Semi-finished components

The ASF body comprises three semi-finished components: extruded sections, diecast components and aluminum panels. Audi engineers employ each of these components following the principle: “The right material in the right place for optimal function.”

Extruded sections are usually produced by pressing an aluminum blank through a die at great pressure with a ram. The die determines the outer shape; mandrels produce cavities. There are virtually no limits to the possible section geometries. The alloy is soft enough for shaping at around 450 degrees Celsius (842 degrees Fahrenheit).

The major advantage of extruded sections is their design flexibility. The side sills of the TT Coupé and the TT Roadster, for example, appear identical from the outside, but on the inside their topology has been optimized according to bionic principles. Their ribbing determines their rigidity, which is higher in the Roadster than in the Coupé to compensate for the absence of the roof. The extruded sections in the TT are made of advanced alloys developed by Audi. This further increases their rigidity and results in an even greater reduction in weight.

The profile and cross section of each extruded section has been optimized for its respective use. In the Audi A8, for example, the roof arch is shaped by means of hydroforming – the section is shaped by fluid forced into it at high pressure. Its cross section changes multiple times with smooth transitions over the 3.20-meter (10.50-ft) length.

The extremely durable vacuum diecast components are used wherever high forces are induced and there is a need for versatility and design freedom. The A-pillar node of the A8 is one such multifunctional component. It connects the longitudinal member, the windshield crossmember, the roof frame, the strut mount and the omega bracket in front of the footwell. Another particularly large part serves as the connection between the side sill and the rear longitudinal member. The ribbing on this part also follows bionic principles.

Aluminum diecast components used in car manufacturing are produced under reduced air pressure in a vacuum process. These components are characterized by extremely precise geometries, second-to-none quality and optimal utilization of space. The complex shapes are only possible with the use of intelligent design and computation programs covering the entire manufacturing process chain. The expertise that Audi has gained over many years

is brought fully to bear here.

The aluminum panels play a supporting role in the ASF structure. In the A8, Audi makes use of a new composite material. This fusion alloy alone saves 6.5 kilograms (14.33 lb) of weight. Fifteen fusion panels are used for the load-bearing parts of the structure – the center tunnel, the cross bracings in the floor, the windshield crossmember, and in the area under the rear seats.

The core layer of the novel material is made of an alloy with a tensile strength of more than 250 megapascals. It contains a copper component, which increases strength but slightly reduces its resistance to corrosion. A protective cover layer is therefore applied to both sides. Each of the cover layers represents approximately ten percent of the total thickness. The cover layer also helps to ensure that the panels can be shaped easily in a press with tight radii and sharp edges, despite the high-strength core.

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