DITEE
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OA800M
Oil Analysis Spectrometer

— The technology of proactive monitoring of oil —











Keeping innovation and leading the developing direction of mid- and high-end oil analysis spectrometer

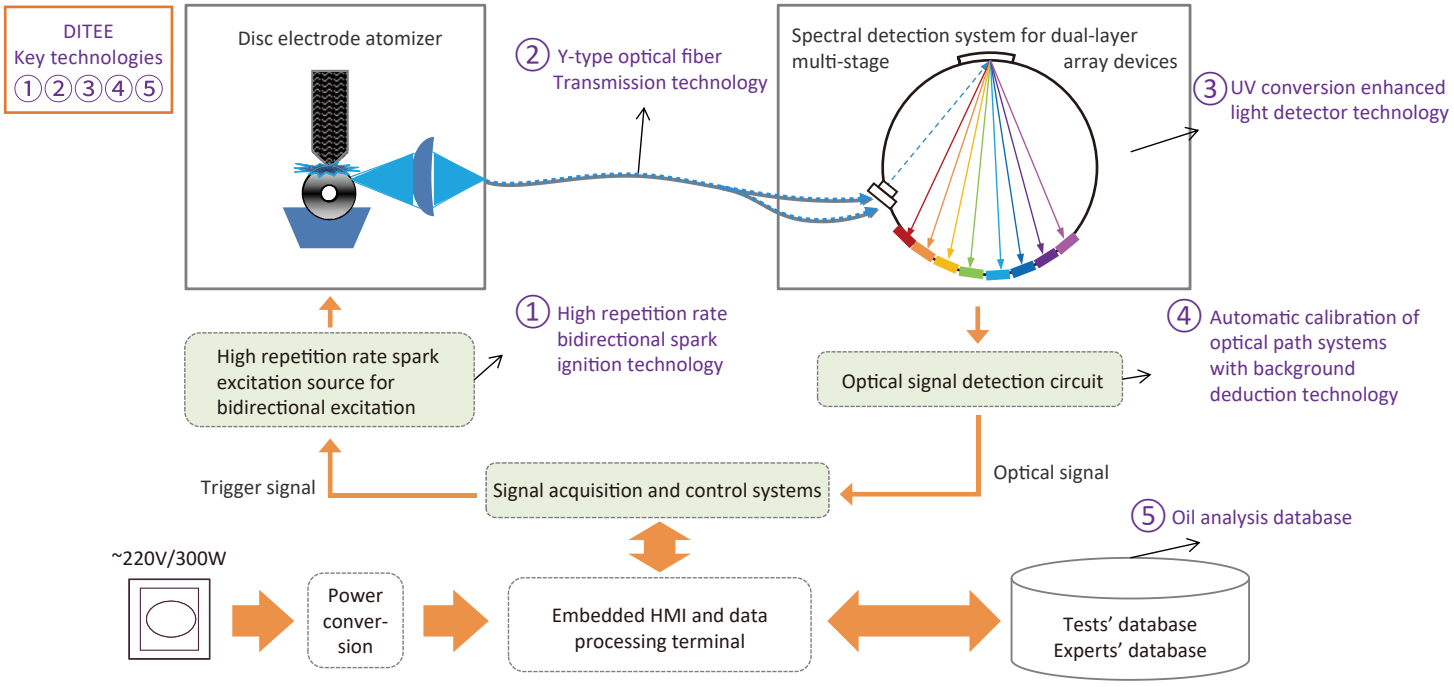


OA800M
Oil Analysis Spectrometer

DITEE OA800M Oil Analysis Spectrometer (OAS)—also known as Rotating Disc Electrode Optical Emission Spectrometer (RDE-OES), is independently self-developed by the Guangdong DITEE Scientific & Technical Co., Ltd., with completely independent intellectual property rights. OAS is an effective tool for oil monitoring, you can directly inject samples to detect the element contents of wear metals, pollutants and additives in samples such as lubricating oil, hydraulic oil, fuel oil, coolant, lubricating grease, industrial circulating water, etc. Then, you can judge the type of failure of large equipment, such as wear, sealing, and overheating, the degree of failures and the location where the failure occurs; realize the operation status monitoring, fault diagnosis and early warning of failures of the key-oil-equipment. Thus, oil spectral analysis can provide early warning of major failures of equipment, through real-time analysis and trend analysis of the spectral analysis data, you can identify potential hidden dangers of equipment in advance, optimize maintenance plans, reduce equipment failure rate, realize proactive preventive maintenance, and accordingly greatly reduces operating costs. The emergence of OA800M OAS has created a historical precedent for oil spectrometers with independent intellectual property rights in China.

