Application Literature
Case History

Improving Diesel/Electric Locomotive Uptime Over A Decade Of Service

Photo by HarshWCAM3, 2009.

SUPERCHANGER® gasketed P&F HE withstands temperature extremes, vibration and fatigue in railway lube oil cooler service for Indian Railways.

Indian Railways (IR) has one of the largest and busiest rail networks in the world, transporting over 18 million passengers and more than 2 million tonnes of freight daily. IR operates over 200,000 freight cars, 50,000 coaches and 8,000 locomotives with 1.4 million employees

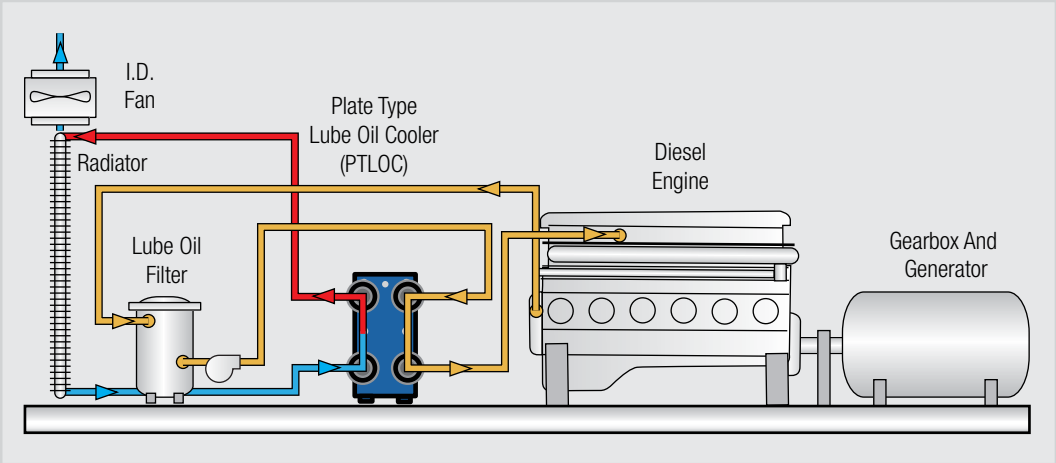
IR also owns locomotive and coach manufacturing facilities: Diesel Locomotive Works (DLW) in Varanasi and Diesel Loco Modernization Works (DMW) in Patiala. DLW manufactures locomotives, and DMW manufactures components, remanufactures traction motors and engine blocks and upgrades existing locomotives to current railway standards and technology.

Frequent S&T Failures And Excessive Downtime

Each engine manufactured by DLW and DMW requires lube oil cooling by a heat exchanger specified by the IR Research Designs and Standards Organization (RDSO). Traditionally, the engines were fitted with shell & tube lube oil coolers, whose substandard performance prompted RDSO to review alternatives. Problems faced included oil overheating with increased fuel consumption and reduced power, damage to piston

SUPERCHANGER® GX-18 105-plate units have been running for 10 years in difficult railway PTLOC service without any unscheduled maintenance.

The SUPERCHANGER GX-18 has logged more than a decade of PTLOC service without unscheduled downtime.



The locomotive diesel engine pressure lubrication system comprises positive-displacement, engine-mounted suction and pressure circulating pumps, a lube oil filter and the PTLOC.

rings and bearings, oil leakage caused by shell-side welding failures attributed to pressure fluctuations and vibration, tube failures with interchannel mixing of water and oil, difficult and dangerous R&R of the large shell & tube units, costs connected with excessive locomotive maintenance and downtime, loss of coolant and oil and inventory cost of maintaining spare units.

Setting A High Performance Standard

RDSO developed performance specifications for a lube oil cooler based on plate heat exchangers, designated Plate Type Lube Oil Coolers (PTLOC). The PTLOC application is regarded as the most rigorous applications encountered for several reasons:

- Oil viscosity and temperature must be maintained within specified limits to attain designed engine power output and to provide adequate engine component lubrication for enhanced service life.
- Locomotives operate under widely varying ambient temperature conditions and severe vibration.
- Maintenance procedures should be minimized and necessary only during scheduled maintenance events.
- No oil or coolant leaks are permissible between scheduled maintenance events.

Tranter designed and proposed a SUPERCHANGER® gasketed plate & frame heat exchanger that would meet the RDSO published PTLOC specifications. Test exchangers were subjected to a 2-year proving process, including vibration and fatigue testing and field testing. Based on the successful conclusion of the lab and field tests, IR awarded Tranter an initial 3-year contract for PTLOCs in 1999.

A Decade Without Unscheduled Downtime

The first of the 105-plate, SUPERCHANGER GX-18 units has been running for 10 years without any unscheduled maintenance. The balance of the initial contract PTLOC units have been operating without unscheduled maintenance on a fleet of locomotives. All performance and maintenance problems were eliminated. After 5 years of consistent performance, Tranter was designated as one of the few Part-I Suppliers to Indian Railways. As of 2010, there were nearly 1200 SUPERCHANGER PTLOCs in operation across India.

The success of the Tranter SUPERCHANGER both technically and commercially in the extremely demanding PTLOC application under rigorous and competitive RDSO standards is a testament to the simplicity, design, workmanship and quality of the unit.

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