

## Case Study

### First front end with aluminum hybrid technology and Durethan® BKV 30



Figure 1 Significant weight reduction proved decisive

The new Audi TT is the first car to have a front end manufactured as a plastic-aluminum composite structure. Before this, steel was always used as the metal component in front ends produced by hybrid technology. Manufacturing the component with aluminum results in a significant 15 percent weight saving compared to steel. The structural component consists of three sheets of aluminum that are molded around with glass fiber-reinforced Durethan® BKV 30 polyamide 6, a LANXESS product that is already well established in hybrid technology. The part is manufactured by systems supplier **Faurecia** at its plant in Ingolstadt, Germany, from where it is delivered direct to **Audi**.

The aluminum hybrid front end not only helps to lower fuel consumption, it also improves the vehicle's driving characteristics because the weight reduction is achieved in front of the front axle, stabilizing the front of the car.

As with all hybrid components, the design freedom offered by plastics enables many functions to be integrated into the front end of the new Audi TT.

Examples include the fixing points for the headlamps, hood latch and elements of the cooling circuit, screw bosses to fix the bumper holders, cable guides and a deeper bottom flange for underride protection in the event of a collision with pedestrians (lower leg impact).

LANXESS provided both Faurecia and Audi with comprehensive support during the development of the aluminum hybrid front end. The design team worked closely with Faurecia, for example, on optimizing the front end support to improve the car's NVH characteristics (noise, vibration and harshness) as requested by Audi. Furthermore, static calculations were carried out to improve the overall stiffness of the front of the car. Through rheological simulations, warpage was minimized and the optimum flow and mold-filling behavior of the polyamide melt established. In addition, experts from LANXESS helped define the most favorable processing parameters for starting up volume production.

LANXESS is working on the assumption that the aluminum-hybrid technology will become increasingly popular in vehicle construction. The weight of structural components can be significantly reduced with this method, lowering fuel consumption and CO<sub>2</sub> emissions as a result. Potential applications include B-cross members, roof frames and the reinforcement of instrument panels.

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