

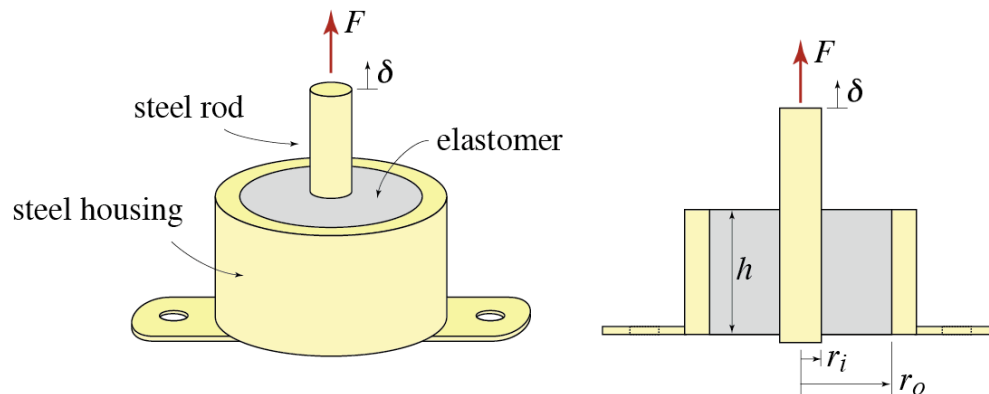
## Design HW #1 Design of a vibration Isolator

due Friday, March 7

[10% deduction if up to 24 hours late, 20% deduction if up to 7 days late, no credit thereafter]

You are to design a vibration isolator. It is to be constructed of low-carbon steel and elastomer.

- The deflection  $\delta$  should be about 5 mm when the force  $F$  is statically applied.
- The elastomer has 4 MPa shear modulus.
- The allowable shear strength of the steel-elastomer bond is 0.8 MPa.
- The allowable shear strength of the elastomer is 1.0 MPa.
- Let  $d$  be the last digit of your UW student ID number. Take the force to be  $F = d(100 \text{ N})$ . For example, if the last digit of your ID number is 6, then you would use  $F = 600 \text{ N}$ . If the last digit of your ID number is zero, then use  $F = 1000 \text{ N}$ . Clearly state in your report the value of  $F$  you are using.



You are to specify:

The inner and outer radii of the elastomer,  $r_i$  and  $r_o$ , respectively.  
The height  $h$  of the elastomer.

Write a report that is brief, to the point, and is professionally written. It should present all pertinent information as succinctly as possible in a well-organized fashion. It should be written using proper English that is easy to read by another engineer. The main discussion should be typed and figures can be computer-drawn or neatly hand-drawn. You should include a neat copy of all of your supporting calculations in an appendix that you can occasionally refer to in the main discussion of your report. You should read the discussion of technical writing located on the course web site:

<http://ecow.engr.wisc.edu/cgi-bin/get/ema/303/1plesha/>

click on: "guide to writing.pdf"

Your report should not exceed two pages in length (plus the appendix containing your calculations).

grading:

- 50% Does your design work?
- 10% Is your design good?
- 40% Quality of report.

Credit will be deducted for work that is not neat.

**Discussion with peers is acceptable, but your work, design and report must be done independently.**

**20% EXTRA CREDIT**  
**To be done independently of your peers**

Recommend a specific, commercially-available elastomer or similar material to be used for this vibration isolator. Discuss why your selection is appropriate (e.g., the manufacturer recommends it for this application or for similar applications, etc.). You should provide:

- Name of the manufacturer (e.g., DuPont, Dow, etc.).
- Trade name of the material.
- Shear modulus of the material.
- Ultimate shear strength of the material.
- Attach copies of the manufacturer's data, test results, etc.
- References.

Remarks:

- You may use one additional typed page for this extra credit work, plus attachments such as manufacturer's data, etc..
- Do not repeat your design analysis ... simply provide a recommendation on a particular material to be used.
- There will be little or no *partial* credit given for this. To earn the 20% extra credit, the expectation level is fairly high.
- In the course of your research, you may need to interpret new terminology and/or ASTM (American Society for Testing and Materials) testing standards, etc. If appropriate, you should discuss these.