

Advantages of Cold Forging vs. Casting Processes

This Tech Bulletin provides a comparison of Cold Forging vs. casting processes. It is part of a series of Tech Bulletins on Cold Forging. For more information, you can also read the Cold Forging Overview Tech Bulletin.



How are Cold Forging and Casting Different?

Cold forging is a metalworking displacement process that forms the existing material into the desired shape as compared with conventional casting methods, which typically heat the material until it is liquid and then pour it into a mold. The following sections describe some of the key advantages of cold forging vs. casting.

Significantly Better Product Strength

Conventional casting cannot achieve the strengthening effects of cold forging, which offers highly predictable strength properties and consistency from part to part.

The high compression process used in cold forging actually displaces and rearranges the grain of the base material such that any inherent weaknesses are eliminated. Therefore, cold forging is able to yield a grain structure oriented to the part shape, resulting in optimum strength, ductility and resistance to impact and fatigue.

In contrast, a casting has neither grain flow nor directional strength and the casting process cannot prevent formation of certain metallurgical defects. For complex parts that may require long sections and/or narrow points in the design, the lack of directional strength can result in significant weak points and risk of breakage for casted parts.

Higher Reliability, Lower Costs and Improved Yields

Forgings are inherently more reliable and less costly than castings.

Casting defects can occur in a variety of forms during the pouring and cooling processes. This leads to increased costs and time required for tighter process controls and inspection in order to achieve desired results. In addition to reducing production efficiency, the need to reject and/or rework casting defects also impairs yield levels and increased scrap costs.

In contrast, by compressing the material with either hot or cold working, the forging process produces consistently reliable parts in a single-pass process, with fewer defects. Using proper process controls in the forging process can greatly reduce the costs of inspection and scrap.

Enhanced Appearance and Surface Finishing

Cold forging offers distinct advantages over casting in that the part appearance and surface smoothness does not typically require post-processing steps.

Depending on the specific requirements of the application, casted parts need to be cleaned up to remove artifacts from the pouring/forming process and to polish the surface to remove defects. These costly and time consuming secondary processes can be avoided with finished parts that have been created through the cold forging compression process.

Summary

Compared with conventional casting processes, cold forging is able to deliver significantly better product strength, higher production yields, lower costs and improved surface finishing.

Other Cold Forging Tech Bulletins:

Tech Bulletins on other cold forging topics include:

- Overview of Cold Forging
- Comparison of Cold Forging to machining
- Comparison of Cold Forging to weldments and fabrication methods

More information regarding cold forging technologies can be found on the web by visiting <http://www.interplex.com/services/cold-forging>