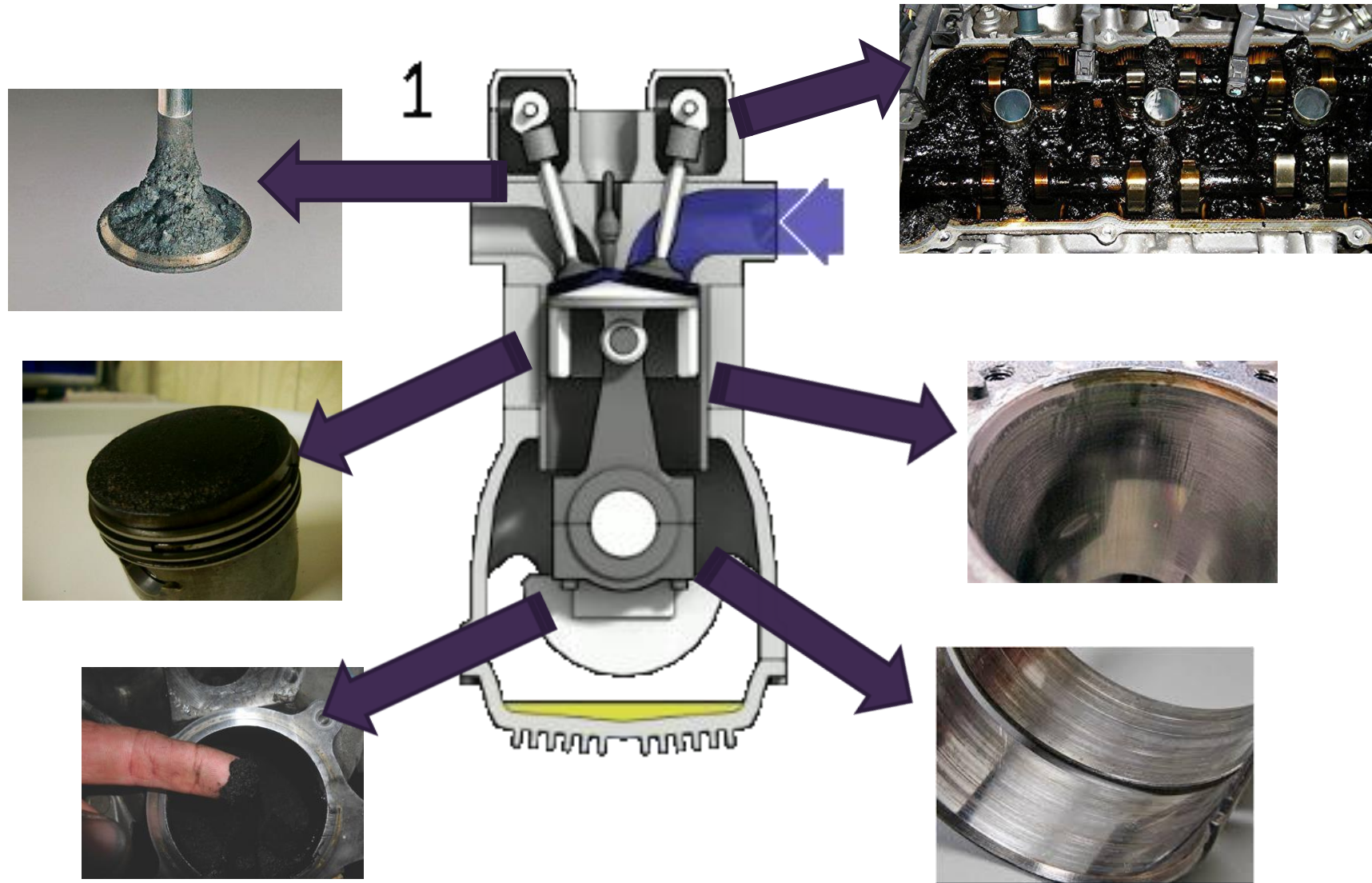