DITEE OA800M OAS is widely used in military, aviation, shipping, nuclear power, wind power, electric power, petrochemical, mining, rail transit, construction machinery, university scientific research, oil testing institutions and other fields of oil quality monitoring, equipment wear monitoring and fault diagnosis and analysis, is a standard analytical mean in the field of oil analysis.

Technical Principle

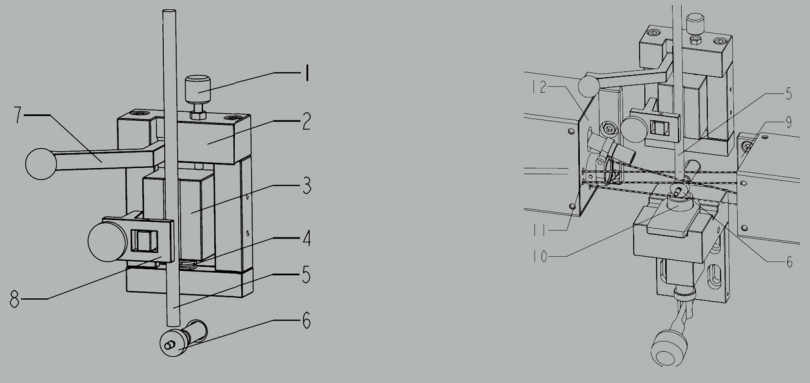


The Oil Analysis Spectrometer is mainly composed of excitation system, optical system and readout system

- The arc or spark generated by the discharge of the excitation system directly acts on the oil sample to be tested, and the outer electrons of the element are excited to generate characteristic spectral lines. The graphite disk electrode continuously rotates to bring the oil between the counter electrodes. There is a huge potential difference between the graphite disk electrode and the rod electrode. When the potential difference between the electrodes reaches the discharge state, a high voltage discharge occurs at the gap between the counter electrodes, generating an arc or spark, providing an instantaneous high temperature, which makes the oil sample on the disk electrode burn, and the oil sample will be burned, vaporized and plasma-ized. The instantaneous high temperature in the discharge gap, can fully excite various elements in the oil sample and produces many stable emission spectra. The spectral signal is flexibly introduced into the Roland circle spectroscopic system through the UV optical fiber.

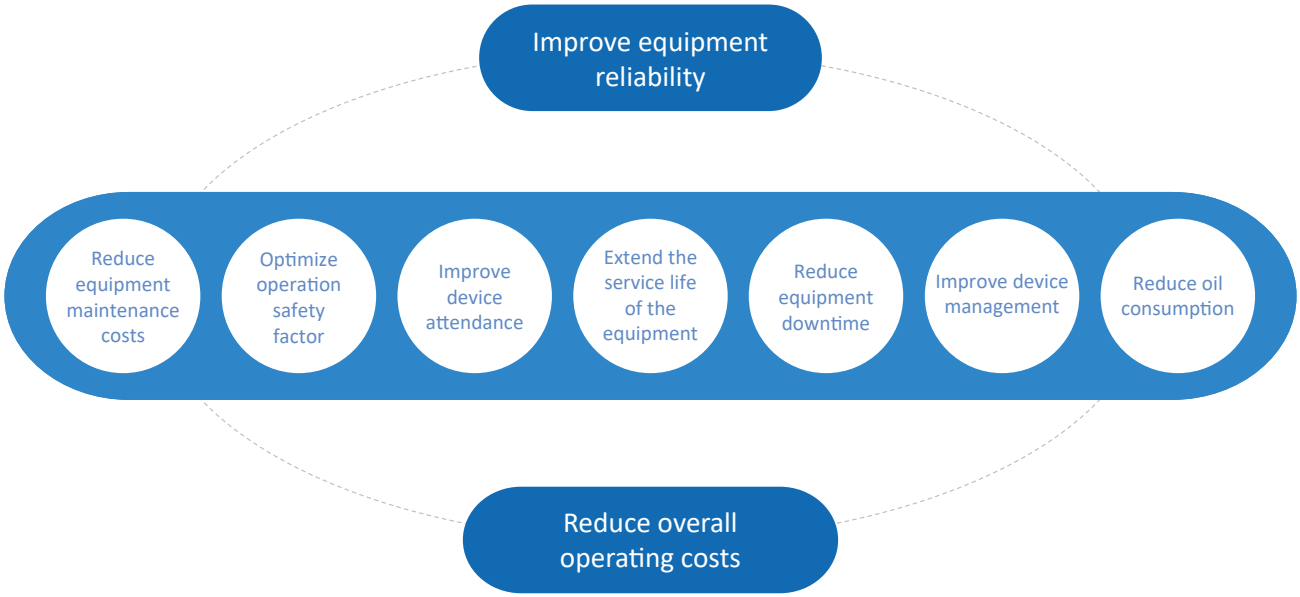
- The optical system uses the grating on the Roland circle to collect and split the characteristic spectral lines of the excited elements (the larger the focal length is, the more grating lines are available; and the higher the resolution is, the better the spectroscopic effect will be); the detector receives and photo-electrically converts all characteristic spectral lines.

