ANSYS 12 - Beam - Step 6

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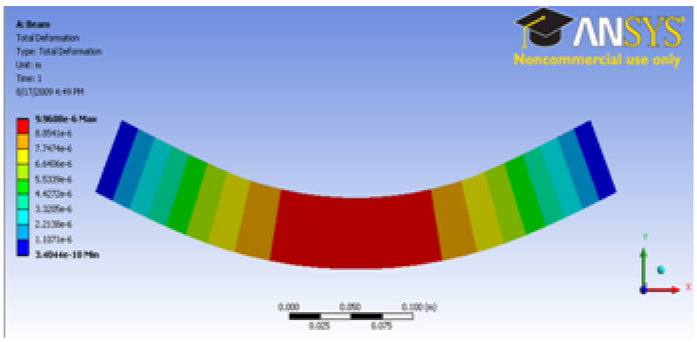
Step 6: Results

Total Deformation

Let first look at Total Deformation. Under ***Solution (A6)***, click on ***Total Deformation***. The Total Deformation plot is then shown in the Graphics window.

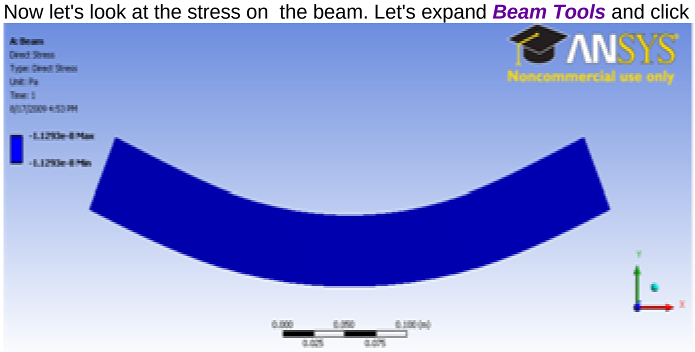


Higher Resolution Image

You can also animate the deformation by clicking play button right under ***Graphics*** window.

Bending Stress

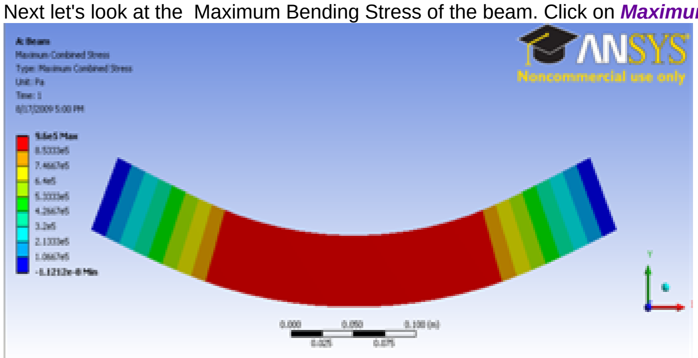
Now let's look at the stress on the beam. Let's expand ***Beam Tools*** and click on ***Direct Stress***.



Higher Resolution Image

The direct stress is the stress component due to axial load encountered by the beam element. Since there is not axial load, we expect a direct stress of zero value throughout the beam.

Next let's look at the Maximum Bending Stress of the beam. Click on ***Maximum Combined Stress***.



Higher Resolution Image

Maximum Combined Stress is combination of direct stress and maximum bending stress. Since we have pure bending problem, the maximum combined stress will be the maximum bending stress.
We expect a pure bending stress in the central region between the two applied forces. Elementary beam theory predicts the bending stress as $_{xx}$ =My/I. Here

M = 4000*0.1 = 400 N m

I =bh^3/12 =(1)*(0.05)^3/12 = 1.04e-5 m^4 (assuming unit thickness in the *z* direction)

For this geometry, we expect the neutral axis to be at *y* =*h*/2 =0.025 m. So the max value of $_{xx}$= M*(h/2)/I = 9.6e5 Pa. This is exact solution to the computational solution.

Force Reaction, Moment Reaction

If we click on the ***Force Reaction***, we see that the force reaction at point A and B is 4000, which is what we are expecting. The moment reaction at A and B is also zero, as expected.

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