

# **SNS COLLEGE OF TECHNOLOGY**

**(An Autonomous Institution)**

**COIMBATORE-35.**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

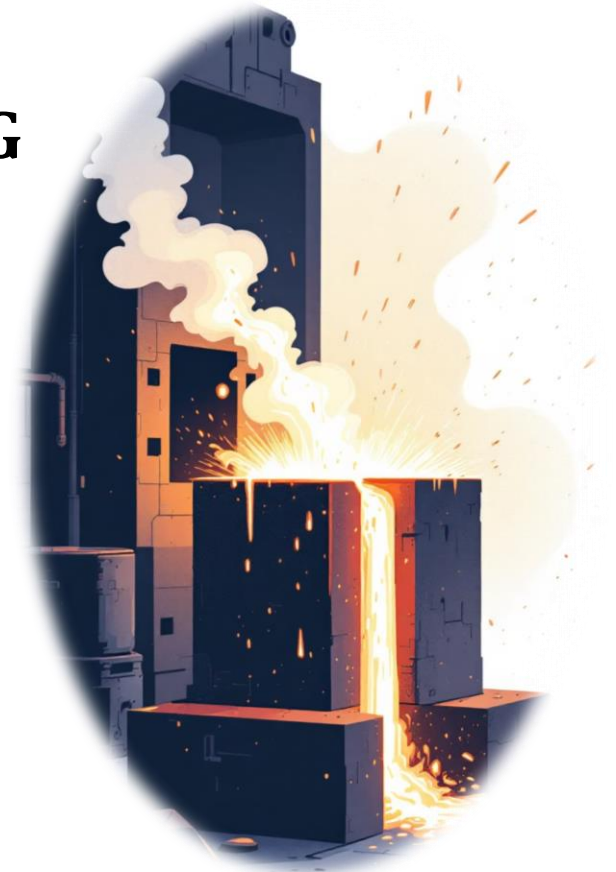
## **DEPARTMENT OF MECHANICAL ENGINEERING**

### **23GET102 – BASIC CIVIL MECHANICAL ENGINEERING**

**I YEAR- CST / I SEMESTER**

#### **UNIT 3 - OVERVIEW OF MECHANICAL ENGINEERING**

**Topic : Basics of Foundry**



# Introduction to Manufacturing

*DT-Empathize*

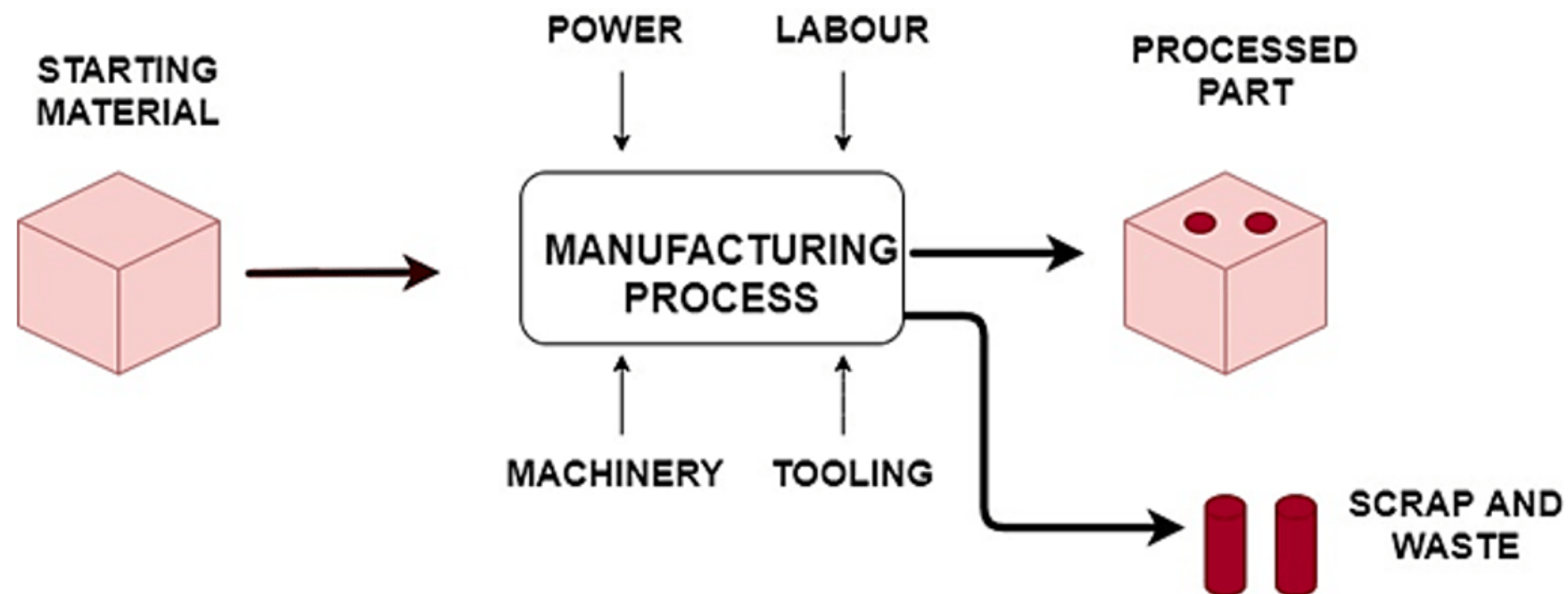
Manufacturing is the **creation or production of goods with the help of equipment, labor, machines, tools, and chemical or biological processing or formulation.** It is the essence of secondary sector of the economy.



