

5 % EFFICIENCY GAIN – PLUS A 20 % PRODUCTIVITY BOOST THANKS TO A DYNAVIS® FORMULATED HYDRAULIC FLUID



PERFORMANCE DEMONSTRATION:

PT. Kayan Putra Utama Coal, Camp Sidi, North Kalimantan, Indonesia



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CUTTING DOWN ON FUEL CONSUMPTION – BOOSTING PRODUCTIVITY

Mining test in Indonesia reveals efficiency potential

Every mining company is trying hard to save expenses with extraction and handling of material. At the end of the day, it’s the cost per ton that counts. That’s why they typically keep a close watch on their equipment’s fuel and energy consumption. One further crucial success factor for mines is productivity in terms of tons of material moved per time.

‘Fuel consumption’ is the answer of most managers and operators when asked for the largest cost factor in their mine. This also applies to the Indonesian coal mine Kayan Putra Utama Coal (KPUC). At Camp Sidi, KPUC owns and operates 25 excavators, each of them burning as much as 100 liters of fuel per hour when pushed to the limits. KPUC records an annual output of 1.5 million metric tons of thermic coal. The lubricant manufacturer, United Tractors and Evonik were glad to get the opportunity from KPUC for a performance demonstration.

This test is the first of its kind in Indonesia and it has revealed promising results concerning the savings potential and the improvement of productivity of a hydraulic fluid formulated with DYNAVIS® technology. The test showed that it is possible to make excavators more efficient, just by changing the hydraulic fluid, opening up tremendous savings potential. A comparison between two different hydraulic fluids was scheduled, one with a conventional hydraulic fluid, the other one the DYNAVIS® formulated hydraulic fluid. The reference oil was formulated from a high viscosity index base oil and a balanced additive system. It had a viscosity grade of 10W and a viscosity index of 113. The competing efficiency improved hydraulic fluid has a unique formulation based on DYNAVIS® technology using Group III base oils. It has a viscosity grade of 46 and a viscosity index of 180.

A fluid with significant benefits

The challenging fluid is a high viscosity index hydraulic fluid that promises an efficiency improvement of hydraulic equipment’s performance. At the same time, it claims to lead to a higher productivity level of the hydraulic equipment. It is the result of a cooperation between the oil manufacturer and Evonik.

The high VI hydraulic fluid has been developed using Evonik’s DYNAVIS® technology and – thanks to its high shear stability – provides long lasting efficiency improvement, better protection for the hydraulic system and extends fluid changing intervals.



“At KPUC we achieved results at a confidence level of 99%, representing our very accurate measurement system and careful collection of data.”

Dr. Achmad Zen, Manager Performance Testing, Innovation Management, Evonik Oil Additives

The testing conditions

The goal of the performance demonstration was to find out if the hydraulic fluid formulated with DYNAVIS® technology was capable of enhancing fuel efficiency, increasing operational performance, improving workforce productivity and lowering operating cost. Specialists from Evonik installed sensors and flow meters to measure data directly from the hydraulic and fuel system of the excavator. The local authorized Komatsu dealer for Indonesia, United Tractors, provided the technical support to the mine site and for the devices’ installation. The excavator was operated under real-world mining conditions – the big difference however was the better hydraulic fluid in part two of the test.

The conventional hydraulic fluid was tested versus the DYNAVIS® formulated one for three consecutive weeks in real mining conditions without any alteration.

Apart from that, the engineers assessed the 12-hour shifts on the criteria of total volume of material handled, fuel consumption, fuel efficiency, work efficiency and productivity. Daily status updates were collected on the machines during operation. The change of fluid temperature and pressure over time was recorded as well.

UNIQUE RESULTS

Pressure profile

With the DYNAVIS® formulated hydraulic fluid (purple curve), the same hydraulic power can be achieved at lower system pressure. This was recorded with all three monitored hydraulic pumps. The lower pressure is a result of the higher hydromechanical and volumetric efficiency of the fluid with DYNAVIS® technology. It makes excavators react faster and more accurately to operators’ steering commands with less throttle power.