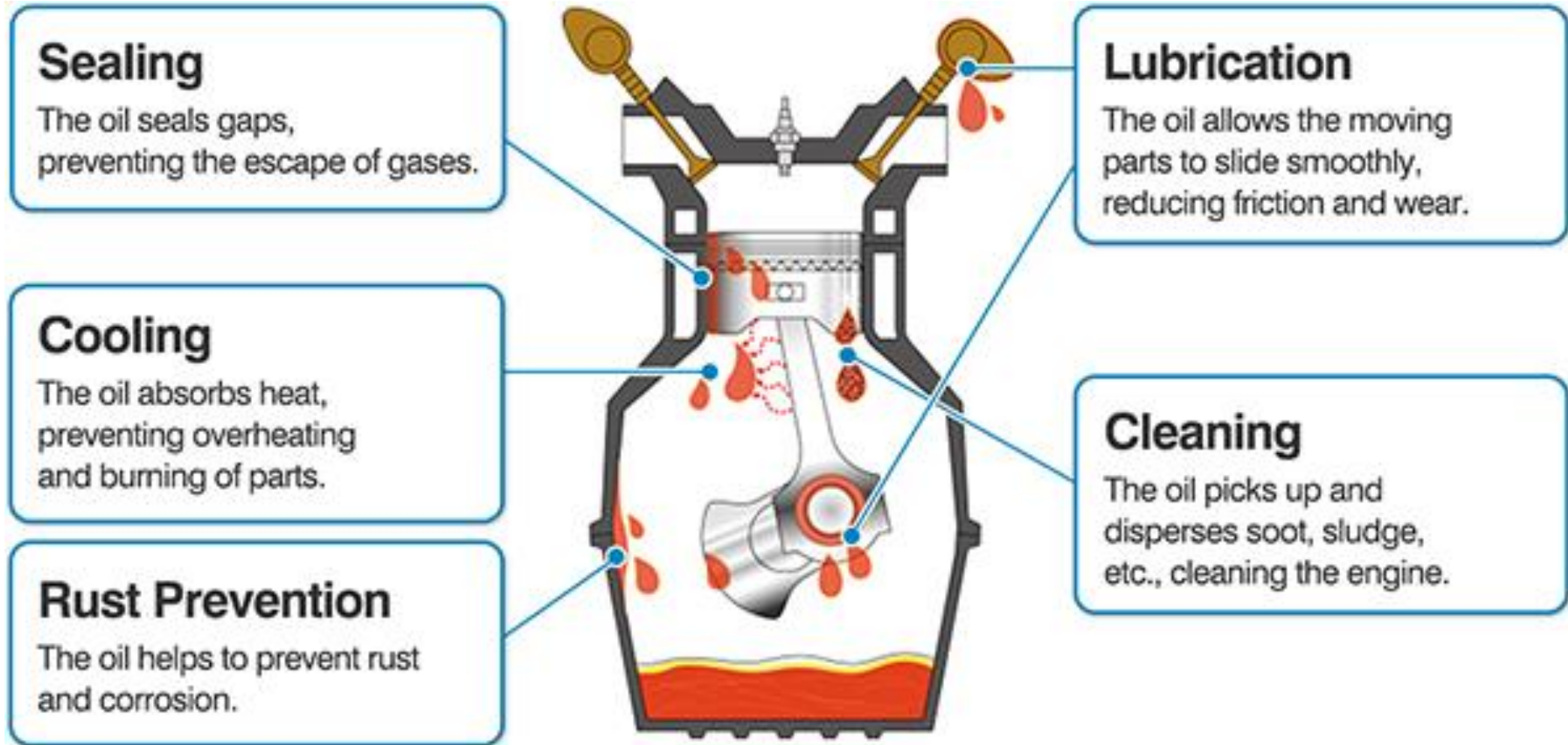


