Written by Rojean Thomas
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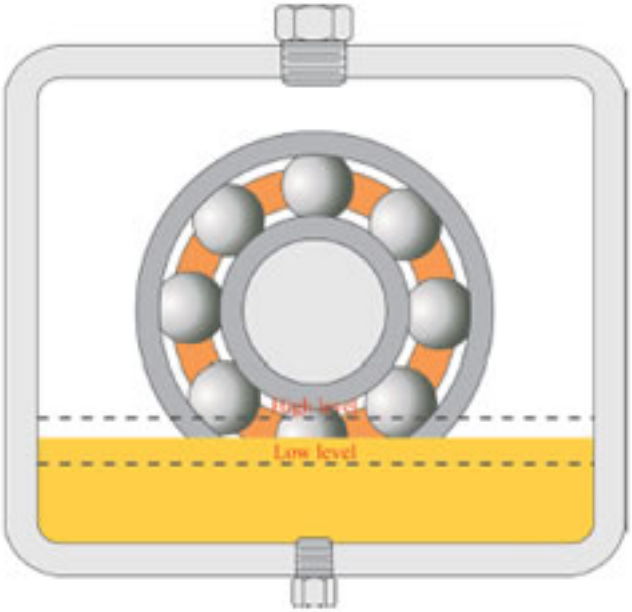
Constant level oilers have been utilized on process pumps and other rotating equipment for more than half a century. Although some oiler designs haven't changed much over time, others have become more advanced—*as have the equipment and applications they serve.*

Regardless of the types of oilers in your plant, you're counting on them to maintain proper levels of lubrication—however and wherever they are deployed. That's why proper selection, installation and maintenance of these devices should be an utmost concern. By taking steps to eliminate additional points of contamination ingression and avoid installation and application errors with your constant level oilers, you can ensure both proper quality and quantity of the lubrication they supply.

Fig. 1. Typical oil level conditions



The right amount and condition

The right condition and the right amount are two critical elements of lubrication. The right condition refers to the quality of oil—*specifically oil that is contaminant free*. Having the proper quantity of contaminated oil is no better than having an insufficient quantity of contaminant-free oil. Having the proper quantity of oil would be considered more important than maintaining the quality of the oil, but both have significant impact on the life of the lubricant and component being lubricated. Oil sump lubrication doesn't require that a specific level be maintained for proper bearing load—
only that oil levels do not reach critically low or high points
(Fig. 1).

In a low-level operating condition, the bearing will not receive enough lubricant necessary for proper film strength—a precursor to surface contact, skidding and possible catastrophic failure. Without enough oil to prevent friction, thermal runaway can happen quickly to a steel bearing. As the temperature of the bearing increases, the ball and race both expand, which creates an even tighter fit. This further increases the temperature, and the cycle continues to a rapid, catastrophic failure.

In a high-level operating condition, churning of the lubricant will occur, accelerating the oxidation rate as a result of excessive air and elevated temperatures. It is a common mistake to believe that more is better—*especially when it comes to oil sump lubrication.* Too much oil can affect the operation of oil rings, flingers and direct bearing contact. Leaking seals are another result of high lubricant levels.

Solving the problem

Maintaining the proper quantity of lubricant is perhaps the easiest means of increasing lubrication life and effectiveness. Consult with your equipment manufacturer for recommended oil levels, optimum lubricating equipment and preferred practices. For direct contact lubrication, such as in rolling element bearing applications, the ball at the deepest point of submersion in a static condition should not be submerged more than one-half the diameter.

The constant level oiler (Fig. 2) continues to be one of the most widely used methods of maintaining the proper level lubricant in a bearing housing. These devices replenish oil lost by leakage through seals, vents and various connections and plugs in the bearing housing. Once the proper level has been set, replacing the oil in the reservoir is the only required maintenance.

Constant level oilers have a "control point" that must align with the proper oil level of the equipment. The device is installed on the equipment and oil is filled to the predetermined level. All constant level oilers require air to function properly. Consequently, if the oil level within the sump lowers, the seal at the control point is broken, allowing air to enter the reservoir and displace the oil until the seal is reestablished. As long as a constant level oiler is set correctly and there is oil in the its reservoir, the equipment will always have the optimum oil level within the sump.

Vented & non-vented designs

Constant level oilers can be put into two categories: vented and non-vented. As mentioned previously, all oilers require air to function properly.

- In vented types, the air comes from the surrounding atmosphere.
- In non-vented types, the air necessary for proper operation is the same air found within the sump.

Vented oilers, which entered the marketplace over 60 years ago, still are the most used type today. That's because they provide great value in maintaining proper oil levels and extending equipment life. It is important to note that vented oilers will provide the proper quantity of oil, but not necessarily proper quality, as they can be a source of contamination ingression.

