

# Machine Tools

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# Topics

- ▶ Machine Tools: milling, turning, cutting, drilling and threading, grinding, shaping, casting, plastic deforming, powder forming, sheet metal, welding, fabrication
- ▶ - Factory equipment: material handling and fire protection
- ▶ - Utility equipment for energy generation, energy consuming devices, for energy utilisation
- ▶ - Electrical installations
- ▶

# Milling Machine



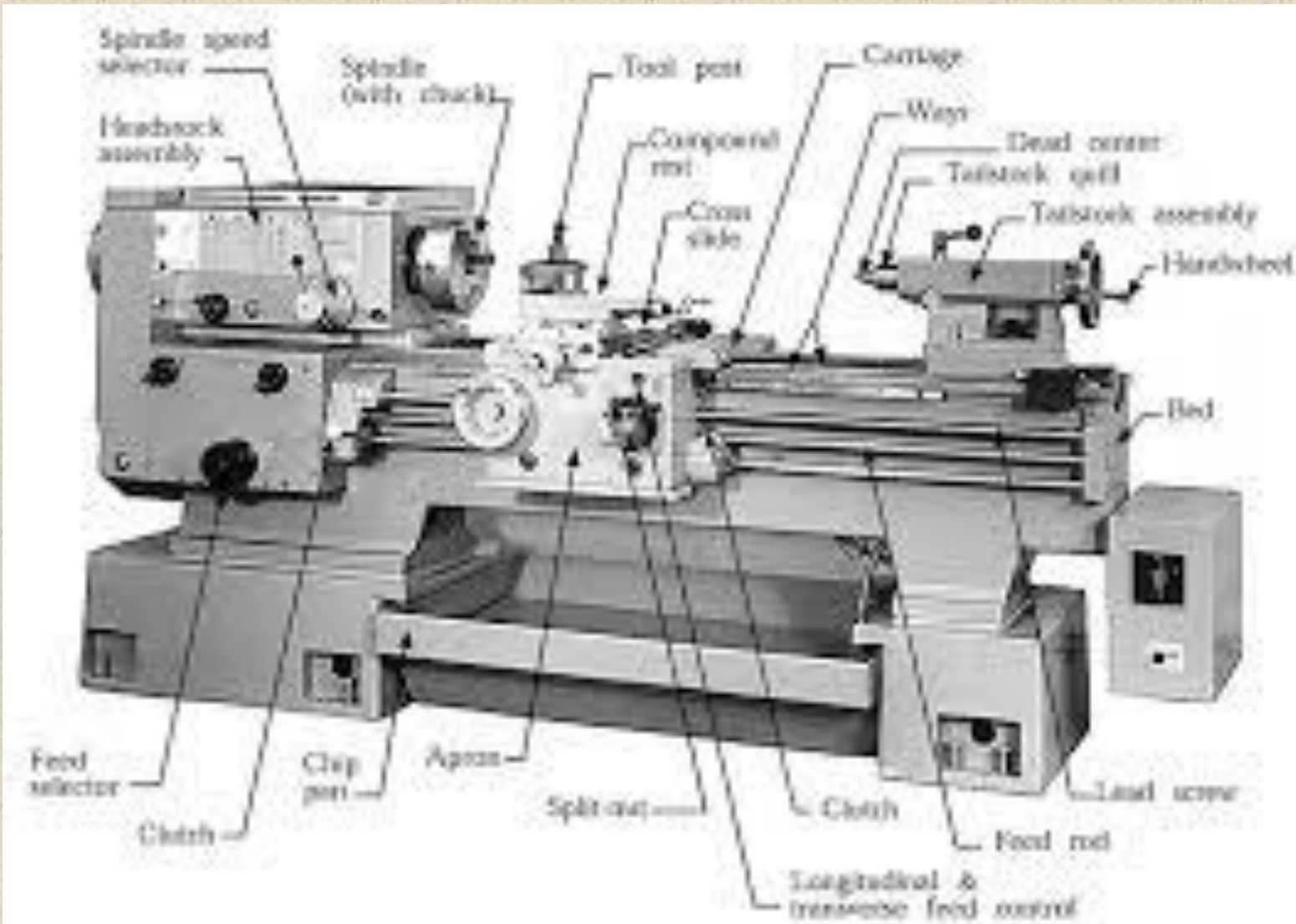
One the OLD Type of machine

Still a base machine

- Tool rotates
- Work p/c moves
- Material removal machine
- Can do a large variety of work.
- Common in maintenance, tool room,
- Manual, CNC and SPM are available.
- Punjab is the largest for low end.
- CNC and higher end are from South – Bangalore.

