

Manufacturing Process

Ref. No.: EX/ME/T/226/2019

Bachelor of Engineering (Mechanical Engineering) –2ndYear –2ndSemester 2019

Manufacturing Process

Time: 3 Hrs.

Full Marks: 100

Answer any five (5) questions of the following taking at least two (2) from a group.

Use Pencil for drawing works.

The figures in the margin indicate full marks.

Group A

1. a) Distinguish between liquid shrinkage and solid shrinkage as related to castings. Explain how these are taken care of in designing sand castings.
b) What are the distinguishing features between a casting and a pattern?
c) What are the specific applications of the following pattern materials: wood, metal and plastics? Also state their advantages and limitations.
8+6+6=20
2. a) Mention about different casting processes.
b) Explain the properties of molding sand in foundry operation. How these properties affect the casting process?
c) How the grain fineness number is tested in laboratory?
d) Why a sprue pin is made tapered?
4+ (3+6) +4+3=20
3. a) A sphere, a cube and a cylinder with a height equal to its diameter have the same volume. Which one should be used as a riser? Justify your answer considering solidification times of each.
b) Define the terms core, core prints, chaplets and chills (both internal and external). Draw supporting figures in all the cases.
10+10=20
4. a) 'The size of gates should be neither too small nor too large'. Discuss the statement.
b) Explain the parameters which cause the pouring time to vary for a given casting.
c) Explain the reasons which make a riser necessary in some castings.
d) What precautions should one take while choosing chills?
e) What are the methods available to a casting designer to increase the casting yield?
4×5=20

OR

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- a) Discuss, with explanatory diagram, the CO₂ molding process. What are the advantages and limitations of this process?
- b) With explanatory figures discuss, in brief, about the components of an ideal gating system.
- c) What is 'antioch' process?
- d) Mention about some commonly used additives and binders. 8+6+3+3=20

Group B

5. a) Deduce the expression for coefficient of spread as given by Tomlinson and Stringer. What is 'pancaking'?

b) A solid cylindrical slug of 1020 steel is 150 mm in diameter and 100 mm high. The height is reduced to 50% by cold, open die forging operation. Assuming a coefficient of friction of 0.2 calculate the forging force needed at the end of stroke. True stress vs. True strain curve is given in Fig.1 (7+3)+10= 20

6. Write explanatory note on the following (any four):

- a) Preservation of acetylene gas in cylinder
- b) TIG welding
- c) LASER beam welding
- d) Anvil and fuel in Smith's open hearth furnace
- e) Relations of extrusion die angle vs. extrusion force 4×5=20

7. a) How heat is generated in electric resistance welding? With explanatory figures discuss about different types of resistance welding processes.

b) 'Thermit welding may either be fusion type or pressure assisted'—discuss. 12+8=20

8. a) Show that the exit velocity of metal strip is much higher than the entry velocity in case of flat rolling operation.

b) What is 'Forward slip' and 'No slip point'? With all necessary assumptions and diagram prove that: $(\Delta h)_{max} = \mu^2 \cdot R$

c) Define the terms: die opening size, deep drawing operation, ironing. 6+(2+2+4)+6=20

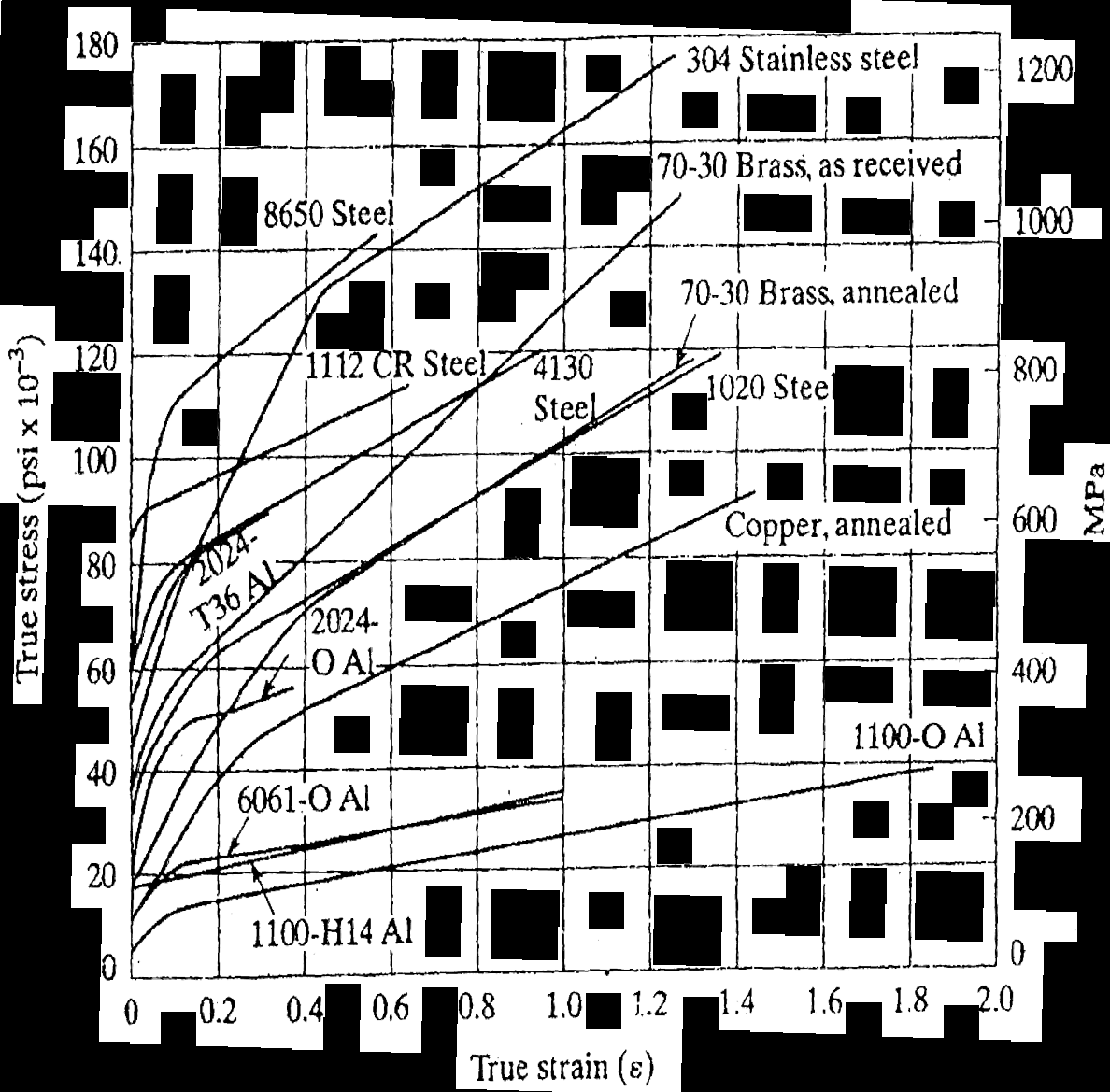


Fig. 1. True stress -vs- True strain curve, in connection with question 5(b).