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A large graphic of a pair of grey-rimmed spectacles. The lenses and bridge are filled with blue circles containing white icons: a money bag with a dollar sign, a tractor, a large mining truck, a shield, a 24/7 service icon, and a stack of oil barrels labeled 'UNIVERSAL'.

**MORE
FOR LESS
WITH UNIVERSAL OIL**



Universal truths:

Can off road operators really get more for less?

We all want more for less – more productivity, more profit with less cost and less complexity. Everyone yearns for it, but not everyone believes it is actually achievable. Perhaps, to phrase it in lubrication-oriented terms, some will always see the sump as half-empty while others see it as half-full.

Making money is about striking a balance between productivity and costs. Many factors affect this balance, from the price you pay for machinery to its performance, reliability and durability, and of course ongoing running and maintenance costs. Lubrication is the common thread that connects productivity with the total cost of ownership, and we believe choosing the right lubricants can help off-road operators find the right balance and make more money.

Off road lubricant growth

Off-road vehicles account for 10% of the global lubricant market demand, growing at 2.2% annually. This market further breaks down into agriculture, construction and mining, with Europe accounting for around 20% of the global off-road lubricant consumption. Off-road is an area often overlooked as a growth opportunity because there is little market information for this region. We have done research to better understand the needs of end users within this industry and gain further insight into how universal oils may offer a solution.

2016 was a tough year in off-road industries but confidence is growing in agriculture and construction with increased investment in urbanisation, infrastructure and housing. The mining industry outlook remains problematic with non-coal commodity prices staying low due to economic conditions. Operational excellence has become essential for survival in the off-road industry. Now more than ever, operators are focusing on the role of maintenance in reducing overall costs. Capital investment in new equipment is lower and replacement cycles for new machines are longer. This trend has led to recent growth in the second hand market for off-road equipment in mature European countries.

Universal solutions

Off-road machinery is expected to undergo three 'lifecycles' after leaving the factory floor, meaning that a typical machine will have had at least three owners before reaching the end of

its life. Good maintenance protocols and the right lubricants are essential throughout to maximise the lifespan of every piece of equipment. As a consequence, the appeal of a universal oil has increased due to a growing fleet of pre-owned off-road equipment having different model years, hardware types and manufacturers.

Universal oils are driveline lubricants that can service many parts of the machine including oil-immersed brakes, transmissions, hydraulics, axles, final drives and in some cases the engine. This is an arduous task as high levels of performance are required of the lubricant for each hardware type. Further complexity is added when, depending on the model, there may be one or more sumps to maintain. We take a look at the benefits universal oils offer, in the face of these challenging operational requirements and differing market and end user needs.

Meeting the challenge

Off-road agriculture, construction and mining equipment operates in severe environments. The pendulum of conditions can swing from extremely cold to hot operating temperatures and often include excessive exposure to dirt and water. Equipment is often heavily loaded, and may be used for as little as a few hours a day to constant 24-hour operation, seven days a week. Productivity is at a premium, so having the necessary lubricant to deal with these extremes is essential for keeping off-road vehicles in good condition.

Traditionally, the number of sumps on an off-road vehicle could lead to different ways of lubrication. Machines with a common sump could use a universal oil, whereas with multiple sumps a universal oil could be used in the driveline with the addition of an engine oil to meet the engine specification and OEM recommended specifications.

Users can also end up using a different lubricant for each part of the driveline, i.e. one lubricant for wet brakes, another for transmissions, yet another for axles, and so on. This leads to costly investment in product and storage needs. Furthermore, applying the incorrect fluid to the wrong part can cause severe damage to the machine, adding complexity to off-road equipment maintenance – particularly when the fleet contains equipment of different ages and specifications.

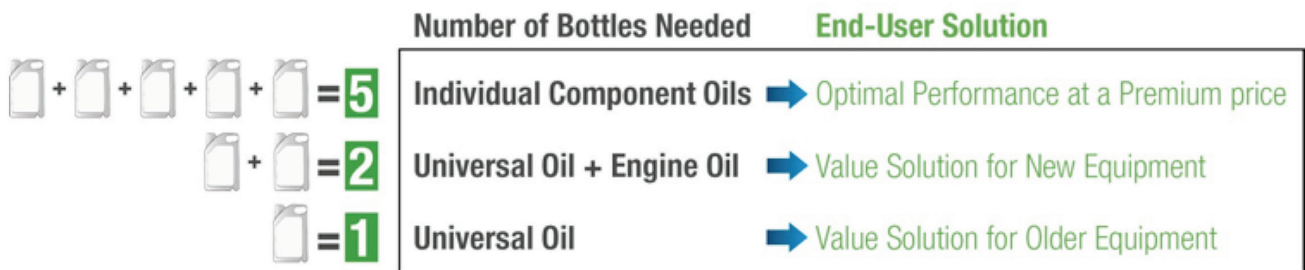


Figure 1: Different Off-road Lubricant solutions

While growth in the used equipment market emphasises the importance of correct maintenance with the right lubricants, universal oils are extremely well placed to meet end user needs by optimising machine performance, reliability and durability across a mixed fleet.

