



FLUKE®

Reliability

Adaptive alignment: the next generation in laser shaft alignment systems

Jonathan Gough

Accelix™
Webinar Series



Jonathan Gough

*Product Manager, PRUFTECHNIK
Fluke Reliability*

- Product Owner for the PRUFTECHNIK touch alignment platform
- 25 years of experience with PRUFTECHNIK
- Roles as Head of Product Management, International Sales Manager, General Manager for S.E. Asia territory
- 30 years of experience in the condition monitoring sector
- Bachelor of Engineering degree, Mechanical Engineering, Bradford University

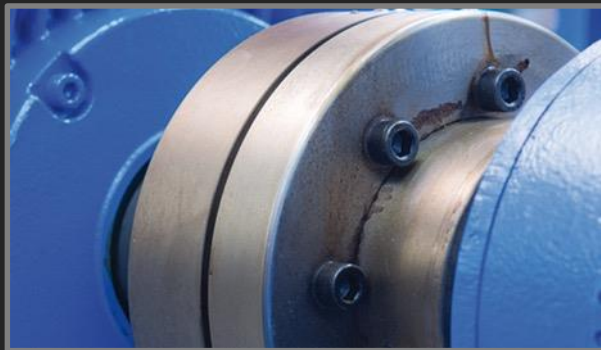
WE KEEP YOUR WORLD ROTATING

A division of Fluke Reliability, PRUFTECHNIK is a leading maintenance technology manufacturer and solution provider.

Founded in 1972, PRUFTECHNIK grew from a family-owned business to a worldwide operating company and is now part of Fluke Reliability. It is present in 80 countries, with 20 subsidiaries and a large network of authorized sales and service partners. In July 2019, PRUFTECHNIK was acquired by the Fluke Corporation, a company of the Fortive group.

Trusted worldwide for the condition-based maintenance of rotating equipment and plant reliability.

We offer a broad range of high-quality products, services and training tailored to the needs of maintenance professionals in the areas of:



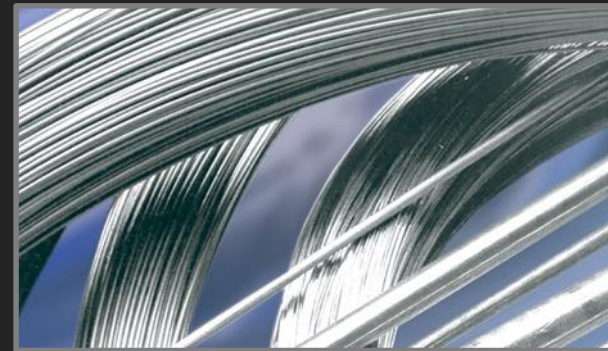
Alignment Systems

Shaft alignment and machine analysis



Condition Monitoring

Vibration analysis and fault diagnosis



Nondestructive Testing

Quality assurance and process control

PRUFTECHNIK worldwide machinery services in the field



Laser shaft alignment



Turbine alignment



Machine condition monitoring



Roll alignment

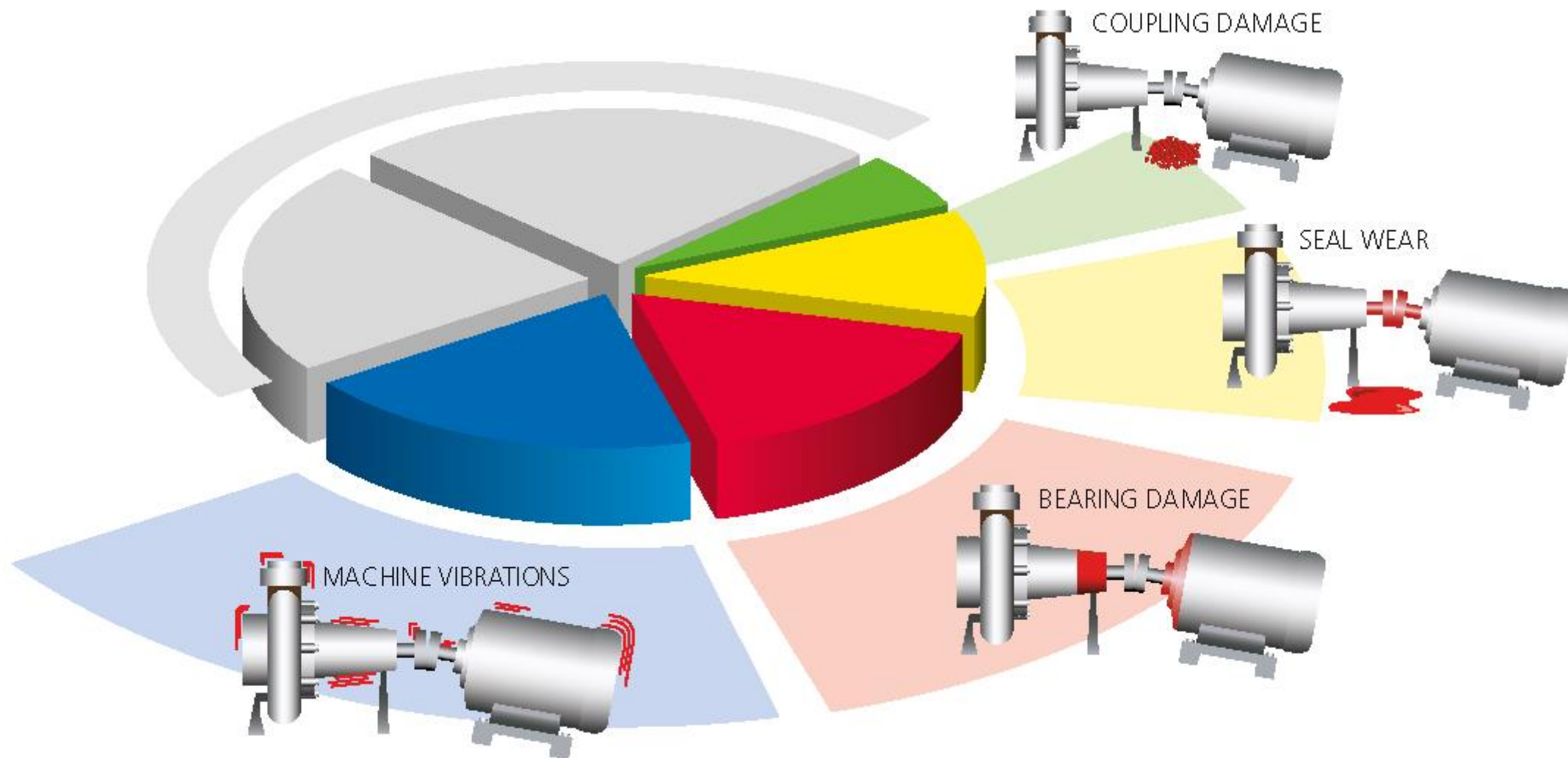


Mobile measurement



Geometric alignment

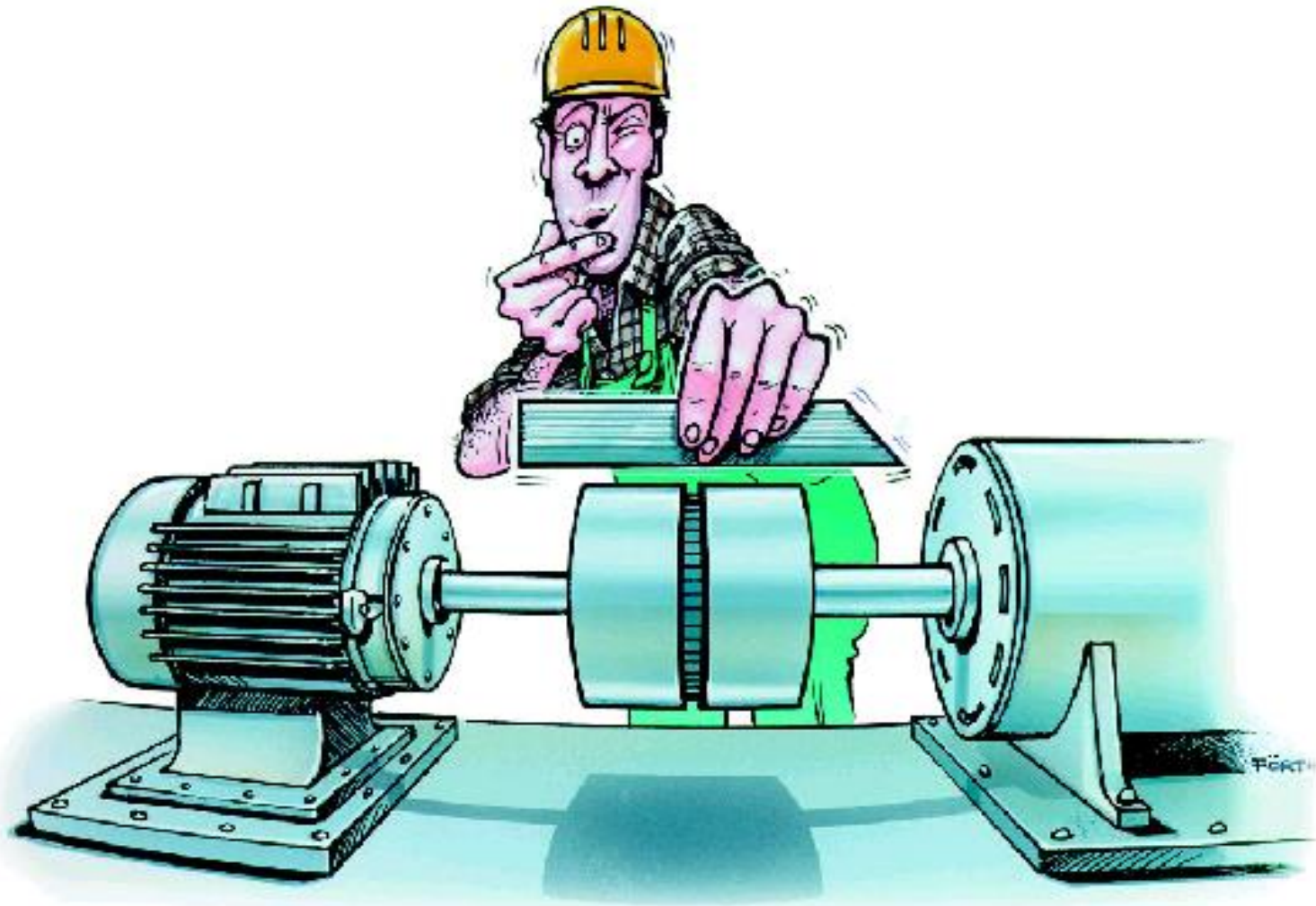
Consequences of misalignment on machine condition



