Efficient engineering in automotive manufacturing

Technical article

Italy Precision CNC Machining Inc.

End users are constantly re-evaluating the most environmentally efficient ways of maintaining or replacing their vehicles. But when it comes to metal manufacturing there is great potential to alter the production process itself so that less waste is generated in the first place.

Sustainability, waste reduction and cost saving programmes are all, to one degree or another, being followed by companies in the automotive sector, from the major car manufacturers down through the supply chain.

Much of the focus is at the top end of this chain: on recycling, at end of vehicle life and during the production phase; energy savings in manufacturing; and, of course, fuel . What is often overlooked, however, are ways in which engineering component manufacturers at the base of the supply chain can make considerable savings in waste materials, process time and energy consumption by often simple changes to production processes or part design.

through such enhancements is good. While car sales in the UK have been

previously even been used as an indicator of our country's poor

economic situation during the downturn, 2013 began with news that car sales have hit a four year high. Some commentators have suggested that this may be because people who were not replacing their cars before but were maintaining them for a longer

repair costs often total more than the cost of a new car. Another suggestion

"free fuel for a year" have also contributed to the upturn. High-selling cars in 2012 were typically small,

vehicles, with the Fiesta, Focus and Corsa being the biggest selling cars of the year. But it is not just the smaller and more economical cars that are selling; Rolls Royce has also reported a

year sales.

So how do manufacturers tackle waste and boost sustainability? Rising commodity prices are posing problems for engineering companies who are

improve returns on investments, and the situation does not look likely to change in the coming months. At the close of 2012, The McKinsey Quarterly, a well-known business publication that focuses on management and organisational theory, observed that the rapid growth in emerging markets will continue to drive up commodity prices. However, McKinse constructive advice amid the gloom, stating that, "Although companies are

persist if not intensify, the way out by using resources more productively." In fact, McKinsey reckoned that there is still huge potential to make savings through reduced material consumption, claiming a 30% saving can be made by recycling and reuse.

Certainly, in the quest for ever greater sustainability, manufacturing companies must look at processes that e leaner manufacturing possible. As well as reducing costs, manufacturers need to achie

CO_2 emissions that are required. And if businesses aim high and make

simply meeting environmental legislation at a minimum level, they

McKinse emerging markets are having on commodity prices but there is also the issue that energy prices are likely to

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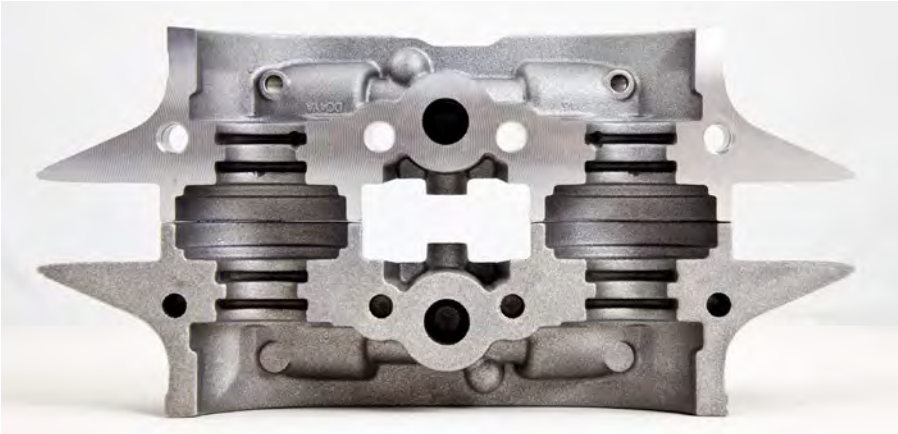

increase due to resource limitations. The steady rise in material costs is therefore a strong incentive for manufacturing and process companies to both control costs and demonstrate a real commitment to environmental protection.

An increasing number of options are now available for metal recycling and reuse that can cut costs and establish a

manufacturing programme. Swarf

strong potential, and the bigger the company, the greater the possible saving. Vacuum pumps can automatically collect swarf from the machining process, collecting hundreds of tonnes of swarf waste every year, with excellent results for the bottom line. Costs for introducing this process are soon recovered and some operations are conducting recycling operations in-house for an even more rapid ROI.

The words 'recycling' and 'reuse' are now a part of our everyday language and so there is a broad understanding that these must be applied to the business wherever possible. What is perhaps less familiar when it comes to metal manufacturing is that there is great potential to alter the manufacturing process itself so less

True, it is possible to collect swarf from the metal machining process and reuse

manufacture using the cold forming process, which uses a smaller initial blank and produces minimal waste because the blank is reformed like Plasticine rather than carved into shape by the machining process.

Cold forming, essentially the extrusion of a part from a blank, is an established and proven process for producing components in a wide range of materials, from Swedish iron, through to copper and brass, and stainless and steel. In the current climate, cold forming can be used to reduce scrap

and improved mechanical characteristics. It also enables component designers to incorporate features which would be extremely

using conventional machining techniques. Yet despite these impressive results, many engineers persist in using conventional material removal processes – typically milling and turning – and are unaware of how cold forming can improve and reduce product cost.

In part this is because they have become set in their ways, in part through ignorance, and in part through misunderstanding of what cold forming can achieve. However, with the pressing need to make manufacturing processes as lean as possible, it is time for design and production engineers to take a fresh look at this established but underused process.

During the machining process, a cutting tool chips away at a blank, and this can produce a staggering amount of waste. In the machining of parts for the aeronautical industry, this can result in the removal of 95% of the volume present in the original blank, leaving behind a machined part tooled from the remaining 5%. This is in stark contrast to the cold forming process, where the blank is placed into a press before die and a punch tooling is used to extrude the metal under extreme pressure. A small degree of machining

formed part but this pile of scrap is dwarfed by that created during the machining process.

The trend is towards a more responsible engineering industry, where the most celebrated technological developments are those that not only improve performance

sustainability. Processes such as cold forming enable manufacturers to reduce their own environmental

through reduced material consumption.

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