

Polimotor 2 Chooses Solvay's High-Performance KetaSpire® PEEK for 3D-Printed Fuel Intake Runner

Fabricated by Solvay collaborator Arevo Labs, the Polimotor 2 engine component is the first successful application of 3D-printing with PEEK polymer

ALPHARETTA, Ga., Dec. 3, 2015 – Solvay Specialty Polymers, a leading global supplier of high-performance polymers, announced today that the Polimotor 2 project, led by legendary automotive innovator Matti Holtzberg, will feature a 3D-printed fuel intake runner fabricated from a reinforced grade of Solvay's KetaSpire® polyetheretherketone (PEEK). Arevo Labs, a leader in additive manufacturing technology for composite parts, produced the part using its innovative Reinforced Filament Fusion technology. Solvay is the principal material sponsor for this highly anticipated technical project, which aims to design and manufacture a next-generation, all-plastic engine for competitive racing in 2016.

"The intake runners in the original Polimotor engine were made from aluminum, but today the automotive industry relies almost entirely on injection-molded nylon," said Holtzberg, who is also president of Composite Castings, LLC, based in West Palm Beach, Fla. "That choice of materials is changing now too, as automakers seek innovative new alternatives like Solvay's PEEK that can withstand rising under-the-hood temperatures caused by the growing use of turbochargers and engine downsizing, both of which are resulting in higher specific power outputs."

Appearing in both racing and production-scale cars, intake runners are typically integrated with an engine's plenum, which is the pressurized chamber that uniformly distributes air flow between an engine's air inlet and its cylinders. A transition piece between the cylinder head and the plenum chamber, an intake's function is to inject fuel into the air stream just as it enters the engine and its performance has a direct influence on the engine's horsepower.

Replacement of the original aluminum runner with PEEK reduced the part's weight by 50 percent. The specific material chosen for Polimotor 2 was a custom-formulated grade of KetaSpire® KT-820 PEEK reinforced by a 10 percent carbon fiber loading. One of Solvay's highest performing polymers, KetaSpire® PEEK offers excellent chemical resistance to automotive fuels as well as reliable mechanical performance at continuous-use temperatures up to 240 °C (464 °F). These qualities made it a highly suitable candidate for Polimotor 2's fuel intake runner, which encounters temperatures reaching 150 °C (302 °F) near the pistons in the intake port.

Like conventional filament fusion 3D printing processes, Arevo's technology bonds polymer filaments on top of or alongside each other in successive stages to ultimately form complex shapes. Thus it can quickly convert digital designs into functional parts without the time or cost required to first build a molding tool and prototype. However, the company's Reinforced Filament Fusion platform offers the unique ability to print with reinforced PEEK polymers. When combined with Arevo's process control software, the platform can help optimize the mechanical properties of printed parts.

“The convergence of 3D printing with Solvay’s PEEK polymer technology in this application underscores how truly cutting-edge the Polimotor 2 project is,” said Brian Baleno, global automotive business manager for Solvay Specialty Polymers. “Neither of these technologies existed in the '80s when Matti Holtzberg developed the first Polimotor engine; and now, with this runner, we see one of the very first carbon fiber-filled PEEK parts to be fabricated with the additive manufacturing process. That signals a whole new range of possibilities for automakers seeking lighter, but high-performing alternatives to metal.”

The Polimotor 2 project aims to develop an all-plastic, four-cylinder, double-overhead CAM engine that weighs between 138 to 148 lbs (63-67 kg), or about 90 lbs (41 kgs) less than today’s standard production engine. In addition to the current fuel intake runner application, Holtzberg’s groundbreaking program will leverage Solvay’s advanced polymer technology to develop up to ten engine parts. These include a water pump, oil pump, water inlet/outlet, throttle body, fuel rail and other high-performance components. Solvay materials targeted for use encompass Amodel® polyphthalamide (PPA), AvaSpire® polyaryletherketone (PAEK), Radel® polyphenylsulfone (PPSU), Ryton® polyphenylene sulfide (PPS), Torlon® polyamide-imide (PAI), and Tecnoflon® VPL fluoroelastomers.

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About Arevo Labs

Arevo Labs, based in Silicon Valley, California, develops technology to enable direct digital additive manufacturing of ultra-strong composite parts for end use applications. Arevo’s technology consists of advanced composite materials, deposition technology and software algorithms to optimize mechanical properties of printed parts. Arevo offers additive manufacturing services, additive software and composite materials to OEMs worldwide. For more information, visit www.arevolabs.com.

About Solvay Specialty Polymers

Solvay Specialty Polymers manufactures over 1500 products across 35 brands of high-performance polymers – fluoropolymers, fluoroelastomers, fluorinated fluids, semi-aromatic polyamides, sulfone polymers, aromatic ultra-high performance polymers, high-barrier polymers and cross-linked high-performance compounds – for use in Aerospace, Alternative Energy, Automotive, Healthcare, Membranes, Oil and Gas, Packaging, Plumbing, Semiconductors, Wire & Cable, and other industries. Learn more at www.solvayspecialtypolymers.com.

As an international chemical group, **SOLVAY** assists industries in finding and implementing ever more responsible and value-creating solutions. Solvay generates 90% of its net sales in activities where it is among the world's top three players. It serves many markets, varying from energy and the environment to automotive and aeronautics or electricity and electronics, with one goal: to raise the performance of its clients and improve society's quality of life. The group is headquartered in Brussels, employs about 26,000 people in 52 countries and generated 10.2 billion euros in net sales in 2014. Solvay SA (**SOLB.BE**) is listed on **NYSE EURONEXT** in Brussels and Paris (Bloomberg: **SOLB:BB** - Reuters: **SOLB.BR**).

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The Polimotor 2 project will feature a 3D-printed fuel intake runner fabricated from a reinforced grade of Solvay's KetaSpire[®] polyetheretherketone (PEEK). The part, produced by Arevo Labs, signals one of the first successful uses of additive manufacturing methods with PEEK polymer. Solvay is the principal material sponsor for the Polimotor 2 project, which aims to design and manufacture a next-generation, all-plastic engine for competitive racing in 2016. Photo courtesy of Solvay Specialty Polymers.