

Joint research on a equipment diagnosis technique utilizing Tribology

Year of Research

2008 • 2009

(Purpose)

Under Time Based Maintenance (TBM), overhauls and other maintenance work are performed based on the predetermined operating hours of the machines. Normally, TBM is used to maintain the major equipment in sewage facilities. However, under this maintenance method, overhauls and maintenance are frequently conducted while the equipment is still sound, resulting in high maintenance costs. But under Condition Based Maintenance (CBM), maintenance is done based on the condition of machinery. Since CBM is a tool useful in reducing maintenance costs while simultaneously keeping machinery healthy, thermography and vibration analysis have been in use for a long time. In order to perform planned repairs, signs leading to failures need to be detected early and a diagnostic tool should be provided to detect them. Lubrication diagnosis utilizing Tribology (science and technology of interacting surfaces in relative motion and lubrication & a technical field concerned with the reliability and durability of machines) is a technology that evaluates machinery health by analyzing lubricants of rotating machinery in detail, because wear debris in lubricants is a cause of damage to bearing surfaces. This diagnostic method can detect the signs of abnormal conditions of equipment earlier than thermography and vibration analysis (figure 1).

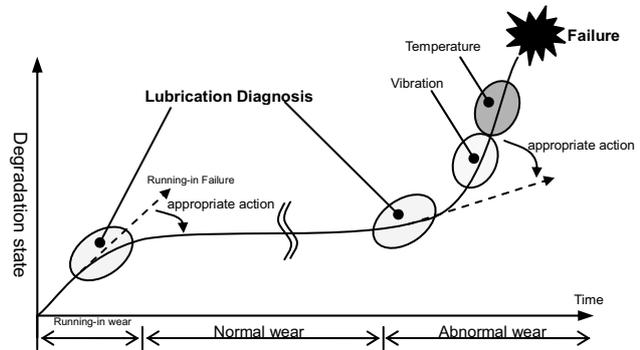


Figure1 Progress of degradation and detection sensitivity

The purpose of this research is 1) examining the applicability of lubrication diagnosis for equipment in sewage facilities & 2) compiling a technical documents covering the management criteria of the diagnosis and matters requiring special consideration for diagnosis.

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(Result)

The major contents of the 2008 research are as follows:

- (1) Study of the fundamentals of the technique and its existing real-life cases

The analysis methods and items analyzed to perform lubrication diagnosis and the existing results of analysis including diagnosis were introduced.

- (2) Clarifying the current state of equipment maintenance

A questionnaire survey conducted in each municipality that has a sewage treatment plant clarified their current equipment maintenance methods, overhaul intervals, and its costs. The findings are: 1) TBM is performed at most of the plants and 2) overhaul intervals and the costs vary between plants, even for the same machinery or same machine models. From findings 1) & 2), we concluded that applying CBM to perform overhauls and repairs at the right time will reduce maintenance costs.

- (3) Applicability to equipment at sewage facilities

Based on the results (1) and (2), we examined matters to be studied to apply this technology; categorized as maintenance, degraded parts of machinery, cost - effects, oil sampling conditions, and lubricants: and commented on each item.

(Future plan)

The following are the content of the 2009 research.

- (1) Examination of specifications

To examine specifications when ordering lubrication diagnosis

- (2) Compiling a technical documents

To compile a technical documents based on the findings of the study.

Collaborators: TRIBOTEX Co Ltd. and Japan Institute of Wastewater Engineering Technology

Contact: : Second Research Div., Osamu Matsushima, Makoto Tanokura, Hideki Hayashi

Key words

Tribology, Lubrication Diagnosis, Condition Based Maintenance