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19/1/24

18 year test: ~5x increase in engine lifespan

At ~20,000 km a 2006 Toyota 1.3 L (2NZ-FE) 4-cylinder Yaris 5-door hatch was treated with XcelPlus Engine Treatment (via the oil).

After treatment with XcelPlus Engine Treatment wear was reduced by ~84 % (measured at 366,294 km): This is 1/5 normal wear and is equivalent to a ~5x increase in engine lifespan N.B. The primary wear metal in alloy engines is iron, followed by aluminium and copper. The number of breakdowns/repairs reduces in direct proportion to a reduction in wear.

Table 1 Oil analysis

Metals	**Parts Per Million (ppm) mg/L**			
	20,607 km*	**366,294 km**	**Change**	**%**
Iron (Fe)	22	6	-16	-72
Copper	11	0	-11	-100
Aluminium (Al)	7	0	-7	-100
Chromium (Cr)	0	0	n/a	n/a
Tin (Sn)	2	0	-2	-100
Nickel (Ni)	2	0	-2	-100
Lead (Pb)	1	3	n/a	n/a
Total	**45**	**9**	**-38**	**-84**

*Compared with a similar untreated engine from a 2015 Yaris

Background

- Serviced regularly at ~10,000 km intervals
- Compression test at ~340,000 km showed 142 PSI across all 4 cylinders
- Cam chain shows no signs of wear
- The engine is very quiet: An indicator of good lubrication
- It runs like it did when it was new e.g. Fuel efficiency remains at ~14 km/L
- Passed 2023 roadworthy: No problems identified
- No work has been done to the engine other than normal service items
- Retreated with XcelPlus Engine Treatment ~180,000 km (as per recommendation)

Figure 1 2006 Toyota Yaris 1.3 L 5-door hatch

Fuel dilution
Two per cent fuel dilution was identified as being caused by the use of E10 (10% ethanol) fuel. Ethanol is a much stronger solvent than petrol and will bypass the rings. Ethanol ends up in the sump causing fuel dilution. Fuel dilution compromises the lubricating properties of oil. Newer cars with low-tension rings and direct injection engines are particularly prone to fuel dilution N.B. Normally wear would increase if lubrication is compromised: Fuel dilution has not increased wear due to XcelPlus protection.

Sludge formation
Ethanol oxidises upon combustion and polymerises to form sticky viscous sludge. This gums up your rings which increases oil use and fuel dilution of the oil. This is why anyone using ethanol fuel should change oil more frequently N.B. Flushing with XcelPlus Sludge Out (carried out just before an oil change) and treating with XcelPlus Ring Free (applied after changing the oil) are two ways to remove sludge from an engine.

Techenomics Australia Pty Ltd

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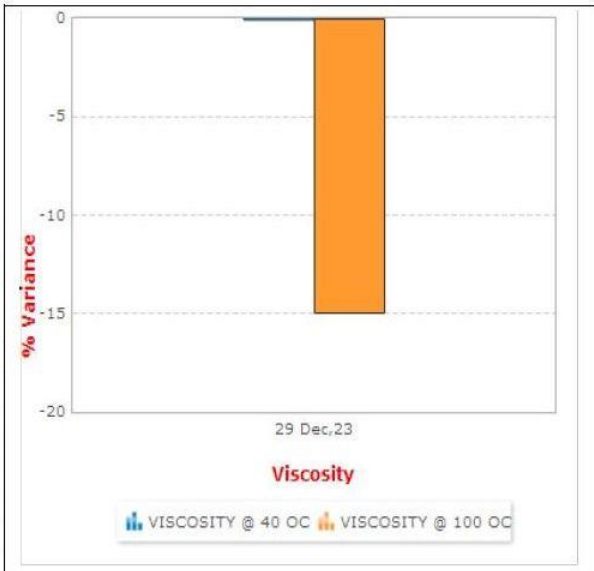
Accreditation No. 20564

