

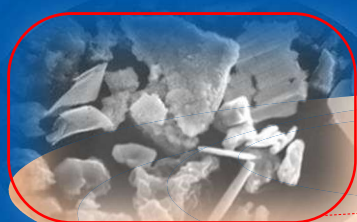


Long-term, stable, and unattended measurement of micron-sized particles (wear particles) in lubricating oil

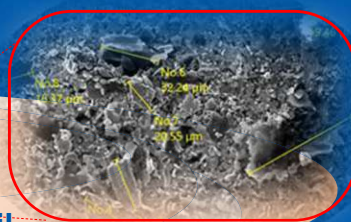
Lubricating Oil Wear Particle Monitor PI-1000



Transforming Preventive Maintenance
through lubricating oil monitoring!



**Magnified Image of
Contaminants in Lubricating Oil**



This product was developed based on the technology presented in K. Matsumoto, etc. "Metal Belt CVT Seizure Monitoring System Using Wear Debris Analysis and Particle Measurement". SAE International Journal of Advances and Current Practices in Mobility. 2020. 2. 5. 2724-2729.

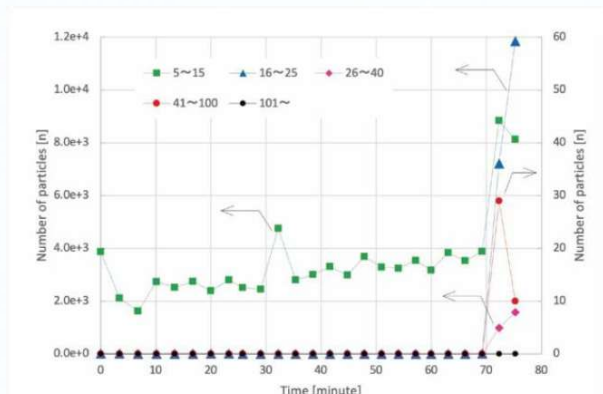
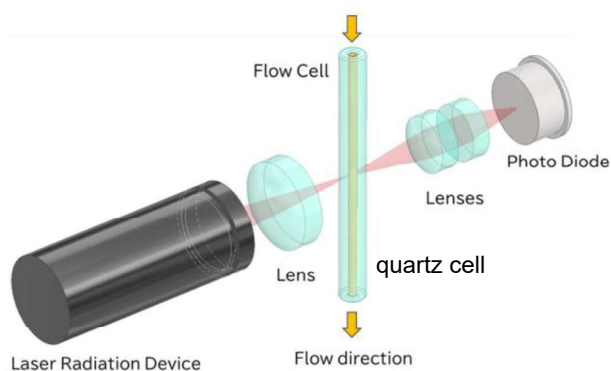
5 patents currently under application



Overview and Benefits of PI-1000

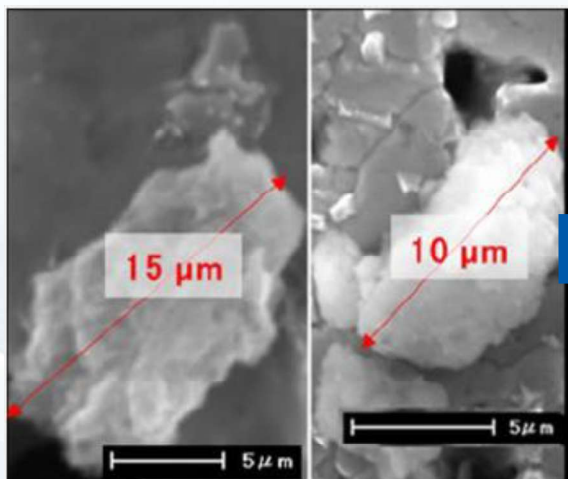
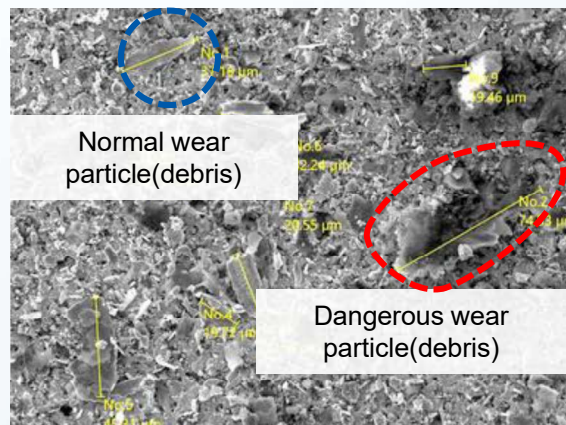
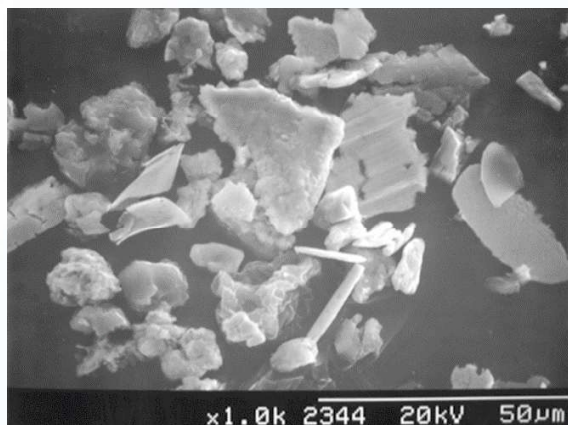
In industrial machinery that includes sliding components, characteristic wear particle is released into the lubricating oil as a sign of impending abnormal conditions. By detecting this wear particle, it becomes possible to optimize maintenance timing and extend the lifespan of sliding components, ultimately reducing total costs through optimized timing for parts replacement and oil changes.

