

# **TEACHING LEARNING**

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# **MATERIAL**

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**BRANCH: MECHANICAL ENGINEERING**

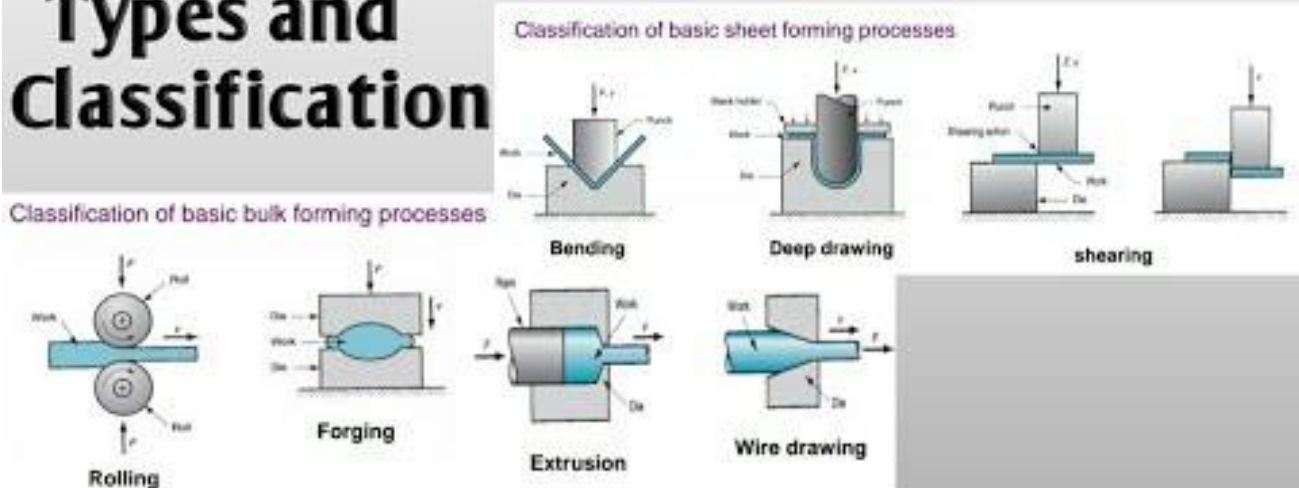
**SEMESTER: 3<sup>RD</sup> SEMESTER**

**SUBJECT: PRODUCTION ENGINEERING**

**PREPARED BY: ER. A.K.BEHERA**

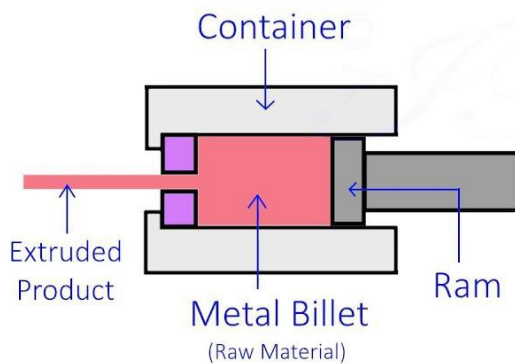
