



Press Information

Sandvik introduces new Pressurflect™ tubing for gasoline direct injection (GDI) to global automotive industry

New tube enables the ultimate safe combustion in high-pressure fuel systems

Sandvik, the high-technology engineering and advanced materials group, is introducing a new type of seamless stainless steel tube called Pressurflect™ to meet growing demands from carmakers to handle higher fuel pressures in tomorrow's gasoline direct injection (GDI) engines.

The new tube will be made available in two grades: standard Pressurflect™, an austenitic chromium-nickel steel for fuel rails and fuel lines; and Pressurflect™ XP, a duplex (austenitic ferritic) stainless steel for demanding fuel rail applications.

Enabling next-generation GDI engines

As the automotive industry seeks out different paths towards "sustainable mobility," GDI is proving to be one attractive alternative. The technology enables carmakers to produce more compact engines with lower emissions and sustained power – in an engine that is affordable for mass production. Examples of the new wave of ultra-efficient GDI engines include Ford's Ecoboost™, GM's Ecotec and Hyundai's Theta Engines. And while other manufacturers continue to roll out hybrid series, these still represent just 10% of the companies' global sales.

Towards cleaner power

In the meantime – faced with tougher emissions regulations in Europe, the US and China – carmakers are looking for better ways to get "clean power" from smaller combustion engines. China, in particular, has recently specified GDI as one of the power-train technologies of the future. And at least 500,000+ GDI-powered vehicles are currently on the road, many using Sandvik stainless tube. Now, the race is on to find the ultimate combustion, a process that often involves raising pressure in the fuel management system and thus requiring stronger and lighter tubing.

Stronger and lighter

"Our starting point in developing Pressurflect™ was to offer automotive companies and their suppliers a seamless stainless tube for GDI fuel systems that was capable of handling the rising fuel pressures of the future," says **Jari Ponsiluoma**, Sandvik global product manager on the Pressurflect™ project. "Many expressed a need for a stronger, safer and lighter material for tomorrow's GDI systems.

Combating corrosive ethanol

The growing use of corrosive ethanol blends at higher pressure in the fuel systems is another driver behind Sandvik's quest to develop superior materials for the engine-makers. According to the company, the goal was to develop a strong, corrosion-resistant material that could handle higher pressures with zero risk of stress corrosion cracking.

70 years in the automotive industry

According to **Jari Ponsiluoma**, Sandvik has a 70-year legacy of providing advanced materials and cutting tools to clients like Mercedes, Ford, BMW, GM and Toyota. "You'll find our high-quality stainless solutions in everything from airbags and brake components to engines," he says. Tools from Sandvik Coromant, the tooling division, are also used by a wide range of automotive companies to manufacture cylinder blocks, cylinder heads, pistons and more.

The two stainless tube grades being offered are:

- **Pressurfect™ – for GDI fuel rails and fuel lines**

The new Pressurfect™ offers favorable mechanical strength and consistent quality that is far superior to conventional welded or carbon steel tube. This is largely due to the steel's microstructure and low carbon content, which have been optimized to avoid jeopardizing properties like corrosion resistance and mechanical strength. Explains Ponsiluoma: "Simply stated, we've reduced non-metallic inclusions and optimized the chemical composition, process and production parameters." The material has also been optimized for machinability, including drilling, turning and other tasks.

- **Pressurfect™ XP – duplex tube for GDI fuel rails**

Pressurfect™ XP is a lightweight duplex stainless tube for GDI fuel systems. The material's superior mechanical strength enables the tube walls to be 30-40% thinner, while still handling the same pressure as thicker tubes. The duplex material has also been optimized to reduce stress corrosion cracking and fatigue. In addition, it improves the brazing process, with little pre-heating or retouch required when mounting the injector ports or other fuel systems.

Meeting an unmet and growing need

As the market for GDI engines continues to grow, Sandvik says it feels there is strong potential to grow orders in this area. "I think we're just seeing the beginning of the use of higher pressure GDI fuel systems," says Ponsiluoma, who has witnessed a doubling in pressure needs every year for the past few years. "Carmakers are looking for ways to take risk off the table and ensure highly efficient performance in lighter weight engines."

Sandvik Materials Technology

Sandvik Materials Technology is a world-leading developer and manufacturer of products in advanced stainless steels and special alloys for the most demanding environments, as well as products and systems for industrial heating.

For further information on Sandvik Materials Technology visit the website:

<http://www.smt.sandvik.com>