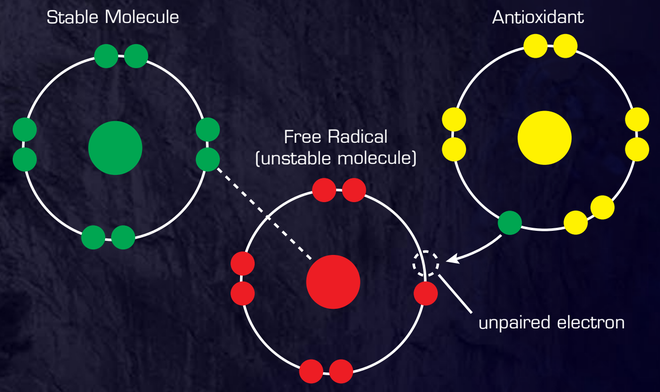
RAVENOL®

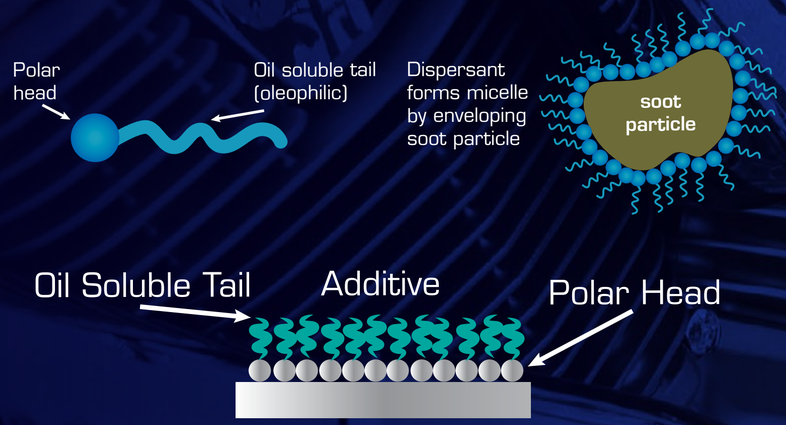
USVO Motobike

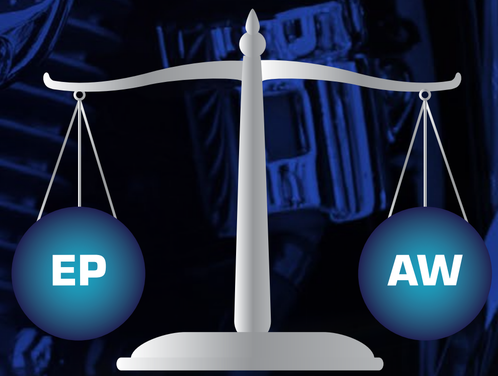
4T MOTORCYCLE OILS AND PCMO`S HAVE DIFFERENT NEEDS

	Motorcycles	Passenger Cars
Friction	High friction for clutch performance	Low friction for fuel economy
Phosphorus	Phosphorus containing for gear protection	Lower Phosphorus for catalytic converter compatibility
Oil Volume	1.0 to 2.5 litres	3.5 to 4.0 litres
Engine Speed	8000 rpm	4000 rpm
Power Output	200hp per litre	100hp per litre
Shear Resistance	Higher requirement for gearbox protection	Stay in Grade only

SPECIAL REQUIREMENTS FOR MOTORBIKE APPLICATION







- **High temperature of operation**

  Selection of Anti Oxidant system

- **Clutch torque capacity and clutch slippage**

  Specific balance of Detergent and friction modifier

- **Gear pitting protection**

  Balance of anti wear

Motor Cycle Oil are not Exposed to the same constrain than Passenger Car motor Oil.

The Design is different

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MOTORCYCLE DIFFERENTIATED PERFORMANCE NEEDS

CLUTCH PERFORMANCE

- Acceptable wet clutch friction performance.
- Sustained load carrying capacity throughout the oil drain interval

GEAR PROTECTION

- Gearbox Wear and EP protection

DEPOSIT CONTROL

- Reliable protection of narrow oil-ways against clogging and oil starvation

OXIDATION

- Robust performance needed to cope with higher temperatures

LUBRICITY

- Superior metal on metal lubricity contributes to lowering bulk oil temperatures.
- Counteracts tendency for higher temperatures resulting from
  - Lower Oil Volumes
  - Inefficiencies of air cooled engines

