Precision Stamped Components – Factors to consider when designing components

Written by Rick Pollick
Mgr., Strategic Marketing – Penn United Technologies, Inc.
January 20, 2010

Certain product design considerations are critical to the success of a precision stamped component. Attention to these factors can contribute to the ease of manufacturability of precision stamped components, and ultimately help to minimize the final manufactured cost. The following three key design considerations will go a long way in helping to ensure manufacturing success. These factors consist of attention to: (1) material selection, (2) part geometry, and (3) intended secondary operations. A company that is well versed in designing precision stamping dies should be able to provide early design-for-manufacturability assistance in addressing these design issues.

First, the selection of material to be used plays a prominent role in the success of manufacturing a precision stamped component. For example, the hardness of a material is directly proportional to the formability of the component. Other factors to consider pertain to the thickness of the material being stamped, and also the grain direction. These two parameters are related to formability, the integrity of small thin features on the component, and spring-back scenarios. Lastly, other material factors to be considered include the flatness, finish, and abrasiveness of the raw material to be stamped. Each of these plays an important role in the success of producing a quality precision stamped component.

A second key consideration for a precision stamped component is related to part geometry. The size of holes, especially as they relate to material thickness is critical to component integrity. Bent features must be carefully designed, taking into account the proximity of other features (such as holes), and also the fact that a degree of spring-back must be accounted for in the stamping process. Other areas of concern (which can be accounted for if there is an early working relationship between the component designer and the stamping die designer) involve planning for features that involve drawing or coining the material. Lastly, geometry issues pertaining to trimmed features, acceptable burr size, and part cutoff design need to be taken into account.

The third design consideration arises out of a concern for attention to intended secondary operations. Heat-treating stamped components is an option for ferrous components. Tumbling may be performed in order to remove certain surface effects, such as burrs and tool marks; however, care must be taken so as to not deform the part geometry. Other secondary operations may be performed on precision stamped components such as passivation or electro-plating. Some tool designers are capable of incorporating secondary assembly operations so that these are performed inside the stamping die during the stamping operation. In-die assembly and in-die welding are two possible operations that can eliminate separate assembly steps (after stamping), and thus effectively mitigate costs.

In short, this brief introduction to design considerations for precision stamped components is intended to spark more deliberate discussions between the component designer and the designer of the precision stamping die. There are other considerations that may need to be discussed, but these are some of the more common design issues that should be addressed. Penn United offers an in-depth training course entitled "*Design for Manufacturing - Designing a Stamped Part for Ease of Manufacture, and Reducing Time and Cost*"

Penn United serves the following markets: Energy, Medical, Defense, and other markets requiring precision components. At Penn United, precision metal stamping is one of our offerings that allows us to stand by our

slogan…"Manufacturing Solutions. Absolute Integrity." Visit our web site at www.PennUnited.com or call us at (724) 352-1507.

Manufacturing Solutions, Absolute Integrity