**WORKSHOP TECHNOLOGY 2011 - NECTA FORM FOUR**

Solutions from: Maktaba by TETEA

By Yohana Lazaro

***1.***

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| E | C | B | D | B | C | B | E | E | D |

2.(a) Brittleness is the property of a material to fracture when subjected to a load.

(b) Ductility is the property of material to be drawn into thin wires without fracture.

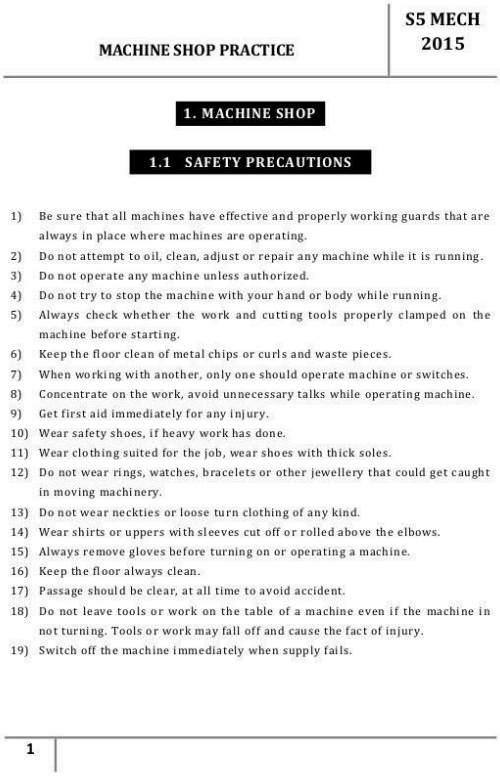
(c) Malleability is the ability of the material to be drawn into sheets without fracture.

3.(a)calamine(zinc carbonate)

(b)copper pyrite

(c)Lead sulphide(Galena)

4.Safety precautions to be observed in the workshop.



MACHINE SHOP PRACTICE | S5 MECH 2015

1. MACHINE SHOP

1.1 SAFETY PRECAUTIONS

1) Be sure that all machines have effective and properly working guards that are always in place where machines are operating.
2) Do not attempt to oil, clean, adjust or repair any machine while it is running.
3) Do not operate any machine unless authorized.
4) Do not try to stop the machine with your hand or body while running.
5) Always check whether the work and cutting tools properly clamped on the machine before starting.
6) Keep the floor clean of metal chips or curls and waste pieces.
7) When working with another, only one should operate machine or switches.
8) Concentrate on the work, avoid unnecessary talks while operating machine.
9) Get first aid immediately for any injury.
10) Wear safety shoes, if heavy work has done.
11) Wear clothing suited for the job, wear shoes with thick soles.
12) Do not wear rings, watches, bracelets or other jewellery that could get caught in moving machinery.
13) Do not wear neckties or loose turn clothing of any kind.
14) Wear shirts or uppers with sleeves cut off or rolled above the elbows.
15) Always remove gloves before turning on or operating a machine.
16) Keep the floor always clean.
17) Passage should be clear, at all time to avoid accident.
18) Do not leave tools or work on the table of a machine even if the machine in not turning. Tools or work may fall off and cause the fact of injury.
19) Switch off the machine immediately when supply fails.

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5.charges for production of pig iron are:-

-iron ore

-fuel(Coke)

-flux(limestone)

6.(a)medium carbon steel 0.4% -0.6%

(b)mild steel 0.25% -0.3%

(c)tool steel 0.7% - 1.4%

7.

| Material | Cutting fluids |
|---|---|
| Manganese | Soluble oil |
| Magnesium | Hysol MG |
| Alloy steels | Synthetic oil. |

8.P

of cutting fluids

-must be free from impurities

-must be non corrosive to materials

-must be able to provide a good finished surface.

9.(a)Smithing is the process of heating, holding,hitting and shapping of metals.

(b)-Non ferrous metal are metals that does not contain iron as their main constituent. Eg copper, aluminum.

-Ferrous metals are metals that contain iron as their main constituent.eg steels,cast iron etc.

10.(a)Flux is the substance that is used during soldering in order to remove impurities and also to prevent oxidation on the soldering process.

(b)Groups

of plastics include

-Thermoplastics

-thermosetting plastics

11.-getting rid of impurities from pig iron

-the killing process

-molten steel is poured into ladles and ingot moulds.

12.(a)Heat treatment is the process of heating the metal to a desired temperature and then cooling it at a suitable rate.

(b)(i) Annealing is the process of heating the metal above upper critical range and cool it slowly in a furnace or sand. The purpose of this is to make the street to be soft.

