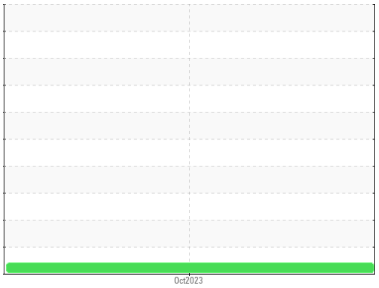
# PROBLEM SUMMARY

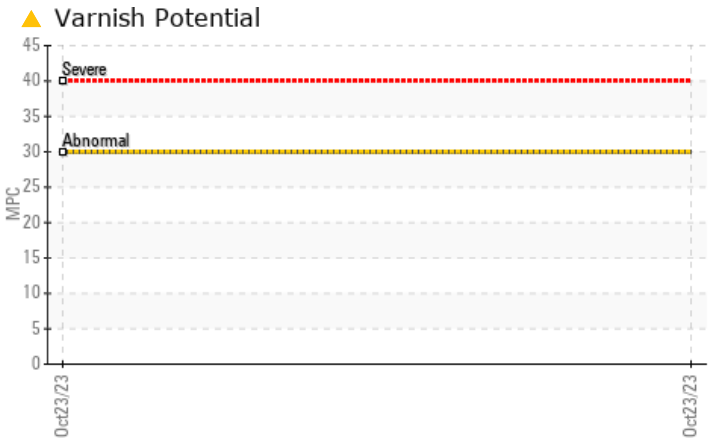
Sample Rating Trend




**INSOLUBLES**

Area
**[02591388]**
Machine Id
**35-T-1550 (36-K-1540)**
Component
**Turbine**
Fluid
**MOBIL DTE 846 (--- LTR)**

## COMPONENT CONDITION SUMMARY




## RECOMMENDATION

We recommend that you use electrostatic filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. We recommend an early resample to monitor this condition. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.

## PROBLEMATIC TEST RESULTS

| | | | | | | |
|---|---|---|---|---|---|---|
| Sample Status | | | | ABNORMAL | --- | --- |
| MPC Varnish Potential | Scale | ASTM D7843(m)* | >15 | ▲ 30 | --- | --- |

**Customer Id:** MAKMOU
**Sample No.:** WC
**Lab Number:** 02591442
**Test Package:** AOM 3

*To manage this report scan the QR code*

*To discuss the diagnosis or test data:*
Bill Quesnel CLS,OMA II,MLA-III,LLA-I +1 (289)291-4641 x4641
Bill.Quesnel@wearcheck.com

*To change component or sample information:*
Gloria Gonzalez +1 (289)291-4643 x4643
gloria.gonzalez@wearcheck.com

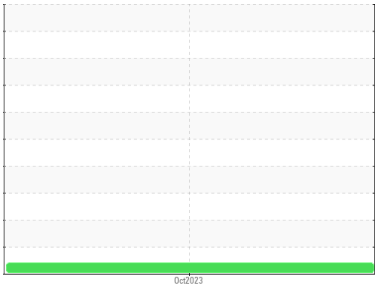
## RECOMMENDED ACTIONS

| Action | Status | Date | Done By | Description |
|---|---|---|---|---|
| Resample | --- | --- | ? | We recommend an early resample to monitor this condition. |
| Information Required | --- | --- | ? | NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. |
| Filter Fluid | --- | --- | ? | We recommend that you use electrostatic filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. |

## HISTORICAL DIAGNOSIS

# OIL ANALYSIS REPORT

Sample Rating Trend




**INSOLUBLES**

Area
**[02591388]**
Machine Id
**35-T-1550 (36-K-1540)**
Component
**Turbine**
Fluid
**MOBIL DTE 846 (--- LTR)**

## DIAGNOSIS

**Recommendation**

We recommend that you use electrostatic filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. We recommend an early resample to monitor this condition. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.

**Wear**

All component wear rates are normal. The ferrography results are normal indicating no abnormal wear in the system.

**Contaminants**

MPC (Membrane Patch Colorimetry) test indicates a moderate concentration of varnish present. The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The water content is negligible.