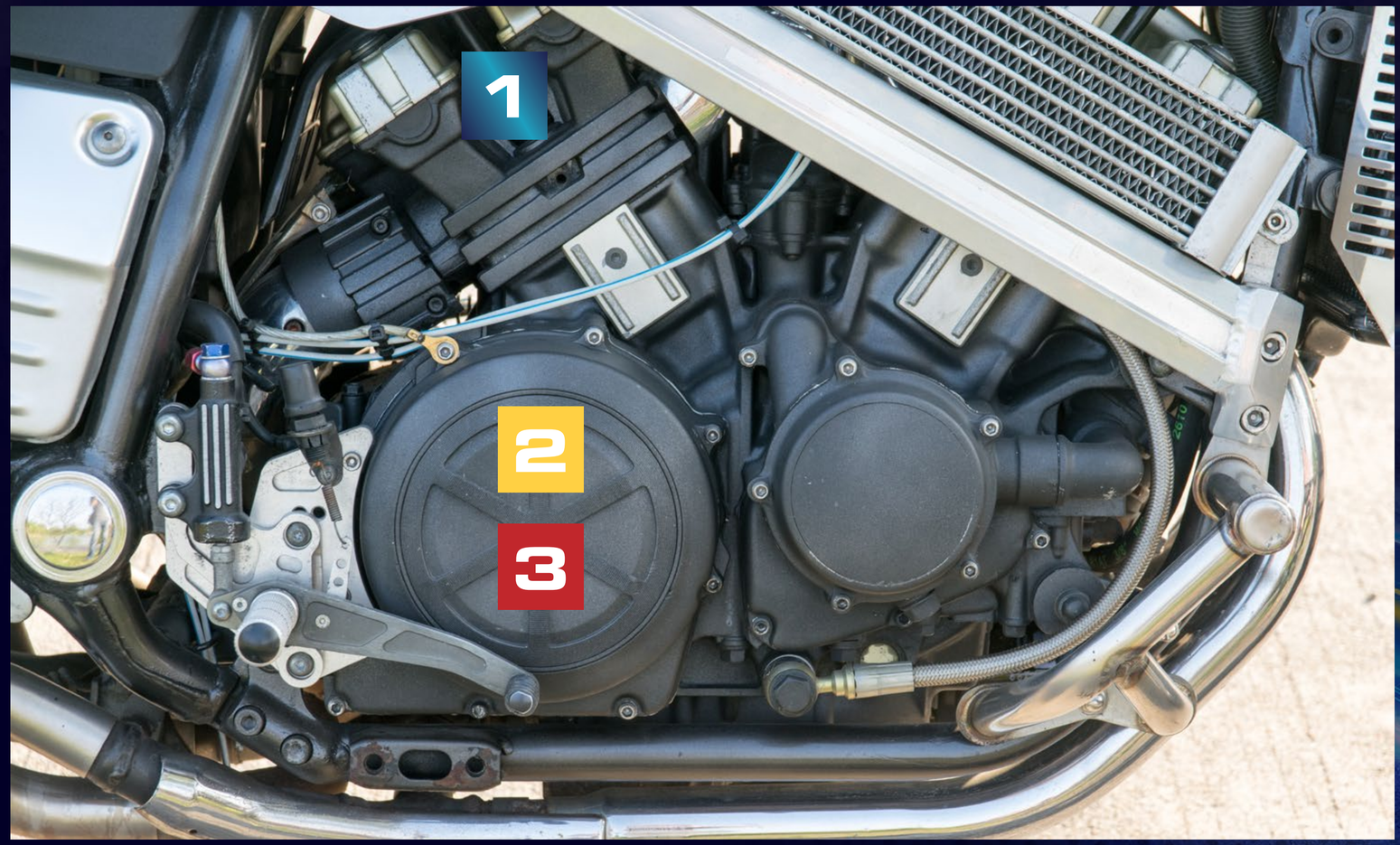
MOTORBIKE MAIN LUBRICATION FUNCTION

Motorcycle oils depend on 3 lubrication functions

1 ENGINE:
Wear Protection

2 CLUTCH:
Shift Durability

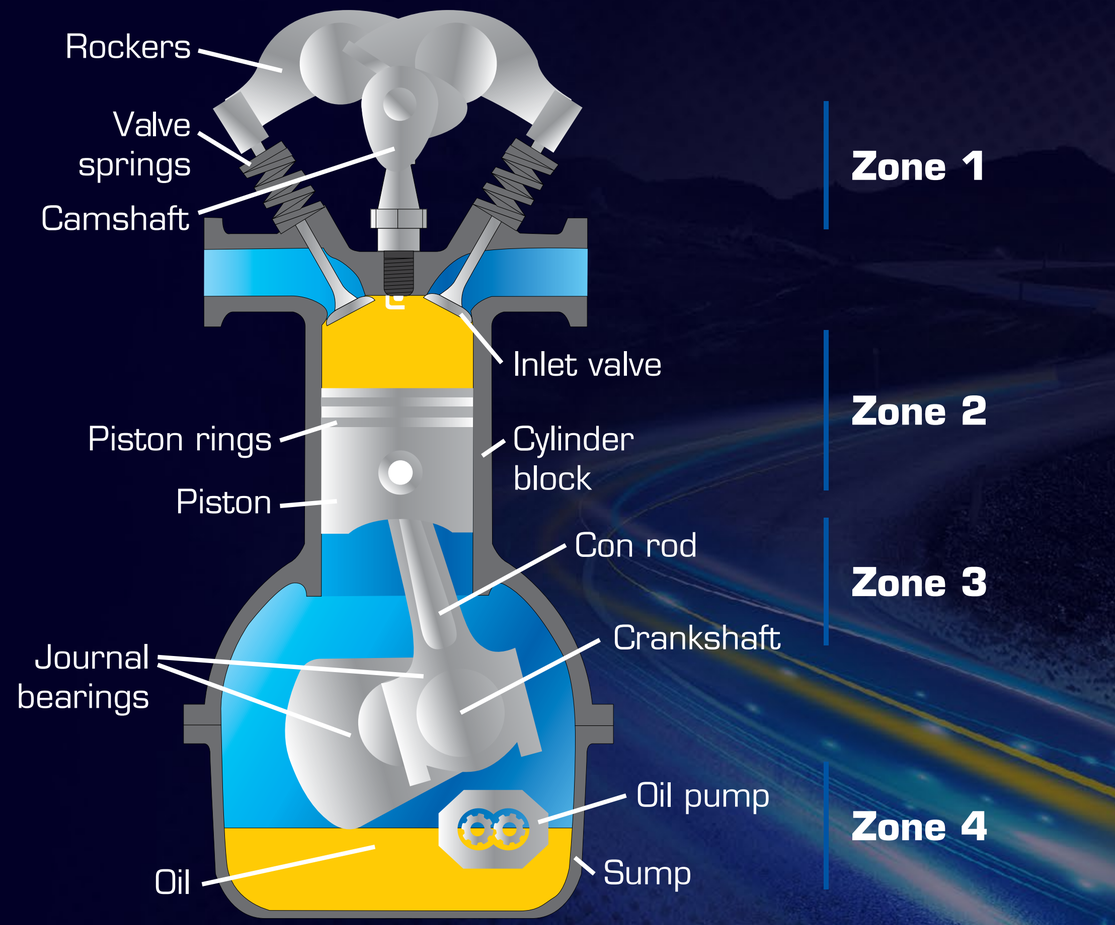
3 GEARS:
Pitting Protection



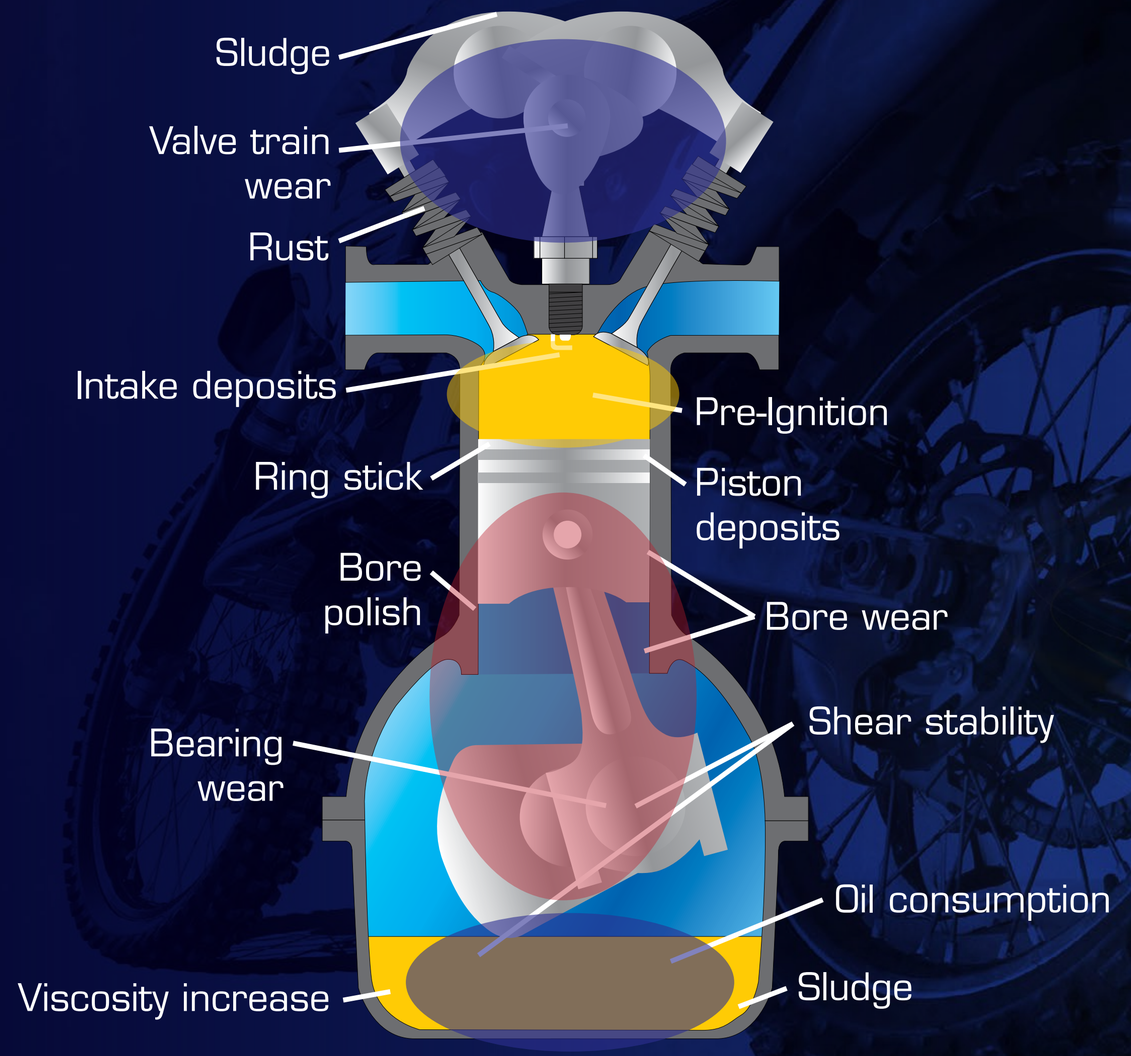
Requires a balanced formulation approach

CRITICAL AREA OF LUBRICATION IN MOTOR DESIGN

Critical Areas of Lubrication	Focus Areas
Zone 1: Valve train area	Wear, friction, rust, deposits and sludge
Zone 2; Piston and cylinder zone	Deposits, ring stick, ring and cylinder wear, bore polish, rust or corrosion
Zone 3: Bearings	Abrasive and corrosive wear, oil film thickness retention
Zone 4: Sump and oil ways	Emulsion, sludge, oil oxidation, filter blocking, shear



