Outline

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Example 1

A 9 in wide 6061-O aluminum (K = 30,000 psi and n = 0.2) strip is rolled from a thickness of 1.00 in to 0.80 in. If the roll radius is 12 in and the roll rpm is 100, estimate the total horsepower required for this operation. What is the velocity of the strip leaving the roll?

Example 2

Estimate the roll force and power for annealed low carbon steel 400 mm wide and 10 mm thick, rolled to thickness of 7 mm. The roll radius is 200 mm. And the roll rotates at 200 rpm. Use $\mu = 0.1$. Repeat for 100 mm radius rolls and elaborate on your results.

Example 3

Calculate the force required in direct extrusion of 1100-O aluminum (K = 180 Mpa and n = 0.2) from a diameter of 20 cm to a diameter of 5 cm. Assume that the redundant work is 30% of the **ideal** work of deformation, and the friction work is 25% of the **total** work of deformation.

Example 4

Bar stock of initial diameter = 90 mm is drawn with a draft = 15 mm. The draw die has an entrance angle = 18°, and the coefficient of friction at the work-die interface = 0.08. The metal behaves as a perfectly plastic material with yield stress = 105 Mpa. Determine (a) area reduction, (b) draw stress, (c) draw force required for the operation, and (d) power to perform the operation if exit velocity = 1 m/min.

Example 5

How would you determine the temperature rise in the workpart due to the plastic deformation.

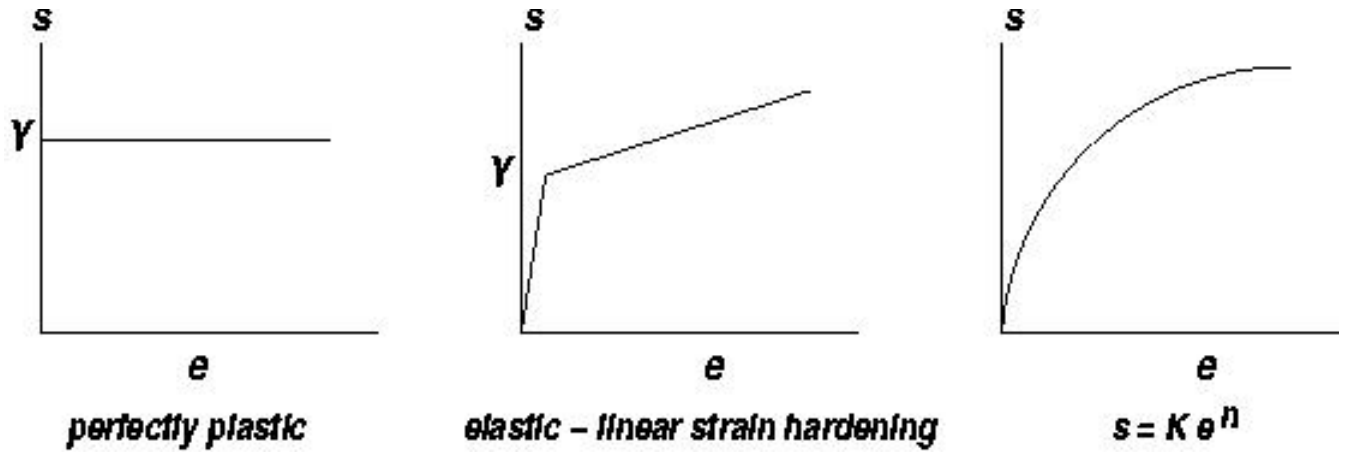
Answer:

Example:

If 27 mm high specimen is compressed down to 10 mm. What is the temp. rise in the following materials?

Example 6

When solving deformation exercises, how would you deal with different behaviours of materials?



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Sheet Metalworking