**Oil Condition**

Rust Prevention test (ASTM D665) indicates the oil retains good anti-corrosion properties. The AN level is acceptable for this fluid.

| SAMPLE INFORMATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Sample Number | | Client Info | | **WC** | --- | --- |
| Sample Date | | Client Info | | **23 Oct 2023** | --- | --- |
| Machine Age | hrs | Client Info | | **0** | --- | --- |
| Oil Age | hrs | Client Info | | **0** | --- | --- |
| Oil Changed | | Client Info | | **N/A** | --- | --- |
| Sample Status | | | | **ABNORMAL** | --- | --- |

| WEAR METALS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| PQ | | ASTM D8184* | | **0** | --- | --- |
| Iron | ppm | ASTM D5185(m) | >15 | **0** | --- | --- |
| Chromium | ppm | ASTM D5185(m) | >4 | **0** | --- | --- |
| Nickel | ppm | ASTM D5185(m) | >2 | **0** | --- | --- |
| Titanium | ppm | ASTM D5185(m) | | **0** | --- | --- |
| Silver | ppm | ASTM D5185(m) | | **<1** | --- | --- |
| Aluminum | ppm | ASTM D5185(m) | >10 | **0** | --- | --- |
| Lead | ppm | ASTM D5185(m) | | **<1** | --- | --- |
| Copper | ppm | ASTM D5185(m) | >5 | **<1** | --- | --- |
| Tin | ppm | ASTM D5185(m) | >5 | **0** | --- | --- |
| Antimony | ppm | ASTM D5185(m) | | **0** | --- | --- |
| Vanadium | ppm | ASTM D5185(m) | | **0** | --- | --- |
| Beryllium | ppm | ASTM D5185(m) | | **0** | --- | --- |
| Cadmium | ppm | ASTM D5185(m) | | **0** | --- | --- |

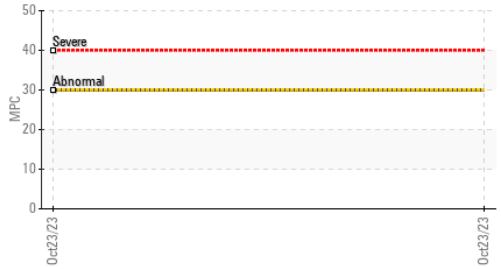
| ADDITIVES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Boron | ppm | ASTM D5185(m) | | **<1** | --- | --- |
| Barium | ppm | ASTM D5185(m) | | **0** | --- | --- |
| Molybdenum | ppm | ASTM D5185(m) | | **0** | --- | --- |
| Manganese | ppm | ASTM D5185(m) | | **0** | --- | --- |
| Magnesium | ppm | ASTM D5185(m) | | **0** | --- | --- |
| Calcium | ppm | ASTM D5185(m) | | **<1** | --- | --- |
| Phosphorus | ppm | ASTM D5185(m) | | **1194** | --- | --- |
| Zinc | ppm | ASTM D5185(m) | | **<1** | --- | --- |
| Sulfur | ppm | ASTM D5185(m) | | **42** | --- | --- |
| Lithium | ppm | ASTM D5185(m) | | **<1** | --- | --- |

| CONTAMINANTS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Silicon | ppm | ASTM D5185(m) | >15 | **<1** | --- | --- |
| Sodium | ppm | ASTM D5185(m) | | **<1** | --- | --- |
| Potassium | ppm | ASTM D5185(m) | >20 | **<1** | --- | --- |
| Water | % | ASTM D6304* | >0.03 | **0.002** | --- | --- |
| ppm Water | ppm | ASTM D6304* | >300 | **24.2** | --- | --- |

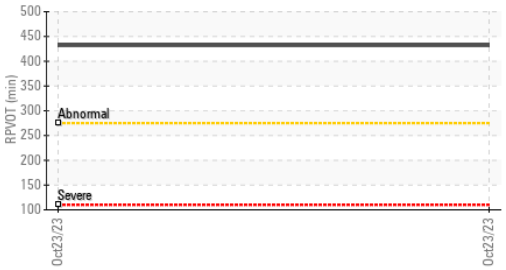
| INFRA-RED | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Soot % | % | ASTM D7844* | | **0** | --- | --- |
| Nitration | Abs/cm | ASTM D7624* | | **3.4** | --- | --- |
| Sulfation | Abs/.1mm | ASTM D7415* | | **15.0** | --- | --- |

