Unit 7 - Week 5: Thermal aspects, tool wear and economics in machining

Assignment 5

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

1. In an orthogonal cutting with a weld of 8° rake angle, the cutting force is 320 N and the thrust force is 255 N. Cutting rate is 0.5. Cutting velocity is 85 m/min. Assume that 80% of the work of plastic deformation gets converted to heat and 10% heat goes into the workpiece. The text flowing (in W) into the workpiece will be ______.

2. In an orthogonal cutting with a weld of 8° rake angle, the cutting force is 210 N and the thrust force is 170 N. Cutting rate is 0.5. Cutting velocity is 85 m/min. The power dissipated (in W) due to friction is ______.

3. Given, Shear angle = 29°, rake angle = 8°, chip velocity = 3 m/s, actual chip thickness = 0.3 mm, cutting rate = 0.6, width of cut = 2 mm, p = 0.17 mm²/m, thermal conductivity = 50 W/m°C, C = 320 J/kg°C, α = 28°C. Power dissipation to primary shear area = 1400 W. Power dissipation to secondary shear zone = 790 W and net temperature = 28°C. Assume Taylor Quinney coefficient = 0.9. The final temperature (in K) along the rake face of the tool when machining is ______.

4. During machining operation, average temperature rise is the maximum is __________.

5. The following figure does not a definite cutting fluid property. High specific heat, high thermal conductivity and low volatility. High flash point, should have high odor, non-toxic in body liquid and gasous stage. The answer is ______.

6. In the following type of tool wear, strong bonds are formed due to welding of surface asperities. Adhesive wear, Abrasion wear, Diffusion wear, Abrasive wear. The answer is ______.

7. In a steady wear zone, at the end of 5 minutes, flank wear was 0.2 mm and it was 0.4 mm at the end of 6 minutes. Assuming a criterion of 0.6 mm tool life, the expected tool life in minutes is ______.

8. Tool life (in minutes) for the maximum production rate, when the Taylor tool life exponent n is 0.23 and the tool changing time is 4 minutes is ______.

9. The main objectives in optimization of a machining process is/are: To produce a component of required dimensions and surface finish at the minimum possible cost, To produce a component of required dimensions and surface finish at the minimum possible production rate, To produce a component of required dimensions and surface finish at the maximum possible production rate, To produce a component of required dimensions and surface finish at the maximum possible profit rate. The answer is ______.