

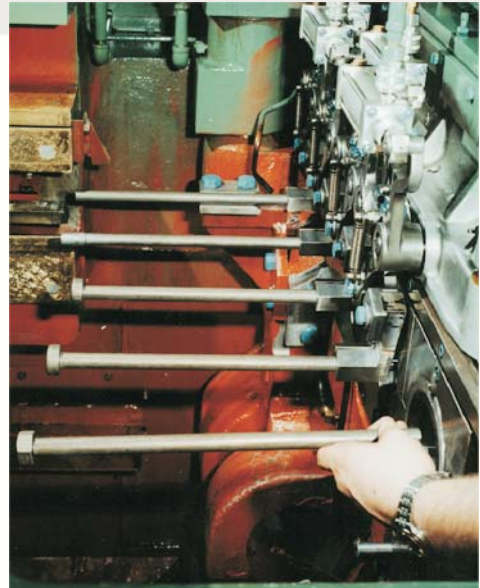


What is Cold Forming?

A high speed forging process where coiled wire at room temperature is precisely sheared to length, and then moved through a succession of tool and die cavities to displace the working metal, either larger/smaller in diameter, longer/shorter in length, or to remove small amounts of material by trimming or piercing.

Metal is forced beyond its yield (elastic) limit and retains its altered shape upon removal from the die. The metal is not forced beyond its tensile strength, otherwise fracturing would occur (the exception is when trimming or piercing).

Historically cold forming has been an experienced based technology, but this is changing as new computer based analytical tools are constantly being developed.



Benefits of Cold Forming

- Speed
- Net / Near net shape to eliminate or reduce secondary operations
- Consistency / dimensional accuracy
- Quality / surface finish
- Material savings & elimination of scrap
- Improvement in mechanical properties, greater strength to weight ratio, unbroken grain flow

Because of these benefits, Cold forming can be considered instead of Hot Forging, Casting, Powdered Metal, Machined Parts, Weldments and Stampings, or Reinforced Plastics/Composites.



Cold Forming
1/10 Material, 15 x Production
18% Stronger



Materials

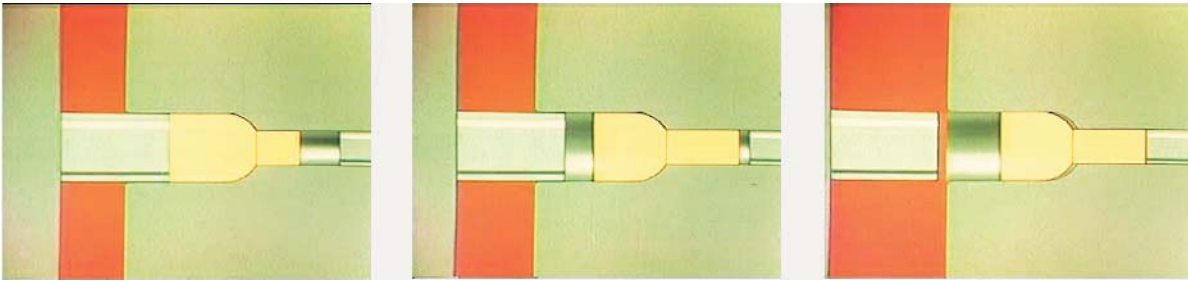
Materials that can be cold formed include, but are not limited to:

- Carbon steels
- Stainless steel
- Alloy steels
- Aluminum
- Brass
- Copper
- Bronze
- Nickel Alloys
- Lead
- Aerospace Alloys
- Precious metals