WATCH

TECHNICAL ADVANCE FOR ECONOMIC GAIN

Wear Metal Report: 00429352
Client: MICHAEL CZAJKA
Attention: -
Machine: TOYOTA YARIS 2006 **ID No:** 1EH5AU
Oil Name: LUBRIMAXX POWER SYN ENGINE OIL
Visc@40°C: 105 **Visc@100°C:** 15 **TBN:** 8
Compartm't: ENGINE

Sample Date:	-	-	-	-	-	29/12/2023
Received Date	-	-	-	-	-	04/01/2024
Analysis Date:	-	-	-	-	-	04/01/2024
Reported Date	-	-	-	-	-	05/01/2024
Sample no:	-	-	-	-	-	00429352
SMU:(hrs)	-	-	-	-	-	366294
Oil Hrs:	-	-	-	-	-	10284
Oil Changed:	-	-	-	-	-	Yes
Component Hours	-	-	-	-	-	-
Wear Metal Rate	-	-	-	-	-	0.00
Serial Number	-	-	-	-	-	-
Work Order Number	-	-	-	-	-	-



Wear Metals	METHOD	PPM	PPM	PPM	PPM	PPM	PPM	Caut	High
lead (Pb)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	3.0	9	15
iron (Fe)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	6.0	65	75
aluminium (Al)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	0.0	15	22
copper (Cu)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	0.0	10	15
chromium (Cr)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	0.0	9	15
tin (Sn)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	0.0	9	15
nickel (Ni)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	0.0	9	15
Contaminants									
silicon (Si)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	4.0	18	25
sodium (Na)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	8.0	10	18
Oil Additives									
magnesium (Mg)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	139.0		
zinc (Zn)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	742.0	0	0
molybdenum (Mo)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	17.0	0	0
calcium (Ca)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	1489.0	0	0
phosphorous (P)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	650.0	0	0
boron (B)(mg/kg)	ASTM D5185	n/a	n/a	n/a	n/a	n/a	42.0	0	0
Infra Red									
TBN(mg KOH/gr)	ASTM E2412	n/a	n/a	n/a	n/a	n/a	4.5	+-25	+-50
TAN(mg KOH/gr)	ASTM D974*	n/a	n/a	n/a	n/a	n/a	0.0	1.5	3
soot(Abs/cm)	ASTM E2412	n/a	n/a	n/a	n/a	n/a	24.0	40	70
glycol(% vol)	ASTM E2412	n/a	n/a	n/a	n/a	n/a	n/a	0	0
water(ppm)	ASTM D6304	n/a	n/a	n/a	n/a	n/a	0.0	0	0
fuel dilution(% vol)	ASTM D7593	n/a	n/a	n/a	n/a	n/a	2.00	1	3
oxidation((x.100)abs/0.1mm)	ASTM E2412	n/a	n/a	n/a	n/a	n/a	17.0	24	40
nitration((x.100)abs/0.1mm)	ASTM E2412	n/a	n/a	n/a	n/a	n/a	8.0	24	40
sulphation((x.100)abs/0.1mm)	ASTM E2412	n/a	n/a	n/a	n/a	n/a	23.0	24	40
Physical Tests									
water(% vol)	ASTM E2412	n/a	n/a	n/a	n/a	n/a	0.0	0.2	0.5
F.debris(mg Fe/L)	ASTM D8120	n/a	n/a	n/a	n/a	n/a	0.0	23	38
visc @ 100oC(cSt)	ASTM D7279	n/a	n/a	n/a	n/a	n/a	12.8	+-10	+-30
visc @ 40oC(cSt)	ASTM D7279	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Iso Code Part/ml(Part/mL)	ISO 4406*	-/-/-	-/-/-	-/-/-	-/-/-	-/-/-	0/0/0	-/-/-	-/-/-

Comments on elevated results

2% Fuel Dilution detected. Fuel dilution can effect viscosity. It is normal for a engine to have upto 3% fuel dilution. Please check injectors, internal pipes and fuel pumps. All other oil properties within acceptable levels. Continue to monitor.

Approved by : Abu Bakkar Siddique

Particle Cleanliness Analysis - ISO CODE 4406

4 m	0.00
6 µm	0.00
14 µm	0.00
SAE AS 4059 NAS CODE	-

Element Trends Graph

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