

Continental Temic builds mechatronic control unit for double-clutch transmission using Ultradur®

Case Study

Conti Temic microelectronic GmbH, headquartered in Nuremberg, Germany - an international supplier of electronic chassis components for the automotive industry - employs Ultradur® (PBT) in the manufacture of the integrated control unit for its new double-clutch transmission. The transmission control unit is a sophisticated, compact mechatronic component installed directly on the gearbox, meaning that it is immersed in hot transmission oil. Two variants of this BASF plastic offer the requisite high-temperature and chemical resistance. This innovative automatic transmission – serially produced at VW for the first time in 2003 – has now found its way into the Golf, Touran, Passat, Jetta and the new Eos models.

The double-clutch transmission consists of two sub-gearboxes, each with its own clutch, that work together to shift the gears. The integrated electronic control unit that Temic developed for this transmission comprises 11 sensors and 11 actuators (e.g. valves) in one single component whose main function is to open one of the clutches and to close the other at the right moment. This results in smooth shifting without interruption of the tractive force. The electronic unit processes the sensor signals, measures the rpm's, the speed and the load on the transmission, ascertains the positions of the mechanical components and electromagnetically operates the valves and slides of the hydraulic gear mechanism.

Such highly integrated mechatronic parts are only possible with the use of high-performance engineering plastics: Only a material that can be freely shaped is able to protect the electronic components while combining actuation and sensor technology in an extremely small space and in a single part. The wiring is simplified, the number of cables and plugs is drastically reduced, and interfaces are rendered unnecessary, thus yielding a component that is small, lightweight and reliable.

Ultradur® fulfils a number of mechatronic functions in the control unit produced by Temic. The standard variant, B4300G6, containing 30 percent glass fibres, has all of the mechanical and chemical properties, for instance, dimensional stability, needed to withstand hot transmission oil. Semiconductor sensors secured in place with this plastic must not shift their position, even when exposed to high temperatures and oil. In contrast, type B4300K6, which is reinforced with glass beads, has to be highly isotropic, so that no oil can get into the structures. The Swoboda company located in Wiggensbach in the Allgäu region of Germany is in charge of the injection moulding of this plastic.