WHERE AND WHAT KIND OF PROBLEMS COULD APPEAR



Temperatures

- 200°C to 350°C
- 100°C to 180°C
- 30°C to 100°C

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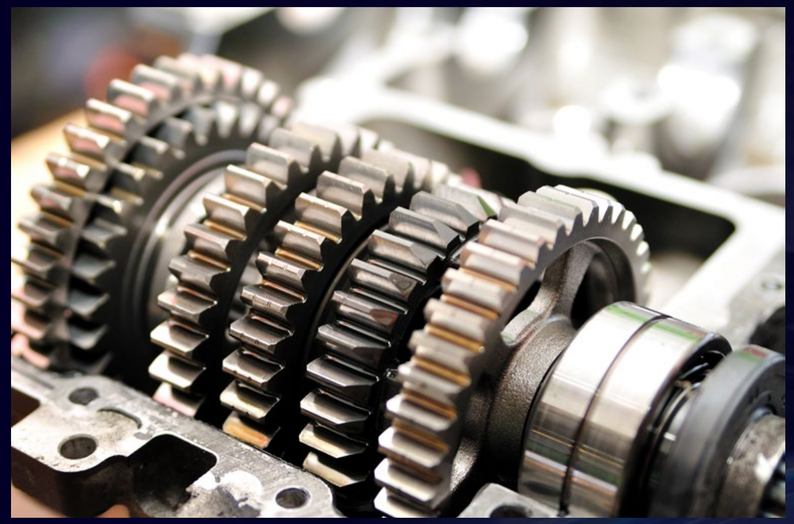
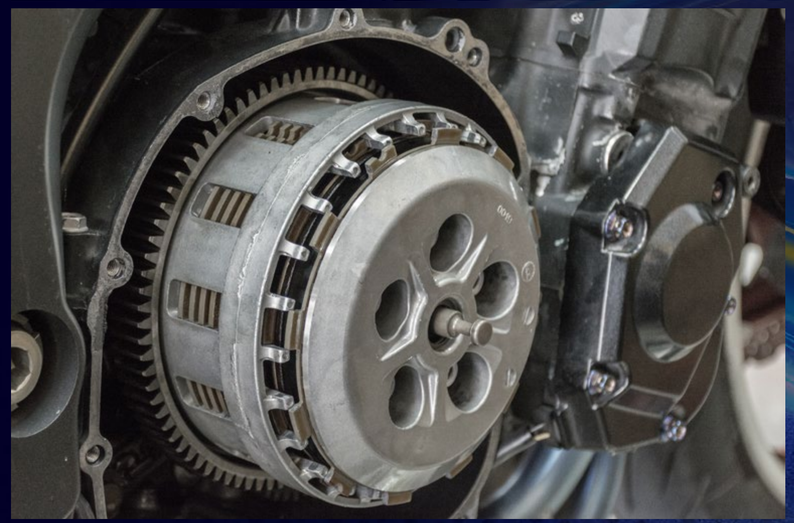
MOTORCYCLE- TRANSMISSION PERFORMANCE

- Wet Motorcycles transmission sumps use the engine oil to immerse the clutch hub and also lubricate the gears
- Wet Clutches need high friction properties for good clutch capacity and to ensure there is no clutch slippage during power transmission.
- The JASO T 903- 2016 specification category MA2 ensures good clutch capacity.
- An optimized friction brings better Clutch capacity and clutch slippage then less power losses

