

## CASE STUDY

**TOPIC:** Entrained Gas Contamination in Lube Oil System of Large Gas Compressor

**LOCATION:** LaPorte, Texas

**DATE:** July 13, 2015

**Problem:** At a large Petrochemical facility near Houston, Texas, there was ingress of Acetylene Gas through a leaking seal into the 750-gallon lube oil system of a Gas Compressor. High concentrations of light end hydrocarbon gases (including H<sub>2</sub>S, Benzene, Toluene, and Acetylene) drive down the flashpoint of compressor oils to very low and dangerous levels, and they also adversely affect the viscosity of the ISO VG 32 compressor oil, inhibiting its ability to act as an effective lubricant.



Because the Gas Compressor could not be shut down to fix the seal leak without incurring a tremendous cost in manpower and down-time, and because the next scheduled turn-around was not until 2017, operators at the plant were “sweetening” the oil on a regular basis in an effort to maintain a proper flashpoint and viscosity. New oil was introduced through the fill port while old oil was drained off of the bottom. The cost to purchase new oil is very expensive (roughly 1,500 gallons per month at \$18.50 per gallon = \$27,750 per month x 12 = \$333,000 per year), with an additional labor cost involved as well.

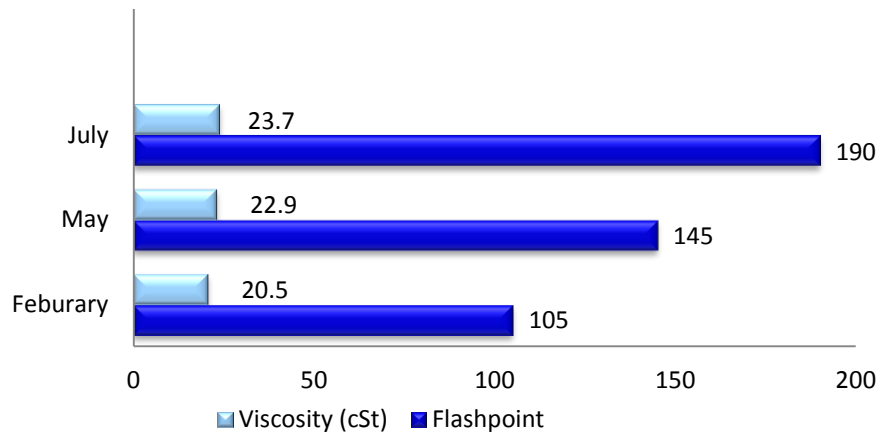
**Solution:** As an alternative, the plant decided to implement a trial 20 GPM Vacuum Dehydration Oil Purification System (VDOPS) to re-circulate the lube oil reservoir in a kidney-loop configuration and continuously remove entrained gases from the oil as the compressor was running. The VDOPS needed to be suitable for Class 1, Division 2, Groups B,C&D hazardous locations, and the gases that were removed from the oil via “vacuum distillation” had to be plumbed to a flare from the discharge of the vacuum pump. While the VDOPS was re-circulating on the reservoir, excellent results were achieved and well documented.



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**Results:** On February 05, 2015 the starting flashpoint of the oil was as low as 105, and the viscosity was 20.5 cSt. On May 04, 2015, the flashpoint had risen to 145 and the viscosity was 22.9 cSt. By July 07, 2015, the flashpoint had risen significantly to 190, and the viscosity was 23.7 cSt.



**Return on Investment:** Due to the implementation of a 20 GPM Vacuum Dehydration Oil Purification System on this Gas Compressor, and because of the successful performance and results, the plant no longer needs to “sweeten” the oil at a cost of \$333,000 per year.

After the trial, a new fully equipped VDOPS was put in place within weeks. With a purchase price of \$72,000 for the 20 GPM NEMA 7 VDOPS, and with virtually no consumables required for the effective removal of entrained gases from the oil, the ROI for the plant was under 3-months.