WELLCOME TO MY PRESENTATION

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Subject : Manufacturing Process

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- 3 0 3

UNDERSTAND THE MANUFACTURING PROCESS & SYSTEM

Manufacturing process:

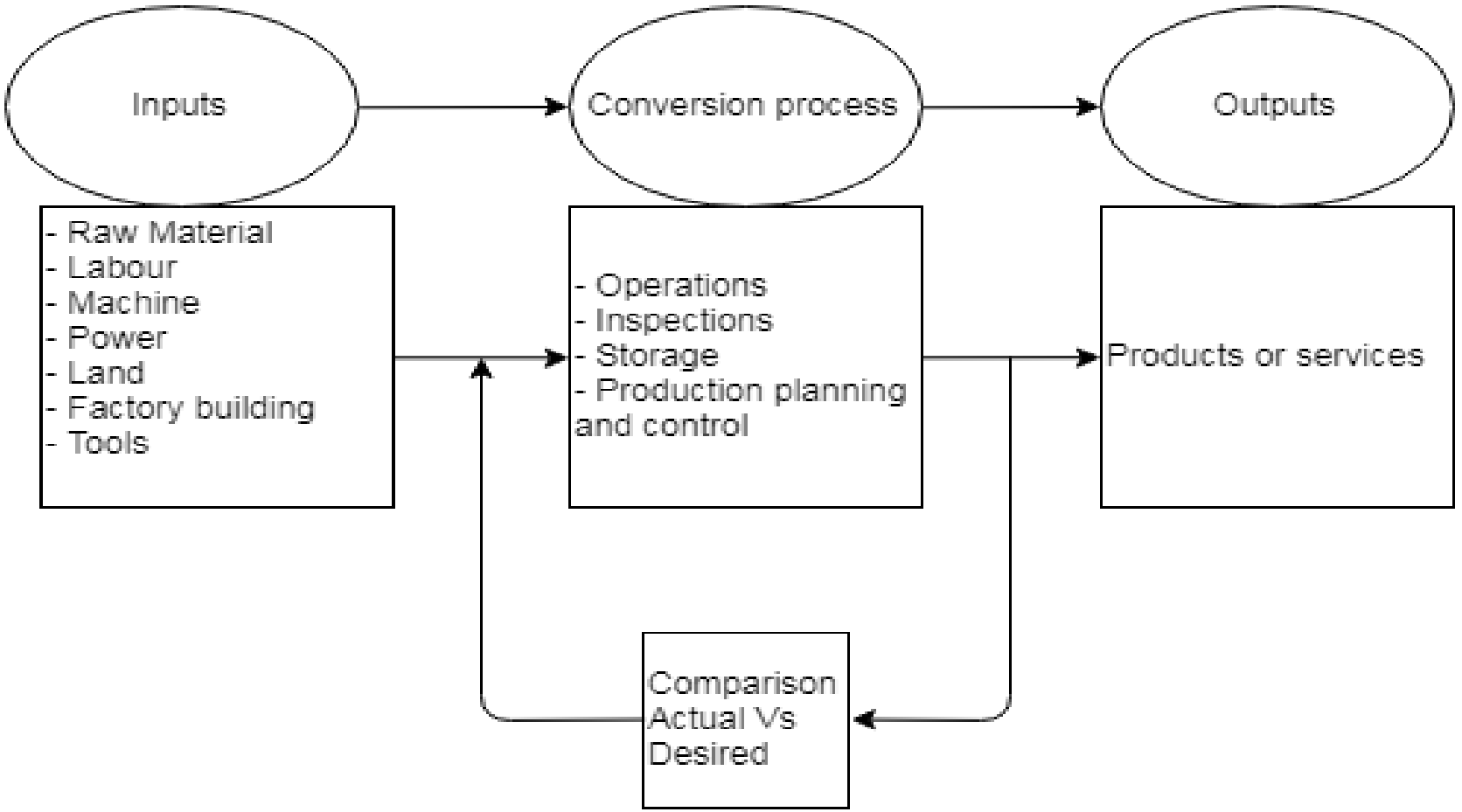
Manufacturing engineering or manufacturing process are the steps through which raw materials are transformed into a final product.

Different types of manufacturing process

The four main types of manufacturing are,

1. casting and molding,
2. machining, joining,
3. and shearing and
4. forming.

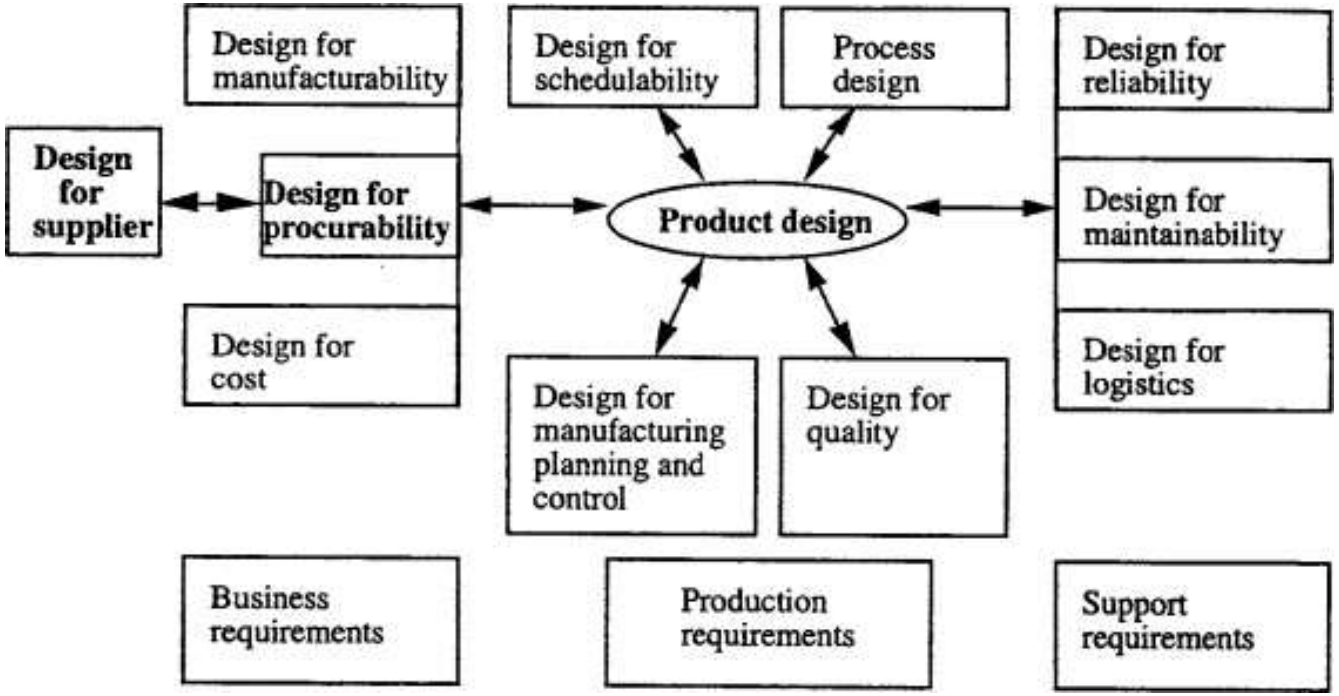
Manufacturing system with block diagram



Concurrent engineering

- Concurrent engineering, also known as simultaneous engineering, is a method of designing and developing products, in which the different stages run simultaneously, rather than consecutively

Block diagram of Concurrent engineering



Benefits of manufacturing process

Here are five important benefits of IoT for the manufacturing industry to consider.

- Greater Energy Efficiency. Energy is one of the largest expenses for manufacturing firms. ...
- Predictive Maintenance. ...
- Higher Product Quality. ...
- Reduced Downtime. ...
- Faster, More Informed Decisions.
-

thank you

UNDERSTAND THE CONCEPT OF COLD WORKING

Cold working

Cold working refers to the process of strengthening a metal by changing its shape without the use of heat. This process, also known as plastic deformation,

Different types of cold working

Cold forming techniques are usually classified into four major groups: squeezing, bending, drawing, and shearing. They generally have the advantage of being simpler to carry out than hot working techniques.

Processes

- Angle bending.
- Roll bending.
- Draw and compression.
- Roll forming.
- Seaming.
- Flanging.
- Straightening.

Effects of cold working process

- Effect of cold working
- Surface Finishes
- Hardness Testing
- Tube Shapes and Profiles
- Pressure Units
- Glossary of Tube Term
- Shipping terms

Advantage of cold working process

When compared to hot working, cold-working processes have certain distinct advantages:

- No heating required.
- Better surface finish obtained.
- Superior dimension control.
- Better reproducibility and interchangeability of parts.
- Improved strength properties.
- Directional properties can be minimized.

Limitation of cold working

Some disadvantages and problems of cold working are:

1.The metal is harder,

2.calling for greater forces,

3.harder tools and dies, and heavier equipment.

4.The metal is less ductile and malleable,

5 The amount of deformation that can be obtained. Metal surfaces must be clean and scale-free.


ANY
QUESTIONS?


Thank
you!

UNDERSTAND DIFFERENT PROCESS USED IN COLD WORKING

Classify cold working process

The major cold-working operations can be classifiedbasically as

1.squeezing,

2.bending,

3. shearing and

4. drawing.