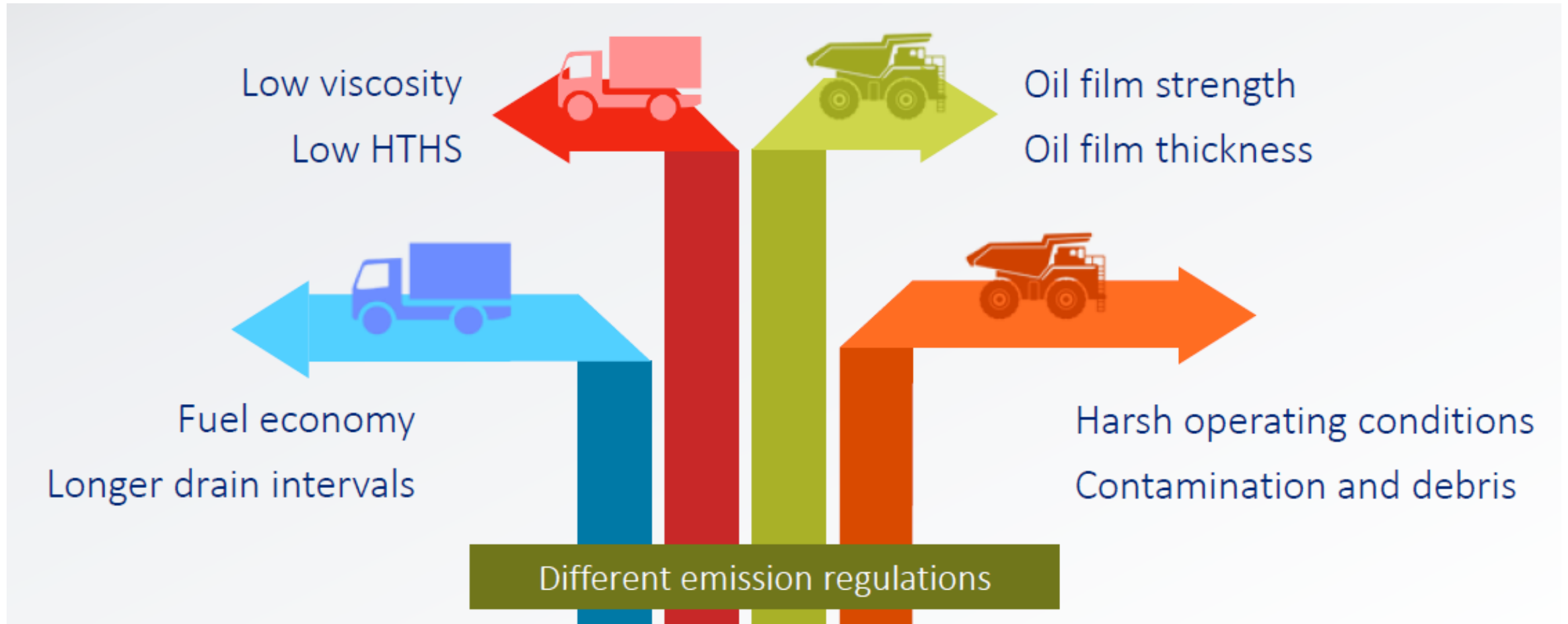
Engine Applications – The Challenges



Engine fluid functions



Lubrication needs for Commercial and Off-Road will continue to diverge



Key Challenges

Truck engine

Increasing engine demands requires an oil with core strength...

Fluid challenges

- Soot and deposits
- Oxidation
- Loss of viscosity
- High temperature & high shear.

Solution

- Strong detergent & dispersant properties to lock away deposits and soot
- Strong anti-oxidant properties to protect from oxidation
- Strong viscosity retention & shear stability



Vehicle challenges

- Longer journeys
- Fuel consumption
- Driving behaviour.

Solution

- Strong Long Drain capability
- Strong fuel economy capability
- Strong oil film even at high temperatures.

Engine challenges

- Varying fuel quality
- Heat and thermal stress
- Poisoning of after-treatment systems.

Solution

- Strong TBN retention to manage high sulphur
- Strong Low SAPS performance to protect DPF and other after-treatment systems.

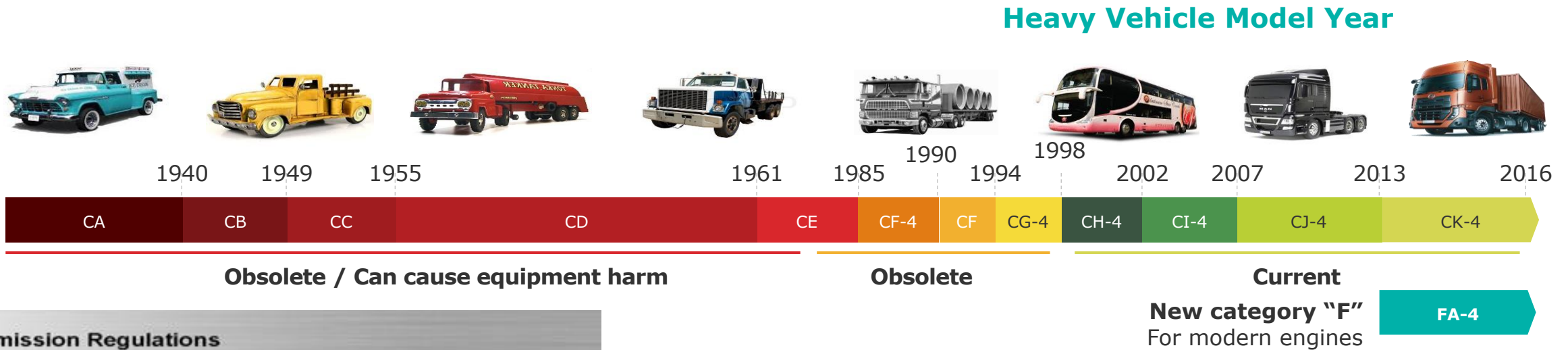
The Industry and OEMs specify engine oil specifications to ensure that the oil used meet required performance level



