



Asphalt Case Study

Client Profile

This client is an industry leader in the design and manufacture of Asphalt emulsions for the construction, roadway, and municipal maintenance industries.

Application

Hi-Tech Seals was approached with an issue affecting a key piece of production equipment, a large centrifugal pump. The pump is used to transfer asphalt product during the production process. During peak season production runs at a steady rate of 24 hours a day, 7 days a week. The service life of this centrifugal pump was between 2-1/2 to 3 weeks. At this point the product would breach the internal stator and result in catastrophic failure. The combination of transporting the parts (1-2 days), overhauling the equipment (2-3 days), and reinstating the pump to service produced a cost close to \$20,000.00 per occurrence. This cost did not include the loss of production profits.

Sealing Challenges

While reviewing the application, the failure appeared to stem from a deficiency in the fluorocarbon FKM O-rings throughout the various ports. During the coking process, the seals would take a heavy compression set (the cross section became triangle shaped), became hardened, cracked, and extremely brittle. The operating temperature was a consistent 325°F (163°C) internally and the pumping pressure was set at 50 psi.

Hi-Tech Seals' Solution

The client sent samples of the failed seals to our engineering lab for analysis. Upon investigation, we eliminated temperature and pressure as sole causes of the failure. This is due to FKM's temperature range exceeding the operating temperature and the operating pressure being too low to cause a compression set or lab for analysis. Upon investigation, we eliminated temperature and pressure as sole causes of the failure. This is due to FKM's temper-

ature range exceeding the operating temperature and the operating pressure being too low to cause a compression set or deterioration of this magnitude. We then changed our focus to chemical compatibility in conjunction with the heat and pressure. Asphalt is comprised of a mixture of the following components:

- Bitumen
- Stoddard Solvent
- Fatty Acids
- Styrene
- Butadiene
- Water
- Aggregate
- Petroleum Based Binder

All of the above (with the exception of direct exposure to water) are rated for excellent compatibility with FKM and FFKM. We concluded the root cause of the O-ring failure was due to the utilization of sub-quality, low fluorine content product. The immediate solution was to supplant the affected seals, using our Chemours Viton™ as a benchmark. Further improvements for extended performance utilizing FFKM would be evaluated at a later date.

Results

Chemours Viton™ exceeded the performance and service life of the original FKM O-rings exponentially, accounting for zero failures. Upon examination of the seals during scheduled maintenance at the end of the season, Chemours Viton™ O-rings exhibited only minor compression set, increase in hardness, and allowed minimal bypass. The performance and production went unaffected and the pump performed throughout the season. Considering the price of both sets of FKM and Viton™ O-rings were comparable, the quality and performance were not. Based on these results, FFKM was determined to be excessive. Viton™ B is currently being explored as an incremental performance improvement for next season.