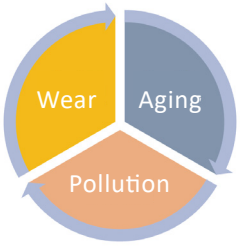
- The readout system periodically reads the charges on the detector and converts them to digital signals, including the intensity of the characteristic spectral lines of elements, because the intensity is proportional to the element concentration, the readout system uses the external standard method to analyze, process and output the data to obtain the content of the detected elements.



1. Fine-tuning base 2. Fixed base 3. Sliding base 4. Spring 5. Rod electrode 6. Disc electrode 7. Rod pressing base
8. Rod pressing base 9. Fixing block-I 10. Sample cup 11. Optical fiber head 12. Fixing block-II

Monitoring significance





Three vectors of the oil monitoring

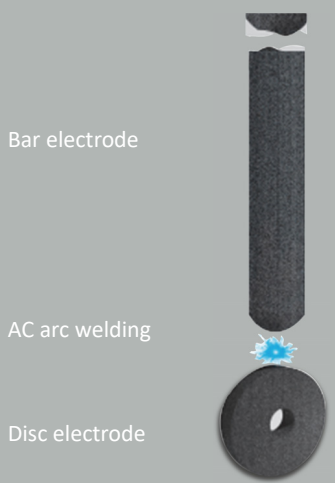
Standard Application

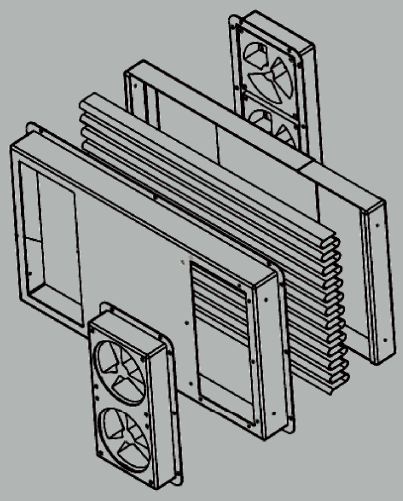
- ASTM D6595 Standard Test Method for Determination of Wear Metals and Contaminants in Used Lubricating Oils or Used Hydraulic Fluids by Rotating Disc Electrode Atomic Emission Spectrometry-- US-ASTM
- ASTM D6728 Standard Test Method for Determination of Contaminants in Gas Turbine and Diesel Engine Fuel by Rotating Disc Electrode Atomic Emission Spectrometry -- US-ASTM
- NB/SH/T 0865 Determination of Wear Metals and Contaminants in Used Lubricating Oils by Rotating Disc Electrode Atomic Emission Spectrometry-- National Energy Administration
- SN/T 1652 Determination of contaminants in gas turbine and diesel engine fuel for import and export. Rotating disc electrode atomic emission spectrometry method -- General Administration of Inspection and Quarantine
- DL/T 1550-2016 Determination of Metallic Copper and Iron Content in Mineral insulating oils by Rotating disk electrode atomic emission spectrometry -- National Energy Administration

Equipment characteristics

The oil analysis spectrometers have been used for a long time, the oil monitoring equipment is not only widely recognized by various military customers, industrial customers and commercial oil laboratories, but also a reliable and effective oil monitoring technology; it can not only realized the condition monitoring of key-oil-equipment, but also be used for the quality control of oil products.