Environmental Factors Driving Lubricant Technology



API Service Classification 'C' & 'F' Categories

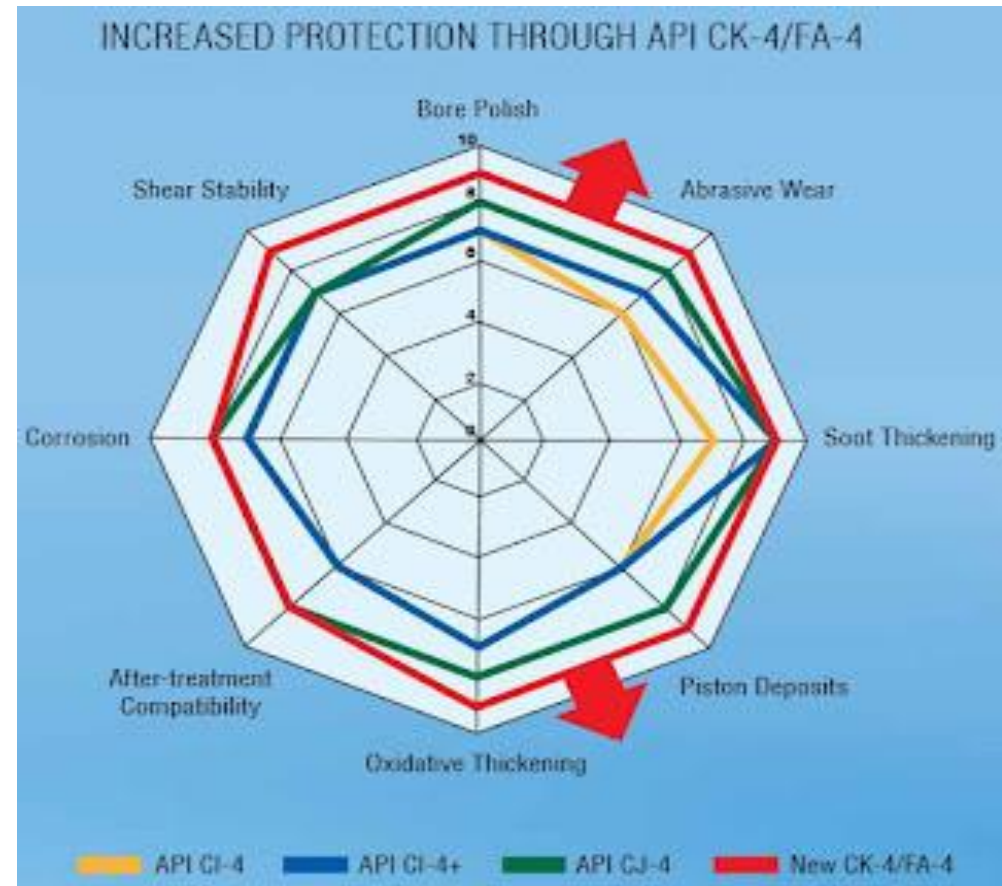
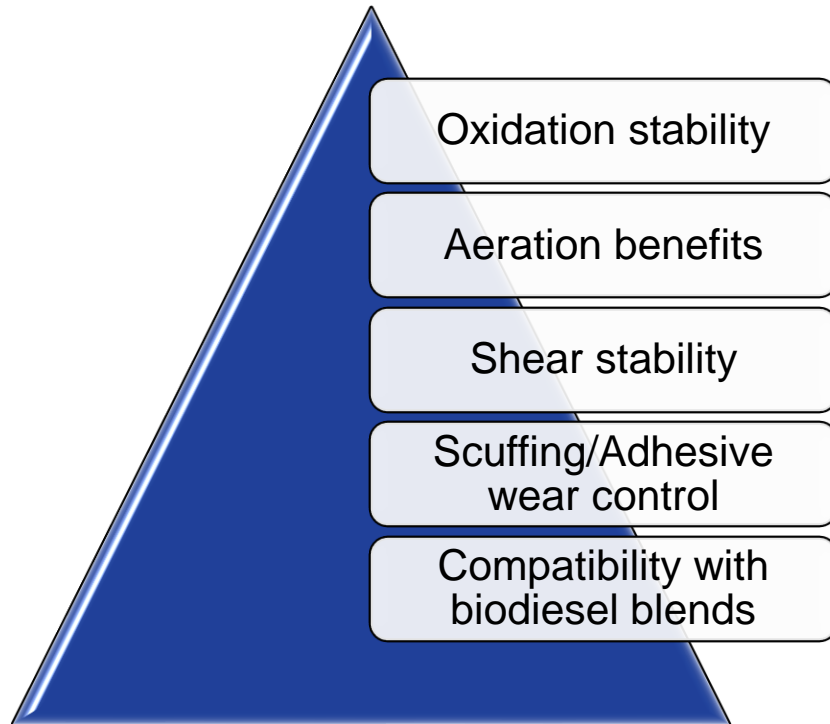


- **Reduced Emission**
 - Emission control devices (low ash)
 - Environmentally friendly fuels
 - Renewable fuels / bio fuels



Specification : API Engine Oil Classifications the differences between CJ-4 and CK-4 (UPGRADE)

- Improvements or changes in performance, relative to API CJ-4 Oils included :



HOW PETRONAS URANIA WITH STRONGTECH™ DELIVERS THE CORE STRENGTH

It focuses on all aspects of our customers' needs

Increase the time between oil changes



Longer ODI



Maximize engine performance.



High Mechanical Load and Power



Improve fuel mileage



better fuel economy



Extend engine life



Improves the service life of the engine

How StrongTech™ technology works?