# Introduction to Manufacturing

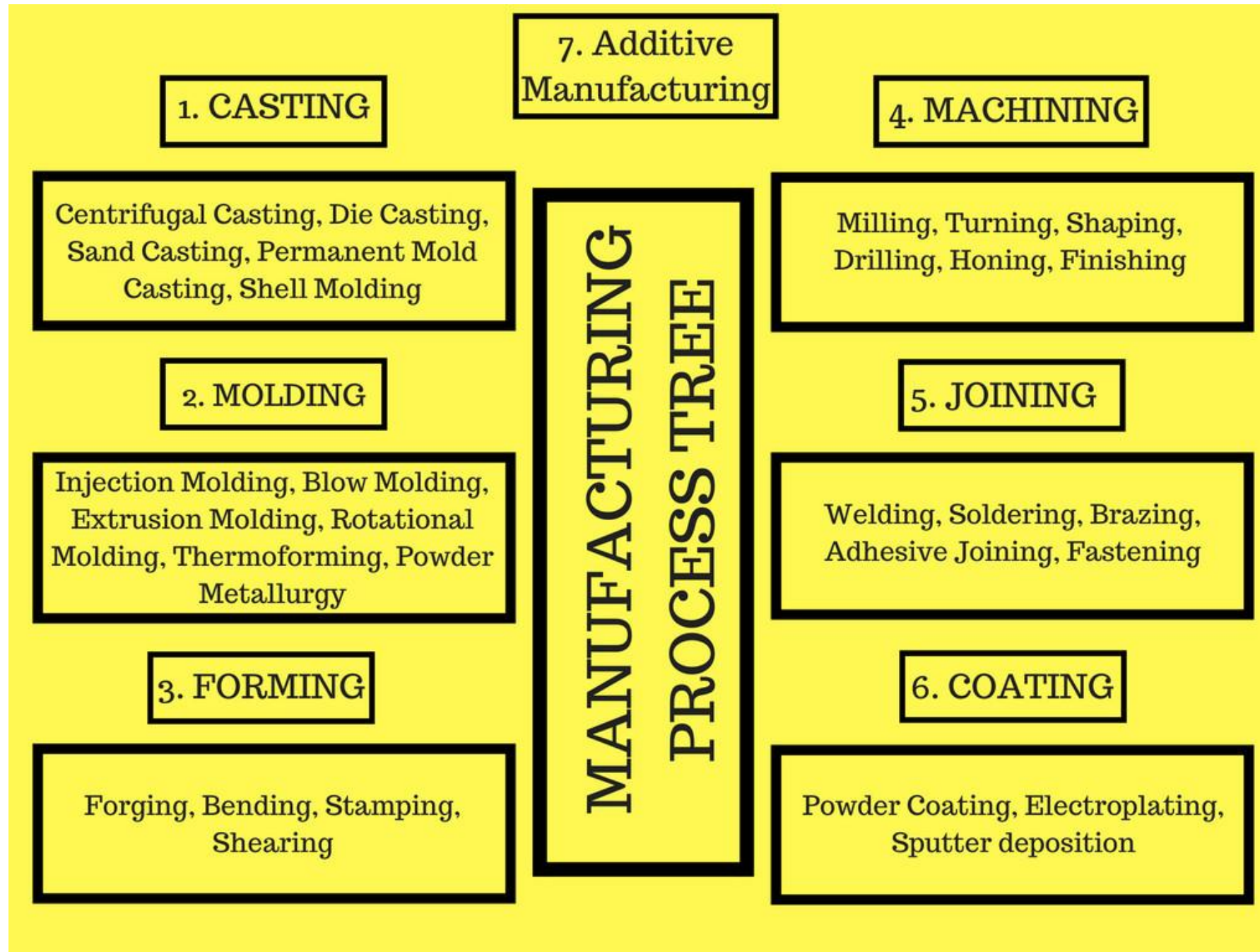
## *DT-Define*

Manufacturing is the **creation or production of goods with the help of equipment, labor, machines, tools, and chemical or biological processing or formulation.** It is the essence of secondary sector of the economy.