Typical short-flex couplings



Short history: Alignment of machines → Ruler and feeler gauge



Short history: Consequences of misalignment on rotating machinery

BEARINGS



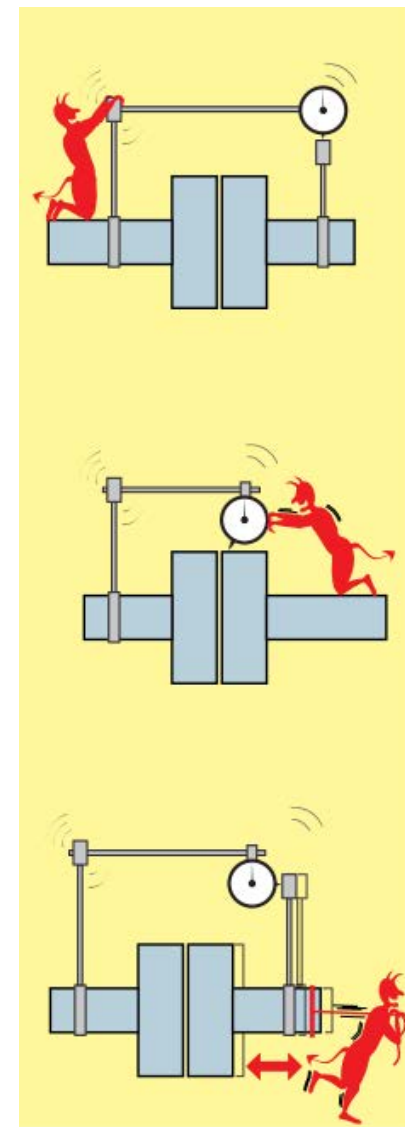
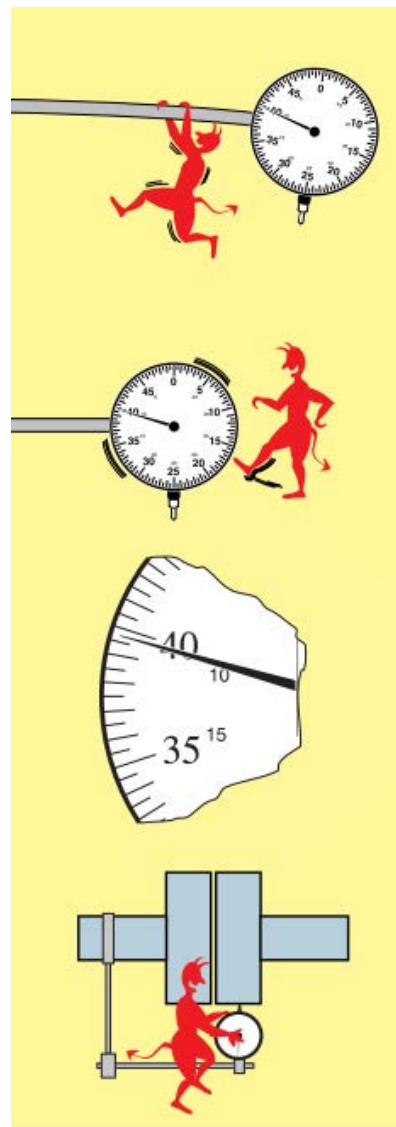
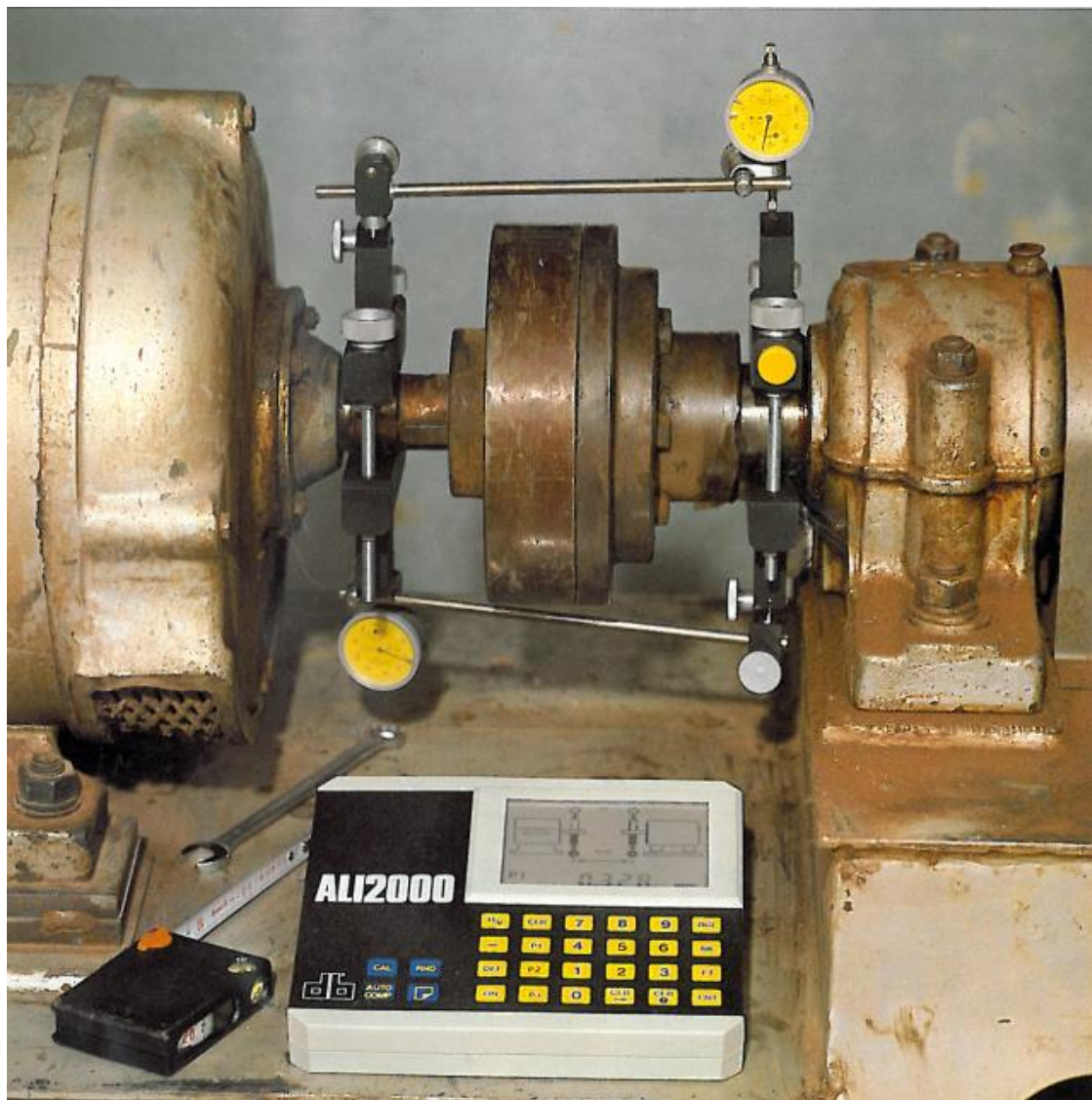
COUPLINGS



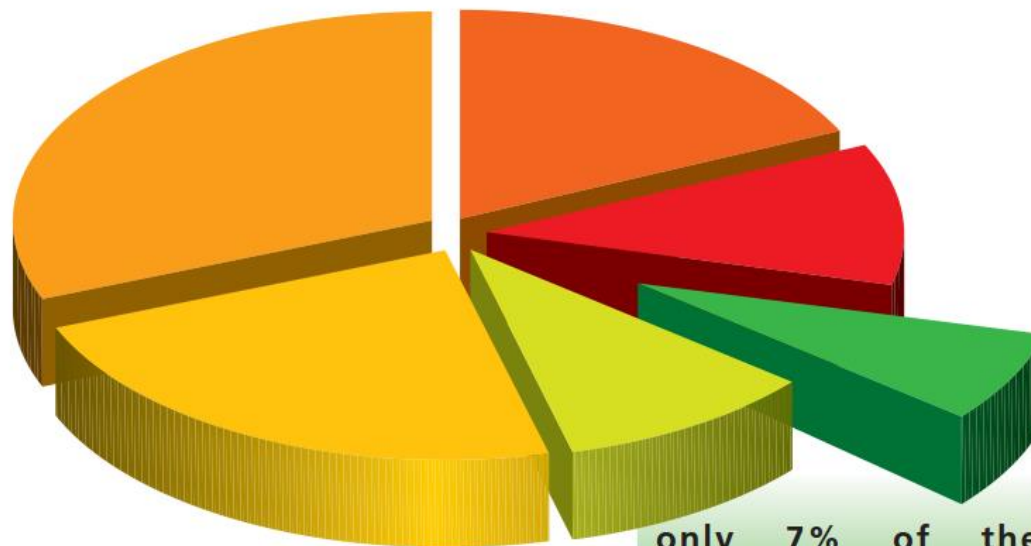
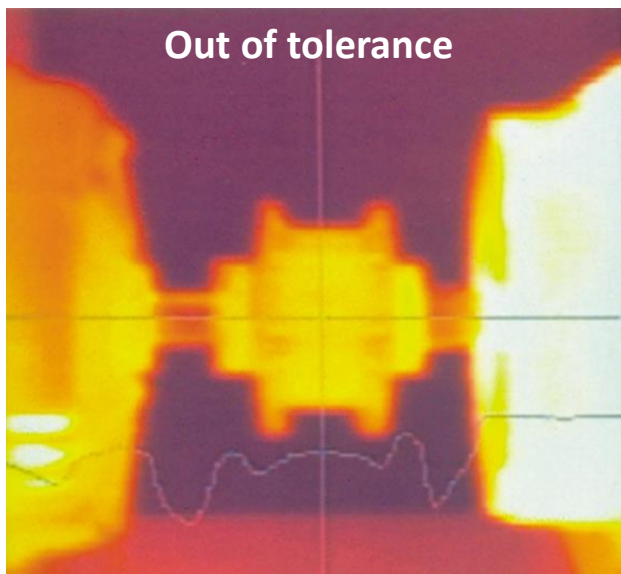
SEALS



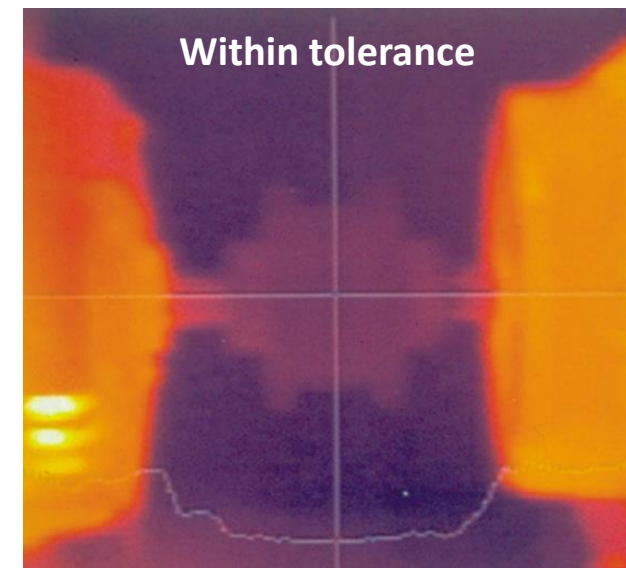
Short history: Alignment of machines → 1982 - PRUFTECHNIK ALI 2000