Cold working is the plastic deformation of metals below the recrystallization temperature. In most cases of manufacturing, such cold forming is done at room temperature.

Different types of squeezing

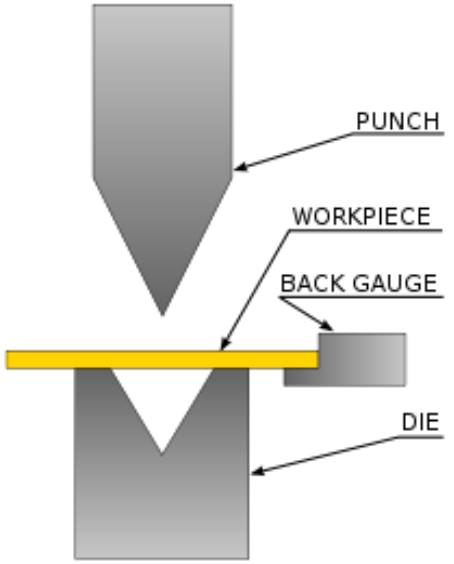
Classification

- In a two-suit squeeze, there are menaces in two suits.
- In a three-suit squeeze, there are menaces in three suits.
- In a compound squeeze, there are menaces in three suits (against one); then, menaces in three suits (against both opponents).

Different types of bending

Types

- Air bending.
- Bottoming.
- Coining.
- Three-point bending.
- Folding.
- Wiping.
- Rotary bending.
- Roll bending.



Different types of shearing process

Shearing-type operations include:

1.Blanking,

2. Piercing,

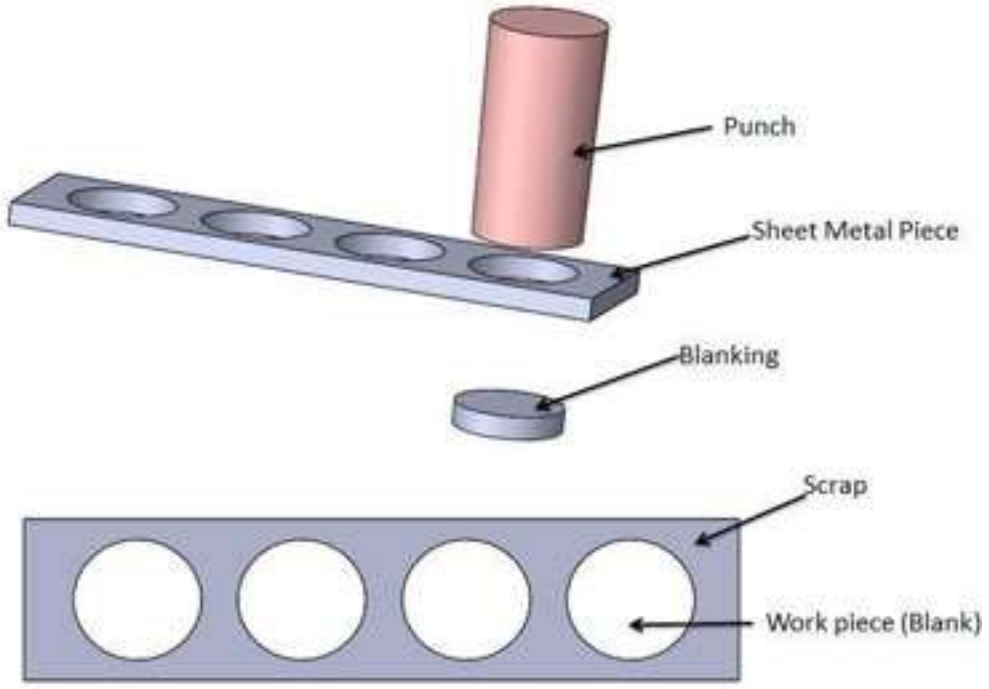
3.Roll slitting,

4. Trimming.

5.Punching

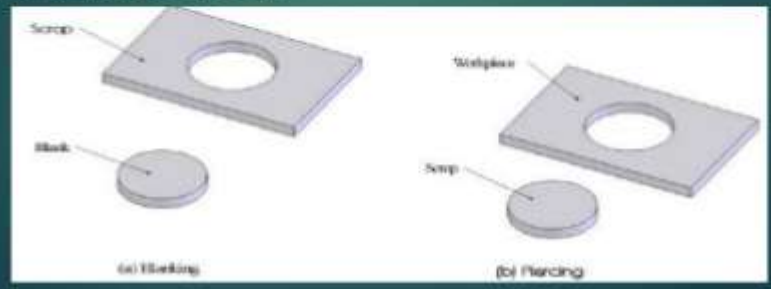
6.Bending

Different between Blanking and punching



Difference:

- In the punching process the final product is the metal sheet from which metal is removed.
- In blanking process the final product is the removed portion from the sheet.




ANY
QUESTIONS?

thank you

UNDERSTAND CONCEPT OF HOT WORKING PROCESS

Hot working

Hot working is a process in which a metal is shaped under pressure at a fairly high temperature. Hot working of this material may be done in the temperature range of 2150 F to 1800 F.

Different types of hot working

Many kinds of working, including

1.Rolling,

2.Forging,

3.Extrusion, and

4.Drawing,

can be done with hot metal.

Advantages of hot working

Advantages of hot working process

- It reduces strain hardening.
- Its components have better toughness.
- Its components have better ductility.
- Its components have better resistance to shocks and vibrations.
- Its components have better strength particularly the forged parts.
- It reduces residual stress in the component.

Limitations of hot working

- This working conditions may form scaling and oxidations.
- This process does not get a required surface finish.
- External machining process is needed to finish the process.
- Due to this high-temperature metal life gets reduced.
- Hot working is not safe to handle.

List the name of products of hot working

- The application of hot metal working includes hot rolling, forging, extrusion and hot drawing. The carbon steel and stainless steel products are rolled to form thin plates and extruded to produce desired shapes. Hot working is used for altering the form of iron and steel without fracture and use of excessive force.


ANY
QUESTIONS?


Thank
you!

UNDERSTAND DIFFERENT PROCESS USED IN HOT WORKING

Classify hot working process

1.Rolling

2.forging,

3.extrusion, and

4.drawing,

Different types of rolling process

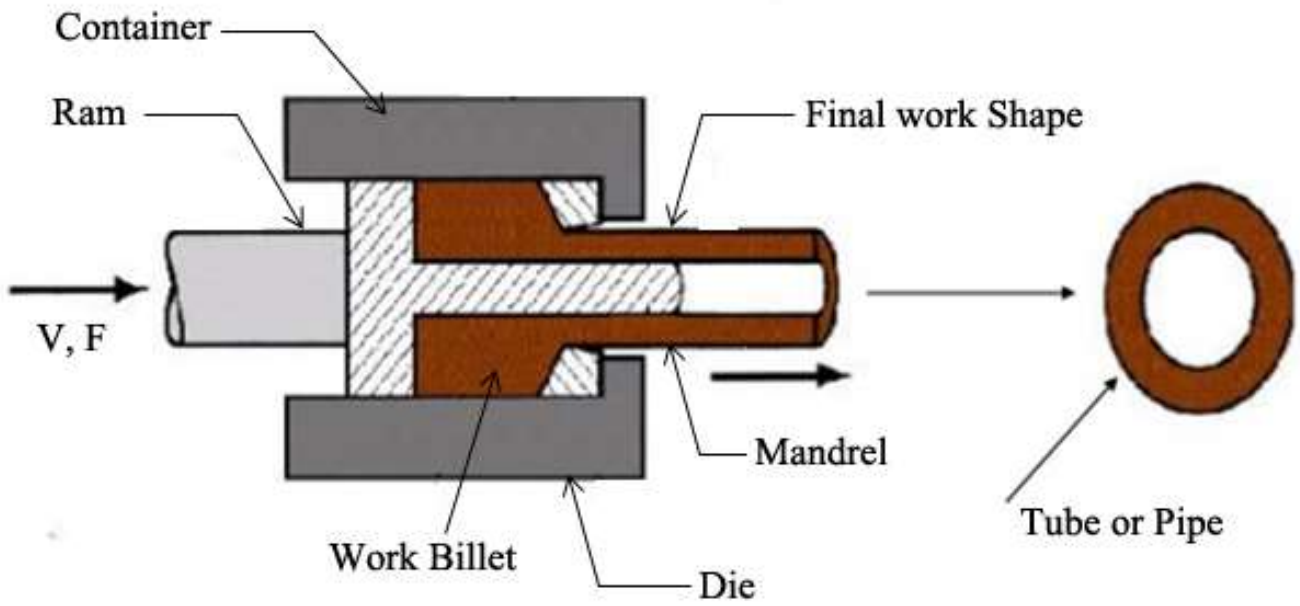
There are many types of rolling processes, including

- Ring rolling,
- Roll bending,
- Roll forming,
- Profile rolling, and
- Controlled rolling.

