Load Test of Geared Engines of the Company SEW Eurodrive on the Premises of the Company ELEKTRO-MASCHINENBAU Bogner GmbH & Co. KG

Purpose:

The test examines the temperature and current behaviour of 4 worm-geared engines without gear oil at nominal load to determine the emergency operating features of the engines. It observes the difference between 2 engines, which have been treated with RVS Technology Gel, and 2 untreated engines.

Test Procedure:

The test comprised 4 older (year of construction 1986) and used worm-geared engines of the company SEW-Eurodrive. 2 of the engines had been treated twice with RVS Technology Gel 1 week before the test; the other 2 engines were left untreated.
Before the test, the engines were disassembled, the oil was removed and the engine was washed with a detergent. The engines were then successively connected at a load spindle with a ratio of i ~ 200. The temperature and current flow were recorded during the test, and it was waited until the engines were got blocked or were destroyed. Finally, the gears were dismantled and photographed.

Engine 1 and 2 were treated with RVS Technology Gel, Engine 3 and 4 were left untreated.

Breadboard Construction:

Technical specifications and serial numbers of the used geared engines:

0.37 kW, 380 V, 1.2 A, 1400/67 1/min, 39 Nm
Engine 1: 010219654.601.03001
Engine 2: 010219336.602.03002
Engine 3: 010220774.605.03007
Engine 4: 010219654.601.03009

Measuring Instruments used:

- Digital Injection Probe Type Clamp Meter DT-266 CE
- Digital-Thermometer GTH 1150

Breadboard Construction: Engine 3 with load spindle

Current flow and temperature curve of the geared engines:

(Graph – In the graph: **Current Flow I = f(t)**)

(Graph – In the graph: **Temperature Curve T = f(t)**)

I1, T1=Engine 1; I2, T2=Engine 2; I3, T3=Engine 3; I4, T4=Engine 4

- Engines 1 and 2 were treated with RVS Technology Gel
- The current was measured in each motor phase of the engines
- The temperature was measured at the front end of the gearbox housing

Comment:

As you can see from the graph, the current and temperature have a steep rise in both untreated geared engines 3 and 4. After a short time, significant scuffing noise could be heard. After about 15 minutes, the two untreated engines 3 and 4 were blocked and further operation was no longer possible. The surfaces of the gears will be shown later.

A much flatter temperature increase was detected in engines 1 and 2. The currents rise only slightly.

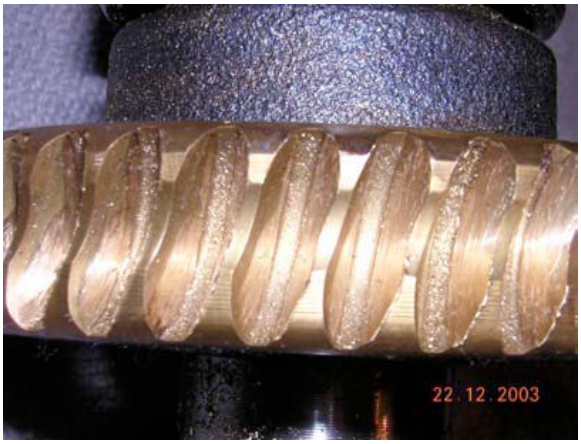
The geared engines 1 and 2 stayed on the course significantly longer, engine 2 was blocked only after 26 minutes and engine 1 was not blocked at all. Engine 2 continued to run after a short cooling period– we assume that the bearing had

jammed due high temperatures. The test with engine 1 was terminated after 30 minutes, because up to then no changes had been detected in the current.

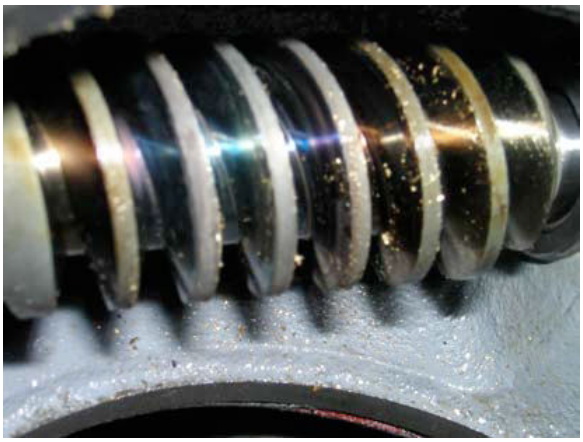
Digital captures of the gears after the dry run:

Engine 1 (3 images)

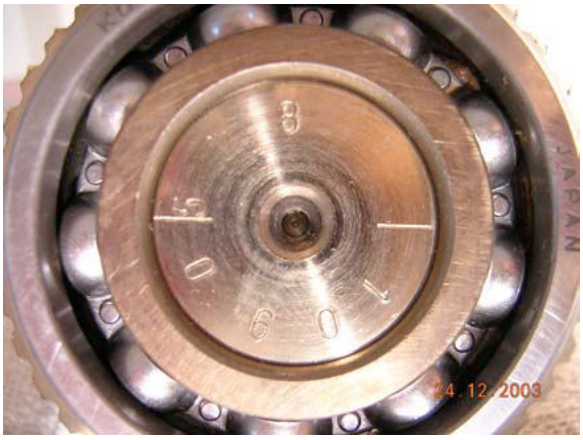
Engine 2 (4 images)



Engine 3(4 images)



Engine 4 (4 images)



Summary:

The test results clearly show that the RVS Technology Gel had a significant effect on the treated geared engines 1 and 2, and the surfaces of the gears are coated so as to achieve a significantly higher stability. Although a steel/brass friction combination does not result in the optimal characteristics of the RVS Technology Gel, the temperature differences up to 54 °C (-61%) and current differences up to 2.0 A (-65%), are evident.

The surface of the gear teeth indicates very strong seizing marks in engines 3 and 4 and very high bearing temperatures (annealing colours) in engine 4. There are absolutely no signs of wear on engine 1. Engine 2 has almost the same current and thermal behaviour as engine 1, whereas engine 2 also bears traces of wear.

In conclusion it can be stated that the RVS Technology Gel is well suited to coat frictional metal surfaces and thus protect them against wear, reduce friction and significantly increase service life.

The tests showed excellent emergency operating features of treated gears. In fact, since this is not a real case of operating, the coating on the gear teeth may result in

significantly longer lifetimes (2-fold), potential savings of oil changes and even the use of cheaper material.

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