

Xcelplus  
7 Boyle Court  
Sunshine West  
Victoria, Australia, 3020  
[Xcelplus@pobox.com](mailto:Xcelplus@pobox.com)  
[xcelplus.com.au](http://xcelplus.com.au)



26 January 2018

### **Soot was totally eliminated & engine life was doubled**

The 2012 Suzuki DR650 is a single-cylinder air-cooled 4-stroke motorcycle with a wet sump and an external oil cooler. It has twin spark plugs and a foam air filter (which reduces silicon levels). An air-cooled engine runs at almost double the temperature (~180 °C) of a water-cooled engine (<100 °C). Higher temperatures make the oil work much harder, increase wear and require more frequent 6,000 km oil change intervals.

After running in the engine for 16,000 km, the first oil sample was taken. The oil and filter were changed before adding Xcelplus Engine Treatment. Sampling intervals were ~6,000 km for all samples.

### **Summary**

Engine wear was halved (-55 %): Half the wear = double the lifespan

Soot production was eliminated: Cleaner combustion increases engine life. Soot can produce significant amounts of engine wear through abrasion

✓ Soot -100 %

*Table 1 Reduction in wear, improvement in combustion efficiency and viscosity*

<b>Metals</b>	<b>ppm</b>			
	<b>16,001 km</b>	<b>34,037 km</b>	<b>Change</b>	<b>%</b>
Iron (Fe)	60	31	-29	-48
Aluminium (Al)	21	9	-12	-57
Copper (Cu) <sup>1</sup>	61	24	-37	-60
Tin (Sn)	15	6	-9	-60
Nickel (Ni)	1	1	0	0
Lead (Pb)	1	1	0	0
<b>Total metals</b>	<b>159</b>	<b>72</b>	<b>87</b>	<b>-55</b>
Soot <sup>2</sup>	16	0	-16	-100
<b>Total particles<sup>3</sup></b>	<b>175</b>	<b>72</b>	<b>-103</b>	<b>-59</b>
Viscosity <sup>4</sup> @ 100 °C	11.20	13.90	+2.7	+24
Viscosity @ 40 °C	83.00	97.00	+14	+16

1) Copper wear fluctuates from test to test and probably comes from the oil cooler.

2) Soot is the by-product of incomplete combustion and adsorbs the anti-wear additives in your oil.

3) Particles in an engine cause wear, increase noise, vibration and temperature while decreasing power.

4) The viscosity of the oil improves as wear decreases, and the engine runs cleaner.