Forging processes

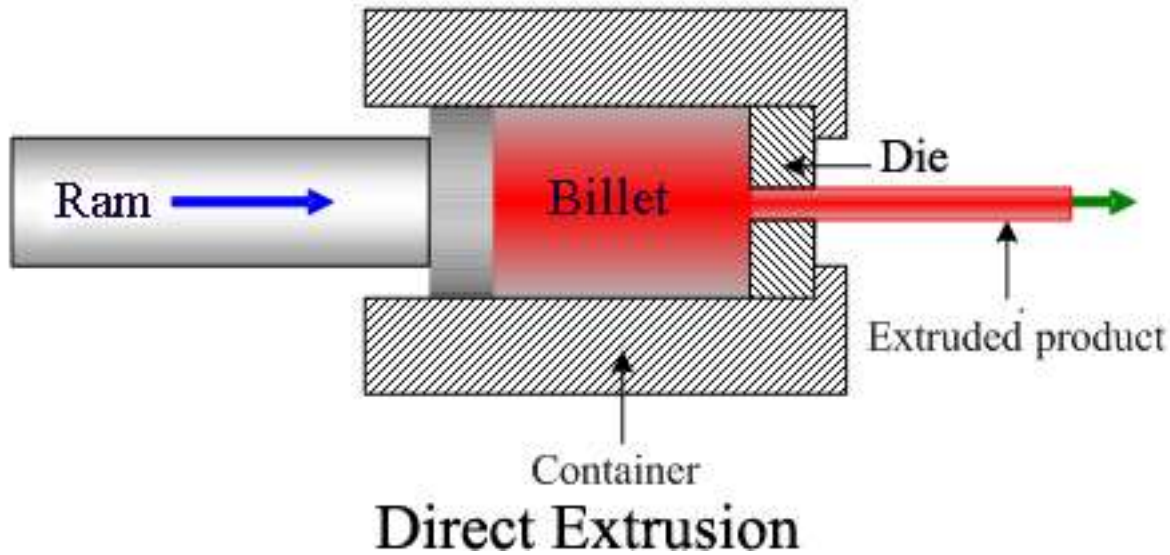
- Roll forging,
- Swaging,
- Cogging,
- Open-die forging,
- Impression-die forging,
- Press forging,
- Automatic hot forging and
- Upsetting.

Extrusion process



Tube Extrusion

Direct extrusion process



Machines and accessories used in hot working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QUESTIONS?


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UNDERSTAND THE CORROSION OF METAL

CORROSION

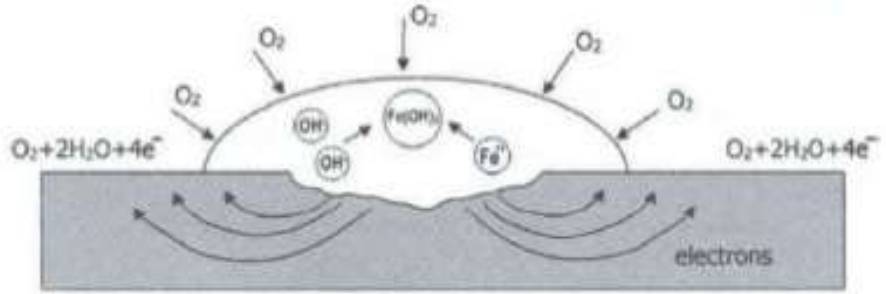
Corrosion is a natural process that converts a refined metal into a more chemically-stable form such as oxide, hydroxide, or sulfide. It is the gradual destruction of materials by chemical and/or electrochemical reaction with their environment.

Mechanism of corrosion

- Corrosion Mechanism. How corrosion occurs? In the presence of moisture, an oxidation reaction takes place on the energized area of the metal surface to elute metal as an ion (anode). On the metal surface, oxidation on anode and reduction on cathode proceed in equal rates and metal corrosion takes place.

Mechanism of corrosion

Mechanism of corrosion (iron)



$$\left\{ \begin{array}{r} 2(Fe \rightarrow Fe^{2+} + 2e^-) \\ O_2 + 2H_2O + 4e^- \rightarrow 4OH^- \end{array} \right\}$$

$$2Fe + O_2 + 2H_2O \rightarrow 2Fe(OH)_2$$

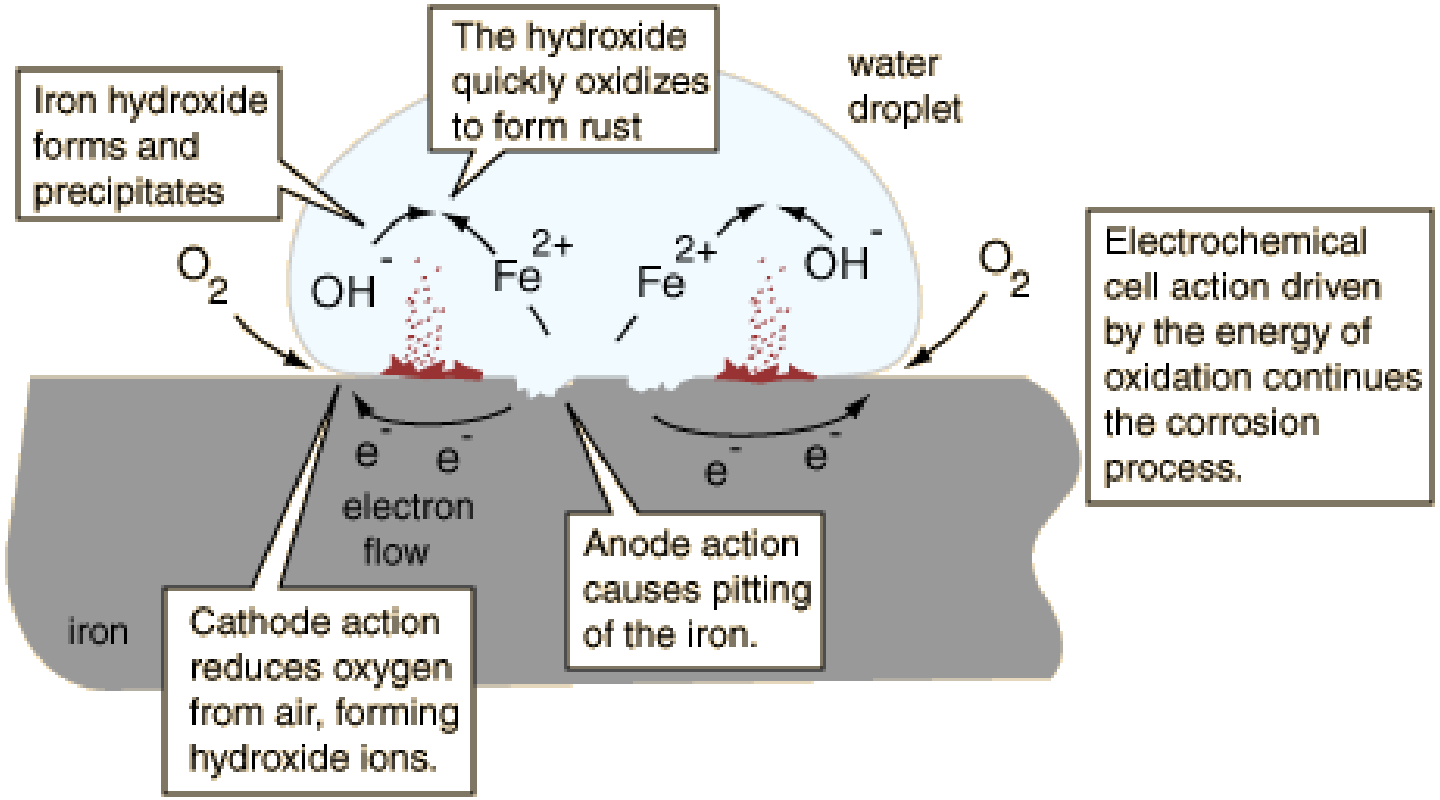
$$2Fe(OH)_2 + \tfrac{1}{2}O_2 + 2H_2O \rightarrow 2Fe(OH)_3$$

Redish-brown

Explain the electro-chemical process of corrosion of metal,plastic and ceramics materials

- Electrochemical corrosion of metals occurs when electrons from atoms at the surface of the metal are transferred to a suitable electron acceptor or depolarizer . Water must be present to serve as a medium for the transport of ions. The most common depolarizers are oxygen, acids, and the cations of less active metals.

Explain the electro-chemical process of corrosion of metal



Different types of corrosion environment

As corrosion most often occurs in aqueous environments, we now explore the different types of degradation a metal can experience in such conditions:

- Uniform Corrosion.
- Pitting Corrosion.
- Crevice Corrosion.
- Inter granular Corrosion.
- Stress Corrosion Cracking (SCC)
- Galvanic Corrosion.

Application of methods of protective coating

- Protective coatings are commonly used to protect culturally significant works, such as outdoor sculptures and architectural elements. While the cost of damage due to corrosion is much higher than that of more common coating applications, the same types of protective coatings are used.


ANY
QUESTIONS?


Thank
you!

UNDERSTAND THE FUNDAMENTAL ASPECT OF ELECTROPLATING

What is electroplating

Electroplating is the coating of an object with a metal. ... The metal bar dissolves in the solution and plates out on the object, forming a thin but durable coating of metal. It is often used to gold-plate objects for decoration or to stop corrosion.

