

# Oil mist system provides rapid payback

Benefits included lower maintenance costs and reduced lost production

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A large west Texas oil refinery applied dry sump, also known as pure oil mist, lubrication to the centrifugal pumps throughout its crude processing units and catalytic crackers (Fig. 1). In addition, purge oil mist, also known as wet sump, was applied to the small steam turbines (Fig. 2) and gearboxes. The project was started during 2000 and completed during 2001. In total, 6 oil mist lubrication systems were installed to serve 130 pumps, 31 steam turbines, 26 fans and blowers and 25 gearboxes in 8 processing units and 5 cooling towers.

This refinery experienced several significant benefits from applying the oil mist systems. Here are the seven main points that the refinery has recently shared with the supplier:

1. The number of bearing failures dropped from 18 in 1999 to 4 in 2001. This 80% reduction is typical and consistent with experience documented by others over the past three decades.

2. Mechanical seal-related failures during the same period declined from about 77 to 38. The refinery attributes this 50% seal failure reduction to the fact that seals last longer when bearings run smoothly and do not cause internal component alignment problems. Combining the reductions in bearing and seal failures has extended pump mean time between repairs (*MTBR*) from 35 to 75 months since applying oil mist.

3. The refinery also observed that, in the few instances involving equipment failures lubricated with oil mist, the average cost of a repair was about 15% lower than it was before using oil mist. The failures, on average, have resulted in less damage to the equipment and have thus reduced the need to extensively rebuild pumps.

4. Impressive is that the repair cost resulting from unplanned mechanical events decreased from about \$1,400,000 in 2000 to \$700,000 in 2002, a 50% reduction. This cost reduction alone provides a strong return on the investment in oil mist.

5. In addition to the sizeable direct savings, this refinery reports some other interesting statistics. The number of pump mechanics in the plant has been reduced by six. The total number of work orders of all types has been reduced by about 10%. In addition, time spent to perform routine preventive maintenance on pumps has been reduced from four hours per pump before oil mist to now only one hour per pump per year after effecting the oil mist conversions. This is because it is no longer necessary to periodically drain and replenish oil in the bearing housings.

6. Another benefit is the impact of oil mist on turbine performance. In this project, 31 small steam turbines were fitted with



**FIG. 1** Pure oil mist installation on a pump and motor (API 610 application).



**FIG. 2** Pure oil mist installation on a steam turbine.

purge oil mist, whereby the oil mist serves to exclude atmospheric air from the bearing housing. Oil mist fills the housing interior, but liquid oil is used to supply the bearings with lubricant by traditional means of application. A steady upward trend in *MTBR* on small steam turbines has been observed from around 50 months in late 2001 to 150 months in third quarter 2003. This strongly suggests that purge misting steam turbine bearings prevents ingestion of airborne dust and atmospheric moisture contamination.

7. This oil refinery, during the peak gasoline production season each year, operates the spare pumps on the crude processing units in parallel with the main pumps to maximize its crude oil processing capability. The refinery was experiencing an average of five failures each year of pumps running in parallel. This forced a reduction in daily crude oil throughput until the defective pump could be restored to service. Following the application of oil mist, there have been no failures of these critical pumps running in parallel. The estimated annual credit for eliminating this lost production is \$500,000.

When these economic credits for eliminating lost production are added to the large savings in maintenance costs, the result is a return on investment of well over 100% and recovery of the initial investment in just over eight months. This application shows some of the compelling reasons to consider oil mist for modern process plants. **HP**



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