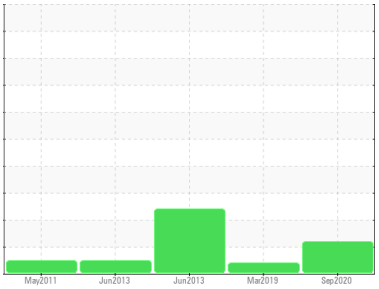
DIAMOND WTG ENGINEERING & SERVICES, INC.
a group company of MITSUBISHI HEAVY INDUSTRIES, LTD.

PROBLEM SUMMARY

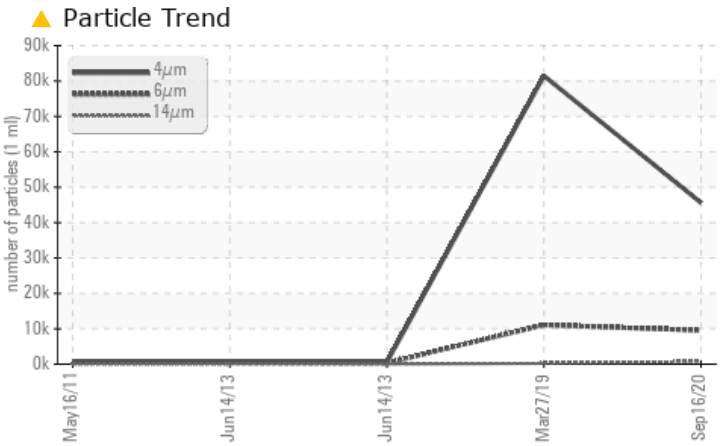
Sample Rating Trend



ISO

Machine Id
E013
Component
Wind Turbine Gearbox
Fluid
MITSUBISHI Daphne Alpha Winforce (60 GAL)

COMPONENT CONDITION SUMMARY



RECOMMENDATION

Replace filter element and resample at later date. In case already attempted and cleanliness was not improved then proceed to replace oil.

PROBLEMATIC TEST RESULTS

Sample Status				**ABNORMAL**	ABNORMAL	ABNORMAL
Particles >6µm		ASTM D7647	>5000	▲ **9546**	▲ 11085	405
Particles >14µm		ASTM D7647	>640	▲ **732**	219	69
Particles >21µm		ASTM D7647	>160	▲ **195**	42	23
Oil Cleanliness		ISO 4406 (c)	>--/19/16	▲ **23/20/17**	▲ 24/21/15	17/16/13

Customer Id: MITROS
Sample No.: MHI025258
Lab Number: 05073860
Test Package: IND 2

To manage this report scan the QR code

To discuss the diagnosis or test data:
Don Baldridge +1
don.b505@comcast.net

To change component or sample information:
Customer Service +1 1-800-237-1369
customerservice@wearcheck.com

RECOMMENDED ACTIONS

Action	Status	Date	Done By	Description
Change Filter	---	---	?	Replace filter element and resample at later date. In case already attempted and cleanliness was not improved then proceed to replace oil.
Resample	---	---	?	Replace filter element and resample at later date. In case already attempted and cleanliness was not improved then proceed to replace oil.

HISTORICAL DIAGNOSIS

27 Mar 2019 Diag: Jonathan Hester

ISO

Re-sample to verify the actual oil condition. Replace filter elements. Change oil if cleanliness level does not improve after replacing the filter(s).All component wear rates are normal. There is a high amount of silt (particulates < 14 microns in size) present in the oil. The AN level is acceptable for this fluid.

view report

14 Jun 2013 Diag: Jonathan Hester

DIRT

We advise that you check all areas where dirt can enter the system. Resample at the next service interval to monitor.All component wear rates are normal. Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress. The amount and size of particulates present in the system is acceptable. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

view report

14 Jun 2013 Diag: Jonathan Hester

NORMAL

Resample at the next service interval to monitor.All component wear rates are normal. There is no indication of any contamination in the component. The amount and size of particulates present in the system is acceptable. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

view report

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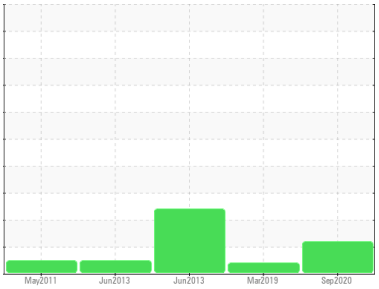
OIL ANALYSIS REPORT

Sample Rating Trend



ISO

Machine Id
E013
Component
Wind Turbine Gearbox
Fluid
MITSUBISHI Daphne Alpha Winforce (60 GAL)

DIAGNOSIS

Recommendation
Replace filter element and resample at later date. In case already attempted and cleanliness was not improved then proceed to replace oil.

Wear
All component wear rates are normal.

Contamination
There is a high amount of particulates present in the oil.

