MachineDesign

FAQ

Understanding the Benefits of Cold Forming

Q1: What is cold forming?

A: Cold forming, or cold heading, is the application of force with a punch to a metal blank staged in a die. As the force exceeds the material's elastic limit, it causes what is called "plastic flow" to occur until the metal blank assumes the shape bound by the punch and die. This method of forming is achieved by force alone, forgoing the application of additional heat or cutting and shearing.

Q2: What types of processes or operations can cold forming technology replace?

A: Cold forming can be considered an alternative process to that of powdered metal processes, machining parts, and stampings.

Q3: Why is cold forming more popular lately?

A: Historically, cold forming was considered an experience-based technology where it took an active operator to observe and make adjustments while the process was taking place. This meant that as a technology it evolved slower than other types of operations. With changes in computer capabilities and analytical tools continually being explored and developed, cold forming has become an accepted process that has many benefits.

Q4: What are some of the benefits of using cold forming for part manufacturing?

A: Key benefits that cold forming offers include high-speed operations for high-volume part production. For example, cold forming can often produce parts at 150 to 200 parts per minute, whereas a standard screw machine would produce only 50 to 80 parts per minute. Other benefits include the elimination of scrap, leading to material savings, the ability to provide dimensional accuracy and part consistency, and a higher quality of surface finish which often eliminates or reduces secondary operations. The combination of material waste elimination and the fact that secondary processes are not required can greatly reduce the overall cost of production.

Q5: Does the added pressure used in the process weaken the metal material?

A: Cold forming actually provides an improvement in the mechanical properties of the material, leading to increased tensile strength—greater strength-to-weight ratios—through work hardening. For every 1% of area reduction or increased surface area of a part's cross-section, its tensile strength increases by a factor of ~0.6 to 1.5 depending on the material used. The process also provides for unbroken grain flows. Literally, no process that removes material from the native shape can achieve these benefits.

Q6: What materials can be cold formed?

A: Most metals can be cold formed, including carbon steels, brass, stainless steel, copper, bronze, aluminum, and a number of aerospace alloys, alloy steels, Kovar, and high-nickel alloys.

Q7: What types of projects would benefit from using cold forming?

A: Cold forming manufacturing techniques lend themselves to a variety of mission-critical needs, including high volume requirements, especially in short time frames; in the correction of part failures due to cold forming's part repeatability capabilities; when higher material strength is critical to part robustness; and when there is a need for tight tolerances or other critical specifications. To view part formation using cold forming, check out this video: https://www.youtube.com/watch?v=EQEMu42d-xM&t=1s

Q8: What are some typical parts that can be produced through cold forming?

A: A wide array of parts can be produced using cold forming technology. Some examples include fasteners of various types, screws, nuts, bolts, rivets, electronic housing, and electrical contacts for a broad number of applications. Shapes and part configurations include threads, knurls, heads, chamfers, grooves, tapers, and undercuts. Required features that cannot be produced through standard cold-forming processes can be achieved by employing secondary procedures such as form rolling, thread rolling, bending, groove machining, and pointing. Since cold forming can create smaller parts, the process is ideal for making micro-electronic components, micro contacts, micro grommets, glass to metal sealing components, and other small parts for medical, aerospace, automotive, and even consumer products applications, to name a few.

Q9: Are there other benefits I should consider when selecting cold forming?

A: Environmental concerns are important in today's manufacturing circles and are proving to be a concern for future production. Because cold forming produces no metal scrap, it requires less reprocessing, along with the associated costs of transportation, fuel, and labor—most of which are environmentally friendly. Also, lubrication is used at a fraction of the rate than for other processes, such as a cutting machine operation.

Q10: Are there tools available to help users with creating a prototype to consider?

A: Yes, there are a number of online tools available from reputable suppliers. For example, MW Industries offers a Prototype Calculator on their MW Components division site for their cold forming process that allows users to select shank diameters and ID and OD specifications to help them determine if cold forming is the right process for them. Visit MWComponents.com to try the *Cold Forming Prototype Calculator*.