Objective of electroplating

Electroplating has many advantages:

i) It is used to coat metal surfaces with desired metal coatings, for decoration purposes.

ii) It saves metal surfaces from rusting.

iii) It saves corrosion of surfaces of metals.

Steps of pre-preparation of electroplating

- First, proper identification of the substrate or base metal is very important.
- Next, presence of oxides can make pre-treatment difficult.
- Knowledge and identification of soils is very helpful in planning the preparation process. Lastly,
- it is important to know the type of finishing that will be applied to the pa

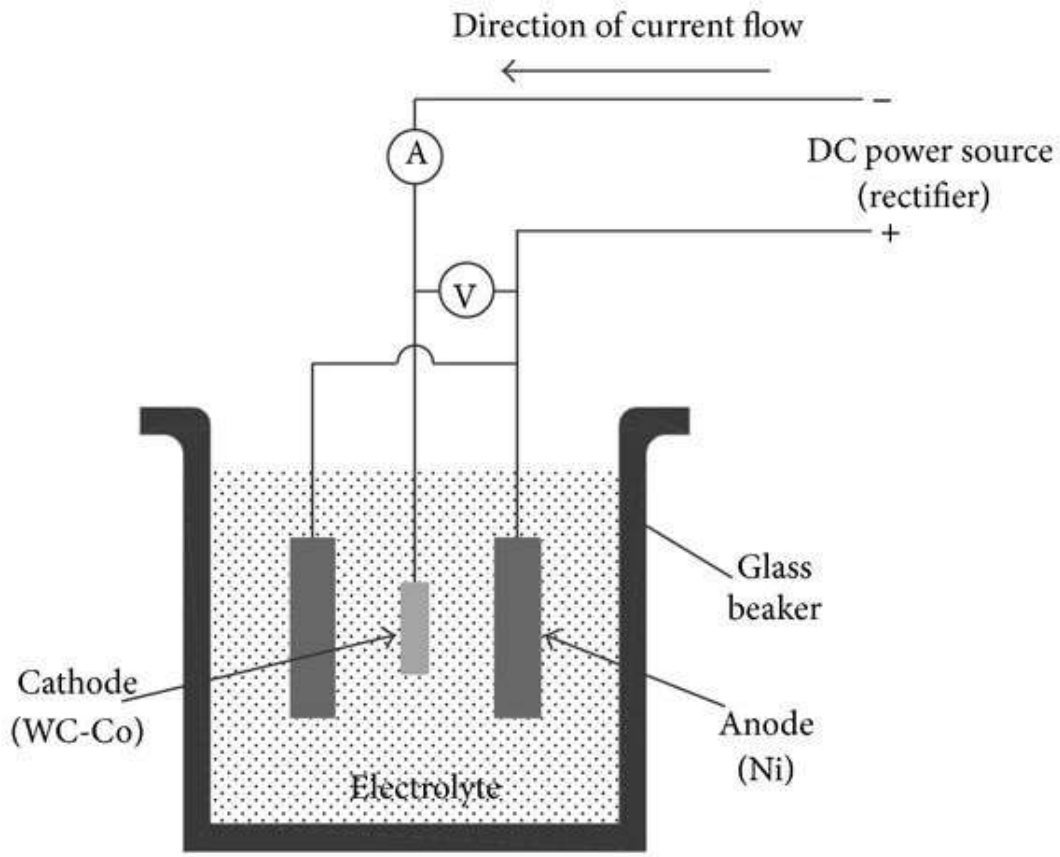
Steps of pre-preparation of electroplating

- Preparation stages often include pre-cleaning,
- secondary cleaning and surface activation.
- Pre-cleaning is often performed by a an immersion/soak cleaning stage.
- Cleaners high in alkalinity are usually the preference in this stage and the strength of the cleaner is for use is determined by the soils that are to be removed.
- Concentration of the cleaner, temperature of the bath and degree of agitation are determined based on the difficulty of soil removal. It is in this step, that the bulk of the soils are removed.

Principal of electroplating

- Electroplating is a process that uses an electric current to reduce dissolved metal cautions so that they form a thin coherent metal coating on an electrode. A power supply supplies a direct current to the anode, oxidizing the metal atoms that it comprises and allowing them to dissolve in the solution.

Method of electroplating



Construction of electroplating equipments

- Bathing tank
- Barrel
- Filter
- Agitator
- Electrical Instruments

Hazards of electroplating

Nickel exposure to humans may damage or effect kidney, liver. Chromium exposure may lead to respiratory tract diseases. A lot of water waste and sludge is also released from
the electroplating industries will also increase environment pollution. For all these above reasons, electroplating is hazardous to environment.


Thank
you!!

UNDERSTAND THE SURFACE TREATMENT PROCESS

Necessity of surface treatment

The purpose of this treatment is increasing the surface energy level of a particular metal surface so that it can easily adhere to the printing or coating that is about take place. This type of treatment is usually known as the coatings pretreatment. The reaction occurs between a solution and the metals surface.

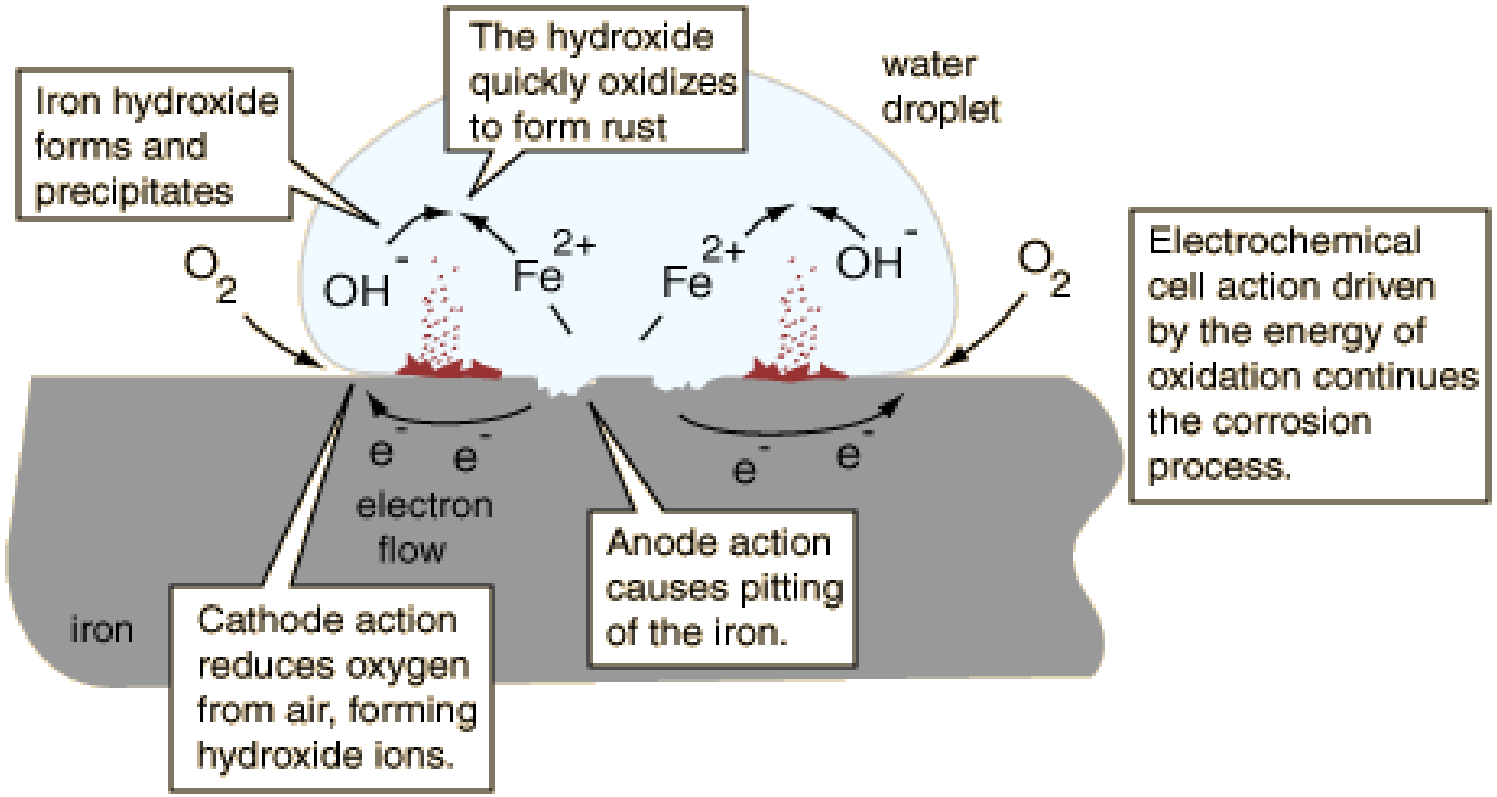
Various surface treatment process

- Methods are vacuum vapor deposition, sputtering, ion plating, ion nitri ding , and ion implantation. Titanium nitride is of gold color. There are spray painting, electrostatic painting, electro deposition painting, powder painting methods, and are generally used for surface decorations, anti-rusting and anti-corrosion.

Anodic coating

- An anodic coating is a type of coating material that utilizes anodizing to provide increased thickness, color and protection to aluminum or any type of substrate. This coating consists of the oxide film that is created on metal through electrolysis, with the metal acting as an anode.

