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MADE EASY
MECHANICAL ENGINEERING
Casting & Welding
BY- Vinod Sir

- Theory
- Explanation
- Derivation
- Example
- Shortcuts
- Previous Years Question With Solution

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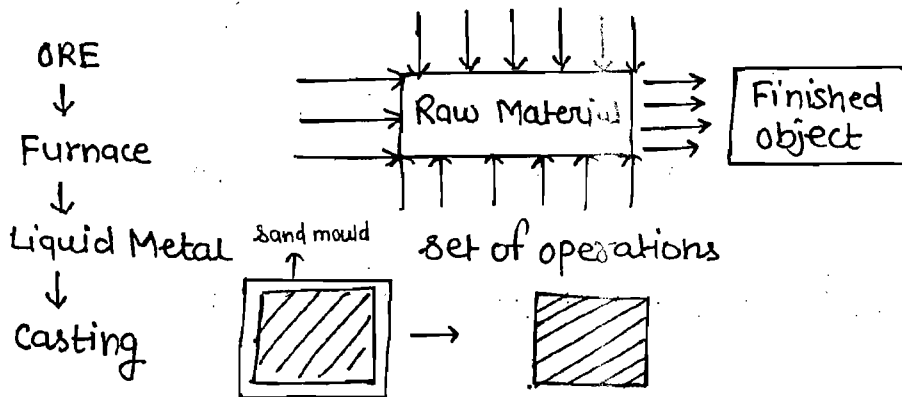
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• Manufacturing Process: →

Manufacturing: → It is a process of converting raw material into a finished product.

It is a process of value addition to raw material such that final object is having more value in market when compare to raw material.



• Classification of Manufacturing Process: →

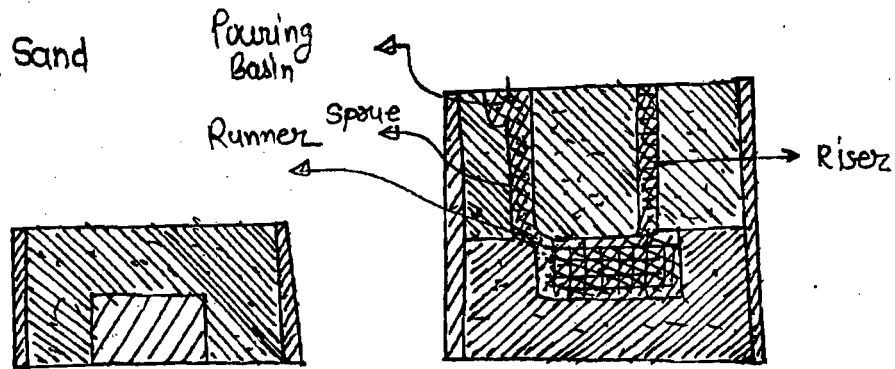
1. Casting
2. Forming
3. Fabrication Process
4. Material removal Process

- A. zero Process
- B. Additive Process
- C. Subtractive Process

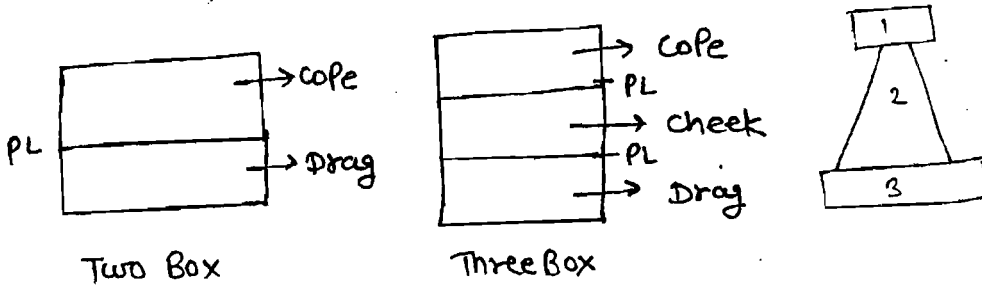
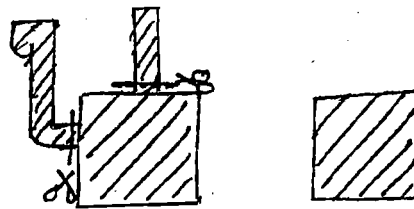
casting: → It is a process in which molten liquid metal is allowed to solidify in a predefined mould cavity.

After solidification by breaking the mould required shape of the object is produced.

