

3. Results

3.1 Thermic stability of plant oil

The results of the heating tests are shown in Fig. 2. After approx. 100 h the mineral oil - plant oil mixture's viscosity increased significantly. This result can be taken as a reference of this heating test: The way the oil is heated up during this test represents the accelerated process the oil is undergoing in the engine. As the oil was increasing its viscosity after 400 hours in the previous test, the conclusion is, that 100 hours in this test correspond with 400 hours in the longterm test.

The same heating test of pure, untreated rape seed oil shows a significant increase in viscosity only after 300 h at 110°C and 420 h at 90°C respectively. This clearly shows that pure plant oil lubricates with a safety factor of 3 to 4 compared to mineral oil which has been diluted by plant oil. Diluted oil is inevitable if the engine is run on plant oil as fuel and lubricated by mineral oil.

From the point of thermic stability, it is 3-4 times safer to lubricate with plant oil rather than with mineral oil which has been mixed with plant oil.

3.2 Motortests

The engine was running for 300 hours operating under the schedule described above. No fuel or lubrication related problems were observed during this time. From the observations made during and after this test it can be safely stated that **the Fieldmarshal FMII is suited to be lubricated with plant oil and run on the same oil as fuel.** The temperature of the lubrication oil was measured to be in the range of 58 to 59°C at a constant load of 4.15 kW at 850 rpm. Therefore there is even greater safety against increase of viscosity as found under the heating test (see Fig. 1).

During the full test periode of seven months the test was interrupted. Each time the test was started up again, the torque necessary to turn the engine was measured, to see wether sticking due to polymerization of plant oil could be observed. This was checked after day 7, 14 and 28 respectively. No sticking could be observed. On the basis of the observations during this experiment it can be concluded:

If the engine is not stopped for longer than two months it is not necessary to clean the engine with diesel oil.