PETRONAS Urania's
NEWLY
STRENGTHENED,
INCREDIBLY STRONG
molecule chains



LOCK AWAY
soot

MAINTAIN
optimal viscosity

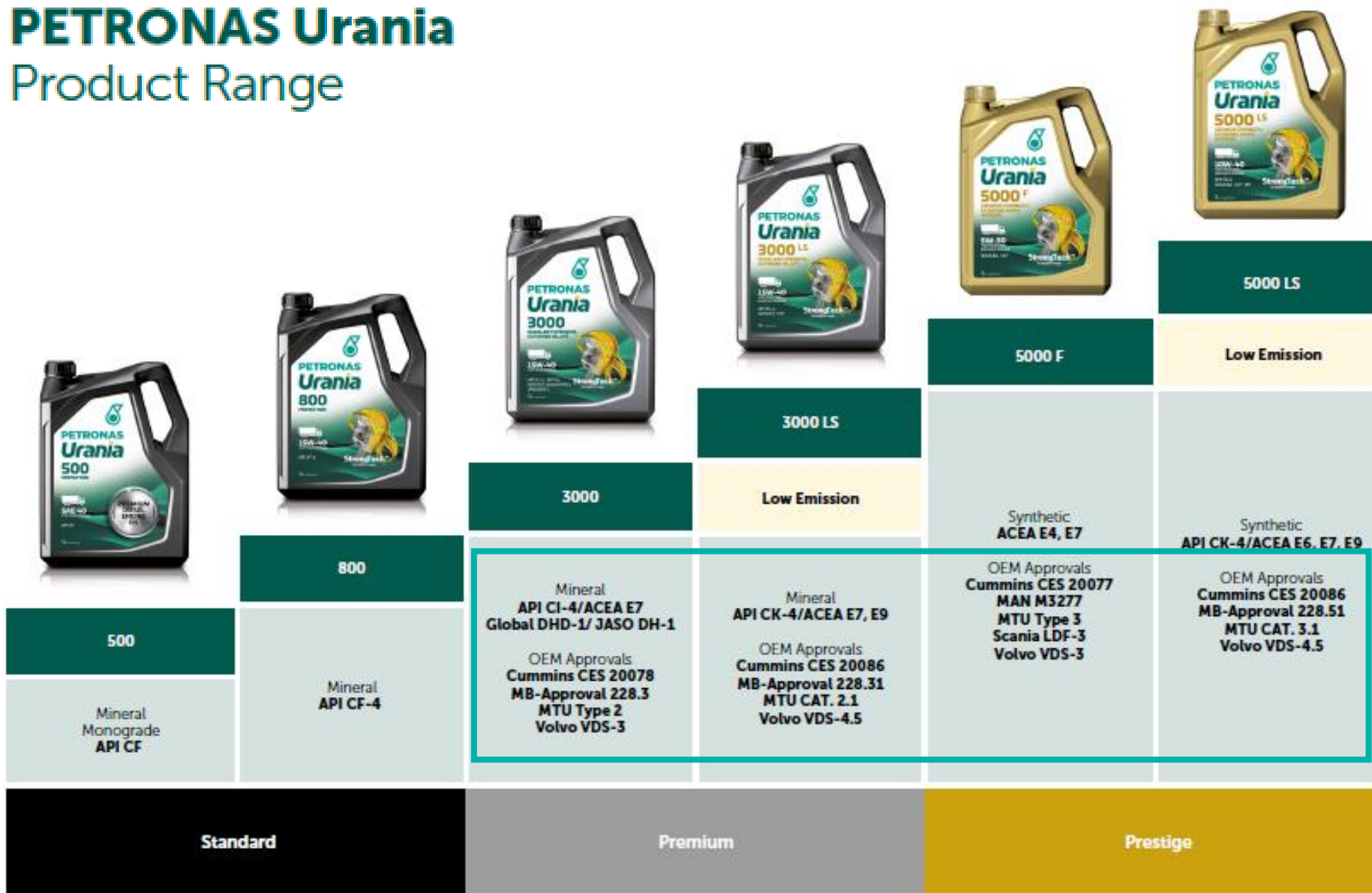
DEFEND against
wear and oxidation

**LONGER DRAIN
INTERVAL**



EXTEND the oil's
performance

PETRONAS Urania Product Range



COMPREHENSIVE PORTFOLIO

- ✓ To Suit Customer Needs
- ✓ Comes With TOP OEM Approvals

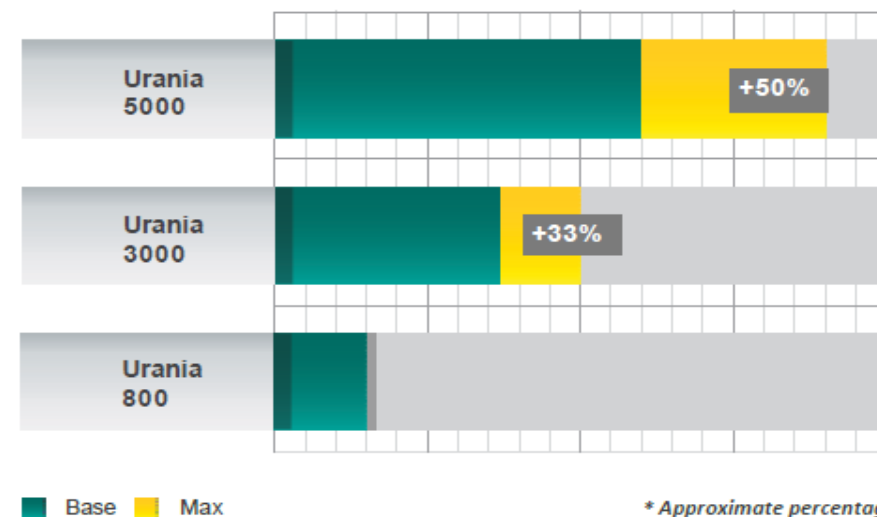
PETRONAS Urania Oil Drain Intervals

PETRONAS Urania delivers impressive ODIs across the entire product range based on the relevant OEM approvals and specifications.

EXCELLENT PERFORMANCE

Urania Oil Drain Interval

Urania Oil Drain Interval Percentage (%)



IMPORTANT NOTE:

1. This test done in EU. Condition based on fuel quality type EURO 5 & 6 Engine.
2. The drain interval ranges refer to minimum/ maximum drain interval for each product category (Urania 5000, 3000 etc.) according and depending on the OEMs specifications. It does not mean that previous ODI was extended.

- Urania 5000's base ODI is based on Mercedes-Benz 228.51 and Mercedes-Benz 228.61 approvals