- It is suitable for the simultaneous determination of multiple elements of various metal elements, such as wear metals, pollutants and additives in oils
- The standard configuration simultaneously determines 24 elements, including Ag, Al, Ba, Ca, Cd, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Si, Sn, Ti, V, Zn and B. Detection channels can be flexibly increased according to different needs, when adding analysis target elements, no hardware changes are required
- Built-in working curve
- It is needless to pretreat the samples, direct injection, ~40s for a single test, the testing-time is adjustable, the results will be obtained after only one measurement
- Low cost of use, the consumable materials includes only the standard graphite disc electrodes, bar electrodes, sample cups
- Uses not ceramic but spectrally pure graphite material as the disc electrode
- Using concentrated optical fiber to ensure the resolution of the instrument
- The light chamber is equipped with a closed isolation heat exchanger to effectively prevent dust, water mist and oil mist from invading
- It includes exhaust structure, prevention of cross-contamination
- Neither argon gas nor cooling water is needed
- Integrated fully closed frame structure design, impact resistance, deformation resistance; Multi-panel design, reasonable internal partition interval
- Built-in electrode sharpener and scanner





Exhaust structure

Measuring Range

The oil working curve is drawn by Guangdong DITEE Scientific & Technical Co., Ltd. using international standard reference oil (the detector linear range covers the following operating curve range). For special requirements proposed by users, the users can provide the related standard reference oil, which includes the special elements and the detected range, subsequently, DITEE can provide free extension service.

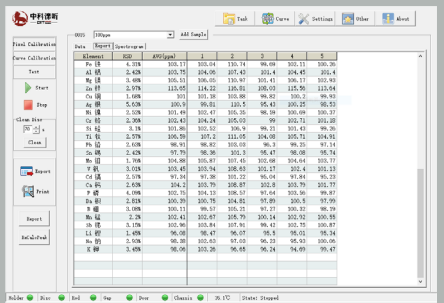
No.	Element's name	Element's symbol	Measuring range (ppm)
1	Aluminum	Al	0-1000
2	Barium	Ba	0-6000
3	Boron	B	0-1000
4	Cadmium	Cd	0-1000
5	Calcium	Ca	0-6000
6	Chromium	Cr	0-1000
7	Copper	Cu	0-1000
8	Iron	Fe	0-1000
9	Lead	Pb	0-1000
10	Magnesium	Mg	0-6000
11	Manganese	Mn	0-1000
12	Molybdenum	Mo	0-1000
13	Nickel	Ni	0-1000
14	Phosphorus	P	0-6000
15	Silicon	Si	0-1000
16	Silver	Ag	0-1000
17	Sodium	Na	0-6000
18	Tin	Sn	0-1000
19	Titanium	Ti	0-1000
20	Vanadium	V	0-1000
21	Zinc	Zn	0-6000
22	Potassium	K	0-1000
23	Lithium	Li	0-1000
24	Antimony	Sb	0-1000

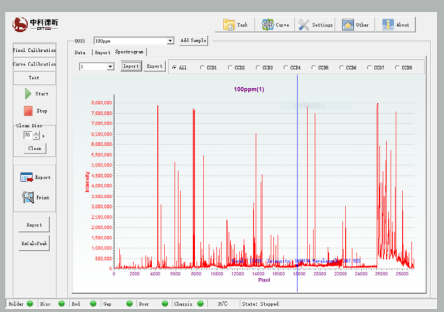


Software

Expert spectral analysis software is not only easy to beoperated, but also includes the following functions:

- The detection is done with the press of a button
- With the built-in working curve, it can work normally after simple calibration with standard reference oil
- Dynamic drift correction to improve the stability of the optical system
- It has export and automatic storage functions
- Automatic pixel calibration (spectral tracing)
- Working curve correction
- Reference line setting
- Spectral lines were automatically selected





Technical Features

Optical system

- Optical system: Pashen-Runge, Roland circle optical structure, Roland focal length: 500mm
- High-performance holographic diffraction grating, Grating notching 1800L/mm & 2700L/mm
- Optical resolution: 0.006nm
- Spectral range: 200~800nm
- Double chamber system:
  Short wave chamber wavelength: 200~470nm
  Long wave chamber wavelength: 470~800nm
- Both Roland circle and the host machine are equipped with a constant temperature system to maintain constant temperature independently, 40±1°C; the constant temperature is adjustable, which is effectively suitable for too high or too low environment temperature condition

