Diesel Lubricating High Frequency

Purpose and Function

To meet the market demand for diesel lubricating high frequency reciprocating rigs, the RIPP has conducted in-depth studies on diesel lubricity testing methods and techniques, developing a solution superior to foreign technologies and better suited to the Chinese market.

The complete system includes a digital zoom microscope, control system, mechanical system, and a constant temperature and humidity chamber. The control system consists of the main unit, driver, and LCD display. The entire testing process is automated through the control system, eliminating the need for manual intervention.

Product Performance Characteristics

1. The LVDT (Linear Variable Differential Transformer) is a type of linear displacement sensor known for its simple structure, reliable operation, and long service life. It offers high sensitivity and a wide linear range, meeting the

latest SH/T 0765-2021 standard requirements, **which are not met by optical sensors**.

2. The LVDT features symmetrical construction, zero-point recovery, high repeatability, and exceptional stability, with zero interference from oil sludge.

3. In contrast, during actual measurement processes, both optical scale and laser methods are prone to deviations, as oil vapors attract airborne dust that forms sludge, which can affect measurement results.

4. The constant temperature and humidity chamber adopts patented continuous temperature and humidity control technology from the Petrochemical Research Institute. Compared to other diesel lubricity equipment on the market, our product offers more precise temperature and humidity control, with a temperature accuracy of $\pm 0.5^{\circ}$C and a humidity accuracy of $\pm 0.3\%$, both superior to arbitration testing requirements, ensuring excellent stability.

5. AI Automatic Recognition Software: Traditional image recognition methods determine test results by measuring the scratch characteristics within wear spots. However, the boundaries of wear spots are often blurry, making it difficult for the human eye to recognize and distinguish the weight of different scratch features. Human eye recognition accuracy: 50-70 μm. The AI automatic recognition software, developed using a national standard training database, enables automatic recognition and measurement of wear spot diameters, reducing human error. AI recognition accuracy: <10 μm. The AI recognition software is 5-7 times more accurate than manual measurements.

6. The Diesel Lubricating High Frequency Reciprocating Rig offers better repeatability and reproducibility than similar equipment from both domestic and international manufacturers.
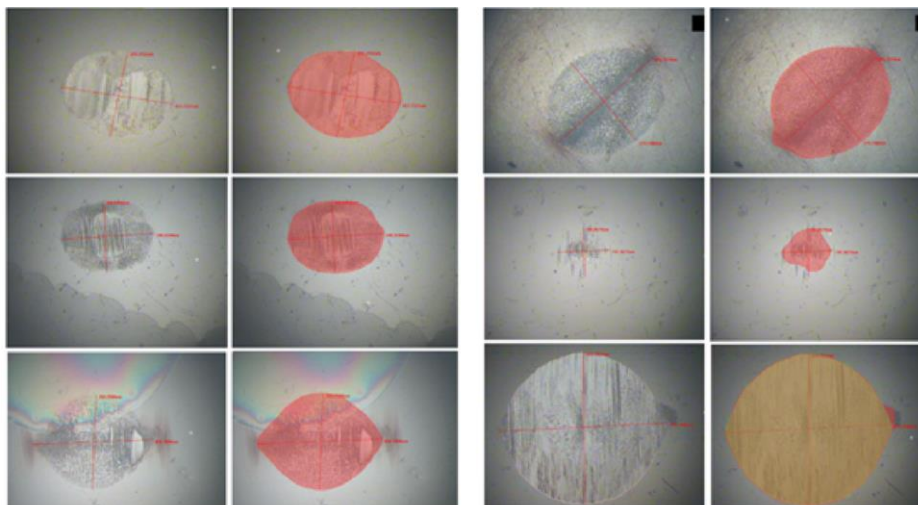
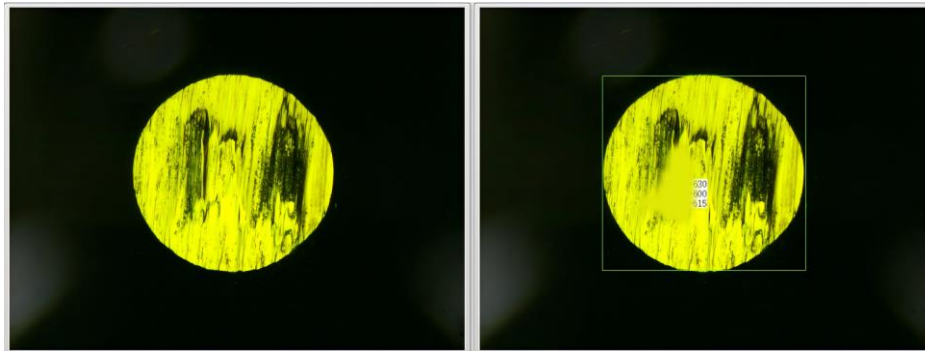Results from Experienced Personnel   AI Automatic Detection Results   Results from Experienced Personnel   AI Automatic Detection Results

Wear Spot Image Recognized by artificial intelligence, Measured automatically through dedicated software

AI Software [Automatic Measurement] The software automatically identifies wear marks and measures the X-axis and Y-axis values, with no need for manual intervention. Results are automatically generated and output by the system.

Specification

Standards	
ASTM D6078, ISO 12156-1:2016, SH/T 0765-2021	
Technical Details	
Frequency	10-500Hz ±0.1Hz
Stroke	10-3000μm ±7μm
	when the frequency setting exceeds 100Hz
	the stroke should not exceed 2000μm
Load	0.1-1200g
Microscope	Digital measurement microscope, 100x magnification
	10-megapixel resolution, measurement accuracy of 1μm
Oil Sample Temperature	Ambient temperature to 150°C ±0.4°C, extendable
	to -20°C to 200°C
Test Environment Temperature	23°C ±0.5°C (arbitration tests conducted at 23°C ±1°C)
Test Environment Relative Humidity	53% ±0.3% (arbitration tests conducted at 53% ±3%
	relative humidity)
Friction Coefficient Measurement Accuracy	0.01