Fluid Condition
The AN level is acceptable for this fluid.

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**MHI025258**	MHI188174	RP160149
Sample Date		Client Info		**16 Sep 2020**	27 Mar 2019	14 Jun 2013
Machine Age	hrs	Client Info		**0**	88602	47436
Oil Age	hrs	Client Info		**100247**	0	47436
Oil Changed		Client Info		**N/A**	Not Changd	Not Changd
Sample Status				**ABNORMAL**	ABNORMAL	ABNORMAL

WEAR METALS		method	limit/base	current	history1	history2
PQ		ASTM D8184	>200	**16**	15	18.0
Iron	ppm	ASTM D5185m	>200	**18**	12	49
Chromium	ppm	ASTM D5185m		**<1**	<1	<1
Nickel	ppm	ASTM D5185m		**<1**	<1	<1
Titanium	ppm	ASTM D5185m		**0**	0	0
Silver	ppm	ASTM D5185m		**0**	0	0
Aluminum	ppm	ASTM D5185m		**0**	0	▲ 12
Lead	ppm	ASTM D5185m		**1**	0	<1
Copper	ppm	ASTM D5185m	>75	**9**	5	<1
Tin	ppm	ASTM D5185m		**0**	0	0
Antimony	ppm	ASTM D5185m		**0**	<1	16
Vanadium	ppm	ASTM D5185m		**0**	<1	0
Cadmium	ppm	ASTM D5185m		**<1**	0	0

ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m		**2**	<1	68
Barium	ppm	ASTM D5185m		**0**	0	4
Molybdenum	ppm	ASTM D5185m		**2**	2	10
Manganese	ppm	ASTM D5185m		**<1**	0	3
Magnesium	ppm	ASTM D5185m		**0**	0	<1
Calcium	ppm	ASTM D5185m		**<1**	<1	2
Phosphorus	ppm	ASTM D5185m		**280**	233	419
Zinc	ppm	ASTM D5185m		**3**	15	103
Sulfur	ppm	ASTM D5185m		**4096**	3956	13784

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>+30	**4**	0	▲ 30
Sodium	ppm	ASTM D5185m		**<1**	1	<1
Potassium	ppm	ASTM D5185m	>20	**3**	<1	1
Water	%	ASTM D6304	>0.1	**0.004**	0.006	0.020
ppm Water	ppm	ASTM D6304	>1000	**43.3**	60	200

FLUID CLEANLINESS		method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647		**45607**	81493	743
Particles >6µm		ASTM D7647	>5000	▲ **9546**	▲ 11085	405
Particles >14µm		ASTM D7647	>640	▲ **732**	219	69
Particles >21µm		ASTM D7647	>160	▲ **195**	42	23
Particles >38µm		ASTM D7647	>40	**6**	1	3
Particles >71µm		ASTM D7647	>10	**0**	0	0
Oil Cleanliness		ISO 4406 (c)	>--/19/16	▲ **23/20/17**	▲ 24/21/15	17/16/13

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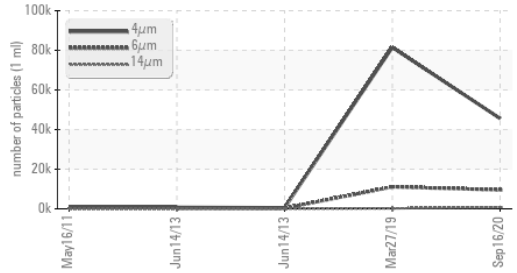
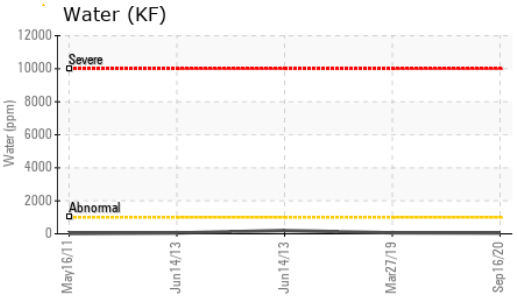
OIL ANALYSIS REPORT

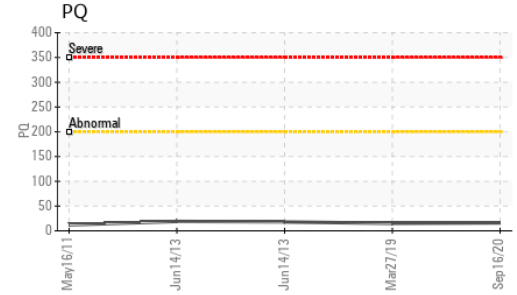
Particle Trend



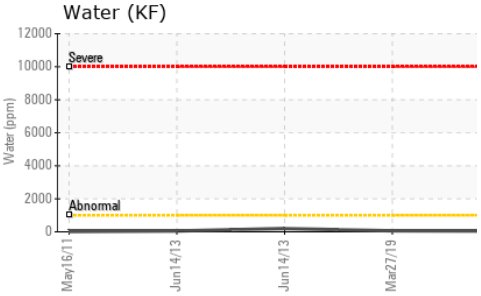
Water (KF)