MOTORCYCLE- GEAR PERFOMANCE

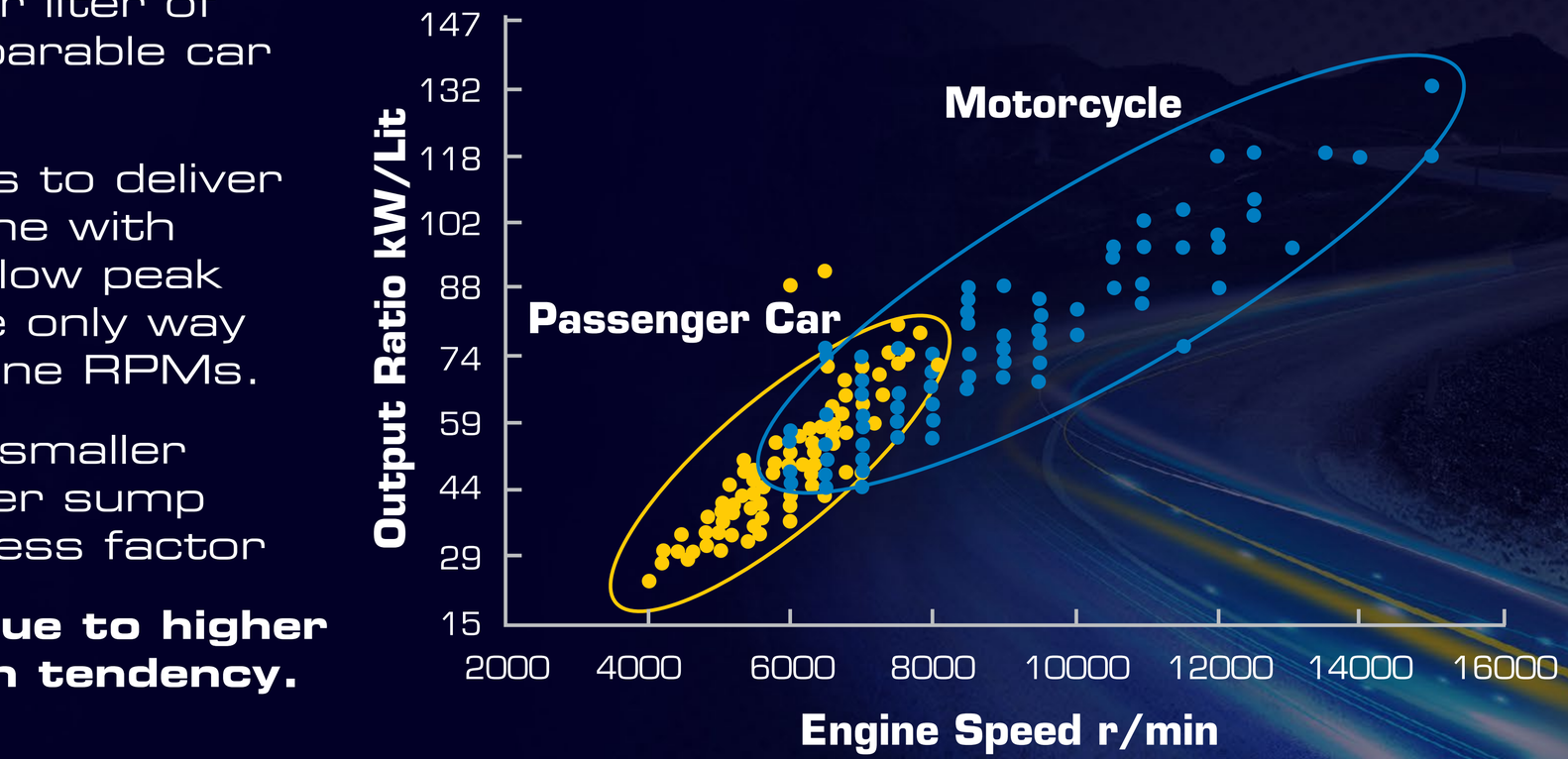
- Low Viscosity SAE XW-30 engine oils have increased propensity to cause gear pitting at elevated (> 130oC) operating temperatures
- Motorcycle oils have to be designed for gear pitting protection, and lower clutch hub wear
- Automotive lubricant are more focused on wear.
- Accurate Gear pitting protection brings better transmission performance.





WHY IS MCO EXPOSED TO GREATER OXIDATION

- Motorcycles on average have 1.5 times the power output per liter of cubic capacity than a comparable car engine.
- Given that the machine has to deliver higher power from an engine with smaller cubic capacity and low peak combustion pressures, the only way is by operating at high engine RPMs.
- Higher power output on a smaller quantity of oil due to smaller sump capacities increases oil stress factor
- **Higher turbulence rates due to higher RPMs, increases oxidation tendency.**



- **RAVENOL RACING 4T 10W-40**
API SN, JASO MA 2

- **REPSOL RACING 4T**
API SN, JASO MA 2

- **MOTUL 300V 4T FACTORY LINE ROAD RACING**
API, JASO

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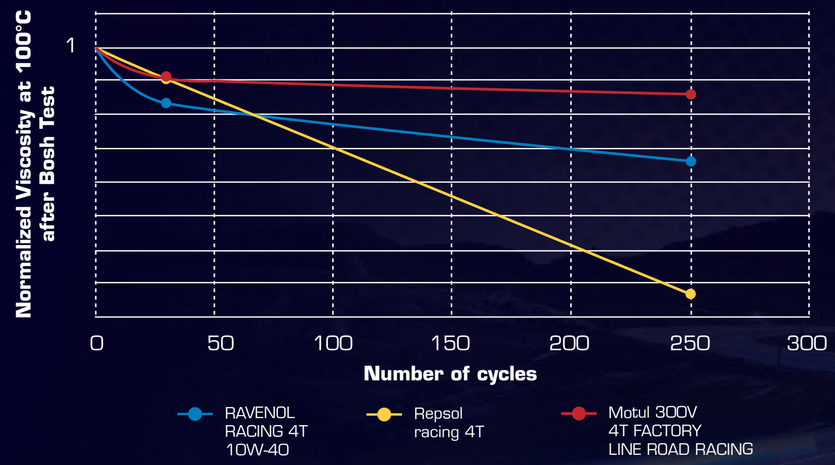
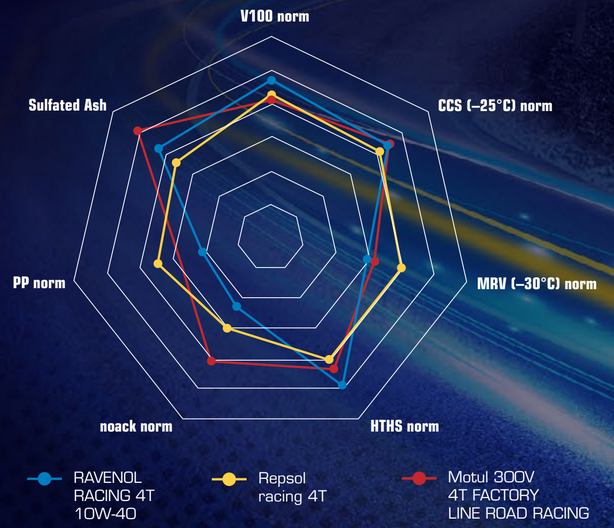
COMPARISON BETWEEN THE KNOWN MCO OIL BRANDS AND RAVENOL