# METAL FORMING PROCESS

## Types and Classification

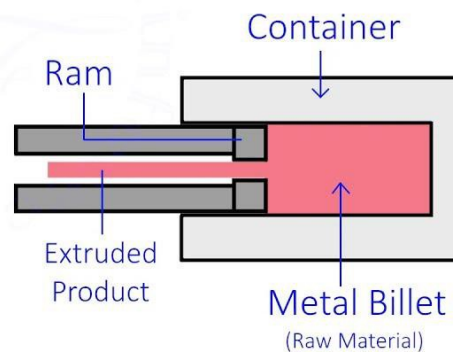


## METAL FORMING PROCESS

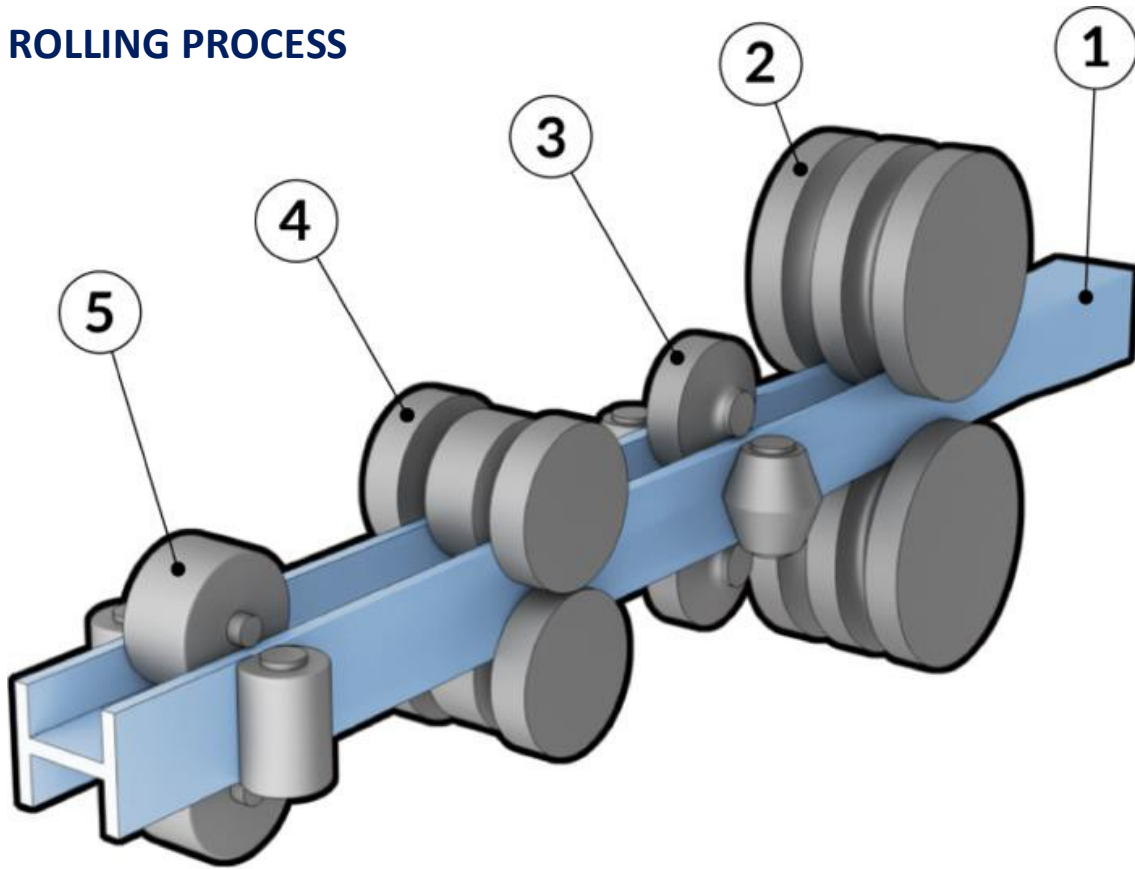
**Direct  
Extrusion**



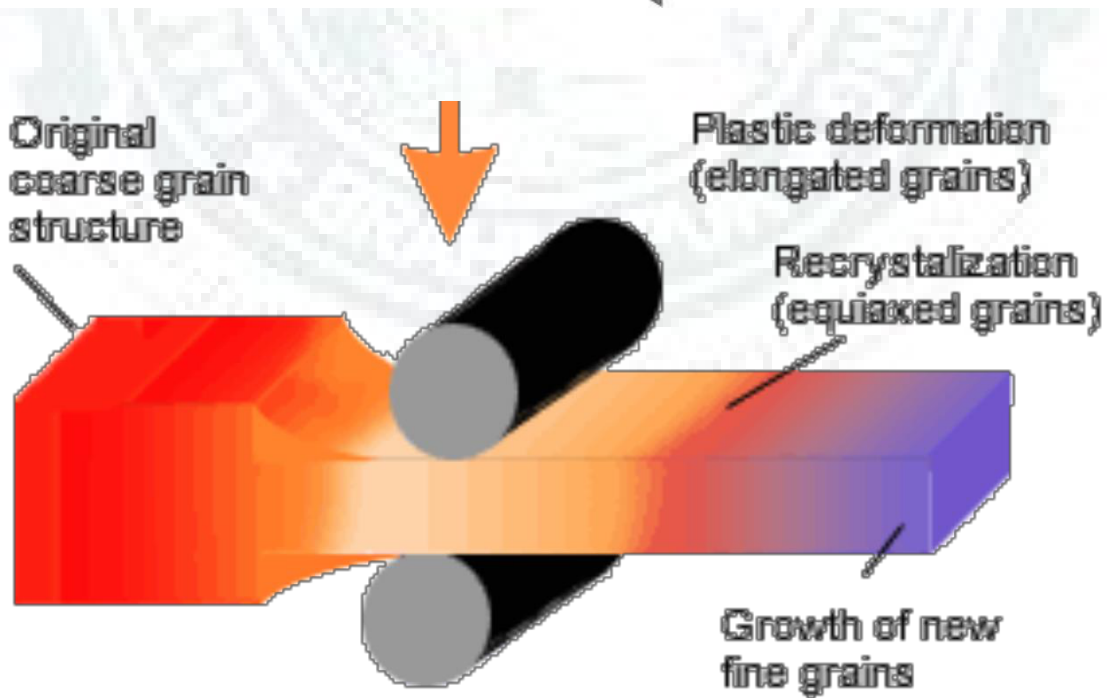
**Indirect  
Extrusion**



# ROLLING PROCESS



 **MANUFACTURINGGUIDE**



## HOT ROLLING



## HOT ROLLING

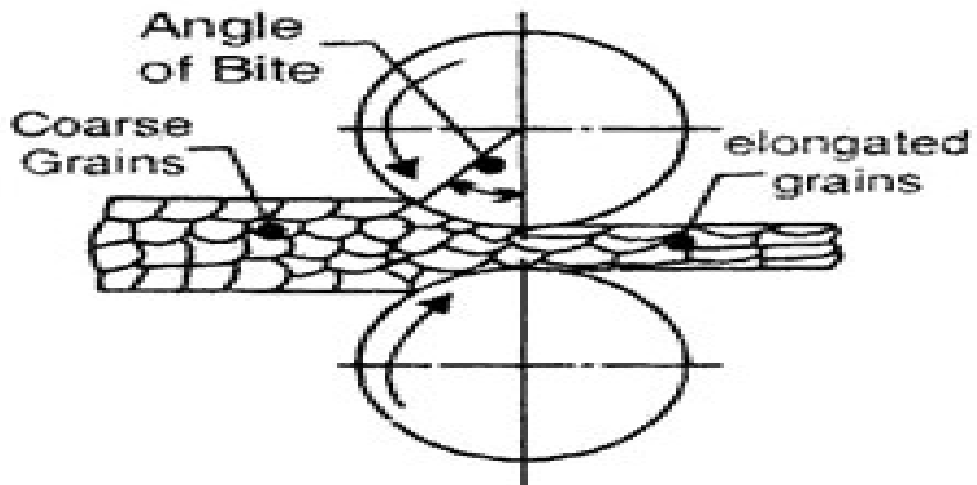


Fig. 2.7. Cold rolling.

