Amsoil Engine® Polygraph tests

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This report documents the findings from a comparison of **before** and **after** Engine Polygraph Assessment reports of a Kia inline 4-cylinder 3.0 L engine, where the **before** and **after** are in reference to an oil change from organic oil to synthetic Amsoil.

On 2017-06-23, John Brock tested his Kia 3.0 L engine with Engine Polygraph. The engine had 5-w20 factory oil at 3500 miles since the previous change.

The data on the left below is the **before** Assessment. The scores are shown below on the right is the Assessment report made **after** changing the oil to 5w-20 Amsoil synthetic. The **after** test was taken 15 miles after the change at odometer = 50232.

Vehicle ID : 2016Kia Assessment 1

Owner	JohnBrock
Serial Number	NA
Engine	Kia 2.0L Theta II Kia I4 (4 stroke, 4 cylinders)
Odometer	15000
Date	2017-06-23 12:00:00 AM
RPM	1532
Engine Temperature	180 F
Engine Polygraph name	20170623-0001 kia 1500 rpm pre oil change.psdata
User's file name	441297f9-84d5-4e3f-ae95-502dd4dfe35a.psdata
User's comments	Pre-Amsoil

Version 5.0

Upper Engine	1
Lower Engine	1
Volumetric Eff. Score	7
Valve Seating	1

Warnings

1 2 3 4 5 6 7 8 9 10

Vehicle ID : 2016Kia Assessment 1

Owner	JohnBrock
Serial Number	NA
Engine	Kia 2.0L Theta II Kia I4 (4 stroke, 4 cylinders)
Odometer	15000
Date	2017-06-23 12:00:00 AM
RPM	1479
Engine Temperature	180 F
Engine Polygraph name	20170623-0001 AMS oil air off 1500.psdata
User's file name	326be52b-2afa-488f-bcd6-bd14d6ee22fc.psdata
User's comments	Post-Amsoil

Version 5.0

Upper Engine	1
Lower Engine	1
Volumetric Eff. Score	1
Valve Seating	1

Warnings

1 2 3 4 5 6 7 8 9 10

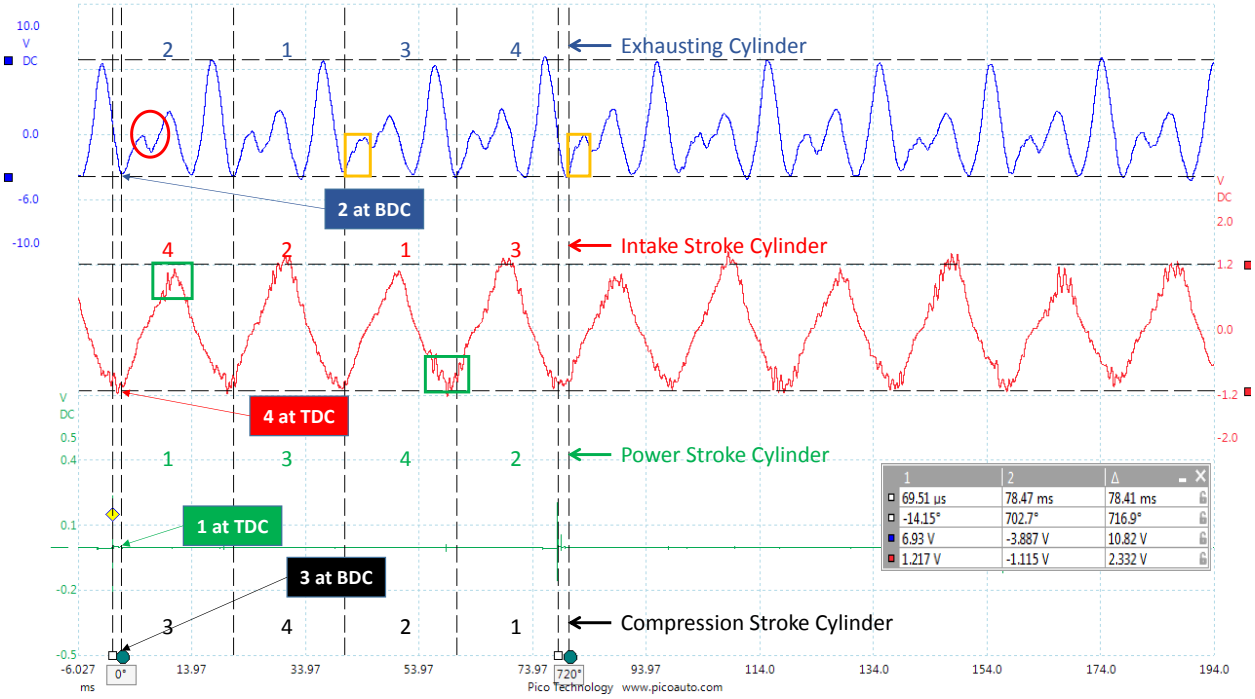
Notice the change in Volumetric Efficiency score with the Amsoil.

The vibrational spectrum (below) shows significant reduction in the intensity of 3 bands of the spectrum that we monitor: 'Low' for vibrations due to variations on the cm-to-mm scale; 'Hi' for the (10-100)µm; whistle for less than 10 µm. In the table below, we use **Ex** for exhaust and **Crank** for crankcase.

Vibrational Spectrum Exhaust & Crankcase		**Ex Low Vibration**	**Ex Hi Vibration**	**Ex Whistle**	**Crank Low Vibration**	**Crank Hi Vibration**	**Crank Whistle**
441297f9-{	pre amsoil 1500	0.28	0.18	0	0.25	0.31	0
326be52b-	post Amsoil 1500	0.15	0.07	0	0.22	0.28	0

We have the firing order for this engine: 1-3-4-2 with cylinder 1 closest to the cooling fan.