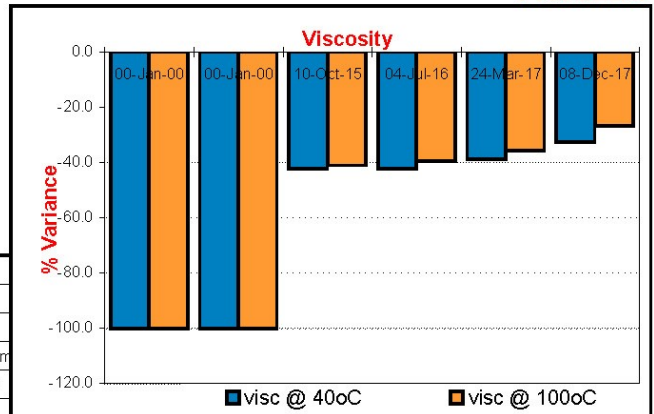


Figure 1 DR650SE 2012

## TECHNICAL ADVANCE FOR ECONOMIC GAIN

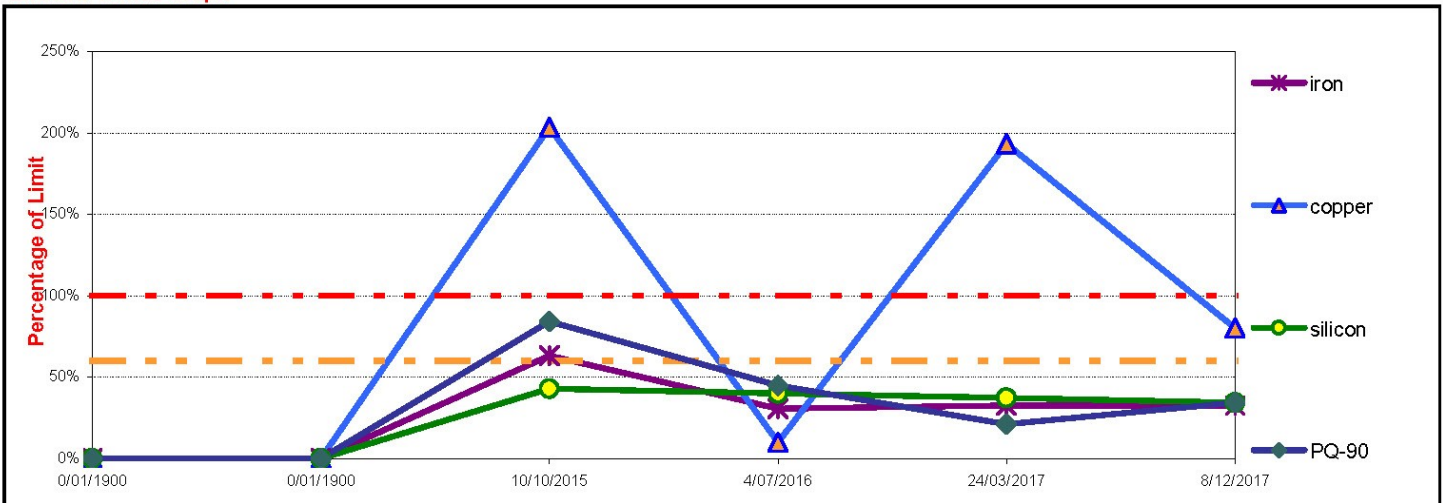
## PROBLEM

**Wear Metal Report:** 355,840  
**Client:** MICHAEL CZAJKA  
**Attention:** MICHAEL CZAJKA  
**Machine:** 2012 SUZUKI DR650 **ID No:** 1M4FV  
**Oil Name:** SYNTECH SEMI SYN15W50  
**Visc@40°C:** 144 **Visc@100°C:** 19 **TBN:** 0  
**Compartment:** ENGINE



Sample Date	0/01/1900	0/01/1900	10/10/2015	4/07/2016	24/03/2017	8/12/2017				
Analysis Date	0/01/1900	0/01/1900	19/10/2015	15/07/2016	29/03/2017	18/12/2017				
Sample no.	0	0	329487	339976	347772	355840				
SMU	0	0	16001km	22022km	28067km	34037km				
Oil Hrs	0	0	5,990	6,021	6,045	5,970				
Oil Changed	0	0	Yes	Yes	Yes	Yes				
Wear Metals	ppm	ppm	ppm	ppm	ppm	ppm	Caut	High	Comments on elevated results	
lead	0	0	1	1	1	1	60	80		
iron	0	0	60	29	31	31	75	95		
aluminium	0	0	21	12	10	9	10	16		
copper	0	0	61	3	58	24	20	30		
chromium	0	0	0	0	0	1	10	15		
tin	0	0	15	11	5	6	10	15		
nickel	0	0	1	1	1	1	10	15		
Contaminants										
silicon	0	0	15	14	13	12	20	35		
sodium	0	0	19	7	6	4	20	30		
Oil Additives										
magnesium	0	0	7	2	2	2	0	0		
zinc	0	0	822	790	826	746	0	0		
molybdenum	0	0	4	2	3	1	0	0		
calcium	0	0	1591	1584	1666	1569	0	0		
phosphorous	0	0	0	0	660	641	0	0		
boron	0	0	0	0	0	2	0	0		
Infra Red										
TBN	0.00	0.00	10.20	10.10	9.70	4.00	-25%	-50%		
soot	0	0	16	2	6	0	50	70		
glycol%	0	0	0	0	0	0	1	2		
water (ppm)	0.00	0.00	0.00	0.00	0.00	0.00	1	2		
fuel dilution%	0	0	3	2	0	0	1	2		
oxidation	0	0	11	11	10	11	30	40		
nitration	0	0	9	9	8	8	30	40		
sulphation	0	0	21	18	17	18	30	40		
TAN	0.00	0.00	0.00	0.00	0.00	-	0	0		
Physical Tests										
water %	0	0	0	0	0	0	0	0		
PQ-90 mg / ltr	0	0	0	0	8	13	20	38		
visc @ 100oC	0.00	0.00	11.20	11.50	12.20	13.90	+/-10%	+/-30%		
visc @ 40oC	0.00	0.00	83.00	83.00	88.00	97.00	+/-10%	+/-30%		
									Particle Cleanliness Analysis - ISO CODE 4406	
									4 µm	-
									6 µm	-
									14 µm	-
									SAE AS 4059 NAS CODE	

## Element Trends Graph



For enquiries, contact: phone: fax: mobile:

This wear analysis and oil condition report should be used in conjunction with normal maintenance and evaluated from sample to sample. Every care will be taken in processing samples but no express or implied guarantee is furnished in regard to the continuing operation or condition of this machinery or any part thereof.