Second hand equipment sales on the rise

Investing in used equipment has many advantages for the off-road industry: the saving on upfront costs associated with new equipment, combined with limited depreciation over the machine's lifecycle, leads to reasonable resale values and lower operating costs. This drives productivity

and contributes to the bottom line. Depreciation on off-road machines is lower than that of cars, for example, due to their longer total lifespan. Most depreciation happens in the first year off the factory floor – around 20-40% – but thereafter a machine retains its value well, providing it is properly maintained.

Due to the increase in used equipment in the market the average age of machines in operation is rising. A well looked after machine can generally fetch 15-20% more on resale value, therefore appropriate lubrication and maintenance is key to maximising equipment resale potential.

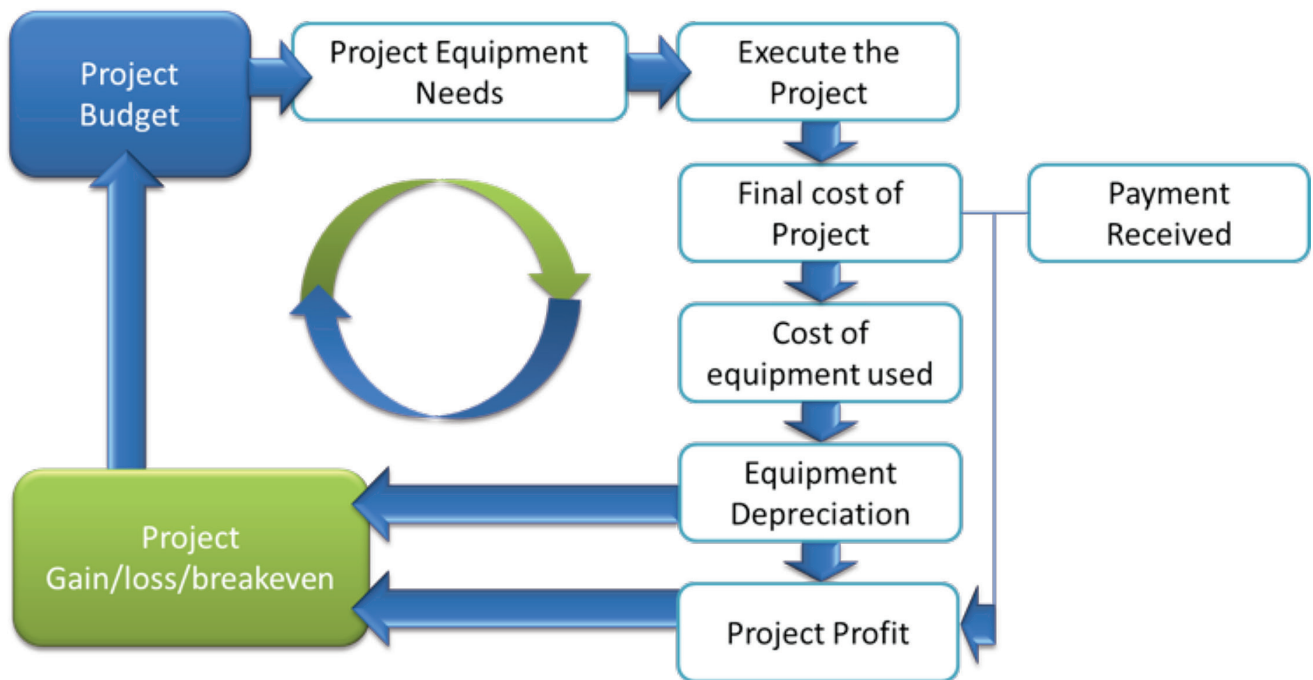


Figure 2: Typical Financial Project Cycle

Average prices for used equipment are down 15% compared to 2015, as sales increase from overseas and expanding European markets.

Following the recent Brexit vote, second-hand off-road equipment sales have increased in the UK; while domestic buyers focus on cash flow, overseas buyers may take advantage of the dip in sterling to buy in the UK. Agricultural tractors, excavators of various sizes and mine haul trucks are some of the most popular in the second hand market.

