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*Hydraulics, Lubrication and Maintenance Management*



FOR  
EARTHMOVING  
EQUIPMENT





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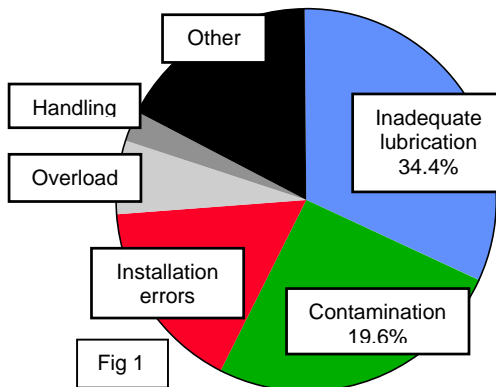
**Hydraulics, Lubrication and Maintenance Management**

**EASILUBE**

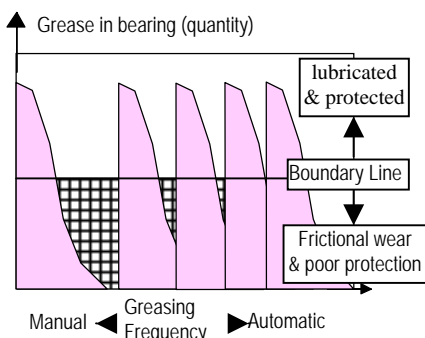
**Overview:**

54% of all bearing failures are due to inadequate lubrication as shown on a chart presented by SKF to the TAPPI 1995 engineering conference.

This percentage would be much higher if the study had been restricted to bearings on mobile machines. Easilube® addresses this high percentage of bearing failures. It does so by providing frequent small shots of #2 grease to the bearings for lubrication while setting-up and maintaining a film of grease to inhibit the ingress of contamination (Fig 2.). The benefits from frequent greasing are shown at Fig.3.



Generally, Easilube systems operate in parallel with hydraulic actuators giving a lubrication frequency to automatically match the demand and to grease the bearings while they are under load. This avoids the use of electrical timers, solenoid valves and similar components to enhance



reliability under adverse conditions (water cannons and the like) while simplifying the initial installation. In other applications where an appropriate pressure source is not available or where a more precise greasing rate is required, Easilube may use a simple adjustable timer to set greasing rate.

Importantly, Easilube provides grease while the machine is operating and the problem of 'tight' bearings with manual lubrication methods is thus solved.

Fig 3

**Easilube Pump:**

Being a single shot pump as opposed to a reciprocating pump, Easilube is almost bullet proof with moving components limited to a piston assembly with four seals. A drain provided between the grease seal and hydraulic seal eliminates any potential for grease contamination of the hydraulic oil.

The pump end-cap is available with various control valves to operate in systems where the hydraulic supply pressure may be very high or where it does not cycle at an appropriate frequency.



### Reservoirs:

- A single or twin cartridge pump is available. Cartridges are preferred because they reduce the risk of contamination by avoiding the need to bulk-fill from a separate facility. Also, the change out period for cartridges (a shift, day or week) is generally below the critical period for the most critical bearing and costly alarm systems may be avoided.
- Where cartridges cannot sensibly be used, bulk-fill systems are offered. A 5-Kg to 20-Kg see-through canister facilitates quick assessment of the need to re-fill and steel reservoirs are available to 90-Kg.
- Options include fill-filtration, overflow prevention and various mechanisms for local and remote level indication.



### Grease Distribution:

- Injectors are preferred because they offer maximum tolerance to contamination and independent adjustment to each bearing.
- With a compromise in contamination tolerance and/or flexibility, a lower cost is realized by grouping the bearings into zones according to lubrication demands. Separate injectors may be used for highly critical bearings whereas other bearings may be grouped and serviced by distributor valves fed from injectors to provide independent adjustment to each zone. Alternatively, Easilube may operate with systems having only distributor valves and such systems often provide the lowest cost option particularly where a large number of bearings are involved.
- Cartridge style pumps are strongly favored for systems with distributor valves because of the improved contamination control.



### Alarms:

Easilube is available with various low level and mal-function alarms. Alarms are rarely required for cartridge style pumps because the replenishment period (1-shift, 1-day or 1-week) is usually well within the 'risk' period for the most critical bearing. The need for alarms for 5-Kg to 20-Kg bulk-fill systems is reduced because of the see-through feature of the reservoir. Alarm systems include:

- A simple switch actuated when the container is close to empty. This may be electrical to actuate an audible and/or visual alarm or a pneumatic switch to provide warning through a pressure gauge.
- A malfunction warning if system pressure fails to rise within a 'set' period. This involves the use of a pressure switch positioned either in the line to the most critical bearing or immediately downstream from a distributor valve where failure is most likely.