- Extended ODIs are based on OEM specific approvals and/or hardware and software requirements
- Urania 3000's ODI refers to Volvo VDS-3 and VDS-4.5 approvals
- Urania 3000's ODI refers to the Mercedes-Benz 228.3 specification performance level.

PETRONAS Urania 3000 LS

Low Emission

Key product benefits
Improved wear protection



PETRONAS Urania 3000 LS is a premium, low SAPS oil that offers improved fluid strength for longer engine life. Protecting the engine from abrasive wear and keeping viscosity under control.

Specifications:

- API CK-4
- ACEA E7 / E9.

Performance level:

- CAT ECF-3
- DAF
- DETROIT DIESEL DFS93K222
- MAN M 3775.

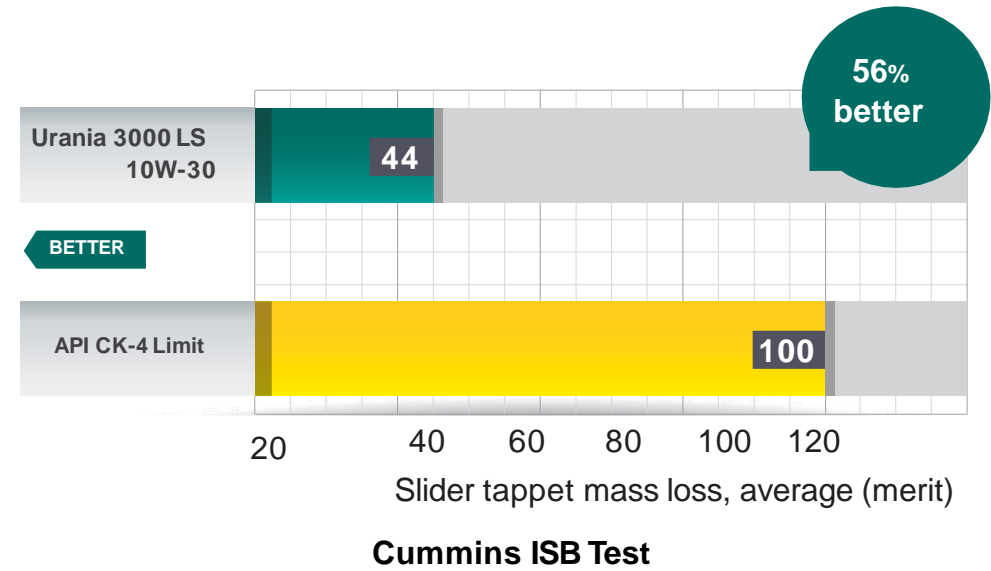
Approvals:

- CUMMINS CES 20086
- DEUTZ DQC III-10 LA
- MACK EOS-4.5
- MB-Approval 228.31
- RENAULT RLD-3
- VOLVO VDS-4.5.

Engine Protection Low Emissions

PETRONAS Urania 3000 LS protects the engine from abrasive wear and viscosity increase in high soot environments.

Urania 3000 LS Improved Wear Protection



This test is applicable to the following products: Urania 3000 LS 10W-30; Urania 3000 K-LS 10W-40; and Urania 3000 LS 15W-40.