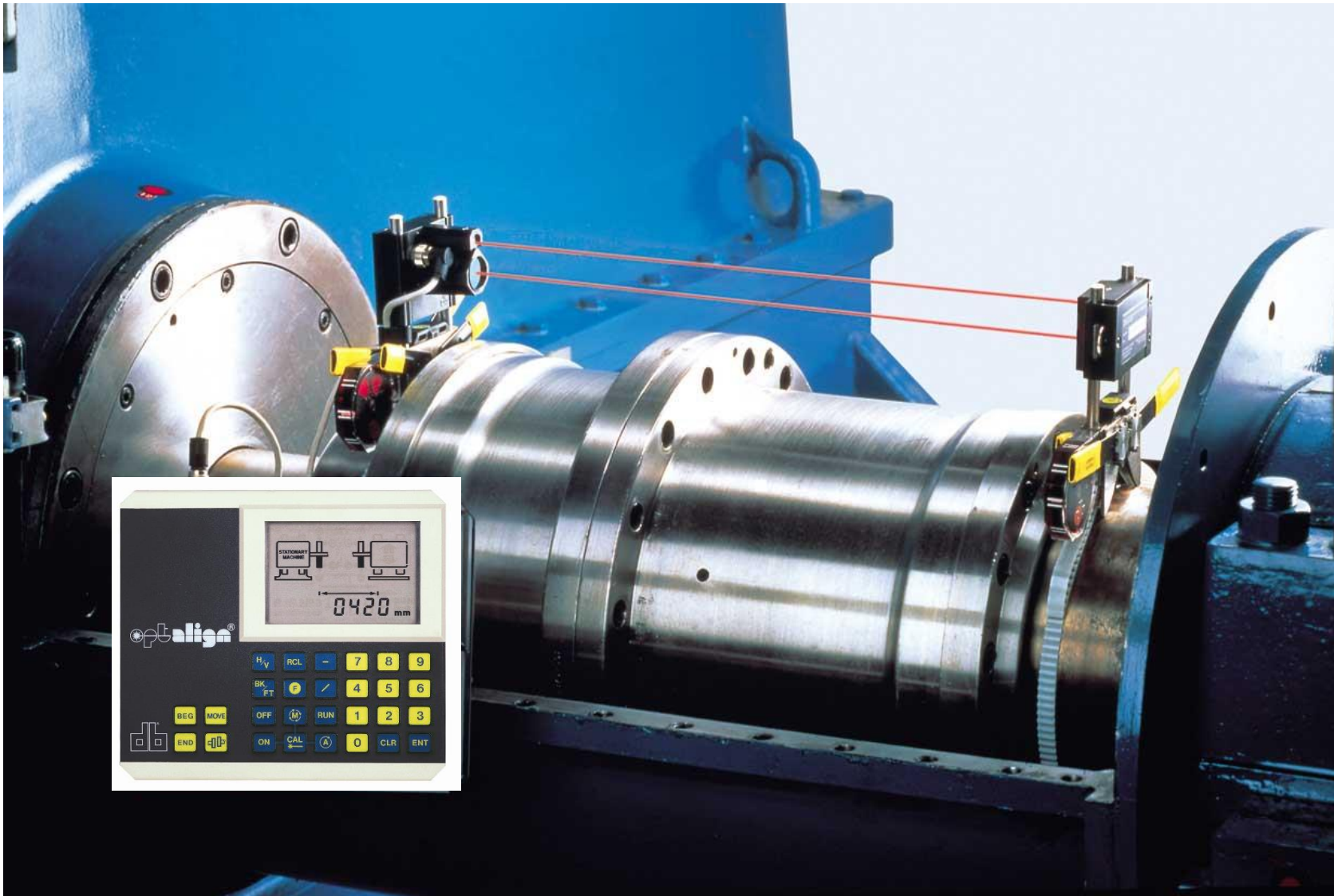
Short history: Machines within precision alignment tolerances



only 7% of the measured machines fall within the acceptable alignment tolerances

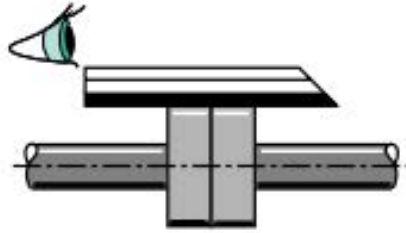


Short history: Alignment of machines → 1984 PRUFTECHNIK OPTALIGN



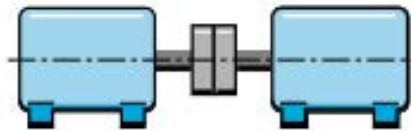
Short history: Shaft alignment methods

STRAIGHT EDGE



Measurement
Messen

5 mils
 $\frac{1}{10}$ mm

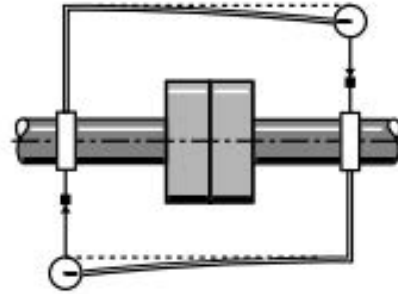


Correction
Korrigieren

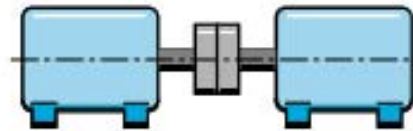


THE WIZARD

DIAL INDICATOR

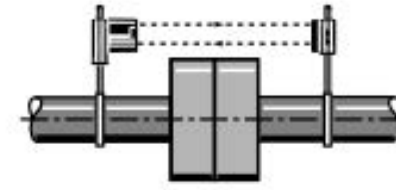


0.5 mils
 $\frac{1}{100}$ mm

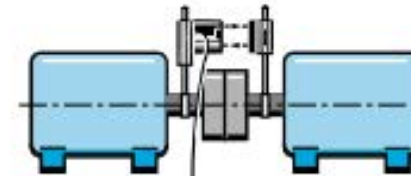


THE SPECIALIST

OPTALIGN LASER SYSTEM



0.05 mils
 $\frac{1}{1000}$ mm



THE TECHNICIAN

POLL QUESTION No. 1



Which alignment method are you predominantly using?

(Click only one answer)

- Straight edge and feeler gauge
- Dial indicators
- Laser shaft alignment
- No alignment method being used at this time

PRUFTECHNIK Alignment → Evolution

OPTALIGN



ROTALIGN



ROTALIGN Ultra



ROTALIGN touch



OPTALIGN touch



1st laser alignment
Single laser
Single XY detector

Single laser
Single sensor
Double XY detector

Colour computer
Bluetooth comm.

Touch GUI
sensALIGN 7:
Integrated BT comm.
Single laser
Double XY detector
Intelli measurements

Common touch GUI
sensALIGN 5:
Integrated BT comm.
Single laser
Double XY detector



Adaptive Alignment

What is Adaptive Alignment?

Adaptive Alignment is the next generation of laser alignment – brought to you by the inventors of laser shaft alignment who continue to innovate in the field.

It is a combination of software and hardware innovations, enabling maintenance teams to address every alignment challenge from simple to complex ... challenges that basic systems cannot handle. Adaptive Alignment systems can adjust:

- To the **asset** itself
- To the alignment **situation** or challenge
- To the **technician** and team charged with completing the alignment task

Adaptive Alignment systems eliminate “guesstimates,” wasted effort, and time-consuming rework that happen with basic laser alignment systems.

Work is completed faster and with higher precision because advanced technology automatically “adapts” in real time, eliminating errors and correcting for situational challenges that other systems cannot.

Innovations that make Adaptive Alignment possible

1. Single Laser Technology

- sensALIGN

2. Active Situational Intelligence

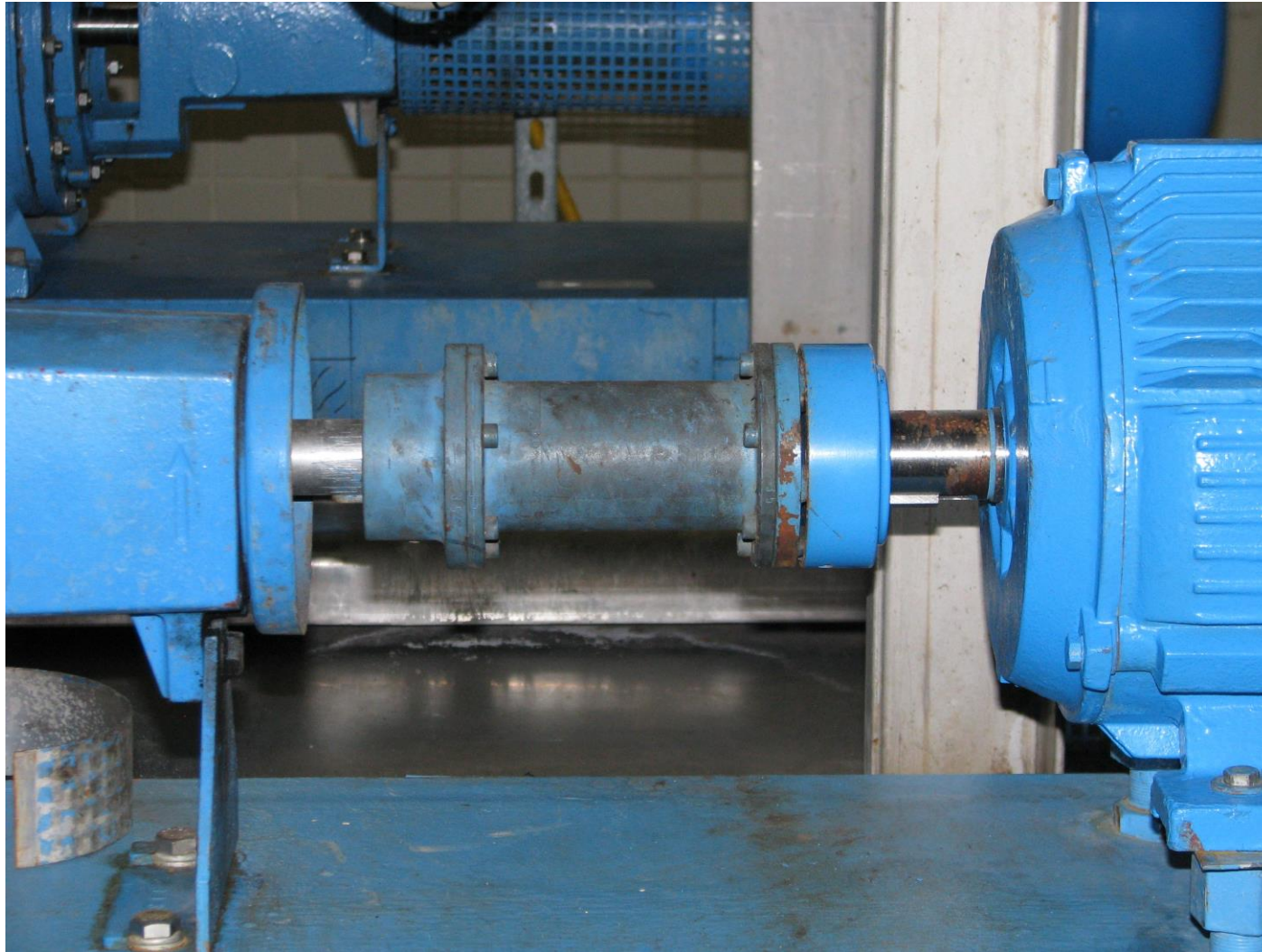
- numerous features, such as:

- Simultaneous Live Move
- Continuous Sweep
- Uncoupled Shaft Awareness
- Freeze-Frame Measurement
- Automatic Multi-Factored Quality Enhancement
- Total Thermal Coverage
- ARC 4.0