# OIL ANALYSIS REPORT

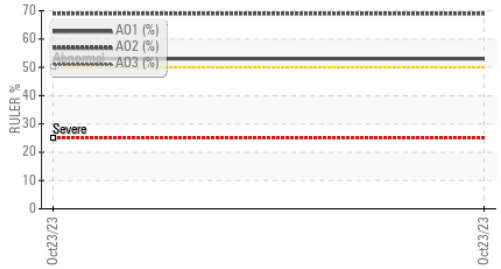
Varnish Potential



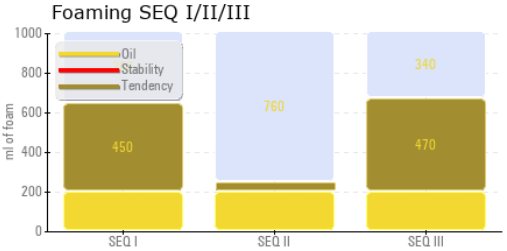

RPVOT



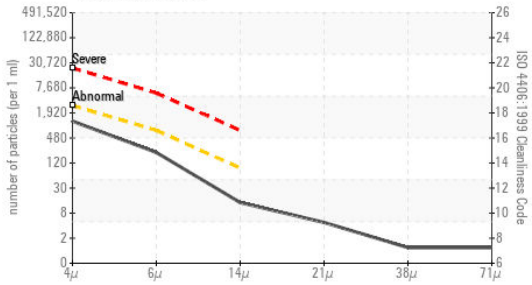

Remaining Life (RULER)




Foaming SEQ I/II/III




Particle Count



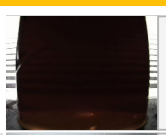
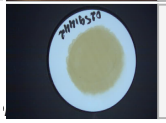

| FLUID CLEANLINESS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Particles >4µm | | ASTM D7647 | >2500 | **1067** | --- | --- |
| Particles >6µm | | ASTM D7647 | >640 | **190** | --- | --- |
| Particles >14µm | | ASTM D7647 | >80 | **12** | --- | --- |
| Particles >21µm | | ASTM D7647 | >20 | **4** | --- | --- |
| Particles >38µm | | ASTM D7647 | >4 | **1** | --- | --- |
| Particles >71µm | | ASTM D7647 | >3 | **1** | --- | --- |
| Oil Cleanliness | | ISO 4406 (c) | >18/16/13 | **17/15/11** | --- | --- |

| FLUID DEGRADATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Oxidation | Abs/.1mm | ASTM D7414* | | **4.8** | --- | --- |
| Acid Number (AN) | mg KOH/g | ASTM D974* | | **0.16** | --- | --- |
| Anti-Oxidant 1 | % | ASTM D6971* | <25 | **53** | --- | --- |
| Anti-Oxidant 2 | % | ASTM D6971* | <25 | **69** | --- | --- |
| MPC Varnish Potential | Scale | ASTM D7843(m)* | >15 | ▲ **30** | --- | --- |

| VISUAL | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| White Metal | scalar | Visual* | NONE | **NONE** | --- | --- |
| Yellow Metal | scalar | Visual* | NONE | **NONE** | --- | --- |
| Precipitate | scalar | Visual* | NONE | **NONE** | --- | --- |
| Silt | scalar | Visual* | NONE | **NONE** | --- | --- |
| Debris | scalar | Visual* | NONE | **NONE** | --- | --- |
| Sand/Dirt | scalar | Visual* | NONE | **NONE** | --- | --- |
| Appearance | scalar | Visual* | NORML | **NORML** | --- | --- |
| Odor | scalar | Visual* | NORML | **NORML** | --- | --- |
| Emulsified Water | scalar | Visual* | >0.03 | **NEG** | --- | --- |
| Free Water | scalar | Visual* | | **NEG** | --- | --- |

| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Visc @ 40°C | cSt | ASTM D7279(m) | 42.4 | **43.4** | --- | --- |
| Visc @ 100°C | cSt | ASTM D7279(m) | 6.2 | **7.1** | --- | --- |
| Viscosity Index (VI) | Scale | ASTM D2270* | 106 | **123** | --- | --- |
| Separability | oil/h2o/em | ASTM D1401* | 40/40/0 | **41/39/0 (15)** | --- | --- |
| Air Release Time | min | ASTM D3427* | 2 | **5.00** | --- | --- |
| Foam Tendency | I/II/III | ASTM D892* | 20 | **450/50/470** | --- | --- |
| Foam Stability | I/II/III | ASTM D892* | 0 | **0/0/0** | --- | --- |
| ASTM Color | scalar | ASTM D1500* | | **7.0** | --- | --- |
| Rust Prevention | PASS/FAIL | ASTM D665* | PASS | **PASS** | --- | --- |
| Oxidation Test (RPVOT) | minutes | ASTM D2272* | 1100 | **432** | --- | --- |

| SEDIMENT | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Pentane Insolubles | % | ASTM D893(m)* | | **0.035** | --- | --- |
| Toluene Insolubles | % | ASTM D893(m)* | | **0.030** | --- | --- |

| SAMPLE IMAGES | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|
| Color | | |  | no image | no image |
| Bottom | | |  | no image | no image |
| MPC | | |  | no image | no image |

CALA Testing Accreditation No. 1005078
ISO 17025:2017 Accredited Laboratory

**Laboratory**
**Sample No.**
**Lab Number**
**Unique Number**
**Test Package**

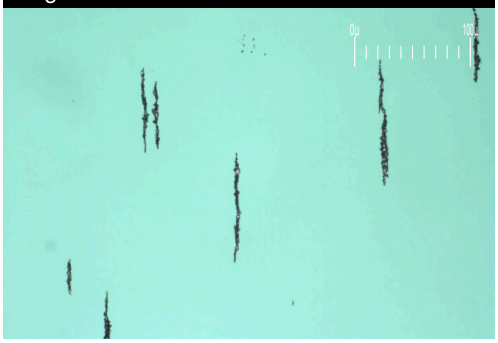
*To discuss this sample report, cc*
*Test denoted (*) outside scope o*
*Validity of results and interpretation are based on the sample and information as supplied.*

F: (709)364-3501

# FERROGRAPHY REPORT

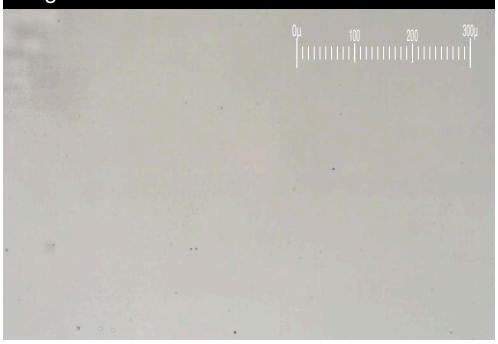
Area
**[02591388]**
Machine Id
**35-T-1550 (36-K-1540)**
Component
**Turbine**
Fluid
**MOBIL DTE 846 (--- LTR)**

Magn: 200x Illum: BC



Magn: 50x Illum: RW

Magn: 100x Illum: RW

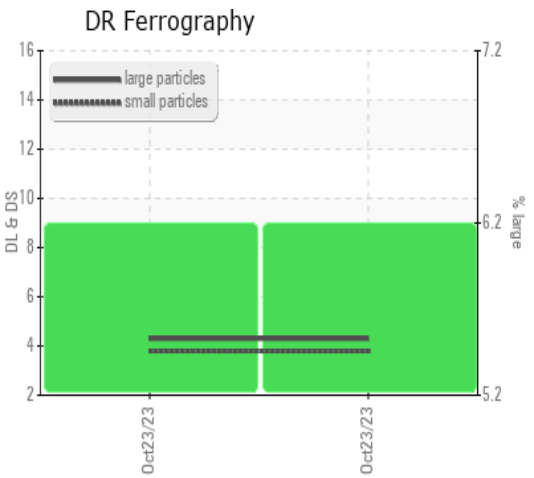


| DR-FERROGRAPHY | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Large Particles | | DR-Ferr* | | **4.3** | --- | --- |
| Small Particles | | DR-Ferr* | | **3.8** | --- | --- |
| Total Particles | | DR-Ferr* | >--- | **8.1** | --- | --- |
| Large Particles Percentage | % | DR-Ferr* | | **6.2** | --- | --- |
| Severity Index | | DR-Ferr* | | **2** | --- | --- |

