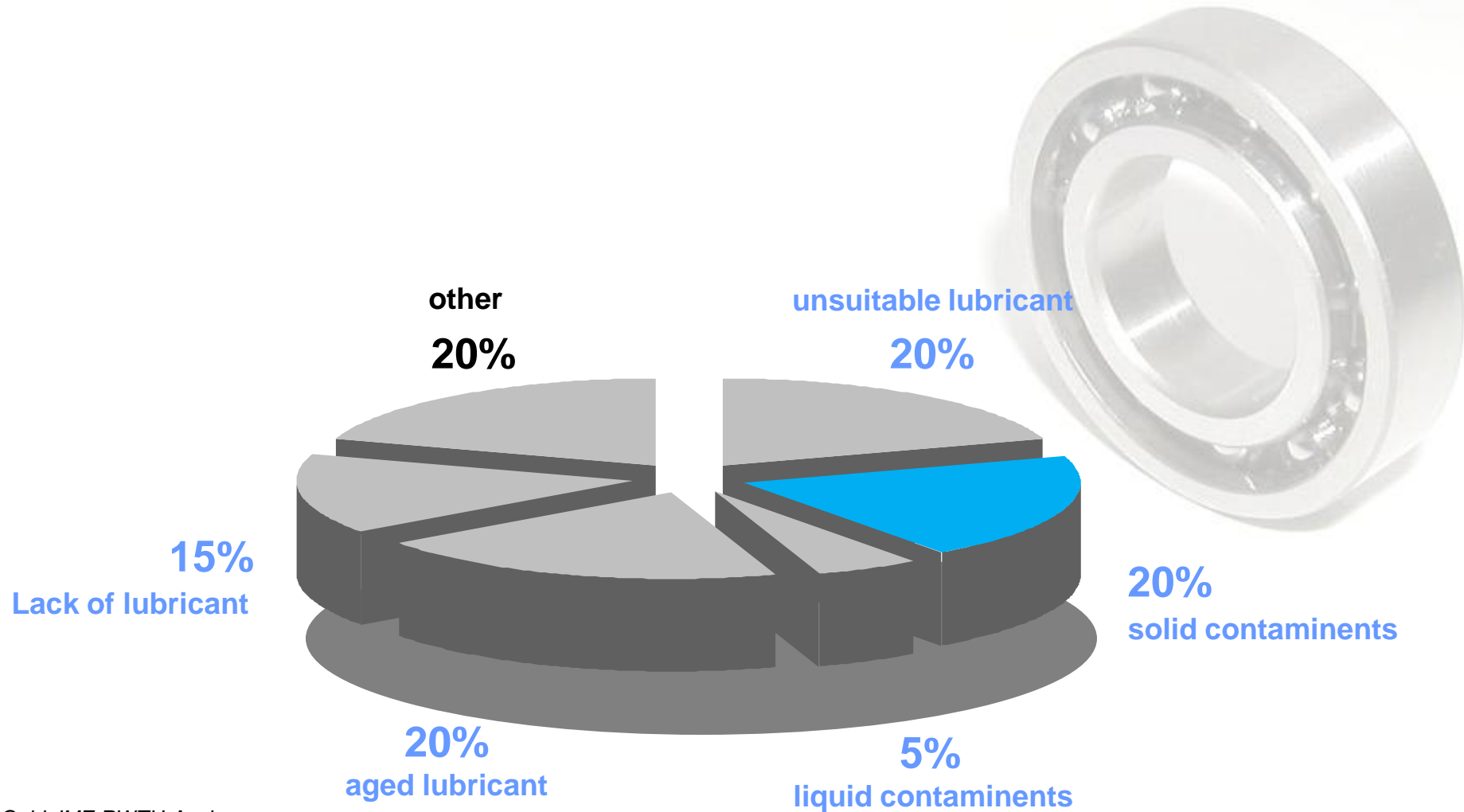




Online condition monitoring

Motivation for Condition Monitoring

Failure causes by the example of a bearing

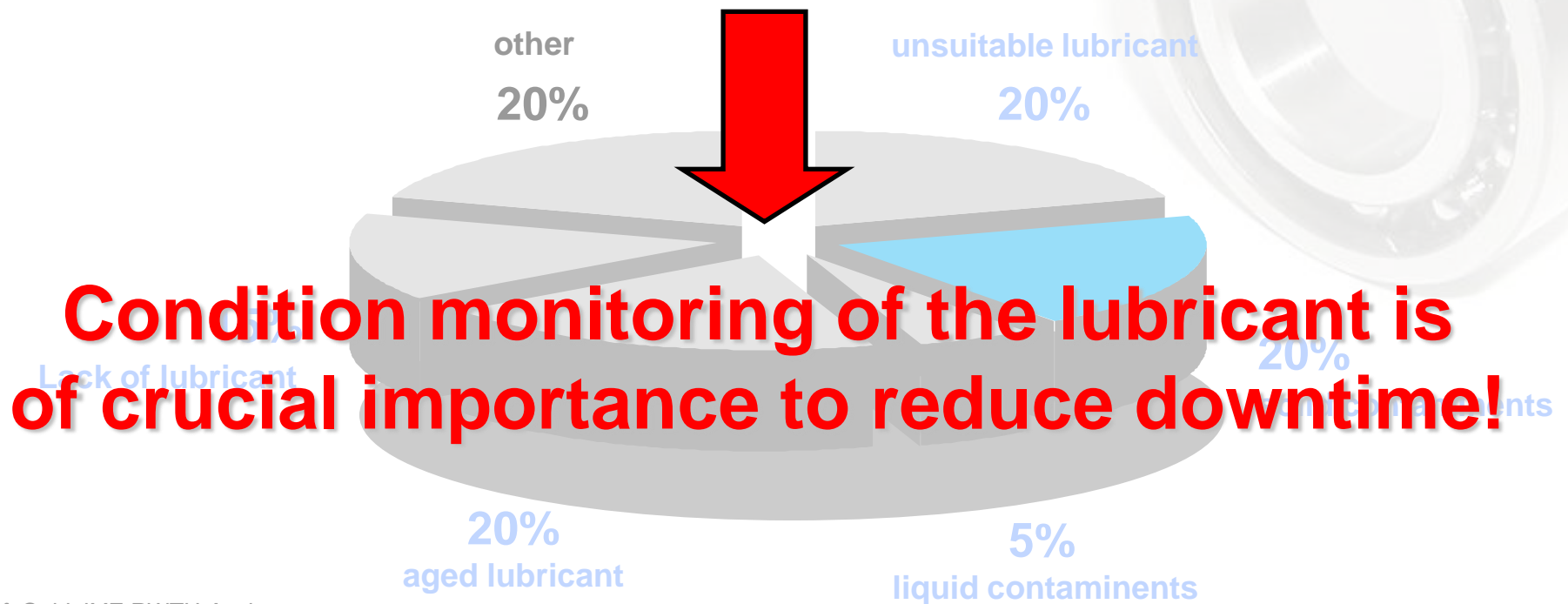


Source: Prof. Gold: IME RWTH-Aachen

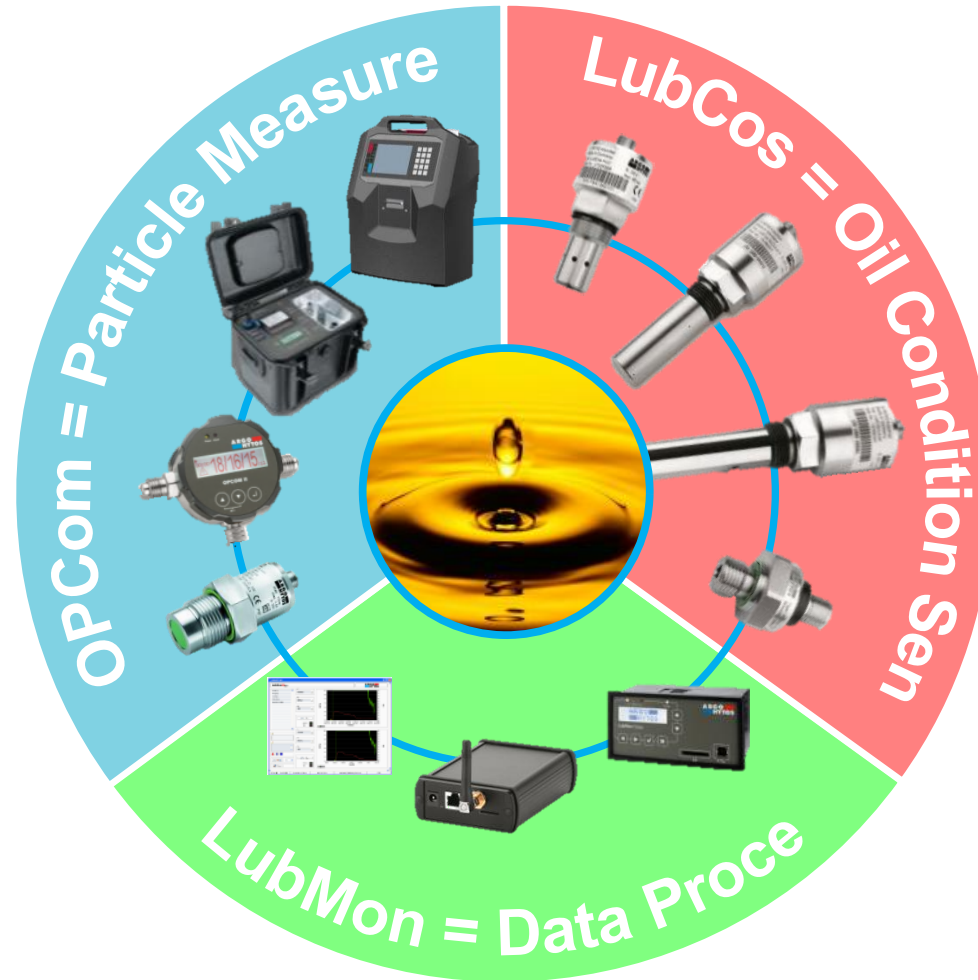
Motivation for Condition Monitoring

Failure causes by the example of a bearing

80% of the failure causes can be detected by the condition of the lubricant!

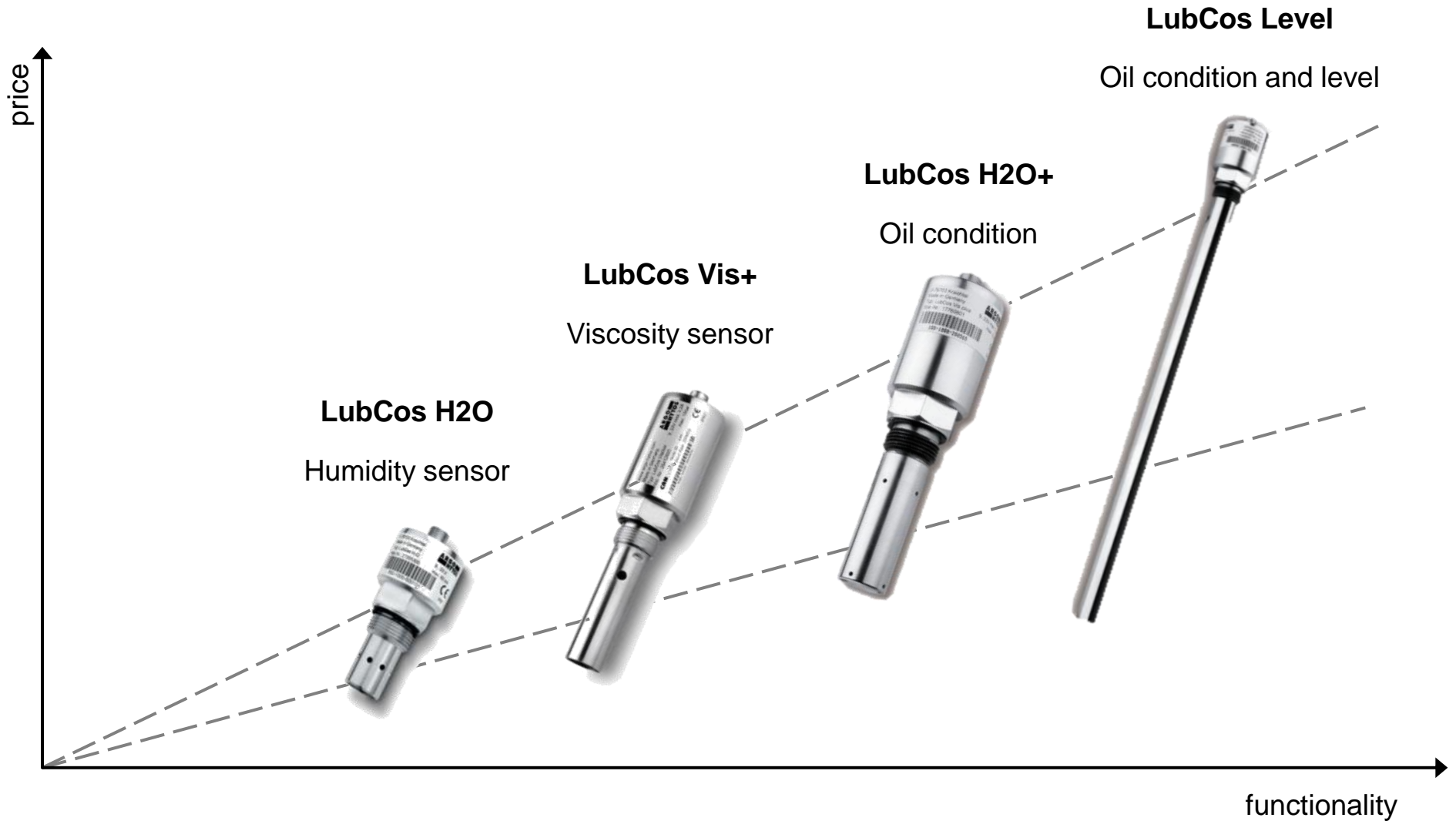


Quelle: Prof. Gold: IME RWTH-Aachen



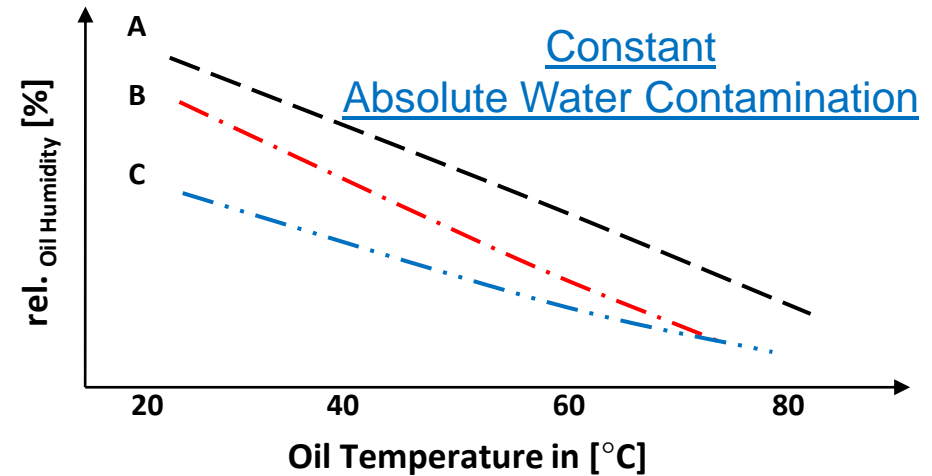
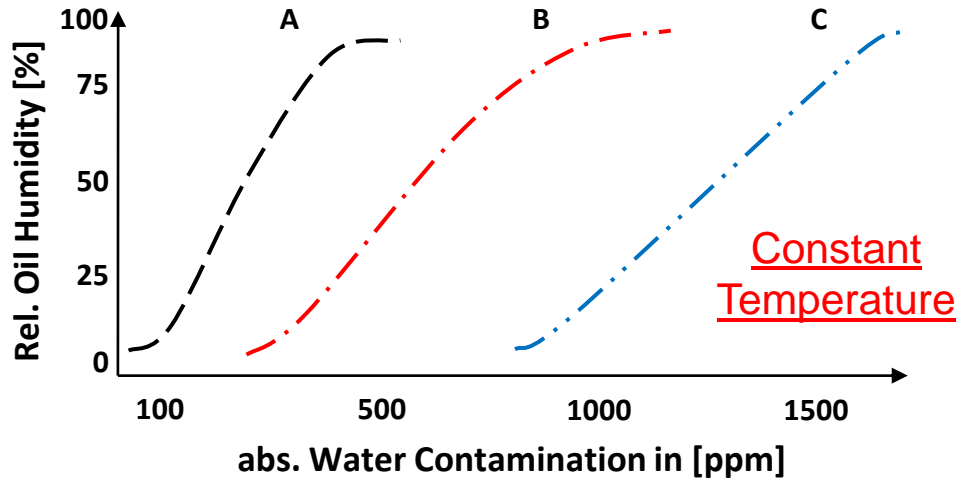
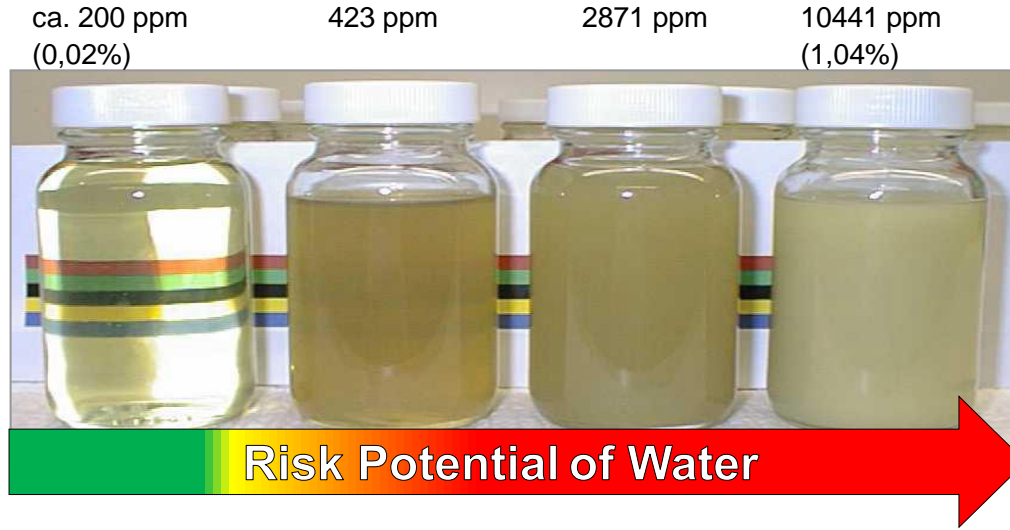
LubCos Products

Oil condition sensors

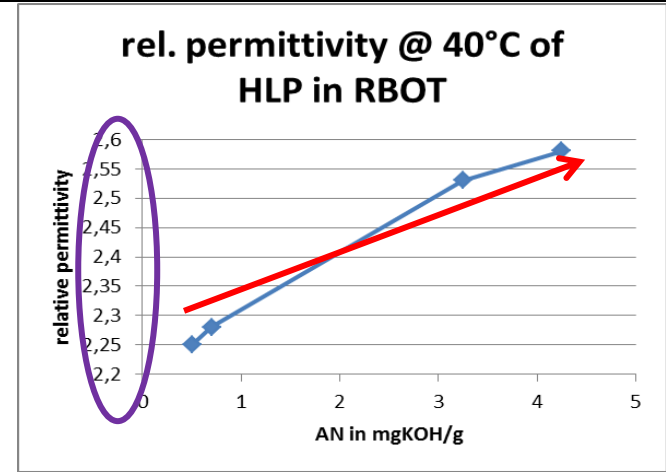
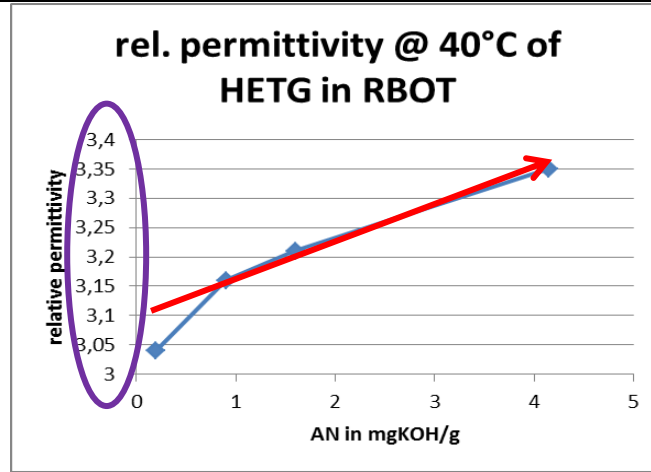
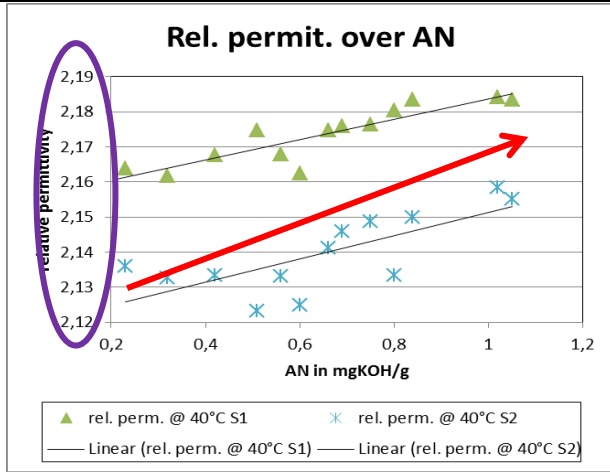


LubCos H2O/H2Oplus/Level

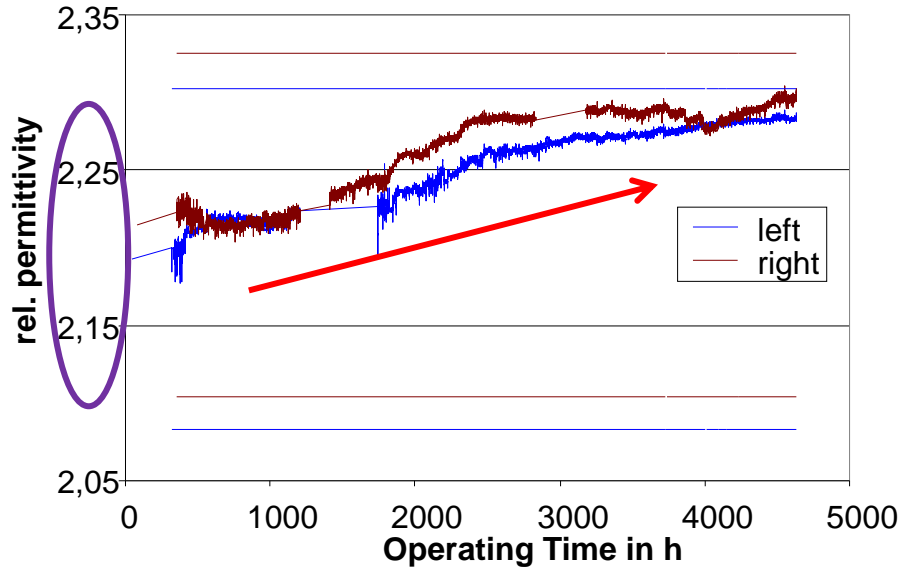
Relative Humidity in different Oil Types



Rel. Permittivity Measurement Summary



Multi-Disk Brake LubCos H2Oplus II temperature compensated rel. permittivity



➔ Trend = Aging!

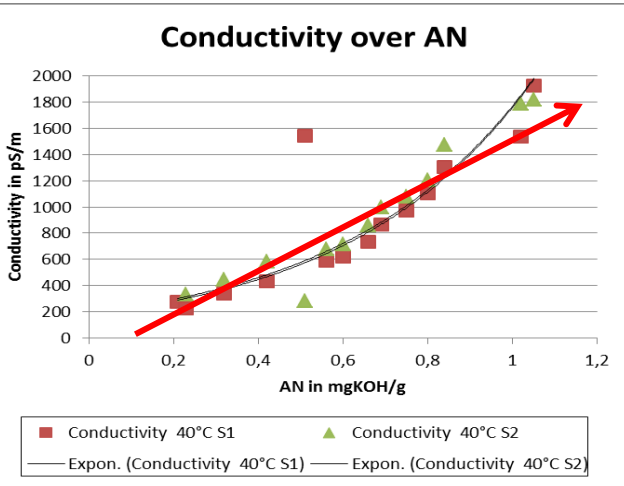
➔ Level = Oil Type!

Conductivity Measurement

Aging Correlation



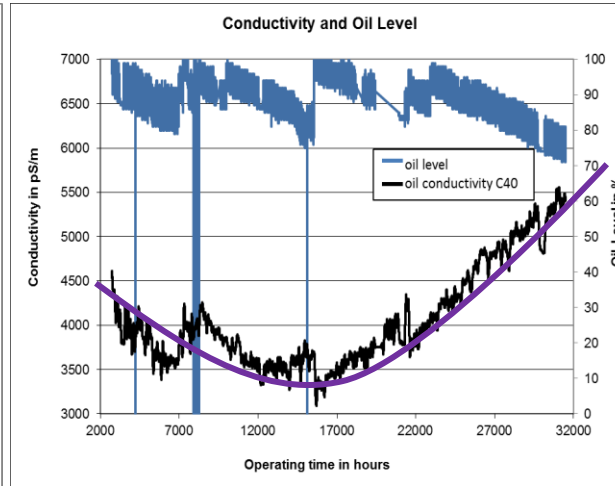
Low conductivity at start



Engrenage 3470 ISO VG 220 Gear Oil

➔ Trend = Aging of basis oil!

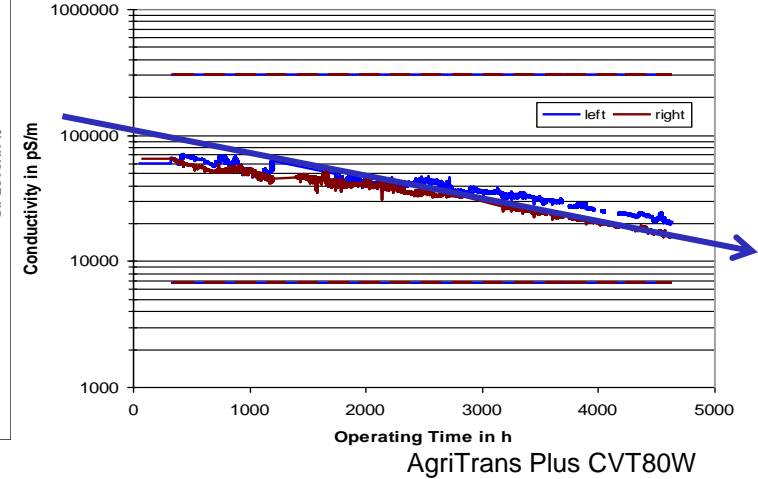
Medium conductivity at start



➔ Trend = Aging of basis oil + overlaid additive depletion!

High conductivity at start

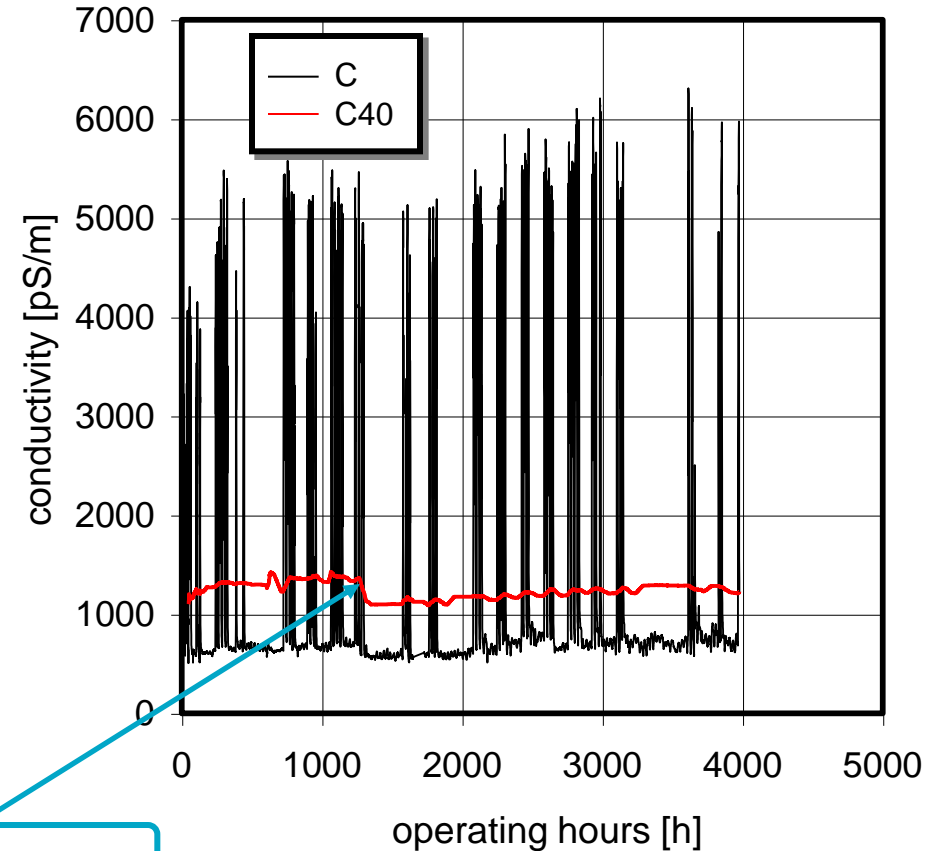
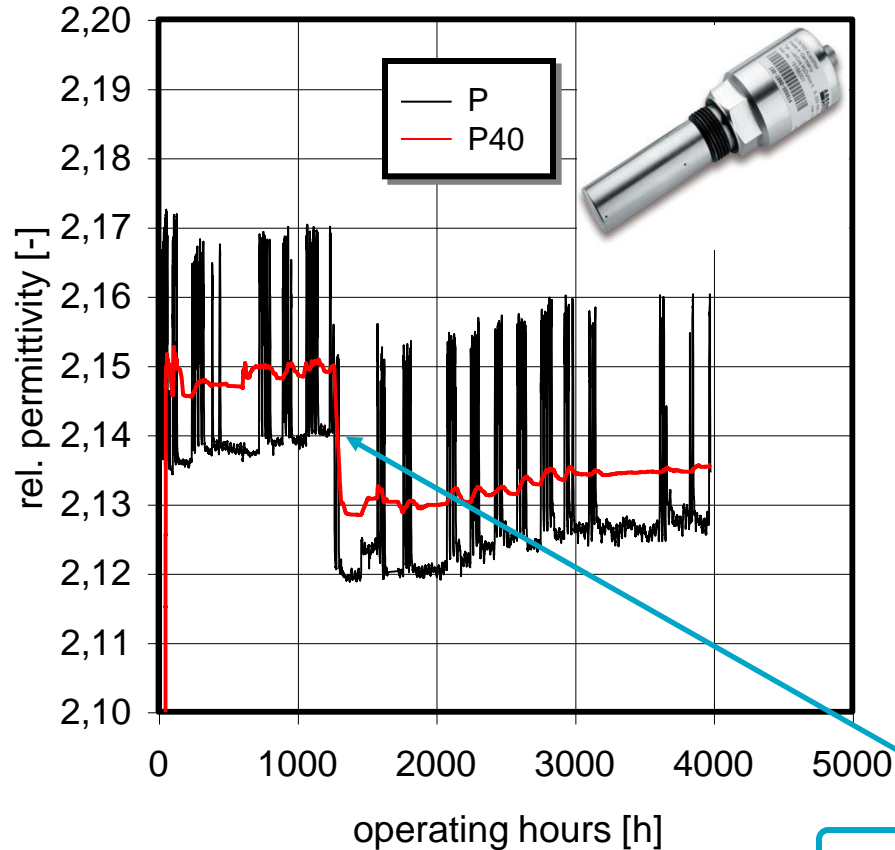
Multi-Disk Brake LubCos H2Oplus II
temperature compensated rel. permittivity



➔ Trend = Depletion of additives!

Parameters and their Information

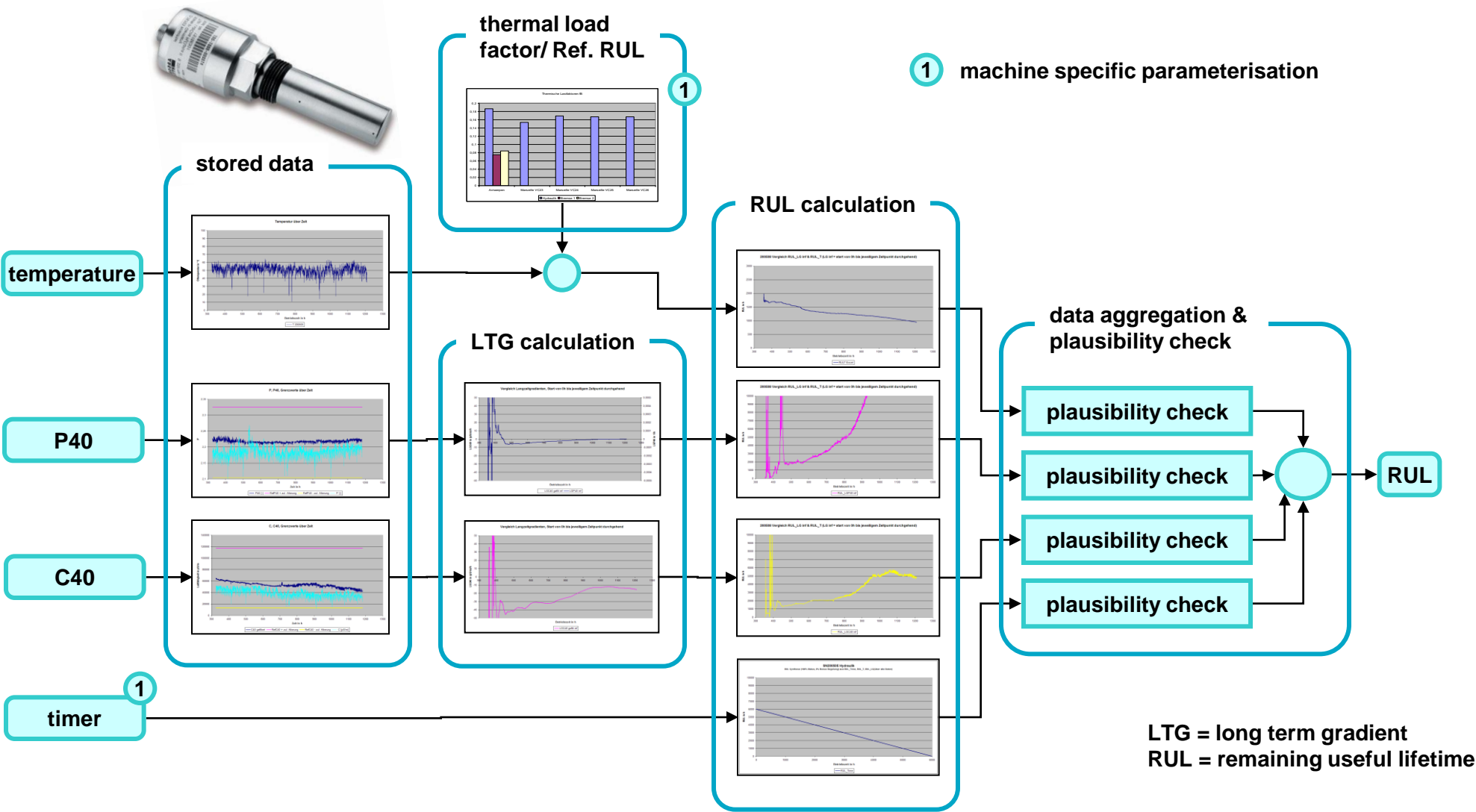
Temperature Compensation and Detection of Oil Mixture



Oil refresh detected

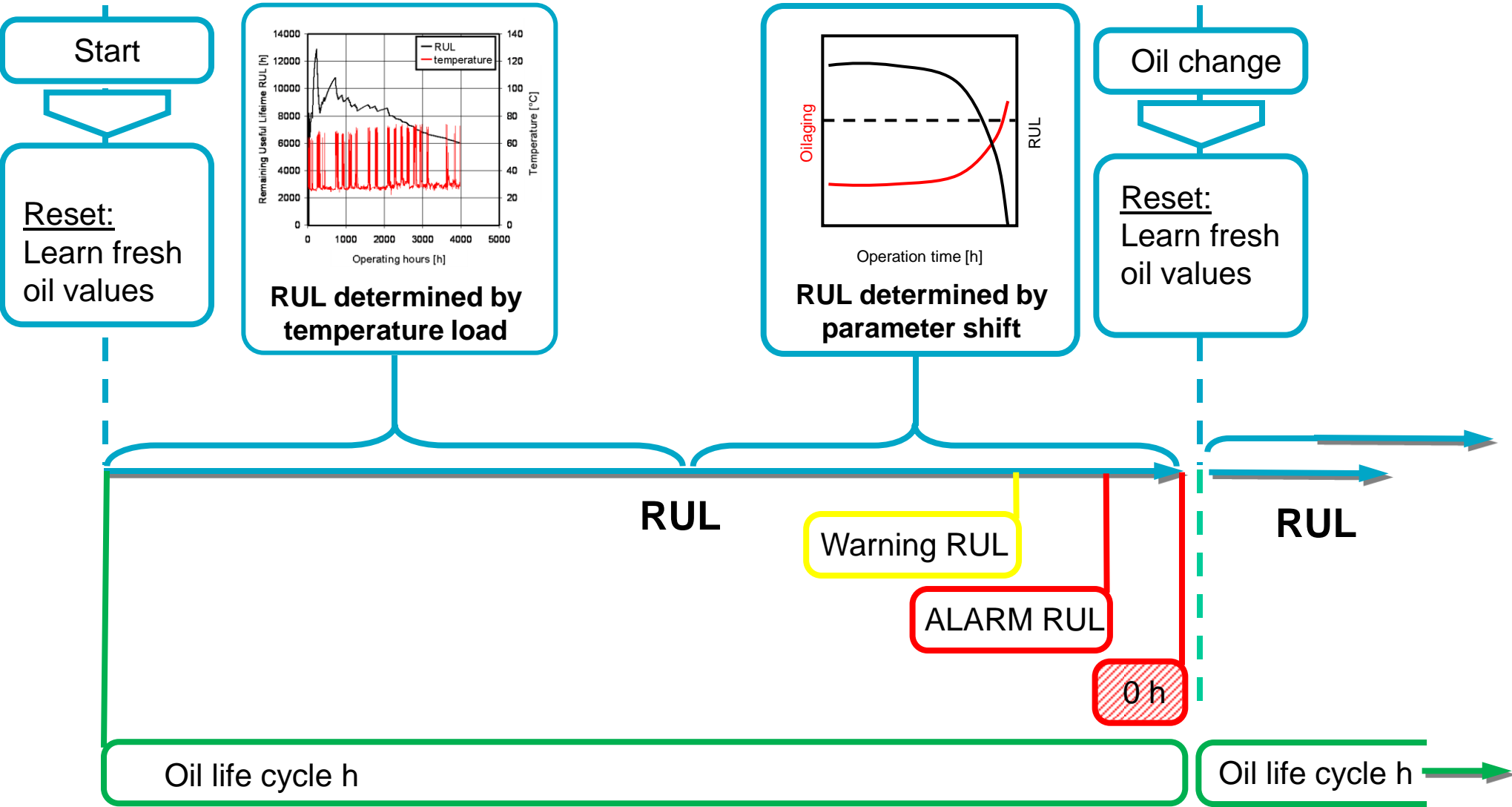
Automated Oil Condition Monitoring

Calculation schema for Remaining-Useful-Lifetime (RUL)



Automated Oil Condition Monitoring

Oil lifecycle view

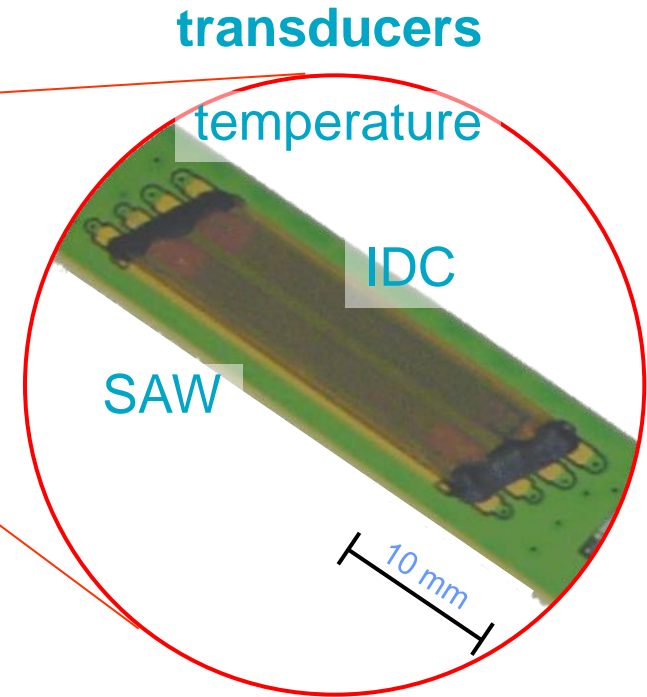
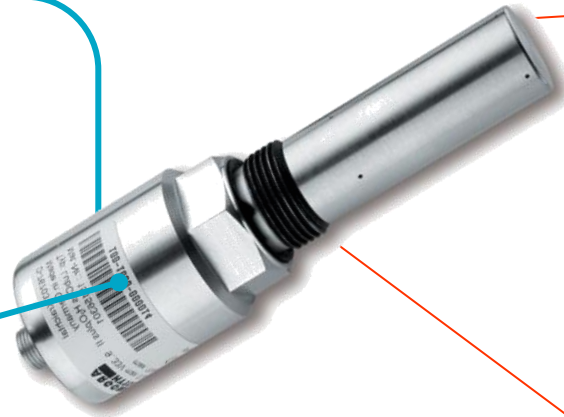


Available Sensors

Multi Parameter Sensor LubCos Visplus

Parameter

- viscosity and V-T-gradient
 - rel. permittivity
 - temperature
-
- power supply 9..33V
 - 4000 datasets memory
 - RS232 and CANopen
 - 2 analog outputs 4...20mA
 - protection class IP 67

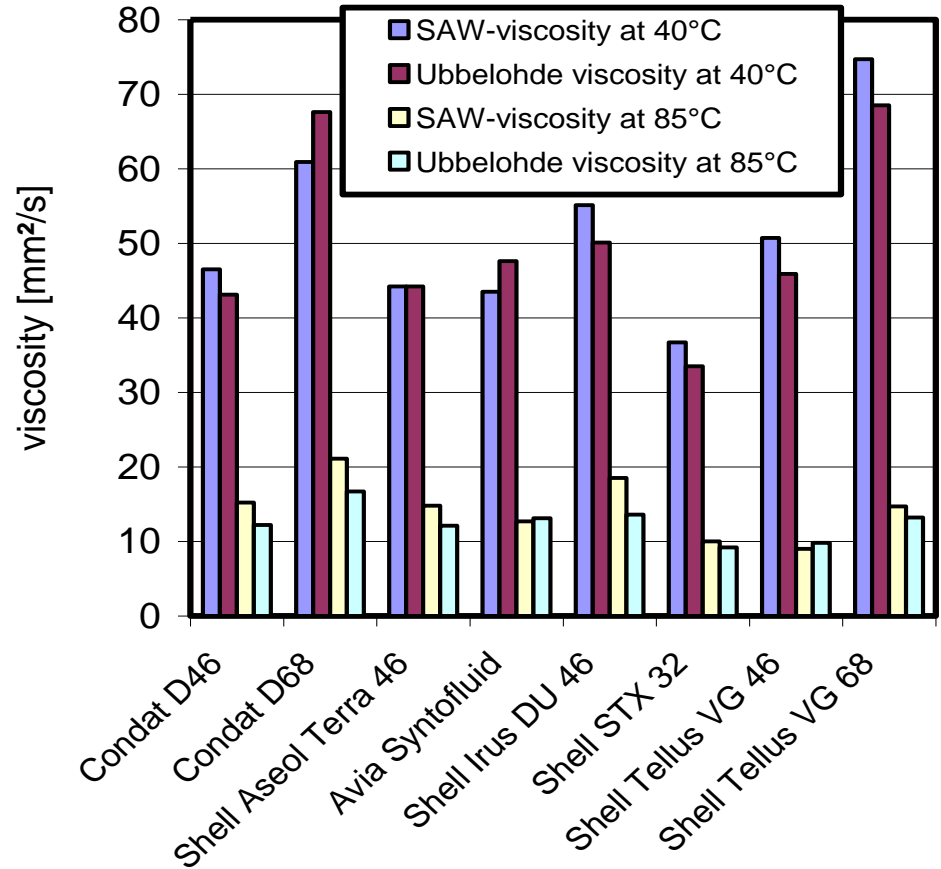
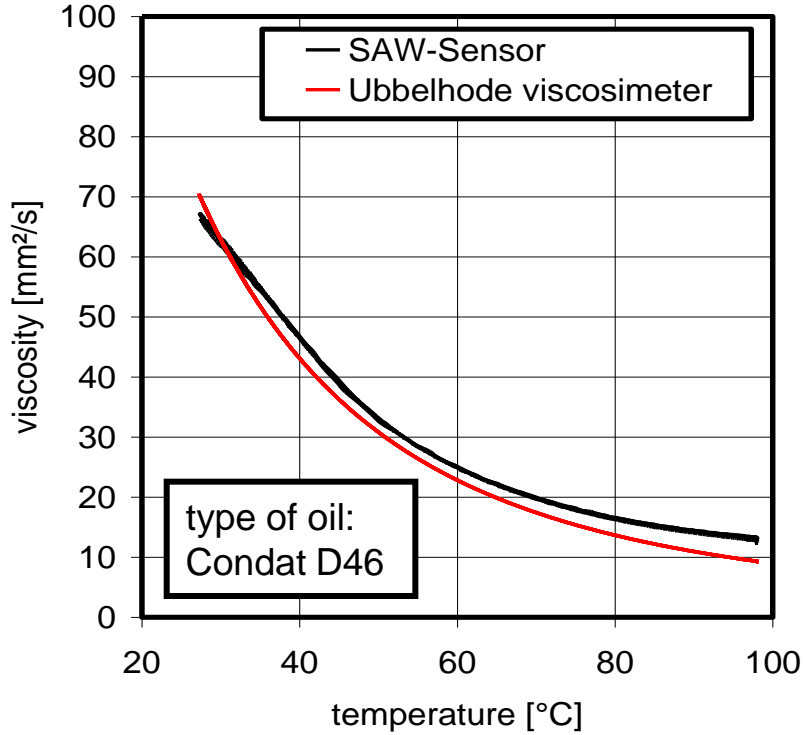


derived information

- oil deterioration
- contamination
- right type of oil

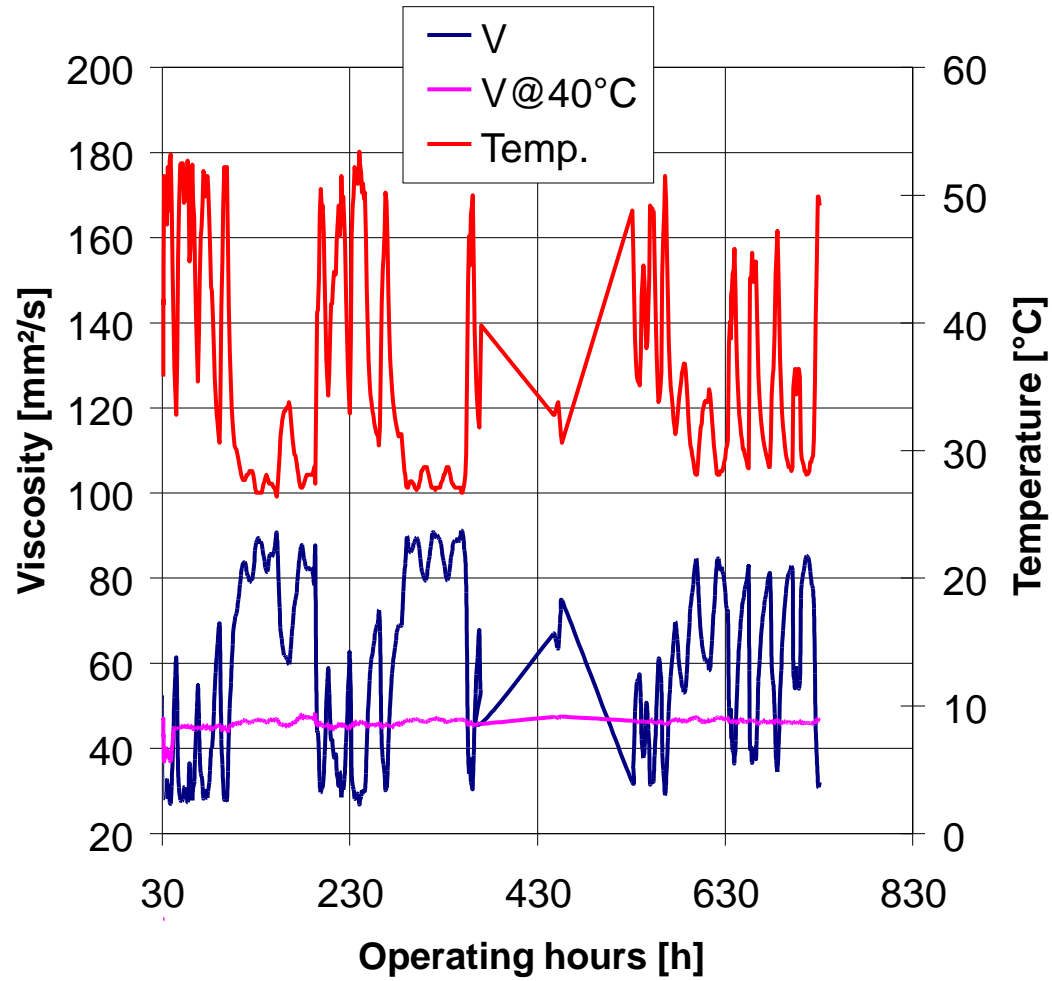
Application example SAW-Viscosity

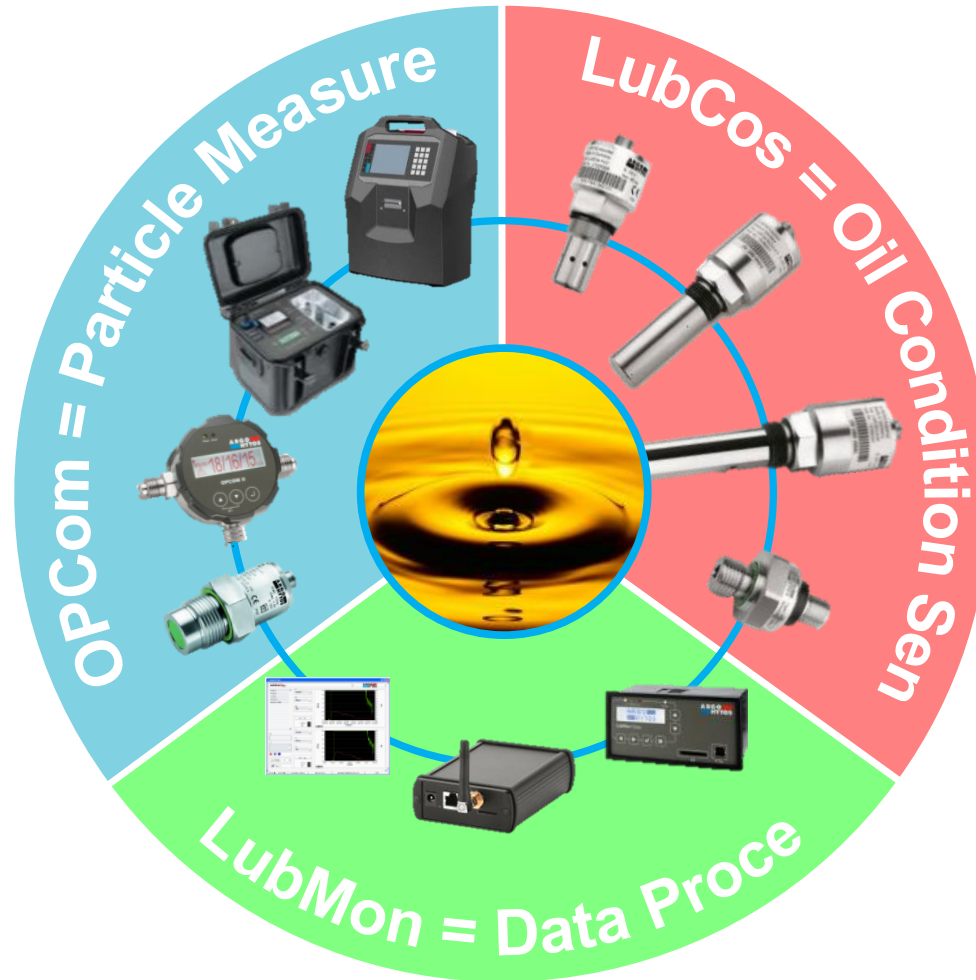
SAW-viscosity sensor compared to viscosimeter



Application Example - Press

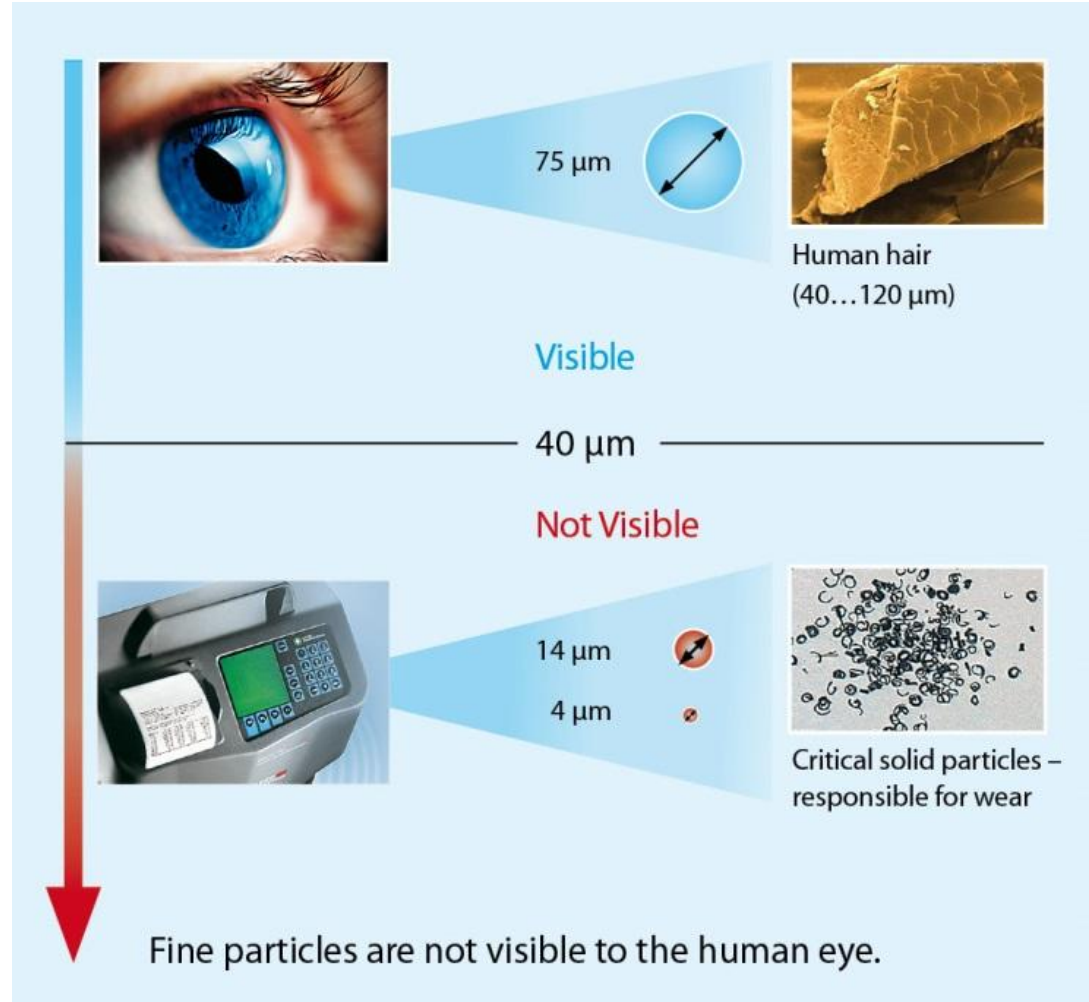
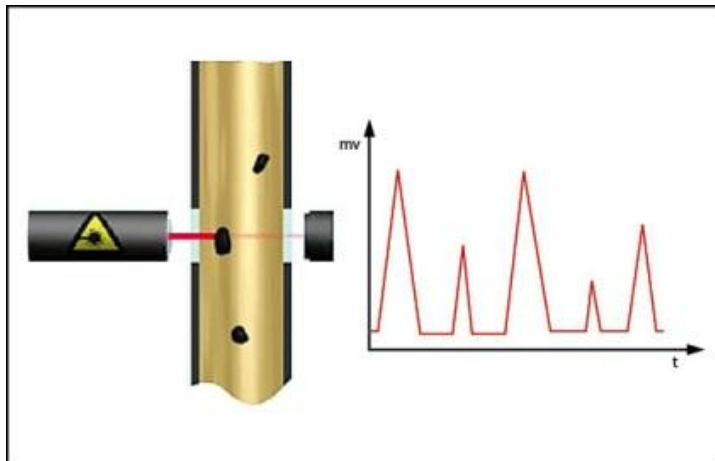
Viscosity measurement





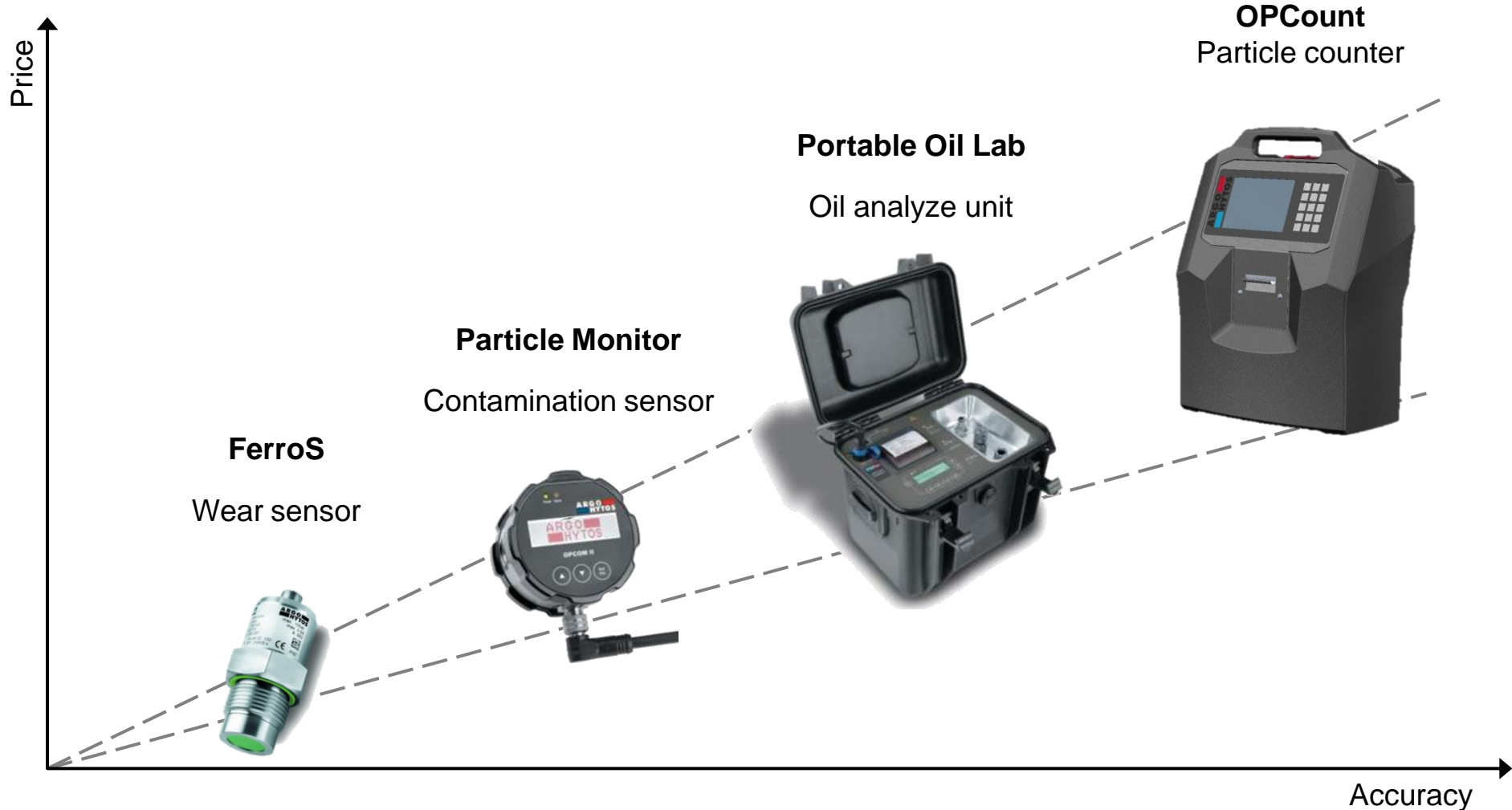
Available Sensors

Particle Monitor OPCom II



OPCom Products

Contamination and wear monitoring



OPCom FerroS

Ferromagnetic wear sensor



Sensor parameter:

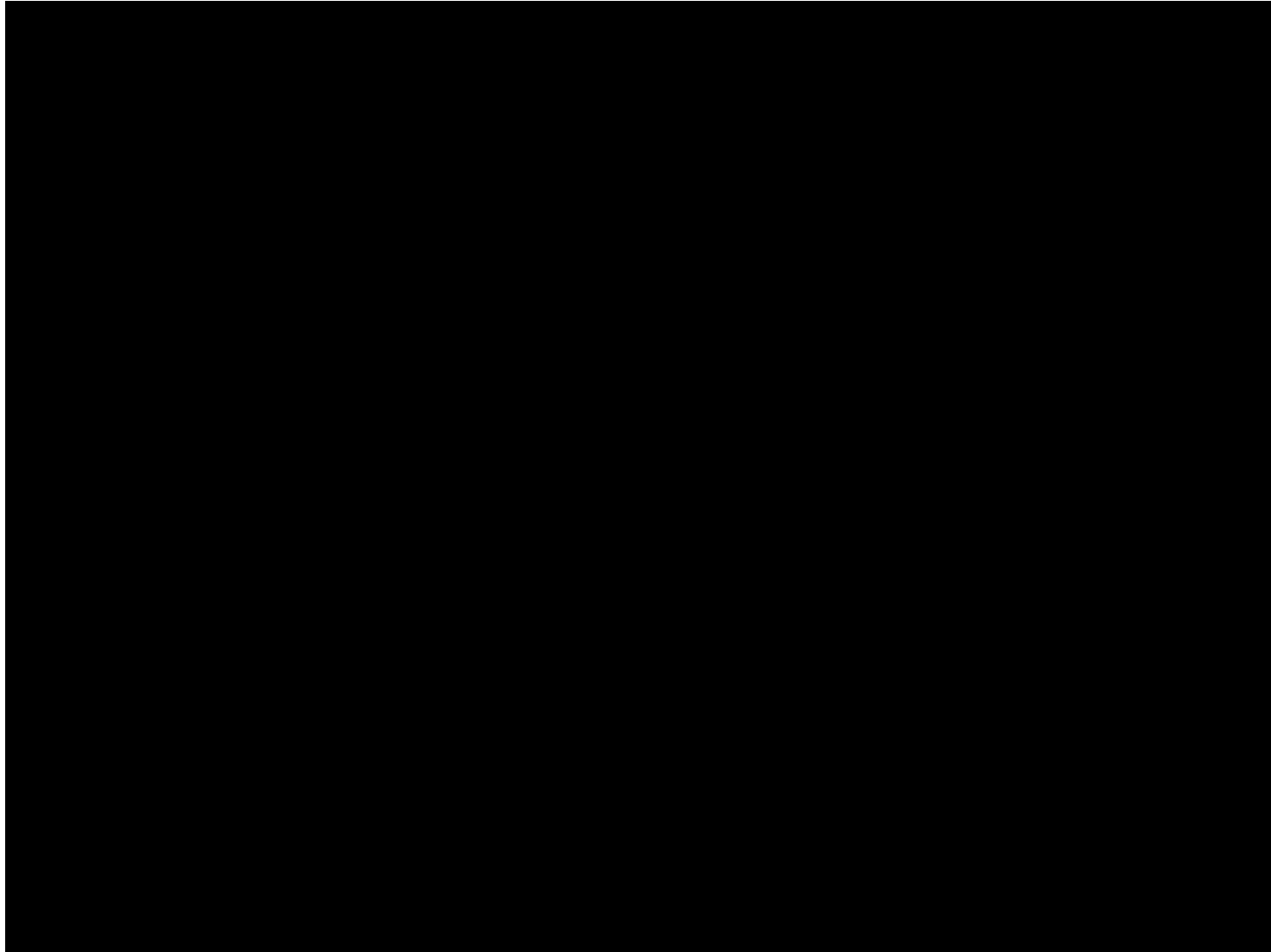
Measurement	Metallic wear
Interfaces	4-20mA, RS232, CANopen, J1939
Power supply	9..33V
Protection class	IP 67
Connection	M12x1, 8pins; G1"



- ▶ Continuous monitoring of ferromagnetic wear particles
- ▶ Automated condition monitoring, no more manual inspection needed
- ▶ Robust against disturbances (air, water, vibration, ...)
- ▶ Ideal to monitor gearboxes and heavy machinery

OPCom FerroS

Ferromagnetic wear sensor

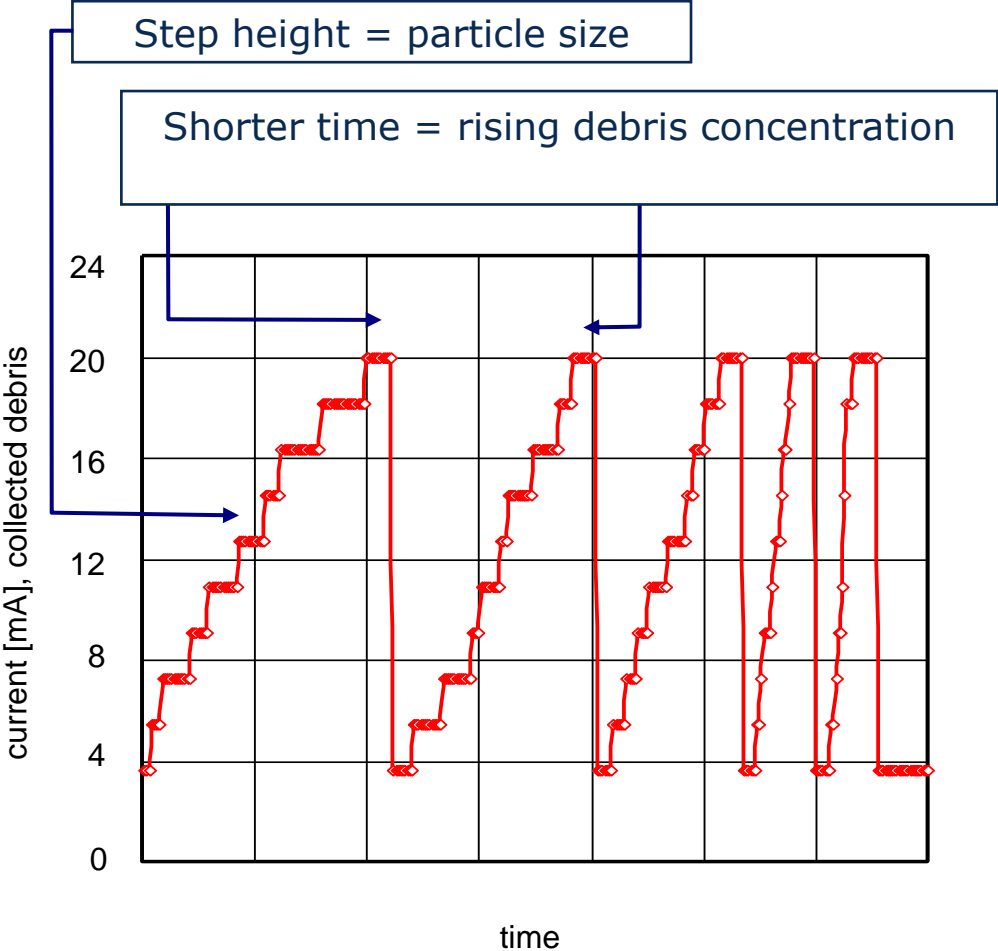


Particle counting

OPCom FerroS



Output signal



OPCOM II

Particle monitor



Sensor parameter:

Particle classes

≥4, 6, 14, 21 μm(c)

Standards

ISO4406

SAE AS 4059

NAS 1638, GOST 17216

Temperature

-10°C...80°C



- ▶ 420 bar max. pressure
- ▶ 50...400 ml/min flow
- ▶ Voltage 9...33V
- ▶ 3.000 datasets memory
- ▶ 4-20mA , RS232, CANopen, SAE, J1939 interface
- ▶ Digital In & output
- ▶ Protection class IP 67

OPCom Portable Oil Lab

Oil diagnosis system



Particle classes	$\geq 4, 6, 14, 21 \mu\text{m(c)}$
Standards	ISO4406 SAE AS 4059
Temperature	-10°C...80°C
Relative humidity	0...100%



- ▶ Integrated pump and printer
- ▶ Powerful battery
- ▶ 320 bar pressure measurement
- ▶ 1.500 datasets memory

OPCount

Particle counter for laboratory and service



Sensor parameter:

Particle classes

$\geq 2, 5, 10, 15, 20, 25, 50, 100\mu\text{m}$

$\geq 4, 6, 10, 14, 21, 25, 38, 70\mu\text{m}$

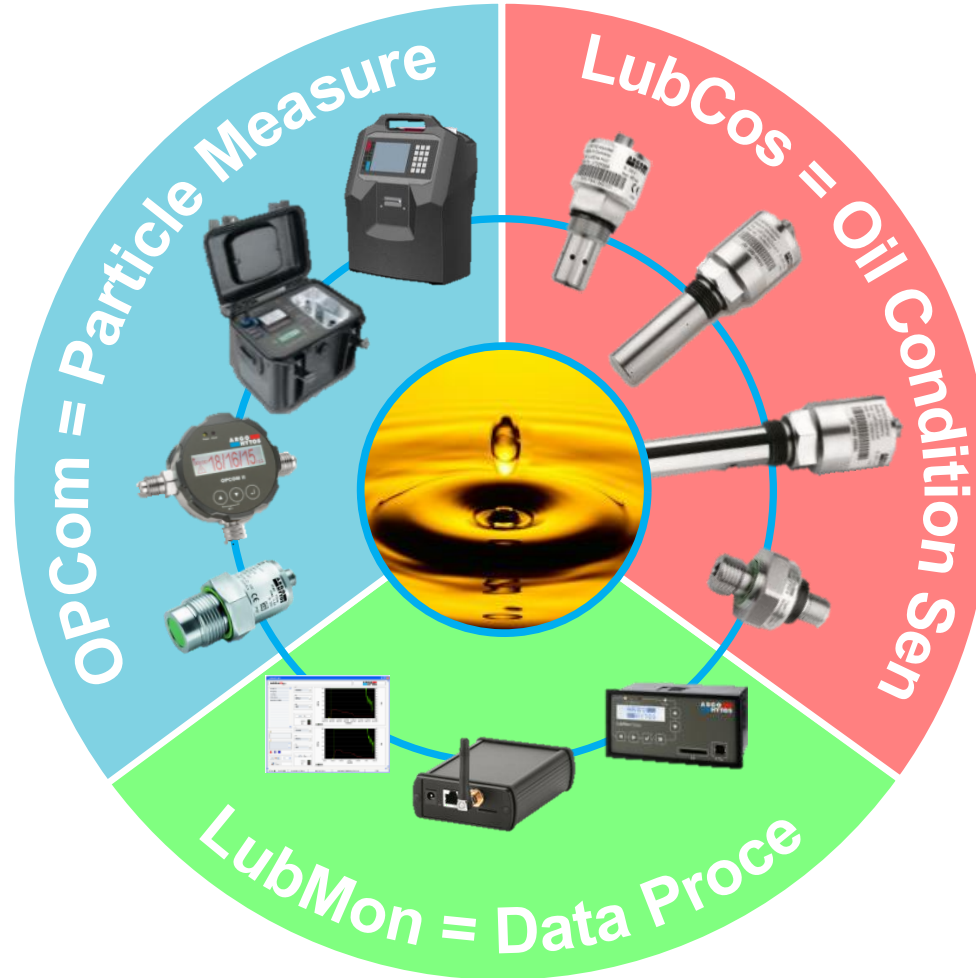
Standards

ISO 4406 NAS 1638 SAE AS 4059 GJB 420A

GOST 17216 EI-IP 577 DEF-STAN 91-91

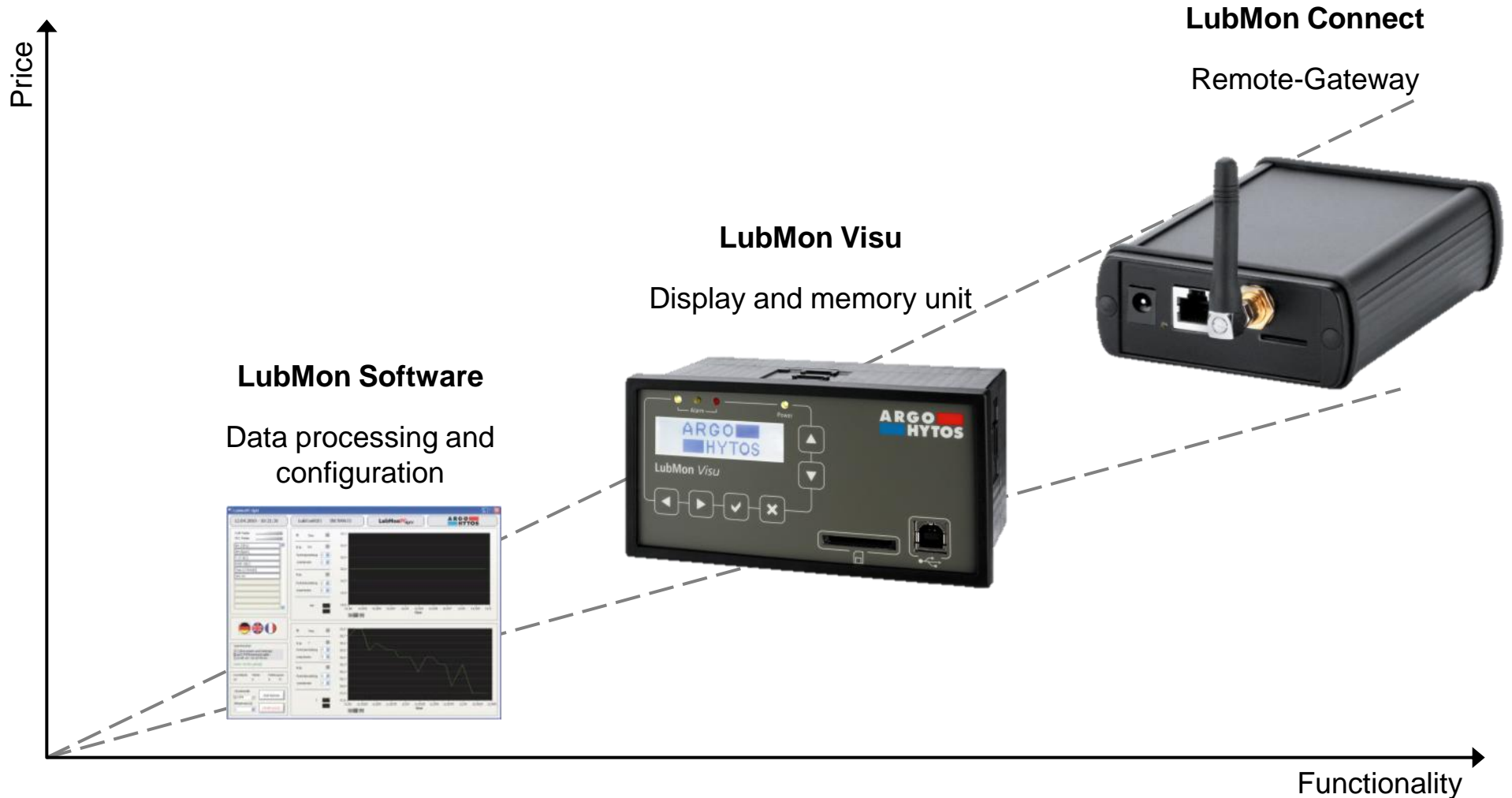
- ▶ High accuracy
- ▶ Sampling via integrated pump or pressure line (420bar)
- ▶ Intuitive handling and operation with touch display





LubMon Products

Data display and processing



LubMon PClight and LubMon Config

Measurement and configuration software



Parameter:

Interface

Functionality

RS232, USB,
Ethernet

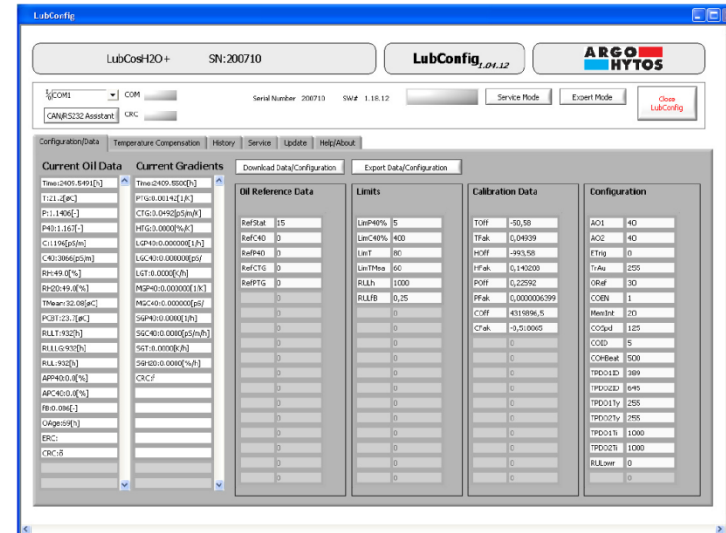
Graphical display

Data management

Sensor configuration



- ▶ For Windows XP/Vista/Windows 7
- ▶ Plug&Play with all AH Sensors
- ▶ Download for free at <http://www.argo-hytos.com>



LubMon Visu

Display and storage unit



Parameter:

Inputs

2x RS232

2x 4-20mA

Outputs

3x Digital

Printer

USB

SD-Card

Ethernet (optional)



- ▶ 9..36 Volt
- ▶ 1.500 datasets memory
- ▶ Plug&Play with all AH sensors

Online Condition Monitoring

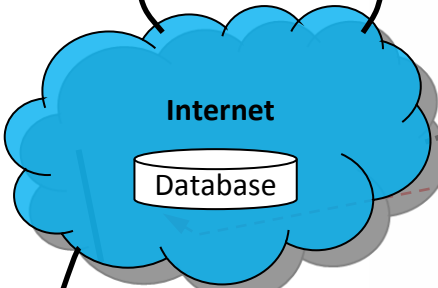
Concept for installation and data transmission



Smartphone



E-mail
www
SMS



E-mail
www



cable

GSM

Gateway

Condition indicator



PLC

Machine display



CANopen / 4-20mA

Oil condition sensors

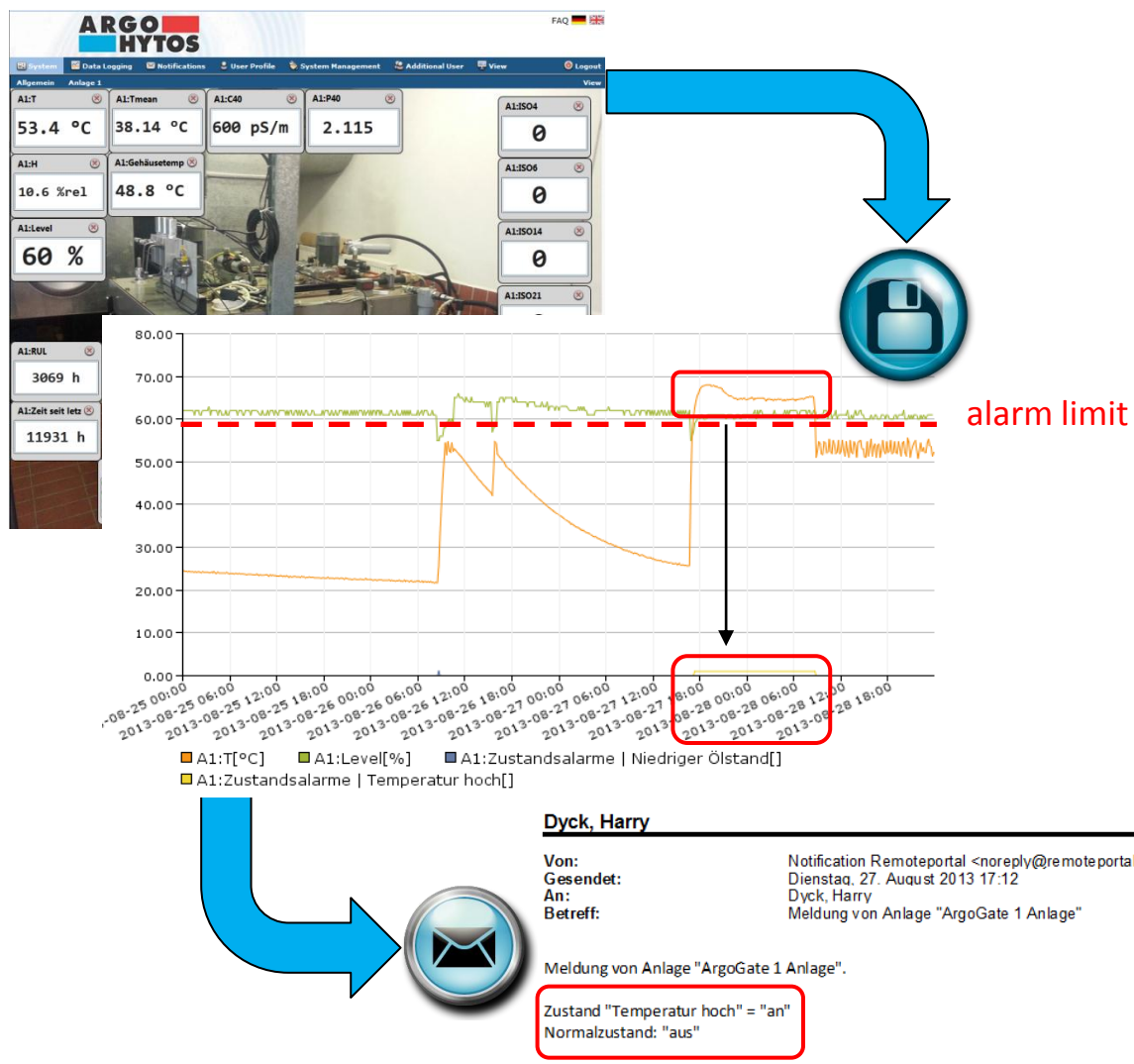


Live Demonstration:

argohytos.remoteportal.de

Application Example – Test Bench

Monitoring and automated alarm handling



Benefits:

- ▶ Continuous monitoring of machine condition
- ▶ Local and global display of data possible
- ▶ Customizable data display and export functions
- ▶ Easy setup of limits and monitoring functions
- ▶ Automated messaging when set limits are reached

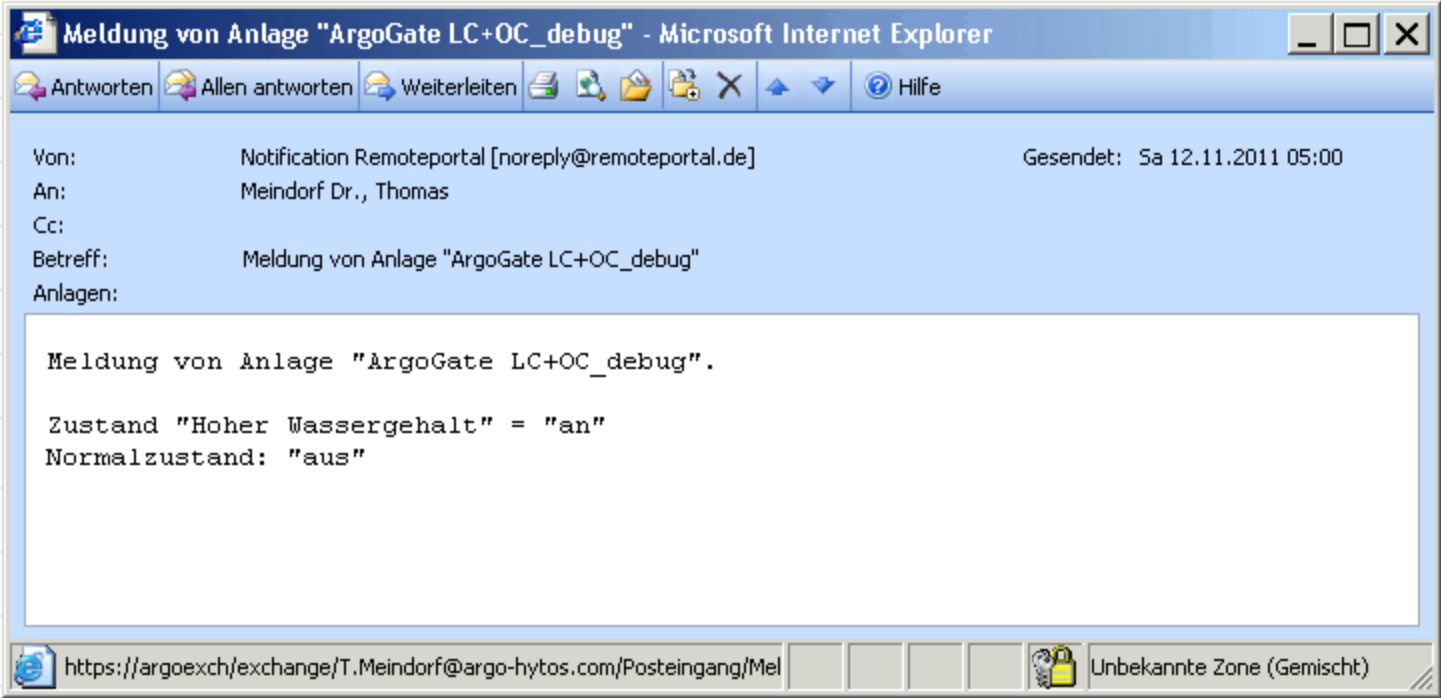
Online Condition Monitoring

Warnings and alarms



Überwachung von Variablenwerten:

Variable	Benachrichtigen, wenn	E-Mail	SMS	Fax	Zeitraum		
Hoher Wassergehalt	an	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Montag-Samstag 10:00 - 12:59	<input type="button" value="Bearbeiten"/>	<input type="button" value="Löschen"/>
Extremer Wassergehalt	an	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Montag-Sonntag	<input type="button" value="Bearbeiten"/>	<input type="button" value="Löschen"/>



Service and maintenance

How and when?



1

Wait until crash

2

Fixed service intervals

3

Service when needed





ARGO 
 **HYTOS**

Applications

Monitoring of oil condition



Application

- ▶ Straddle carrier / container handler

Customer

- ▶ Noell/Terex

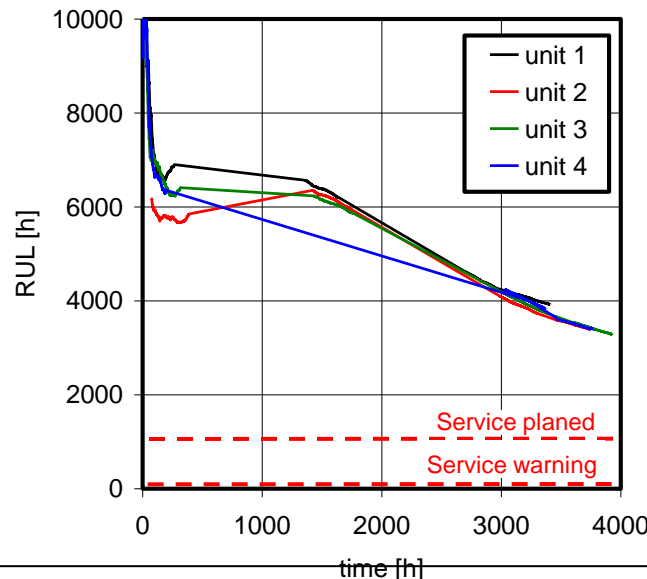
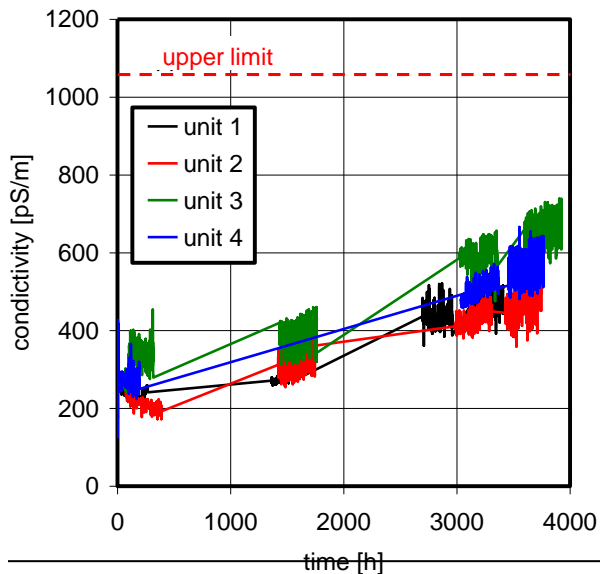
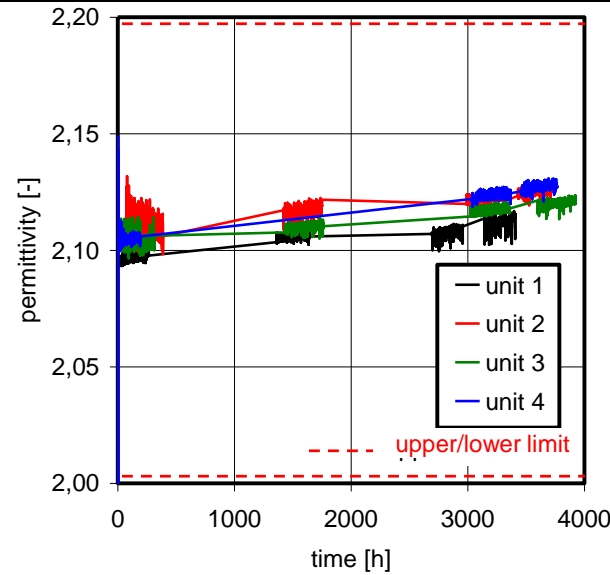
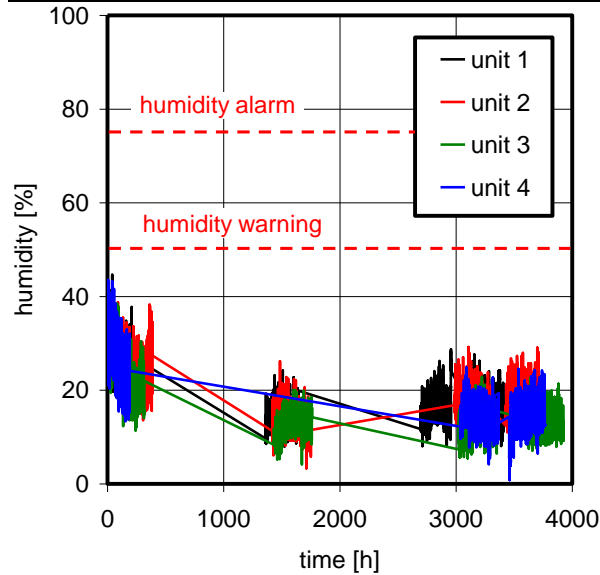
CME Products

- ▶ LubCos H2O+

Benefit

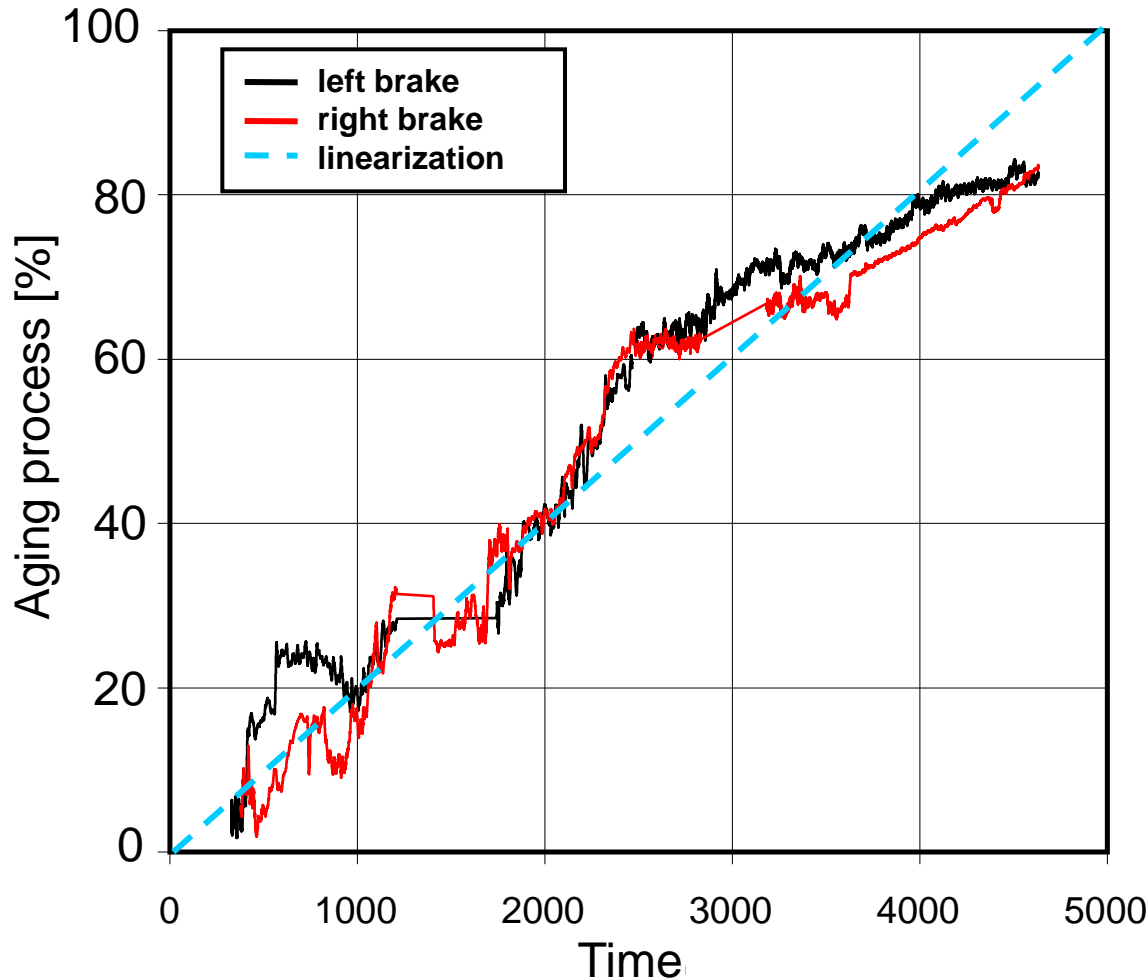
- ▶ Monitoring of oil condition in Hydraulics and brakes.





Results:

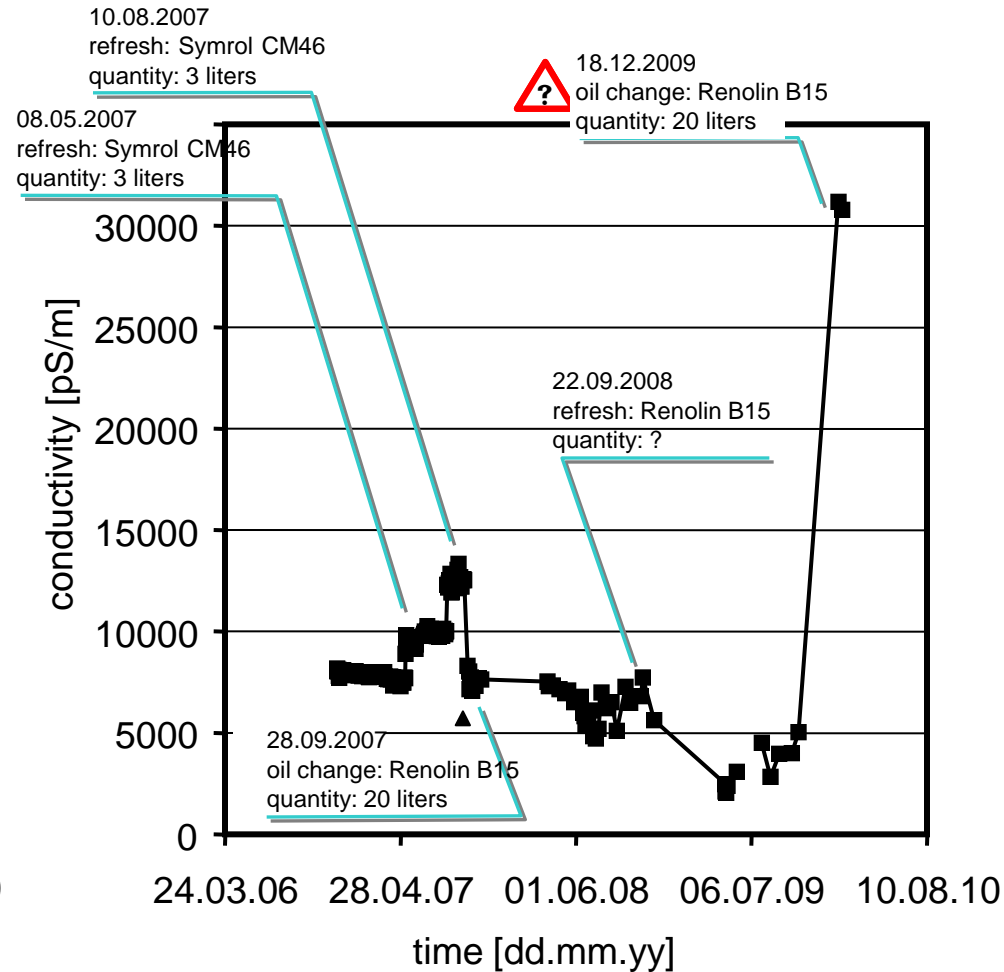
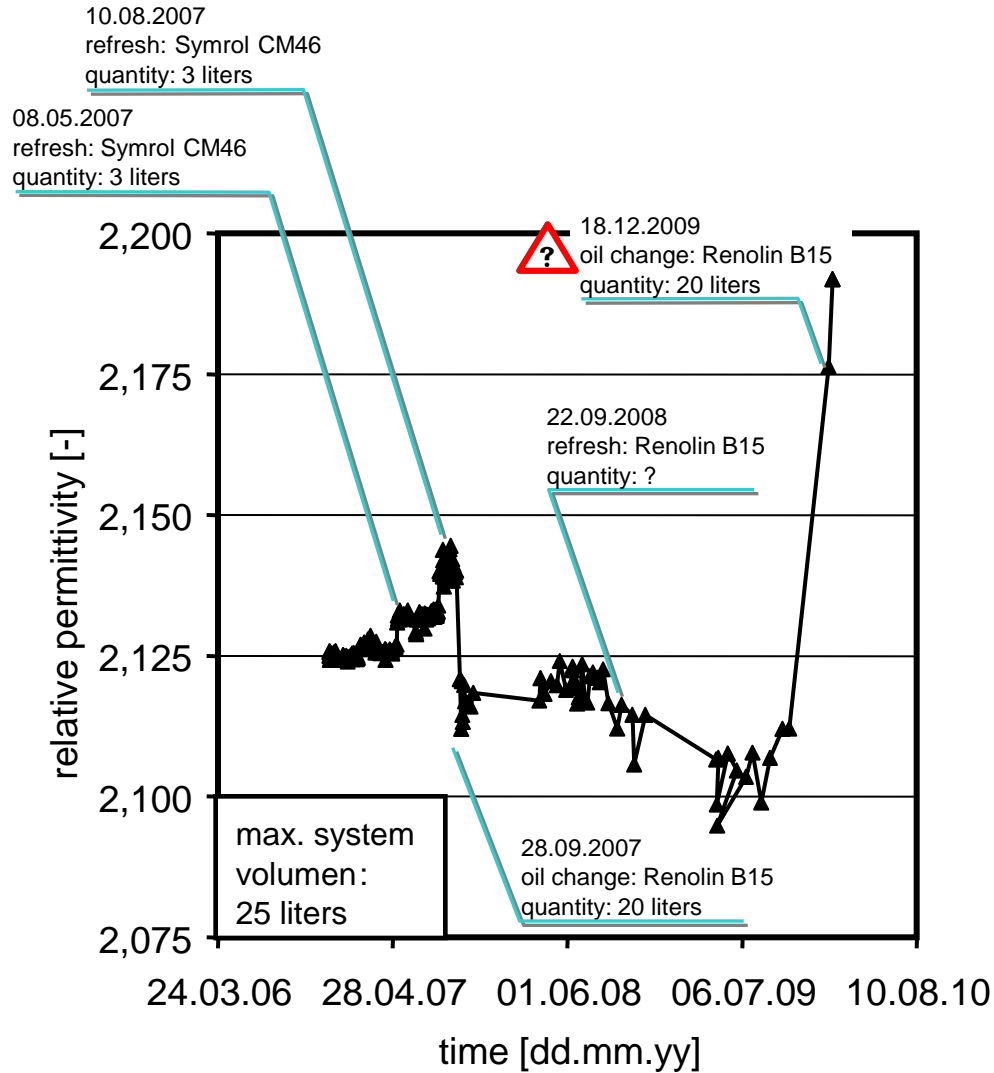
- The measurement in all monitored machines are comparable
- Humidity: The value at startup and during operation is very low
- Conductivity & Permittivity: The values are steadily increasing.
- Oil aging: The former oil change interval of 4000h has been extended to a value of about 6000h



Results:

- The aging progress in the two independent brake circuits develops similar
- The former oil change interval of 2000h has been extended to about 5000h. The results were confirmed by an independent laboratory.

Monitoring of oil condition in milling machine





We produce fluid power solutions

www.argo-hytos.com