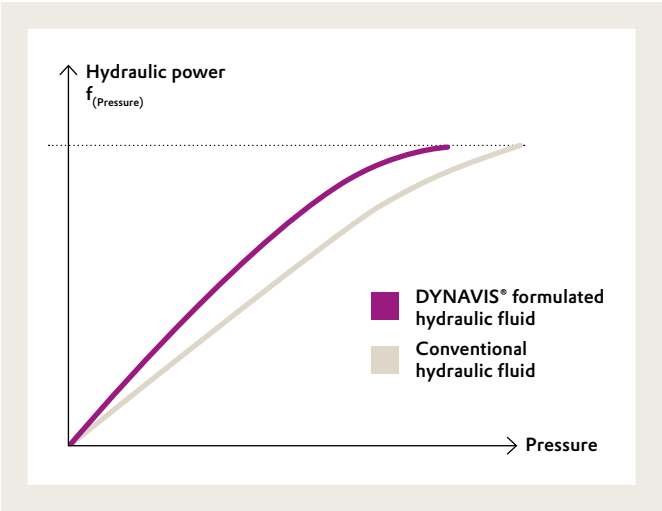
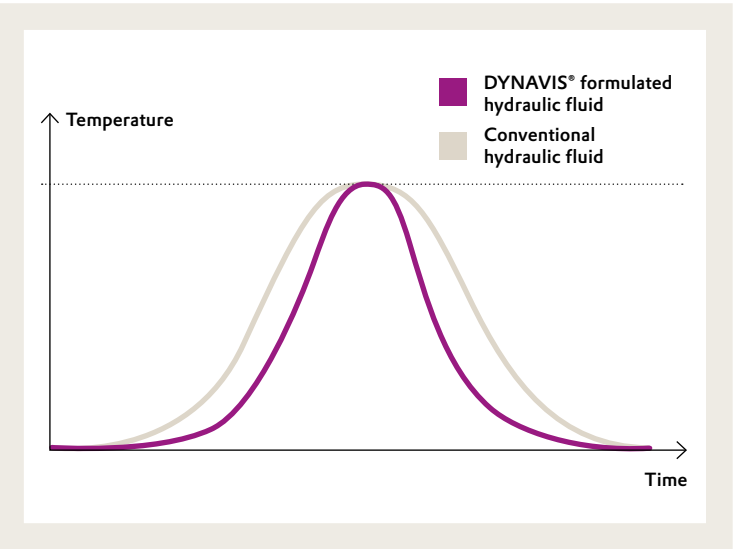
Temperature profile

The purple curve for the DYNAVIS® formulated hydraulic fluid shows a slower heat up and faster cool down compared to the reference fluid.

The improved temperature profile results in less oxidation and helps extend the life time of both the fluid and the equipment.

The equipment

The performance demonstration was run using a typical mid-sized mining excavator with a hydraulic fluid volume of 1,200 l, which allows to expect productivity gains of the same order in similar mining equipment.



“The usual problem that we have encountered comes from the hydraulic oil. The hydraulic oil quickly heats up and decreases the power output. However, when we use a DYNAVIS® formulated hydraulic fluid, the temperature is very stable.”

Pak James Tompunu, Operational Manager Heavy Equipment, KPUC



What is DYNAVIS® technology?

DYNAVIS® is a technology for formulating hydraulic fluids that increases the efficiency and productivity of hydraulic equipment.

DYNAVIS® technology offers a number of benefits: the equipment responds more accurately, shows reduced wear and less leakage due to better seal compatibility. As a result, the fluid life increases and oil drain intervals can be extended. The use of hydraulic fluids formulated with DYNAVIS® technology pays off quickly, most notably in demanding applications, while also assuring higher returns, lower energy consumption and reduced CO₂ emissions.



"The performance test of the DYNAVIS® formulated hydraulic fluid conducted in KPUC was very good, it is done professionally with the help of installed tools and sensors to obtain accurate performance data. We had very good performance for many hours during testing time, very good speed and performance for operators, so we are very satisfied with this hydraulic fluid."

Pak Dedi, Service Department Head, United Tractors

The efficiency leap in detail

On average, the conventional fluid allowed the operators to move 3,860 BCM per shift at a fuel consumption of 601 l while the fluid with DYNAVIS® technology allowed to move 4,960 BCM at a fuel consumption of 646 l, equal to a productivity increase of almost 20 %.



"There are significant differences when I use the DYNAVIS® formulated hydraulic fluid. The power output is maintained and constant even after many hours, and I can load more in the dump truck or hauler. My message to other operators, especially those in Indonesia: please try the DYNAVIS® formulated hydraulic fluid."

Pak Joni, Operator, day shift, KPUC

FACTS AND FIGURES

Shift length	12 hours
Volume per truck	19.68 BCM*
Start of study	December 6, 2018
End of study	December 20, 2018

*BCM = bank cubic meters

FINAL TEST RESULTS

Fuel efficiency gain BCM per l	+ 5 %*
Productivity gain BCM per h	+ 20 %**

*at a confidence level of 99 %

**according to an official confirmation of PT. Kayan Putra Utama Coal
Calculated as compared to conventional hydraulic fluid.