# Classification

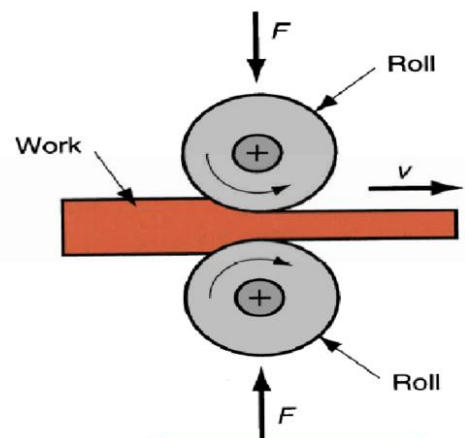
*DT-Define*



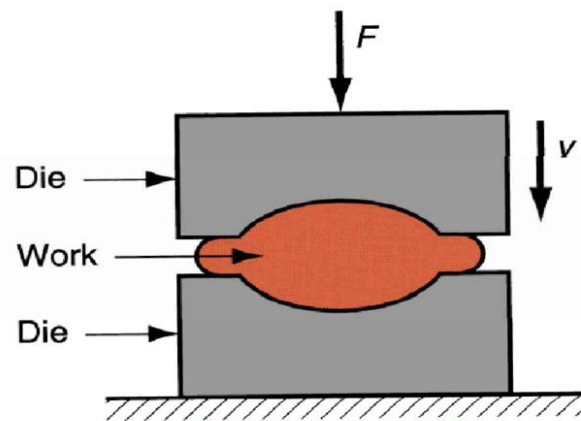
# Examples – Forming Process

*DT-Ideate*

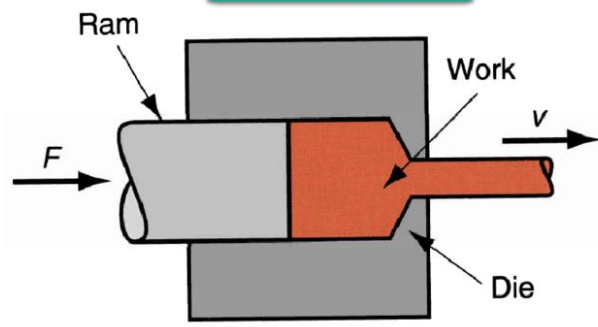
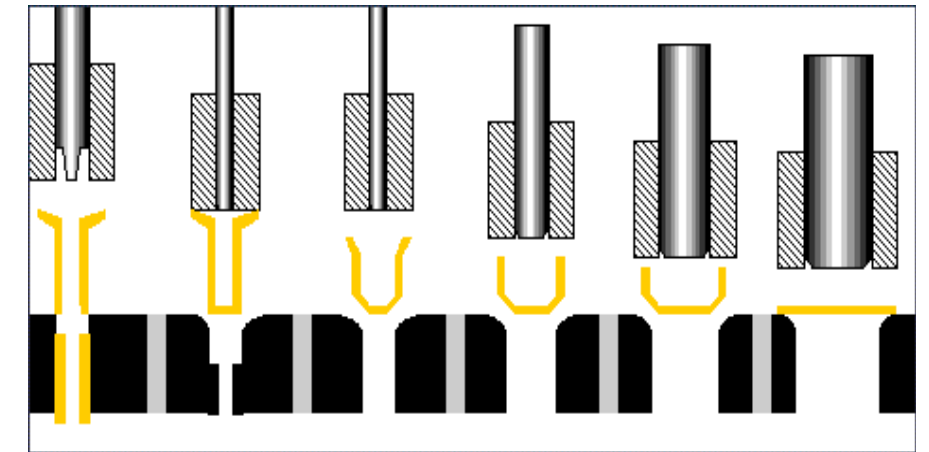
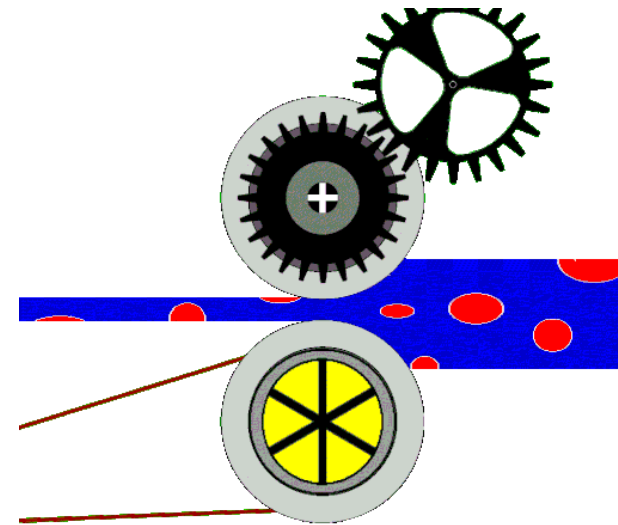
Forming is a process in which the shape of a partly finished product, for example sheet metal, is changed using plastic deformation



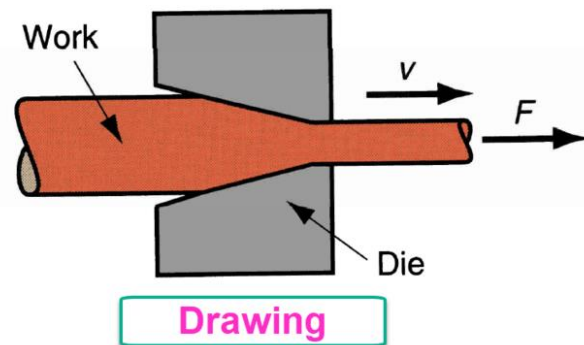
Rolling



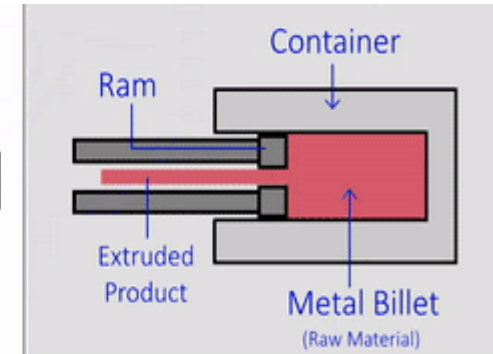
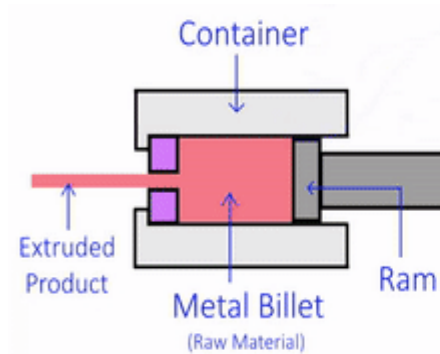
Forging



