



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

TECHNOLOGY OF COREMAKING

Cores

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INTRODUCTION

- Cores are the materials used for making **cavities and internal features** which cannot be produced by the pattern alone.
- Cores are **generally made of the sand** and are even used in permanent molds.
- In general, cores are surrounded on all sides by the melt and therefore subjected to much more severe thermal and mechanical conditions. Hence **core sand** should be of **higher strength than the molding sand**.

Desired Characteristics For a Core

- **Green strength**
- **Dry strength**
- **Permeability**
- **Refractoriness**
- **Collapsibility**
- **Smoothness**
- **Friability**
- **Low gas emission**

Coremaking practice

- Pattern placed over cover box filled with sand, inverted and baked
- Core boxes normally made of Aluminium
- Vent holes are provided
- Reinforcing wires may be used
- Corebaking is carried upto temperature of about 650°F (moisture driven off, further polymerization taking place)
- Finishing of cores (cleaning, sizing, core assembly, inspection)
- Core setting is done
- Core knockout
- Use of chaplets

Core sand ingredients

- Core Sand should Contain the **Sand Grains**, **Binders** and other **Additives** to Provide Specific Properties.
- **Sand:**
 - ❖ Silica Sand which is Completely Devoid of Clay is Generally Used for Making Core Sands.
 - ❖ **Coarse Silica** (because of its Higher Refractoriness) is Used in **Steel Foundries**
 - ❖ **Finer Sands** are Used for **Cast Irons** and **Non-Ferrous Alloys**.
- **Binders:** Core Sands Need to be Stronger than the Molding Sand.
- Clay Used as Binder in Molding Sands is NOT Enough and so **Organic Binders** are used.

- Generally used binders are, **linseed oil, core oil, resins, dextrin, molasses**, etc.
- **Core oil** is a mixture of linseed, soya, fish & petroleum oils and coal tar.
- These binders are **burnt away** by the heat of the melt and thus make the core **collapsible** during the cooling of the casting.
- **Amount of binder** required depends to a great extent on the **fineness of the sand grains**.
- Amount of **clay** left in the sand **increases the consumption of the binder**.
- Driers are used to hasten polymerization process. They function as catalysts to the polymerization process or provide additional oxygen and heat for the reaction (Ammonium nitrate, Sodium perborate, Manganese dioxide, Manganese oleate etc. (used with liquid oils and resins))

Additives

- Cereals and water soluble binders
- Sulfite binder
- Pitch
- Wood flour
- Release agents
- Thermosetting plastics
- Inorganic binders
- Water

Core defects

- Off gauge/off size
- Core sticking
- Inaccurate core assembly
- Fins
- Cracked cores
- Blow, Dirt
- Core raise, Core shift
- Metal penetration
- Core wash
- Hot tear, scabs and buckle
- Crush, Fissures

Types of cores

- Cores are named according to their shape and position in the mold.
- Based on type of sand used: Green sand core (obtained by pattern itself) and dry sand cores (using core boxes)
- Can be made in a single piece or in two pieces
- Horizontal core and vertical core (stock cores)

➤ **Balanced core:** suitable when the **Casting has an Opening Only on One Side.**

- ❖ Core Print has to be large enough to Support the Weight of the Core.
- ❖ To Support the Core in the Mold Cavity, Chaplets are Often Inserted.

➤ **Cover Core:** It is used when the Entire Pattern is Rammed in the Drag and the **Core is Required to be Suspended from the Top of the Mold.**

- ❖ the **Cover Core Stretches Vertically Downwards.**

- **Hanging Core: Core Hangs from the Cope**, no Support at the Bottom in the Drag, core is **Fastened with a Wire or Rod**, which Extends through the Cope to a Fastening on the Top Side of the Cope.
- **Wing Core" or Stop-Off core:** Used **when a Hole or Recess is to be Obtained in the Casting Either Above or Below the Parting Line.**
- **Ram-Up Core:** The Core is Set with the Pattern in the Mold before the Mold is Rammed. Such a Core is called Ram-Up Core
 - ❖ Favoured when the **Core Detail is Located in an Inaccessible Position.**
- **Kiss Cores: Core is Held in Position Between the Cope and Drag Simply by the Pressure of the Cope. (Pattern is not Provided with Core Prints)**

Core prints and chaplets



THANKS

