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Standard Guide for Practical Lubricant Condition Data Trend Analysis¹

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INTRODUCTION

This standard provides specific guidelines for trend analysis, as they are applied to condition monitoring of machinery. The main purpose of trend analysis is to learn how rapidly the machine and fluid are deteriorating. A significant change in trend is indicative of a developing failure. Intervention in the early stages of deterioration is much more cost effective than failure of the machine.

Maximum reliability of in-service machine components and fluids requires a program of condition monitoring to provide timely indications of performance and remaining usable life. To achieve these goals, a condition monitoring program should monitor the rate of progression of the failure by including sufficient tests to determine the rate of degradation, increase of contaminants, and quantity and identity of metal debris from corrosion or wear.

The condition monitoring process determines the presence of oil-related failure modes, allowing remedial maintenance to take place before failure and subsequently expensive equipment damage occurs. In order to diagnose and predict machinery and fluid condition, the rate of change of machine condition must be trended. Equipment maintainers expect condition monitoring information to clearly and consistently indicate machinery condition, that is, the rate-of-change of component damage over time and the risk of failure.

Trending utilizes a comparison of a condition parameter with time. For example, plots of a condition-related parameter as a function of time is used to determine when the parameter is likely to exceed a given limit. Forecasting the expected breakdown of a machine well in advance enables the operator to minimize the machine's downtime

1. Scope*

1.1 This guide covers practical techniques for condition data trend analysis.

1.2 The techniques may be utilized for all instrumentation that provides numerical test results. This guide is written specifically for data obtained from lubricant samples. Other data obtained and associated with the machine may also be used in determining the machine condition.

1.3 This guide provides a methodology for assessing changes in lubricant during service. For limits on a specific lubricant parameter used in different system types, users should refer to Practice D4378, Practice D6224, or other established

industry criteria, such as from the OEM. Guide D7720 may be used to determine limits if unavailable through the other references given.

1.4 This guide does not address upper or lower control limits. These limits are provided by product manufacturers, defined in ASTM specifications, or both. The range between upper and lower control limits should be greater than the range within each test method's repeatability coefficient. See Practices D3244, D6299, and D6792 for more information about ensuring that process control limits do not violate statistical fundamentals.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

¹ This guide is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.96.04 on Guidelines for In-Service Lubricants Analysis.

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*A Summary of Changes section appears at the end of this standard