

Step 3. In the Force/Torque Property Manager set:
under Selection, **Fig. 4**
select **Force**
click **split line face on top of Beam**, **Fig. 5**
under Units
select **English**
set **Force Value 23**
click OK .

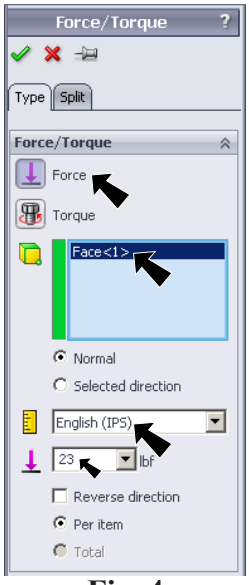


Fig. 4

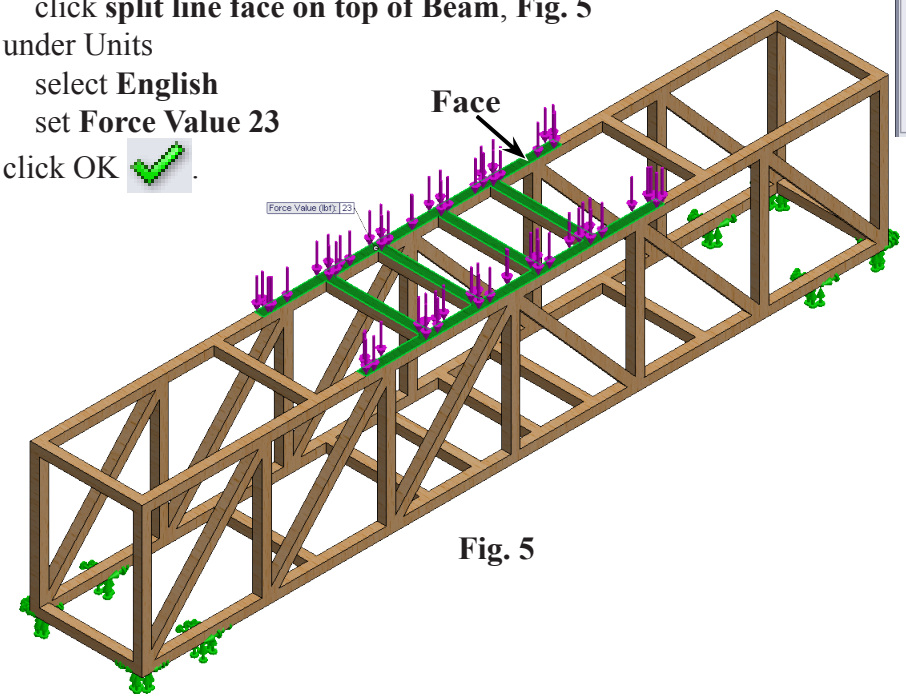


Fig. 5

D. Run.

Step 1. Click **Run** on the Simulation toolbar.

Step 2. Note the **Yield strength:**
15.567 mega pascals, **Fig. 6**
yours might be slightly different.

