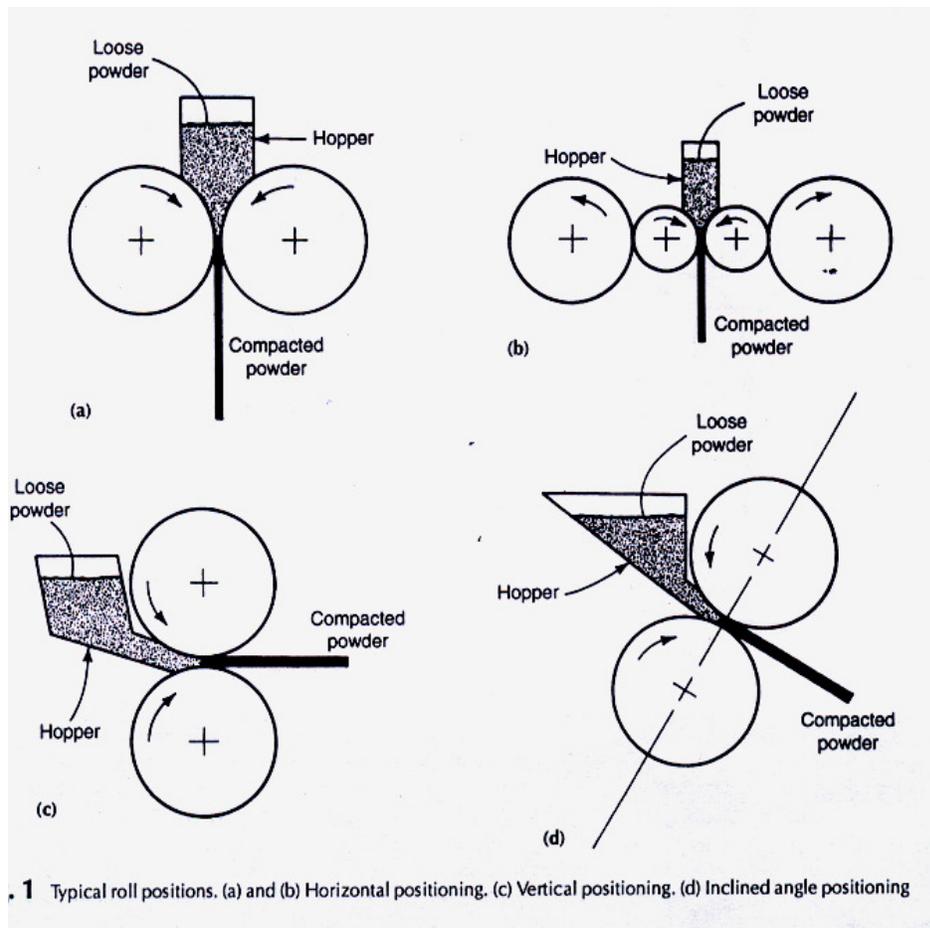


## POWDER METALLURGY

Powder Production Reduction, Electrolytic deposition, Pulverization, Mechanical Alloy and others Blending of powders Compaction of Powders Punch and Die, Rolling, Extrusion, Injection Moulding, Isostatic Pressing Sintering Typical Sintering set up

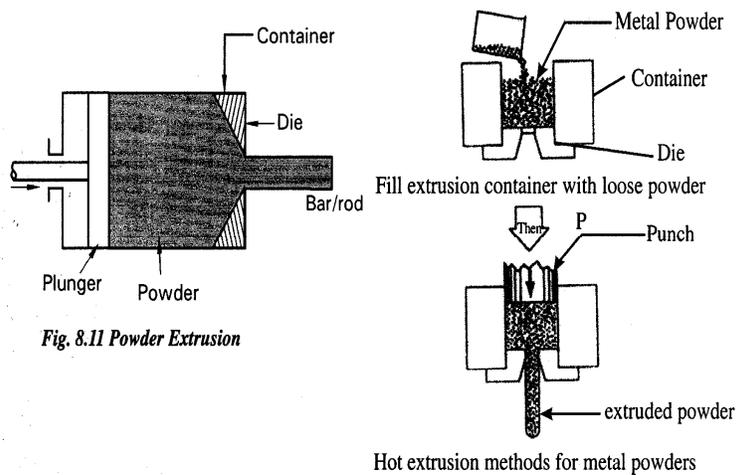
### Powder Rolling

\*In powder rolling (powder compaction) the powder is fed into the roll gap in a two high rolling mill and is compacted into a continuous strip at speeds up to 0.5m/s.\*The process can be carried out at room temperature or at elevated temperatures.\*Sheet metal for electrical and electronic components, coins can be made by powder rolling.



### Powder Extrusion

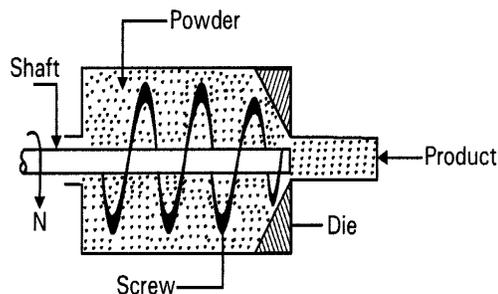
\*Powders can be compacted by extrusion.\*The metal powder is encased in a container and extruded.\*After sintering, preformed PM parts may be rolled or forged in a closed die to their shape.



## Powder Injection Moulding

\*It is also called metal injection moulding.\*Very fine metal powders ( $<10\mu\text{m}$ ) are blended with a polymer or a wax based binder.\*The blended mixture undergoes compaction due to pressure.\*The green compacts are heated in a oven at low temperature to burn off plastic and then sintered in a furnace.

Pressing can be carried out either at room temperature or at elevated temperature.\*The powder must flow easily into the die cavity.\*The density of the green compact, depends on pressure applied during compaction.\*By using particles of different shape, very close packing of the metal powder can be achieved\*Higher density results in higher strength and higher elastic modulus of the components.



The normal compaction pressure ranges from 70Mpa for aluminium to 800Mpa for iron parts.\*Crank or eccentric type mechanical presses are used for small tonnage.\*Toggle or knuckle joint presses are used for higher capacities.\*Hydraulic process (450MN) are employed for large components. Compaction can also be carried out by a number of other processes such as

isostatic pressing, rolling and forging.\*Since the density of the compacted powders can vary significantly, green compacts are subjected to hydrostatic pressures in order to achieve more uniform density.

Source: <http://elearningatria.files.wordpress.com/2013/10/vtu-e-notes-mpiii-16.pdf>