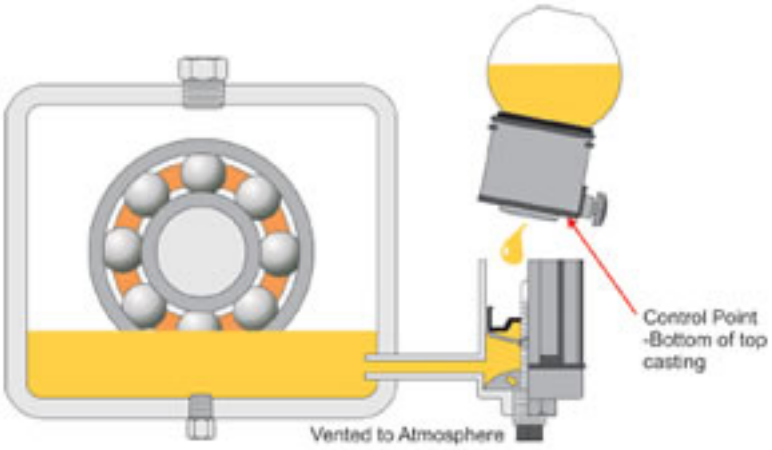


Fig. 2. Cross-section of typical oil sump lubrication with constant level oiler

Pressure differentials between the equipment housing and surrounding atmosphere is a leading cause of contamination ingression. In outdoor applications, for example, or where housing temperature fluctuations occur during frequent on/off running conditions or process fluid temperature changes, air flow over the equipment create this atmospheric exchange as pressure is equalized. During this air exchange, contamination from the surrounding environment is "breathed" into the oil sump.

Non-vented oilers do not exchange air with the atmosphere. One common non-vented model uses a pressure balance line that connects the air within the oiler base to the air within the

sump (Fig. 3). Non-vented types of oilers operate under the same principle as vented. Their "control point" is set to align with the desired oil level and if it lowers, air enters the reservoir displacing the oil until the seal is re-established.

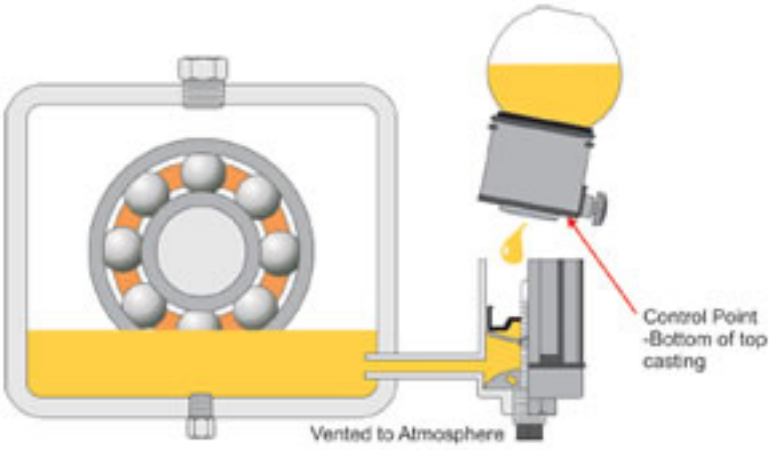
Proper specification
Determining which type of oiler to use for an application requires consideration of the surrounding environment, type of seals and design of the housing, including port locations and vents. In highly contaminated environments, it is recommended that a non-vented type of oiler be installed to minimize particulate and moisture ingression. Other sources of ingression are through seals and vents located on the top of the housing.

Certain types of seals are better at preventing ingression than others. Spending money to upgrade seals to prevent contamination ingression and oil leakage will not be as effective if vented types of oilers are used. The ideal configuration for oil sump housing lubrication is to eliminate the potential for contamination ingression by "closing" up the sump. Some seals are not capable of handling the pressures due to equalization and would require an expansion chamber. An expansion chamber has a rolling diaphragm that expands as the air within the sump heats up minimizing pressure increases (Fig. 4).

Proper installation & maintenance The leading causes of incorrect oil sump levels when using constant level oilers include:

- Incorrect oiler settings
- Pressure differential (vented types only)
- Oiler location
- Blocked or plugged fittings
- Improper filling methods

These problems can be overcome, as follows:



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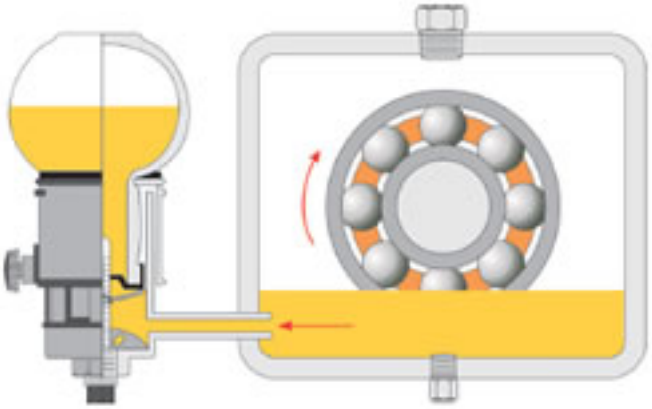

Fig. 5. Correct mounting of oiler relative to shaft rotation

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