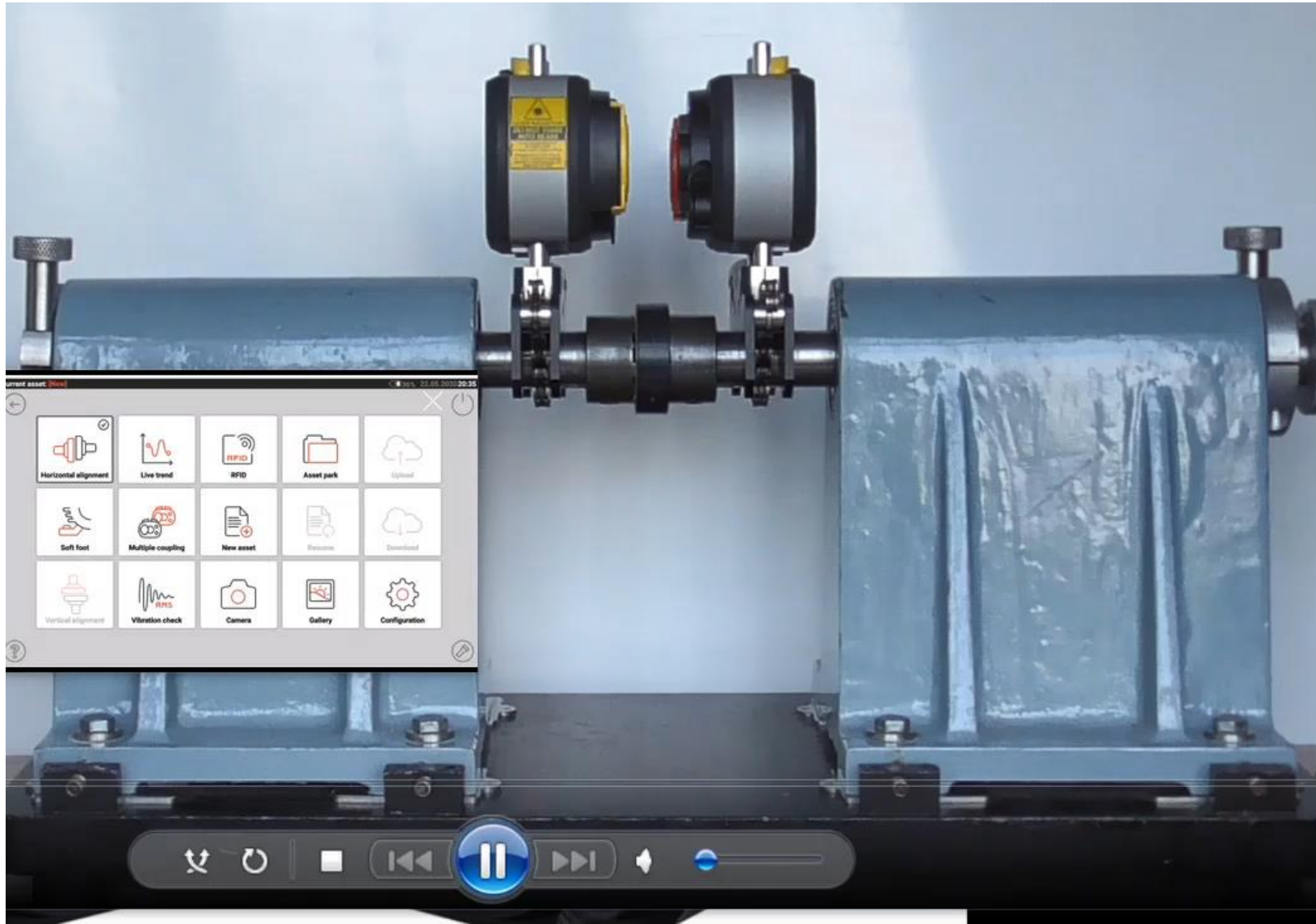
Adaptive Alignment – Examples

Example 1: Coupled M/C – ROTATABLE → Continuous Sweep

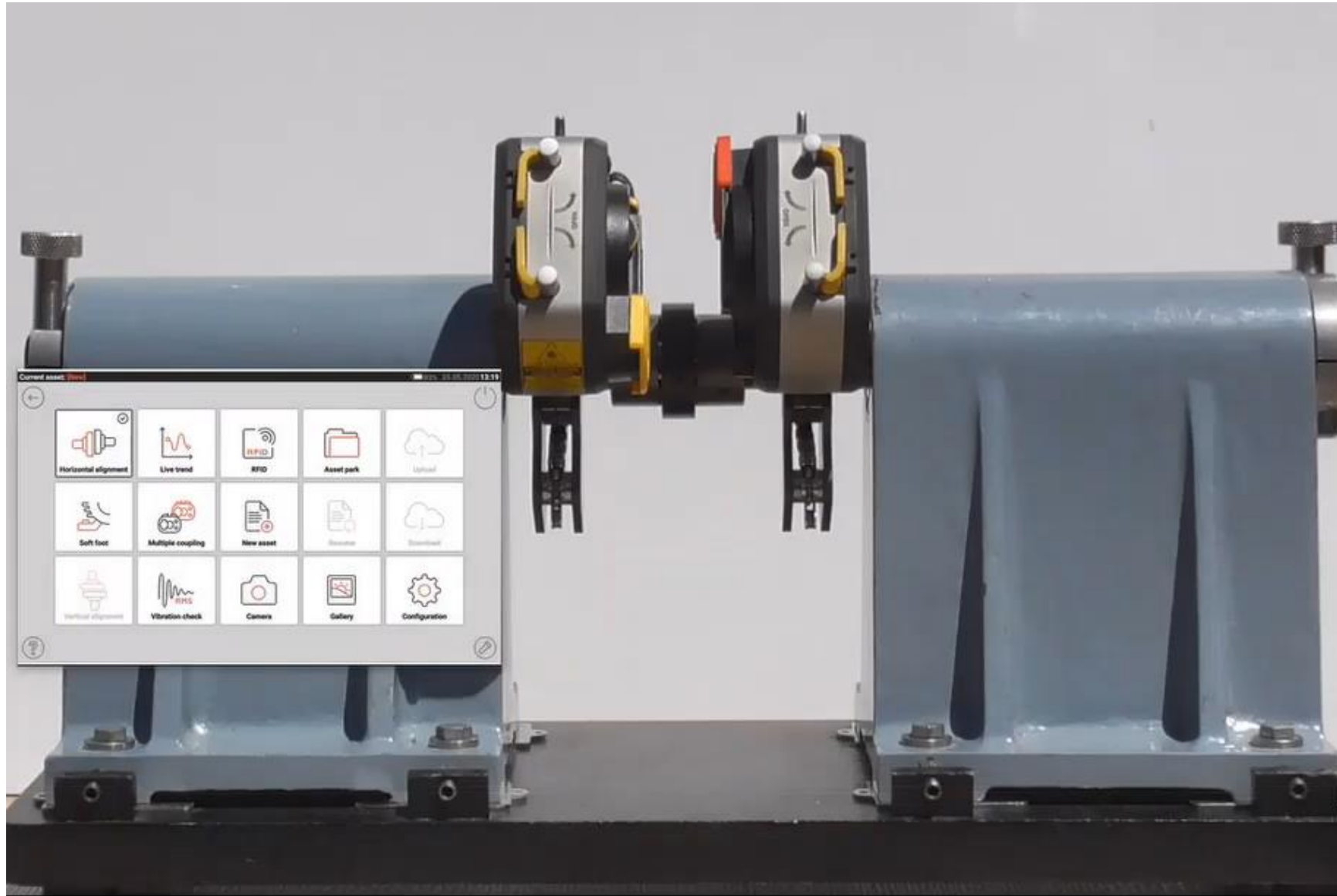


Hans Lenz, PRUFTECHNIK Germany: Pump-Motor coupled application

Example 1A: Coupled M/C → Continuous Sweep → MEASURE & LIVE MOVE



Example 1B: Coupled M/C → Continuous Sweep → COUPLING BACKLASH



Example 1C: Coupled M/C → Continuous Sweep → USER ISSUES

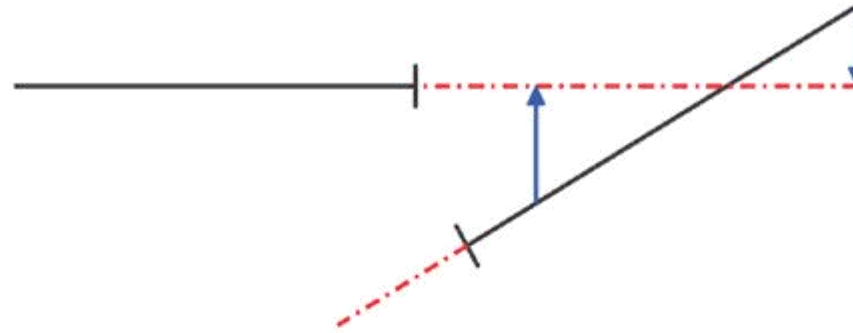


Example 2: COUPLED Vs. UN-COUPLED SHAFT ALIGNMENT

Coupling strain and shaft deflection

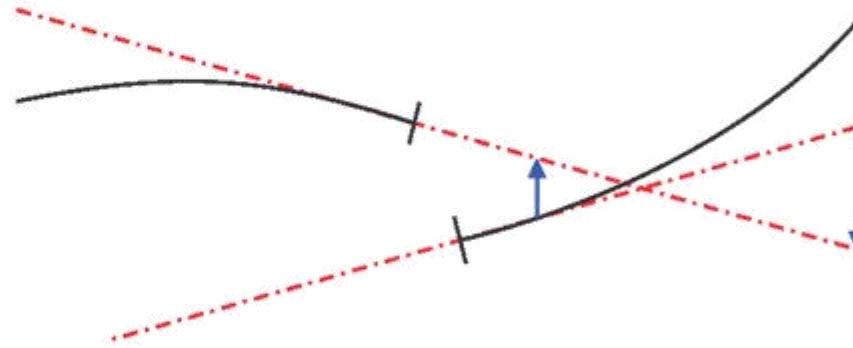
Shaft uncoupled

The alignment condition with the shafts uncoupled. Severe misalignment is present.



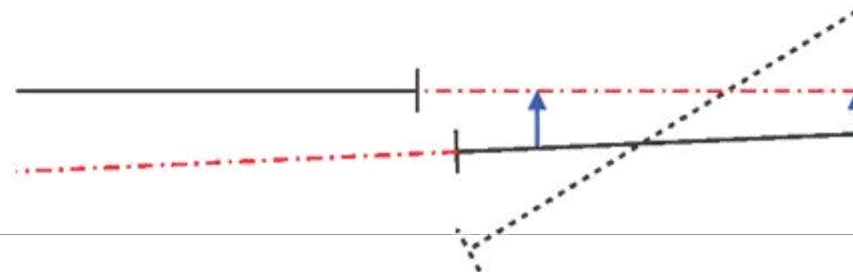
Shaft coupled

The projected centrelines of rotation are shown as measured with the shafts coupled.