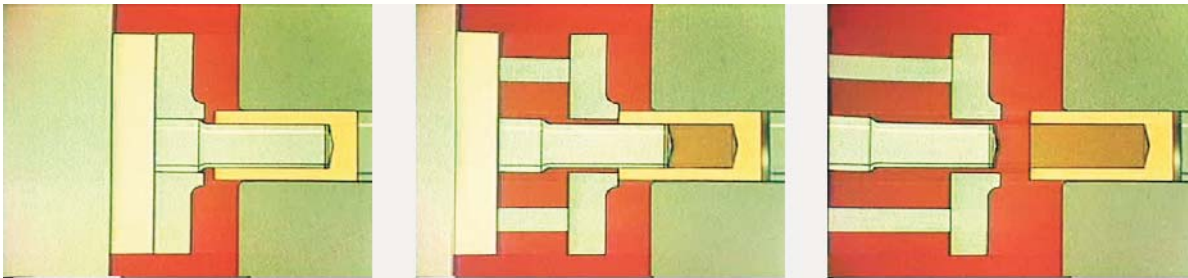


Basic Steps of Cold Forming

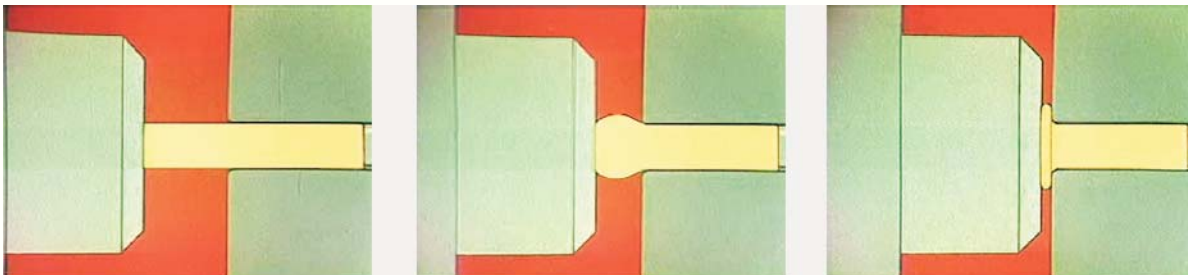
Cold forming the chosen material into a given part shape is governed by that material's structural properties. These properties help make up the "rules" of how to form parts, all based off the combination of 3 basic forming methods.



Forward Extrusion – Method to reduce diameter, where depending on % of reduction is open or trapped for material to flow into the cavity of lesser diameter.



Backward Extrusion – Method to makes holes, where material flows backward around a penetrating punch.

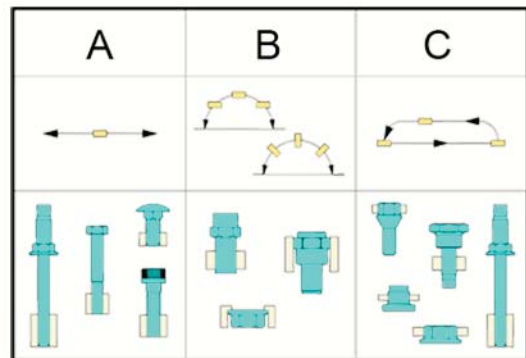


Upset – Method to form heads on fasteners, where material is upset at the face of dies and can be open or trapped to upset a particular shape.

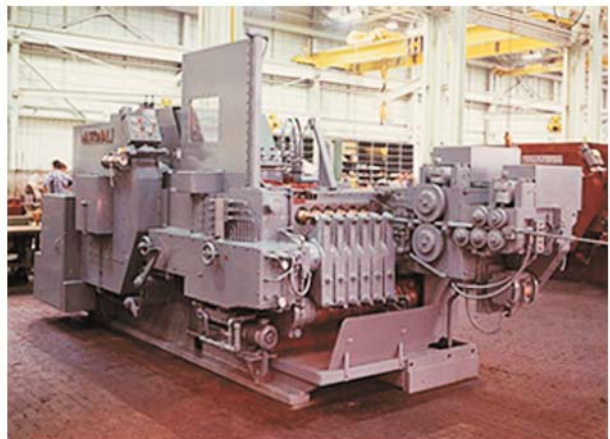
Machinery

Cold forming equipment is typically a horizontal press that feeds wire, cuts the wire to an appropriate length which is then transferred through a series of tools and dies to form the material into a desired shape. Machines have many variations according to the type of parts that are to be produced including:

- Cutoff diameter capability (ranges from 2mm to 48mm)
- Feed length capability (ranges from 2mm to 300mm+)
- Tonnage (ranges from 5 Mtons to 1600 Mtons)
- Type of Transfer: Boltmaker®/Straight Across (A), Universal/Cold Nut former (B), Pick Move Place(C)
- # of dies/punches (1 die/1 punch, 1 die/2 punch, 2 die/2 punch, 2 die/3 punch, 2 die/4 punch, 3 die/3 punch, 4 die/4 punch, 5 die/5 punch, 6 die/6 punch)



Example of 2 die & 3 punch machine



Example of 6 die & 6 punch machine



Example of 6 die & 6 punch Advanced FORMAX Cold Former



Die Area of 6 die & 6 punch Advanced FORMAX Cold Former