# Fact or Fiction:

## Biodegradable lubricants perform as well as conventional products

There is a misconception that biodegradable lubricants do not match the performance of conventional products. We explore three of the most common myths behind this.

## Myth 1

### Readily biodegradable lubricants[1] fall apart on contact with water

Water can break down synthetic esters in biodegradable lubricants through hydrolysis, but:

- The process occurs very slowly under standard operating and storage conditions. [2]
- The lifetime of any lubricant can be extended by keeping systems clean and dry.
- Water levels in well-maintained lubrication systems are minimal. [3]

Biodegradable lubricants are able to match conventional products for hydrolytic stability. [4]

## Myth 2

### Biodegradable lubricants oxidise quickly, resulting in short oil drain intervals

Esters used to formulate biodegradable lubricants make a difference to a product's oxidation stability[2]:

- **Naturally occurring vegetable oils:** effective biodegradability at a low cost but prone to oxidation and require frequent oil changes.
- **Unsaturated synthetic esters:** excellent biodegradability and ecotoxicity performance but lower oxidation stability than saturated esters.
- **Saturated synthetic esters:** high oxidation resistance and improved stability, alongside excellent biodegradability and ecotoxicity performance.

In some cases, saturated esters can deliver better oxidation resistance than mineral oils.[5]

## Myth 3

### Biodegradable lubricants are not compatible or interchangeable with mineral-based lubricants

Across a range of blends, there is clear compatibility between some mineral oils and esters [6]

- Under low temperature conditions, oil mixtures remain clear, miscible and fluid.
- There is no separation or changes in viscosity between different blends.
- In low-temperature storage, biodegradable lubricants demonstrate equal or better stability.

Although the base fluids may be compatible, additives used to boost performance can be incompatible, and Shell advises for PANOLIN fluids, in line with ISO 15380, that less than 5% mineral based contents should be mixed with the product for optimum performance.Testing is always advised prior to filling.

*Fig 1*

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*Fig 1 – Compatibility study showing a saturated ester (66) miscible with Grp II Mineral oil (67) at ratio 90/10 (68).*

1 Examples include Shell PANOLIN S4 HLP Synth EAL, Shell PANOLIN S4 HLP Synth, and Shell PANOLIN S2 Hydraulic EAL.

2 How Ester-Based Oils Handle Hydrolysis to Remain the Top EAL for VGP, Maritime Report and Engineering News, Whitepaper, July 2015

3 Water levels in static systems are generally lower than 0.01% ppm, making the impact on biodegradable lubricants minimal.

4 Shell PANOLIN biodegradable hydraulic lubricants pass Swedish Standard 155434 tests and protocols.

5 Saturated ester based hydraulic fluids last longer (695 minutes) than mineral oil based hydraulic fluids (415 minutes) in an RPVOT oxidation resistance test (Shell PANOLIN S4 HLP SYNTH 46 Vs Grp II Mineral oil based Hydraulic fluid)

6 Understanding Biodegradable Lubricants: An Introduction to 'Green' Oil in Hydraulic Systems Offshore, IMCA , October 2014



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