PUMPING UP SCR MODULES, FUEL CELLS

New emissions systems present fresh opportunities for Thomas Magnete's liquid dosing technologies

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While oftentimes technical challenges require all-new, out-of-the-box solutions, just as often, tweaking an existing technology can provide just the capability needed for another. When that occurs, manufacturers can find them-selves with entirely new business opportunities.

Such has been the case for Thomas, the Herdorf, Germany, designer and manufacturer of actuators, metering pumps and other solenoid-driven actuators and valves for a variety of markets, including the automotive, off-highway, marine and construction industries.
For almost three decades, Thomas has supplied a range of fluid handling and dosing systems for mobile equipment and vehicles. They have been used for such applications as fuel-fired heating systems used in commercial vehicles and automobiles. Based on specialized piston and diaphragm pump designs, the company's dosing technology has evolved to the point where it could be used to measure and deliver nearly any kind of liquid medium.
Most recently, emissions-related technologies have provided new opportunities for the company's products. Thomas has begun sup-plying dosing modules for selective catalytic reduction (SCR) systems used in mobile and stationary engine applications.

One of the keys factors in SCR's ability to reduce NOx in diesel engine exhaust involves the precise metering of a liquid urea reductant — known as AdBlue in Europe and diesel exhaust fluid (DEF) in North America — into the exhaust stream. In 2008, the company launched the P700 diaphragm pump designed for pumping AdBlue in multitank systems. Now the company has released its second-generation unit, the P800 diaphragm pump.

The second-generation Thomas dosing units are based on a hydraulically driven diaphragm pump. In operation, an electromagnetically driven piston pump generates a hydraulic pulse that displaces a defined volume of fluid. That volume deflects an integral diaphragm, which injects the metered amount of AdBlue into the exhaust through an injector nozzle.
The volume flow is variable, depending on engine status and the amount of NOx reduction required at different operating conditions.

Internal check valves provide directional control of liquid flow and an internal pressure limiter prevents pump overloading in the event of any system malfunction.

The pump's solenoid actuator, which generates the hydraulic pulse, is separated from the additive by the diaphragm, so that only the surfaces in direct contact with the AdBlue are constructed of resistant plastics and stainless steel, said Christer Fjellgren, president of Thomas USA, Milwaukee, Wis.

The pump's housing is engineered to be robust, offering protection against contamination and allowing it to be mounted at or near the vehicle chassis. In addition, the radial sealing concept of the hydraulic connections reliably prevents leaks even at high pressures and protects the sealing surfaces from damage, Thomas said.

That durability is especially important when it comes to nonroad applications, where SCR is already being applied by several engine and equipment manufacturers and is generally seen as a key technology to meet Tier 4 final standards that loom in the coming years.

While SCR dosing modules are part of today's business for Thomas, the company has also looked even farther down the emissions road and has identified fuel cells as a promising application area. In auxiliary power units (APUs) using fuel cells, liquid hydrocarbons have to be converted into a gas mixture containing hydrogen. This conversion is performed by means of a reformer. Trucks, marine vessels and aircraft that often use such APUs, typically rely on liquid fuels such as diesel fuel or kerosene. These fuels could use reformers to yield the needed hydrogen for the fuel cell, but the reformer technology must be as lightweight and compact as possible.

Thomas said its compact dosing units are suitable for delivering different fuels to the reformer of stationary or mobile fuel cell applications in a very precise manner. The company said its research has shown that the systems can provide a deviation from mean flow targets of well below 1%, while still offering a robust integrated solution. By means of a P320 piston pump, the fuel delivery is guaranteed over the lifetime of the fuel cell, the company said.