Customer Success Story:
Alstom Ferroviaria SpA

Market Served
Transportation

Eaton high pressure filters on board high speed trains

Location:
Savigliano, Italy

Segment:
High-Speed Rail

Challenge:
Create a smooth ride for railroad passengers traveling across Europe at high speeds.

Solution:
Eaton designed a hydraulic and filtration system that would bring much-needed order to each railcars undercarriage.

Results:
Increased protection of hydraulic components resulting in efficient operation of the train's hydraulic system in a harsh environment.

"These filters will help ensure a long component life for the system. They are an integral part of the whole system."

Walter Facchinelli,
Sales Manager, Eaton

Background

Operating trains at high speeds before the 1980s called for a costly investment in tracks with high-curve radii and moderate relief. Wanting to avoid the need for infrastructure investment, Alstom engineers came up with the tilting technology as a way to use existing track, while improving speed and passenger comfort and reducing travel time.

The technology enables trains to be tilted up to a maximum of 8 degrees on bends, making increased speeds and a smooth ride possible.

Since 1991, Alstom Ferroviaria SpA of Savigliano, Italy, has been relying on products from Eaton's Filtration and Hydraulics operations to supply the muscle for its high-speed tilting trains.

Blazing between cities at speeds up to 160 mph, the Alstom trains feature an empowering lineup of Eaton products. On board each railcar is an Eaton power unit; servo valve, screw-in cartridge and directional valves; piston pump; hose and threadless connectors; and several filtration products.

Challenges

With the tilting system technology on the drawing board, Alstom put the system's hydraulic tilting mechanism out for bids to hydraulics equipment manufacturers, including Eaton's Hydraulics operations in Pessano, Italy.

A contender for the business proposed a hydraulic system that would be strung out from front to back on the undercarriage of each railcar. Besides being concerned about the maintenance that would be required for that system, Alstom engineers had many other valid concerns that they shared with Eaton's Alessandro Piccolini, industrial application engineering manager.

"I learned that the proposed design called for a servo valve at the front of the railcar and one at the rear, a setup that Alstom feared could cause the railcar to twist while traveling along curves," Piccolini said.

"Alstom was also concerned that the proposed piston pump and valves would not offer long service life, due to the performance and safety demands of the tilting technology, and the fact that

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the system would be equipped with components from many different suppliers."

Solution

Determined that there must be a better way, Eaton designed a hydraulic and filtration system that would bring much-needed order to each railcars undercarriage.

Engineers proposed a centralized, lightweight Eaton power unit that included a series of valves, pumps and cylinders, plus an HP.91 filter assembled on one of the pumps and an HP.170 filter located on a manifold. These filters were designed to provide optimal filtration to protect the hydraulic system and maintain efficient operation in a harsh environment.

"These filters will help ensure a long component life for the system," said Walter Facchinelli, sales manager Italy, Hydraulics and Lube Filtration. "They are typically used in these power units to remove contaminants from the hydraulic oil. They are an integral part of the whole system."

Contamination is any solid or liquid substance that is not part of a hydraulic system's working fluid. There are three principal means through which contamination can occur in a typical hydraulic system: it can be incorporated during system assembly, generated during system operation, or ingested by the system during operation.

Dirty hydraulic fluid is the root cause of up to 80 percent of all hydraulic system problems. If hydraulic oil is contaminated, there are a number of potentially detrimental effects that can diminish performance or damage system components.

Potential ramifications include surface corrosion and accelerated fatigue of metal components. Another effect is distinct changes in the physical characteristics of the oil itself, resulting in hydraulic oil that has a different viscosity or compressibility, which can adversely affect the ability of the oil to transfer power.

Eaton's filters have a high-dirt holding capacity to ensure consistent filter efficiency and long element life.They reduce downtime, minimize safety hazards, improve operating efficiency and decrease maintenance costs.

"Our filters keep the train's hydraulic system on track ," said Facchinelli. "The filters require changing about every 360,000 kilometers (224,000 miles), and replacement is simple and fast, which decreases down time."

Results

Impressed with the streamlined design of Eaton's proposed hydraulic tilting system and its attention to detail, Alstom awarded Eaton a contract to supply 103 systems for a train it was developing for the Italian market.

During the ensuing 16 years, Eaton Italy has supplied Alstom with approximately 500 hydraulic systems that are being used in high-speed railway transit across Europe.

In addition, Eaton Italy recently worked with Alstom to replace electromechanical controls on the pantograph of its high-speed Pendolino™ trains with Eaton servo valves.

Eaton's Hydraulics Power Units contain PVM piston pumps, slip-in cartridge valves, servo valves and Eaton's filtration products HP.170 and HP.91

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