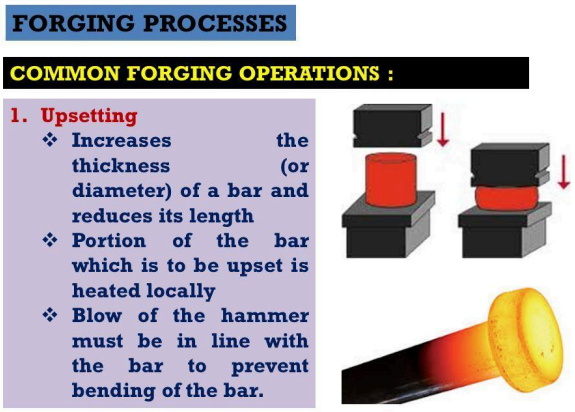
(ii)Nitriding is the process of heating a steel in gaseous ammonia at temperature between 500 to 550°C, whereby nitrogen diffuses into steel.

This helps to harden the surface of the steel due to induced nitrogen as it reacts with iron to form hard metallic nitride.

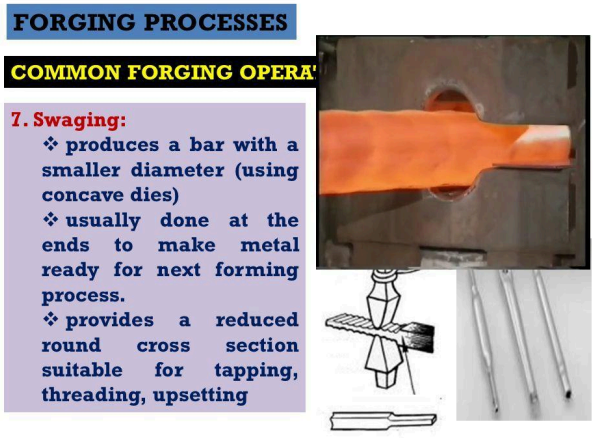
(iii) Normalising is the heat treatment process used to give steels a uniform and fine grained structure.

(iv)Tempering is the process of heating the metal at high temperature Below its melting point and allow it to cool in air. This helps to improve toughness and reduces internal stresses.

13.Forging process.







## FORGING PROCESSES

**COMMON FORGING OPERATIONS:**

**2. Bending:**

- ❖ Gives a turn to a metal rod or plate
- ❖ Spreads the metal in the inside of the bend narrowing at outside
- ❖ Upset the bar prior to bending

