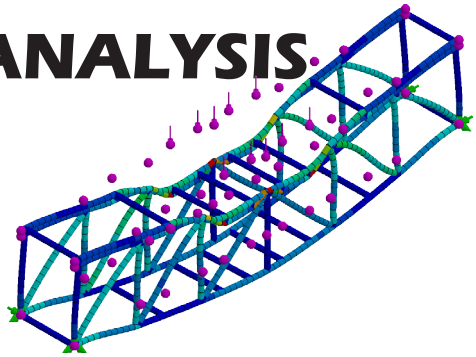
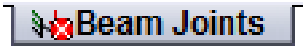
Beam Double Joints ANALYSIS



A. Update Beam Joints Study.

Step 1. If necessary, open your **Beam Double** part file.

Step 2. Click **Beam Joints Study** tab 

at the bottom left of the graphics area.

B. Recalculate Joints.

Step 1. **Double click Joint group** in the Simulation Study Tree to display the Edit Joints Property Manager, **Fig. 1**.

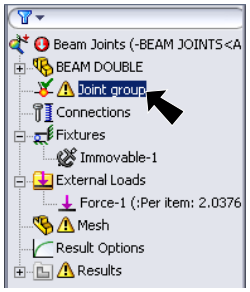


Fig. 1

Step 2. In the Edit Joints Property Manager set:

under Treat as joint for clearance, **Fig. 2**

select **less than**

click **Yes**, **Fig. 3**

select **inch** for units

value **.13**

click **Calculate** button

click OK .

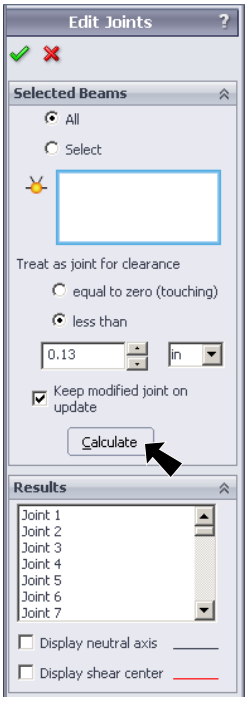


Fig. 2

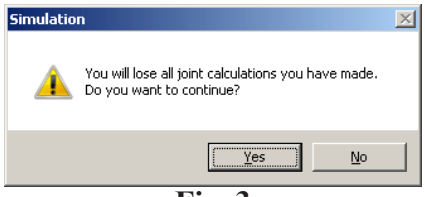


Fig. 3

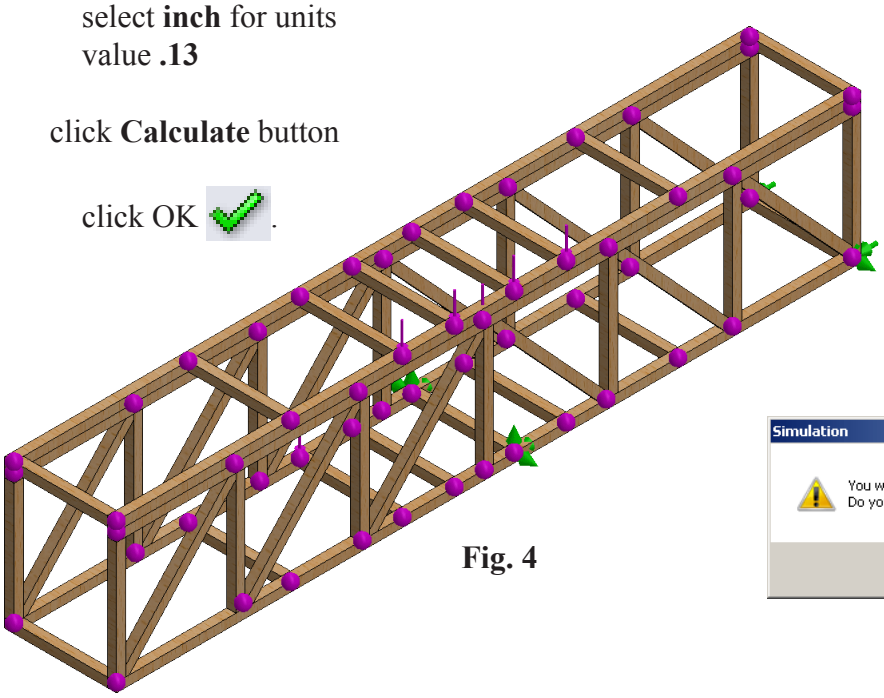


Fig. 4

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C. Fixture.