# Lathe Machine

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One the OLD Type of machine  
Still a base machine

- Work piece rotates
- Cutting tool moves
- Material removal machine
- Can do a large variety of work.
- Common in maintenance, tool room,
- Manual, CNC and SPM are available.
- Punjab is the largest for low end.
- CNC and higher end are from South – Bangalore.
- Can do turning, drilling, threading facing etc.
- Wide variety of material are used.. Wood, metal, plastic etc.

# Cutting Machine

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One the OLD Type of machine  
Still a base machine

- Cuts material in smaller pieces
- In standard shapes
- Used to work as a base machine
- Different type of machine for
- Different material

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# Drilling & Tapping



One the OLD Type of machine  
Still a base machine

- Drills holes in all types of material
- Can be vertical, or horizontal.
- Different drills for different materials
- Tapping is to make threads.
- External threads are made by dies or lathe.
- Internal threads are made by taps, and used with a tapping attachment
- Tapping attachment is used with a drill machine.
- These are low cost, general purpose machines.



# Grinding

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Finishing operation.  
Gives a smooth finish of surface  
Giver better accuracy than machining.

- Pedestal grinding
  - Surface grinder
  - Cylindrical grinder.
  - Hand grinder
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- Different material have different abrasive
  - Size of abrasive plays a major part in finish.

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# Shaper

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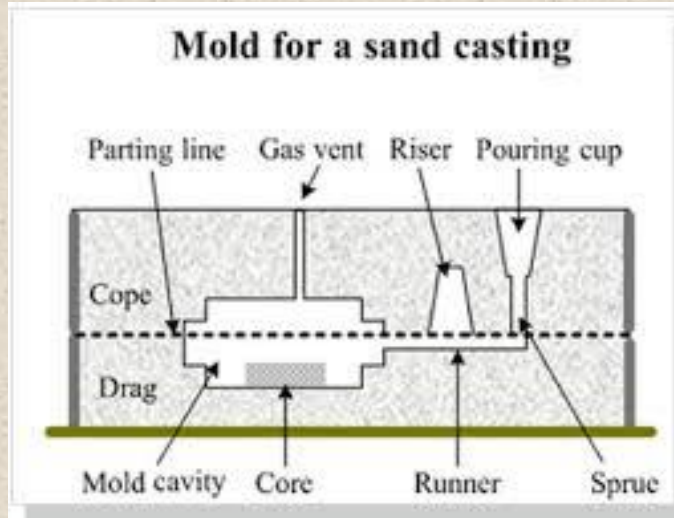
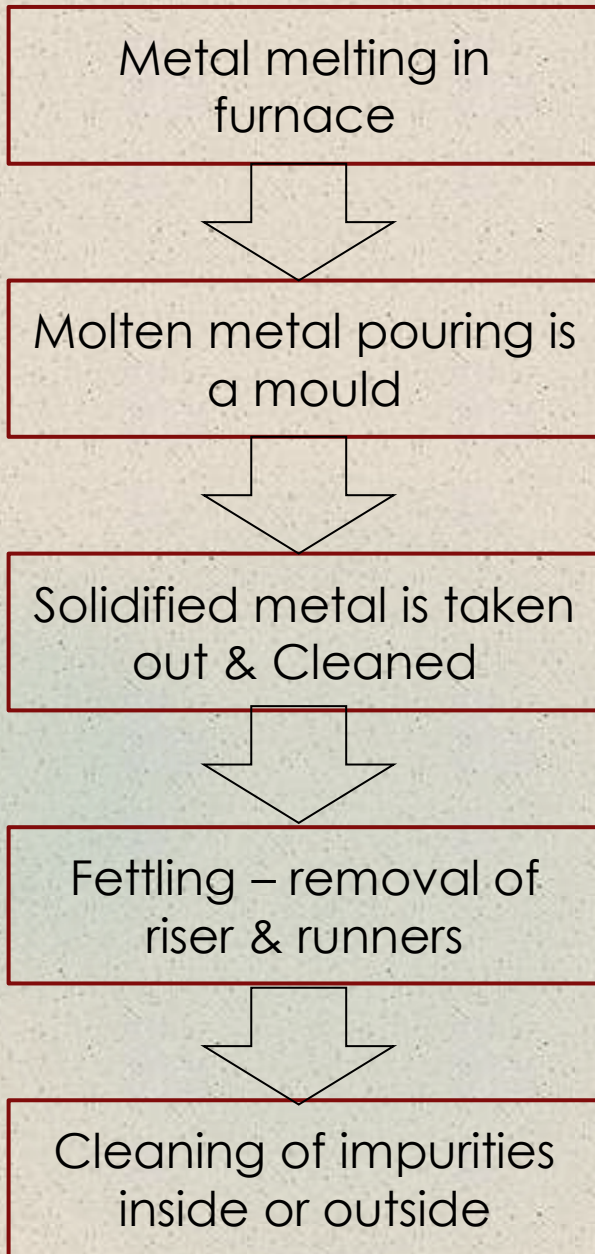