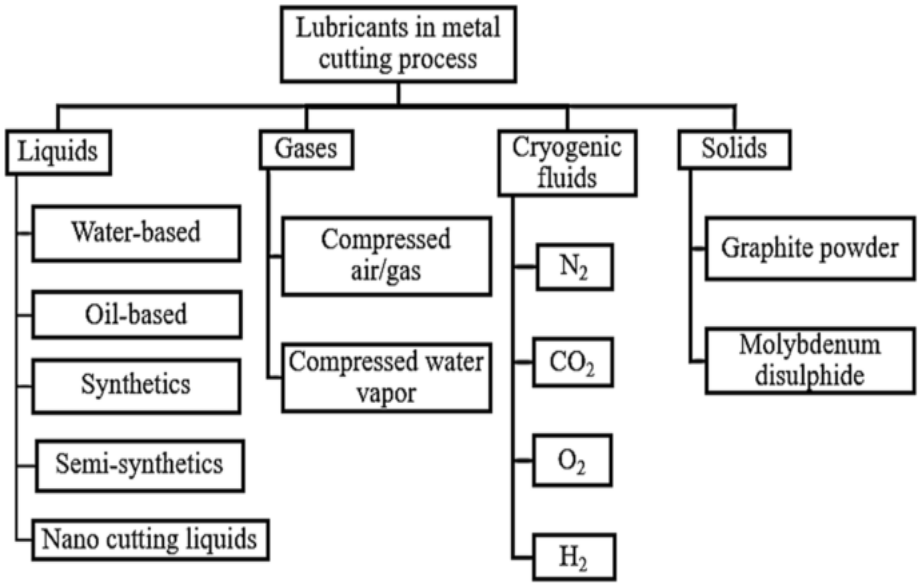
## FORGING PROCESSES

**COMMON FORGING OPERATIONS:**

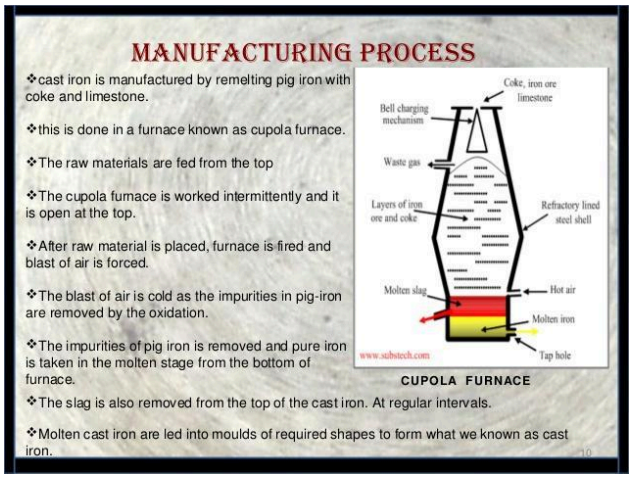
**3. Drawing Out**

- ❖ Reduces the thickness of a bar and to increase its length
- ❖ Hammering done on it on the anvil face so that force applied perpendicularly to the length axis

GROUPS OF CUTTING FLUIDS.




14.(a) cast iron.



## Gray Cast Iron

- Gray cast iron forms when
  - Cooling is slow, as in heavy sections
  - High silicon or carbon,
  - Mn = 0.4 to 1.0 %
- Flake graphite in a matrix of pearlitic, ferrite or martensite
- Properties depend strongly on casting shape & thickness
- Low ductility - elongation 0.6%
- High conductivity, high damping
- Wide range of applications



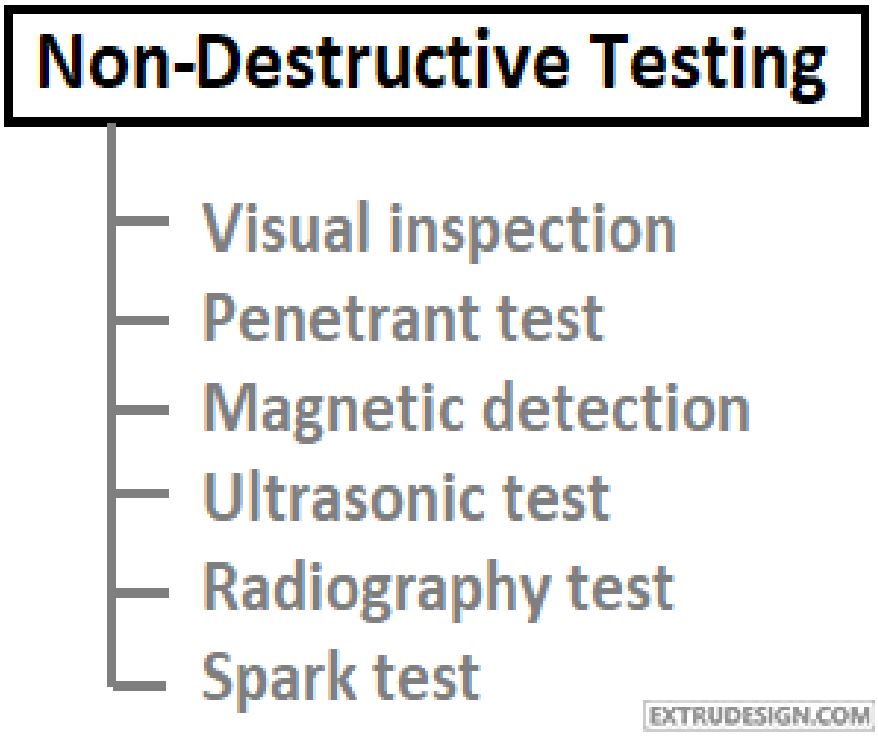
## 2. MALLEABLE CAST IRON

- After first-stage annealing, the castings are cooled as rapidly as practical to about 1400oF in preparation for the second stage of the annealing treatment.
- During the slow cooling, the carbon dissolved in the austenite is converted to graphite on the existing temper-carbon particles, and the remaining austenite transforms into ferrite. After cooling to room temperature the structure is known as standard malleable cast iron.