Below is the Pico waveform for the Exhaust (top – blue), Crankcase (middle – red), and Ignition (bottom – green) of the engine **before** the oil change to Amsoil. Ignition precedes TDC by several ms.

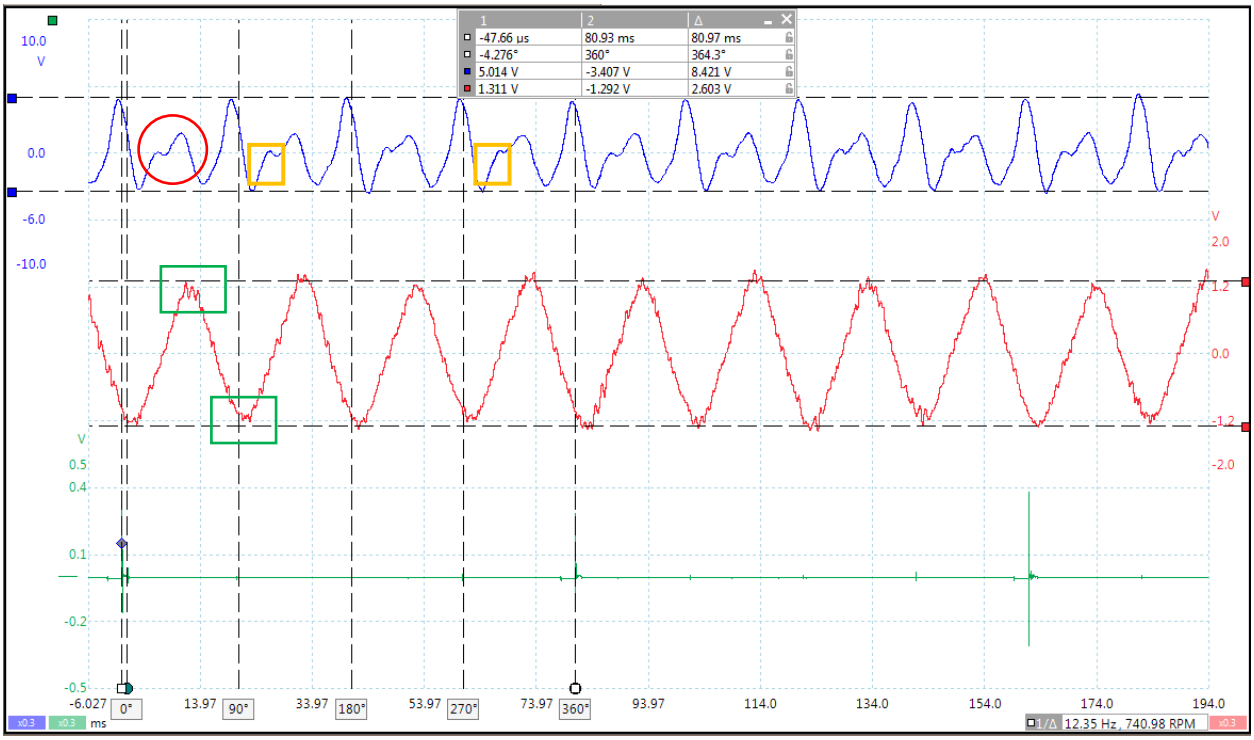


RPM = 30000 * Nstrokes)/ (cycle time) = 120000 / 78.41 = 1530 by aligning the spark events.

The red crankcase curve pressure variation is largely due to the pressure change in the intake manifold through the PCV (positive crankcase ventilation) valve. Notice the rough sections on the crankcase curve near the top and bottom extremes (green boxes) indicating possible 'fluttering' of the PCV valve in the 'Before' engine.

The colored boxes represent the cylinders (1 to 4) and the stroke each is entering at the time that cylinder one hits TDC.

Below is the Pico waveform for the Exhaust (top - blue), Crankcase (middle – red), and Ignition (bottom – green) of the engine **after** the oil was changed to Amsoil.



RPM = 30000 * Nstrokes)/ (cycle time) = 120000 / 80.97 = 1482 by aligning the spark events.

Visible differences with possible explanations:

1. The dip in the first peak of the Exhaust (circled in red) is less **after** Amsoil than **before**, relating to the lower Volumetric Efficiency score. The roughness on the upward incline in the '**before**' Exhaust (yellow squares) also contributes to that difference.
2. The crankcase is more uniform here in the **after** with less 'hair' at the top and bottom of the peaks and valleys (where the intake valve is opening and closing – green boxes). There is less 'roughness' on the sides indicating less vibration from the cam lobes, cylinder walls, crankshaft – suggesting better lubrication.
3. The Exhaust range is less in the **after** (8.421 - 10.82)/ 10.82 = 22% lower) due to the slower speed (1482 - 1530)/ 1530 = 6.7% lower. This suggests that the engine is burning much less fuel after the Amsoil than would be expected by the small change in engine speed.
4. The pressure range in the crankcase is greater in the **after** than the **before** – suggesting that more air is flowing into the cylinders from the crankcase upon intake. (2.603 - 2.332)/2.332 = 11% more.

Engine Polygraph is a product of **Predictive Fleet Technologies, Inc**. More information can be found in the Documents section of the website www.enginepolygraph.com and in the KnowledgeBase section of www.engineangel.com, the website for the **Engine Angel®** Fleet Management application.