Extrusion



Drawing



# The Foundry Process

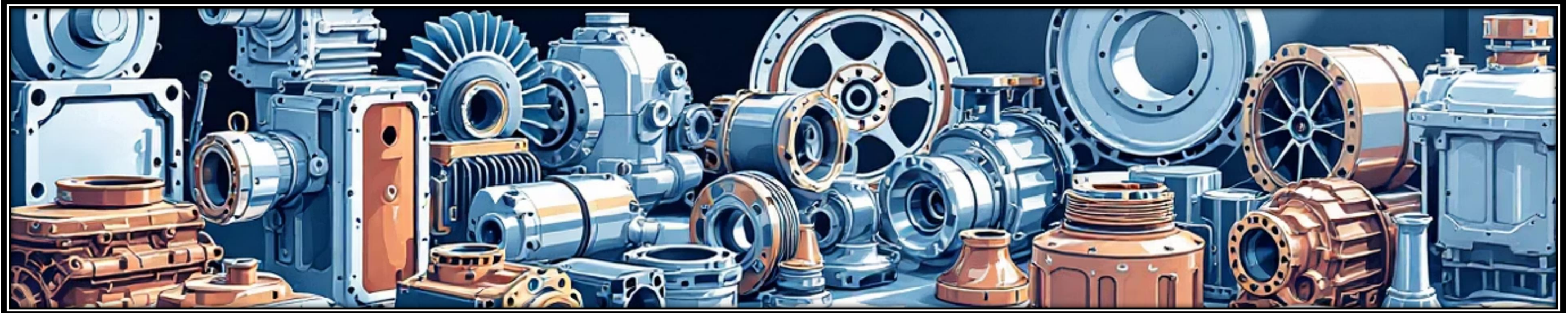
*DT-Ideate*

A manufacturing method that transforms **raw metal into complex components by melting, molding, and solidifying**. This versatile process shapes everything from automotive parts to construction materials, serving as the backbone of modern manufacturing across multiple industries.



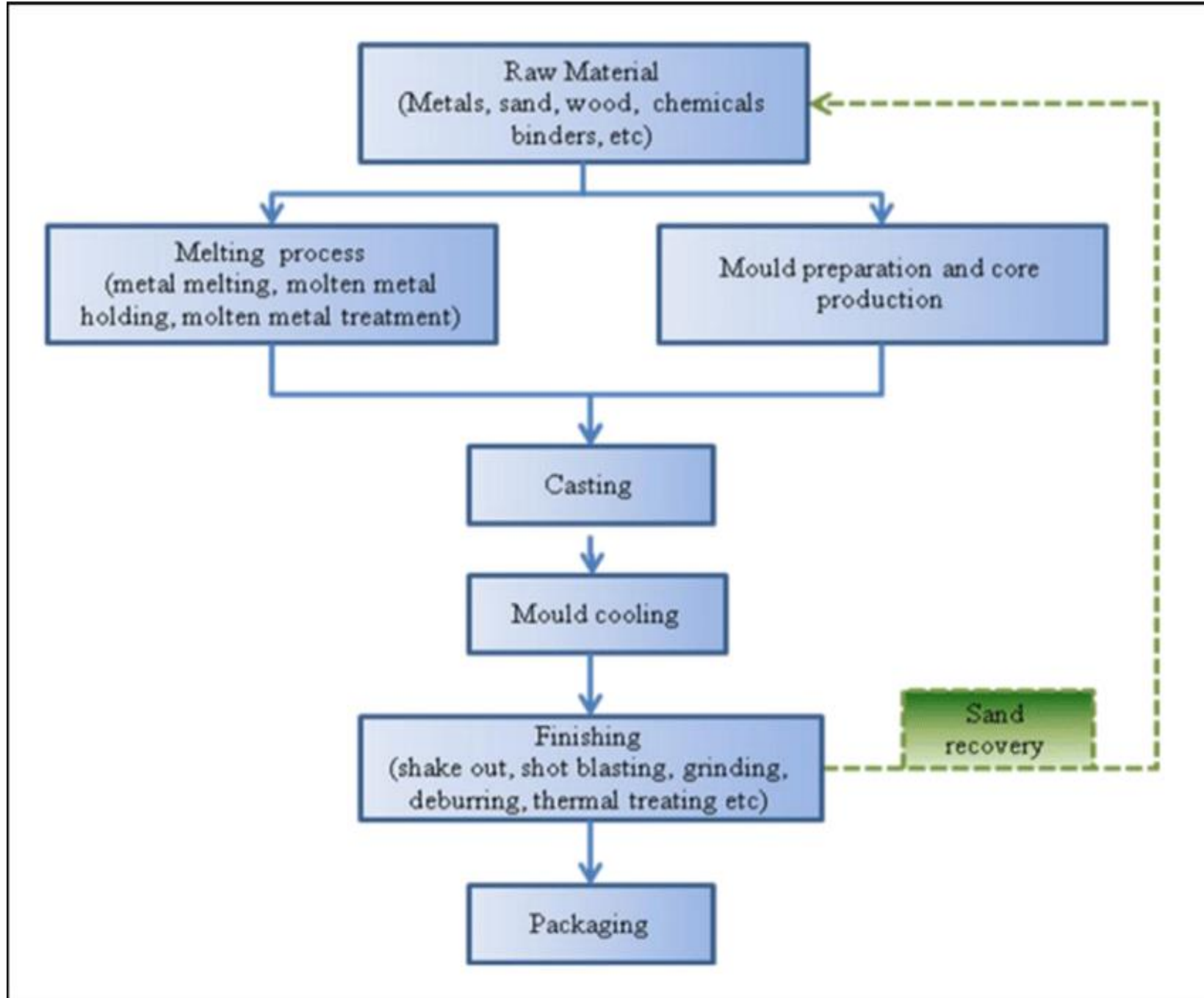
# Why Foundry Processes Are Important ?

