

Hydraulic Fluid Properties and their Impact on Energy Efficiency

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Abstract

To meet the increased requirements on higher efficiency and better functionality of hydraulic systems, new components and system concepts have been developed over the years. However, the most important component in a hydraulic system, which has a major impact on system efficiency and wear are the fluid itself. The last decades, major attention on hydraulic fluid development, have been set upon environmental adaption. Today, energy efficiency has been a hot topic and a number of energy efficient fluids have been launched on the market. Besides energy efficiency, environmental adaption of fluids, are extremely important in mobile applications.

In this paper the focus is set on hydraulic fluid properties and its impact on system efficiency. Environmental adapted fluids will also be discussed. Synthetic saturated esters are analysed and compared with mineral oils. The main question that will be tried to answer is - "How to select the best fluid for a specific application?".

Keywords: Hydraulic fluids, Synthetic esters, Fluid properties, Viscosity, Energy efficiency.

1 Introduction

The pressure media is the most important component in the hydraulic system because it takes care of the energy transfer in the whole system from pump to cylinder / motor. Additionally the hydraulic fluid has to provide lubrication and cooling. Especially in mobile applications it is of great importance to minimize the negative environmental influence from hydraulics.

1.1 Environmental adapted fluids

In order to make hydraulic fluids environmentally adapted a number of synthetic fluids have been developed. One of the most promising fluids is saturated synthetic esters. This type of fluid has many interesting properties to explore. Synthetic saturated esters have been on the market for more than 10 years, but the evaluation of their properties is still limited. However, the results so far about the lubrication properties, viscosity index, and stability etc are very positive, see **Fig. 1**. There is no doubt that the synthetic esters can be considered as a

future product with a high development potential.

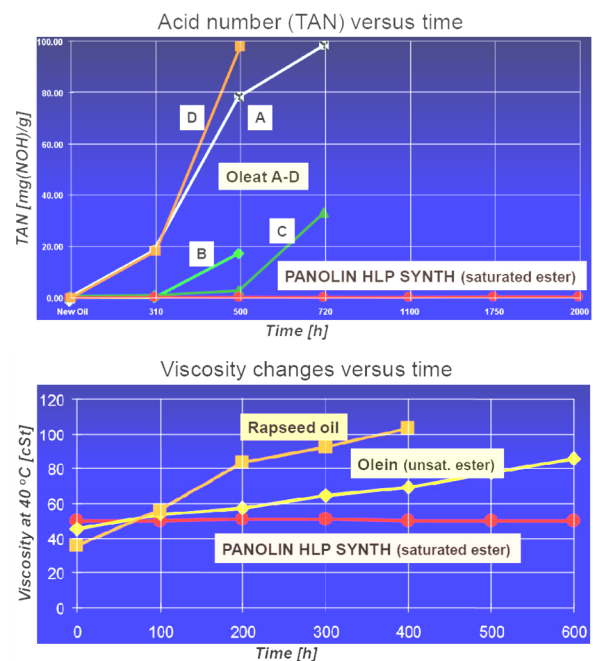


Fig. 1: Acid number and viscosity stability of saturated ester, Panolin HLP Synth, [2].