Cold forming delivers low cost micron precision

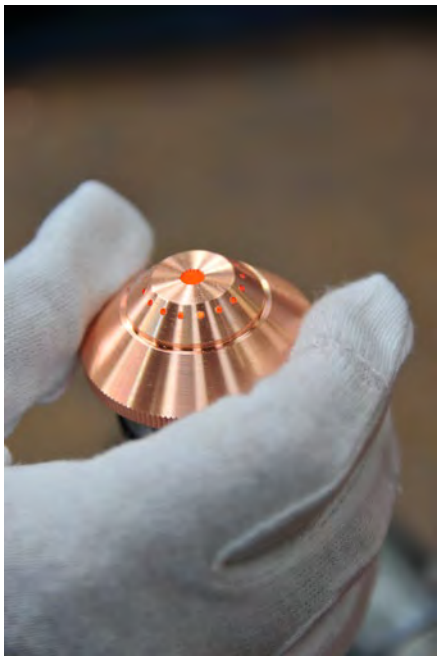
Technical article

Italy Precision CNC Machining Inc.

Today, the demand from industry for more complex components with ultra-fine tolerances down to micron level has led to some remarkable results using cost-efficient cold forming.

The requirement for highly complex component parts using copper, aluminum and ferrous metals to be manufactured to exacting tolerances is becoming a critical factor for today's sophisticated high tech equipment used in the aerospace, electronics and medical industries. This has pushed the boundaries of processes such as cold forming, resulting in precision vel of accuracy that can be measured in terms of microns.

Traditionally, the cold forming process has been associated with manufacturing simple components such as screws and bolts in vast , while many larger or complex parts are manufactured using conventional processes such as machining and forging. Although the latter processes have their advantages, they can be expensive, time consuming and require



multiple process stages to produce precision components with high

Additionally, machining operations are generally extremely wasteful in that they generate large volumes of scrap as parts are cut or milled from solid billets of material.

Cut, punch and press approach

Although the high cost of materials and energy consumption is leading engineers and designers to consider cold forming as a commercially viable alternative, it is the potential to produce extremely high quality components with superior mechanical

accuracy that is interesting many companies.

The cold forming process itself produces metal components at low, usually ambient temperatures without removing any material. A simple blank, which has been sawn or cropped from a round bar or wire, or a cold headed pre-form is placed within a die and a punch is pressed into the blank using pressures of up to 600 tonnes. The blank then adopts the form of the punch and then the die.

methods used in cold forming, including forward extrusion, backward . Naturally, the most suited method of cold forming is determined by the application and the type of component required. Through extrusion, drawing or coining, a blank can be made into a wide range of components, segments and assemblies.

Minimum waste

can provide to design and production engineers over traditional methods, one of the most obvious being the cost savings that can be realised by reducing wastage. As cold forming eliminates the need for machining and removing any metal from the blank, waste material is kept to a minimum. In fact, the cold forming process can reduce material waste by up to 80%.

With the general trend in the

and with such large amounts of metal usually required to produce high volumes of components, any reduction

impact on operating costs.

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Lower carbon footprint and quicker production

The obvious advantage of producing components at ambient temperatures

consumption, helping to reduce costs still further, as well as meeting carbon footprint targets. Consequently, components can be produced extremely quickly, cutting both costs and lead times by up to 70% and, therefore, eliminating the need to store high volumes of spare parts on site.

Production cycle times can be reduced still further on multi-station machinery, which is particularly useful for large production runs. These time saving

times faster than conventional methods, reducing production time.

Going with the grain

As well as the reduced energy consumption and greater output, cold forming also enables components to be manufactured to a higher standard than other processes. Unlike forging and machining where the part is cut away and the grain structure of the material being elongated is forced to follow the contours of the component. As a result, the strength of the part is maximised along its length, in the same way that a piece of wood is stronger with the grain.

Harder, smoother finish

In addition, during cold forming the part undergoes work hardening, improving its machinability and durability. Work hardening dislocates the structure of the metal, strengthening the component as a result. As this increase in strength is comparable to that of heat treating, it

a less costly and weaker material than to hot work a more expensive metal,

required. The outcome is a cold

stronger than a conventionally machined component.

