

**Faurecia produces sophisticated black panels on ENGEL duo**

## **Against the flow for increased competitiveness**

**The vehicle interior of the future will make drivers feel even more at home and will fulfil the individual preferences of the vehicle owner. Operating elements will disappear under high-quality surfaces and control will be even more intuitive. The way to move forward – Faurecia is working intensively on this topic and is meeting the challenge of combining aesthetics and functionality with efficiency and cost effectiveness. The Peine plant near Hanover, for example, has focused on multi-component injection moulding processes. It is part of the Interiors division with a total of 81 production sites in 24 countries.**

The interior of the Audi Q8 is functional and at the same time elegant; it thus points the way to the future. "Audi is particularly design-oriented," says Jochen Klos, Injection Moulding Manager at Faurecia Innenraumsysteme GmbH, headquartered in Hagenbach, southwest Germany, describing an especially demanding customer. Six interior parts are produced for the SUV Coupé at the Peine production plant. The centre console clearly illustrates the high quality requirements. In order to be competitive, Faurecia, in collaboration with its injection moulding machine manufacturing partner ENGEL, developed a production process beyond the mainstream.

The Black Panel component parts are produced on an ENGEL duo 700 combi injection moulding machine with a rotary table in a three-component injection moulding process. PC-ABS is processed for the carrier structure as are two PC types, one of them transparent, because the letter P, which symbolises the "Parking" position in the switch display, is backlit. An articulated robot integrated into the production cell removes the parts from the mould and transfers them to quality control. Immediately after injection moulding production, the surfaces of the centre consoles are painted and the paint is precisely removed from the backlit P by laser engraving. The black high-gloss paint with a precisely defined matt content is a special development from Audi and a distinguishing feature for the automotive group.

The centre console of the Audi Q8 is a filigree frame structure which houses the on-board computer, the gearshift system and a storage compartment in the cockpit. Production is demanding not only because of the three materials, which are processed simultaneously in one work step, but above all because the high-gloss lacquer requires an absolutely flat substrate. "Audi uses a strip light to test the component parts," as Tobias Hüppe, the plant manager at the Peine site explains. "You can't fool the light. Even the finest weld lines or sink marks are detected and lead to rejects."

### **Supplying hot pressurised water at 180 °C via the rotary table**

"Polycarbonate is a particularly demanding material in terms of weld lines," as Jochen Klos confirms. In order to avoid visible weld lines, the Faurecia process developers opted for variothermal mould temperature control using pressurised water. However, sink marks caused by ribs and mounting elements on the B side of the carrier structure, with its thickness of just 2.5 mm, remained a challenge, as did washout in the transparent, backlit material, with the potential to impact light purity.

"These topics really caused us some headaches," as Klos reports. "Ultimately, we turned the conventional multi-component process on its head, so to speak," giving ENGEL, the mechanical engineering partner, a tricky task. "We had to route the entire media supply to the mobile mould mounting platen through the rotary table," says Jochen Wallmüller, Automotive Sales Manager at ENGEL's Schwertberg headquarters in Austria. What is already state-of-the-art with high-temperature cables for applications in the automotive lighting sector has taken on a new dimension with Faurecia. "This is the first time that we have also connected the pipes for variothermal mould temperature control, which transport 180 °C hot pressurised water, via the rotary table," says Wallmüller. ENGEL has developed a rotary feedthrough specifically adapted to these requirements in order to reliably control the high temperatures and load changes between heating and cooling in the tightest of spaces. "The difference to conventional rotary feedthroughs lies in the sealing system," explains Klaus Hof, sales engineer at ENGEL Deutschland, who worked particularly closely with the Faurecia team on process development. "ENGEL has supported us excellently in solving the new engineering challenges and it was thus also ENGEL's contribution that we were able to take this extraordinary process into series production," says Jochen Klos. "We are achieving a scrap rate of less

than 4 percent for three-component parts, which puts us ahead of the competition among black panel suppliers."