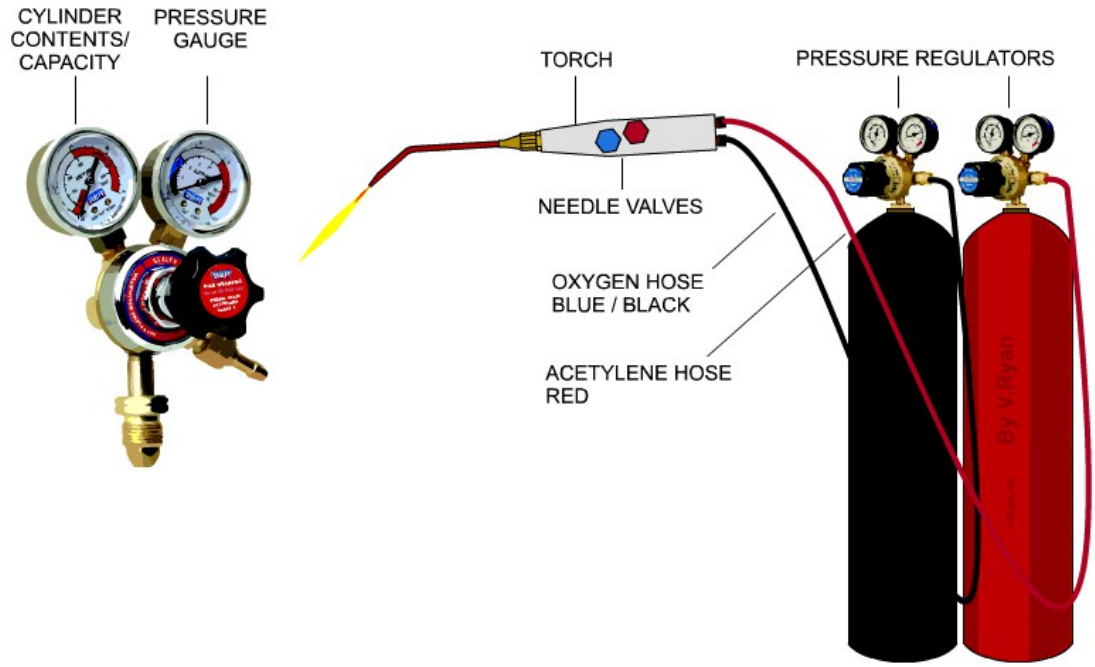
## COLD ROLLING



**CLOD ROLLING**

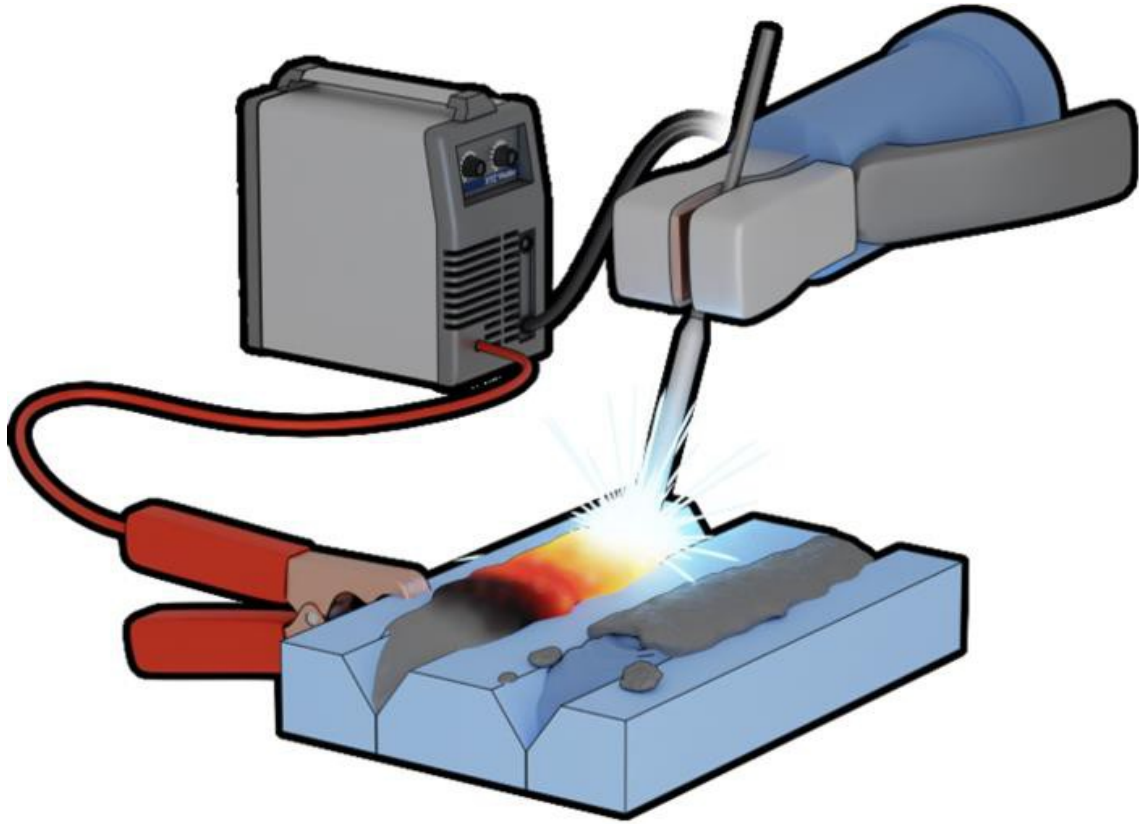


**ROLLING MILL**



## oxy acetylene welding





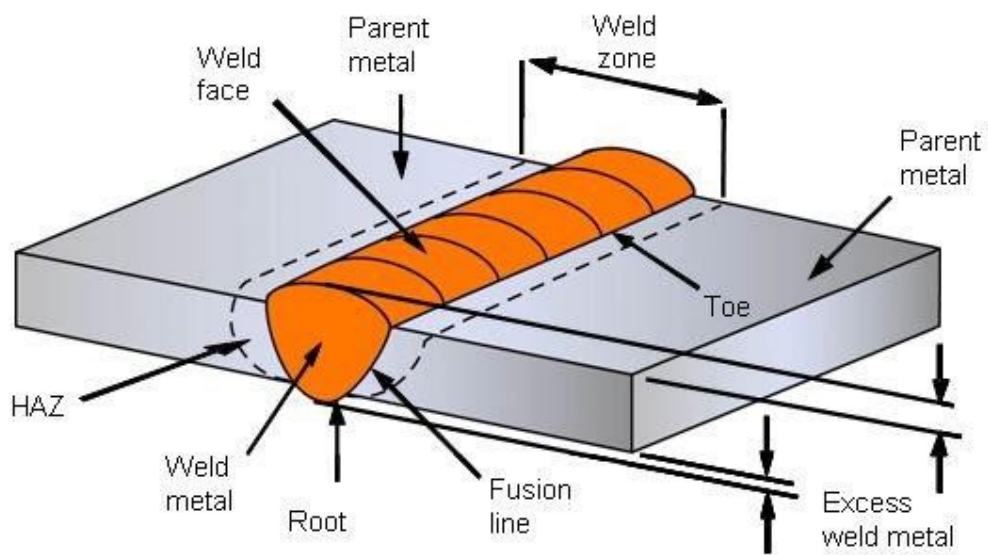
 **MANUFACTURINGGUIDE**

## **ARC WELDING**



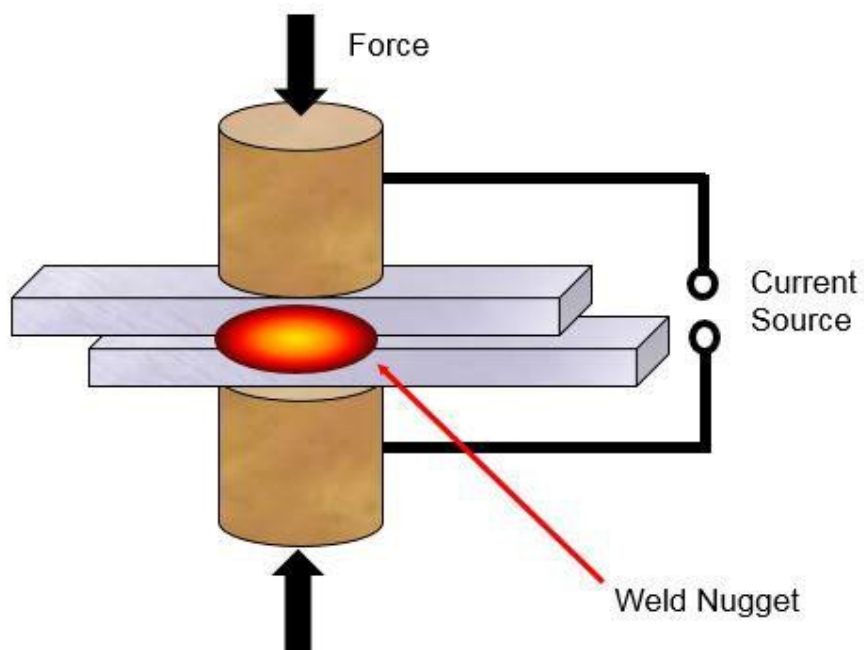


## RESISTANCE WELDING

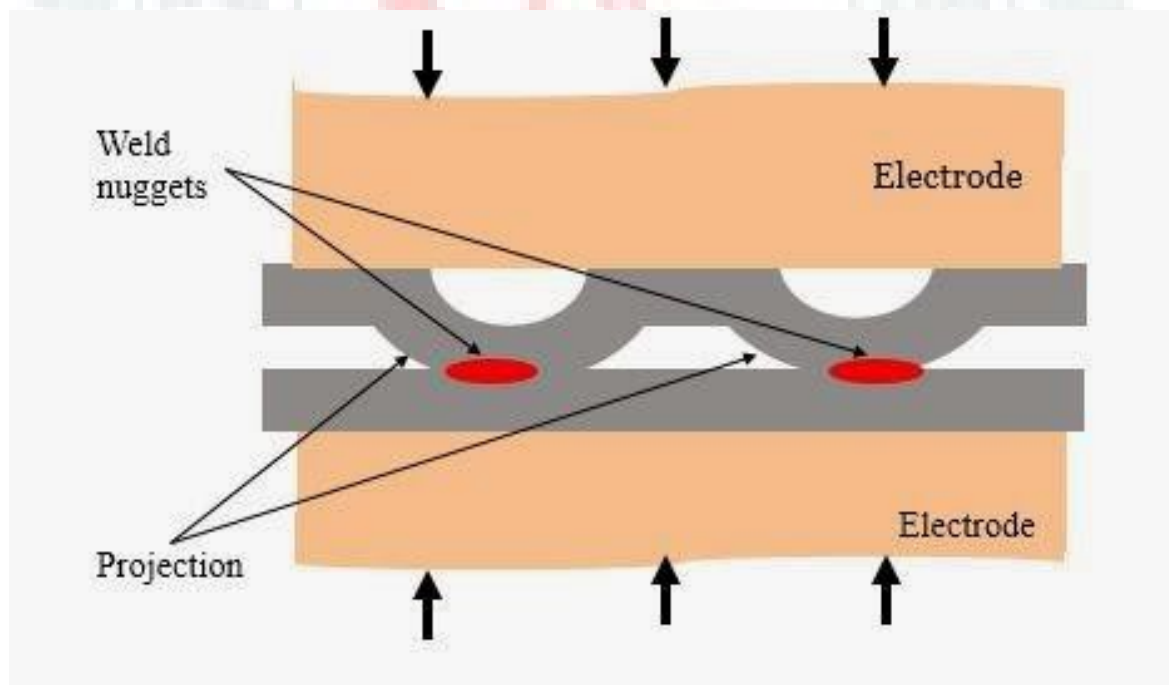


## BUTT WELDING



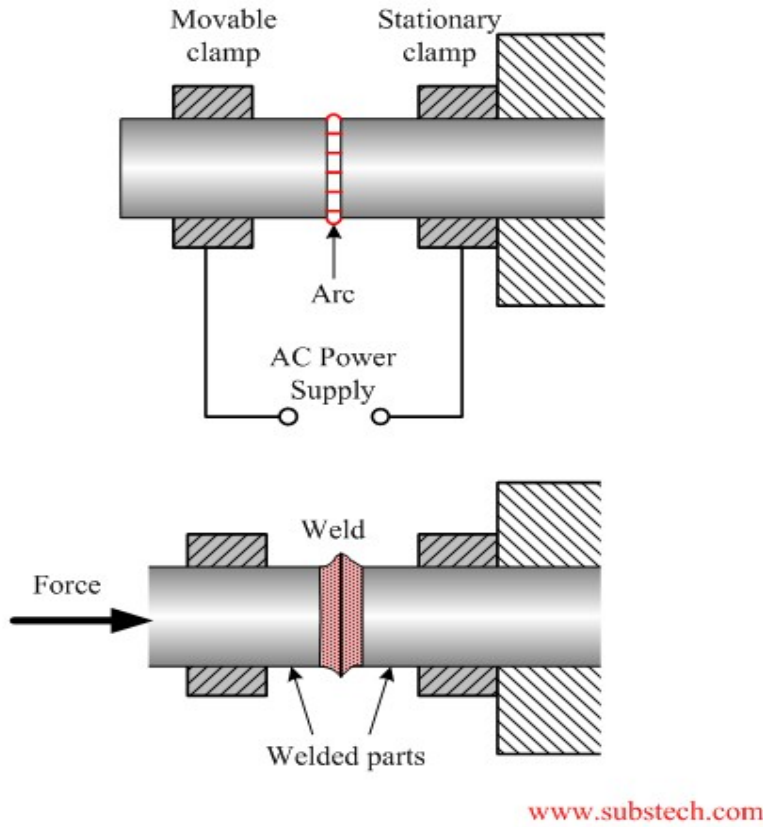


### SPOT WELDING

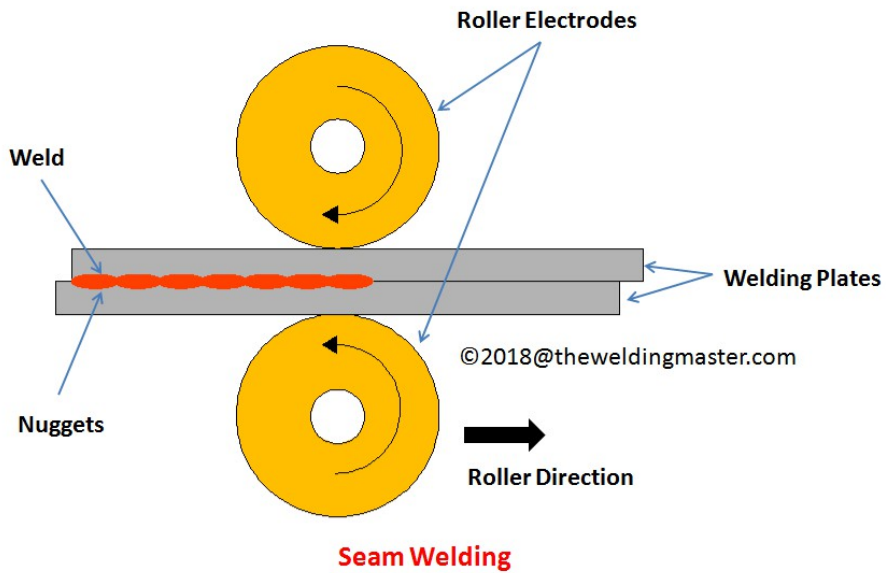


