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Dialog of the DEF

DIESEL EXHAUST FLUID IS GREAT FOR REDUCING NO_x, BUT THE VALVES THAT REGULATE FLOW TO THE HEATING ELEMENT CAN OFTEN BECOME UNRESPONSIVE. THIS SOLENOID-POWERED GATE VALVE SHOULD ENSURE A LONG AND PRODUCTIVE INTERACTION

▶ Selective catalytic reduction (SCR) systems using diesel exhaust fluid (DEF) are now an established method for control of NO_x emissions in diesel engines. However, because DEF systems have a freezing point of -11°C (12°F), on occasion engine coolant must be circulated to the reservoir to thaw the fluid. Most systems have adopted poppet, diaphragm or spool valves to regulate flow to the DEF heating element; however, these valves are susceptible to contamination and do not perform well when a low pressure drop is required.

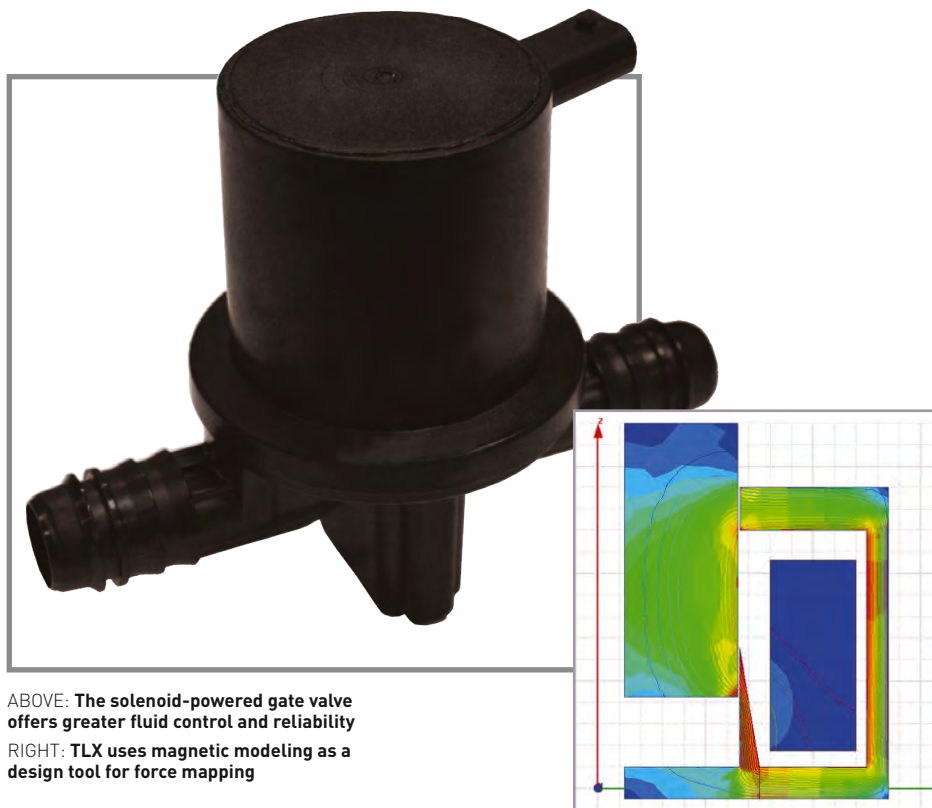
Superior operation of a diesel engine fluid coolant system can be achieved using a solenoid-powered gate valve, where the automated or 'commanded' valve responds to a signal from electronic controls. The coolant valve has a sprung gate assembled with elastic materials to reduce friction forces as the gate moves from open to closed. The sprung gate contains a continuous elastic band assembled with two gate members. There is an interference fit within the gate that provides a complete seal. The elastic quality of the gate allows system pressure to provide the sealing force needed in a closed position.

Alignment of the armature of the solenoid to the valve body is made through a mechanical rail system. This mechanical coupling to the armature reduces the chance of binding whenever the alignment of the armature, coil and stem is not perfectly concentric. The mechanical coupling can be accomplished in a variety of orientations, making it easy to set the valve either normally open or normally closed.

Unique designs

TLX Technologies is a leader in the manufacture of quick-response, high-force custom solenoids, offering patented features and unique expertise to deliver effective solutions for tough automotive and off-highway applications. It has now patented technology for a solenoid-powered gate valve that greatly improves performance in a variety of applications.

The technology provides a continuous membrane gate valve with high contamination resistance and greater reliability in real-world applications with less than perfect alignment. Availability of multiple control methods means this new technology can replace poppet, diaphragm and spool valves, and provide superior reliability and flow control.



ABOVE: The solenoid-powered gate valve offers greater fluid control and reliability

RIGHT: TLX uses magnetic modeling as a design tool for force mapping

But the technology of this solenoid-powered gate valve has applications beyond SCR diesel systems. The solenoid valve can be driven by direct voltage, PWM, and peak and hold electric systems. The peak and hold signal will supply high force with smaller package sizes and lower heat generation. The smaller package size can be critical in engine applications, opening up the possibility for flow control where previous solutions would not fit.

The gate valve can be operated on a proportional control basis, rather than normally open or normally closed, with a PWM signal. With proportional control, the gate valve can replace diaphragm valves in most applications. The gate valve will never need a pilot valve or line for operation. This simplifies the design of valves traditionally used in water and oil pump applications. Removing pilot lines reduces complexity of valve bodies, which makes them less expensive to

manufacture and increases reliability. The elastic gate reduces friction, helping to reduce the force needed to operate the valve. Using a solenoid to actuate the gate provides a quicker response time in a smaller package than any motorized gate valve.

Selecting the correct elastic material for the gate valve allows it to be used in most off-highway and automotive fluid systems. With proper material selection, life expectancy of the gate valve will meet or exceed off-highway and automotive requirements in water, oil or air systems. Off-highway applications will particularly benefit from this high resistance to contamination. Overall the benefits of this new technology will provide better flow control in a variety of off-highway applications. **ivt**

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