Step 1. **Double click Immovable-1** in the Simulation Study Tree to display the Fixture Property Manager, **Fig. 5**.

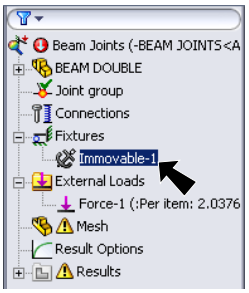


Fig. 5

Step 2. In the Fixture Property Manager:
under Standard, **Fig. 6**
right click in the Joints field and select **Clear Selections**

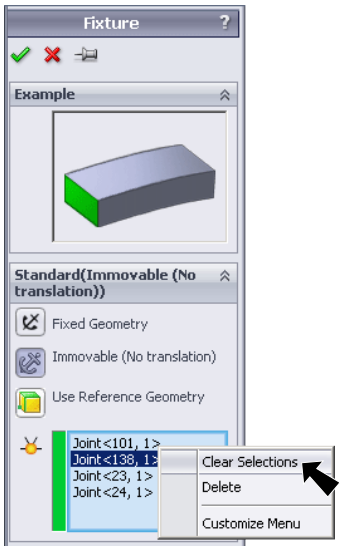


Fig. 6

click the **bottom corner joints** on Beam, **Fig. 7** and **Fig. 8**

click OK .

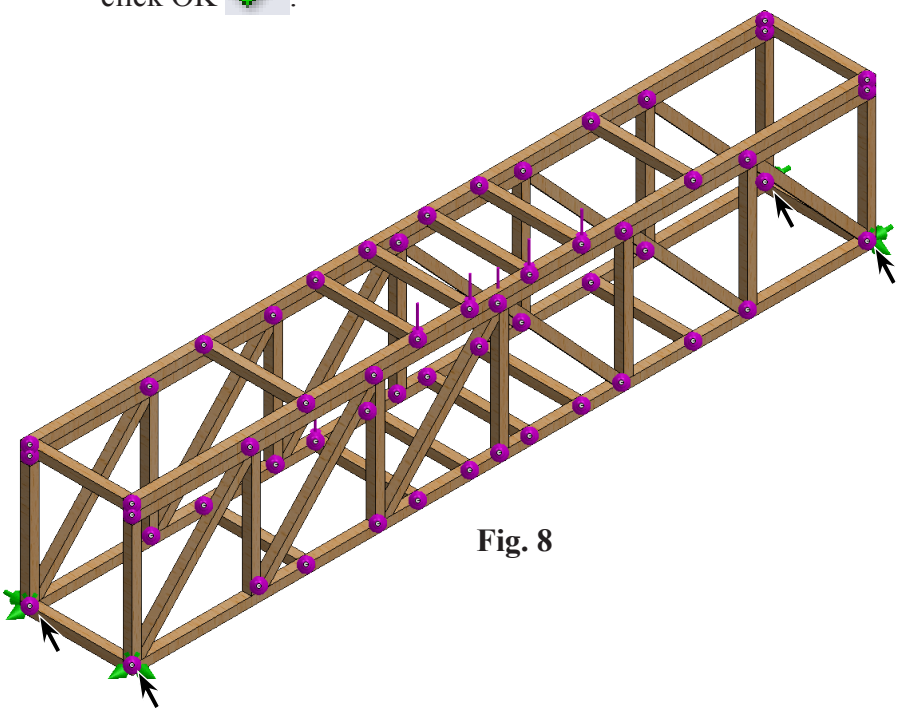


Fig. 8

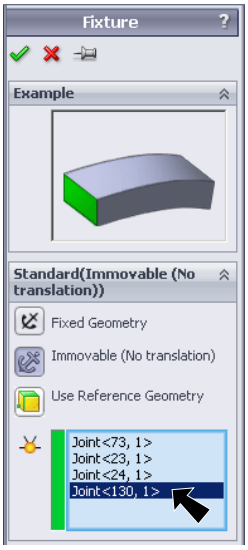


Fig. 7

D. Force.

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

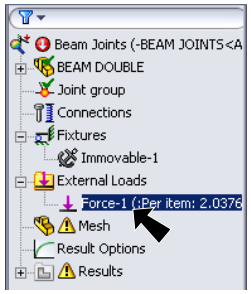


Fig. 9

Step 2. In the Force/Torque Property Manager set:
under Selection, **Fig. 10**
right click in the Joints field and select **Clear Selections**

