

www.youtube.com/watch?v=Rn31IEOKgQ8
<https://www.youtube.com/watch?v=5CuJjSk4U38>
www.sme.org

DOWNLOAD FROM BLACKBOARD:

Punch Press Shearing Forces Example Rev 5.xlsx
Punch Press Shearing Forces-Figure 7-9 Rev 1 20200415.xlsx
FIGURE_7-9.SLDPRT
FIGURE_7-9.SLDDRW
112-09-001-XXX.SLDPRT SPACER WITH TWO HOLES
3_4 N WASHER.SLDPRT
NAMEPLATE.SLDPRT

DELIVERABLES:

- Fully Dimensioned Drawing(s) for
 - 112-09-001-XXX Spacer with two holes
- Include: Material, Material Thickness, Length of Cut (Stage 1 and Stage 2), Location of Center of Pressure.
- Excel spreadsheet for punch press shearing forces and center of pressure for:
 - Nameplate
 - Type A $\frac{3}{4}$ N Washer (http://www.engineersedge.com/plain_washers.htm).
 - Spacer with two holes

GUIDELINES for 112-09-001-XXX:

1. Review Chapter 7, Design of Pressworking Tools Fundamentals of Tool Design (4th Ed).
2. SolidWorks parts for NAMEPLATE, and Type A $\frac{3}{4}$ N WASHER, are on Blackboard. http://www.engineersedge.com/plain_washers.htm. For the parts with gage thicknesses look up the thickness on <http://www.custompartnet.com/sheet-metal-gauge>, or at back of handout. Open 112-09-001-XXX Spacer with two holes.
3. The Thin configurations have been created for you. Find the total length of cut for each (i.e. Stage 1 **and** Stage 2) by using Evaluate > Measure.
4. Open the Excel spread sheet from BlackBoard, "Punch Press Shearing Forces Example Rev 5.xlsx." Review the length of cuts in the spread sheet.
5. Add equations (from page 333) to the spreadsheet to calculate:

$$TN = \frac{S * L * T}{2000}$$

where TN = tonnage needed to punch out the shape in one punch

S = Shear Strength in pounds per square inch

L = Length of cut in inches

T = Thickness of material in inches

The 2000 converts pounds to tons (there are 2000 pounds in 1 ton). Look up the Shear strength on the attached Shear Strength reference chart. Enter the formula into the Punch Press Shearing Forces spread sheet to calculate Total Tonnage.

6. The Nameplate, the 3/4 Washer, and the Spacer with two Holes could be punched in two steps - Stage 1 and Stage 2 tonnages have been calculated for you. Review the formula in the Punch Press Shearing Forces spread sheet to calculate the Tonnage.
7. Find the total Stripping Force for each shape using equation on p334.

$$TN_s = \frac{3500 * L * T}{2000}$$

where TN_s = Stripping Force in tons

L= Length of cut in inches

T= Thickness of material in inches

Review the formula in the Punch Press Shearing Forces spread sheet to calculate the Tonnage.

8. Find the **Center of Pressure** of 112-09-001-XXX: After creating the part (Name the Configuration "SOLID", create a Configuration called "THIN". Create a new sketch. Convert all the entities of the first sketch. Create a thin extrude with a .001 inch thickness and .5 blind depth. Use Evaluate > Mass Properties (applied to the very thin extrusion).
 - a. Write down the numbers. Create a point using those numbers. This is the Center of Pressure.
 - b. Create a fully dimensioned drawing with the location of the center of pressure to three or four decimal place dimensions.
9. Read pages 372-374 and review Chapter 7 (Design of Pressworking Tools), pages 318-389 in the Fundamentals of Tool Design, 4th edition, on BlackBoard.

MCDESG-112 Tool Design
Assignment 9-10 Combined Rev 3 4/15/2020



EQUATIONS:

$$B_{Type A \frac{3}{4} NARROW WASHER} = 0.70 * Thickness$$