Helsinki Technical University tested X-1R additive

Pin-On-Disc -examinations 5/2000

1. Target

Target of test series was to examine oil additive X- effect to friction and wear.
Is mentioned, that the additive is mixed to the all lubricants and that it improve to the lubricant the duration of the surface pressure and reduces the wear.
In the experimental series as the lubricant was used the motor, hydraulics and gearbox oil, to which increased the additive of 3...6% X-1R.

2. Equipment under test

Tests performance so called on the peg consumption machine (Pin-On-Disc).
In the device is rotating disk, which against pressures peg.
And disk that the material of the peg is freely in the selecting.
The peg will be loaded by focusing their normal power with the help of the weights.
From the effect of the load resulting friction will measure built in power detector. Disk rotation rate is adjustable and circuit amount is possible limit.
The examinations can be completed as the dry so called without any lubricant or as lubricated.

The surface pressure of the contact is also adjustable by the few geometry of the peg.
In addition to friction and wear affecting surface roughness and temperature.
To the lubricant temperature can be changed with the outside heating.

Tests achievement:

Tests were started by attaching test panel and bowl to his should and adjust slide ray for the desired.
The samples and device was naturally cleaned before new examination.
To the lubricant after the addition examination could be started to by setting load weights.
After to the examination was measured the friction power and results were chiseled on the graphic plotters.

The trial materials:

Test board were used SFS 506 steels made disk, which was carbon hardened to hardness 710 HV. The disks was ground to surface roughness Ra = 0,20 µm thus, that the grinding figure was in the perpendicular with respect to the slide direction.
Trial dowels were used from the diameter 8 mm laurel heard.
FAG for the hardness of the ball-bearing steel will be informed 60-66HRC.
As the other material was used Kymenite-ADA cast iron, which hardness was 310hv.
Cast iron pegs were made from the diameter 8 mm ball head.

Lubricants:

Lubricants were used common motor, hydraulics and gearbox oil and for them added X-1R additive.
To Motor oil was put accordingly to the instruction 6% and hydraulics and to gearbox oil capacity 3% additive.

Used lubricants:
10w30, synthetic motor oil, ADA the examinations of the pegs
0w40, synthetic motor oil, the laurel bowl examinations
10w30, mineral motor oil
Hydraulic 32, hydraulics oil
HD 80w90 GL 5, gearbox oil

Test parameters:

Slide speed was used 0,1 m/s and as the slide journey was 1000 m.
The slide diameter was in between 44 - 64 millimeter.
Load Power was 8 N, which answer the bowl level in the contact the surface pressure of 1000 MPa.
When the bowl spends, the surface pressure goes lower.
The test panel surrounded lubricant mug and oil was disk surface about 3 millimeter thick floor, touch point in being completely oil surrounded.
The examinations were made 22°c room temperature.
Experiments was completed three pieces each variation towards.

3. Results

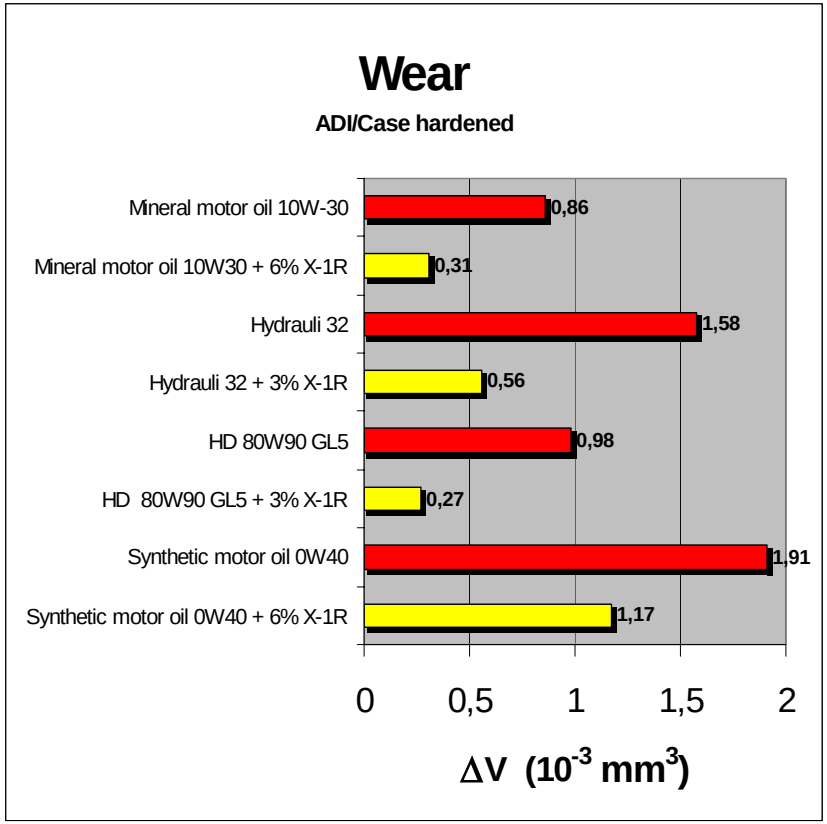
Tests together pulled results are presented as the graphic on the columns three examinations as the average.
In between these examinations printout was change, what is really typical to the wear examinations.
Change can cause different surface roughness quality, different slide diameter or such., although examination is tried to complete possibly in the frame of the similar conditions.
Is also notice, that the experiments was driven *only three* each variation towards.