*DT-Ideate*



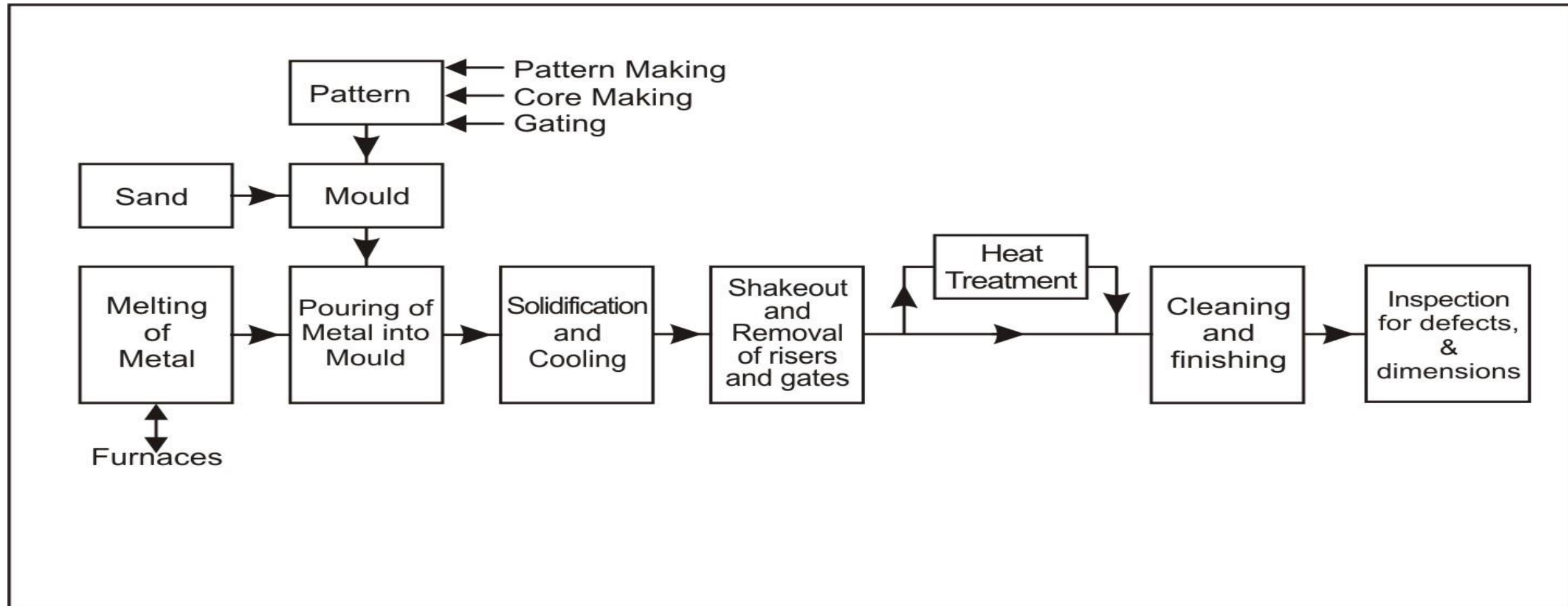
Foundry processes form the industrial backbone that enables modern manufacturing. From massive infrastructure components to intricate decorative elements, casting technology makes possible what other manufacturing methods cannot achieve.

# The Steps of a Foundry Process



Understanding each phase of the foundry process is essential for manufacturing excellence. From **initial pattern creation to final inspection**, every step requires precision and expertise to produce high-quality cast components.

# The Steps of a Foundry Process (Cond.)



## Pattern Creation

An initial mold template is crafted, often using wood, plastic, or metal patterns that precisely replicate the desired final part geometry.

## Mould Making

The mould cavity is formed around the pattern using sand or other refractory materials. Sand's heat resistance and moldability make it ideal for withstanding extreme temperatures.