1. Pattern
2. Moulding Sand
3. Tools



draw spike



Advantages: →

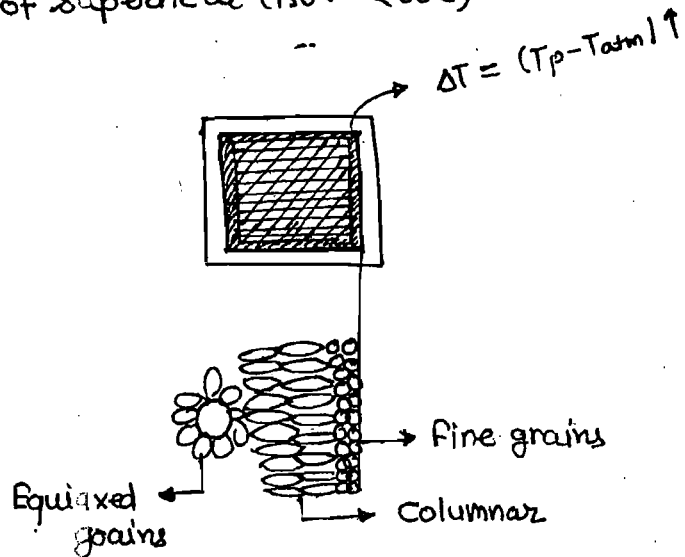
1. Complex shapes of the object can be easily produced
2. Less expensive process
3. Ductile and Brittle materials can be easily produced.
4. Large size objects can be produced by casting only.

(100-150 Ton)

eg. Machine tools Bed (lathe Bed), Road Roller, Turbine housing etc

$$T_p = T_m + \Delta t$$

T_m → melting temp.
 T_p → Pouring temp.
 Δt → degree of superheat (150°C - 200°C)



Limitations of Casting: →

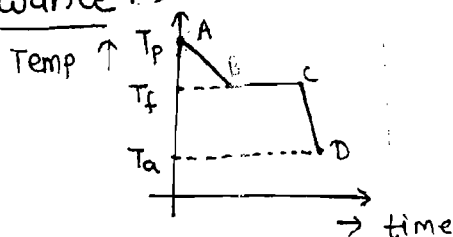
1. Casting objects are not having smooth surface finish.
2. It is laborious and time consuming process.
3. There is a possibility of gas defects can be formed in the casting.
4. Due to non-uniform cooling, non-uniform grain-structure is produced in the casting because of this non-uniform mechanical properties will be produced in the casting.

Pattern: → It is replica of final casting to produced with some allowances.

Allowances: →

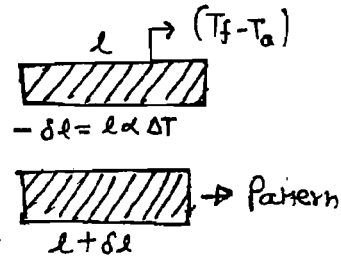
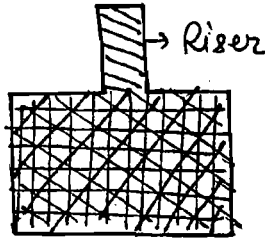
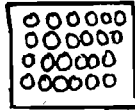
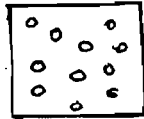
1. Shrinkage or contraction
2. Draft or Taper
3. Machining or finish
4. Shake or Rapping
5. Distortion or camber

1. Shrinkage Allowance: →

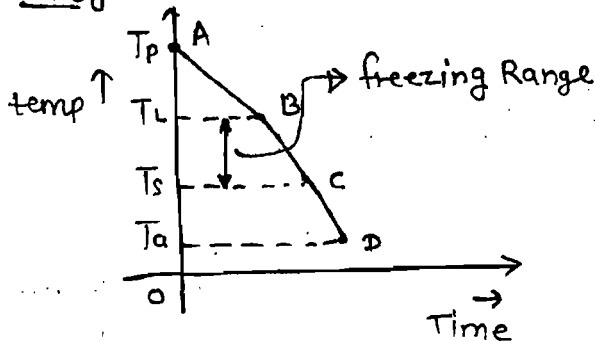


$$(t_s)_r > (t_s)_c$$

$t_s \rightarrow$ solidification time



Alloy:



when liquid metal is allowed to solidify in the cavity there is a contraction or shrinkage of the material. When the liquid metal is cooled from pouring to freezing temp. shrinkage is liquid shrinkage.

During phase transformation shrinkage is solidification shrinkage.

With the solid casting is cooled from freezing to ambient temp. the shrinkage is solid shrinkage.

Liquid and solidification shrinkage can be compensated by providing riser. Solid shrinkage can be compensated by providing shrinkage allowance in the pattern.

• Shrinkage Value: \rightarrow

- | | |
|---------------------------------------|--|
| (i) Bismuth \rightarrow Negligible | (vi) Copper \rightarrow 17 mm/m |
| (ii) White metal \rightarrow 5 mm/m | (vii) Steels \rightarrow 20 mm/m |
| (iii) Cast Iron \rightarrow 10 mm/m | (viii) Lead & Zinc \rightarrow 23 mm/m |
| (iv) Aluminium \rightarrow 13 mm/m | |
| (v) Brass \rightarrow 15 mm/m | |