### **Automation will further enhance part quality**

Two other factors contribute to this success: the needle shut-off mechanism and automation. In order to process three very different shot weights – the smallest being just 1.1 grams – in a single step, not only the three injection units must be tailored precisely to their respective tasks, but special attention must also be paid to the needle shut-off mechanism in the mould. A decision was made in favour of FLEXflow by the Italian supplier HRSflow. The needle shut-off mechanism with servo drive enables the stroke, speed and acceleration of the individual needles to be controlled independently of each other. Slow and precise opening and closing of the needle valve nozzles also helps to reduce the risk of surface defects.

"Our goal is a fully automated process," says Tobias Hüppe, giving an outlook on the further development of the manufacturing process. Today, we already have an articulated robot removing the injection moulded parts from the mould and depositing them for visual quality inspection by an employee. The plan is to integrate a camera system and use AGVs (automated guided vehicles) to connect the injection moulding cell with the painting system and the laser processing station. As Jochen Klos clarifies: "From the injection moulding process to the final processing of the painted components and their packaging and delivery, nobody will have to handle the parts. Automation will enable us to further improve the surface quality and reduce the scrap rate."

Five ENGEL duo injection moulding machines with clamping forces of 7000 and 5000 kN are in operation at the Faurecia plant in Peine producing a wide variety of black panel components for the Audi Q8 and Audi Q3. Further duo machines have been ordered, as Faurecia is manufacturing an increasing volume of interior parts using multi-component technology. And the numbers of variants are continuing to grow, thus leading to increasingly frequent setup processes. To avoid this impacting on the cost effectiveness of the integrated manufacturing process, all the duo machines are equipped with magnetic rapid mould clamping systems as an enterprise standard.

## Homogeneous design – that's the way forward

ENGEL is a strategic supplier for Faurecia. "The TCO, the Total Cost of Ownership, is crucial here", as Klos emphasises. Faurecia's Procurement department evaluates all machines, equipment and technologies on the basis of a matrix, which in turn is based on a large number of different facts and figures. In terms of products and technologies, these include performance and quality. In terms of the supplier, a global presence, services and innovative strength are decisive. "And we definitely do not want over-engineering," completes Klos, adding an aspect that is personally important to him – second only to great innovative strength. "We do not want standard machines, but the opportunity to continuously expand our business. That is why ENGEL is the right partner for us. In the future, engineering expertise will be even more pivotal for our competitiveness than it is today."

Faurecia is systematically investigating which technologies will set the tone in the future. At the Méru location north of Paris, the automotive supplier has established its own competence centre, focusing on the "Cockpit of the future", which employs more than 50 product developers. Autonomous driving and electric mobility are fundamentally changing the passenger car. The new challenges for interior designers include increasing connectivity and the desire for an increasingly individual, customised environment. "Buttons and switches will disappear. Homogeneous design – that's the way forward," says Jochen Klos. For injection moulding processes, this means even more integration, for example, from electronic features through to complete TFT displays. "In the future, there will be fewer parts to be assembled and thus fewer of those gaps that still have to be covered with hides today. The design becomes even simpler," says Klos. And it's not only the aesthetes who will be happy about this. The positive side effects are, on the one hand, that reducing the number of parts reduces interior noise and, on the other, that the number of work steps will be reduced saving even more energy and raw materials.



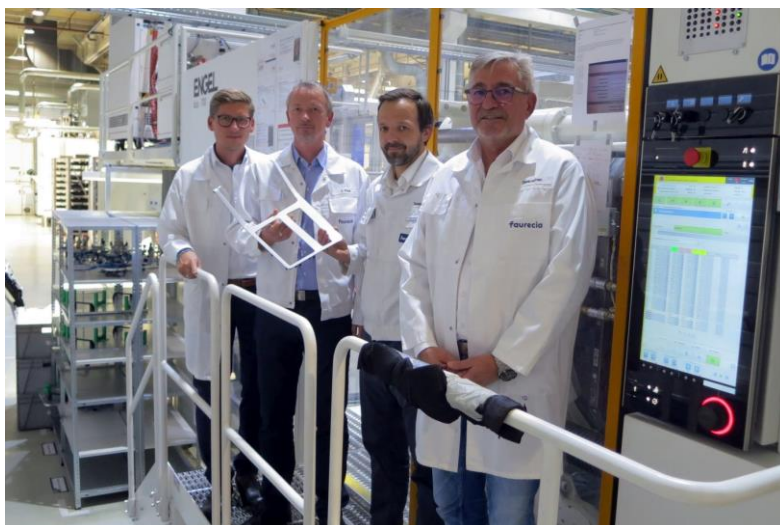
The design of the automotive interior is becoming more sleek. The Audi Q8 leads the way.  
(Picture: AUDI AG)



These centre consoles are made of PC-ABS and two PC grades in three-component injection moulding (left) and then high-gloss painted (right). The shift position P is backlit. For this purpose, the paint is partially removed with the aid of laser engraving.