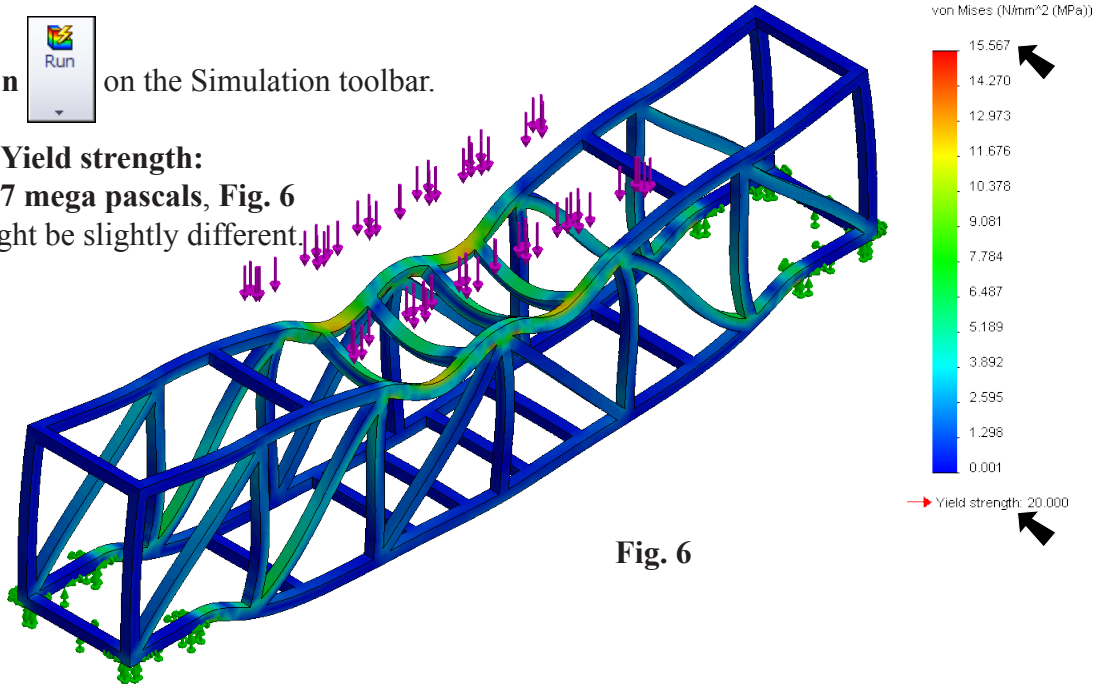


Fig. 6

E. Results - Factor of Safety.

Step 1. **Right click Results folder** in the Simulation Study Tree and click **Define Factor Of Safety Plot**, **Fig. 7**.

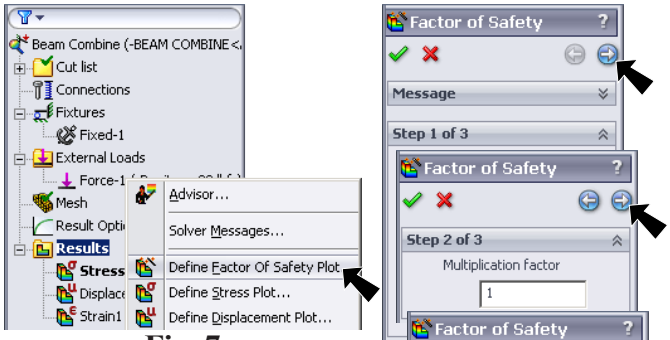


Fig. 7

Step 2. In the Factor of Safety Property Manager, **Fig. 8**

Step 1 click **Next**

Step 2 confirm **Multiplication factor is 1** and click **Next**

Fig. 8

Step 3. In the Factor of Safety Property Manager
Step 3, **Fig. 8**
select **Areas below factor of safety**
note **Minimum factor of safety 1.28475**
your FOS might be slightly different
click OK .

Step 4. View the FOS plot. The red members will not support the current load. Blue members indicates we can increase the load.

Step 5. Next, we will change load using formula
current FOS * current Force = safe load
or 1.28475 * 23 lbs. = 29.549 lbs.
Try 29.549 lbs of force.

F. Edit Force.

Step 1. **Double click Force1** in the Simulation Study Tree to display the Force Property Manager, **Fig. 9**.

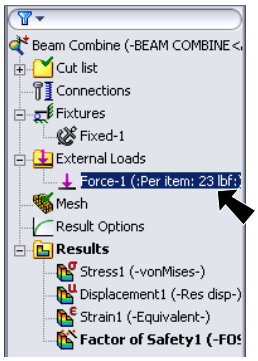
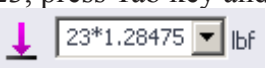


Fig. 9

Step 2. In the Force/Torque Property Manager set:
under Force, **Fig. 10**
Force Value 29.549
Tip: Key-in *1.28475 in the Force Value field after the 23, press Tab key and let SW do the math



click OK .

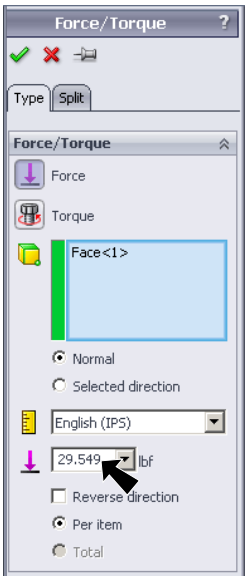


Fig. 10

G. Run.

Step 1. Click **Run**

on the Simulation toolbar.

Step 2. Note the **Yield strength:**
20,000 mega pascals, **Fig. 11**.

