PERFORMANCE PLASTICS PRESS RELEASE

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From team working to innovation: Joma-Polytec GmbH, Daimler AG and RadiciGroup Performance Plastics have been awarded for innovative use of plastics in the "Power Train" category

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The Society of Plastics Engineers (SPE), a well-known international professional association for the promotion of scientific and engineering knowledge relating to plastics, has awarded a joint project concerning two oil system components for trucks, carried out by Joma-Polytec GmbH, Daimler AG and RadiciGroup Performance Plastics.

The award, announced at "Automotive Award Night 2016" - held in Düsseldorf on 17 October 2016 before the official opening of the K Exhibition - recognized the best innovative projects relating to engineering polymer applications for the "*Power Train*" category.

Name of component

Valve body assembly + elbow

Function of the component

Valve body and elbow connecting the oil pump to the crankcase.

A non-return valve is incorporated into the valve body to prevent oil backflow and drainage from oil pipes into the crankcase at engine stop. This allows the oil pressure to rise more rapidly and immediately supply the bearing with oil when the engine is started.

Production processes

Standard injection moulding + fusible cores

Ultrasonic welding + hot plate welding of rivets

Description of innovation

The innovation consisted of new technical solutions using glass-fibre-filled polyamide as an alternative to metal.

The polymer, trade name Radilon® S RV350W 339 BK, is a heat-stabilized PA6-GF35, which provides high heat resistance at prolonged exposure to hot air and hot engine oil.

The proposed solution reduces the weight of the valve body and elbow by 0.256 kg.

The special valve design, which permits a central movement in the direction of the oil flow, will have a very low pressure drop in comparison to the existing valve. The innovation in both the design and material contributes to a reduction in fuel consumption.

The valve body consists of two parts assembled by rivets welded using the hot plate welding technique and is designed to withstand very high pressure on a cold start of the engine and pulsating pressure cycles.

The shape of the plastic rivets was designed to ensure the highest resistance.

Elbow geometry was also optimized to withstand high stress and aid oil flow. This was achieved through the use of the “lost core” technology, which also led to a reduction in pressure loss and a weld-free component with very high resistance to both burst and pulsating pressure.

In cooperation with the RadiciGroup Performance Materials Business Area, FEM simulations of the elbow and valve body shapes were carried out taking into account the glass fibre orientation. The FEM analysis and the application of advanced calculus methods to virtually simulate the behaviour of the parts subject to stress was made possible by a complete characterization of the Radilon® S RV350W 339 BK material.

The components were designed to withstand 1.2 million km of travelling, which roughly corresponds to 15,000 hours of exposure to high temperatures (130°C) in contact with air and engine oil under the influence of pulsating pressure (10 million cycles).

Several iterations were required to optimize the shape of the part. However, virtual simulation helped to speed up the realization of the final mould.

Furthermore, the use of high-precision tools and equipment, as well as state-of-the-art injection processes and assembly, ensured a very high qualitative level in component production.

JOMA-POLYTEC GmbH offers a wide range of products for demanding problem solving in plastics, extrusion and hydromechanical pump technology. The strategic product orientation ranges from structural components (metal replacement), innovative insulation strips, to core melting solutions.

RADICIGROUP PERFORMANCE PLASTICS is a leading worldwide producer of a broad range of engineering plastics and copolymers: polyamide (RADILON® - RADISTRONG® - RADIFLAM® - HERAMID®), PBT (RADITER®), TPE (HERAFLEX®) and POM (HERAFORM®). These recognized brands stand for technical performance, reliability and sustainability. A global network of production and sales sites, in Italy and the rest of Europe, North America, South America and Asia, allows RadiciGroup Performance Plastics to supply its customers with products and services that are the result of its long experience and exceptional know-how gained in the polyamide business. All products are developed to best respond to the needs of markets such as automotive, electrical/electronics, household appliances and industrial, the main fields of application of RadiciGroup engineering plastics.

RADICIGROUP - With 2,985 employees, sales revenue of EUR 1,011 million, and a network of production and sales sites located in Europe, North America, South America and Asia, RadiciGroup is one of the world's leading producers of a wide range of chemical intermediates, polyamide polymers, engineering plastics, synthetic fibres and nonwovens. These products are the result of the Group's outstanding chemical know-how and are used in a variety of industrial sectors such as: AUTOMOTIVE – ELECTRICAL AND ELECTRONICS – CONSUMER GOODS – APPAREL – FURNISHINGS – CONSTRUCTION – HOUSEHOLD APPLIANCES – SPORT. With its business areas - **Specialty Chemicals, Performance Plastics and Synthetic Fibres & Nonwovens** (Performance Yarn, Comfort Fibres and Extrusion Yarn), RadiciGroup is part of a larger industrial group that also includes textile machinery (ITEMA), energy (GEOGREEN) and hotel (SAN MARCO) businesses.

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