ability to achieve a component with a

internally and on the surface. Extremely high accurate internal

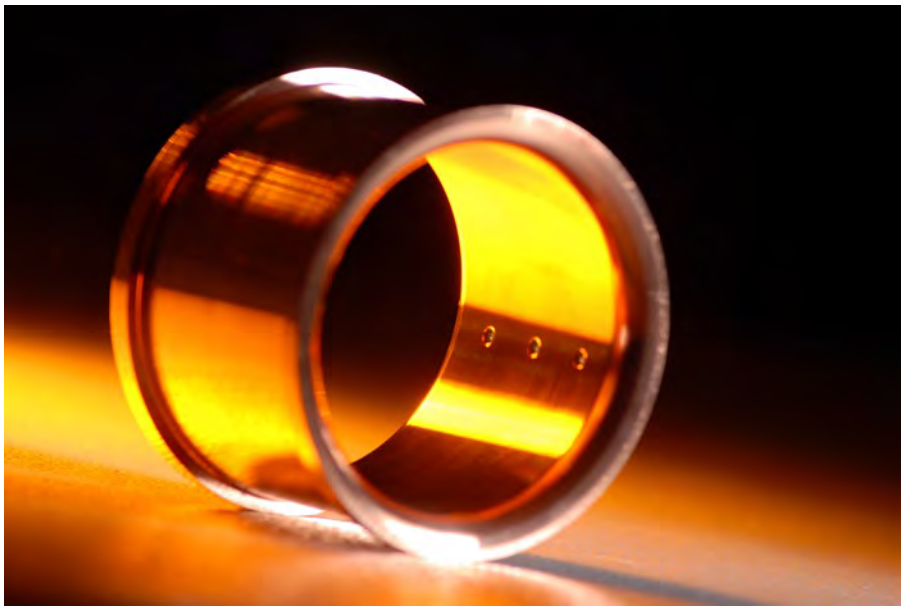
are now both possible, enabling precision parts to be manufactured

impact on the performance of the assemblies and machinery in which they are to be used. It is this aspect of cold forming that is particularly critical in applications for the medical and aerospace industries.

Revolutionary breakthrough

While the cold forming technique has been used with advanced engineering metals such as copper, aluminium and brass, the inherent strength of stronger stainless steel has been something of a stumbling block for the cold forming process. For engineers today though, an alternative to more conventional processes using cold forming techniques has been developed by cold forming specialists Italy Precision.

This latest innovative development now means that stainless steel, as well as other metals such as titanium, can be cold formed using a specialised metallic lubrication and extrusion coating, avoiding the need for hazardous chemical solutions. This unique shell, created by the research and development team at Italy Precision, eliminates the problem of galling. This prevents damage being caused to the components and tooling,



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which often presents itself in the form of scores or surface imperfections, thus maintaining consistent quality in all

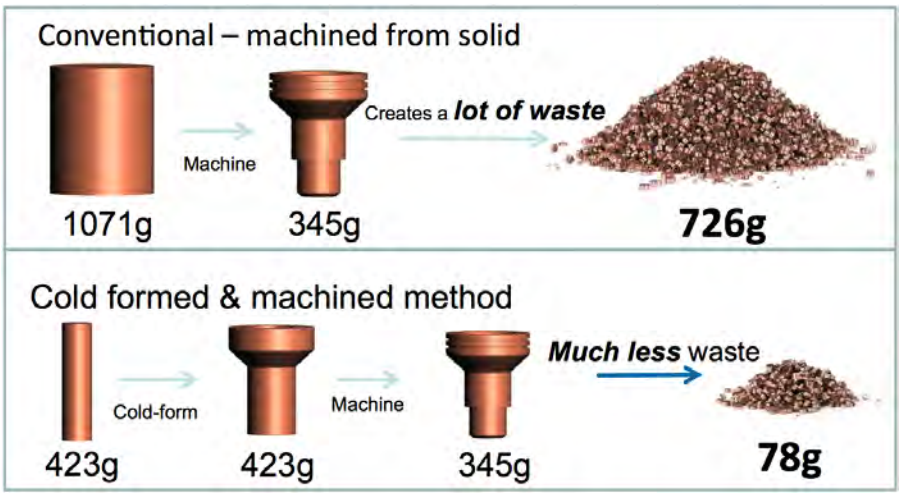
In fact, this new technique has been endorsed by independent laboratory test results, which show that this ground-breaking process retains all the mechanical properties of stainless steel

performance.

The advantages of this new process will

of industry requiring robust, ultra-high precision parts, including laser applications, where cold formed

accuracy, or in industrial engines where the parts are used to boost overall reliability, while cutting CO_2 and particulate emissions. Equally, other stainless steel components made through cold forming, such as diesel injectors for example, are generally more reliable especially when used with biofuels, as these fuels can place greater stresses on conventionally manufactured parts.



Meeting today's stringent standards With outstanding levels of accuracy , cold forming can produce extremely strong, lightweight components with superior surface

operation. This versatile and cost

also meeting the requirements for quality and precision set out in today's

parts display no surface scaling, which often appears with hot forming, better grain boundaries for added strength,

In addition to the increase in component quality, the cost savings for high volume production runs

The cold forming method is ideal for industries such as automotive, aerospace, and alternative energy, indeed, anywhere where high integrity parts are a must and reliability is critical.

With the need to conserve energy and materials for both economic and environmental reasons, an increasing number of manufacturers are adopting a more conscientious approach in their operations. Fortunately, cold forming now provides a more viable option as opposed to traditional methods through a more sustainable and responsible manufacturing approach.

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