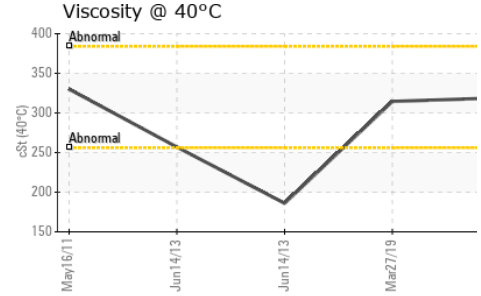
PQ



Water (KF)



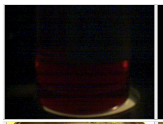
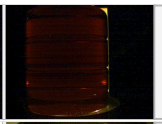
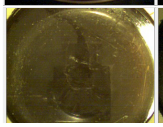
Viscosity @ 40°C



FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D8045		**0.928**	0.769	0.490

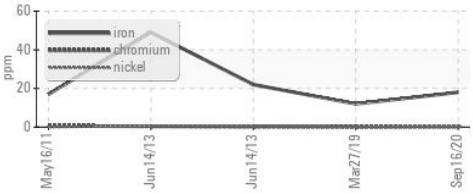
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	**NONE**	VLITE	NONE
Yellow Metal	scalar	*Visual	NONE	**NONE**	NONE	NONE
Precipitate	scalar	*Visual	NONE	**NONE**	NONE	NONE
Silt	scalar	*Visual	NONE	**NONE**	NONE	NONE
Debris	scalar	*Visual	NONE	**NONE**	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	**NONE**	NONE	NONE
Appearance	scalar	*Visual	NORML	**NORML**	NORML	NORML
Odor	scalar	*Visual	NORML	**NORML**	NORML	NORML
Emulsified Water	scalar	*Visual	>0.1	**NEG**	NEG	NEG
Free Water	scalar	*Visual		**NEG**	NEG	NEG

FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445		**319**	314.5	186.0

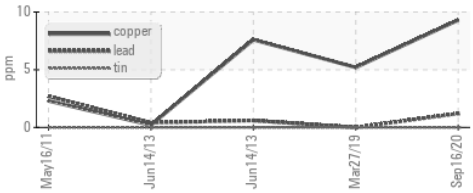
SAMPLE IMAGES	method	limit/base	current	history1	history2
Color					*no image*
Bottom					*no image*

GRAPHS

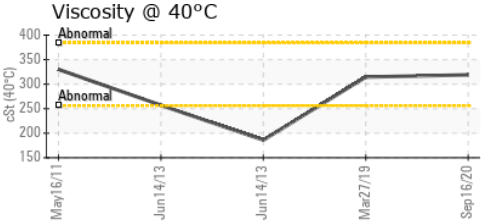
Ferrous Alloys



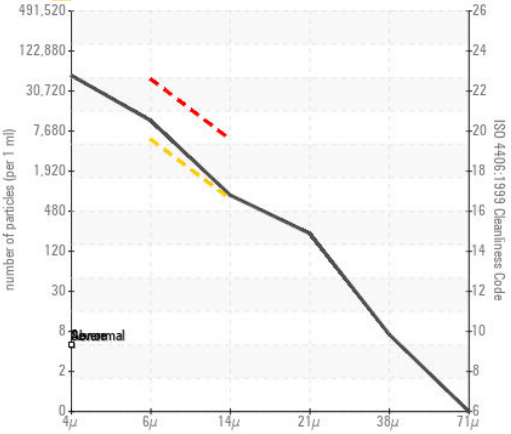
Non-ferrous Metals



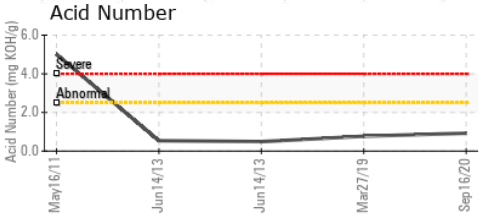
Viscosity @ 40°C



Particle Count



Acid Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : MHI025258 **Received** : 25 Sep 2020
Lab Number : 05073860 **Diagnosed** : 28 Sep 2020
Unique Number : 9189091 **Diagnostician** : Don Baldridge
Test Package : IND 2 (Additional Tests: KF, PQ, PrtCount)

To discuss this sample report, contact Customer Service at 1-800-237-1369.
** - Denotes test methods that are outside of the ISO 17025 scope of accreditation.*
Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

DIAMOND WTG - SWEETWATER SITE - MPS SW
7900 FM 608
ROSCOE, TX
US 79545
Contact: MATTHEW MILES
matthew.miles@diamondwtg.com
T: (325)288-4333
F: (325)288-4338