Rough operations.  
To remove bulk of material  
Bad surface finish  
Bad accuracy  
Low cost  
Low skill of operator.  
Not popular today.



# Casting

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Popular process

- Heavy items
- Intricate items
- Multi alloy items.
- Used in all industries
  - Automobiles
  - Power
  - Railways
- Intricate casting used
  - Handicrafts
  - Jewellery

Plastic Granules



Heat to melt

Inject under pressure in a mould

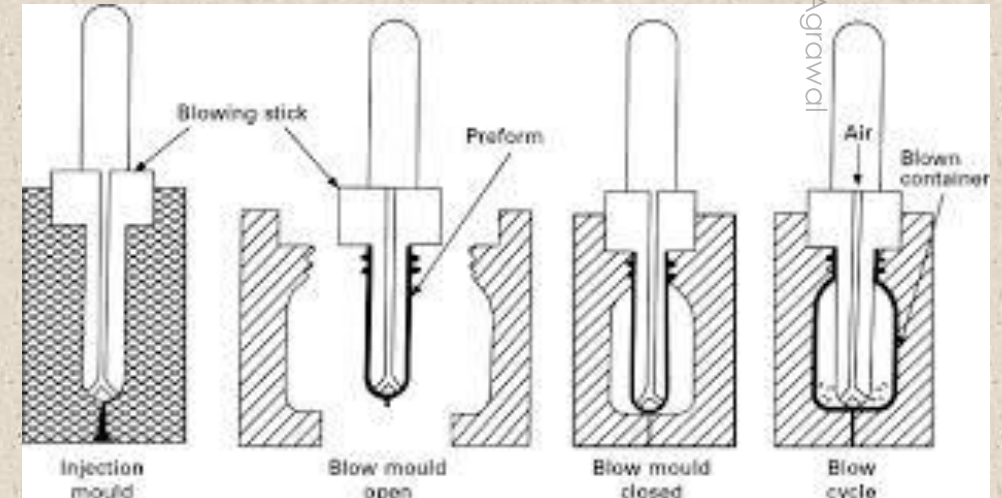
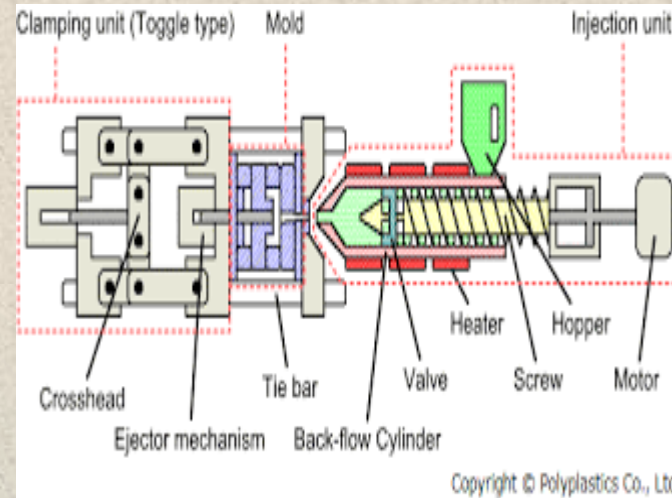
Forms the shape