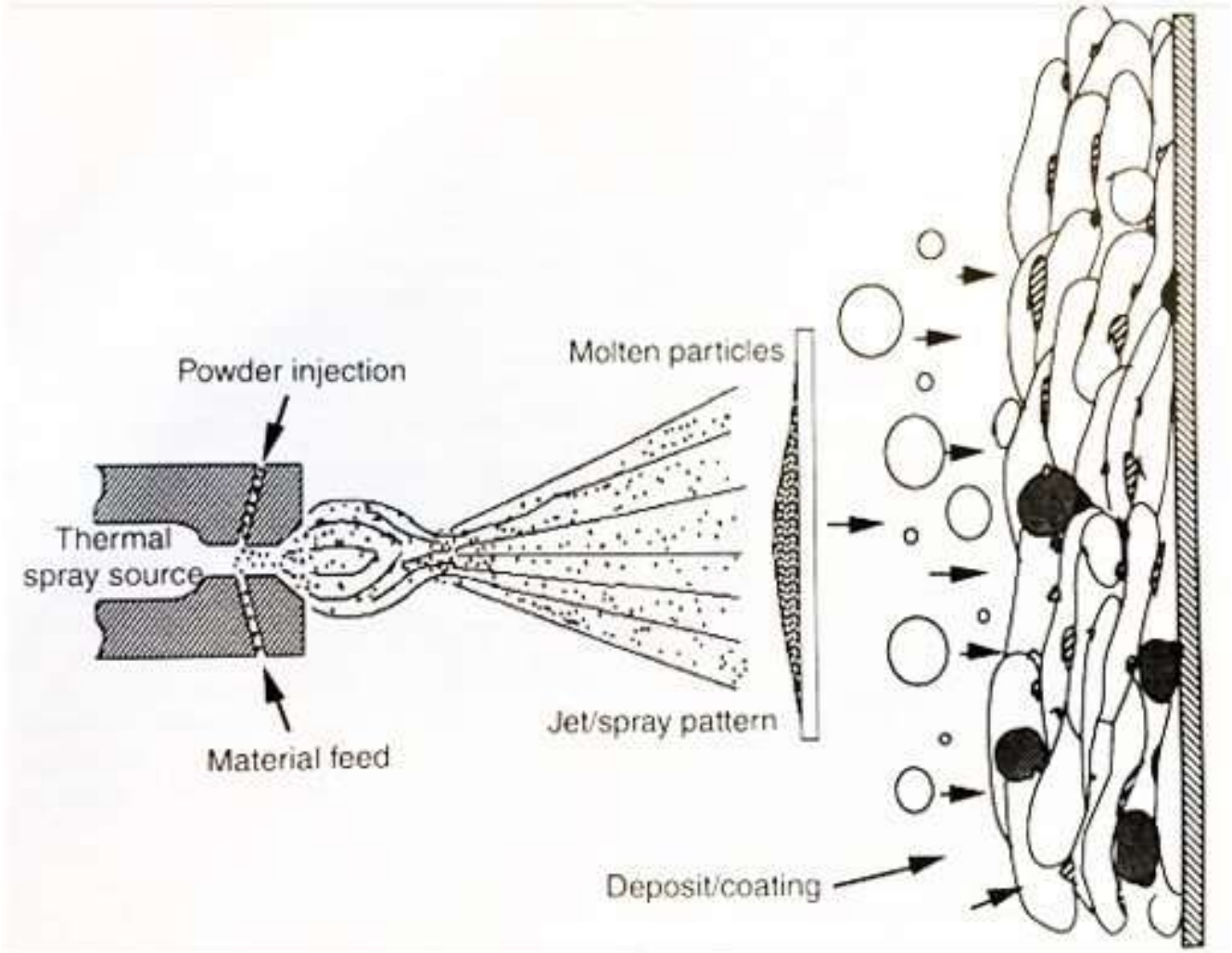
Cathodic process



Hot dipping process

- Hot-dip galvanization is a form of galvanization. It is the process of coating iron and steel with zinc, which alloys with the surface of the base metal when immersing the metal in a bath of molten zinc at a temperature of around 449 °C (840 °F).

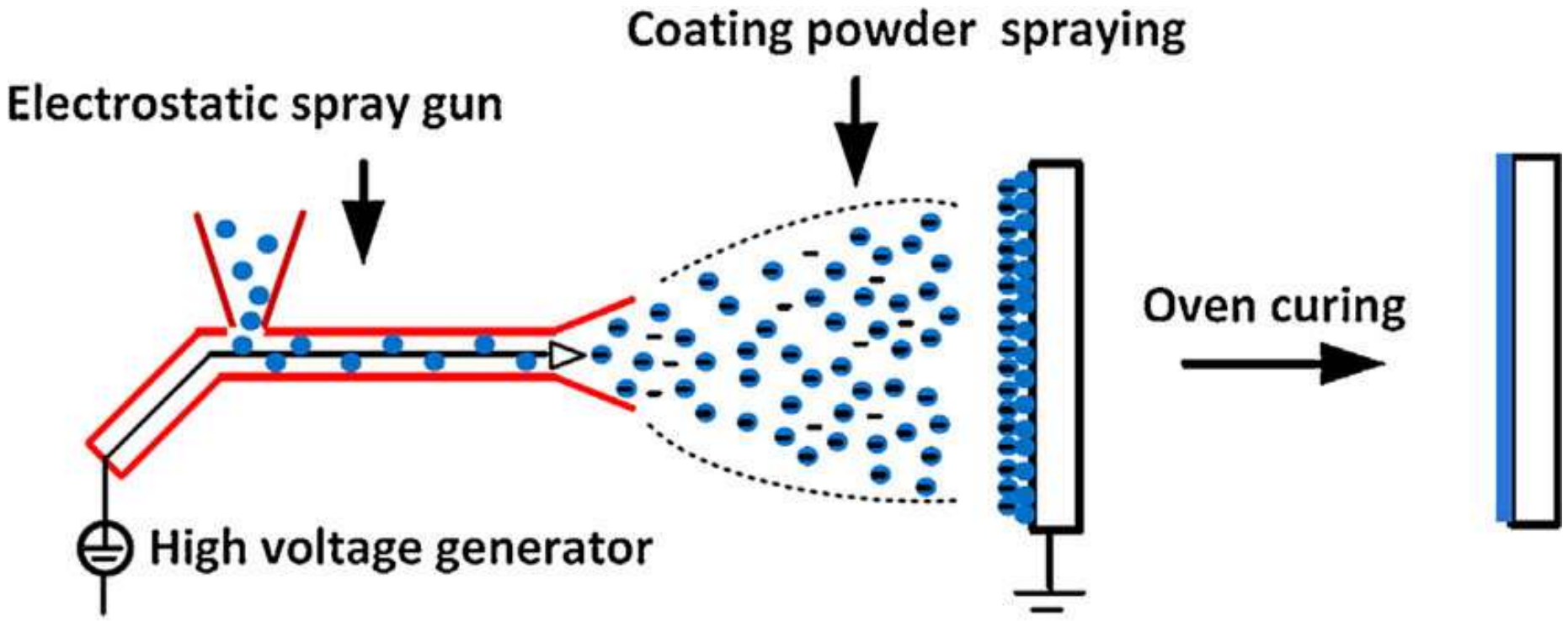
Metal spray process



Metal cladding

Metal cladding is a type of exterior**cladding** made of **metal**. Exterior**cladding** is basically the protective outer covering on buildings. It's a term used to describe exterior surfaces on things like walls, windows, doors, and trims.

Describe the electro-static coating process




ANY
QUESTIONS?


Thank
you!

UNDERSTAND THE POLYMERIC MATERIALS

POLYMER

A polymer is a large molecule, or macromolecule, composed of many repeated subunits.

Classify of polymer

Classification of Polymers. The most common way of classifying polymers is to separate them into three groups –

- thermoplastics,
- thermosets, and
- elastomers.

Characteristics polymer

- Some of the useful properties of various engineering polymers are high strength or modulus to weight ratios (light weight but comparatively stiff and strong), toughness, resilience, resistance to corrosion, lack of conductivity (heat and electrical), color, transparency, processing, and low cost.

Source of the raw materials of polymer

- The most important primary sources of synthetic polymers are crude oil, natural gas and, to a minor extent, coal.
  Where polymer manufacture is different is in the range of sources of the basic building blocks for the polymer repeat units. Both oil and natural gas can be used to make polyethylene for example

Application of polymer

- Polymers are more resistant to chemicals than their metal counterparts.
- Polymer parts do not require post-treatment finishing efforts, unlike metal.
- Polymer and composite materials are up to ten times lighter than typical metals.
- Polymer materials handle far better than metals in chemically harsh environments.
- Polymer materials allow the oil and gas industry

Usages limitation of polymer

- Cannot withstand very high temperature as all plastics melt down very soon as compared to metals.
- The strength to size ratio of polymer is less while for metals is more.
- Cannot be machined easily and limited speed for machining for it.
- Heat capacity of polymer is very less so cannot be used in heat applications.
- Heavy structure cannot be made by polymer as the structural rigidity is very less.
- The disposal becomes an issue as some polymer cannot be recycled but all metals can be recycled.