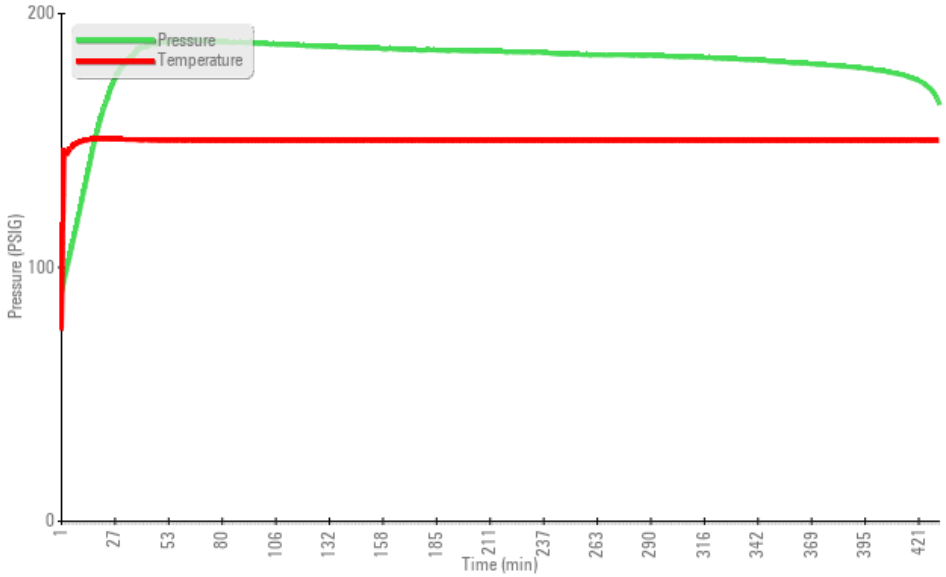
| FERROGRAPHY | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Ferrous Rubbing | Scale 0-10 | ASTM D7684* | | **3** | | |
| Ferrous Sliding | Scale 0-10 | ASTM D7684* | | | | |
| Ferrous Cutting | Scale 0-10 | ASTM D7684* | | | | |
| Ferrous Rolling | Scale 0-10 | ASTM D7684* | | **1** | | |
| Ferrous Break-in | Scale 0-10 | ASTM D7684* | | | | |
| Ferrous Spheres | Scale 0-10 | ASTM D7684* | | **2** | | |
| Ferrous Black Oxides | Scale 0-10 | ASTM D7684* | | **2** | | |
| Ferrous Red Oxides | Scale 0-10 | ASTM D7684* | | | | |
| Ferrous Corrosive | Scale 0-10 | ASTM D7684* | | | | |
| Ferrous Other | Scale 0-10 | ASTM D7684* | | | | |
| Nonferrous Rubbing | Scale 0-10 | ASTM D7684* | | | | |
| Nonferrous Sliding | Scale 0-10 | ASTM D7684* | | | | |
| Nonferrous Cutting | Scale 0-10 | ASTM D7684* | | | | |
| Nonferrous Rolling | Scale 0-10 | ASTM D7684* | | | | |
| Nonferrous Other | Scale 0-10 | ASTM D7684* | | | | |
| Carbonaceous Material | Scale 0-10 | ASTM D7684* | | | | |
| Lubricant Degradation | Scale 0-10 | ASTM D7684* | | | | |
| Sand/Dirt | Scale 0-10 | ASTM D7684* | | **1** | | |
| Fibres | Scale 0-10 | ASTM D7684* | | | | |
| Spheres | Scale 0-10 | ASTM D7684* | | | | |
| Other | Scale 0-10 | ASTM D7684* | | | | |

