

Reducing metal waste in engineering



**Dawson
Shanahan**
Precision Engineering & Cold Forming

High material costs for manufacturers of metal components are sometimes judged to be a fact of life to be endured but the truth is that there are now an increasing number of options available with which to cut costs and achieve a more efficient and sustainable manufacturing programme. You can't control the market cost of the metal you use, but you can apply production methods that allow you to use less of the same.

Cold forming

Cold forming is a manufacturing process by which metal is shaped without removing material. A simple blank (either sawn or cropped from a round bar or wire or as a cold headed pre-form) is placed within a die and a punch is pressed into the blank at ambient temperature. The blank then takes on the form of the punch and the die. Put more simply, cold-forming is making a shape from material at room temperature, just like Plasticine when it is pushed into a mould. With appropriate force, hard material such as copper, aluminium, brass and now even stainless steel can be formed to the required shape.



In cold forming, the metal is stretched beyond its yield strength, so that it takes on and retains the exact shape of the mould, but without adversely affecting its tensile strength.

Unlike conventional machining, where the material removal processes cut across the grain structure of each part, cold forming allows the grain structure of the material to follow the contours of the die or mould. As a result, the strength of the part is maximised along its length, while internal surfaces take on a highly polished finish.

This process can cut production costs without sacrificing the quality of components. Indeed, cold forming offers not only big material savings but also an enhanced surface finish and improved mechanical characteristics. And because it retains the integrity of the metal, while also producing parts with highly polished surfaces, the performance of a component can be improved dramatically.

Along with producing simple, high volume components, cold forming is now increasingly used to produce precision components in, for example, laser applications, where cold-formed

nozzles can increase cutting precision significantly. Thanks to cold forming, up to 80% material savings can be achieved, as well as time and costs saved that would otherwise have been incurred by machining.

Copper is perhaps the most commonly used material in cold forming and it is here that companies currently machining high volumes of components from tellurium copper (CuTe) rods or bars can derive the greatest benefits.

CuTe is ideal for machining, but techniques such as milling, grinding, turning and drilling all produce large volumes of waste. Market rates for scrap are often far lower than the initial stock or raw material price.

For example, a typical circular, hollow-shaped part used in a power generation or distribution unit, with a finished weight of 345g, you would typically require a solid section of rod weighing 1071g, from which around 68% of material is removed as waste.

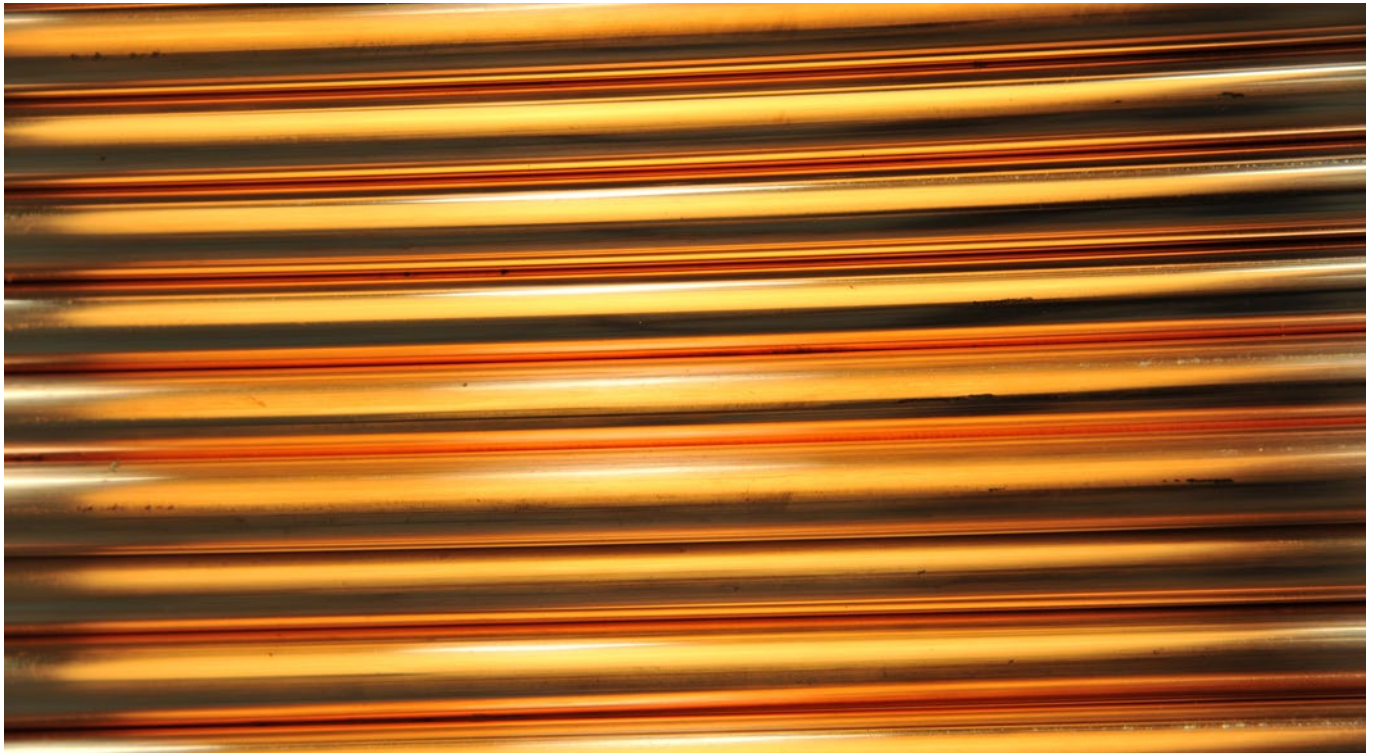
So why not adopt a process that minimises the need for recycling from the outset?



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New Developments

Because cold forming has proved increasingly popular, engineers have advanced the process so that now even stainless steel can be cold formed.

With growing demands from industry, combined with the need to reduce wastage rates and energy consumption for both economic and environmental

reasons, an increasing number of manufacturers are adopting the more efficient and cost-effective method of producing stainless steel components via cold forming.

This new development in cold forming looks set to revolutionise the way stainless steel components are manufactured in the future.

Swarf collection

Looking beyond cold forming, there are other relatively new methods of saving on costs that have recently gained attention. New systems that use vacuum pumps to automatically collect swarf from the machining process, for example, offer strong potential, and the bigger the company, the greater the possible saving.

Manufacturers can land themselves with tonnes of valuable metal using this method and if they can conduct recycling operations in-house without contracting out, the benefits are greater still.

Summary

So, those who are striving to maintain a profit margin in the face of high material costs, methods such as swarf collection and cold forming offer just two ways in which a major reduction in costs can be achieved by avoiding the waste of the precious metal they buy.