### PROJECTION WELDING

## Flash Welding (FW)

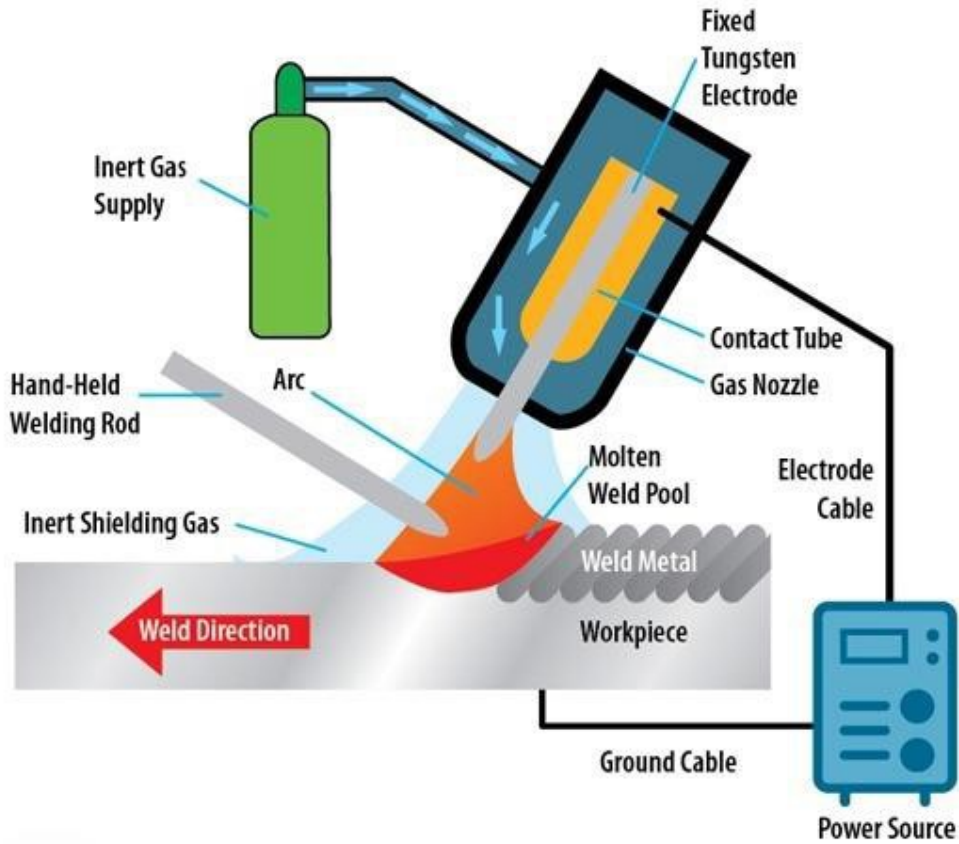


## FLASH WELDING



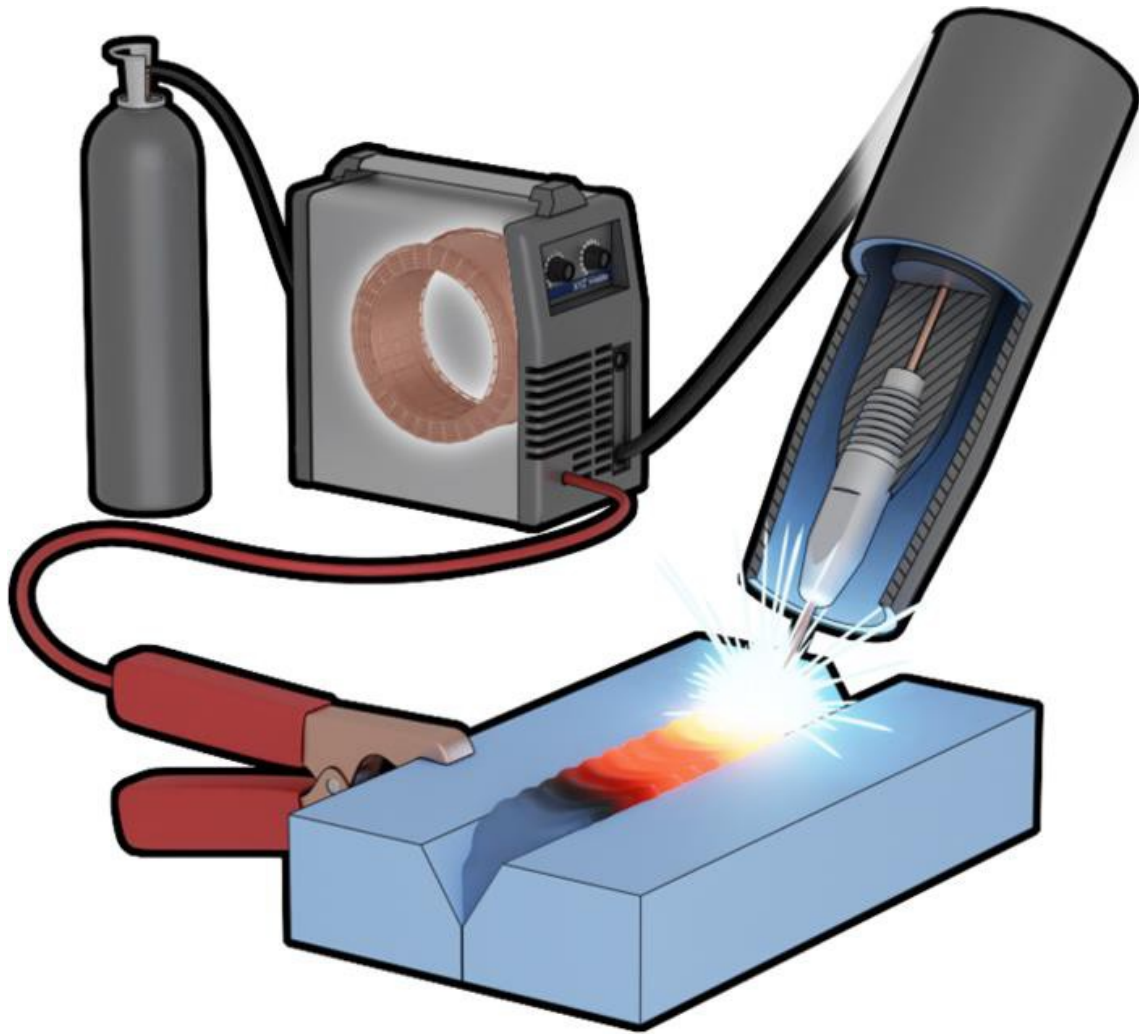
## SEAM WELDING

# Gas Tungsten Arc Welding (GTAW) AKA Tungsten Inert Gas (TIG) Welding



## TIG WELDING



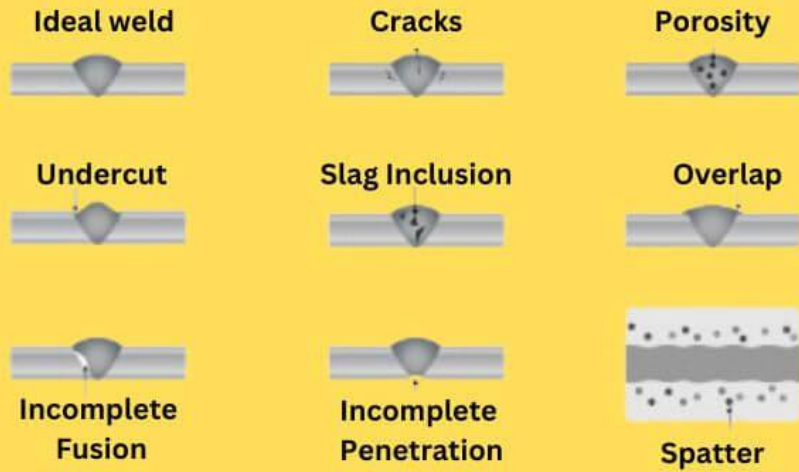


 **MANUFACTURINGGUIDE**

**MIG WELDING**



# COMMON WELD DEFECTS

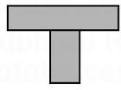


## WELDING DEFECTS

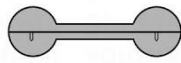