ANY
QUESTIONS?


Thank
you!

UNDERSTAND THE PLASTIC MATERIALS

What is plastic

Plastic is material consisting of any of a wide range of synthetic or semi-synthetic organic compounds that are malleable and so can be molded into solid objects.

Classification of plastic

- Plastics are usually classified by their chemical structure of the polymer's backbone and side chains.
- Plastics can also be classified by the chemical process used in their synthesis, such as condensation, poly addition, and cross-linking.
- There are two types of plastics: thermoplastics and thermosetting polymers.

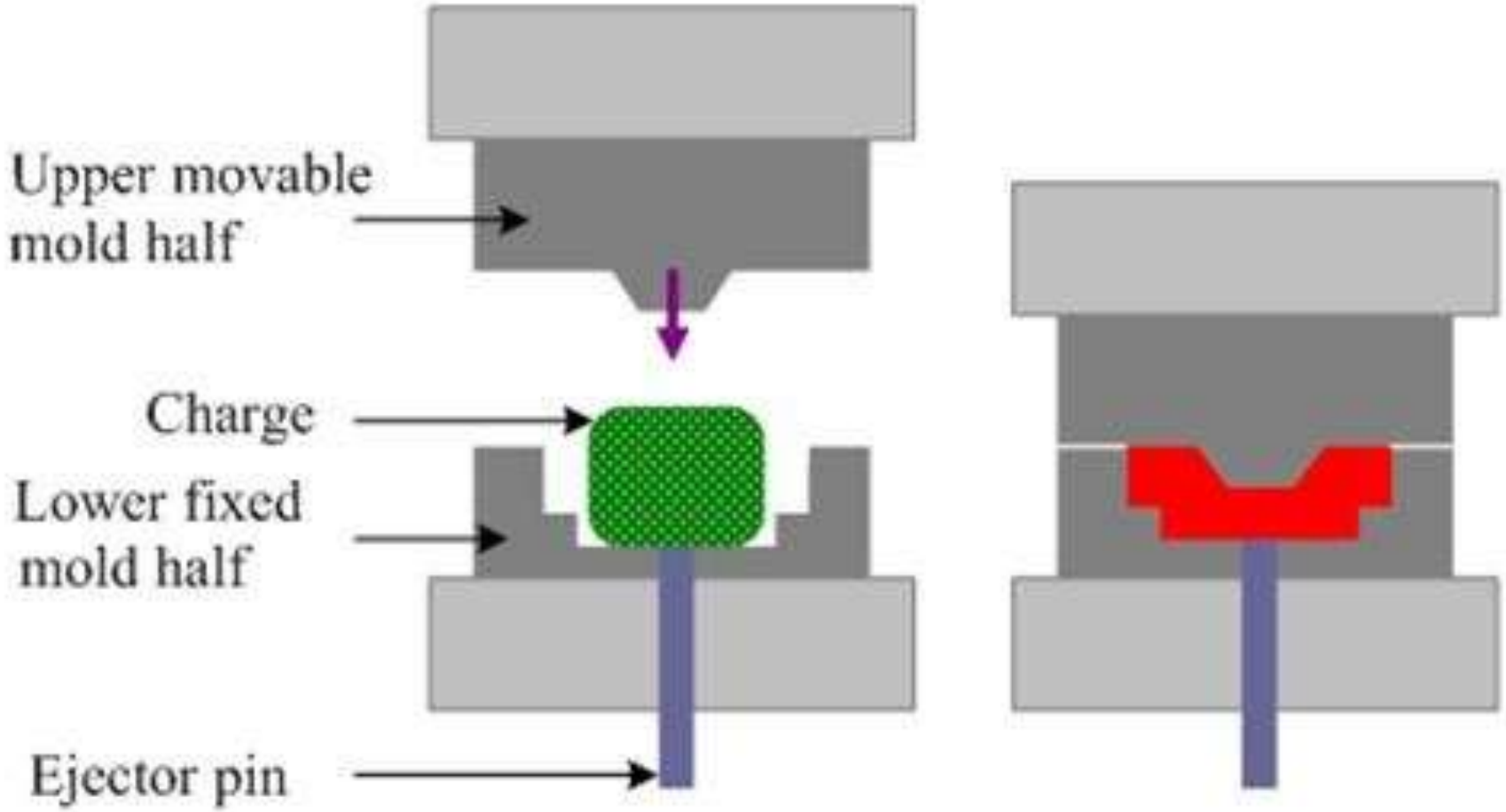
Thermoplastic

- A thermoplastic, or thermo softening plastic, is a plastic polymer material that becomes pliable or moldable at a certain elevated temperature and solidifies upon cooling. Most thermoplastics have a high molecular weight

Thermosetting plastic

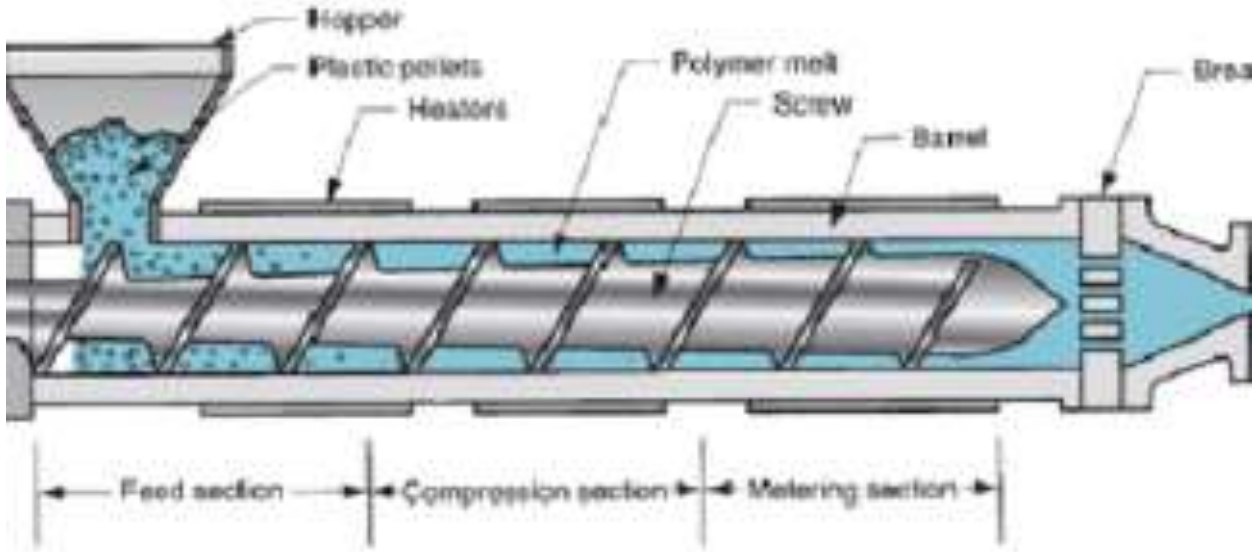
A thermosetting plastic is a polymer that irreversibly becomes rigid when heated. Such a material is also known as
a thermoset or thermosetting polymer. Initially, the polymer is a liquid or soft solid.