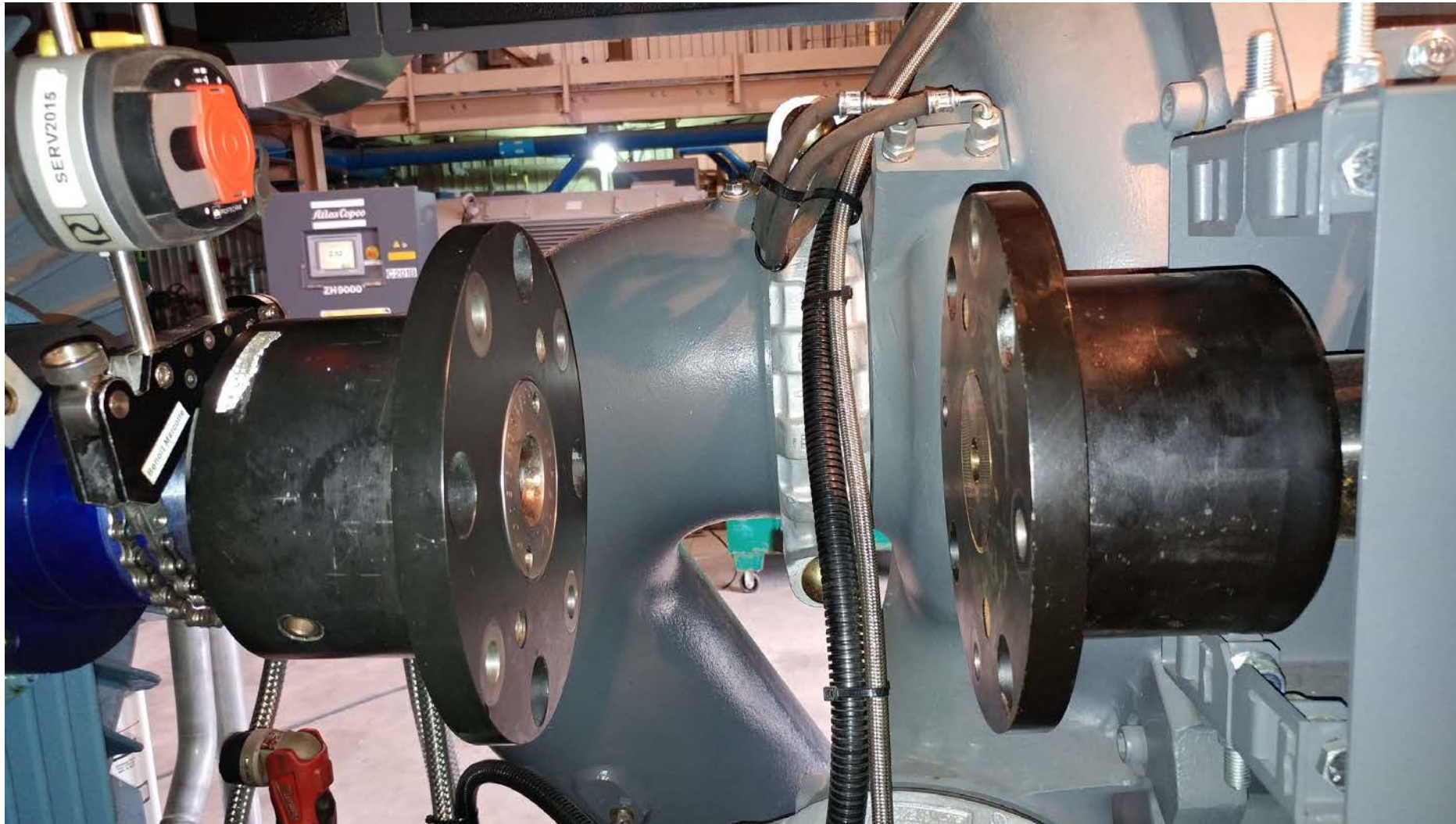


Shaft after alignment

The right shaft is moved according to the measured values. The alignment situation has improved but the shafts are still not aligned.



Example 2: Un-Coupled M/C – ROTATABLE → Uncoupled Shaft Awareness

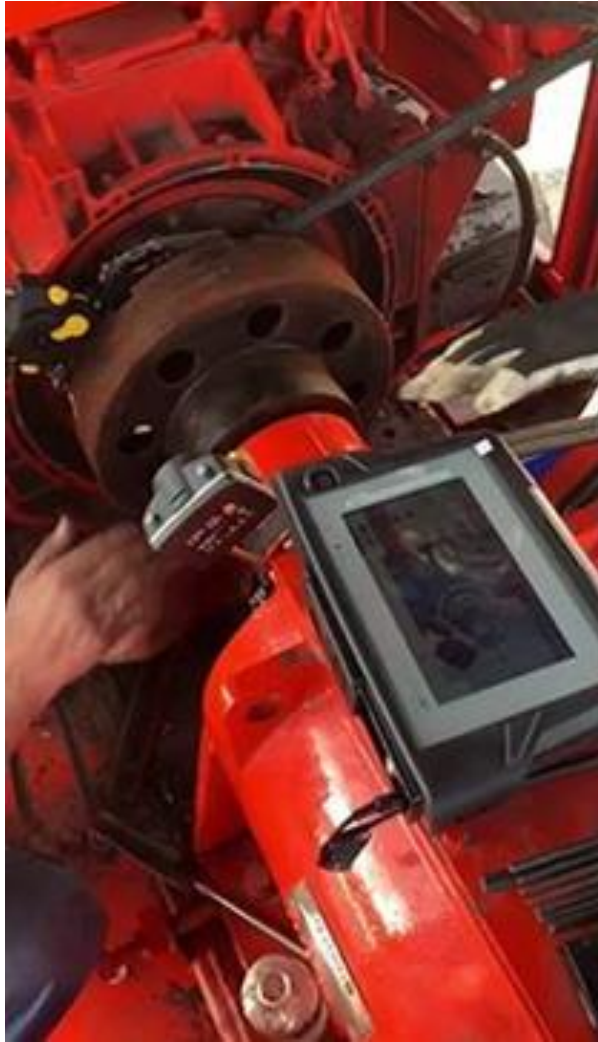


Benoît Marcotte, PRUFTECHNIK Canada: Compressor application

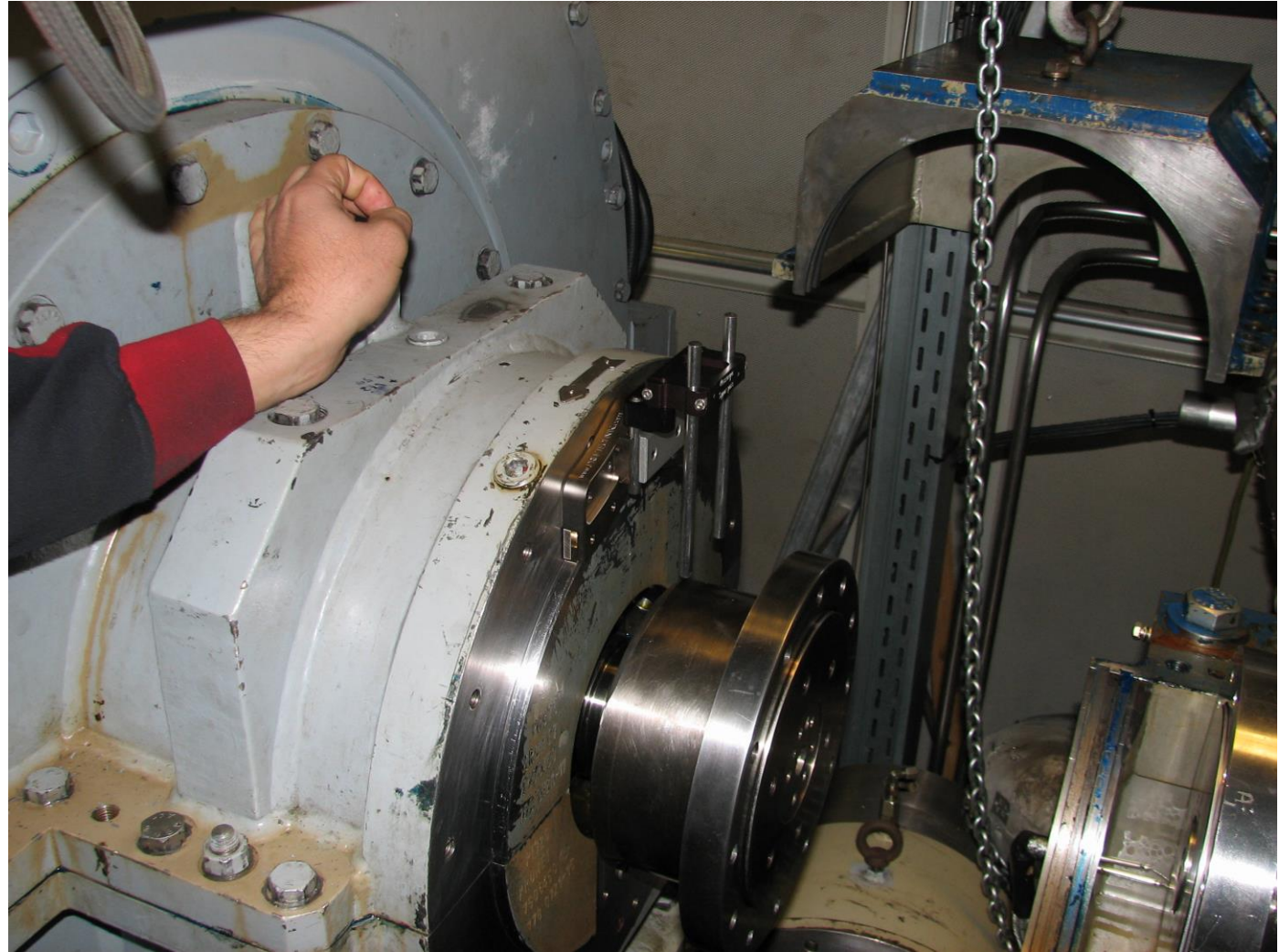
Example 2: Un-Coupled M/C – ROTATABLE → Uncoupled Shaft Awareness