## White cast iron

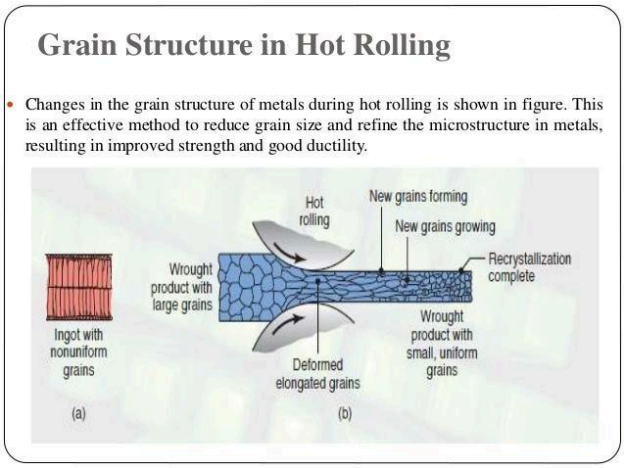
- With a lower silicon content and faster cooling, the carbon in *white cast iron* precipitates out of the melt as the metastable phase cementite, Fe3C, rather than graphite.
- The cementite which precipitates from the melt forms as relatively large particles, usually in a eutectic mixture, where the other phase is austenite (which on cooling might transform to martensite).
- It is difficult to cool thick castings fast enough to solidify the melt as white cast iron all the way through.
- However, rapid cooling can be used to solidify a shell of white cast iron, after which the remainder cools more slowly to form a core of grey cast iron.

15.(a)(i)metal testing helps to ensure product safety and reliability.

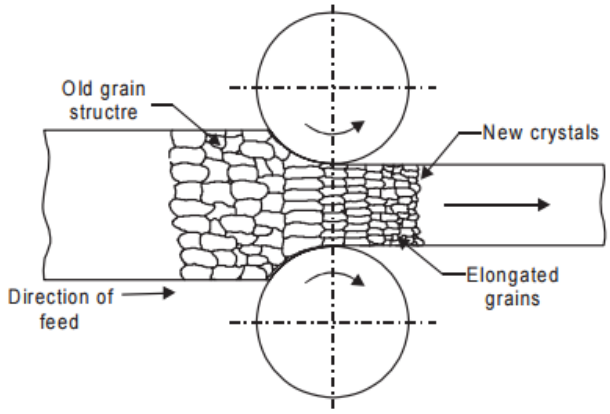


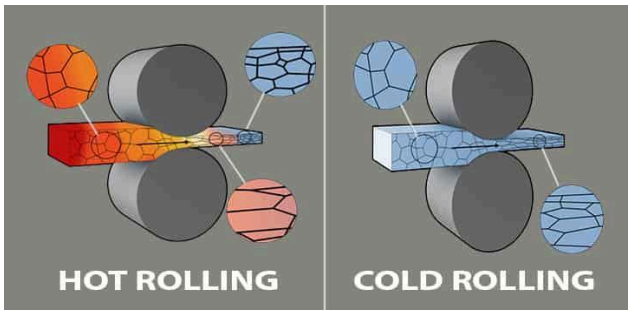

(b)Rolling of metal is the process of metal forming, metal is passed between two or more pairs of rollers in order to reduce and maintain the uniform thickness.

(c)



Cold Rollin




16(a)(i) Hole basis system,the hole is kept constant and the shaft upper and lower deviation values determine the type of the fit.In this,the lower deviation of the hole will be zero.

(ii)

## Shaft Basis System

- In this system, the design size of a shaft, whose upper deviation (fundamental deviation) is zero, is assumed as basic size and different class of fits obtained by varying the limits of the hole only.
- In other words, the limits of shaft are kept constant and limits of holes are varied to obtain the necessary type of fit.

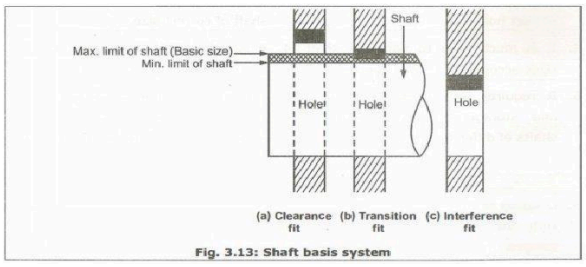
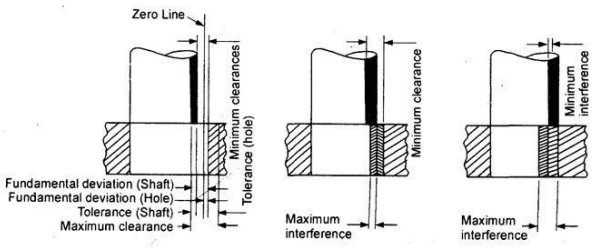



Fig. 3.13: Shaft basis system

(b) types of fits.




(c)shaft =25.00+0.02 = 25.02mm

Also,shaft = 25.02- 0.06=24.6mm