* The test was based on the weakest example (10W-30), which means the results can be applied to the other variants with confidence.

PETRONAS Urania 3000 15W-40

Key product benefits
 Reduced concentration of soot build ups



The higher the piston cleanliness merit, the better the oil protects the engine from harmful deposits – which therefore demonstrates the strength of PETRONAS Urania 3000 15W-40 in this instance.

Specifications:

- API CI-4
- ACEA E7
- Global DHD-1
- JASO DH-1.

Performance level:

- CAT ECF-2, ECF-1a
- Cummins CES 20077
- MAN M3275.

Approvals:

- MB-Approval 228.3
- Cummins CES 20078
- Detroit Diesel DSF 93K215
- Deutz DQC III
- MACK EO-N
- MTU Type 2
- Renault VI RLD-2
- Volvo VDS-3.

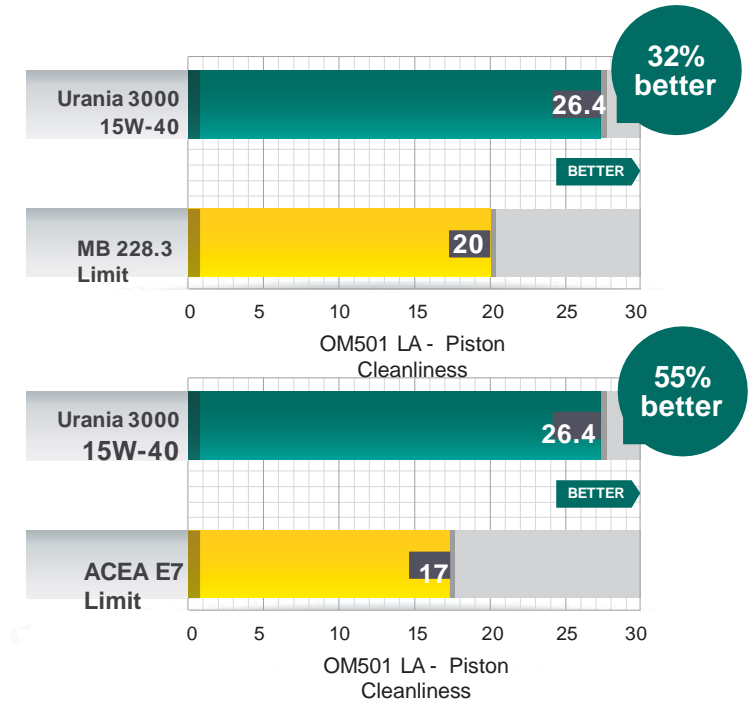
All packs shown are for illustration purposes only.

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Great Performance Robust Formulation Enhanced Specification

PETRONAS Urania 3000 15W-40 delivers improved piston cleanliness to prevent the loss of vehicle horsepower.

Urania 3000 15W-40 Improved 'Piston Cleanliness'



PETRONAS Urania 3000 15W-40

Key product benefits

Improved viscosity retention



PETRONAS Urania 3000 15W-40 is also proven to improve viscosity retention, which leads to better working conditions within the engine.

PETRONAS Urania 3000 15W-40 is also proven to improve viscosity retention, which leads to better working conditions within the engine.

Even at high temperatures and within the high oxidation environments of modern low emissions engines.

Benefits:

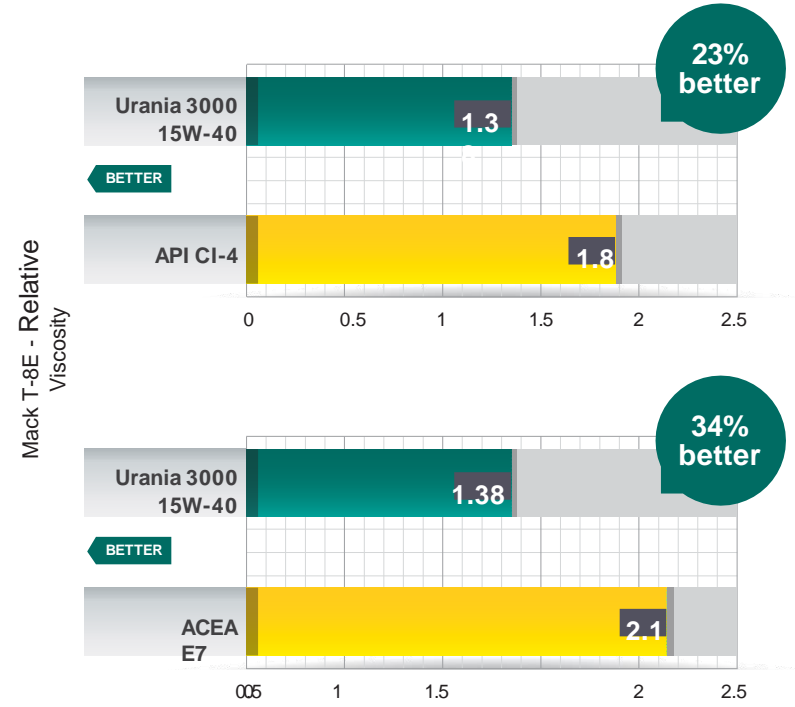
- better efficiency,
- lower power loss
- better responsiveness

All packs shown are for illustration purposes only.