Example 3: Un-Coupled M/C – NON-ROTATABLE → Intelli/Multipoint

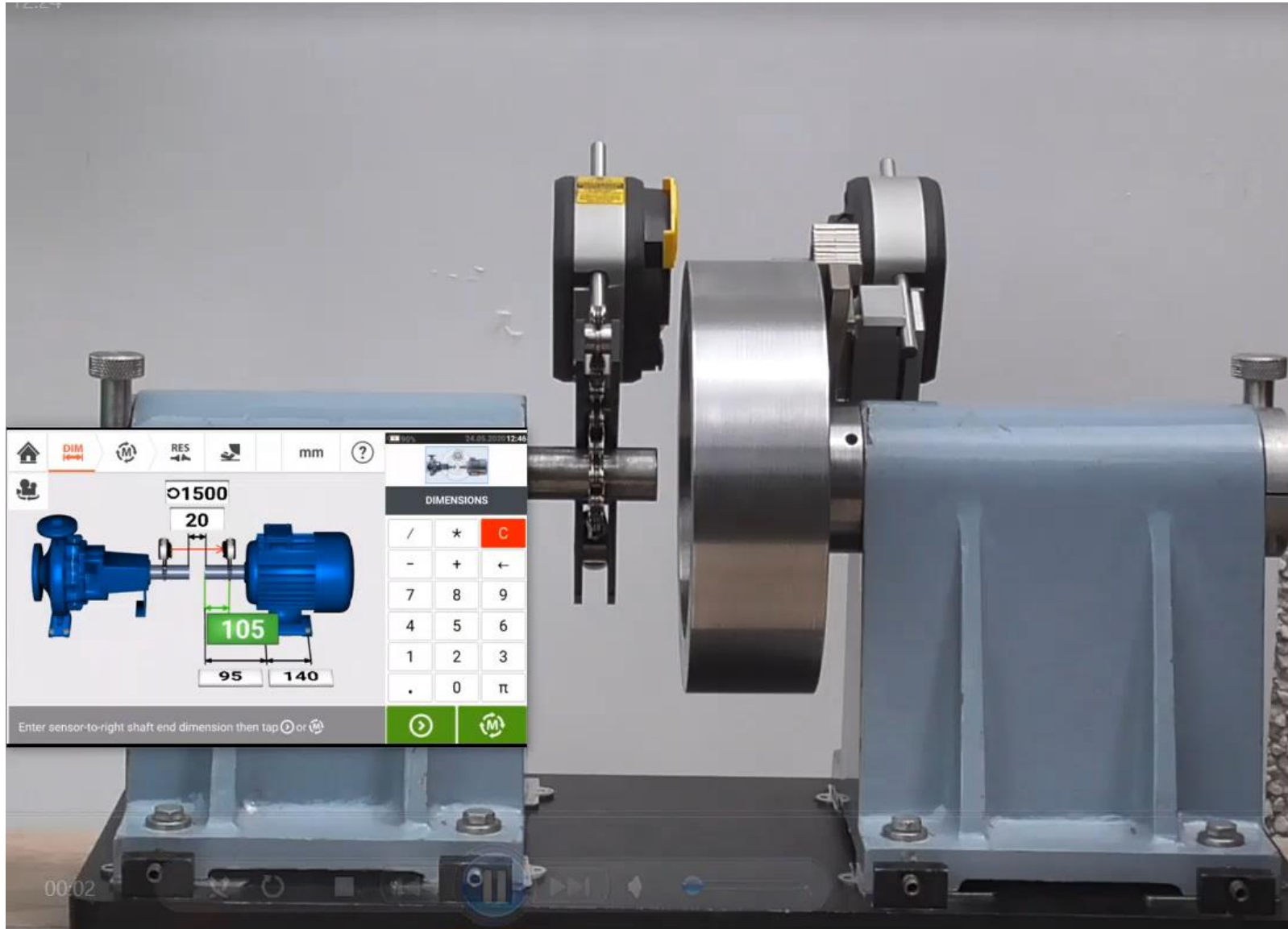


Brandon Zupperdo, Star-tech

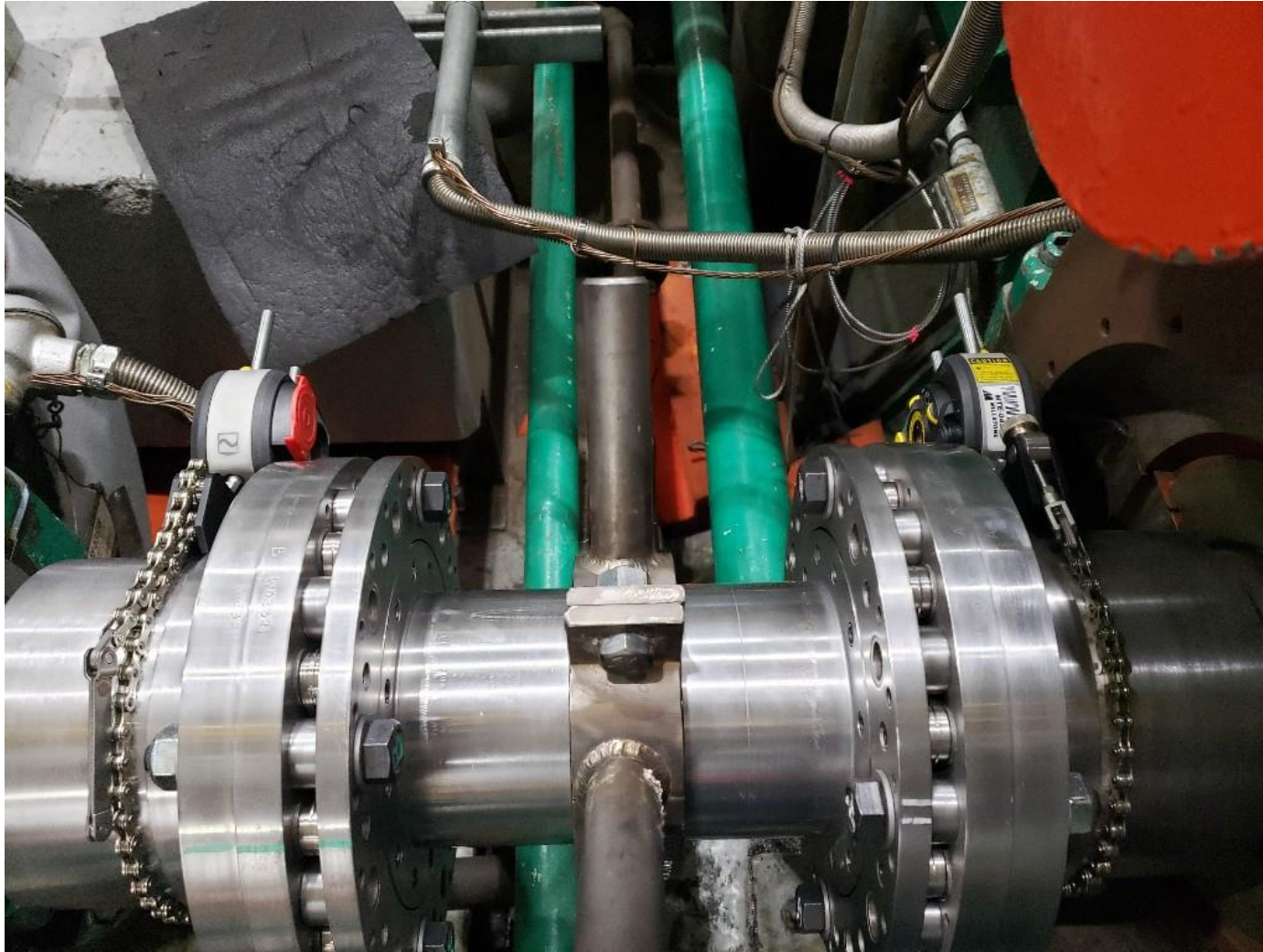


Hans Lenz, PRUFTECHNIK Germany: Planetary gearbox non-rotatable shaft

Example 3: Un-Coupled M/C – NON-ROTATABLE → Intelli/Multipoint

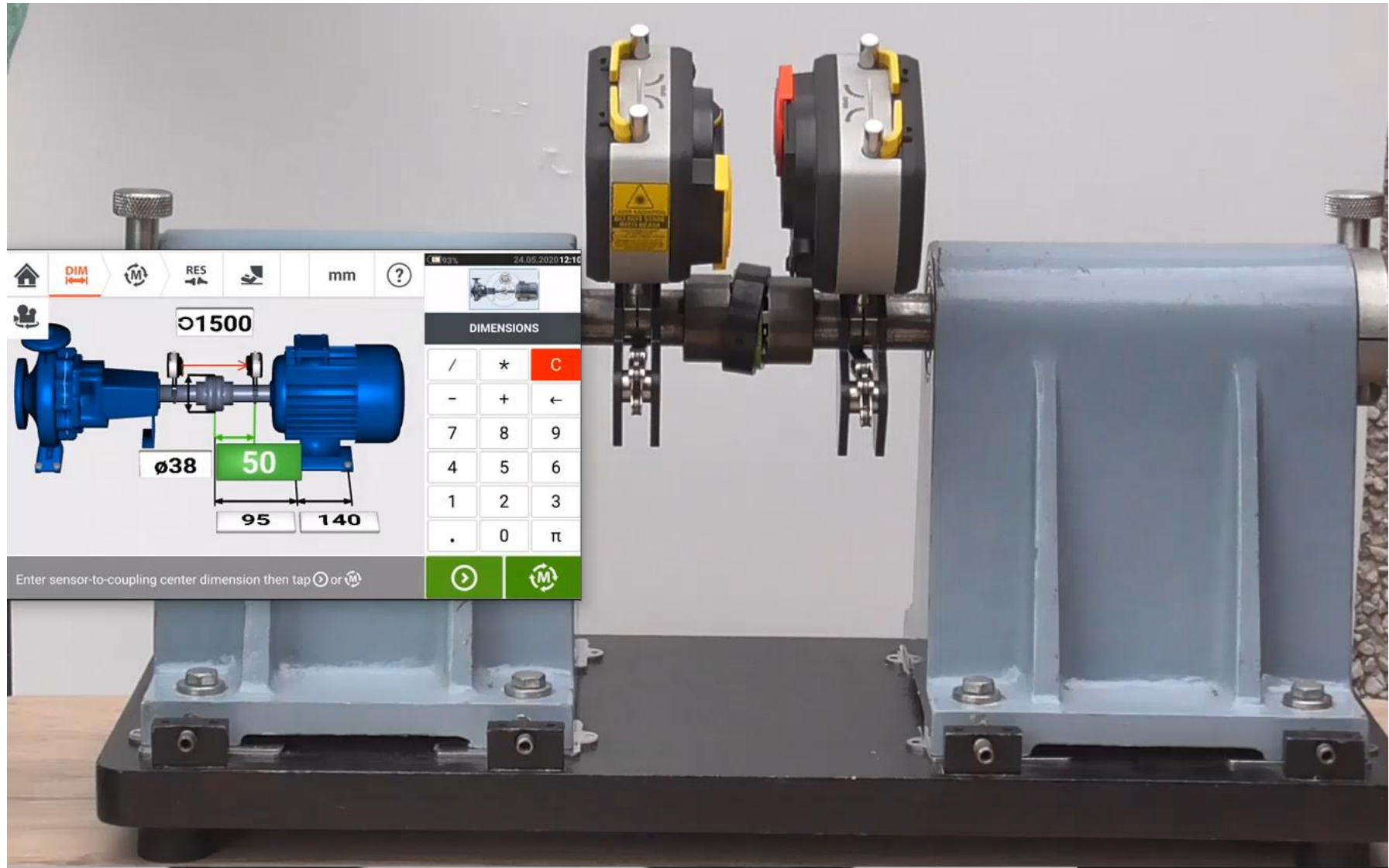


Example 4: INITIAL MISALIGNMENT → Freeze-Frame Measurement



Deron Jozokos, Shoreline Reliability: Turbine driven nuclear feed water pump

Example 4: INITIAL MISALIGNMENT → Freeze-Frame Measurement



Example 4: INITIAL MISALIGNMENT → Report protocol: As found

db PRÜFTECHNIK

Machine alignment information

Asset ID: Pump-Motor 210265

Dimensions mm

Measurements mm

AS FOUND:

Coupling #1

Date	Type	V		H	
		↖	↗	↖	↗
10.04.2020 11:26:43	IntelliSWEEP	0.24	-0.14	0.27	-0.15

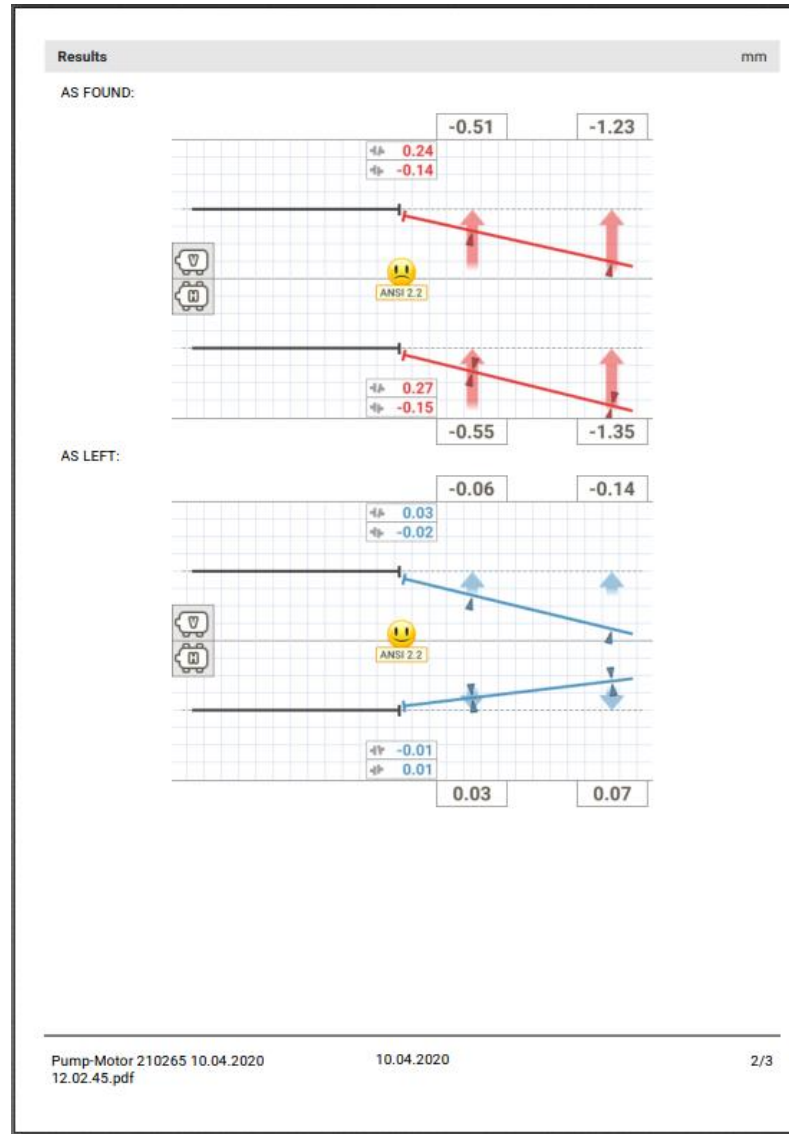
Measurements mm

AS LEFT:

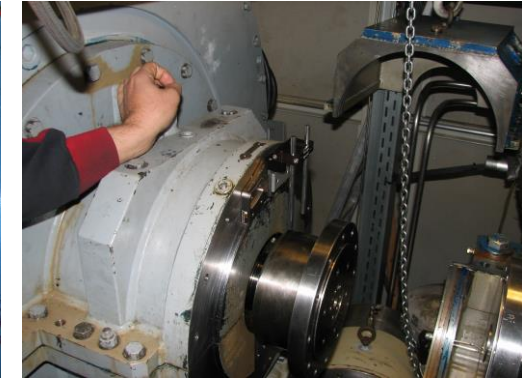
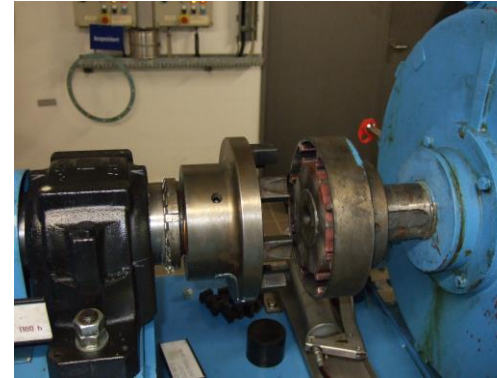
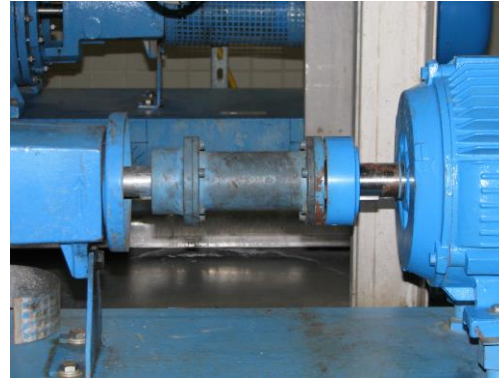
Coupling #1

Date	Type	V		H	
		↖	↗	↖	↗
10.04.2020 12:01:03	IntelliSWEEP	0.03	-0.02	-0.01	0.01

Pump-Motor 210265 10.04.2020 12.02.45.pdf 1/3

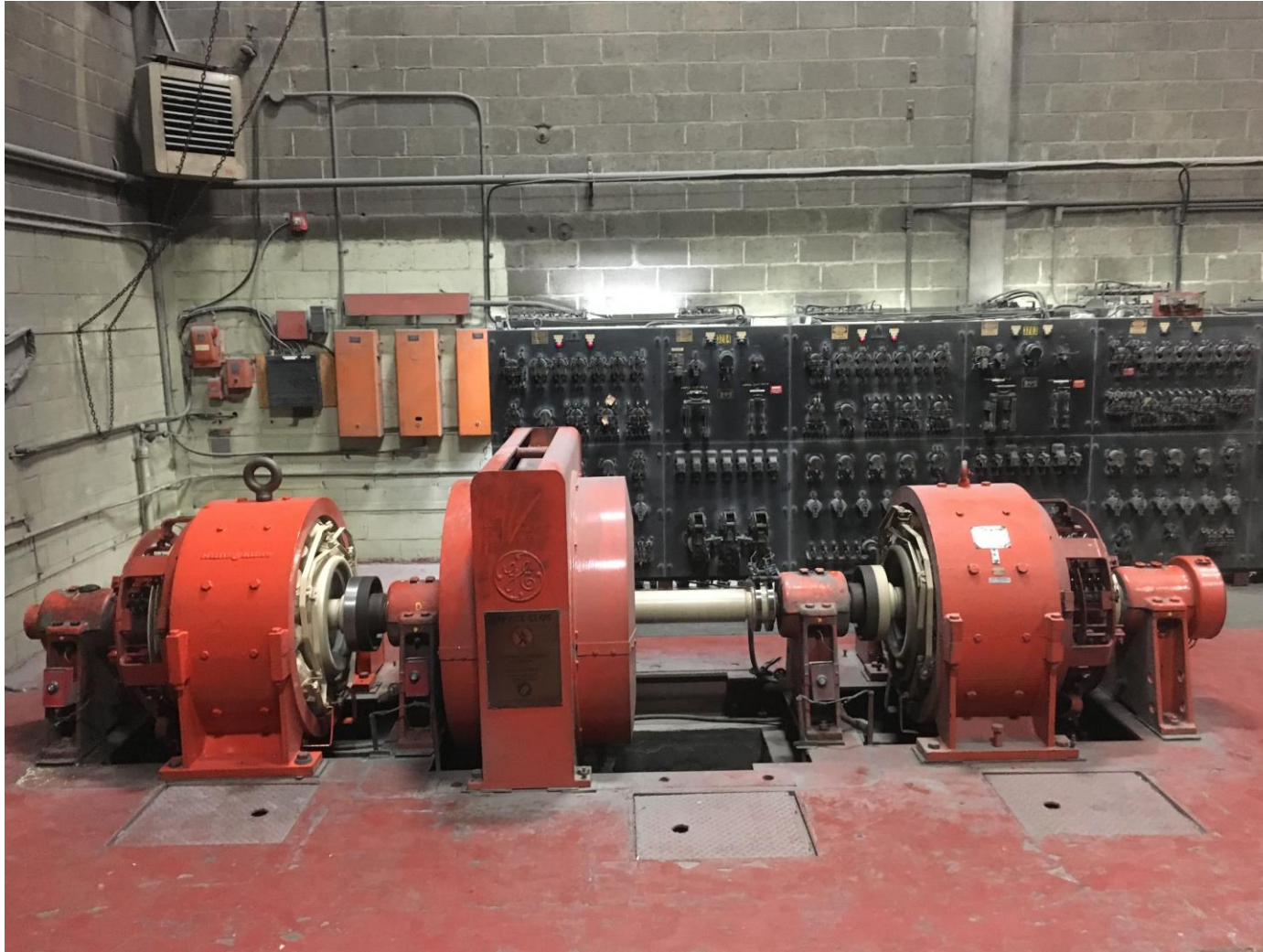


Examples 1 - 4: Adaptive Alignment measurement summary



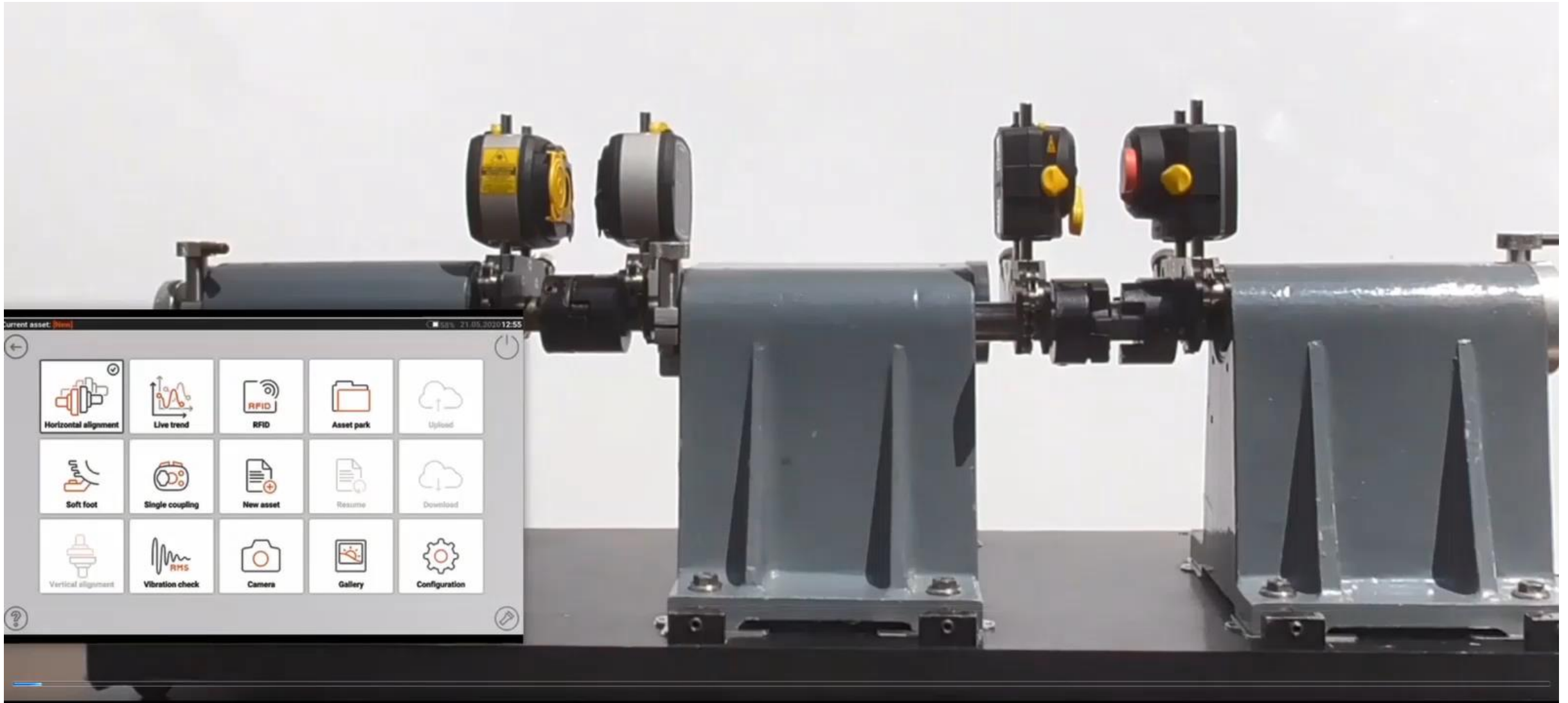
Asset Situation	COUPLED ROTATABLE	UN-COUPLED ROTATABLE	UN-COUPLED NON-ROTATABLE
Active Situational Intelligence	Continuous Sweep	Uncoupled Shaft Awareness - Pass	Uncoupled Shaft Awareness - Multi
ASI Value	Real-time automatic detection & elimination of erroneous data		
User Benefits	User guidance, speed and consistent high precision results for all users		

