## SUBJECT:

Oil viscosity in Purge Mist Applications:

## BACKGROUND:

A west coast refinery reported that after 2 years of lubricating their rotating equipment (pumps, electric motors and small steam turbines) in 2 process units (Coker and #5 Gas) they were experiencing a decrease in their MTBR instead of the increase in MTBR they were expecting. After looking at records of the two process units for the two year period before oil mist was installed as compared to the two years after oil mist was installed, it was determined that the Coker unit MTBR had increased from 36 months to 80 months while the #5 Gas decreased from 55 months to 34 months. Further investigation showed that the #5 Gas unit had 41 pieces of rotating equipment with 25% being purge mist applications. The study also revealed that more failures had occurred on purge mist applications than on pure mist applications.

## FINDINGS:

Reclassifier sizes, bearing temperatures, system installation, application connections, mist density and oil viscosity were all taken into account in a unit survey. The mist generators were filled with an ISO 220 synthetic oil and the mist density (0.65 cu. In. oil per hour per SCFM) was properly set. The reclassifier sizes were correct, bearing temperatures were acceptable and the system installation looked good. Some of the overhung pumps (9) on pure mist originally installed with one mist inlet and labyrinth seals had been equipped with bearing isolators that require two mist inlets per API 610 9 th edition. The purge mist was applied to lubricate between bearing pumps with sleeve (plain) bearings. When taking samples of oil from the bearing housings it appeared to be very heavy, analyses showed the oil to average about 135 cSt.

Since repairs on the purge mist applications were causing the decrease in MTBR after oil mist was applied, it appeared that the use of the ISO 220 oil could be responsible for the problems. Further investigations into pump OEM's requirements showed they recommend ISO 32 and ISO 46 for the sump lubricating oil and in some instances where the bearings were operating at a higher temperature (above 160° F) an ISO 68 oil could be used. When too viscous of an oil is used in conjunction with ring-oiled systems the ring will not rotate and the bearings will fail due to lack of lubrication.

API Standard 610, 8.2.6.4 states “the typical lubricants employed in a common oil system are mineral (hydrocarbon) oils that correspond to ISO Grades 32 through 68, as specified in ISO 3448.”

**CONCLUSION:**

When a single oil mist system is pure mist lubricating pumps and motors with ball bearings and purge mist lubricating turbines and pumps with sleeve (plain) bearings no heavier than ISO 68 oil should be used. If heavier oil is used in the mist system, the oil in the purge mist sumps must be monitored and changed as required.

When overhung pumps are adapted for bearing isolators they should be changed from one mist inlet to two located between the end caps and the bearings and the drain back ports should be plugged.

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