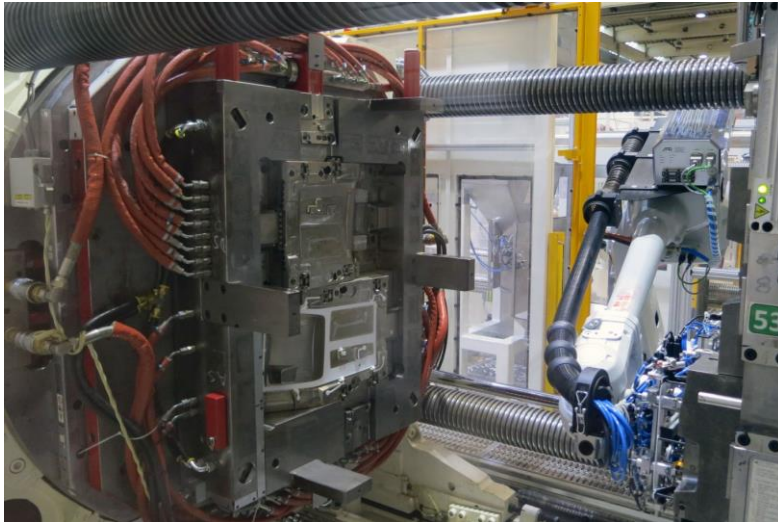


The multi-component process runs on a duo 700 combi injection moulding machine by ENGEL. The Faurecia plant in Peine currently produces various black panel components for the Audi Q8 and Q3 models on five duo machines.

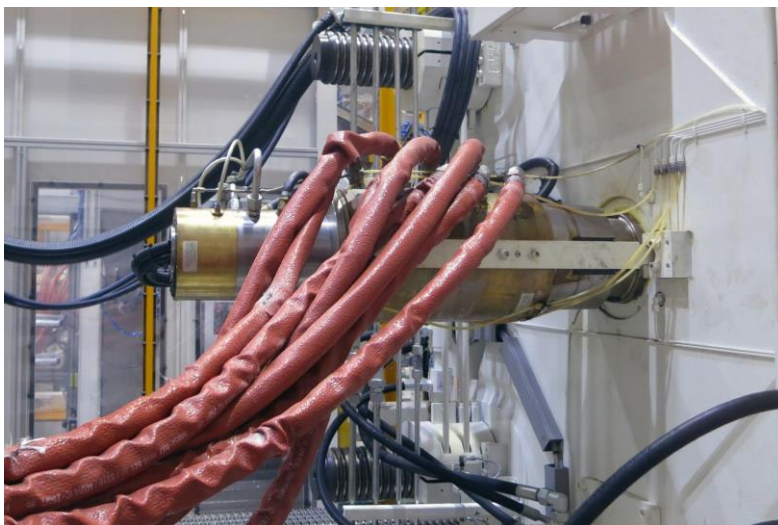


Taking new paths together to combine an excellent surface finish with high cost-effectiveness: Jochen Wallmüller from ENGEL AUSTRIA, Jochen Klos and Tobias Hüppe from Faurecia, and Klaus Hof from ENGEL Deutschland (from left to right).





The duo 700 machine is equipped with a rotary table for the three-component production of the centre consoles: an articulated robot removes the injection moulded parts.



ENGEL has developed a new rotary feedthrough for Faurecia to supply all media, including pressurised water, for variothermal mould temperature control via the moving platen and rotary table.



Black panel components place particularly high demands on surface quality. Aykut Bozdogan, a specialist in injection moulding of plastics, is responsible for production quality at the Faurecia plant in Peine.



As the number of variants increases, so does the number of setup processes. To keep these efficient, all duo machines are equipped with magnetic rapid clamping systems.

Pictures: ENGEL