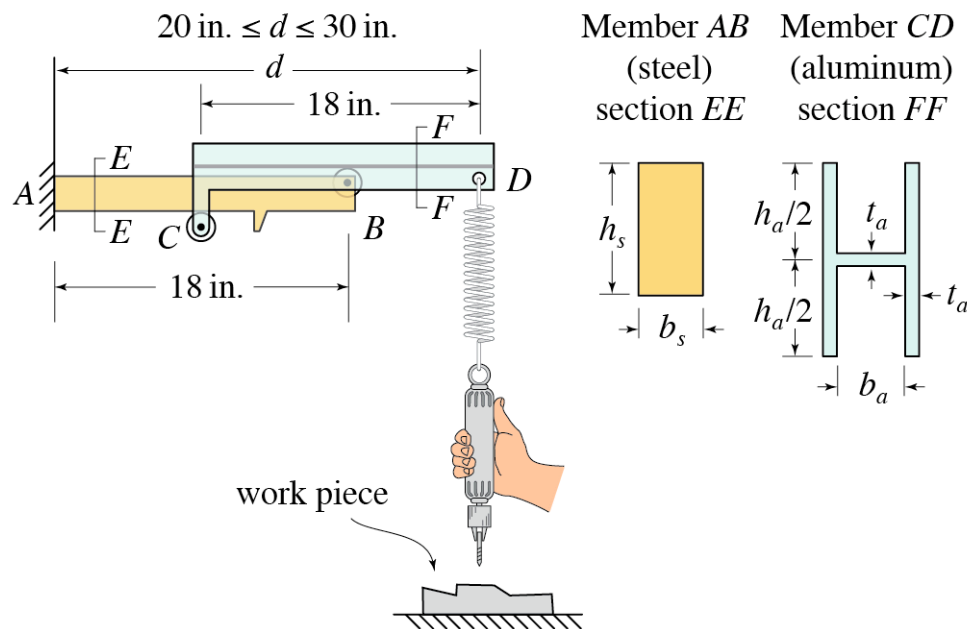


Design HW #2 Design of a Tool Support

due Monday, April 21 (this date is revised from that given in the syllabus)

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

You are to design a two-piece horizontal beam (tool support) to support a hand drill that is used on an assembly line. The hand drill weighs 4 lb, and the operator must apply a 1 lb vertical force to fully extend the drill to the work piece. The tool support has the feature that it can be retracted when the drill is not needed, such that the total length d of the tool support is within the range $20 \text{ in.} \leq d \leq 30 \text{ in.}$



- Portion AB of the tool support is to be constructed of steel with 50 ksi yield strength.
- Portion CD of the tool support is to be constructed of extruded aluminum with 35 ksi yield strength.
- The steel bar AB has rectangular cross section with dimensions b_s and h_s .
- Dimensions b_s and h_s should be multiples of $1/8$ in. so that inexpensive commercially available bar stock can be used.
- The aluminum member CD has symmetric channel cross section where b_a is the interior dimension of the channel, h_a is the height and t_a is the uniform thickness.
- The interior dimension of the aluminum channel should satisfy $b_a = b_s + 0.01$ in. so that the channel has acceptable clearance over the steel bar.

You are to specify the dimensions b_s and h_s of steel member AB , and the dimensions h_a and t_a of the aluminum channel CD .

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. If you develop your design using loads that are higher than those described above, you should clearly state what these are. You should discuss why your design is good, including issues such as sufficient strength, durability, etc. 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.