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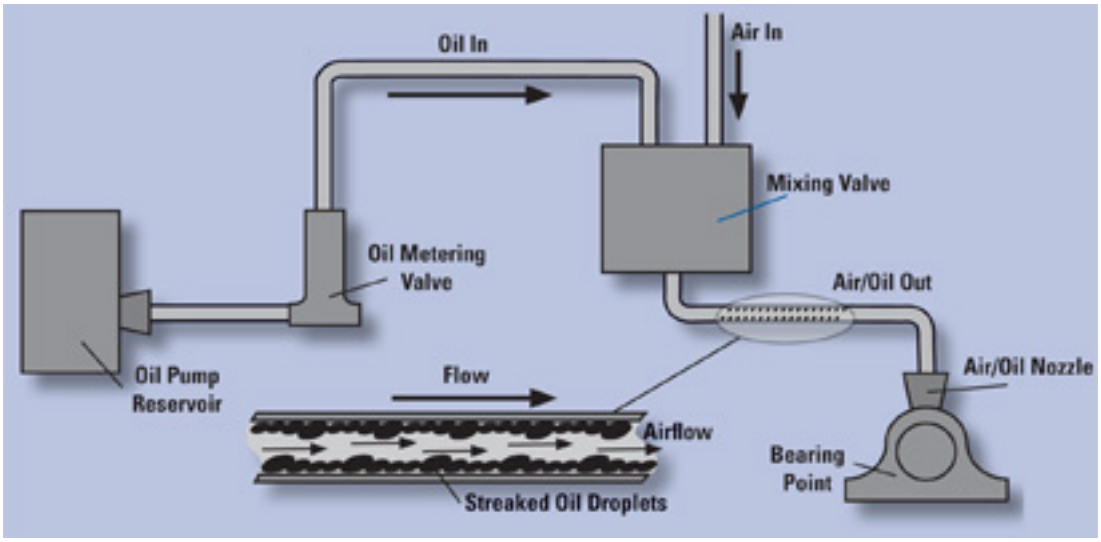

The Air/Oil system was first developed as a total-loss oil system to meet the specific needs of the high-speed bearing environment.

It's now been refined to the point where it is a viable and effective lube system for any rotary or linear machine application. Development of these systems was fueled by a number of issues.

In today's high-speed rotating-equipment applications (i.e., those with machine spindles, turbines, blowers, etc.), bearings and gearing can reach surface-speed values of up to 2.2 million DN. (DN value is calculated by multiply-ing the bearing diameter in mm [D] by the rotational speed of the spindle in RPM [N]).

Traditional wet-sump oil and grease lubrication methods cope poorly in high-speed environments as they struggle to dissipate the additional heat load created by speed and fluid friction, leading to energy loss and reductions in lubricant life and machine speed capability. Although mist-lubrication systems allow for higher rotating speeds over traditional lube systems, they're not able to provide the exact metering requirements needed for extended bearing service life. Furthermore, as mist is in a micro-droplet form and susceptible to becoming airborne in the plant environment, some operations consider it to be a health and safety problem. Air/Oil technology has been able to address these concerns.

How the System Works

A relative newcomer on the block, the Air/Oil lubrication system can best be described as a hybrid system incorporating the metering capability of existing single-line resistance, positive-displacement injector in conjunction with progressive-divider delivery technology. Oil is metered in the traditional manner in minute quantities to a mixing block connected to a clean, dry compressed-air supply. Individual oil drops are dispensed into a small-diameter (usually 4mm or 3/16 in.) delivery tube where they are "streaked" by the air into macro-droplets and transported along the tube's inner walls to a dispensing nozzle located at each lubrication point. The small diameter of the nozzles creates a venturi effect, allowing the air and oil droplets to envelop the bearing surface in an almost oil-free manner. The air forces the lubricant film across the bearing surfaces, producing additional cooling and a positive pressure in the bearing area that aids in sealing out external contaminants such as coolant and dirt.

Pros & Cons

When set up correctly the Air/Oil system boasts an impressive number of benefits, including:

- The ability to deal with the highest possible bearing surface speeds
- Bearing-temperature rises over ambient of less than half those of traditional lubrication methods
- Reduced energy consumption
- Continuous fresh-oil delivery
- Up to a 90% reduction in lubricant use compared with mist-lubrication systems
- Up to a 99% reduction in lubricant use compared with grease systems
- Extended bearing and seal life expectancy
- Small environmental impact compared with that of other lubrication cleanup/disposals methods

Because the Air/Oil system is a hybrid system, it requires the purchase of a traditional lubrication system and the additional costs of adding mixing control valves and a clean and dry air-supply network to each mix valve assembly. Due to the small aperture of the delivery nozzle, use of solids additives such as moly and PTFE is discouraged, since they can "bridge" across the nozzle, form deposits and cause an oil starvation situation. The Air/Oil system is more difficult to design as an add-on to an existing system than it is to incorporate in the machine design stage. **LMT**

For more information regarding automated lube systems, check out Ken Bannister's best-selling book Lubrication For Industry, *published by Industrial Press. Telephone him at*

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