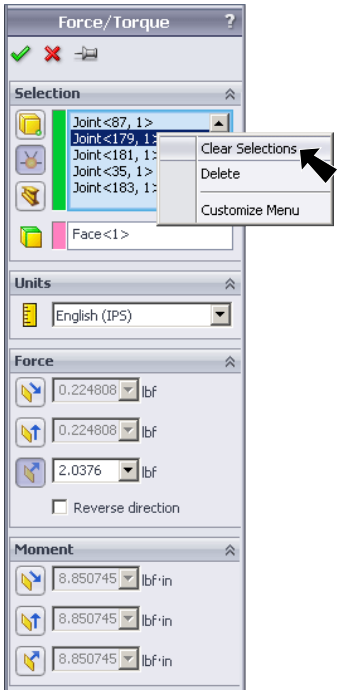


Fig. 10

click the **10 joints across middle**, **Fig. 11** and **Fig. 12**
click OK .

Step 3. Save. Use **Ctrl-S**.

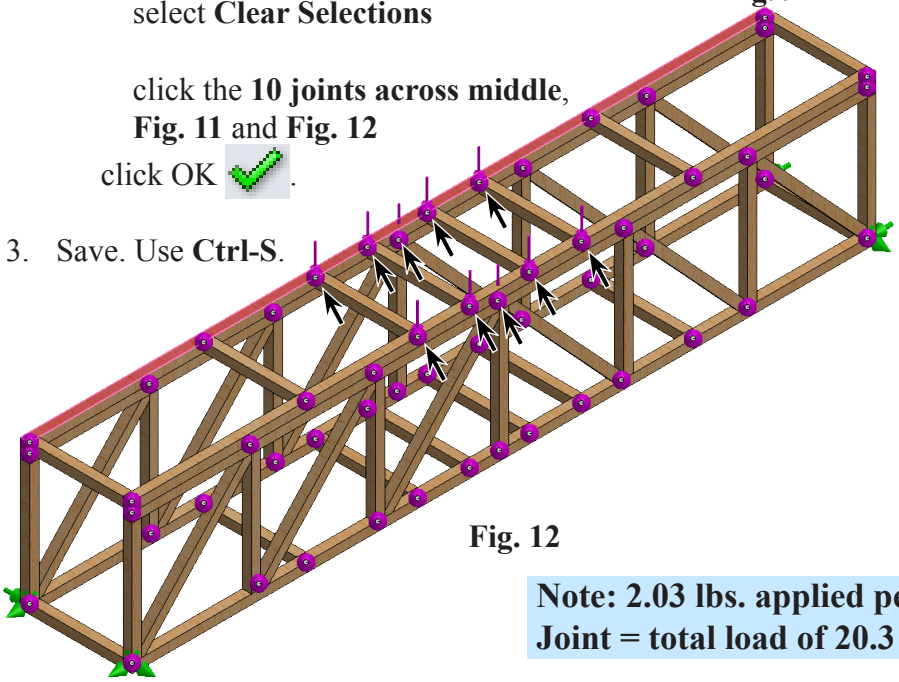


Fig. 12

Note: 2.03 lbs. applied per Joint = total load of 20.3 lbs.

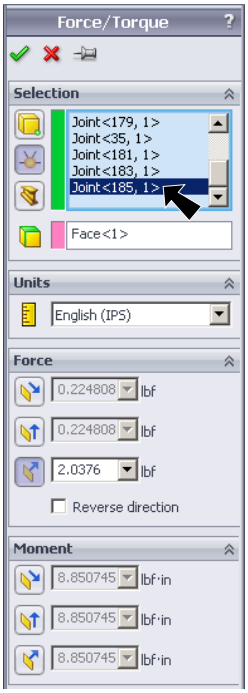


Fig. 11

E. Run.

Step 1. Click **Apply Materical**

on the Simulation toolbar.

Step 2. **Expand Woods** in the material tree, select **Balsa**, click **Apply** and **Close**.

Step 3. Click **Run**

on the Simulation toolbar.