## WEAR

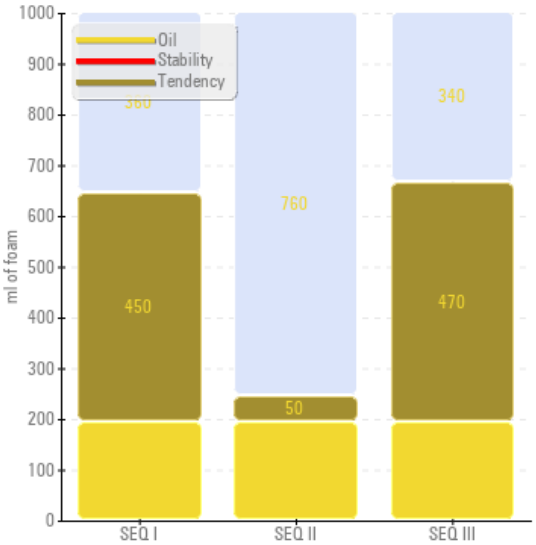
All component wear rates are normal. The ferrography results are normal indicating no abnormal wear in the system.



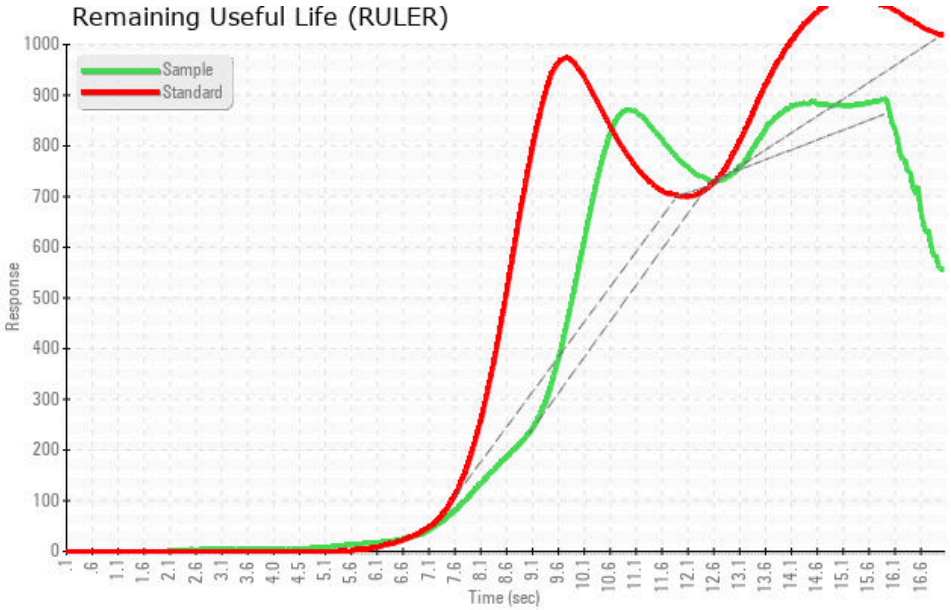
## Rotating Pressure Vessel Oxidation Test



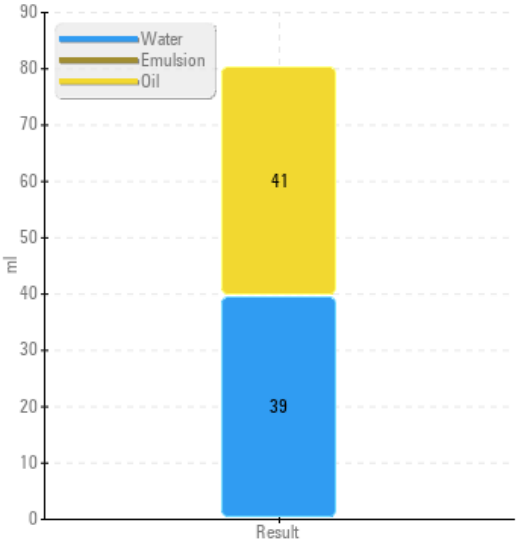

## Foaming SEQ I/II/III




## Remaining Useful Life (RULER)




## Water Separability




## MPC (Varnish Test)

## Sample Color & Clarity