	Specs	Motul 300V 4T FACTORY LINE ROAD RACING	Repsol racing 4T	RAVENOL RACING 4T 10W-40
V100	12,5-16,3	13,43	13,98	15,23
CCS (-25°C)	max 7000	6300	5770	6210
MRV (-30°C)	max 60000	12700	15900	11700
HTHS (150°C)	min 3,5	4,36	4	4,87
NOACK	max 20	8,2	6	4,6
Flash Point	N.A.	228	224	242
Pour Point	N.A.	-45	-36	-60
Sulfated Ash	max 1,2	1,01	0,72	0,85
Four-Ball method anti-wear properties	N.A.	0,48	0,5	0,34
Determination of the shear stability of polymer-containing oils using a diesel injector nozzle (30 cycles)	min 12	13,31	13,85	14,98
SSI 30 cycles		0,89	0,93	1,64
Determination of the shear stability of polymer-containing oils using a diesel injector nozzle (250 cycles)	N.A.	13,24	12,96	14,72
SSI 250 cycles		1,41	7,30	3,35
Oxidation Induction Time OIT temperature 210 °C	N.A.	N.A.	31	40





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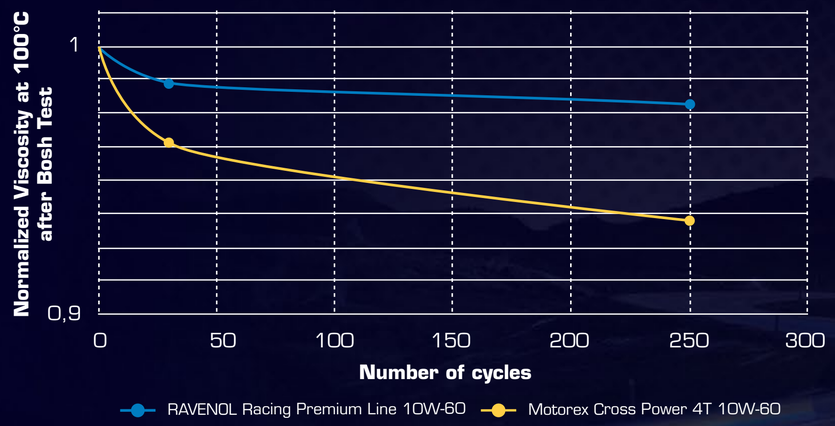
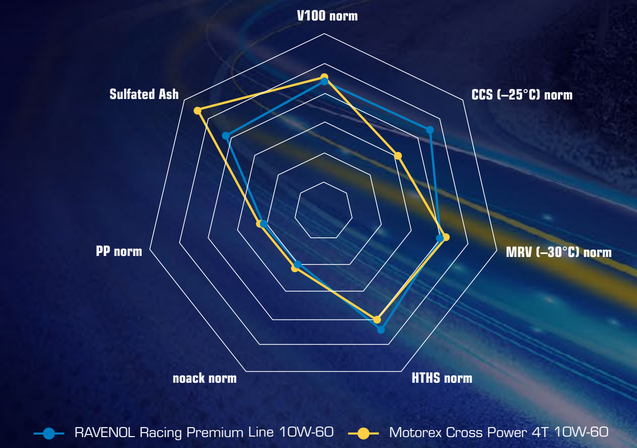
- **RAVENOL RACING 4T 10W-60**
API SN, JASO MA 2

- **MOTOREX POWER SYNT 4T**
API SJ, JASO MA 2-Freigabe, KTM LC4 2007+

COMPARISON BETWEEN THE KNOWN MCO OIL BRANDS AND RAVENOL

	Specs	Motorex Cross Power 4T 10W-60	RAVENOL RACING 4T 10W-60
V100	21,9-26,1	24,3	23,46
CCS (-25°C)	max 7000	4420	6270
MRV (-30°C)	max 60000	20760	19700
HTHS (150°C)	min 3,7	5	5,4
NOACK	max 20	5,9	5,4
Flash Point	N.A.	244	246
Pour Point	N.A.	-42	-57
Sulfated Ash	max 1,2	1,28	0,84
Four-Ball method anti-wear properties	N.A.	0,46	0,37
Determination of the shear stability of polymer-containing oils using a diesel injector nozzle (30 cycles)	min 21,9	23,41	23,16
Determination of the shear stability of polymer-containing oils using a diesel injector nozzle (250 cycles)	N.A.	22,68	22,96