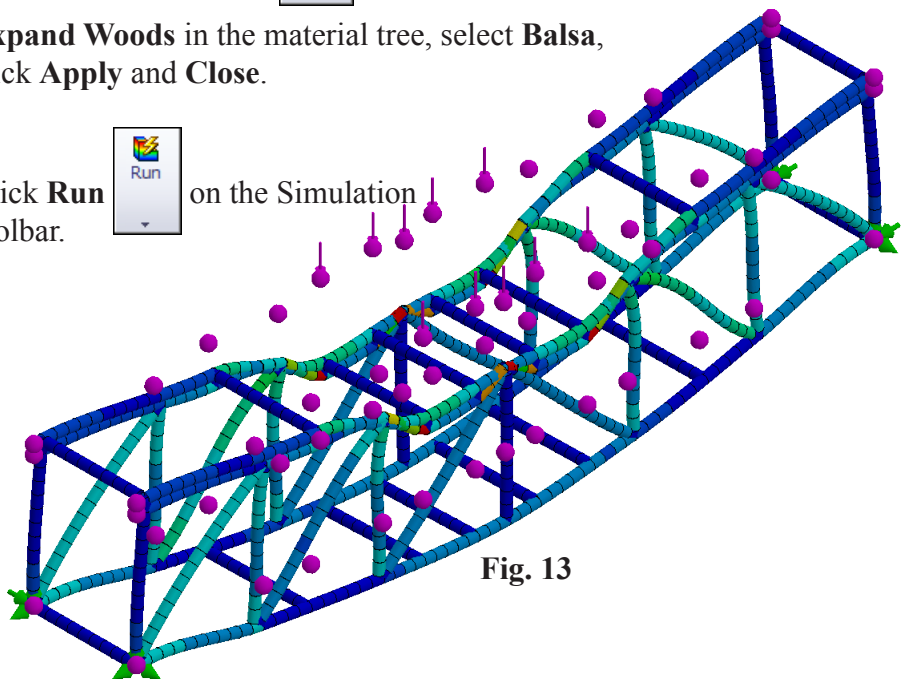


Fig. 13

F. Results - Factor of Safety.

Step 1. **Double click Factor of Safety1 twice** in the Simulation Study Tree to display the Factor of Safety1 plot, **Fig. 14**.

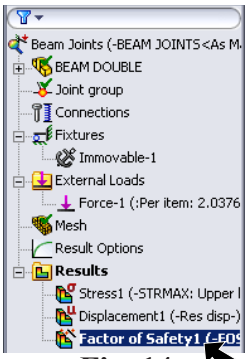


Fig. 14

Step 2. In the Factor of Safety Property Manager

click **Next** and **Next** , **Fig. 15**

select **Areas below factor of safety**
note **Minimum factor of safety 1.41759**
your FOS might be slightly different
click OK .

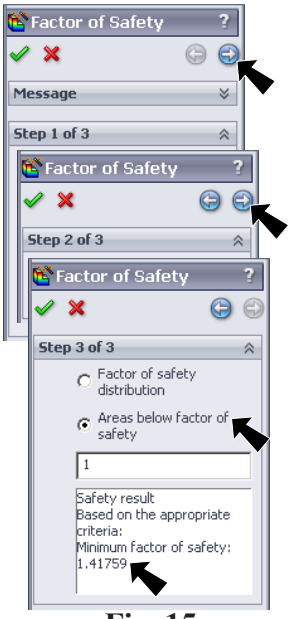


Fig. 15

Step 3. Next, we will change load using formula
current FOS x current Force = safe load

or 1.41759 x 2.0376 lbs. = 2.888 lbs.
Try 2.888 lbs. of force.

G. Edit Force.

Step 1. **Double click Force1** in the Simulation Study Tree to display the Force Property Manager, **Fig. 16**.

Step 2. In the Force/Torque Property Manager set:
under Force, **Fig. 17**
Force Value 2.888
Tip: Key-in *1.41759 in the Force Value field after the 2.0376, press Tab key and let SW do the math 2.0376*1.41759 lbf
click OK .

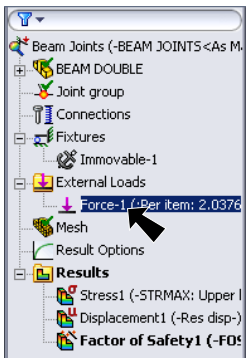


Fig. 16

Note: 2.888 lbs. applied per Joint = total load of 28.88 lbs.

