

Analysis of strip rolling - 1:

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1. Quiz – Key:

1. What material is the work roll in a cluster mill made of? Why?

Tungsten carbide. Because of its high rigidity, wear resistance and strength.

2. How will you avoid roll flattening?

By using a material for roll with high stiffness, high elastic modulus, by reducing the reduction per pass and reducing.

3. Where is the neutral point located for zero friction condition? For high friction?

For zero friction the neutral point shifts towards the exit section. Because, the work slips against the roll. For high friction, the neutral point shifts towards entry section.

4. A strip of 200 mm width is rolled from a thickness of 15 mm to 11 mm. The roll has a diameter of 600 mm and a speed of 100 rpm. Estimate the roll force. Assume the strength coefficient as 900MPa and $n = 0.5$.

Solution: We can find the rolling force using the approximate method.

$F = Y' L w$, where L is projected arc length. $L = \sqrt{R \Delta h}$

Y' is average flow stress.

$$Y' = k \frac{\epsilon^n}{1+n}$$

$$\epsilon = \ln(h_0/h_f) = 0.31$$

$$Y' = 334 \text{ MPa}$$

$$L =$$

$$\text{Rolling force} = 3.27 \text{ MN}$$