Detector

- Cluster optical fiber signal transmission dual-layer, multi-CCD detection spectrum system
- The linear array of multiple CCDS is arranged in a Roland circular shape, which realizes continuous and simultaneous detection of the whole band, and facilitates later development of other elements
- 8 high performance CCD detectors, each CCD with 3648 pixels
- Ultraviolet band spectral enhancement detection technology, enhances the ultraviolet band light intensity, and prolongs the life



Excitation light source

- Bidirectional high performance excitation light source, 14000V ignition pulse, digital discharge parameter setting, digital pulse generator, digital offline pulse control
- Dual-phase zero-crossing signal detection technology, avoiding high-voltage spark electromagnetic compatibility interference, and improving voltage stability

Excitation chamber

- Rod electrode holder for automatic adjustment of electrode pole distance device, ensure that the height of electrode spacing is consistent for all measurements
- The excitation room has a visual window, which can visualize the whole excitation process
- Complete safety monitoring and protection functions, including excitation chamber door safety lock, sample cup, disc electrode, rod electrode, spark gap sensing monitoring device (laser light source automatic positioning), with safety alarm and automatic flameout function, so as to ensure user safety
- Semi-permeable cutoff to prevent oil sputtering contamination and filter stray light
- Aluminum fire extinguishing device, to prevent volatile sample ablation to produce flames

Computer system

- Operating system: Instrument control and data management software based on Windows platform
- Built in control computer,printer,and USB interface

Power supply and environment requirements

- Power: 220V±10%, 50/60Hz, AC power, Built-in pressure stabilizing device, no special grounding device is required
- Power consumption: ≤1kw
- Fusing current: 16A
- The range of operating temperature: -40~50°C
- The variation allowance of the maximum temperature: ±5°C/h
- Operating humidity: 0~90%, no condensation
- Working altitude: ≤7000m

Mechanical Specifications

- Dimensions: 77 cm(L) ×36 cm(W) ×54 cm (H)
- Weight: 69kg
- Shipping Package Dimensions: 111 cm(L)×60 cm(W)×85 cm(H)
- Shipping Package Weight: 125 kg

About DITEE Scientific

DITEE Scientific was established in 2020, and is an innovative technology enterprise integrating R&D, production, sales, and maintenance. The research experts at DITEE Scientific come from the Guangdong Academy of Sciences and have been engaged in the development of spectroscopic instruments since the 1960s. Currently, DITEE Scientific is equipped with a team of professionals who have long been involved in the R&D of analytical instruments, instrument production, and analytical applications. We possess strong problem-solving capabilities and are committed to meeting the ever-changing customer demands in the market, striving to create high-quality products and services.

Research and Development History

- In the 1960s, the first generation of domestic spectroscopy experts start their research at the Guangdong Academy of Sciences.
- Since 2020, several key patents based on atomic emission spectroscopy have been obtained.
- In 2014, started research of OA800 Oil Analysis Spectrometer (RDE-OES).
- In 2015, the Guangdong Provincial Department of Finance support the research of RDE-OES.
- In 2018, the demo of the RDE-OES passed third-party testing.
- In 2020, DITEE Scientific established.
- In 2023, obtained the certification for high-tech enterprises.
- In 2024, launched the ICP-OES and the MP-AES.

Quality Management System Certification: ISO9001:2015, NOA2208630

Environmental Management System Certification: ISO14001:2015, NOA2208629

Occupational Health and Safety Management System Certification: ISO45001:2018, NOA2208628

Professional technical support and nice after-sales service

Users need to ensure that instruments are running properly at all times.

DITEE has a team of experienced engineers to provide performance assurance services for each OA800 oil spectrometer. Professional engineers provide high-value customized services to ensure proper operation and extend the life of instruments, including but not limited to preventive maintenance, application method establishment, and professional consultation and customized training. DITEE provides users with life-long parts, consumables, maintenance and technical support services.

www.zkditee.com

Guangdong DITEE Scientific & Technical Co., Ltd.

11th Floor, Block C, Foshan National Torch Innovation Pioneering Park, No.13 Huabao South Road, Foshan, China

0757-83277860

Official website

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