Compression molding

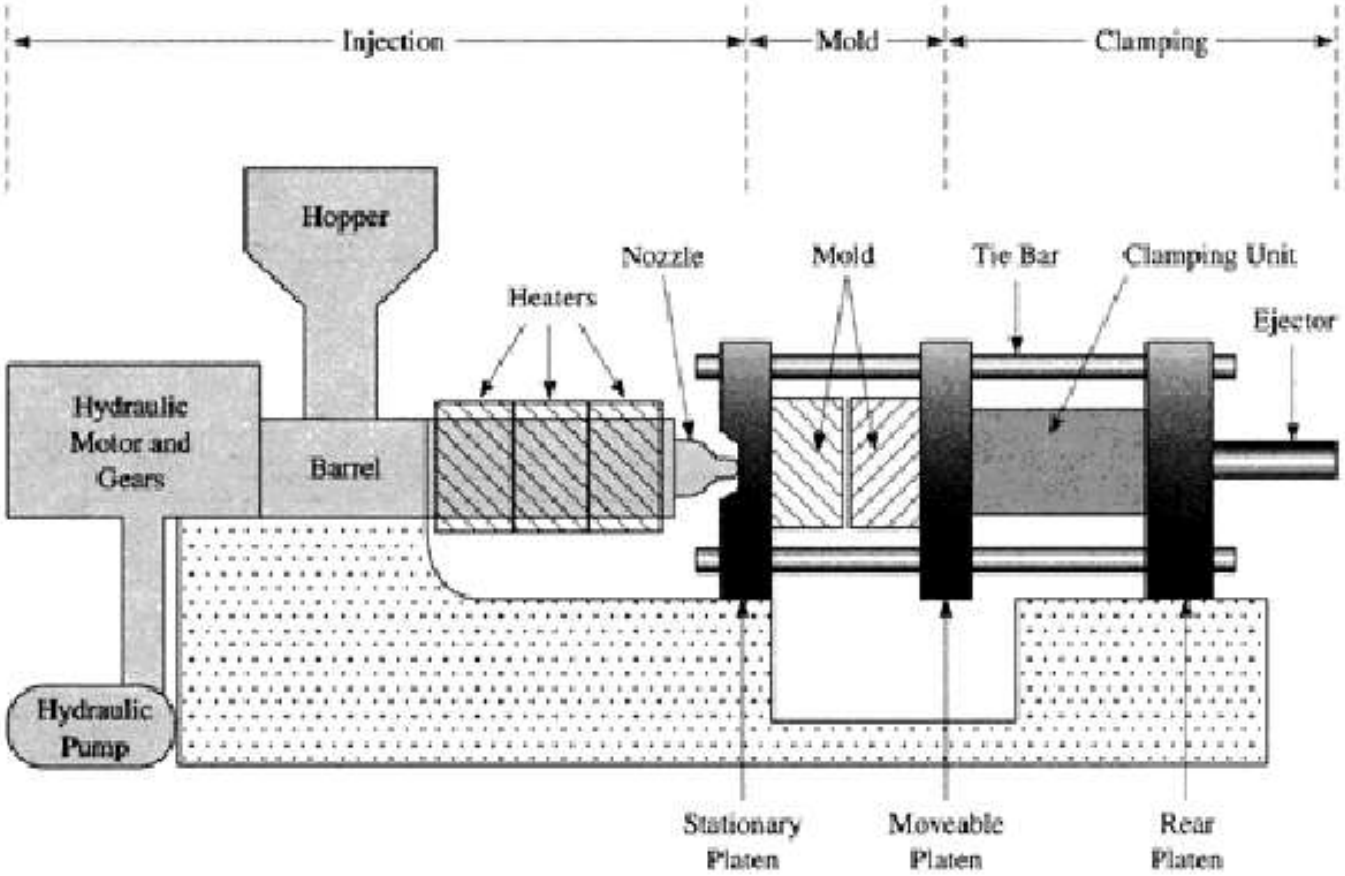


Extrusion molding

Extrusion is a manufacturing process used to make pipes, hoses, drinking straws, curtain tracks, rods, and fibre. The granules melt into a liquid which is forced through a die, forming a long 'tube like' shape.



Injection molding



Joining of plastics

- Mechanical fasteners
- Welding of plastic
- solvent

Uses of plastic

- Plastics are used to make bicycle helmets,
- child safety seats and airbags in automobiles.
- They're in the cell phones, televisions, computers and other electronic equipment that makes modern life possible.
- They're in the roofs, walls, flooring and insulation that make homes and buildings energy efficient.


ANY
QUESTIONS?


Thank
you!

UNDERSTAND THE FUNDAMENTAL ASPECTS OF GLASS

CHARACTERISTICS OF GLASS

The main characteristics of glass are

1. transparency,
2. heat resistance,
3. pressure and breakage
4. resistance and chemical resistance

INGREDIENTS OF GLASS

- Main glass ingredients: sand / soda / limestone. 70% Silica (sand) SiO_2 , 18% Sodium oxide (soda ash) Na_2O, 12% Calcium carbonate (lime) Cao melted at around 1320 degrees Celsius makes a typical glass which can be formed by blowing by mouth or machine, by casting, by pressing and by drawing.