### Hoses and fittings:

The lowest cost option utilizes grease filled high-pressure 'plastic' tube usually 8-mm for the supply line and 4-mm or 6-mm for the feed lines to the bearings. 'Plastic' has a lower impact resistance than hydraulic hose but it is readily repaired in the field without the need for a 'hose doctor'. Where hydraulic hoses are preferred, 1/4" or 3/8" is used for the supply line and 1/4" is used for the feed lines and double braid is selected.

**Typical applications:**

**(Note: Prices relate to 2004 and exclude GST, travel and accommodation costs)**

**1. Dozers:**

Dozers have high bearing loads at the equalizers and at some points at the ripper. Systems comprise either a twin cartridge Easilube pump and 3 injectors, protecting the equalizer points only, or full systems using a 30-Kg pump and up to 29 injectors. The Easilube pump maybe powered from the main hydraulic pump so that grease is applied to all bearings each time either the ripper or blade is used or maybe powered each time the ripper is raised.

The price for the most common system comprising a 30-Kg bulk fill pump powered from the ripper circuit and 14 injectors is \$9500 for a fully installed system. This price does not include the main mounting bracket for the pump.



Easilube Pump

**2. Graders:**

Graders have bearings under arduous conditions particularly at the steering links. Grease is applied to these critical bearings while loaded and a grease film is maintained to exclude contamination. Systems generally comprise a twin cartridge or 5-Kg Easilube pump with 24 small injectors.

The price for the most common system comprising a 5-Kg bulk fill pump powered from the blade raise circuit and 24 injectors is \$10900 for a fully installed system.



**3. Loaders:**

Easilube systems are applied to loaders particularly those operating in coal or sand because of concern for the bearings at the articulation, main bucket and dog-bone. Systems vary from a twin cartridge Easilube pump to a 90-Kg pump. There are generally 25-points involved and the Easilube pump is powered from the bucket raise circuit.

The price for the most common system comprising a 5-Kg bulk fill pump powered from the bucket raise circuit and servicing 25 points is between \$10,400 and \$13,400 for a fully installed system, depending on machine type.



**4. Scrapers:**

Scrapers generally have about 32-points. Systems comprise either a twin cartridge or 5-Kg pump with three large injectors and three distribution valves. A single cartridge system is attractive with a cartridge lasting about 10 to 12 hours.

The price for the most common system comprising a 5-Kg bulk fill pump powered from the eject circuit is \$7800 for a fully installed system.



## 5. Excavators:

Systems vary depending on the number of points to be serviced. The PC 200 illustrated used a twin cartridge pump with seven small injectors and was powered directly from the crowd circuit.

The price for the most common system comprising a 5-Kg bulk fill pump with 14 small injectors and powered from the main hydraulic pumps via a solenoid valve and timer is \$9800 for a fully installed system.



## 6. Trucks:

Systems vary depending on the size of truck and number of points to be serviced.

Easilube was selected for application to the last two fleets of Euclid trucks sold in Australia. For this application, 90-Kg Easilube pumps are operated through an electric timer. In other cases, a 5-Kg pump is used and connected in parallel with the lift cylinder.

The price for a system comprising a 5-Kg bulk fill pump with 27 small injectors and powered from the lift cylinder circuit is \$12400 for a fully installed system.



## 7. Retrofit – All machines:

It is possible, through the use of an Easivent valve, to have more than a single shot of the pump to reach the operating pressures for injectors. The prime application for this concept is to permit the replacement of the typical reciprocating pump by the more robust Easilube pump without requiring the replacement of the larger hoses and larger injectors typically used in these other systems.

## 8. END USERS:

**Underground Coal Mines:** Appin, Berrima, Central, Clarence, Cooranbong, Crinum, Cumnock, Dendrobium, Glennies Creek, Grasstree, Munmorah, Myuna, Newstan, North Goonyella, Oaky Creek, Southern, Southland, Ulan, Westcliff and contractors such as Roche.

**O/C Mines:** Bengalla, Bulga, Callied, German Creek, Griffin Coal and Hunter Valley. Several other mines with hire machines from Emeco etc and machines by contractors such as Boral, Henry Walker Eltin, etc..

**Earth Moving/Farming:** ASMS, Emeco, Dal-Brois, Gregoire, Daracon, Dival, Dukes, Kennedy, Rosebrooke, Toll Logistics, Violi and Wilde.