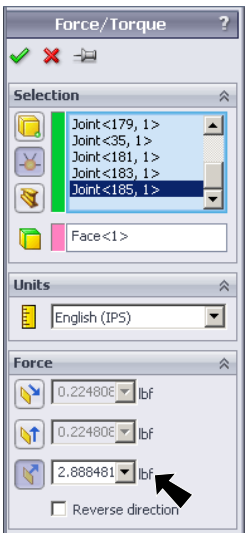
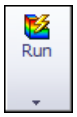


Fig. 17

H. Run.

Step 1. Click **Run** 

on the Simulation toolbar.

I. Confirm Factor of Safety = 1.

Step 1. **Double click Factor of Safety1 twice** in the Simulation Study Tree to display the Factor of Safety1 plot, **Fig. 18**.

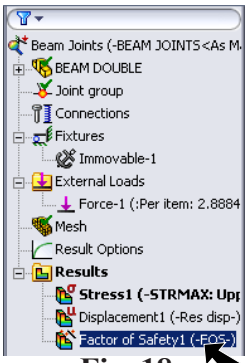


Fig. 18

Step 2. In the Factor of Safety Property Manager

click **Next** and **Next** , **Fig. 19**

select **Areas below factor of safety**
note **Minimum factor of safety 1**
your FOS might be slightly different
click OK .

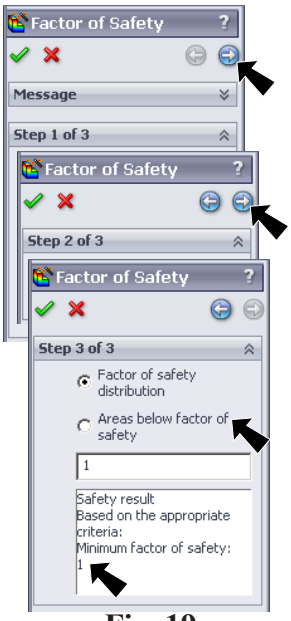


Fig. 19

Tip: View the FOS in the Plot description in top left of graphics area, **Fig. 20**.

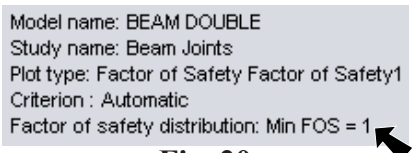


Fig. 20

J. 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 , **Fig. 21**.

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

28.88 x 4.54 / 5.27 = **24.87**

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

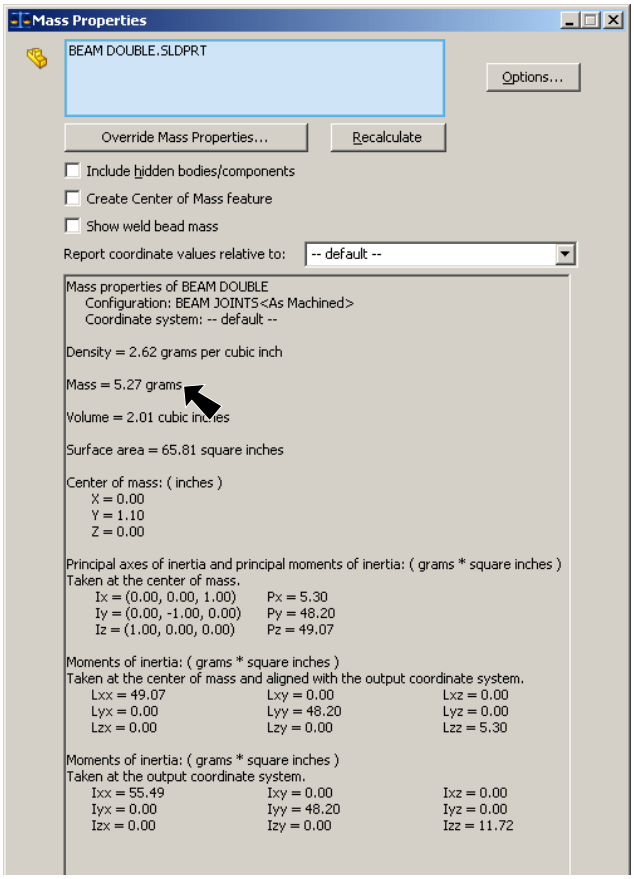


Fig. 21