

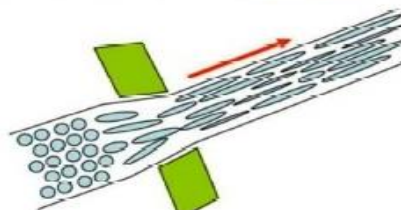
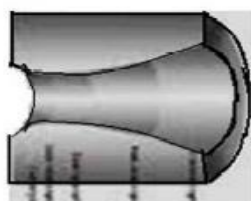
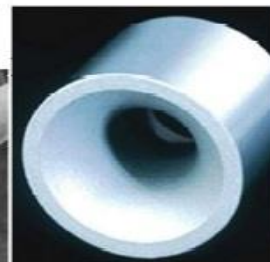
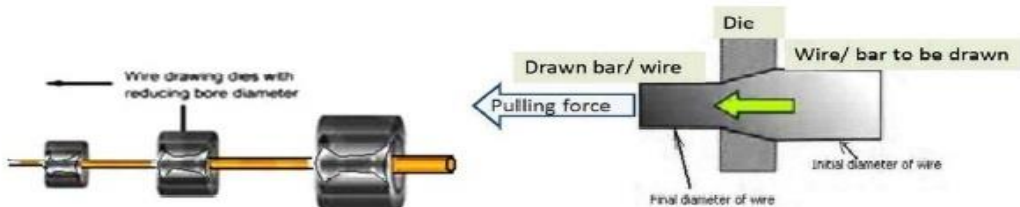
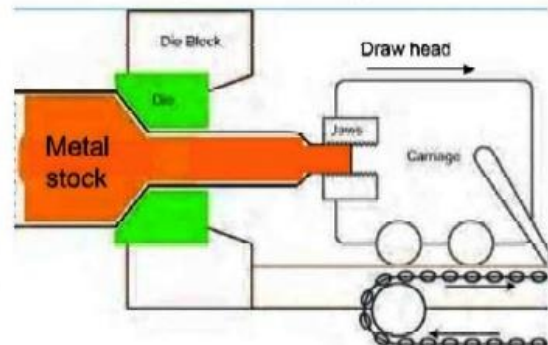
Wire Drawing

Wire/ bar drawing is a metal working process used to reduce the cross-section of a wire/ bar by pulling (applying tensile force on) the wire through a single, or series of, drawing die(s). Drawing is usually performed at room temperature, thus classified as a cold working process, but it may be performed at elevated temperatures for large/ thick wires to reduce forces. The figure below shows the process of wire drawing and dies used for the purpose.

Process of wire or bar drawing:

- The wire/ bar are prepared by shrinking the beginning of wire, by hammering, filing, rolling or swaging.
- Then wire is passed through the die and **lubricant** is used to reduce friction.
- The wire is then pulled through the die by applying the pulling force.
- As the wire is pulled through the die, its volume remains the same, so as the diameter decreases, the length increases.
- Usually the wire will require more than one draw, through successively smaller dies, to reach the desired size.
- Annealing may be required in between the number of passes.

Applications: There are many applications for wire drawing, including electrical wiring, cables, tension-loaded structural components, springs, paper clips, spokes for wheels, and stringed musical instruments.



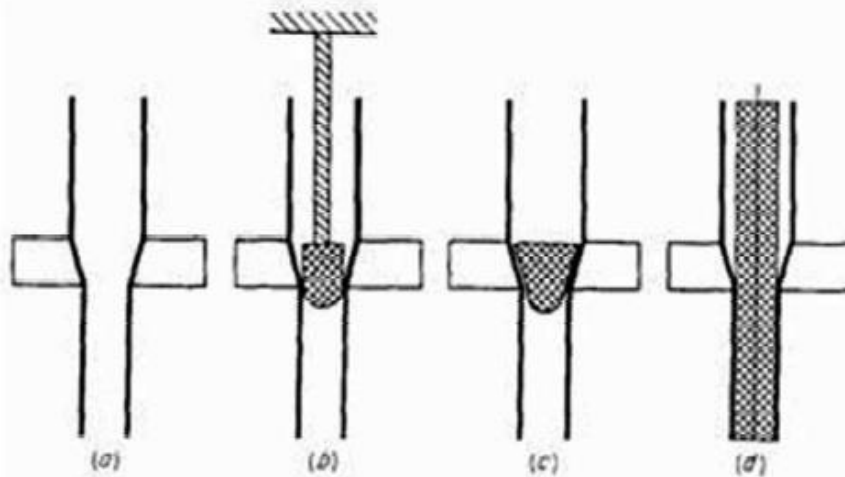
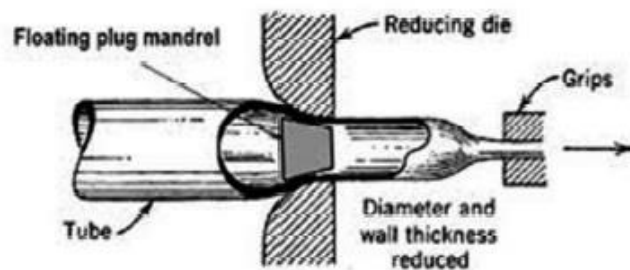
Wire/ bar making process with the views of dies drawing arrangement and grain flow direction