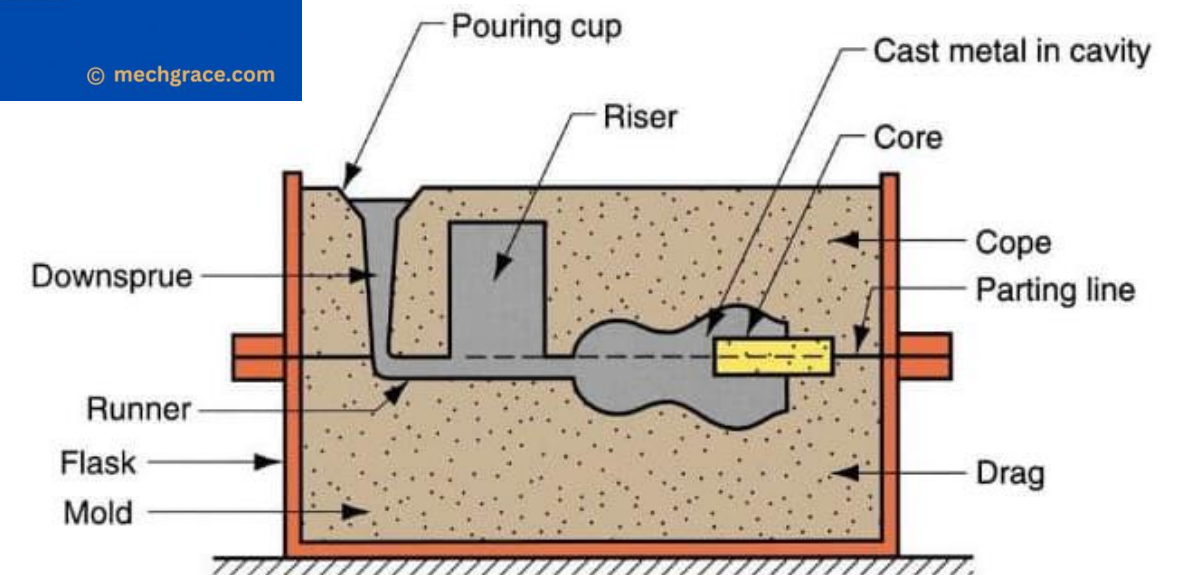
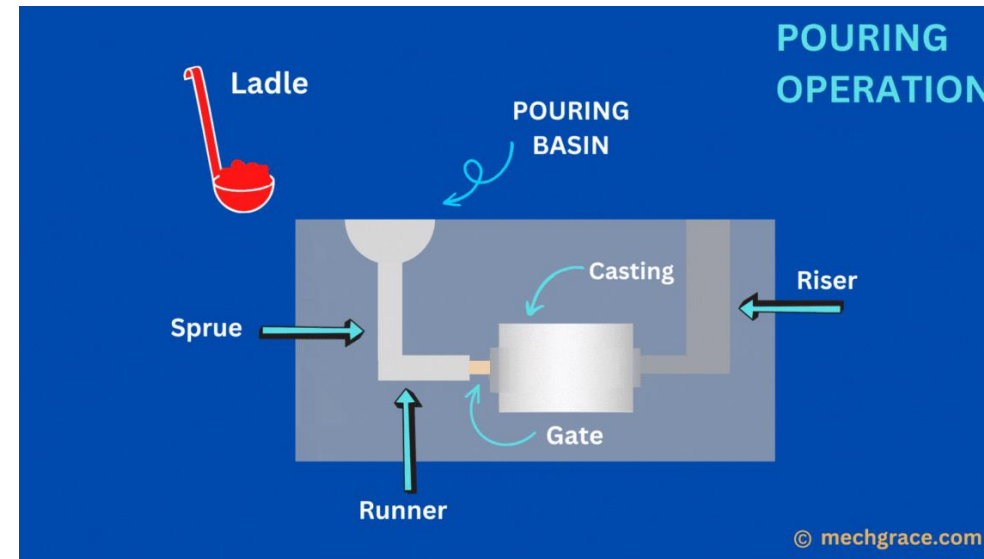
## Melting

Selected metals—iron, aluminum, steel, or specialized alloys—are **heated in high-temperature furnaces until they reach liquid state**, typically between 1,000-3,000°F depending on the material.

