NEW PAG TURBINE OIL THAT ENABLE EASY MANAGEMENT

TRACK OR CATEGORY
Power Generation

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INTRODUCTION

For large power plants generating several megawatts of electricity, long-term stable operation is required, which means that the management of turbine oils is important. Therefore, oil manufacturers strive to develop management technologies that enable a prompt assessment of the status of turbine oils. In recent years, there have been problems related to sludge and varnish in the hydraulic control system of the turbine equipment. It is difficult to develop sludge and varnish with PAG turbine oil owing to its high solubility. However, some PAG turbine oils cause sudden oxidative degradation, resulting from a decrease in antioxidants due to poor thermal stability of the PAG base oil. Thus, the management of PAG turbine oils is difficult. We optimized the antioxidant systems, developing a PAG turbine oil that is easy to manage. In addition, the new PAG turbine oil exhibited high oxidation stability in the hydraulic system.

Figure 1 shows the data of Dry-TOST test (ASTM D7873) at 120 ℃. Rapid formation of sludge was observed with the PAG turbine oil currently available in the market (PAG turbine oil B). On the other hand, the latest PAG turbine oil (PAG turbine oil A) formed little sludge. The latest PAG turbine oil consists of the latest PAG base oil with optimized antioxidant systems.

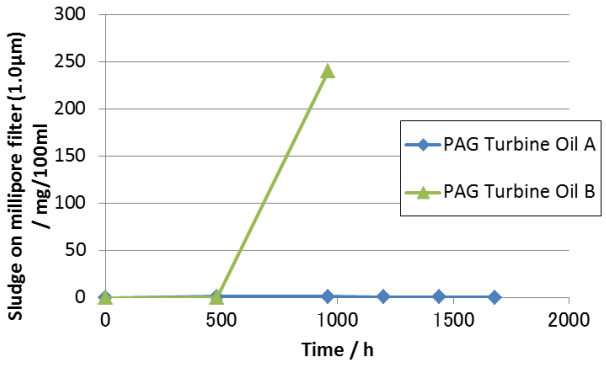

Figure 1. Relationship between the Dry-TOST test time and the sludge formation.

We conducted the high pressure circulating oxidation stability pump test (JCMAS P045 pump test), in order to simulate the hydraulic control system for the latest PAG turbine oil (Figure 2). In this pump test, we observed lower sludge formation while using the latest PAG turbine oil (PAG turbine oil A), compared with the PAG turbine oil currently available in the market (PAG turbine oil B). In addition, the latest turbine oil is better than mineral turbine oil. Figure 3 shows the appearance of oil cooler in this pump test equipment. As seen in this figure, the latest PAG turbine oil shows a good performance in relation to sludge and varnish.

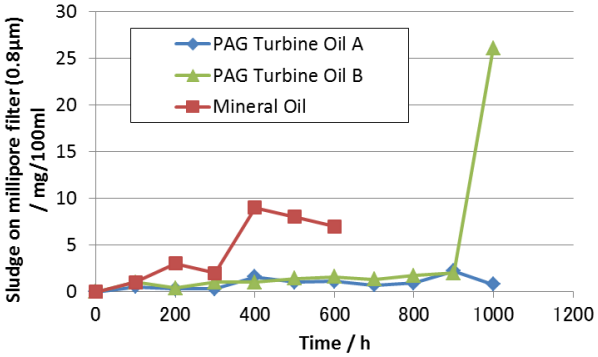

Figure 2. Relationship between the JCMAS P045 pump test time and the sludge formation.

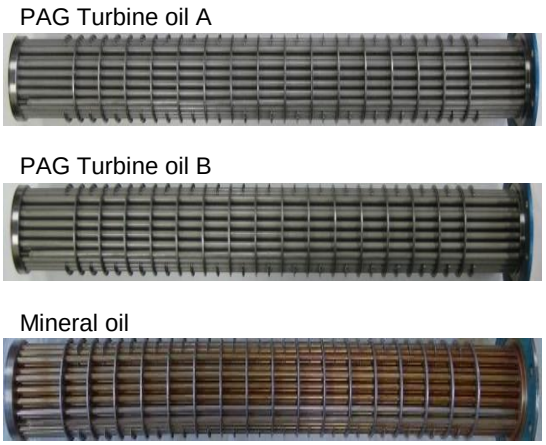

Figure 3. appearance of oil-cooler in JCMAS P045 pump test equipment..

Finally, we introduced a method to manage PAG turbine oil. PAG turbine oils form sludge and varnish rapidly because of the difficulty of managing it. We developed a method for determining the degree of deterioration, based on the relationship between the antioxidant ratio measured by high-performance liquid chromatography (HPLC) and the time of the JCMAS P045 pump test. As shown in Figure 4, the relationship is nearly linear, making it possible for the latest PAG turbine oil to manage the trend of deterioration.

Figure 5 shows the relationship between the antioxidant ratio determined by Linear Sweep Voltammetry (ASTM D6971) and the time of the JCMAS P045 pump test, as well as HPLC.

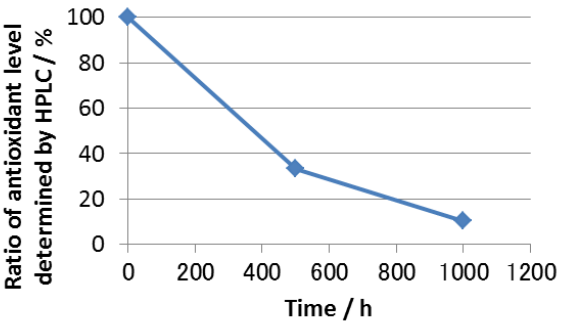

Figure 4. Relationship between the JCMAS P045 pump test time and ratio of antioxidant level determined by HPLC method.

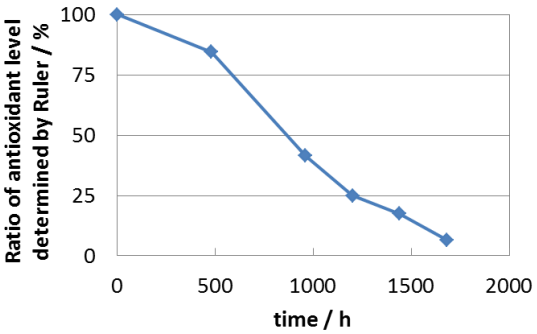

Figure 5. Relationship between the Dry-TOST test time and ratio of antioxidant level determined by Linear Sweep Voltammetry (ASTM D6971).

REFERENCES

KEYWORDS
Lubricants:Gas Turbine Oils, Base Stocks:Polyglycols, Additives:Antioxidants.