

Cold Working and Classification of Squeezing Process

Cold working

The process is usually performed at room temperature, but mildly elevated temperatures may be used to provide increased ductility and reduced strength

For example: Deforming lead at room temperature is a hot working process because the recrystallization temperature of lead is about room temperature.

Effects of Cold Working

Deformation using cold working results in

- Higher stiffness, and strength, but
- Reduced malleability and ductility of the metal.
- Anisotropy

Advantages

- No heating is required
- Strength, fatigue and wear properties are improved through strain hardening
- Superior dimensional control is achieved, so little, if any, secondary machining is required
- Better surface finish is obtained
- Products possess better reproducibility and interchangeability
- Directional properties can be imparted
- Contamination problems are minimized

Disadvantages

- Higher forces are required to initiate and complete the deformation
- Less ductility is available
- Intermediate anneals may be required to compensate for the loss of ductility that accompanies strain hardening
- Heavier and more powerful equipment is required
- Metal surfaces must be clean and scale-free
- Imparted directional properties may be detrimental
- Undesirable residual stresses may be produced

Cold-working Processes

- Squeezing
- Bending
- Shearing
- Drawing
- Presses

Classifications of Squeezing Processes

- Rolling
- Cold Forging
- Sizing
- Staking
- Staking
- Coining
- Burnishing
- Extrusion
- Peening
- Hubbing
- Riveting
- Thread Rolling

ROLLING

Process used in sheets, strips, bars, and rods to obtain products that have smooth surfaces and accurate dimensions; most cold-rolling is performed on four-high or cluster-type rolling mills



ROLLING PROCESS

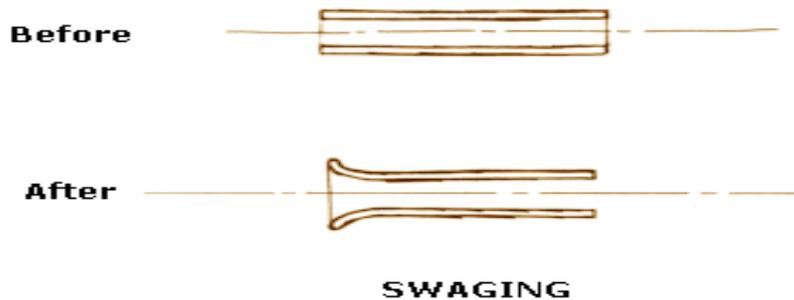
Flat Rolling

A sheet or block or strip stock is introduced between rollers and then compressed and squeezed. Thickness is reduced. The amount of strain (deformation) introduced determines the hardness, strength and other material properties of the finished product.

Used to produce sheet metals predominantly

Swaging

Process that reduces/increases the diameter, tapers, rods or points round bars or tubes by external hammering



Cold Forging

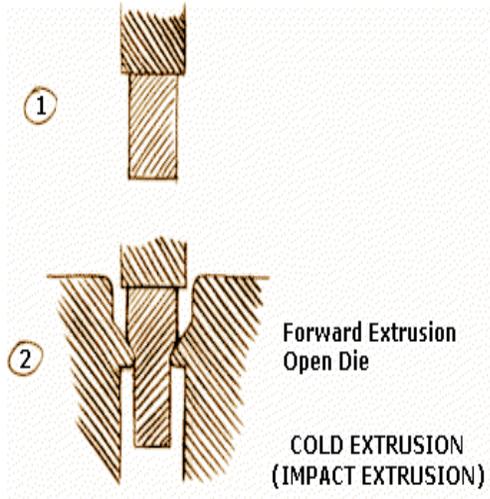
Process in which slugs of material are squeezed into shaped die cavities to produce finished parts of precise shape and size.



COLD HEADING/COLD FORGING

Extrusion

Process which is commonly used to make collapsible tubes such as toothpaste tubes, cans usually using soft materials such as aluminum, lead, tin. Usually a small shot of solid material is placed in the die and is impacted by a ram, which causes cold flow in the material.



Sizing

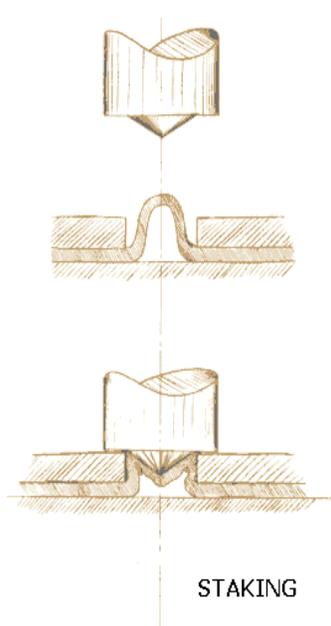
Process of squeezing all or selected areas of forgings, ductile castings, or powder metallurgy products to achieve a desired thickness or precision

Riveting

Process where a head is formed on the shank end of a fastener to permanently join sheets or plates of material;

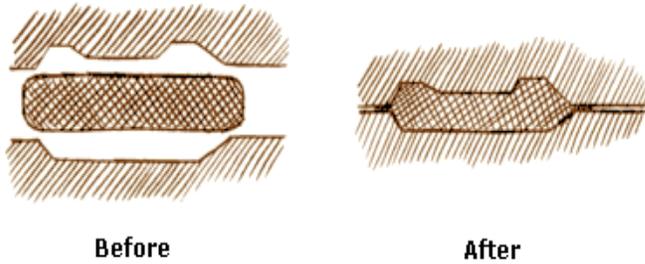
Staking

Process of permanently joining parts together when one part protrudes through a hole in the other; a shaped punch is driven into the end of the protruding piece where a deformation is formed causing a radial expansion, mechanically locking the two pieces together



Coining

Process where metal while it is confined in a closed set of dies; used to produce coins, medals, and other products where exact size and fine details are required, and thickness varies about a well-defined average



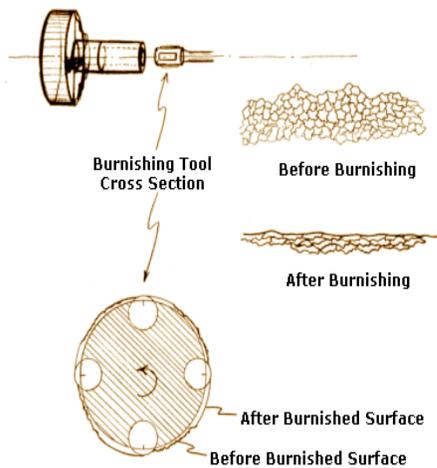
COINING

Peening

Process where the surface of the metal is blasted by shot pellets; the mechanical working of surfaces by repeated blows of impelled shot or a round-nose tool

Burnishing

Process by which a smooth hard tool is rubbed on the metal surface and flattens the high spots by applying compressive force and plastically flowing the material



BURNISHING

Hubbing

Process is used to form recessed cavities in various types of female tooling dies. This is often used to make plastic extrusion dies in an economical manner

Thread Rolling

Process is used for making external threads; in this process, a die, which is a hardened tool with the thread profile, is pressed on to a rotating workpiece



THREAD ROLLING

Source : <http://nprcet.org/e%20content/mech/MT.pdf>