SAND CASTING

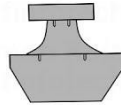
# Types of Pattern



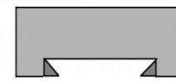
Single Piece



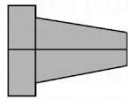
Two Piece



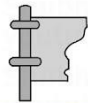
Multi Piece



Loose Piece



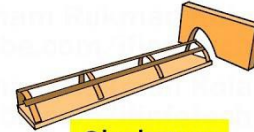
Cope and Drag



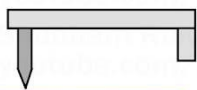
Sweep



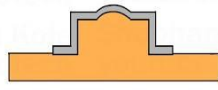
Shell



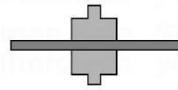
Skeleton



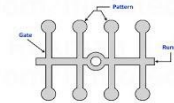
Segmental



Follow Board



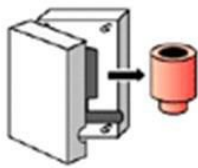
Match plate



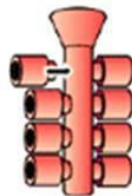
Gated

## TYPES OF PATTERN

### The Basic Steps in the Investment Casting Process



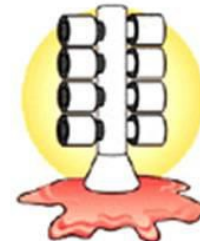
Wax Injection



Assembly



Shell Building



Dewax/Burnout



Gravity Pouring



Knock Out



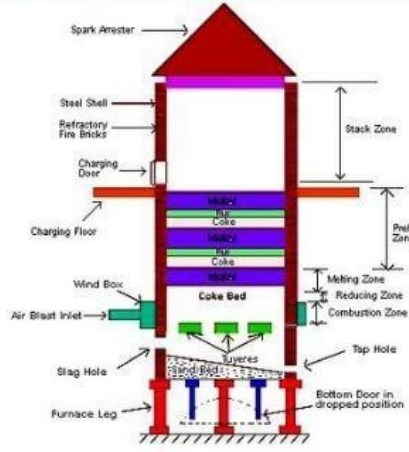
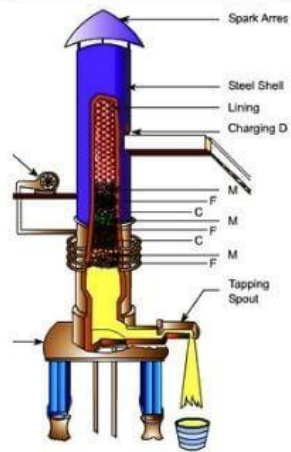
Cut-off