Great Performance Robust Formulation Enhanced Specification

By demonstrating a **lower viscosity increase**, PETRONAS Urania 3000 15W-40 helps the engine perform at its peak.

Urania 3000 15W-40 Improved Viscosity Retention





Proof of Performance
Palm Oil Industry

Petronas Urania 3000 15W-40 (CI-4)

Optimizes the operational of Perkins Industrial Diesel Generator by 100%.

4 October 2019

MJM Plantation Sarawak. Palm Oil Production. Malaysia



It has a total of 3 units of industrial diesel generator and Perkins Diesel Generator is one of it. Currently the oil change service interval is 250 hours. However the mill manager is looking forward for extended service interval to 500 hours in order to minimize the mill maintenance and operational costs. A trial run was conducted using the PETRONAS Urania 3000 CI-4 15W-40 Heavy Duty Diesel Engine Oil.

Equipment Details

Perkins 2806A-E18TAG Industrial Diesel Generator was selected for the field trial test. It can deliver 514-652 kWm engine power and 591-750 kVA generator output, along with mechanically operated unit fuel injectors, electronic control and carefully matched turbocharging system. The generator runs 24 hours daily, 7 days a week. It is one of the main engine which produces electrical power for the mill. Thus it operates under severe load daily. With the currently oil change service interval of 250 hours, it requires extra maintenance downtime in a year. During peak production period, 250 hours can be as fast as 2 weeks. Short service interval leads to high maintenance cost due to frequent engine parts replacement such as the oil filter and gaskets.

Company overview

MJM (Palm Oil Mill) Sdn Bhd is in Bekenu, Miri, Sarawak. Established in 2012, the mill is designed to process 60MT/Hr of fresh fruit bunch which produce crude palm oil and palm kernel. The mill requires diesel generator to generate electrical power for the mill equipment.

Field Trial Monitoring Results

- Optimum protection from excessive wear
- Excellent oxidation and thermal stability
- Maximum protection from engine deposit

Customer Benefit

Extended oil drain interval
500 Hours
from usual practice of 250 Hours

Up to 50% reduction
of the service interval

Up to 50% saving
on total maintenance cost

"The Mill Manager was satisfied & has confidence with performance of Urania 3000 15W-40 and this is one of the solutions to reduce service interval and maintenance cost"

To discuss how PETRONAS can help your business, please contact our sales representative or emails us at

lube-edge@plmm-petronas.com
www.pli-petronas.com



Proof of Performance
Mining Industry

Petronas Urania 3000 15W-40 (CI-4)

Excellent improve and extend Oil Drain Interval by 100%.

4 October 2019

Sarawak Coal. Coal Mining. Malaysia



by crushing the coals into finer grade before sending off the processed coals to their customers domestically and internationally.

To ease the operation, SCR fully utilized their limited few units of heavy duty diesel engine excavators to excavate the coals before loading off onto the transporter trucks for further processing at the crusher plant. A smooth and continuous daily operation is important to ensure optimum daily productivity and hence there is no space for the unexpected equipment breakdown. To overcome this situation, SCR has selected PETRONAS Urania 3000 CI-4 15W-40 for the field trial.



Equipment Details

The chosen excavator unit for trial using PETRONAS Urania 3000 CI-4 15W-40 was Komatsu PC 200 8. The unit was manufactured in 2008 with 110 kW horsepower, 6.69 liter displacement 6-cylinder diesel engine. The normal oil drain was 300 hours. The operating hours is average at 14 to 16 hours daily non stop. During workers break interval, the excavator is operated by spare drivers

Company overview

Established in 2005 Sarawak Coal Resources Sdn Bhd (is a government linked company in charged of coal mining and processing of coal. Their coal processing yard is in Balingian, Sarawak. It was designed to process low sulphur coal extracted from the nearby coal mines

Field Trial Monitoring Results

- Cleaner engines & component life
- Minimized engine oil and spare part consumption, especially filters.
- Service downtime and increased productivity
- Optimum protection from excessive wear
- Excellent oxidation & thermal stability
- Maximum protection from engine deposit

Customer Benefit

Extended oil drain interval
600 Hours
from usual practice of 300 Hours

Potential annual cost saving of
RM43,600
for seven excavators

Reduced service downtime
Increase productivity

To discuss how PETRONAS can help your business, please contact our sales representative or emails us at

lube-edge@plmm-petronas.com
www.pli-petronas.com