Overview of Particle Measurement Method

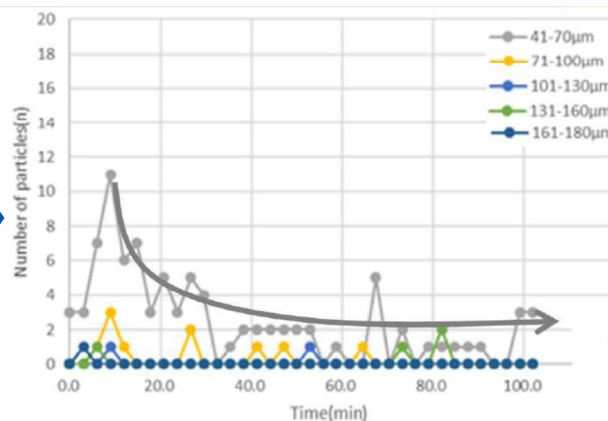


Emission behavior of wear particle by particle size during seizure (example)

Electron Microscope Images of Wear Particle(Debris) in Oil



SEM image of wear particle(debris) in oil during initial break-in period

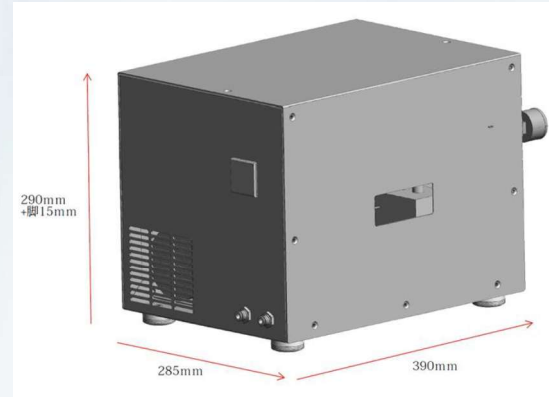


Detection of initial run-in completion through small particle emission trends

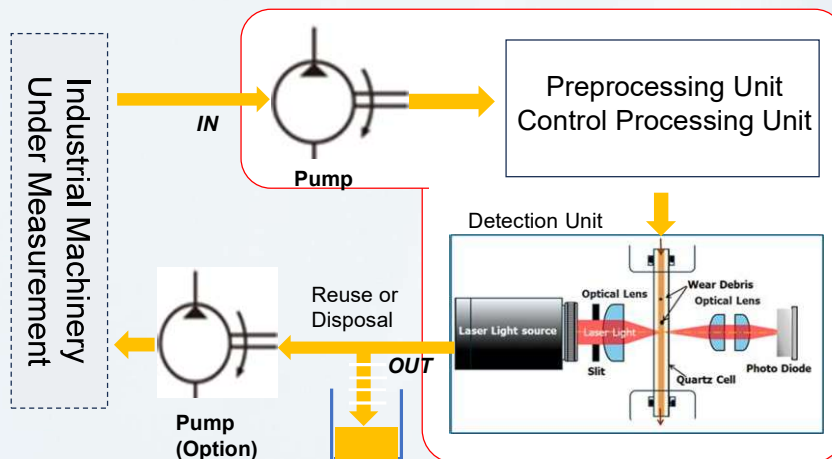
Configuration and Implementation Diagram of PI-1000

Long-term, stable, and unattended measurement is made possible by: (1) a proven laser light obscuration method, (2) a proprietary deaeration unit, and (3) a built-in oil pump.