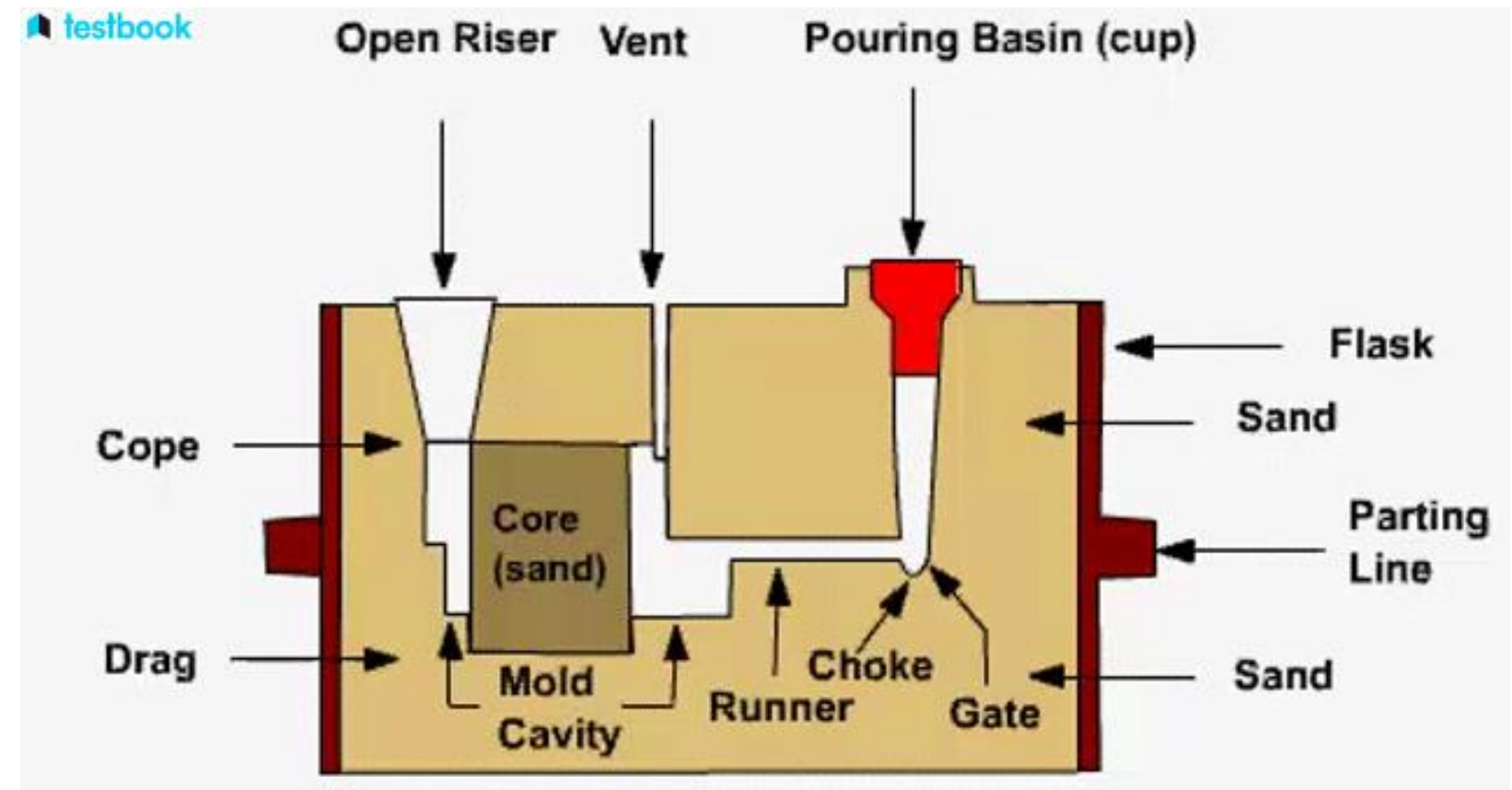


## Pouring

**Molten metal flows into the mold cavity** through carefully designed gates and runners. Gravity, vacuum, or pressure systems ensure complete fill and minimize defects.



- 1 — **Initial Pour**  
Molten metal fills the cavity
- 2 — **Heat Dissipation**  
Temperature gradually decreases
- 3 — **Solidification**  
Metal transforms to solid state
- 4 — **Final Cooling**  
Part reaches ambient temperature



## Cooling & Solidification

The metal gradually cools within the mold, transitioning from liquid to solid state. This phase determines the final grain structure and mechanical properties of the casting, requiring controlled cooling rates for optimal results.

# Ejection & Cleaning



The casting emerges from its mold cocoon, ready for surface preparation and refinement.

