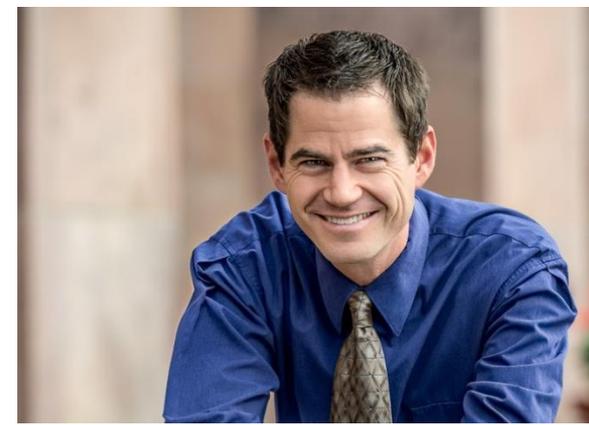


Keywords:

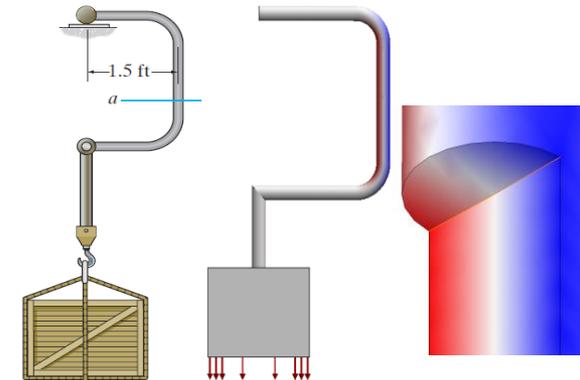
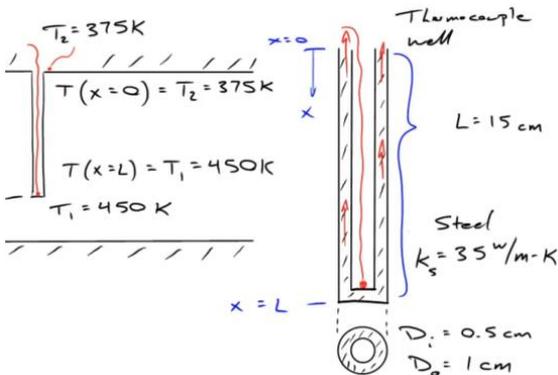
Screencasts, Tablet PC, OneNote,
SolidWorks, Finite Element Analysis



Electronic Resources for Mechanical and Chemical Engineering Courses

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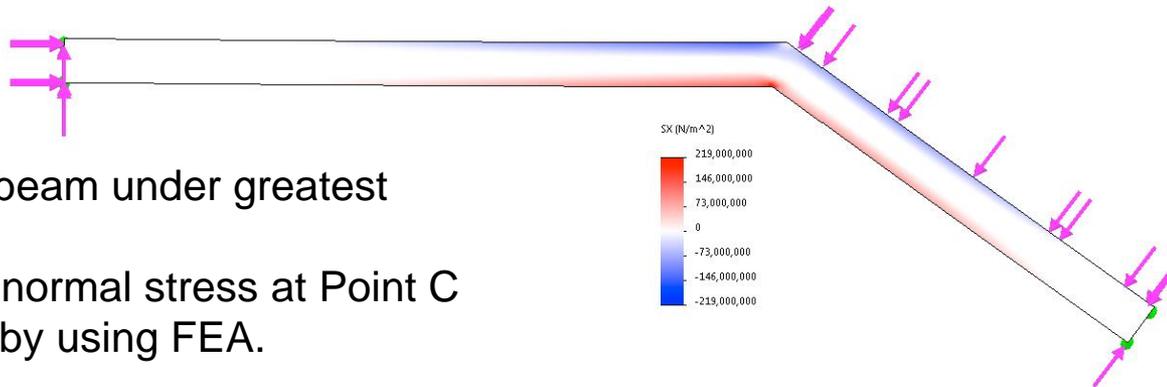
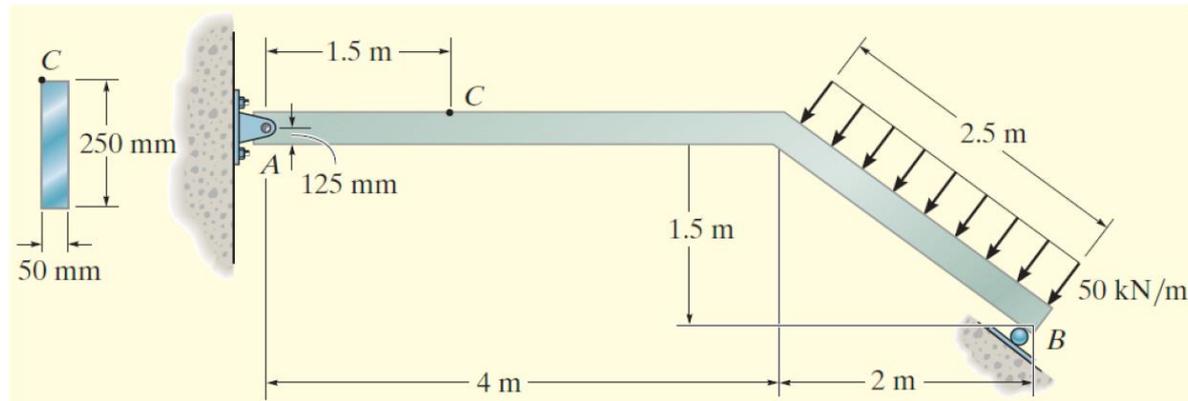


