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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 ºC) of a water-cooled engine (<100 ºC). 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

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

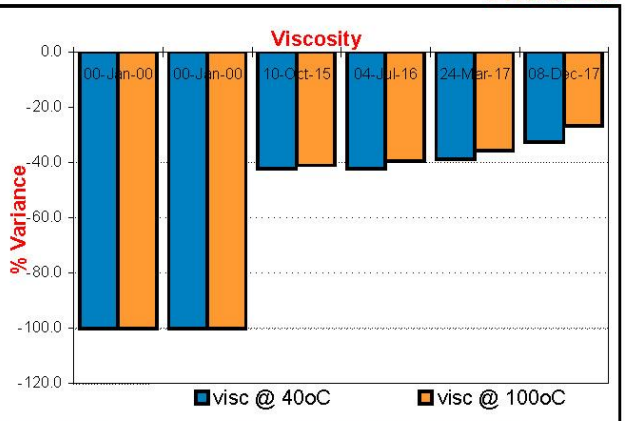
CONDITION MONITORING

TECHENOMICS

TECHNICAL ADVANCE FOR ECONOMIC GAIN

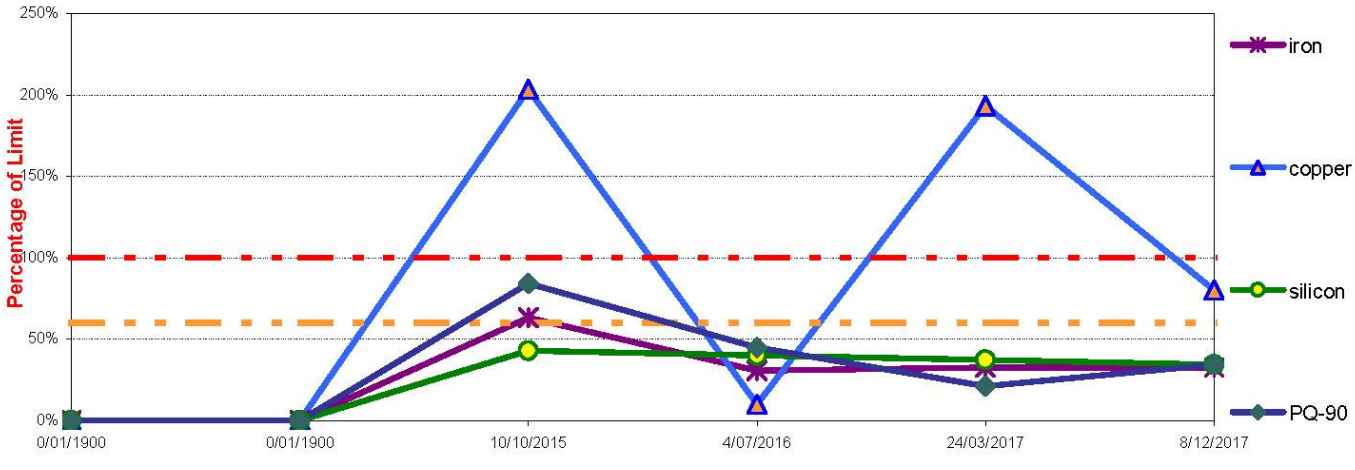
PROBLEM

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
Compartm't 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	Copper is elevated at 24ppm. Copper can come from thrust
iron	0	0	60	29	31	31	75	95	washers, bushings/bearings and oil coolers. Viscosity @
aluminium	0	0	21	12	10	9	10	16	40oC 33% below ISO standard at 97cst, but consistent with
copper	0	0	61	3	58	24	20	30	history, please confirm oil type being used.
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									**Particle Cleanliness Analysis - ISO CODE 4406**
water %	0	0	0	0	0	0	0	0	4 µm -
PQ-90 mg / ltr	0	0	0	0	8	13	20	38	6 µm -
visc @ 100oC	0.00	0.00	11.20	11.50	12.20	13.90	+-10%	+-30%	14 µm -
visc @ 40oC	0.00	0.00	83.00	83.00	88.00	97.00	+-10%	+-30%	SAE AS 4059 NAS CODE -

Element Trends Graph



For enquiries, contact: phone: fax: mobile: