

***IMPLEMENTING TRIBOTECHNICAL DIAGNOSTICS IN AUTOMOTIVE  
INDUSTRY***

***Ivan Čorný, Hekmat Al Hakim***

***Faculty of Manufacturing Technologies, Technical University Košice, with the seat in  
Prešov, Bayerova 1, 080 05 Prešov, Slovakia***

***Abstract:*** *The contribution deals with an influence of up-to-date lubricants in agricultural power tractors on tractors longevity. Importance of periodical tribotechnical diagnostics measurements as a mean of rapid wear-out prevention in various heavy machinery is considered.*

***Key Words:*** *tribology, tribotechnical diagnostics, maintenance, lubricant, automotive industry.*

## **1. INTRODUCTION**

Fast development of technologies in last decades brought significant design changes in mechanical engineering. Together with increasing machine power, new materials, and technology intensification, complexity of end-products have grown, quantity of electronic, hydraulic, testing, and automation systems included in machinery increased.

Experience from the recent years have shown that technology development can project itself into economy only when it goes together with improving of operational features development.

Research shows that machinery maintenance costs during its longevity are comparable to initial investment and often exceed the investment. Even though the maintenance technology level is quite good, its organisational and management aspects often prove to be

far from perfect because they are not based on objective information about actual machinery operational state.

Findings and estimations of machinery technical state is in most cases only intuitive. So the repair and maintenance plans depend solely on experience and invention of maintenance staff.

To improve this situation (higher effectiveness and lower costs) two ways of technical state identification could be implemented:

- continual (on-line)
- non-continual (planned or casual).

## **2. DIAGNOSTICS**

Present tractor park in Slovakia is characterized by high number of heavy and high power tractors. It is apparent that these machines are investment-costly so the highest operational reliability and maximum longevity should be maintained.

There are two significant terms:

1. warranty operation time
2. after-warranty operation time.

Manufacturers bear responsibility for machinery operation during warranty period including maintenance and repairs, most often these costs are added to the investment.

Once warranty expires, all the care of machinery is left on user. Required services are either ordered from provider company (high costs) or are in care of user (often poor quality).

From what was mentioned above there is one question emerging: how can be determined degree of operational reliability of the tractors? Main aim would be to find:

- the wear of movable and immovable tractor parts, especially determination of wear trend, particularly defining metal wear limits – in terms of quantity and quality,
- technical state of tractors and certain aggregate subsystems, e. g. injectors, injection pumps, injection nozzles, compression and terminative rings, etc.
- lubricant longevity (not a small item) and its exchange interval determination, the interval is usually prescribed in kilometers, or operation hours (according to service and maintenance manual).

The information prescribed by manufacturer are not always to be solely relied on, because:

- climatic condition are not taken into account,
- operational condition are not fully taken into account,
- technical state of machines can vary.

It can be said that oil exchange is often done:

- untimely,
- in time (when all the factors and parameters are correct),
- late.

This can cause:

- lubricant wasting,
- quickening of machine parts wear.

This means:

- increased maintenance and repair costs,
- decreased reliability coefficient,
- raised costs because of machinery idle times.

From the reasons mentioned above we propose implementing tribotechnical diagnostics as one from perspective diagnostics methods that are non-destructive, machine is not to be disassembled. When we need to know what is going on inside the machine, we have two possibilities:

1. disassemble the machine and inspect its friction surfaces,
2. or apply diagnostics and experience to estimate the running processes.

The first possibility is relatively costly and thus inefficient. Significant costs-saving can be achieved by applying non-disassembling diagnostic methods.

### **3. CONCLUSIONS**

Tribotechnical diagnostics use lubricants as medium to gain information about processes in lubricating system. Lubricant analyses in tribotechnical diagnostics have similar meaning to blood tests in medicine.

According to our twenty years experience in the field we can confirm that nowadays implementing tribotechnical diagnostics into complex machinery care system is not a luxury but a necessity – in agriculture, road, railroad, and air transport, civil engineering, and industry.

In these industry branches tribotechnical analyses of oils (motor, hydraulic, transformer, and other types of oils) and plastic lubricants are aimed at determining:

- lubricant longevity and exchange interval,
- technical state of a given system (subsystem),
- friction regime,
- suitability of a given lubricant in a given system.

### **4. REFERENCES**

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