Example 5: MULTI-COUPLING → Simultaneous Machine Train Alignment

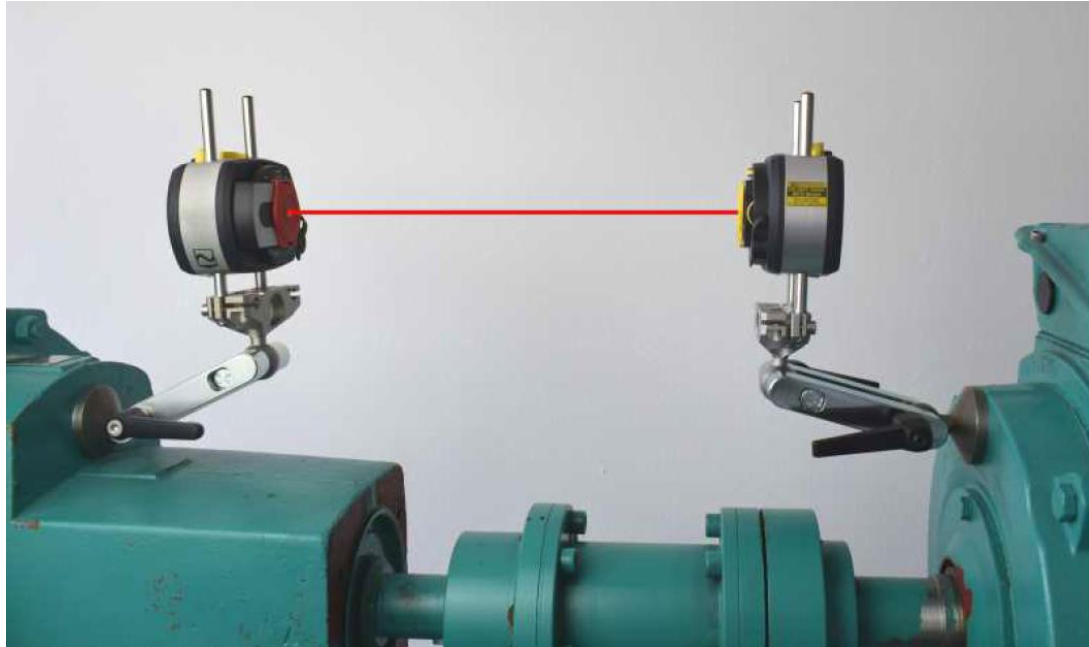


Benoît Marcotte, PRUFTECHNIK Canada: DC Generator machine train

Example 5: MULTI-COUPLING → Simultaneous Machine Train Alignment



Example 6: MULTI-COUPLING → Total Thermal Coverage

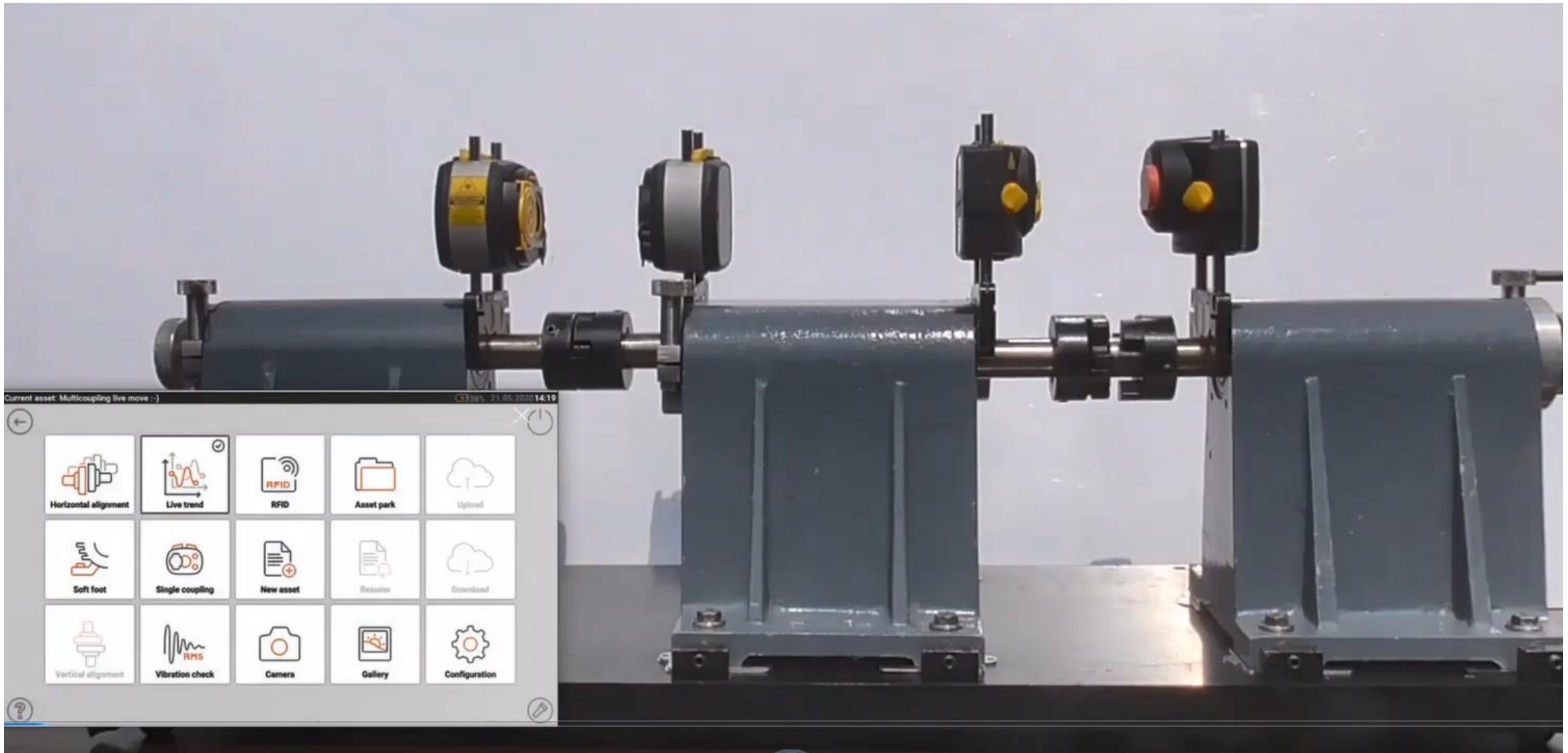


Example 6: MULTI-COUPLING → Total Thermal Coverage



Benoît Marcotte: Gantry crane

Example 6: MULTI-COUPLING → Total Thermal Coverage

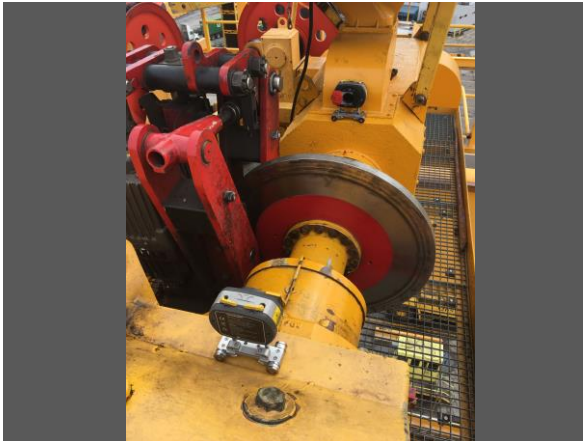


Example 5 - 6: MULTI-COUPLING → Adaptive Alignment summary



Multi-Coupling Simultaneous Machine Train Alignment:

- **Asset:** Horizontal Coupled & Uncoupled Shaft Alignment – complete machine-train
- **Active Situational Intelligence:** Monitor measurement and movement on all machines in real-time with automatic detection & elimination of erroneous data
- **User:** Track simultaneously complete machine movement changes to avoid machine-train bolt and base-bound situations with user guidance
- **BENEFITS:** Speed and accuracy of complete machine-train measurements and movements



Multi-Coupling Total Thermal Coverage:

- **Asset:** Horizontal Machine Alignment – complete machine train
- **Active Situational Intelligence:** Measure/Log simultaneously the complete movement of complete machine train
- **User:** Automatic recording of machine-train changes to determine machine pre-sets at coupling and machine feet
- **BENEFITS:** Speed, Simultaneously measure the complete machine train static/dynamic changes

Value proposition summary – Adaptive Alignment

- A comprehensive solution that acclimatizes in real time. Adaptive Alignment achieves results through two major innovations - single laser technology and active situational intelligence. Together, these innovations optimize every alignment task – from simple to complex – minimizing downtime, extending asset life, and enabling technicians to accomplish more every day.
- Supports a broad range of critical rotating asset types & alignment challenges. Adaptive alignment quickly and easily handles straightforward alignment jobs, but more importantly **it's speed and ease of use expand to support more complex assets and situations**, such as machine trains, cardan shafts, long distance measurements, severe misalignments, high-precision tolerances, and more.
- Every technician can align like a pro. Adaptive Alignment systems unlock team capacity via real-time situational intelligence and built-in analytics. The system auto-corrects common user errors, enabling less experienced team members to obtain the same high-quality results as more experienced technicians. Unique collaboration facilities enable expert review of measurements, consulting, and mentoring as an alignment job progresses.

POLL QUESTION No. 2



Do you see the benefits of an alignment system that adapts to situations and user experience level? (Click only one answer)

- Yes, extremely beneficial
- Somewhat beneficial
- Not that important
- Not sure
- We don't use an alignment system

Adaptive Alignment – Web content and information

Learn from this Whitepaper

Adaptive Alignment

Next-generation technology for solving every shaft alignment challenge

DOWNLOAD >



<https://www.pruftechnik.com/en-US/adaptive-alignment/>

Adaptive Alignment – Best Practice webinar → Thanks



A big thank you to **Chris Wilson** at **PRUFTECHNIK UK**, who created the touch Adaptive Alignment video clips

QUESTIONS?



Thank you!

Jonathan Gough

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Product Manager, PRUFTECHNIK, Fluke Reliability

Next webinar June 10: Keys to CMMS success

BEST PRACTICE WEBINAR

Wednesday, June 10, 11 a.m. ET

10 keys to CMMS success

Experts estimate that up to 70 percent of initial CMMS implementations fail to meet expectations. A CMMS implementation is not just about CMMS data. It also involves centering empirical asset health data within your own cohesive synergy involving people, processes, and technology.

In this webinar, Gregory Perry, Fluke Reliability Senior Consultant, explores the 10 key steps that bring a focus and guidance to implementing your CMMS, setting you up for success.



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DEMO

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Reliability

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