

**IME 100 -.BULK PROCESSING**

**IN CLASS WORK**

**OCTOBER 12, 2015**

Class Preparation and Reading Review

This should be completed prior to class

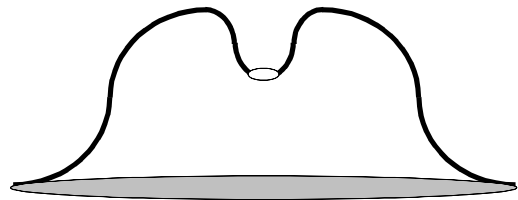
Key Concepts to Be Discussed in Class:

Questions About Subject Matter for Class Session:

Concept Question

- What is a Basic Working Definition of Mechanical Processing?

- Describe in Your Own Words the Sequence of Operations Would Be Required to Make the Following Part



- Then try to identify the processes based on your working definition<sup>1</sup>

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<sup>1</sup>Bending, Deep Drawing, Drawing, Extrusion, Forging, Rolling, Shearing

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## IN CLASS WORK

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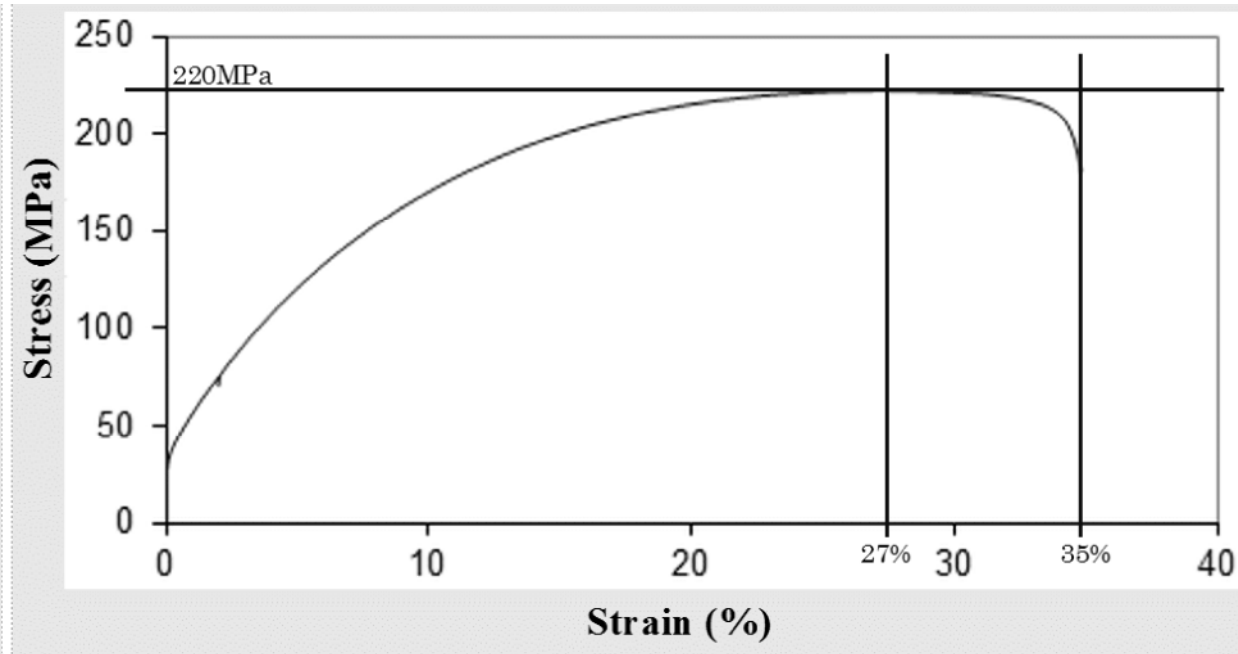
### In-Class Exercise

- What Mechanical Properties (from a stress-strain curve) are important for each of the following processes<sup>2</sup>

| Process      | Impt Mech Props | Why? |
|--------------|-----------------|------|
| Bending      |                 |      |
| Deep Drawing |                 |      |
| Drawing      |                 |      |
| Extrusion    |                 |      |
| Forging      |                 |      |
| Shearing     |                 |      |

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<sup>2</sup>Ductility, Maximum Strain, Modulus, Ultimate Tensile Strength, Yield Stress