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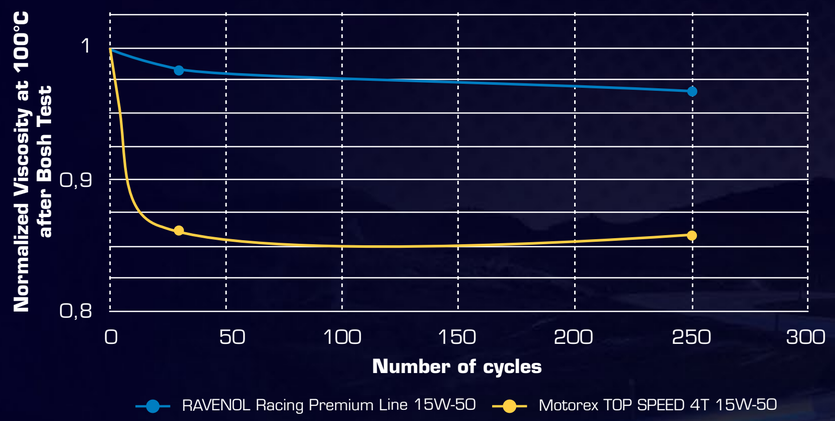
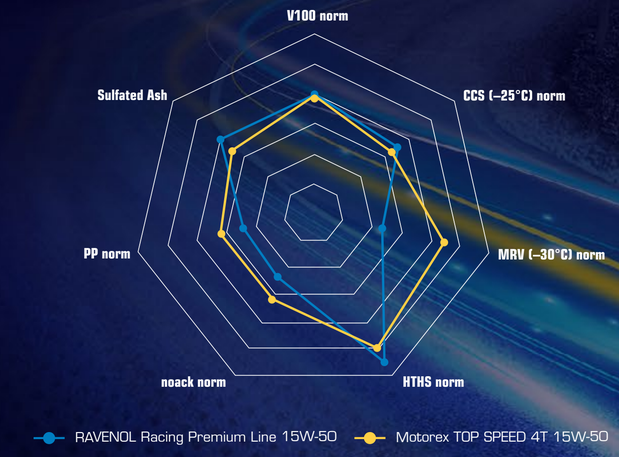
- **RAVENOL RACING 4T 15W-50**
API SN, JASO MA 2

- **MOTOREX CROSS POWER 4T**
API SN, JASO MA 2-Freigabe

COMPARISON BETWEEN THE KNOWN MCO OIL BRANDS AND RAVENOL

	Specs	Motorex TOP SPEED 4T 15W-50	RAVENOL RACING 4T 15W-50
V100	16,3-21,9	17,74	18,12
CCS (-25°C)	max 7000	4410	4950
MRV (-30°C)	max 60000	17800	9100
HTHS (150°C)	min 3,7	4,83	5,4
NOACK	max 15	6,4	4,7
Flash Point	N.A.	248	248
Pour Point	N.A.	-36	-57
Sulfated Ash	max 1,2	0,7	0,84
Four-Ball method anti-wear properties	N.A.	0,42	0,34
Determination of the shear stability of polymer-containing oils using a diesel injector nozzle (30 cycles)	min 15	15,36	17,93
Determination of the shear stability of polymer-containing oils using a diesel injector nozzle (250 cycles)	N.A.	15,33	17,63





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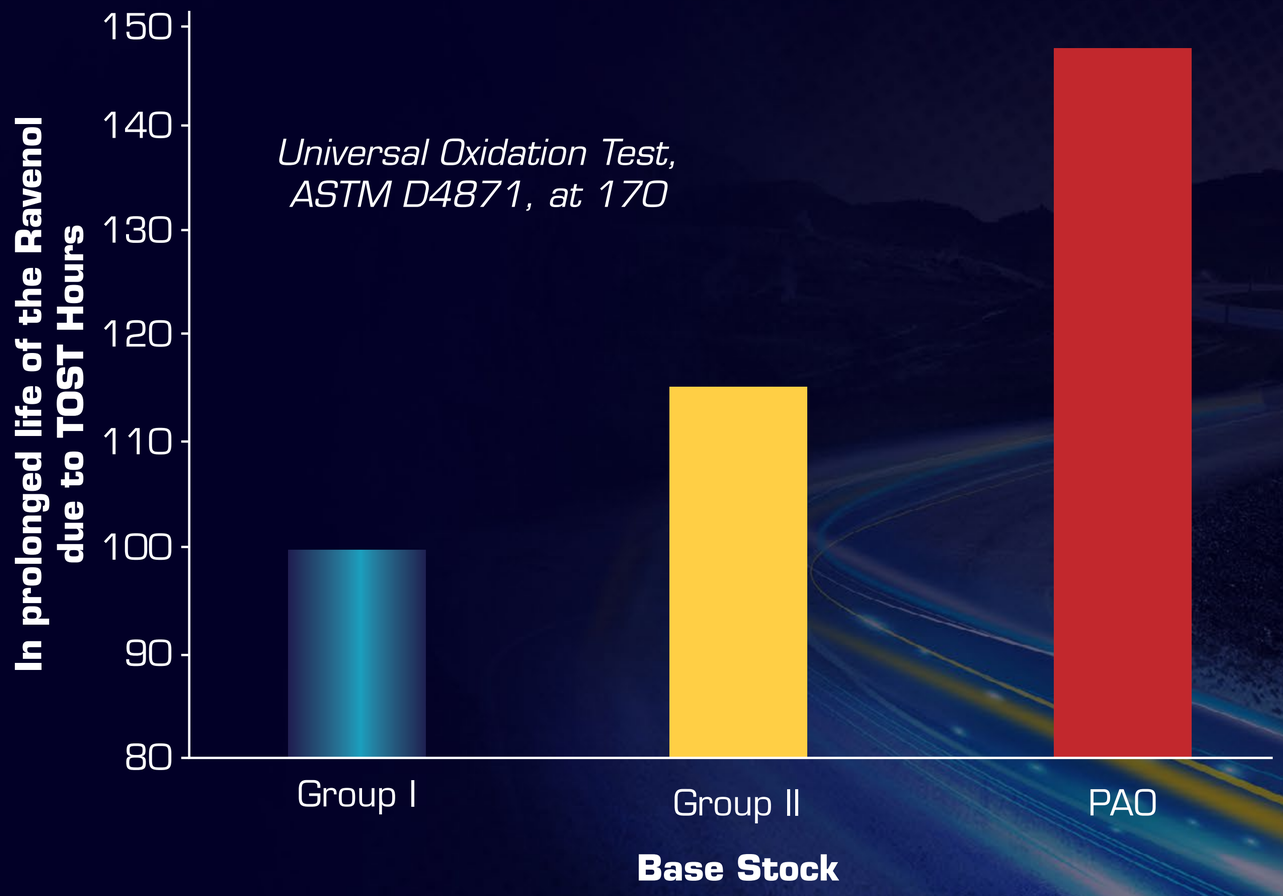
EXTENDED DRAIN INTERVAL