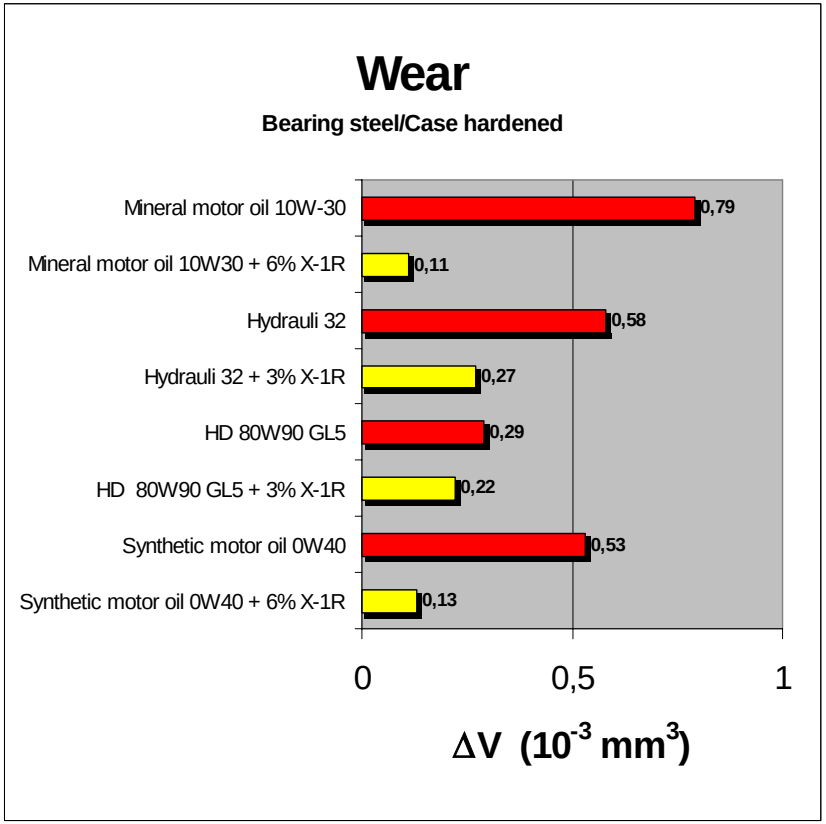
The results suit however well lube oil additive perception of the effect and assessing.
To the deeper inspection of the assignment of Wear values and received difference meaning would be reason completes clearly wider and more the thorough experimental series.

From the Wear results are in sight, that X-1R additive has reduced wear almost all cases noticeable.
The amount of Wear has been laurel bowl much lesser as on cast iron.
This is because of materials different law from hardness.
Additive effect can be seen more plainly in connection with the motor oil and hydraulics oil.
From the powerful of the gearbox oil wear inhibition additive resulting, the wear of their without X-1R additive has been lower also.

Friction tells that X-1R additive effect has been from the part of the motor oil favorable.

Wear results in bar chart





Coefficient of friction in bar chart