## Mold Breakaway

Sand molds are broken apart to reveal the solidified casting underneath



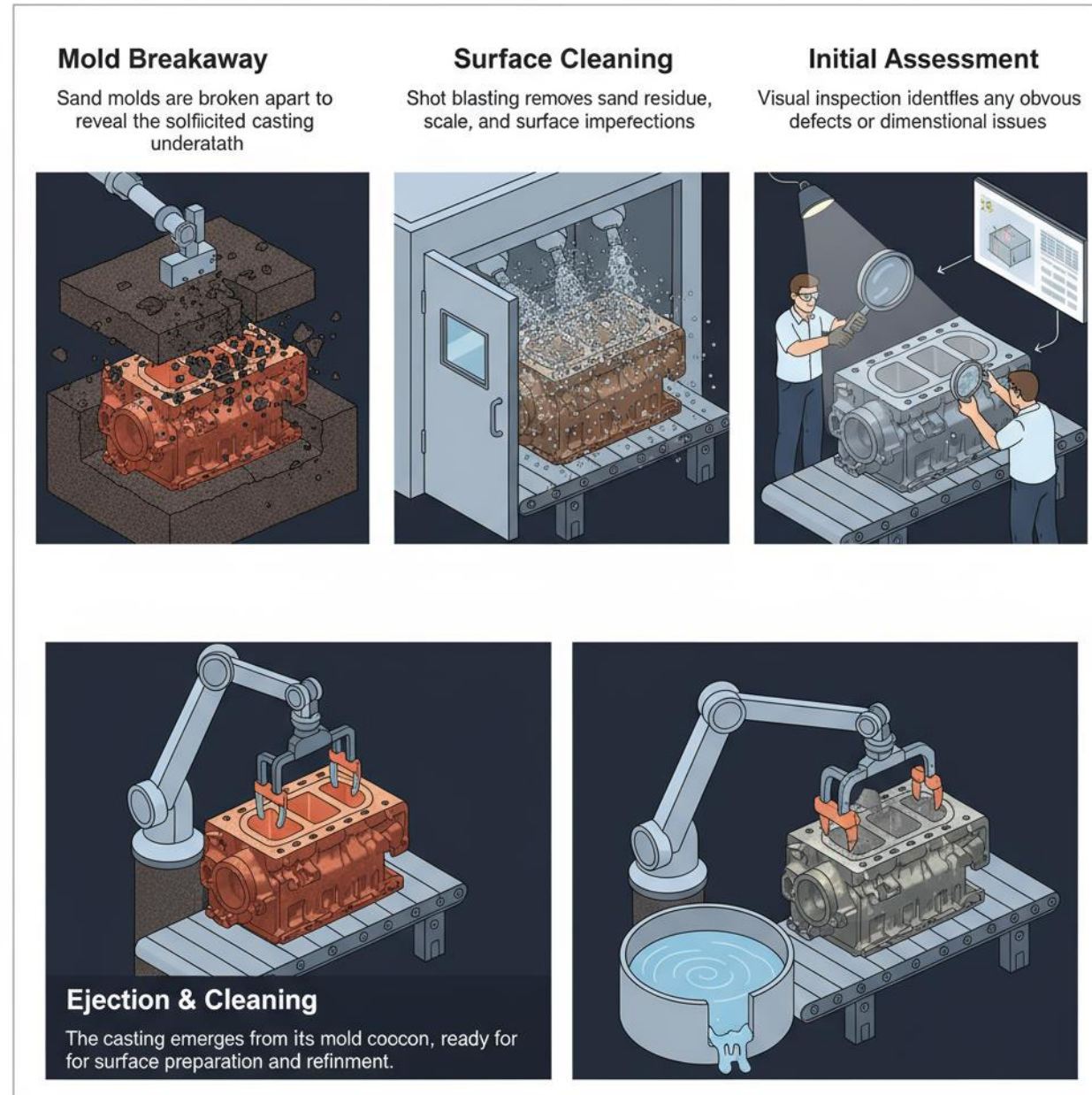
## Surface Cleaning

Shot blasting or grinding removes sand residue, scale, and surface imperfections



## Initial Assessment

Visual inspection identifies any obvious defects or dimensional issues



# Fettling & Final Inspection



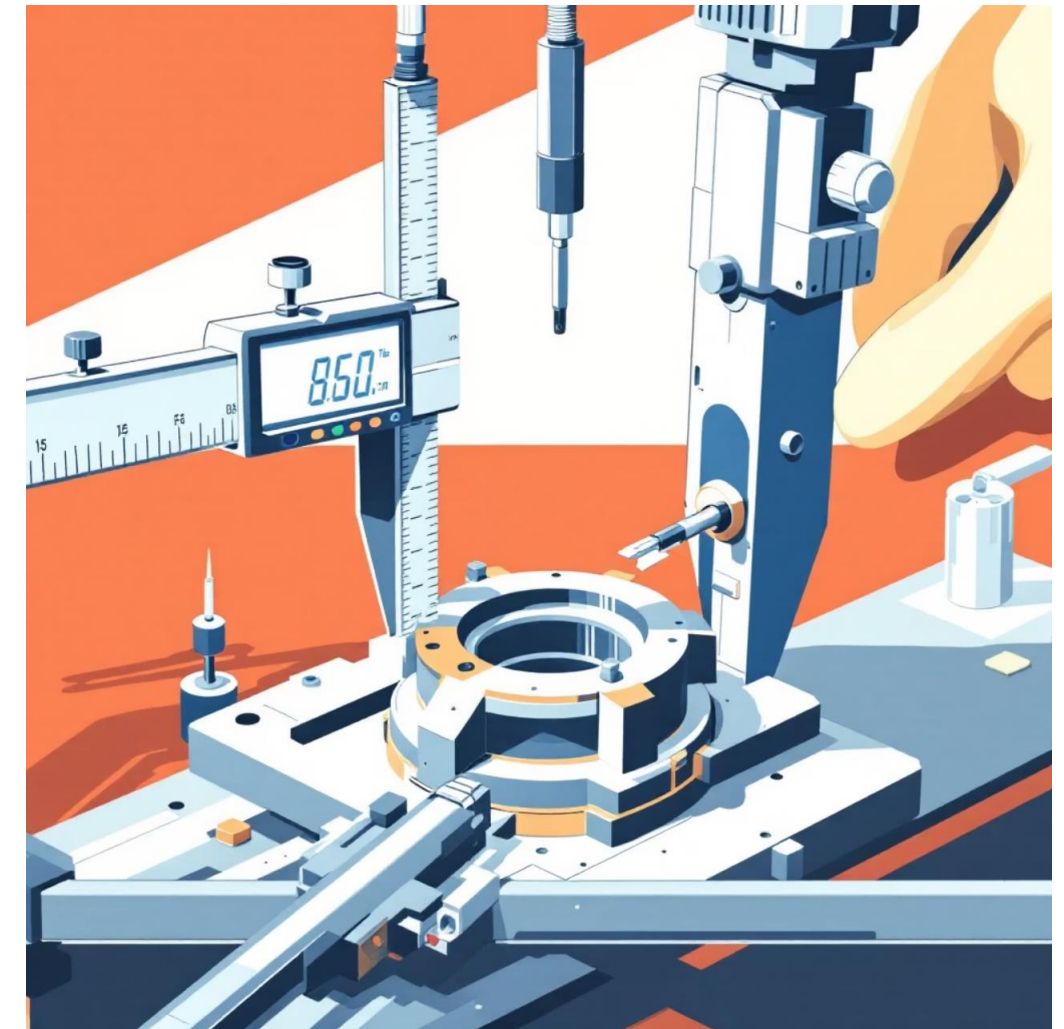
## Material Removal

Gates, risers, and excess material are cut away using saws, grinders, or machining operations



## Quality Control

Dimensional verification, surface finish assessment, and material property testing ensure specifications are met



# Key Advantages of Foundry Processes: Versatility & Mass Production



## Versatility

Creates complex geometries, internal cavities, and intricate details that machining or forming cannot economically produce.

Enables hollow structures and undercuts impossible with other methods.



## Customization

Accommodates unique designs, prototypes, and specialized applications. Perfect for architectural elements, artistic pieces, and bespoke engineering solutions where flexibility matters most.



## Mass Production

Scales efficiently from prototype to millions of units. Essential for automotive, aerospace, and construction industries requiring consistent, high-volume component production.



## Material Diversity

Compatible with cast iron, aluminum, steel, brass, bronze, and specialized alloys. Each material brings unique properties—strength, corrosion resistance, or conductivity—for specific applications.

# Questionnaire

1. What user needs are not addressed in today's foundry process?
2. How can you redefine the challenges experienced during casting?
3. Brainstorm alternative process improvements – sketch, list, discuss.