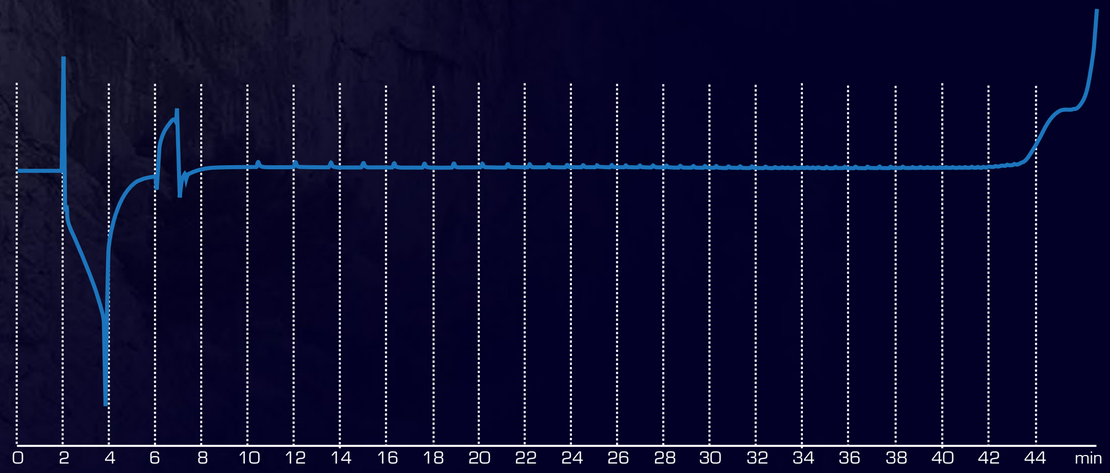
- **Oxidation** and thermal stability are among the most important advantages that synthetics bring to the table. Better base oil stability means better additive stability and longer life. High stability is the key of the premium-quality lubricants with longer drain intervals.

- Generally, **oxidation** will reduce the service life of a lubricant by half, for every 10°C increase in fluid temperature above 60°C.

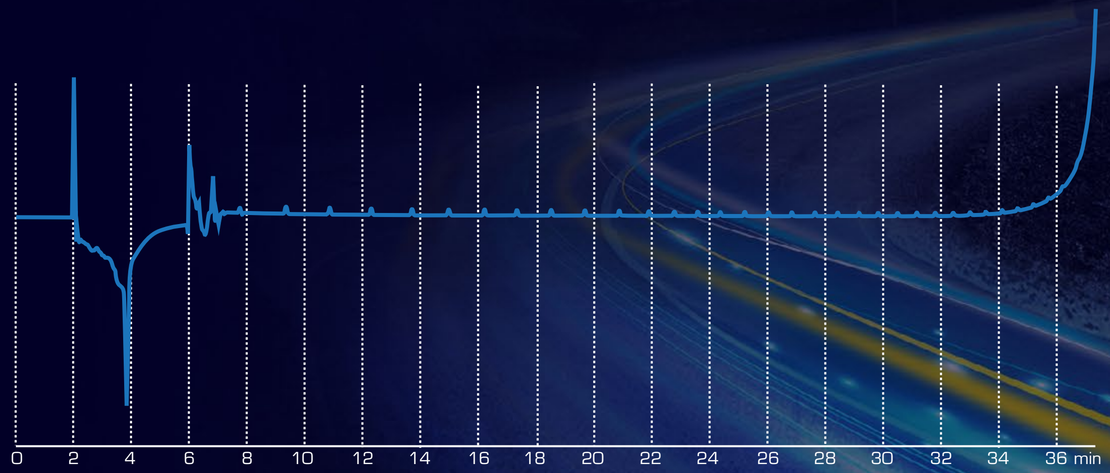
- Generally, the drain interval can be extended by 30% when changing base oils from Group II to PAO.



Prolonged life of the Ravenol product due to better oxidation stability.



Probe RAVENOL RACING 4-T 10W-40
0002-000680



Probe Repsol MOTO Racing FS 10W-40
0030212895

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NEW LINE: MOTOBIKE 4-T

RAVENOL RACING 4-T 10W-40

Art. Nr.: 1171106-01

RAVENOL RACING 4-T 10W-50

Art. Nr.: 1171107-01

RAVENOL RACING 4-T 10W-60

Art. Nr.: 1171108-01

RAVENOL RACING 4-T 15W-50

Art. Nr.: 1171109-01

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Ultra Strong Viscosity Oil

MOTOBIKE

- BETTER ENGINE WEAR PROTECTION
- EXTENDED OIL CHANGE INTERVALS
- FASTER ACCELERATION