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COLLECTION OF WASTE OIL FROM FORESTRY MACHINES

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INTRODUCTION

Maintenance of forestry machinery is mostly carried out on the work site, and oil changes are one of the more common forms of maintenance. Since environmental regulations prohibit on-site disposal or spillage of used oil, maintenance personnel must be able to conduct oil changes in the field without spills and store waste oil until it can be disposed of at a central collection point. Thus, maintenance crews must use suitable systems for collecting, temporarily storing and transporting used oils. This Field Note discusses several oil-collection systems cited in the literature or observed by FERIC in the field.

DRAINING OIL FROM MACHINES

Even minor engine maintenance such as oil changes commonly requires the removal of cumbersome protective guarding. To facilitate oil changes, oil drainage should be possible without removing the engine's protection. Lowering and lifting an engine's belly guard to access the drain plug can be facilitated by the use of a manual winch in some machines, but as the belly guard becomes deformed as a result of damage and wear, dealing with its fastening bolts becomes difficult and time-consuming. A small access hatch over the drain plug is more efficient.

Although many newer machines have been designed to permit quick and spill-free drainage, older machines may have to be modified to achieve the same effect. Most manufacturers provide kits for repositioning oil drain plugs on older machines. To avoid dealing with the belly pan or special hatches for draining, a hose can be run between the drain port and a fitting mounted outside the engine's guarding so as to offer easy access to the plug. Such designs use high-pressure hydraulic hose and fittings to reduce the risk of failure, and have been used successfully for 20 years; however, their perceived weakness is that the hose can break, resulting in failure of a component. Installing a valve in a component's drain port and fitting a hose to the valve is safer than simply fitting a plug at the end of the hose. However, access to the valve may be difficult.

A hose attached to the drain port can be used to direct the oil into a container. This can be important in outdoor operations, where wind can blow draining oil past the opening of a container, especially when the flow slows near the end of the process. However, it may be inconvenient to stow the hose in the machine during operation.

The Ettco drain valve (Figure 1) is designed to facilitate oil changes. It is mounted on a component's drainage port and contains both a plug and a check valve. When the plug is removed, the check valve remains closed. To drain the oil, the operator connects a special hose to the valve; a device in the hose attachment then opens the check valve and permits the oil to drain. As well as avoiding spillage, the operator also avoids contact with the oil, permitting drainage of very hot oil with minimal danger of burns. The Ettco valve is available for most engines. Accessory fittings can adapt the valve to different positions and to meet specific requirements.

An engine can also be equipped with a manual or electrical pump to remove oil. This is convenient for the operator, who need not work under the machine. However, if the pump withdraws oil from the top of the engine, the hose may not reach the bottom of the oil pan and more residual oil will remain after pumping than would remain after unassisted drainage. Other machine components can also be

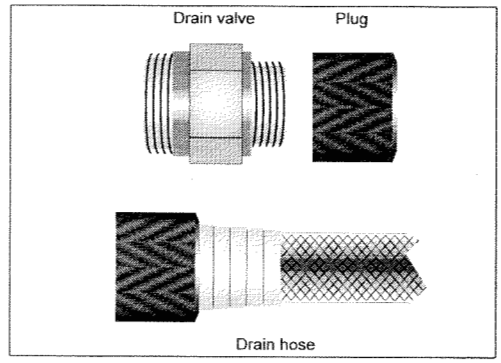

Figure 1. The Ettco drain valve.

emptied with a pump if a hose can be connected to their drainage ports, possibly using a quick coupling. Not all components are suited for conversion to such a system, however. For example, the drainage ports on axles are often so close to the belly pan that there is no room for fittings and hoses.

Other suction devices for removing oil are available. The Slurper, developed in Maine, is a tank designed to suck used oil from machine components using a vacuum. A venturi-type pump powered by compressed air creates a vacuum in the tank in about three minutes; then, a 6- or 8-mm plastic hose is pushed to the bottom of the crankcase through the engine's oil dipstick hole and the tank's valve is opened. Hot oil is drawn from the engine at about 4 L/min. Once the engine is empty, the remaining vacuum cleans the suction hose. It is important to push the suction hose right to the bottom of the oil pan to ensure complete drainage before the vacuum is lost. Because this loss of vacuum can occur before drainage is complete, a backup method must be available at locations without access to compressed air. Used oil can be transported to the main collection point in the Slurper itself, which comes in 18- and 32-L sizes. The price of a Slurper starts at $380 (all costs have been converted to 1993 Canadian dollars).

The final drives in crawlers have drainage ports very close to the ground. Therefore, shallow catch basins must be used, and these basins are difficult to handle when full. Bowater Inc.'s Southern Woodlands Division has addressed this problem by connecting a hose to a shallow catch basin, from which the oil is pumped into a 200-L steel drum using a manual pump. The same pump can be used to empty the steel drum into a central waste oil collection container.

DRAINAGE AND TRANSPORTATION CONTAINERS

Open catch basins cannot be used for transporting used oil to a central collection point at the garage or camp. The catch basin must close to prevent spillage during transport or the oil must be transferred into a separate transport container.

Simple existing materials can often be used. For example, the top of a 20-L plastic oil pail can be removed to catch draining oil and then reinstalled easily for transport. If a hose can be fitted from the component through the container's top to direct drainage, the top need not be removed.

L.D. Long Inc.'s maintenance crews designed an aluminum drainage and transport container. The container's broad, funnel-shaped top (Figure 2) collects draining oil over a relatively large area and directs it into a reservoir through an opening that can be plugged during transport. A plug in the bottom of the reservoir permits subsequent drainage. Used oil filters can also be left in the top to drain. The first model, used to drain oil from skidders, had a 75-L capacity and cost $170 to manufacture. A shorter tank ($130) was later designed for draining oil from graders. Since a single worker can only safely lift a 20-L container full of oil, the containers should be built with the minimum possible capacity.

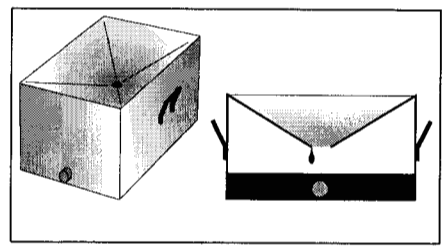

Figure 2. The funnel-top oil container produced by L.D. Long Inc.

CONCLUSIONS

Oil changes are frequently necessary with heavy forestry equipment, and careless handling of waste oil can cause spills. Redesigning oil drainage valves, selecting appropriate containers to receive the oil, and using a hose will reduce labor, and will minimize the risk of spills and of operator exposure to used oil.

For more information:

- J. Stewart Murray Agency (Ettco drain plugs)
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  (204)488-3885, Fax 489-0129
- Technical Support Services (Slurper)
  Waterman Beach Road, Box 632
  South Thomaston, Maine 04858
  (207)596-5671, Fax 596-7101 (Lowell R. Goodman)
- Bowater Inc., Southern Division Woodlands
  (used oil recovery system)
  P.O. Box 1437
  Cleveland, Tennessee 37364-1437
  (615)472-0241 (Walter E. Craig)
- L.D. Long Inc. (waste oil drainage reservoir)
  Monticello, Arkansas
  (Described in "Capturing oil the easy way", Timber Harvesting (July 1993), p. 27.)