Universal solution to changing fleet needs

Growth in used equipment sales means that fleets may increasingly be made up from machinery of different ages and from multiple OEMs. For fleet operators this makes buying, storing and applying an array of different lubricants increasingly expensive, while further raising the risk of the wrong lubricant being applied to a particular component.

A recent European study by Lieberman research worldwide on behalf of Afton Chemical surveyed off-road end users in

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Germany and France on their buying criteria for universal oils. The overriding requirements of end users – whether owners and operators or maintenance and fleet managers – were:

1. Maximum engine durability
2. Smooth hydraulics
3. Meeting newer and older engine specifications
4. Minimising risk and storage of fluids.

Universal oils offer a simple yet effective solution, without having to sacrifice high performance levels. The right universal oils deliver high performance characteristics with longer drain intervals to help keep productivity up and the total cost of ownership down. Coupled with multiple OEM specification approvals, universal oils can successfully be used across mixed OEM fleets, cutting down the storage space needed for lubricants and lessening the risk of operators using fluids incorrectly.

Machinery differs from agriculture to construction to mining, so equipment lubrication needs to be tailored. In off-road there are two main universal oils: one for agriculture and construction applications, the other catering to mining equipment.

Agriculture and construction oils

Tractors and excavators make up the majority of this market and in France the universal oil adopters tend to use Super Tractor Universal Oil (STOU). These oils can be used in the engine as well as the transmission, wet brakes, gear, axles & hydraulics, meaning only one oil is required for maintaining the entire fleet.

German users instead prefer to use a dedicated engine oil, plus a Universal oil for all the other machine parts. In both countries, the number of different oils required for fleet lubrication is significantly reduced to just one or two.

The simplicity of universal oils reduces the risk of misapplication, of paramount importance with the rise of imported machinery and potential language barriers for foreign workers. Reducing storage is an additional benefit for machine operators and owners, as illustrated by the end-user comment below:

"Storage space. And I don't always have to check what oil goes where and is used for what; I simply know what to use if I only have two kinds, or just one specialised oil that is used for the three different areas. That's what's nice about it."

Martin, Farmer, Germany

What should I look for in a universal oil for agriculture/ construction?

Universal oils should meet at least ACEA E3 and API CG-4 specifications when used using in older equipment engines and drivelines. These fluids cater to longer drain intervals under severe operating conditions and offer superior stability and cleanliness, reducing wear on engines and equipment for an all-important longer lifespan. To ensure hydraulics run smoothly, universal oils that meet the hydraulic requirements of Sperry Vickers and Sauer/Sunstrand tests are suggested.

The right formulation will be suitable across a multi-brand fleet; where the most popular OEM specifications include John Deere, Massey Ferguson, New Holland, Volvo, Fendt, Case and Ford. Universal oils with the latest and most demanding specifications are best placed to support the fleet as it expands and alters its composition.

Mining lubricants

Mining haul trucks make up a large portion of the market. These place particularly heavy demands on lubricants, with intense work cycles and extremely tough operating environments where productivity is crucial and downtime is costly. Using the correct lubrication across the mining fleet saves significant cost by protecting components effectively and maximising productivity. Universal oils catering to the mining application are referred to as TO-4 oils, based around meeting the caterpillar TO-4 specification.

What do you need from a universal oil for mining?

TO-4 oils are suitable for mining machinery that meet the demanding Caterpillar TO-4 specification, but it's not the only approval you should look out for. Fluids that meet the latest Alison TES-439 specification require a higher performance standard to protect heavily loaded components, which is essential to the ongoing maintenance of mining equipment. TO-4 oils meeting KES 07.868.1 for Komatsu and other OEM specifications such as ZF and hydraulic approvals will offer the widest possible fleet coverage. Not only do TO-4 oils offer superior wear protection and load carrying, they also include outstanding yellow metal protection to help maintain optimum performance and longer component life. This helps mining operations minimise downtime and maintenance costs for machinery fleets of all ages.

Universal benefits

It is clear to see how universal oils can contribute to minimising risk, saving money and maximising fleet productivity by providing optimised protection and reduced maintenance for off-road equipment of varied types, ages and OEM recommendations. Operators looking for a lubrication solution for an expanding multi-brand equipment fleet stand to reap considerable benefits in taking a more universal approach, making maintenance simpler and easier.

Regardless of whether you tend to see sumps as half full or half empty, you'll have far fewer sumps to deal with and greater peace of mind when you use universal oils in your off-road equipment.

To find out more about universal lubrication solutions for your off-road fleet, please visit: <http://www.aftonchemical.com/SBU/DrivelineAdditives/Off-Road>.

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