國立中央大學九十學年度碩士班研究生入學試題卷

所別: 機械工程學系 乙組 科目: 機械製造 共 1 頁 第 1 頁

1)

(a) Which improvements in material properties may be obtained in hot forming? Which deteriorations can occur, and under what circumstances? (10 points)

(b) Why should the roll diameter be large for the rough hot-rolling passes and small for all the following passes, especially for the cold-rolling ones? In the latter case, what is the effect on the rolling force F, the rolling torque T, and the rolling power P? (10 points)

2)

(a) Explain the difference between slab, bloom, and billet in the hot forming processes. (6 points)

(b) Name the three basic types of machines used in metal forming. Specify the differences in what determines the end of downward travel in each of them. (6 points)

3) Let n=0.5 and C=400 in the Taylor tool life equation for tool wear. What is the percent increase in tool life if the cutting speed is reduced by 50% ? (17%)

4) Why are tools coated? What are the common coating materials? (17%)

5)(a)Describe the material used for making pattern of expandable pattern casting process.
Briefly describe the process for producing expanded pattern casting by using flow chart.10%

(b)Describe main differences between shell-mold casting process and sodium silicate process!4%

(c)Descrbe three main constituents (compositions) of inclusion in cast steel!
Briefly explain why do they exist in the matrix of cast steel! 6%

(d)Draw the microstructure of a square ingot (pure metal)!
Descibe what is columnar grain!
Do you expect to get the columnar grain structure for a strip casting, why?8%

6)(a)List two manufacturing processes which would produce heat affected zone (HAZ).2%

(b)List one effective method to reduce the extent of HAZ!2%

(c)What is the main effect of HAZ on the mechanical properties of a weldment?2%