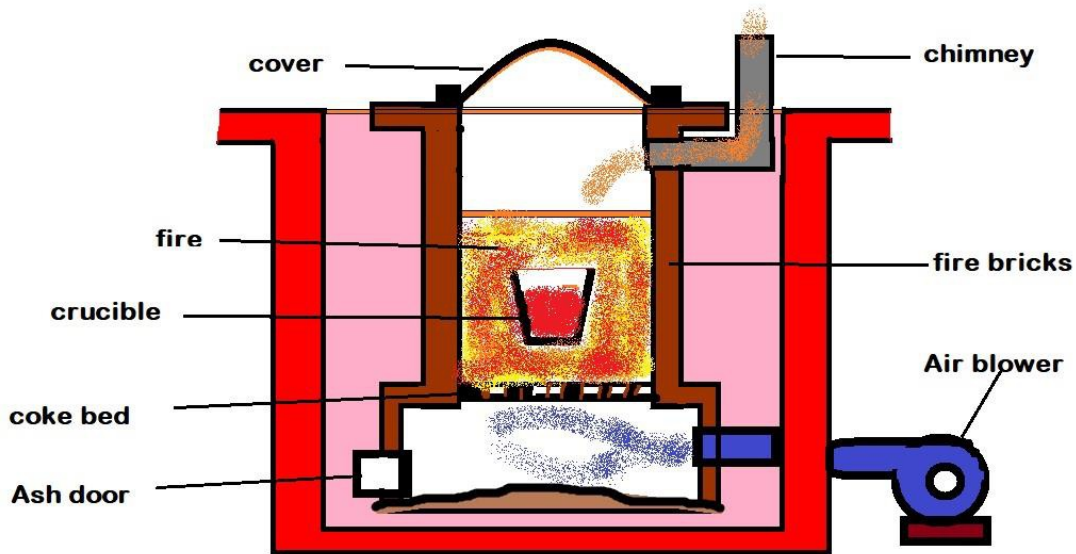
Finished Castings

## Investment Casting

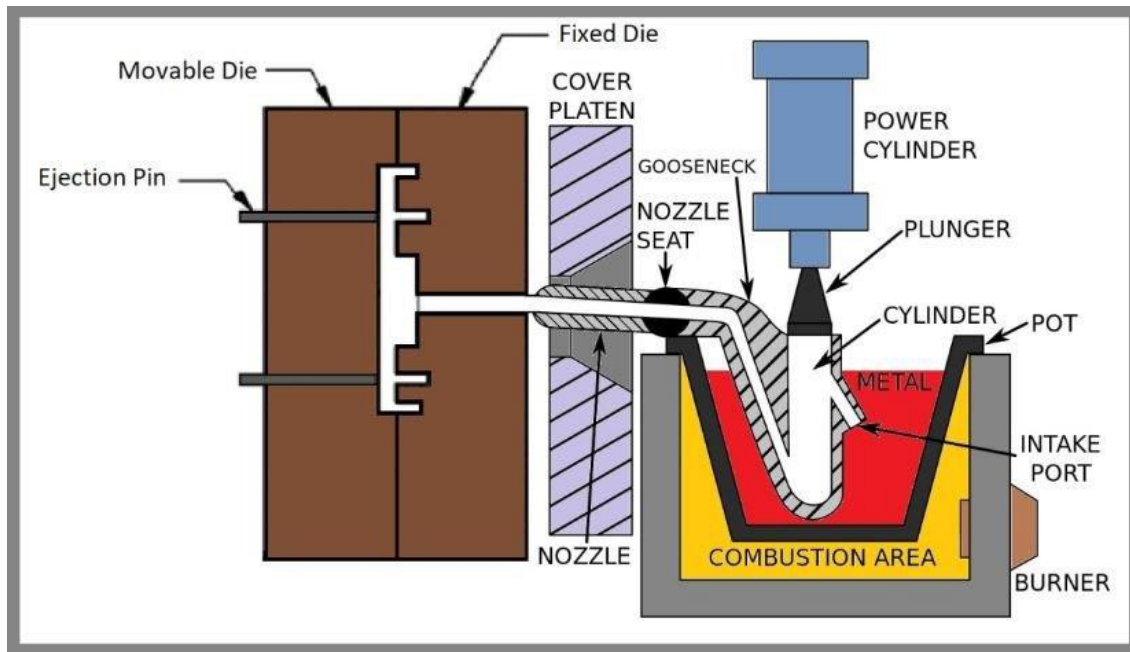
What is Cupola Furnace? | Cupola furnace design | Cupola construction | Purpose of cupola | Working Principle of Cupola Furnace: | Advantages of Cupola Furnace | Disadvantages of Cupola Furnace | Applications of Cupola Furnace



