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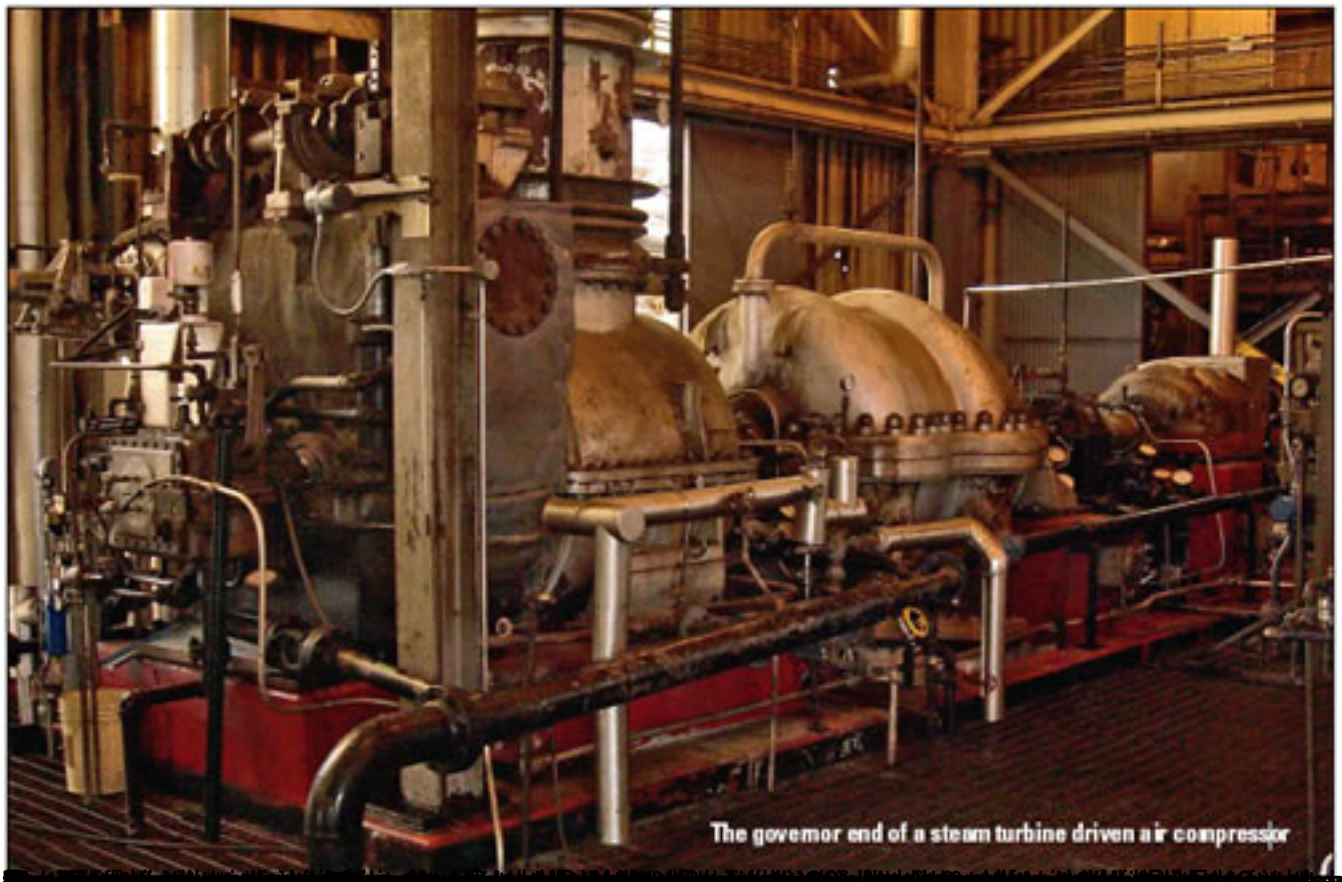
By the time I joined Rentech in 2000, the three Clark TCV 16 engine/compressors compressing hydrogen and nitrogen at our East Dubuque Ammonia Plant had begun experiencing shortened packing life. Packing life on the 4600 psi 3rd and 4th stages—that historically had reached 18 to 24 months—suddenly fell to just three to six months. Excessive ring wear also was observed.

Maintenance personnel at the plant had noticed that the major brand lubricant we were using on these units looked somewhat different than in the past. When questioned about this, the supplier assured us that no changes had been made. As we continued to pursue the problem, the manufacturer later admitted that the formulation had indeed been changed and the diminished performance we were experiencing was unintended and unexpected. Consequently, we began to look for an alternative lubricant.

The first alternative we selected, an independent brand cylinder lubricant, appeared to work well for about a year. Then we encountered another unintended consequence. The oil carried downstream of the compressor was plugging the chillers in the synthesis loop. At that point, we determined that an oil with a lower flock point (temperature at which wax crystals form) was what we really needed.

We opted to go with Royal Purple's NGL-NS synthetic lubricant as it had no flock point and no sulfur that could poison the process catalyst. After just three weeks, however, we experienced a packing failure on a synthesis loop compressor cylinder. A repetitive failure occurred just four weeks later. In all, we had six packing failures over a twoto- three-month period. Then, the failures stopped—*just as suddenly as they had begun*.

Interestingly, only the packings on the recirculation cylinders of compressors C & B were failing. We sent samples of the failed packings, along with foreign material found in them, to Royal Purple for analysis. Because the oil travels downstream of the compressor, the supplier attributed the failures to the NGL-NS cleaning out 37 years of "stuff" that had accumulated in the loop. We were advised to persevere with the clean-up and to expect that the failures would eventually stop. They did. Our packing life increased to two years. Subsequently, we also changed packing materials, increasing our current life to four years with expectations of six years life.



The governor end of a steam turbine driven air compressor

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View of compressor cylinders of a TCV-16 Integral gas engine compressor

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## About Rentech

Rentech, Inc. is a Los Angeles, CA-based process technology company focused on the efficient conversion of underutilized hydrocarbon resources into high-value fuels and chemical products. Rentech's patented iron-based Fisher-Tropsch catalyst technology has made it a world leader in coal-to-liquids and gas-to-liquids processing knowledge.

Rentech's ammonia fertilizer plant in East Dubuque, IL operates over 750 pieces of rotating equipment totaling over 50,000 hp. Each day it is capable of producing 845 tons of ammonia, 1100 tons of urea ammonium nitrate, 400 tons of liquid CO2, 400 tons of nitric acid and 300 tons of urea.

Rentech Energy Midwest Corp. has announced plans to build an $800 million coal gasification plant to convert the feedstocks to the fertilizer plant from natural gas to coal. A second phase is planned to produce ultra-clean burning Fisher-Tropsch fuel. The knowledge gained from this project will be used to develop a footprint for future plants ranging in sizes up to 50,000 barrels per day of production per plant.

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