Closed-loop oil mist systems are a viable lubrication option

Although plantwide, centralized oil mist systems have served industry well since the early 1960s, closed-loop oil mist systems have made major inroads only in this decade. Environmentally-acceptable applications are presently operating flawlessly at several U.S. and overseas plant sites.

The centerpiece of these systems is a combination demisting and oil supply vessel (Fig. 1). In systems developed by Houston-based Lubrication Systems Company, a typical mist return header slopes back to, and is connected into, this central vessel. The liquid oil drains back to this vessel. The oil mist that reaches the vessel has traversed the entire supply network and has gone through the bearing cavities, collection containers and return header system. It is finally being recaptured here.

Fig. 1 The centerpiece of these systems is a combination demisting and oil supply vessel.

Recapture involves an electric motor-driven rotating filter located at the top of the demisting vessel. Its rotating internal element catches the returned mist and coalesces the small globules into larger droplets that then fall into the oil below. Clean, essentially hydrocarbon-free air vents from the raised exhaust pipe.

Creating a vacuum must be avoided. The spinning filter has been designed so as not to "pull a vacuum" on the return header system. Creating a vacuum would negate one of the principal benefits of oil mist lubrication: maintaining a positive pressure in bearing housings-essential to keeping atmospheric contaminants out. Experience shows that the filter will operate over a wide range of ambient conditions. It does not suffer the inherent problems of changing differential pressures across the filter media encountered with static filter elements. In fact, the filter media a v bypassed if the electric motor fails; the unit would fail in the "safe" mode.

The demisting vessel also serves as the supply tank for the central oil mist generator. Typically, the generator and demisting vessel are located adjacent to each other. This allows for efficient connection to the common utilities, compressed air and electric power. Moreover, the oil supply line is kept short. Oil from the demisting vessel is pumped, on demand, through a filter and into the mist console reservoir for reuse. Since it is reasonable to expect that over 95% of the oil is recycled, superior-performing, higher-cost synthetic lubricants can now be easily justified for use in oil mist systems.

The oil in the demisting vessel should be analyzed periodically to assess its continued suitability for lubricating the hundreds of bearings that are typically served by these reliable, cost-effective systems. Demisting vessel design allows for piping to an oil purifier for online lubricant reconditioning.

Next-generation oil mist systems unveiled. The most recent development in closed-loop oil mist technology was introduced at the International Pump Symposium in March, 1999, in Houston. On display by Lubrication Systems Company was an attractive assembly (Fig. 2) that combines the mist generator and oil supply/demisting vessel. All the features of the separate demisting vessel have been retained and several system control and monitoring improvements incorporated in the integral package.

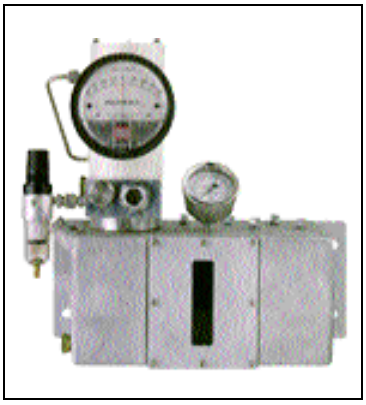

Fig. 2 The mist generator and oil supply/demisting vessels are combined.

Oil mist is suitable for all rolling element bearings. A recently released CD-ROM ,"Shortcuts to Machinery Reliability Improvement," Gulf Publishing Company Product Code BH30) contains data showing how 90% reductions in bearing failures have been achieved with this technology. Payback periods are sometimes less than 12 months for thoroughly engineered, virtually maintenance-free state-of-art oil mist lubrication systems feeding a "directed fog" and, in the case of low-speed rolling element bearings, “directed spray” of lubricant into bearings associated with critical equipment.

Older plants that had experienced housekeeping problems with old-style open oil mist lubrication systems are encouraged to stay on top of recent findings. For instance, the notion that oil mist lubrication is not cost-effective for small (less that 25 hp) electric motors appears to have originated with plants that use oversized application fittings and have not paid attention to the merits of directed application of quality synthesized hydrocarbons. Resizing and relocating fittings can reduce oil consumption by a factor of 4:1, even on open systems. Conversion to a closed systems configuration may well reduce consumption by an additional 5:1 ratio and satisfy virtually all reasonable environmental concerns.

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