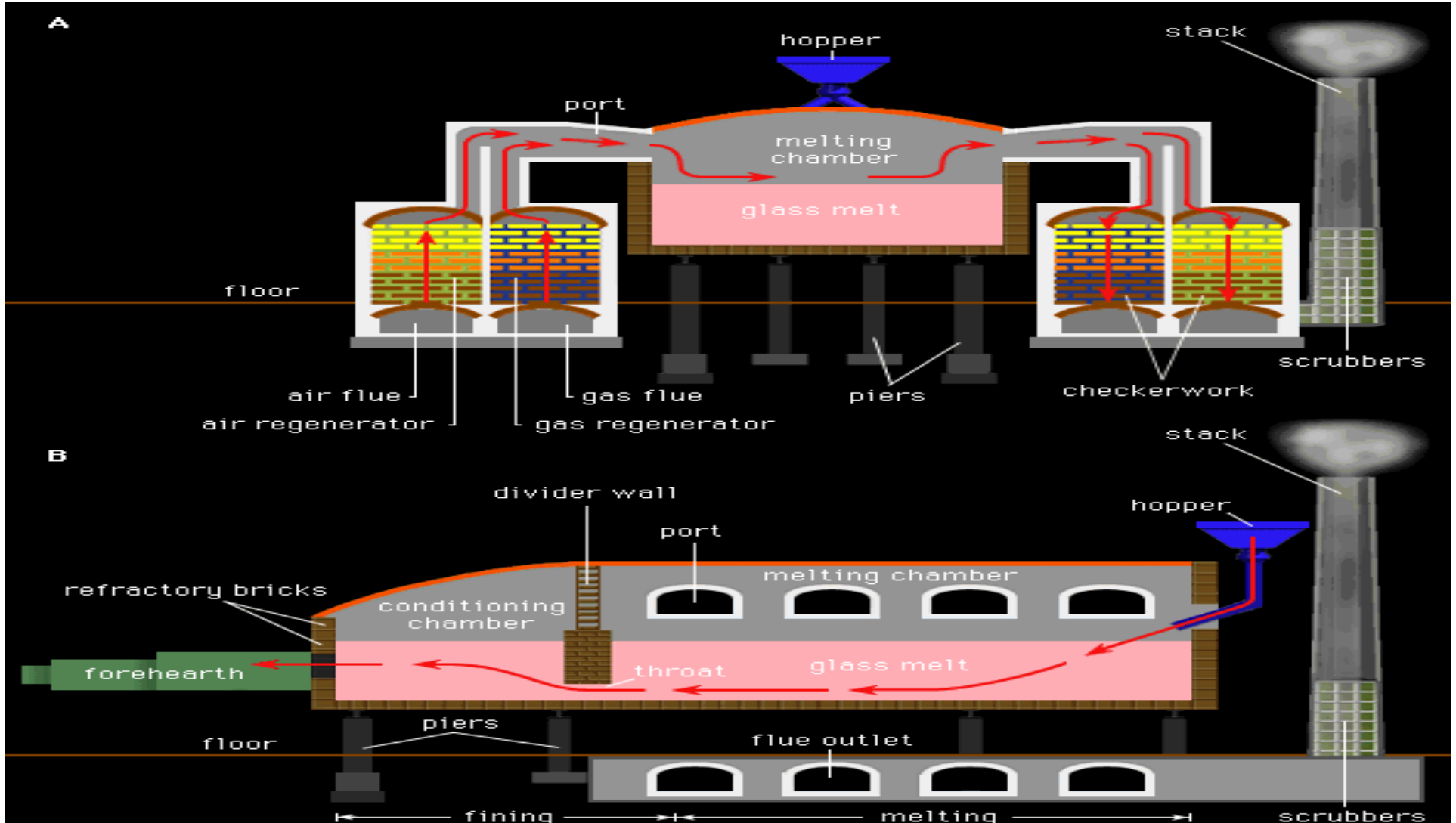
Controlling parameter of glass

- **Briefly describe of controlling parameters of glass**

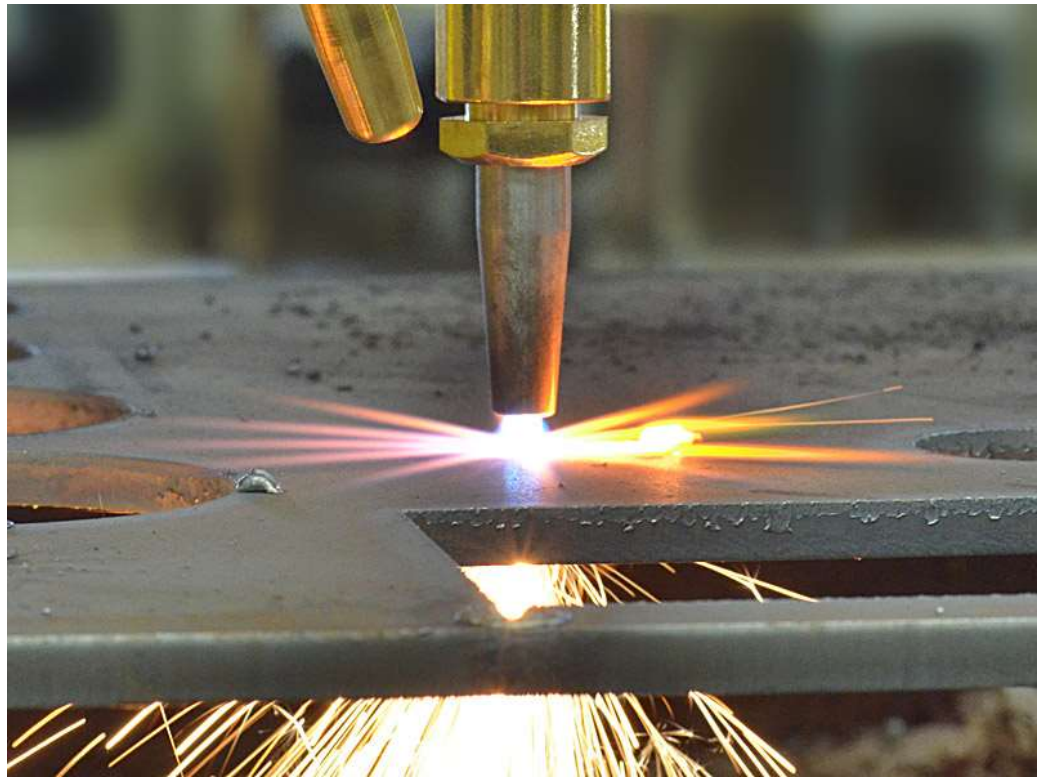
Formation of glass ingredients

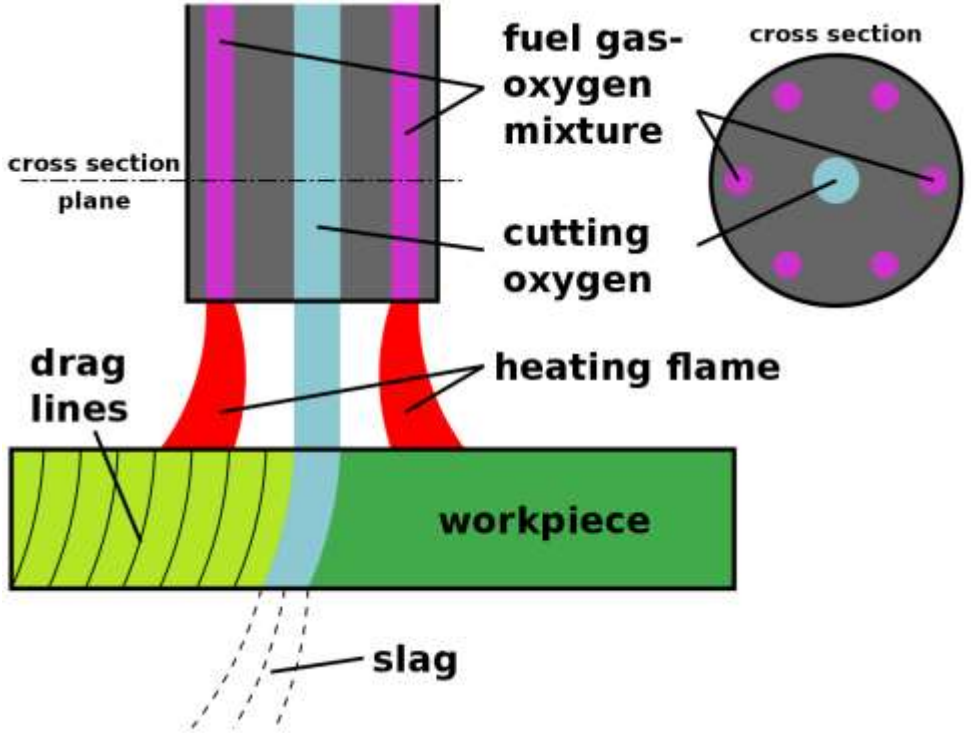
- Of the many silica-based glasses that exist, ordinary glazing and container glass is formed from a specific type called soda-lime glass, composed of approximately 75% silicon dioxide (SiO_2), sodium oxide (Na_2O) from sodium carbonate (Na_2CO_3), calcium oxide (CaO), also called lime, and several minor additives.

Construction of glass melting furnance



Flame cutting process of glass





Classification of glass product

- Classification of Glass. In general you can divide glass into two groups:
- Natural glass and
- Artificial glass. While artificial
- Glass is produced by the melting of several raw materials, natural glass is produced by processes in nature. ... These natural types of glass result from volcanic eruptions of lava

Application of glass

- Glass is used in the following non-exhaustive list of products: Packaging (jars for food, bottles for drinks, flacon for cosmetics and pharmaceuticals)
- Tableware (drinking glasses, plate, cups, bowls)
- Housing and buildings (windows, facades, conservatory, insulation, reinforcement structures)


Thank
you!

UNDERSTAND THE FUNDAMENTAL ASPECTS OF CERAMICS

Ceramics

A ceramic is a solid material comprising an inorganic compound of metal, non-metal or metalloid atoms primarily held in ionic and covalent bonds. Common examples are earthenware, porcelain, and brick.

CHARACTEERISTICS OF CERAMICS

- High melting points (so they're heat resistant).
- Great hardness and strength.
- Considerable durability (they're long-lasting and hard-wearing).
- Low electrical and thermal conductivity (they're good insulators).
- Chemical inertness (they're unreactive with other chemicals).

INGREDIENTS OF CERAMICS

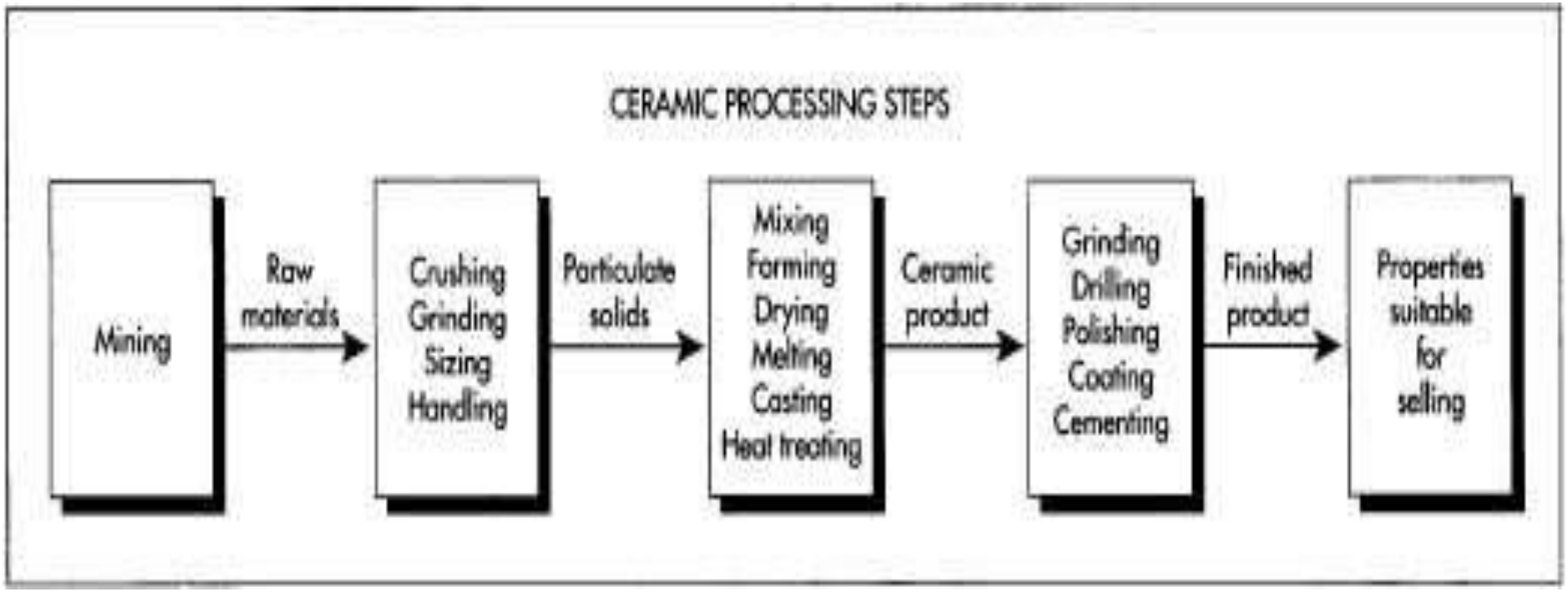
- Traditional ceramic raw materials include clay minerals such as kaolinite, whereas more recent materials include aluminiumoxide, more commonly known as alumina. The modern ceramic materials, which are classified as advanced ceramics, include silicon carbide and tungsten carbide.

THE PROCESS OF PREPARATION OF CERAMIC POWDER

- Compaction of ceramic powders. Compaction of ceramic powders is a specific forming technique for ceramics. It is a process in which ceramic granular materials are made cohesive through mechanical densification, involving (hot pressing) or not (cold forming) temperature exposition.

CERAMICS POWDER

FORMING TECHNICQUE OF CERAMICS PRODUCTS



DESCRIBE THE PROCESS OF :

- Molding
- Drying
- Finishing
- Firing articles


Thank
you!

UNDERSTAND FLEXIBLE MANUFACTURING SYSTEM(FMS)

(FMS)

A flexible manufacturing system is a manufacturing system in which there is some amount of flexibility that allows the system to react in case of changes, whether predicted or unpredicted. This flexibility is generally considered to fall into two categories, which both contain numerous subcategories

STATE REQUREMENTS OF FMS

- The basic components of an FMS are:
- workstations,
- material handling and storage systems,
- computer control system, and
- The personnel that manage and operate the system.

DESCRIBE FLEXIBLE MANUFACTURING SYSTEM(FMS)

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MENTION COMPONENTS OF FMS

- Basic components of an FMS are:
- workstations,
- material handling and storage systems,
- computer control system, and
- The personnel that manage and operate the system.

ADVANTAGES OF FMS

Some of the advantages associated with FMS include :

- Reduced manufacturing cost,
- Increased labor productivity,
- Increased machine efficiency,
- Improved product quality,
- Increased system reliability,
- Reduced parts inventory,
- Shorter lead times, and
- Increased production rate.


ANY
QUESTIONS?


Thank
you!