Remove and do fettling

Cleaning

# Plastic forming

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Most common Material

- Used every where / every thing
- Easy to work
- Disposable
- Looks good

*Has environment concerns on disposal*

Metal Powder

Put in mould with adhesive

Put in pressure and heat

Forms the shape

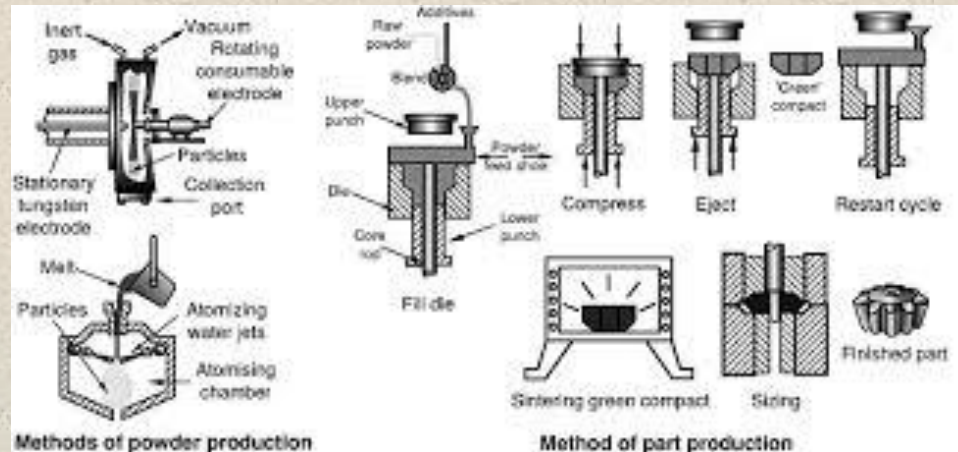
Remove

Cleaning



# Powder forming

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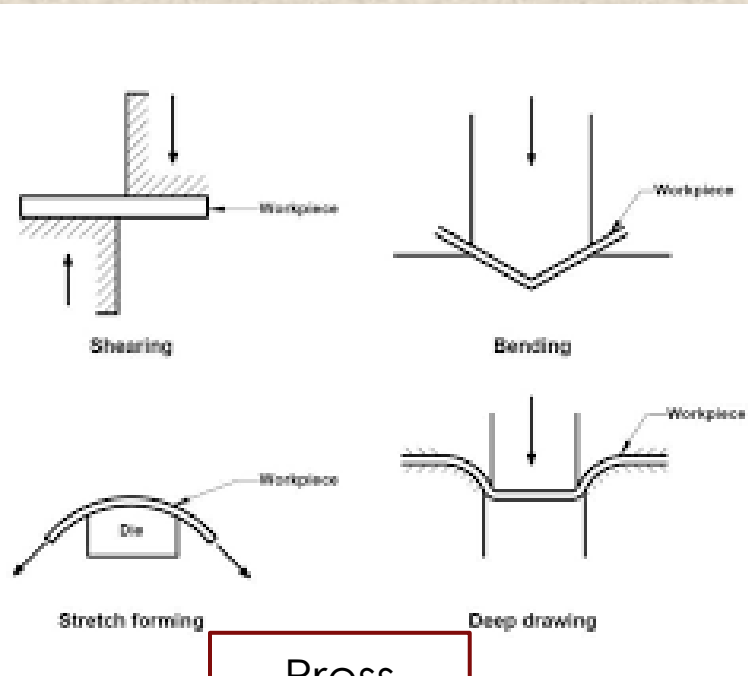


Modern Manufacturing Method.