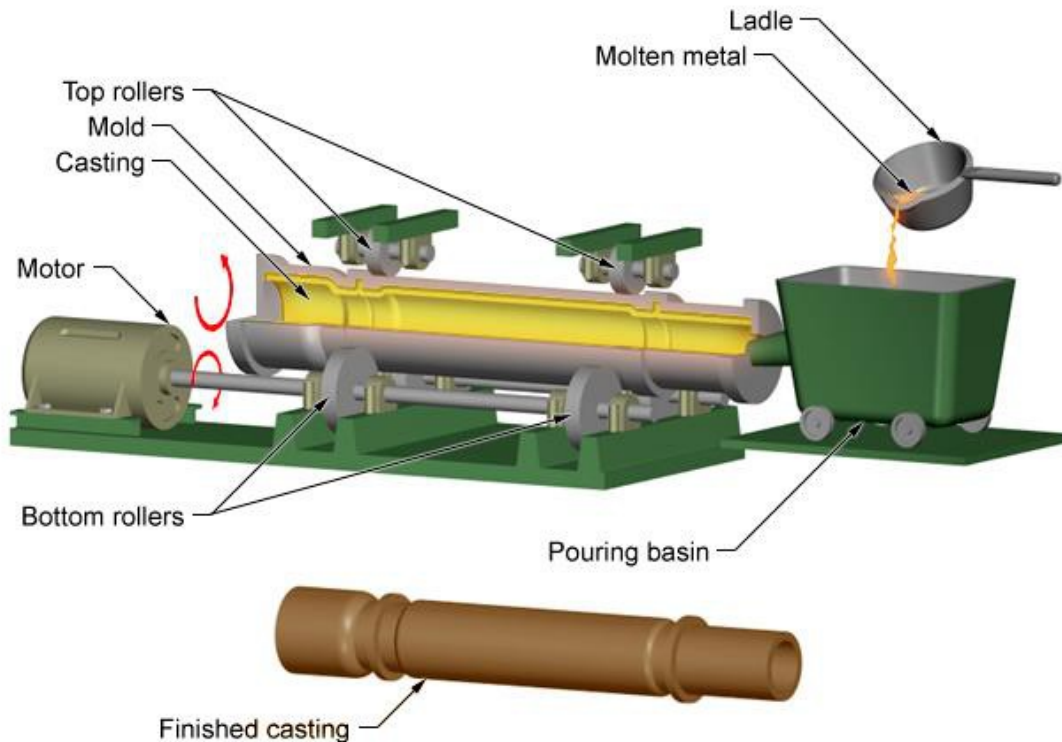
CUPLOA FURNACE



Crucible furnace  
CRUCIBLE FURNACE



## DIE CASTING

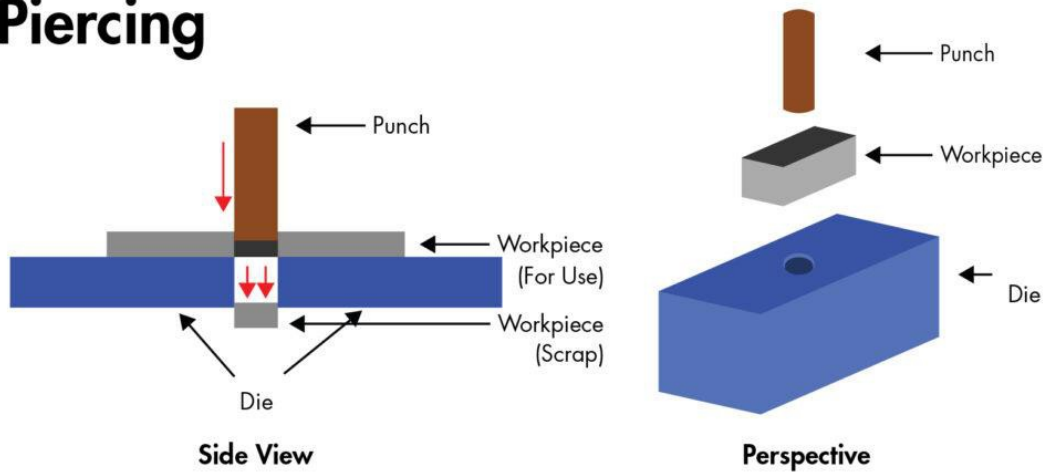


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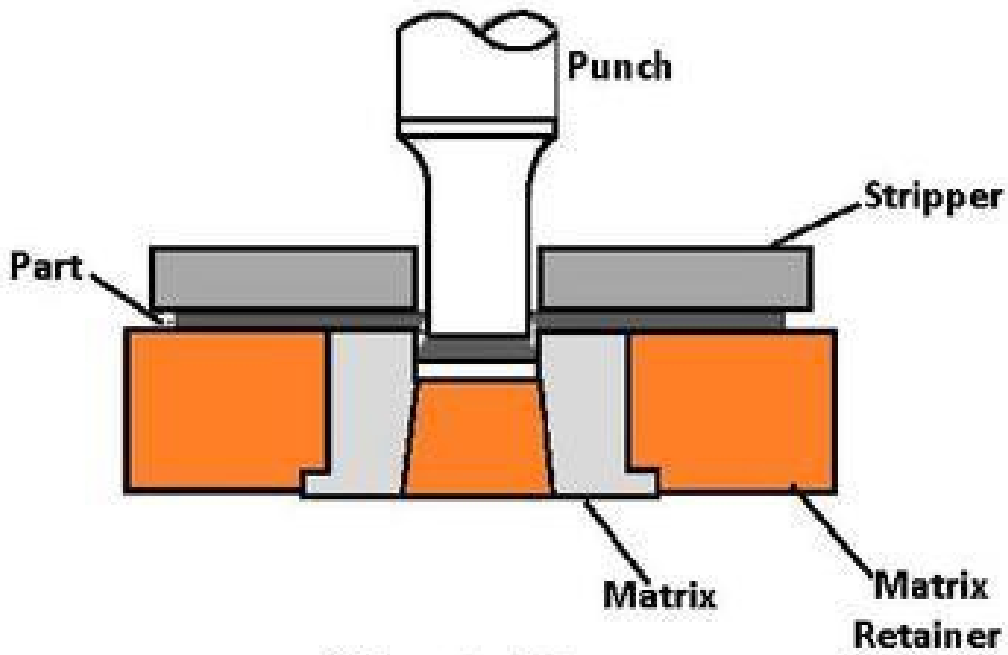
## CENTRIFUGAL CASTING



# Piercing



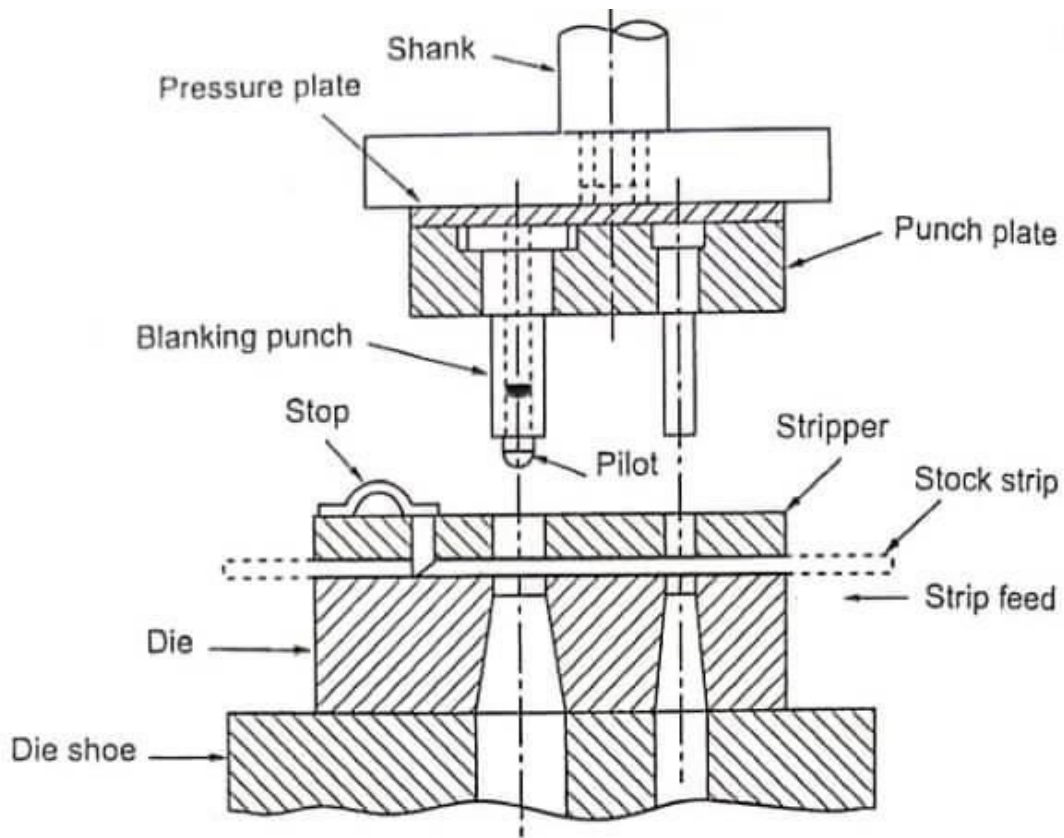
## DIE AND PUNCH



## Simple Die

SIMPLE DIE





**PROGRESSIVE DIE**



**Jigs**

**Fixtures**



**JIGS AND FIXTURE**