

Rotary Vane E-Compressors

Case Study

High-performance PTFE Lip Seals for High-Speed,
Compact Transit Vane Compressor

Custom Sealing Solutions for the Future of Transit

The Client

A leading global manufacturer of compact rotary vane compressors. These compressors are critical to the safe and efficient operation of pneumatic braking systems and suspension systems in commercial vehicles such as buses, trucks, and trains.

These systems demand exceptional reliability and consistent performance in compact, mobile environments.

The Objective

To engineer a robust, high-performance sealing solution tailored for vane compressors operating in mobile transit environments, ensuring long-term reliability, reduced maintenance, and enhanced system integrity.

The Challenge

Transit vane compressors differ from industrial compressors such as those common in manufacturing, which operate in clean, controlled environments.

Transit compressors face:

- **Intermittent Duty Cycles:** Frequent start and stops aligned with vehicle operation.
- **Environmental Exposure:** Extreme temperatures, moisture, dust, and road contaminants.
- **Mechanical stress:** Constant vibration and shock from vehicle movement.
- **Space Constraints:** Tight installation areas requiring compact, efficient designs.
- **High Speeds:** Speeds up to 3500 rpm.

FTL conducted a full investigation into the existing seal design and determined the seal was failing due to:

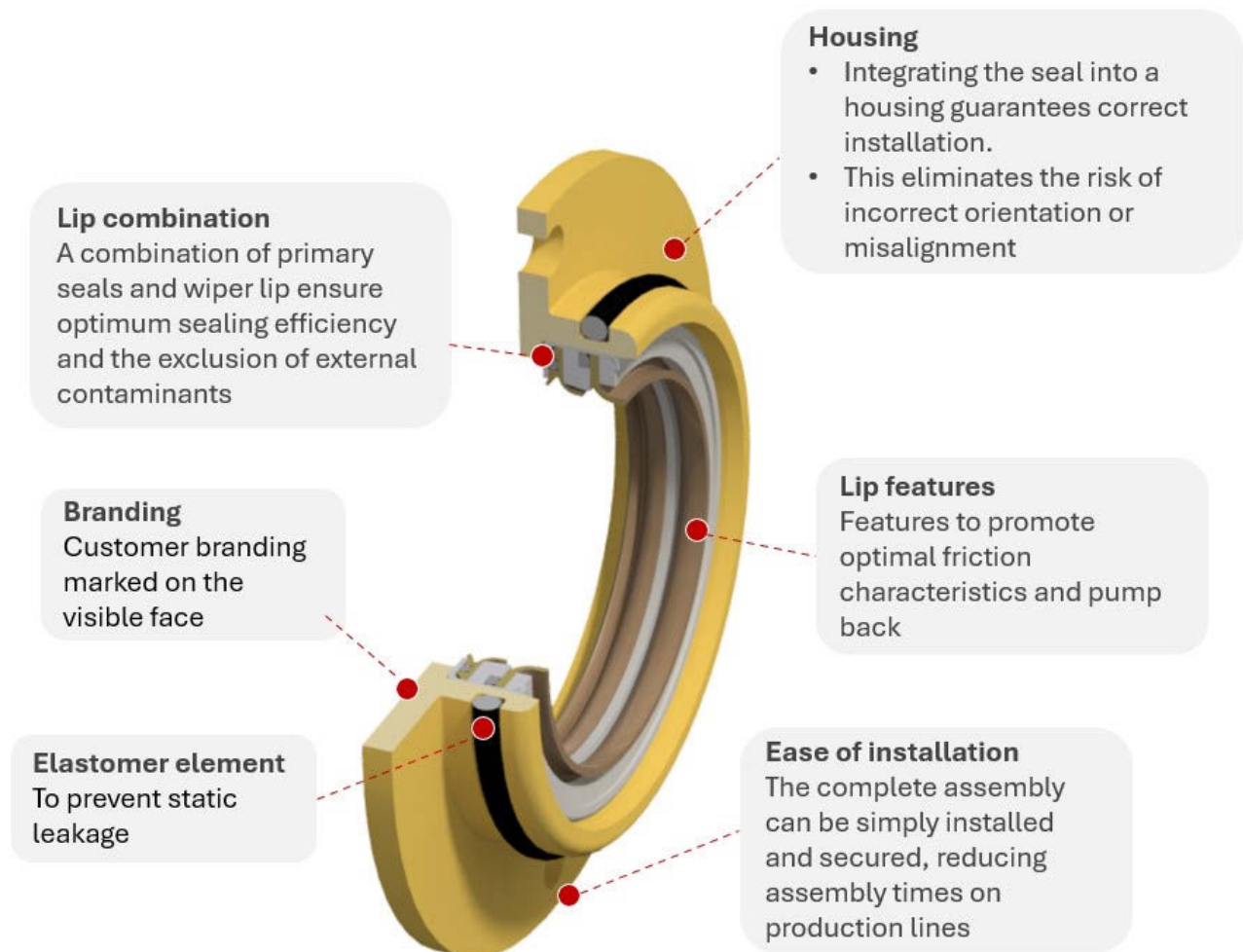
- Internal leakage from poor seal retention
- Material creep caused by thermal cycling
- Deformation of transport sleeves during installation

These issues compromised compressor performance, leading to reliability concerns and warranty claims.

Engineered PTFE Lip Seals for Quiet, Efficient Transit Systems

The Solution

A custom-engineered sealing solution was developed with features designed specifically for mobile compressor applications:



Improving Reliability in Compact Compressor Systems

Additional Value Adds

- No transport sleeve required, removing errors during the installation process.
- Simplified installation, reducing reliance on service engineers for correct seal replacement.
- Laser-etched part numbers for traceability and aftermarket protection.
- Consignment stock agreements, ensuring consistent availability to support production and aftermarket demand.

Benefit

Validation: Successfully met all performance and durability benchmarks.

Long-term Reliability: No reported issues since implementation.

OEM trust: FTL became the seal supplier of choice.

Quality: Reduced maintenance and improved uptime in transit systems.

Operational Efficiency: Over 100,000 seals delivered with zero non-conformance reports or failures.

Strategic Impact

As transit systems continue to evolve toward electrification and compact design, many OEMs are transitioning from piston compressors to vane and screw technologies to meet modern noise and efficiency standards. This project highlights the importance of tailored engineering and advanced materials in achieving maximum efficiency and long-term reliability. FTL is ready to support this transition, delivering sealing solutions that align with the needs of next generation transit platforms.