- Adopts a detection method resistant to vibration and quartz cell contamination.
- By using a compact and efficient deaeration structure, measurements can be performed without the influence of bubbles.



Oil Measurement Schematic Diagram (Flow Path)



PI-1000 Block Diagram



Optional Oil Return Unit
(used for oil reuse)

Features

- Long-term, stable, and unattended measurement is made possible by:
 - (1) a proven laser light obscuration method
 - (2) a proprietary deaeration unit
 - (3) a built-in oil pump
- By using a PLC with EMC countermeasures, noise resistance and measurement accuracy are improved.
- A measurement system applicable to fault prediction and condition monitoring
- A small pump is installed inside PI-1000 to automatically perform oil supply and drainage. The drained oil can also be returned to the industrial machinery under measurement. (Enabling oil reuse)

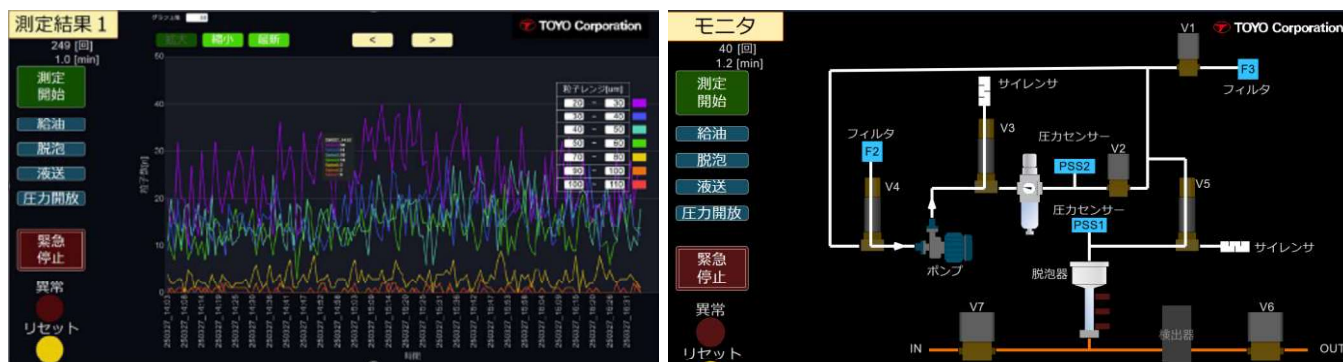
Applications

- Proactive fault prediction and condition monitoring of industrial machinery through early detection of damage to sliding components
- By understanding the initial run-in process, the time required to obtain specific wear particle data can be shortened.
- Inspection of precision part cleanliness and lot-based contaminant control
- Minimizing and Identifying damage in equipment testing for new product development

Measurement Monitoring Software

Intuitive Software Interface

This software can be operated via a LAN or network connection (prepared separately) with the main unit, allowing users to instantly visualize acquired data and internal circuit behavior. The acquired data can also be viewed in CSV format. Users can freely select specific groups of wear particles and track changes in those particles' emission behavior.



Particle Count Distribution Data from 5 to 150 μm (CSV File)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	EO	EP	EQ
1		5	6	7	8	9	10	11	12	13	14	15	16	17	148	149	150
2	2025/07/31-10:22:12	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0
3	2025/07/31-10:24:11	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0
4	2025/07/31-10:26:11	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0

Main Unit Specifications

Measurement Method	Light Obscuration Method
Detector / Light Emission Unit	Semiconductor Laser
	Maximum Output: 1 mW
	Wavelength: 655 nm
Detector / Light Receiving Unit	PD (Photodiode)
Range of Detectable Particle Sizes	5 to 150 μm
Required Oil Volume per Measurement	Approximately 20 ml
Measurable Viscosity Range	Up to 2,400 cSt
Power Supply Voltage	AC 100 V, 50/60 Hz $\pm 5\%$ (For other voltage options, please contact us)
External Dimensions Diagram (mm)	290 mm (plus 15 mm for legs) $\times$ 285 mm $\times$ 390 mm
Weight	Approximately 22 kg

Optional oil return unit and internal cleaning oil are available. Please contact your sales representative for details.

TOYO Corporation

One Technologies Company
LAS Business Unit
1-6, Yaesu 1-chome, Chuo-ku, Tokyo 103-8284, Japan
TEL. +81-3-3279-0771 FAX. +81-3-3246-0645
E-Mail : las@toyo.co.jp
<https://www.toyo.co.jp/lp/las/>

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