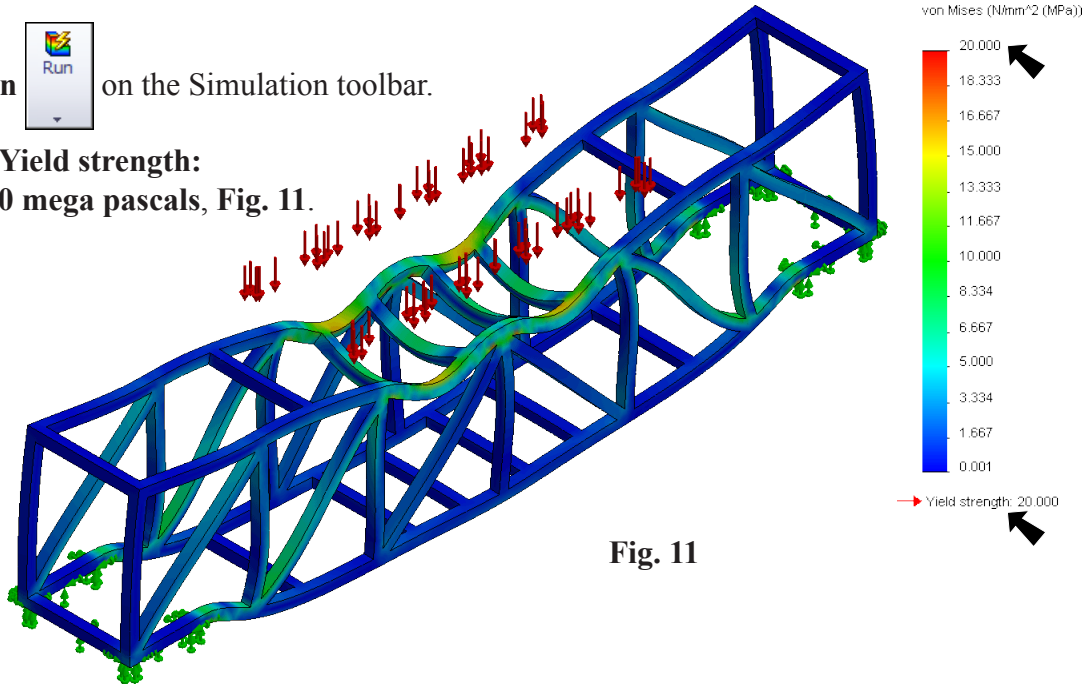


Fig. 11

H. Confirm Factor of Safety = 1.

Step 1. **Double click Factor of Safety1** in the Simulation Study Tree to display the Factor of Safety1 plot, **Fig. 12**.

Step 2. All members should be blue. The blue member will support the load.

Step 3. **Double click Factor of Safety1** in the Simulation Study Tree to display the Force Property Manager, **Fig. 12**.

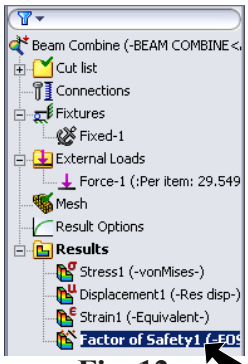


Fig. 12

Step 4. In the Factor of Safety Property Manager, **Fig. 13**

Step 1 click **Next**

Step 2 click **Next**

Fig. 13

Step 5. In the Factor of Safety Property Manager **Step 3**, **Fig. 13**
select **Areas below factor of safety**
note **Minimum factor of safety 1.00001**
your FOS might be slightly different
click OK .

I. Efficiency.

Step 1. Click Tools Menu > Mass Properties.

Step 2. Make note of **Mass in grams** in the Mass Properties dialog box and close dialog [X], **Fig. 14**.

Step 3. Use formula **total load in lbs. * 4.54 / Structure Mass in grams = Efficiency**

29.549 * 4.54 / 4.56 = **29.41**

Step 4. Save. Use **Ctrl-S**.

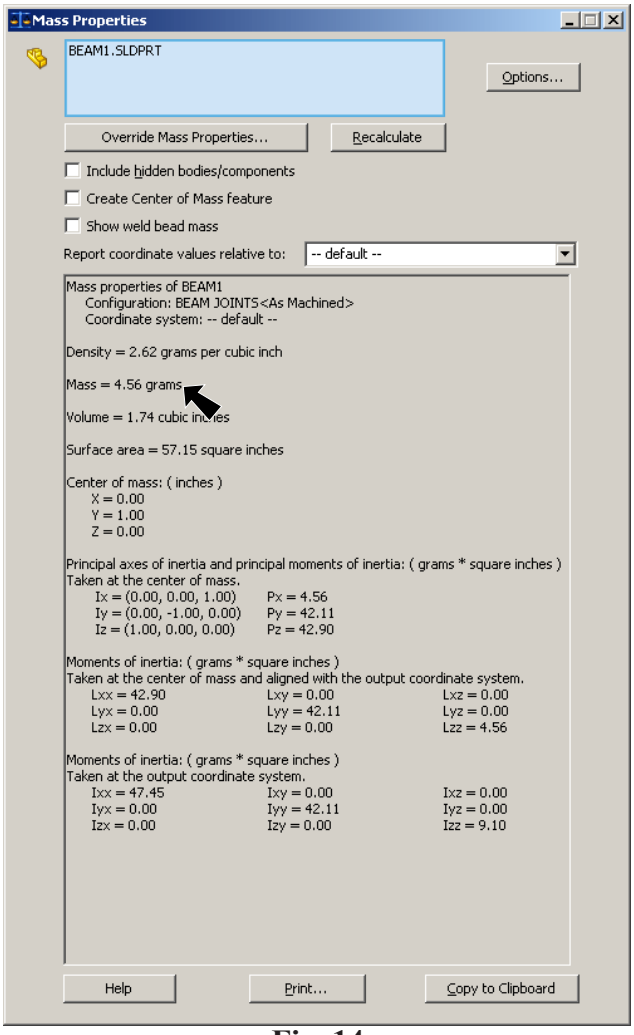


Fig. 14