Why?

- Make adoption of a flipped classroom easier by freely disseminating electronic resources
 - screencasts: short (7 – 10 minute) recorded videos of mathematical derivations, example problems, software tutorials, and other concepts that take up time in a traditional classroom
 - course packages: entire curricula available for use with a tablet PC running Microsoft OneNote
- Experimenting with the use of finite element analysis in SolidWorks for a Mechanics of Solids course
 - students can visualize shear and normal stresses under various loadings
 - book problems with compromised solution manuals can be turned into useful opportunities for design and visualization of the deformations
 - emphasis on validating FEA with traditional hand calculations

When?

- We have been disseminating screencasts for the last several years.
- I have implemented FEA since the spring of 2015 and am currently midway through my second semester with this approach.

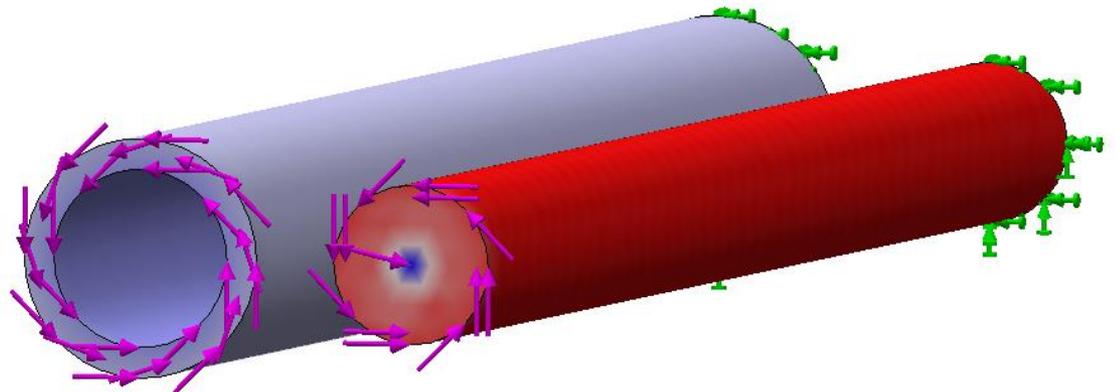


1. Where is the beam under greatest tension?
2. Calculate the normal stress at Point C by hand, and by using FEA.

Where?

- Have you tried this in other institutions?
 - screencasts and other course materials freely available at www.learncheme.com and www.learnmeche.com
 - tens of thousands of views, mainly in English-speaking countries
- Is this developed for a single class, a full course, or a curriculum?
 - materials available for numerous courses, such as thermodynamics, fluid mechanics, heat transfer, material & energy balances, computational methods, statics, dynamics, and mechanics of solids

The same torque is applied to both. They are both made of the same mass of steel. Why does the tube experience less shear stress than the rod?



What?

- What is your theory of change?
 - Time spent in a traditional classroom is largely ineffective, as are traditional book problems. Although time consuming to initially develop, teaching in a flipped classroom tends to be well received by students (and is much more enjoyable for me).
- What has worked really well?
 - Screencasts are always rated highly by students in course reviews.
 - In-class concept questions such as the following can be very enlightening.

The simply-supported beam sags under its own weight. Which simulation shows the shear stress distribution?

A. the upper one

B. the lower one



Prognosis?

- We are documenting impact through the use of in-class concept questions and concept inventories administered at the beginning and end of the semester.
- We have scaled up by making the material freely available on our websites.
- What challenges are you currently facing?
 - Only about half of the students bought into the use of SolidWorks last semester: felt it took too much time, somewhat opposed to learning it
- What advice would you like from others at FOEE?
 - I would love to know if you've tried FEA or assigned screencasts in your courses.
 - If you've tried FEA in your class, how did you implement it? To what degree did you find it successful?

