Oil Analysis for Predictive Maintenance

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What is RULER™?

RULER stands for Routine Useful Life Evaluation Routine by Linear Sweep Voltammetry (LSV)

RULER:
> Test to determine and monitor the Remaining Useful Life (RUL) of turbine oils.
> By measuring remaining Antioxidant Additives (oxidation inhibitors) in turbine oils.
> Result in % remaining of antioxidant additive (oxidation inhibitors) in turbine oils.
> RULER is ASTM approval test method: ASTM D-6971-04 and ASTM D-6810-02

“Testing and monitoring antioxidant additives (oxidation inhibitors) level is important for controlling the degradation of turbine oils and industrial oils and their remaining useful life (RUL)”

Refer: ASTM D-4739-02 and ASTM D-6224-02

Note for Turbine Oil Monitoring Program:

- RULER can be screening tool and more frequent scheduling test to monitor remaining useful life (RUL) of turbine oils which can prompt end-users to perform RPVOT (RBOT) when needed. See Figure 2.
- RULER is not a replacement for RPVOT (RBOT) and FTIR, but it will be complementary test or an effective way to monitor remaining useful life (RUL) of turbine oils. See Figure 2.
- RPVOT (RBOT) test will often provide not only poor repeatability data but also high fluctuation data.
- By combining RULER + RPVOT + FTIR, will be more reliable information for right and better decision. See Figure 2.
- Recommend to be an effective Turbine RUL monitoring program, with monthly testing of RULER and FTIR and testing RPVOT every 6 months and/or whenever RULER and FTIR show some abnormal data. See Figure 2.
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Figure 2: Effective Monitoring Program for Turbine Oils System

Reference:

1. ASTM D-4738-02 : Standard Practice for In-Service Monitoring of Mineral Turbine Oils for Steam and Gas Turbine
2. ASTM D-6224-02 : Standard Practice for In-Service Monitoring of Lubricating Oils for Auxiliary Plant Equipment

Oil Analysis Report

Option Test: RULER™ (Remaining Useful Life Evaluation Routine) or Linear Sweep Voltammetry
Test Method for determining and monitoring Percent Remaining Antioxidant Additives (Oxidation Inhibitors) in lubricants.

<table>
<thead>
<tr>
<th>% Remaining Antioxidant Additives</th>
<th>72.1</th>
<th>66.8</th>
<th>84.7</th>
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Note: Testing and monitoring antioxidant additives (oxidation inhibitors) level is important for controlling the degradation of industrial lubricants and their remaining useful life refers to ASTM D-4378-02 and D-6224-02.