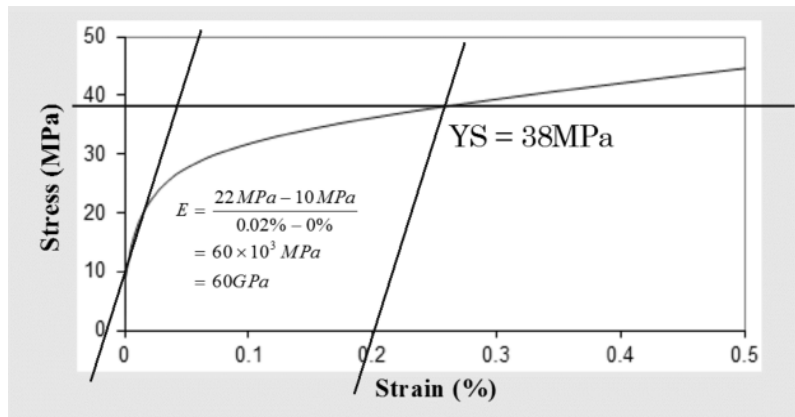


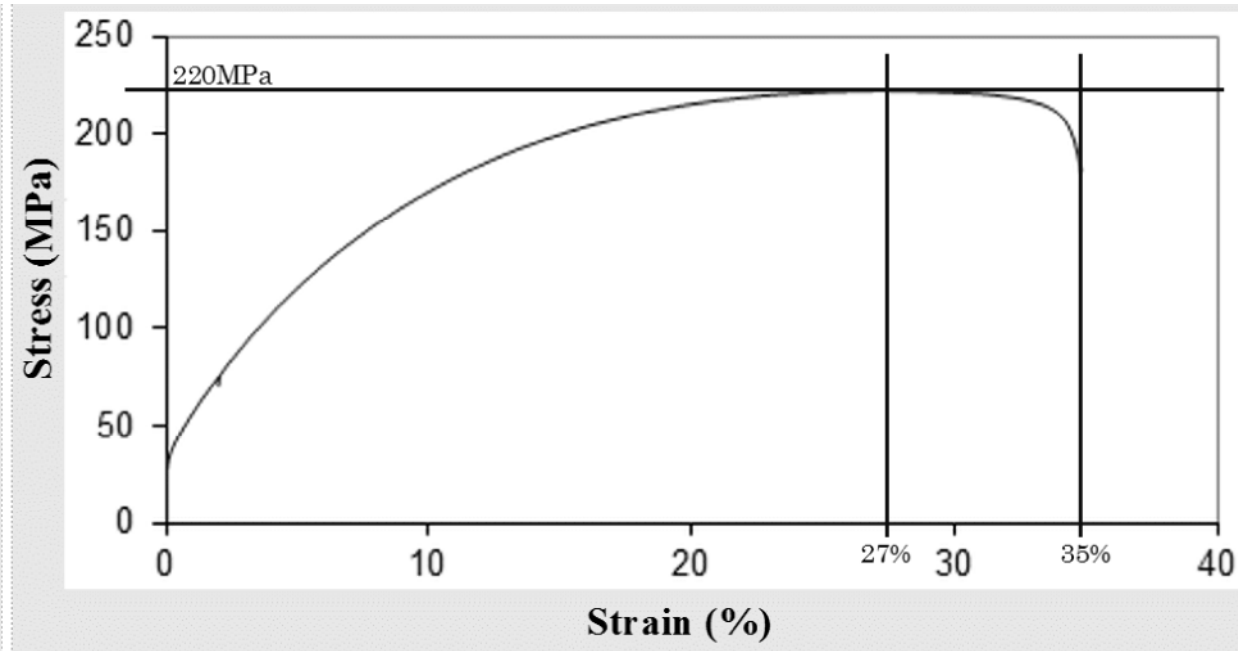
In-Class Problem

- How Much Force is Required to Create a 4.5 cm ( $4.5 \times 10^{-2} \text{m}$ ) diameter blank if the material thickness is 1.3 cm ( $1.3 \times 10^{-2} \text{m}$ )

$$F = 0.7tl\sigma_{UTS}$$

1MPa= $1 \times 10^6$ Pa  
 1GPa= $1 \times 10^9$ Pa  
 1Pa=1 N/m<sup>2</sup>

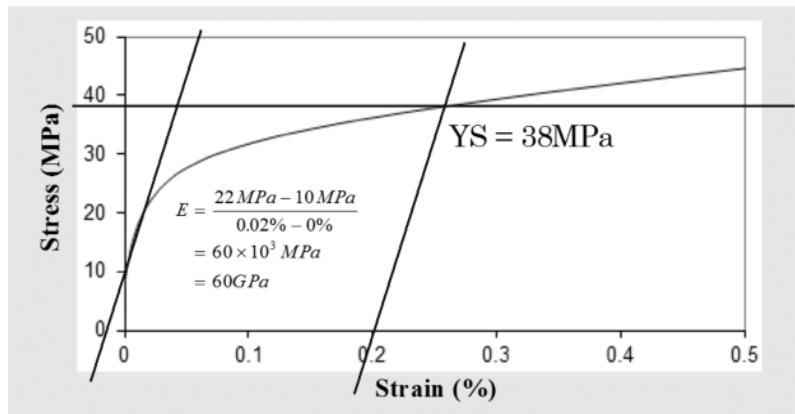




In-Class Problem

How Much Force is Required reduce the thickness of a 1.5 cm ( $1.5 \times 10^{-2} \text{m}$ ) thick sheet to 1.35 cm ( $1.35 \times 10^{-2} \text{m}$ )? Assume the width of the rollers is 15 cm ( $15 \times 10^{-2} \text{m}$ ) and they have a diameter of 20cm ( $20 \times 10^{-2} \text{m}$ ).

1MPa= $1 \times 10^6$ Pa  
 1GPa= $1 \times 10^9$ Pa  
 1Pa=1 N/m<sup>2</sup>



$$\epsilon = \frac{t_0}{t_f} - 1$$

$$F = \sigma w \sqrt{R(t_0 - t_f)}$$

After Class Review

Summarize Key Concepts and List Further Questions  
Review Notes and Make Links to HW Problems

| <u>Key Concepts</u> | <u>HW Connections</u> | <u>Questions</u> |
|---------------------|-----------------------|------------------|
|                     |                       |                  |

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