Tube Drawing

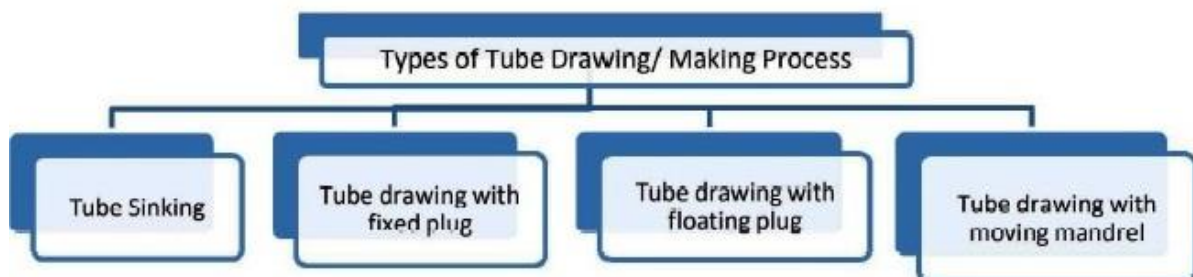
TUBE Making/ Drawing is a metal working process to reduce the diameter of tubes or tube shells by shrinking the large diameter tube into a smaller one, by drawing the tube through a die.

Basic Process of tube making/ drawing:

- a) The tube with larger diameter is prepared by shrinking the beginning of by hammering, filing, rolling or swaging.
- b) Then tube is passed through the die and **lubricant** is used to reduce friction.
- c) The floating plug or mandrel or fixed plug is inserted
- d) The tube is then pulled through the die by applying the pulling force.
- e) Usually the tube will require more than one draw, through successively smaller dies and plugs to reach the desired size.
- f) Annealing may be required in between the number of passes.



Tube drawing process by (a) Sinking (b) Fixed plug (c) Floating plug (d) Moving mandrel



The comparison table of tube making processes

Tube Sinking	Tube drawing with fixed plug	Tube drawing with floating plug	Tube drawing with moving mandrel
Tube sinking, also known as free tube drawing, reduces the diameter of the tube without a mandrel or float inside the tube.	Fixed plug drawing, also known as stationary/ fixed mandrel drawing, uses a mandrel at the end of the die to shape the ID of the tube.	Floating plug drawing, also known as floating mandrel drawing, uses a mandrel that is not anchored fixed.	The tube is drawn with a mandrel. The mandrel consists of along hard rod or wire that extends over the entire length of the tube and is drawn through the die with the tube.
The inner diameter (ID) is determined by the inner and outer diameter of the stock tube, the outer diameter of the final product, the length of the die landing, the amount of back tension, and the friction between the tube and the die.	This process is slow and the area reductions are limited, but it gives the best inner surface finish of any of the processes. This is the oldest tube drawing method.	The mandrel is held in by the friction forces between the mandrel and the tube. This axial force is given by friction and pressure.	In this design, the area reduction can be 50 per cent. However, after drawing, the mandrel must be removed from the tube by rolling (reeling), which increases the tube diameter slightly and disturbs the dimensional accuracy.
Simple to perform		The greatest advantage of this is that it can be used on extremely long lengths	

References:

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4. <http://nptel.ac.in/courses>