

所別：機械工程學系碩士班 乙組(製造與材料) 科目：機械製造

1. Use the following keywords to describe **Squeeze Casting**; less than 50 words in **English**. (15%)

Keywords: Solidify, pressure, heat transfer, microstructure, mechanical properties.

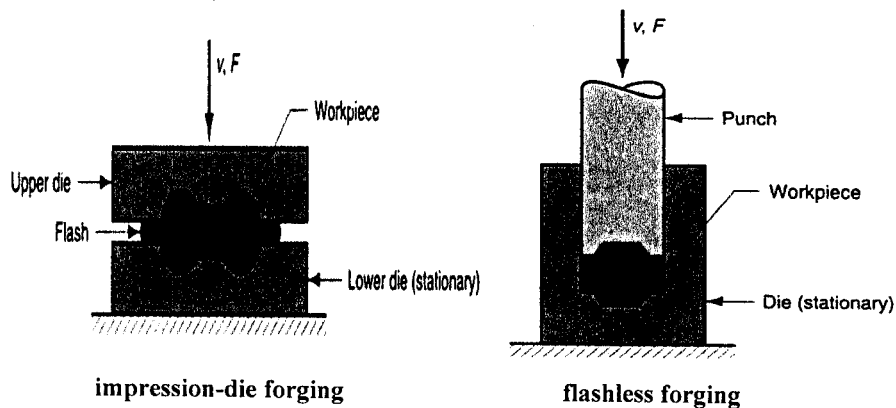
2. (a) Write down the general expression for the heat generated in resistance welding; (7%)

Which one factor is the most influential parameter? (2%)

- (b) Write down three of the most commonly used solid lubricant! (6%)

二、

1. Please discuss differences between impression-die forging and flashless forging in machining. (5%)



2. A 40 mm thick plate is to be reduced to 30 mm in one pass in a rolling operation. Entrance speed = 16 m/min. Roll radius = 300 mm, and rotational speed = 18.5 rev/min. Determine: (a) the minimum required coefficient of friction that would make this rolling operation possible, (b) exit velocity under the assumption that the plate widens by 2% during the operation, and (c) forward slip. (10%)
3. A deep drawing operation is performed in which the inside of the cylindrical cup has a diameter = 4.0 inches and a height = 2.5 inches. The stock thickness = 1/8 inch, and the starting blank diameter = 7.5 inches. Punch and die radii = 5/32 inch. The metal has a tensile strength = 60,000 lb/in² and a yield strength = 30,000 lb/in². Determine: (a) drawing ratio, (b) reduction, (c) drawing force, and (d) blankholder force. (10%)
4. A 4.0 inch wafer has a processable area that is only 3.65 inches in diameter. How many square IC chips can be fabricated within this area, if each chip is 0.25 inch on a side? All chips must lie completely within the processable area. Assume the cut lines (streets) between chips are of negligible width. (5%)
5. Why is silicon a desirable work material in microsystem technology? (5%)

三、試從以下幾點論述一般金屬材料與陶瓷材料被切削時的不同。

1. 切屑形態 (5%)
2. 加工表面形態 (5%)
3. 刀具傾斜面(Rake face)的磨耗形態 (5%)
4. 刀腹面(flank)的磨耗形態 (5%)
5. 材料破壞形態 (5%)
6. BUE 產生的可能性 (5%)
7. 刀具壽命曲線的斜率 (5%)

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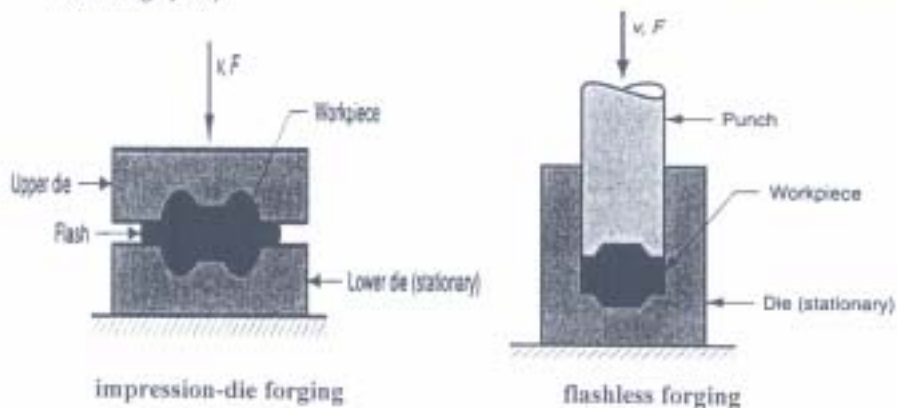
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