

ENGEL system solution for automotive supplier Hengst

PA replaces aluminium – the overall efficiency is compelling

The replacement of aluminium and other metals with plastics is progressing swiftly and this development also concerns components under the bonnet. But it is not just about lightweight construction, as the example of an oil filter module for four-cylinder diesel engines shows.

Hengst SE & Co. KG excels in both fields. As leading provider of fluid management modules, crankcase ventilation systems as well as filter technology for oil, fuel, air and cabin filtration the medium-sized enterprise based in Münster, Germany, is proficient in the use of different materials. At the Hengst plant in Nordwalde, aluminium and thermoplastic materials are processed using die casting and injection moulding, respectively. For every new product Hengst assesses which material brings the most benefits. "If forces and pressures allow the use of plastics, it is the preferred solution," says Christian Oldenburg, head of industrial engineering in Nordwalde. Ever lighter, smaller, and cleaner – those are the demands from automobile producers for modern engines. Integrated plastics solutions play a vital role in meeting these requirements despite the further increasing cost pressure.

The roughly 35 cm long, 30 cm wide and 30 cm deep oil filter module for longitudinal installation in four-cylinder diesel engines will be used in various Audi and Volkswagen models. It is among the most complex three-dimensional components Hengst is injection moulding. In December 2013 the production of the previous series started on a new ENGEL victory 500 injection moulding machine with integrated ENGEL viper 40 robot and also the component design had already been devised by Hengst. "Our customers indicate performance data and mounting dimensions. On this basis we develop the optimum solution," says Michael Oertker from the industrial engineering team. The biggest challenge with this component was to develop a very compact design despite the many cavities, junctions, and bore holes. Moreover, the component should ideally be manufactured in a single work step. "This high level of manufacturing efficiency would be unimaginable with an

aluminium die cast construction," stresses Oertker. "We would have needed several work steps and would have had to use cutting on some of the surfaces." The construction from glass fibre reinforced polyamide renders this unnecessary. All junctions are formed during injection moulding and threads are cut out with a core-pull.

Tie-bar-less technology keeps manufacturing cell compact

All in all the 1-cavity mould comprises eight core-pulls, which account for its considerable size. Since the mould fixing platens of the tie-bar-less ENGEL victory machines can be fully used up to the edge, the oil filter modules can be manufactured by a single 500-tonne machine. "Alternatives using tie bars start at 800 tonnes," says Michael Oertker.

The tie-bar-less design has advantages for automation as well. The robot arm can reach from one side directly into the mould cavity and thus reduces the working height. Hengst assumes that automation will become even more important in the future. "The parts we manufacture in-house are getting more and more complex. Automation is increasingly becoming an integrating part of the process," says Oertker. Because this requires a very intensive collaboration between plastics processor and system supplier, ENGEL also employs automation experts at its sales subsidiaries. "When removing the oil filter module, the gripper head in the mould needs to rotate," explains Christoph Hoelscher, sales engineer at the ENGEL Germany Hannover subsidiary. "On location at the subsidiary we can implement even special solutions like this in no time at all."

After the successful pre-series the production figures are increasing steeply. Planned are 300,000 filter modules a year. The cycle time is already being optimised, but there is not much room for improvement. The cycle time directly affects dimensional accuracy and surface quality and these factors are strictly limited for this component. The demands for the injection moulding machine are just as high. "When it comes to precision, tie-bar-less injection moulding machines are our first choice," says Christian Oldenburg. "In fact at first it is astonishing how this can even work with such a huge mould. We have looked into this very carefully and know that with tie-bar-less machines we can achieve the best possible platen parallelism even under full load. Now, we only produce rejects during start-up."

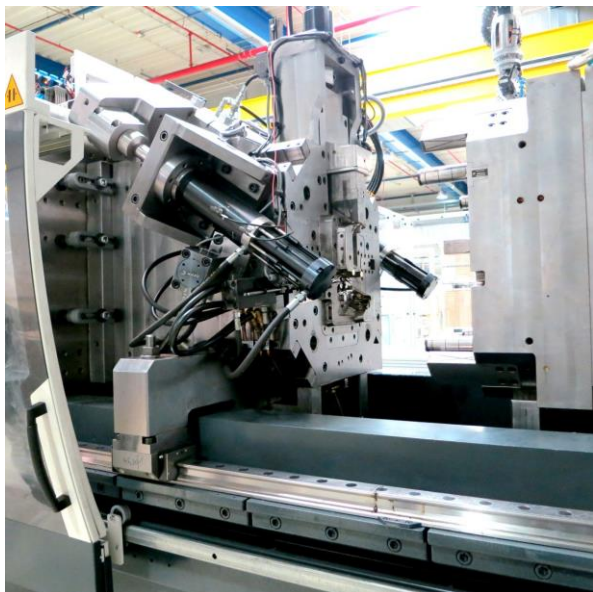
New machine design ensures clear arrangement and organisation

The Hengst machine park in Nordwalde comprises a large number of ENGEL injection moulding machines, including many machines of the ENGEL victory series. The ENGEL victory 500 is the first machine featuring the new design, which ENGEL introduced in late 2011 for the 500-tonne version of this machine type. The goal for this development was to make working even more ergonomic and comfortable.

"Thanks to the two-part safety gate, access to the mould for carrying out smaller interventions is a lot quicker," says Daniel Zimmermann, operating technician at Hengst. "And this doesn't even require strength." His fellow operating technician, Roman Gerber, also gives a positive account of the new design features, "We use the storage space and the clipboard a lot. Due to the many cooling circuits, examining the oil filter module mould resulted in a vast amount of information, which we were able to access directly via the machine control unit."



The oil filter modules for four-cylinder diesel engines – picture illustrates the version for transverse installation – are particularly complex three-dimensional components.



Tie-bar-less advantage optimally taken: The bulky mould is installed on a 500-tonne machine.



In its new design the ENGEL victory 500 injection moulding machine features a two-part safety gate.



Cooperative detecting of efficiencies: Daniel Zimmermann, Roman Gerber, Michael Oertker (Hengst), Christoph Hoelscher (ENGEL Deutschland), Christian Oldenburg (Hengst), and Franz Pressl (ENGEL AUSTRIA), from right to left.