Press Release

Solvay Specialty Polymers' Torlon® PAI Chosen for Breakthrough Cam Sprocket in Polimotor 2 Automotive Project

New sprocket fabricated from Torlon® PAI replaces conventional metal to help Polimotor 2 designers reduce weight, decrease noise and vibration and extend timing belt life

ALPHARETTA, Ga., Oct. 26, 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, selected its high-performance Torlon® polyamide-imide (PAI) to replace conventional metal in the fabrication of an innovative cam sprocket design. 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.

"Solvay's Torlon® PAI played a vital role in the success of our first Polimotor engine during the early 1980s; and the breadth, performance and versatility of the company's materials technology has definitely expanded since then," said Holtzberg, who is also president of Composite Castings, LLC, based in West Palm Beach, Fla. "Solvay's continuing advances offer the basis for even greater innovation in Polimotor 2 today, where its carbon-fiber filled Torlon® PAI enabled development of a mechanically strong, but extremely lightweight cam shaft sprocket. This is only the first of several new breakthrough applications using Solvay's advanced materials technology that we expect to announce in the coming months."

Allegheny Performance Plastics, LLC, a leading processor of high-performance thermoplastics, injection molded the net shape. Gates Corp., a premier manufacturer of power transmission belts and a premier global maker of fluid power products, performed final machining to incorporate a spur tooth design that reduces wear and optimizes transfer of transmission torque between the sprocket and the belt. Ultimately, the Polimotor 2 engine will incorporate two 4-in (102-mm) diameter sprockets, and one 2-in (51-mm) diameter sprocket in its valve train drive system.

Cam sprockets are attached to one end of the cam shaft in an automotive combustion engine and, along with the timing belt, help maintain timing between the cam shaft and crankshaft. Despite constant exposure to high torque, extreme temperatures and vibration, as well as dirt, automotive fluids and road salt, cam sprockets must reliably deliver precise timing control to maintain optimal engine performance. If these sprockets overheat, chip, lose their shape or fail to perform reliably under load, everything from the crank to the pistons can quickly cease to work properly.

Cam sprockets are typically made from sintered steel, aluminum or occasionally thermoset phenolic polymers. However, Polimotor 2 opted to mold its engine's spur tooth cam sprockets using Solvay's 30 percent carbon fiber-reinforced Torlon® 7130 PAI – an ultra-high performance grade launched by Solvay long after Polimotor's earlier iteration during the 1980s.

As a class of materials, Solvay's Torlon® PAI delivers the highest strength, stiffness and fatigue resistance of any thermoplastic technology up to 525° F (275° C). Torlon® 7130 PAI, in particular, delivers the portfolio's most optimal balance of these mechanical properties, with a specific strength of 5.4 x 10^5 in-lbf/lb (1.4 10^5 J/kg) and specific stiffness 6 x 10^7 in-lbf/lb (15 10^6 J/kg). Stainless steel, in contrast, delivers specific strength and stiffness of 3.1 x 10^7 in-lbf/lb (0.8 10^6 J/kg), and 9.7 x 10^7 in-lbf/lb (24 10^6 J/kg), respectively.

In practical terms, this allows the Polimotor 2 cam sprocket fabricated from Torlon® 7130 PAI to deliver comparable mechanical properties with a 75 percent weight reduction over a similarly sized stainless steel cam sprocket that weighs 2.4-lb (1.1 kg).

Unlike metals, Torlon® 7130 PAI does not conduct heat, helping to promote longer belt life. It also eliminates potential chipping of the sprocket, which can be a concern when using phenolic materials because they are more brittle. Lastly, Solvay's high-performance PAI delivers excellent fatigue resistance and outstanding wear performance at elevated pressures and velocities, thereby decreasing noise and vibration, and offers broad chemical resistance to automotive fluids.

"The innovative selection of high-strength, lightweight, fatigue-resistant Torlon® PAI over traditional sintered steel or aluminum was critical to our ability to develop a new, state-of-the art valve train drive system for Polimotor 2," said Fraser Lacy, senior engineering specialist for Gates Corp.

Torlon® PAI and other Solvay high-performance polymers are seeing strong adoption as a metal replacement option in automotive engines as OEMs move to downsize and downspeed them. Solvay's advanced polymers offer higher efficiency through reduction of weight to enable OEMs to comply with tougher corporate average fuel economy (CAFÉ) regulations and stricter CO_2 emission standards, both of which are considered top priorities for the automotive industry over the next decade.

"One of the highest performing polymers in Solvay's automotive portfolio, Torlon® PAI has a proven track record of success in commercial automatic transmissions and dual-clutch transmissions, where higher pressure and velocities require higher temperature materials with excellent strength, stiffness and fatigue resistance," said Brian Baleno, global automotive business manager for Solvay Specialty Polymers. "One notable area is metal replacement for needle bearings where Torlon® PAI saves both weight and space, allowing transmissions to be smaller than comparable aluminum castings, which helps reduce CO_2 emissions and lower cost."

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 cam sprocket 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), KetaSpire® polyetheretherketone (PEEK), AvaSpire® polyaryletherketone (PAEK), Radel® polyphenylsulfone (PPSU), Ryton® polyphenylene sulfide (PPS) and Tecnoflon® VPL fluoroelastomers.

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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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