Advantage
NOT Restricted to FERIC Members and Partners Vol. 2 No. 3 January 2001

Keywords:
Saw-chain oilers, Harvesters, Lubrication, Easy Greasy GM 220 oiler, Hultdins oiler, Oil consumption, Comparison.

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Conventional versus continuous saw-chain oilers for harvesters

Abstract

Newer lubrication systems for harvester saw chains provide a continuous flow of oil to match the chain's needs, and potentially reduce costs. FERIC measured oil consumption with conventional and continuous oilers, and found payback periods as low as 1.5 years with a continuous oiler installed at the time of purchase and 2.5 years with a retrofitted harvester.

Introduction

Conventional saw-chain lubrication systems administer measured amounts of oil when operators activate the saw. The amount of oil generally remains constant, regardless of how long the saw operates, though changes in oil viscosity cause some variation. In contrast, newer oilers continuously supply oil throughout the cut, for as long as the saw operates, so shorter cuts use less oil. These continuous oiling systems should significantly reduce oil costs by reducing oil consumption and, to a lesser extent, improving chain and bar life. They should also reduce oil discharges onto the forest floor, thereby reducing environmental impacts. To gauge the potential savings, FERIC compared the economics of conventional and continuous lubrication systems.

Study description

In the fall of 1999, FERIC and Highland Pulp Ltd. studied an operation near Truro (N.S.) in which multiple products were being processed. Stands were mostly a mix of softwoods and hardwoods. Log diameters averaged 16.5 cm, and harvester productivity averaged 20 m^3/PMH. Highland Pulp supplied a Timberjack 608 harvester with a Logmax 650 harvester head, and helped adapt the machine. The Logmax head used an Easy Greasy GM 220™ continuous-flow oiler, which supplies oil only when the saw operates. FERIC installed a compatible conventional Hultdins oiler for part of the trial to measure oil consumption when constant, metered shots of oil are dispensed. Hydraulic pressure in the saw bar's actuator cylinder drives the Hultdins oiler.

Our goal was to compare the amount of chain oil used by the two systems under identical conditions. To do so, we first measured the oil consumption per cycle (for the Hultdins oiler) or per unit of time (for the Easy Greasy). Next, we recorded the number of saw activations and their durations during normal operation. Finally, we measured the volume of wood processed during the measurement period.

Results and discussion

We activated the Hultdins oiler several times and measured its oil output in a graduated cylinder. When the saw cylinder cycled quickly, the pump sometimes filled incompletely because of the oil's high viscosity. To resolve this problem, we calculated the average amount of oil used by fast, repetitive saw cycles and slow, deliberate cycles, both of which occur in actual operations. Oil volumes averaged 1.34 mL per actuation for the Hultdins, versus a nominal

volume of 1.8 mL. We measured oil delivery by the Easy Greasy with its control unit set to low, medium, and high (i.e., activation every 1.2, 0.7, and 0.2 milliseconds, respectively); the operator had found the "high" setting to be optimal in normal operations. We measured average oil flow rates of 5, 9, and 25 mL/min, respectively.

To quantify oil consumption, we counted the number of activations of the Hultdins unit and the total duration during which the Easy Greasy supplied oil. To calculate the oil consumption per m^3 of wood, we divided the total volume harvested into the total number of saw activations (for the Hultdins) or the total number of minutes of saw operation (for the Easy Greasy), then multiplied the results by (respectively) the average oil volume per activation and the average oil volume per minute. Figure 1 represents the average oil consumption rates along with the maximum and minimum values. Oil consumption averaged 18.74 mL/m^3 with the Hultdins oiler, versus 8.92 mL/m^3 with the Easy Greasy.

Based on these oil consumption rates, a contractor cutting 60 000 m^3 of wood per year could repay the cost of an Easy Greasy in around 2.5 years using mineral oil (at $1.25/L) or 1 year using vegetable-based oil ($3.00/L). This assumes that the harvester head already comes with a Hultdins or similar oiler and that replacing it with an Easy Greasy costs an additional $1800. However, installing the Easy Greasy at the time of purchase costs only $1000 more, and this would reduce the payback period to less than 1.5 years with mineral oil and less than 7 months with vegetable-based oil.

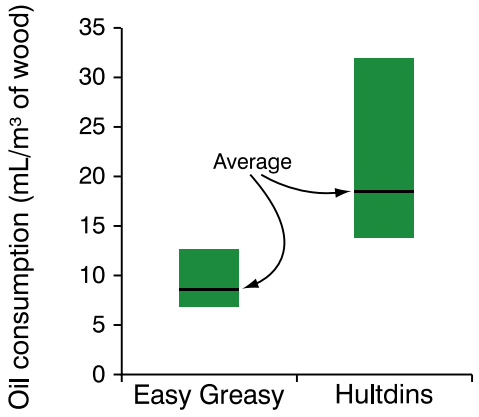

Figure 1. Mean oil consumption and range of values with a continuous oiler (the Easy Greasy) and a conventional Hultdins oiler.

Implementation

Continuous chain oilers offer savings over conventional oilers, with the fastest payback when they are installed at the time of purchase. Retrofitting existing heads also saves money. The payback periods in this report are conservative, since the Easy Greasy used its maximum flow setting, while the Hultdins oiler consumed less oil than usual because of high oil viscosity. Optimizing oil delivery should also improve saw chain and bar life, but longer studies are required to confirm this.

Acknowledgments

The author thanks James Tompkins and Highland Pulp Ltd. for their assistance in this study.

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Publications mail #1677314 ISSN 1493-3381