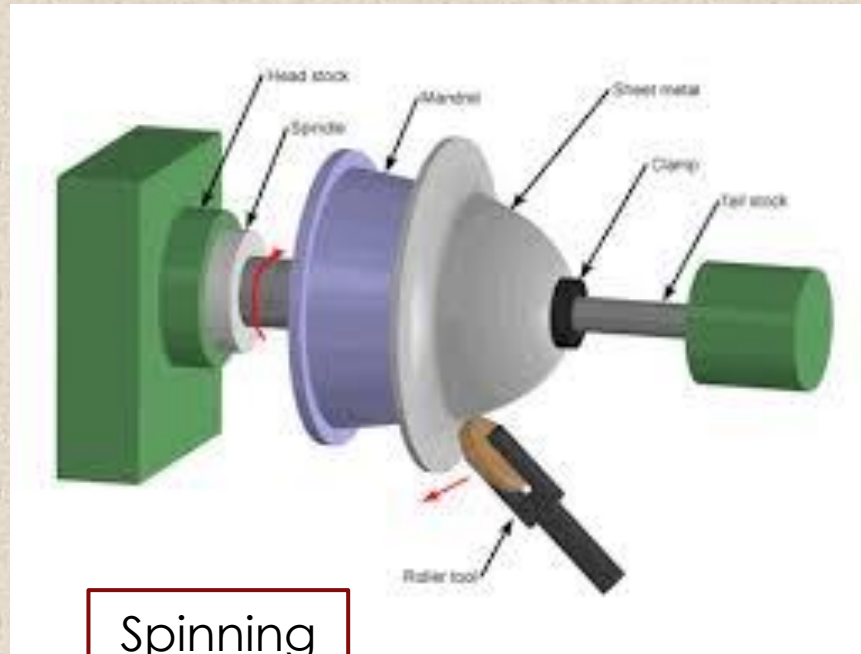
- Makes intricate shapes quickly
- Good For mass production
- Ready to use. Less cleaning and repairs.
- Gears, Injection pump parts

# Sheet Metal

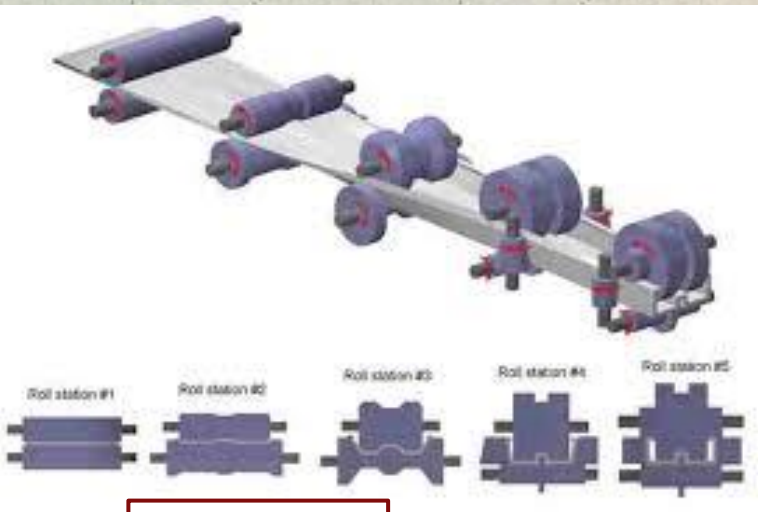
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Press



Spinning



Rolling

- Very Common and useful process
- Ships, air craft, cars, trains
  - Washing machines, white goods
  - Very commonly used.
  - Used all metals.
  - Low cost high speed process

# Welding & Fabrication

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## ▶ Welding

- ▶ Join 2 or more metals
- ▶ Same or different metals
- ▶ Melt the metals through
  - ▶ Spark
  - ▶ Gas melting
- ▶ Put filler metal
- ▶ Form the joined product.

## ▶ Fabrication

- ▶ Use of welding bending cutting etc to make a product.
- ▶ Ship... cut, form weld – get the shape.
- ▶ Large size objects can ONLY be made like this.
- ▶ Can make fairly complicated shapes.
- ▶ Other processes – grinding, painting also used

# Factory Equipment – Material Handling

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# Fire Protection



# Energy Generation

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## ELECTRICAL ENERGY

- Solar Panels
- DG sets
- Turbines / generator
- Chemical Reaction / Electrical – Batteries.

## COMPRESSOR AIR ENERGY

- Screw Compressor
- Reciprocating Compressor
- Multi stage / single stage

## FUEL GAS ENERGY

- LPG
- CNG
- Acetylene
- PNG



# Energy Consuming Devices

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- ▶ Machines
- ▶ Furnaces
- ▶ AC's
- ▶ Compressors
- ▶ Material Movements
- ▶ Welding

Any activity that is used for material transformation or movement used energy.

# Electrical Installations

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- ▶ Electricity is to be put to us with a proper voltage. Phase, and frequency.
- ▶ It has to have many protection devices – for safety of human and machine.

- Transformer
- Air ECB at sub station
- Control panel
- Distribution panel
- Wires / Bus bars.
- Junction boxes.
- Fuses
- MCB
- Plugs
- Switches

Thanks

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