



**FLUKE®**

Reliability

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# The most costly pitfalls in laser shaft alignment (and how to avoid them)

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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

# About PRUFTECHNIK

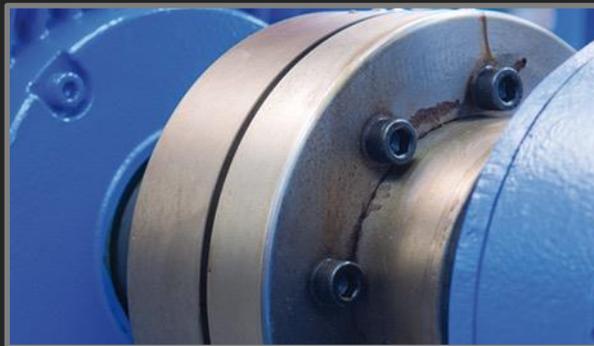
## WE KEEP YOUR WORLD ROTATING

*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

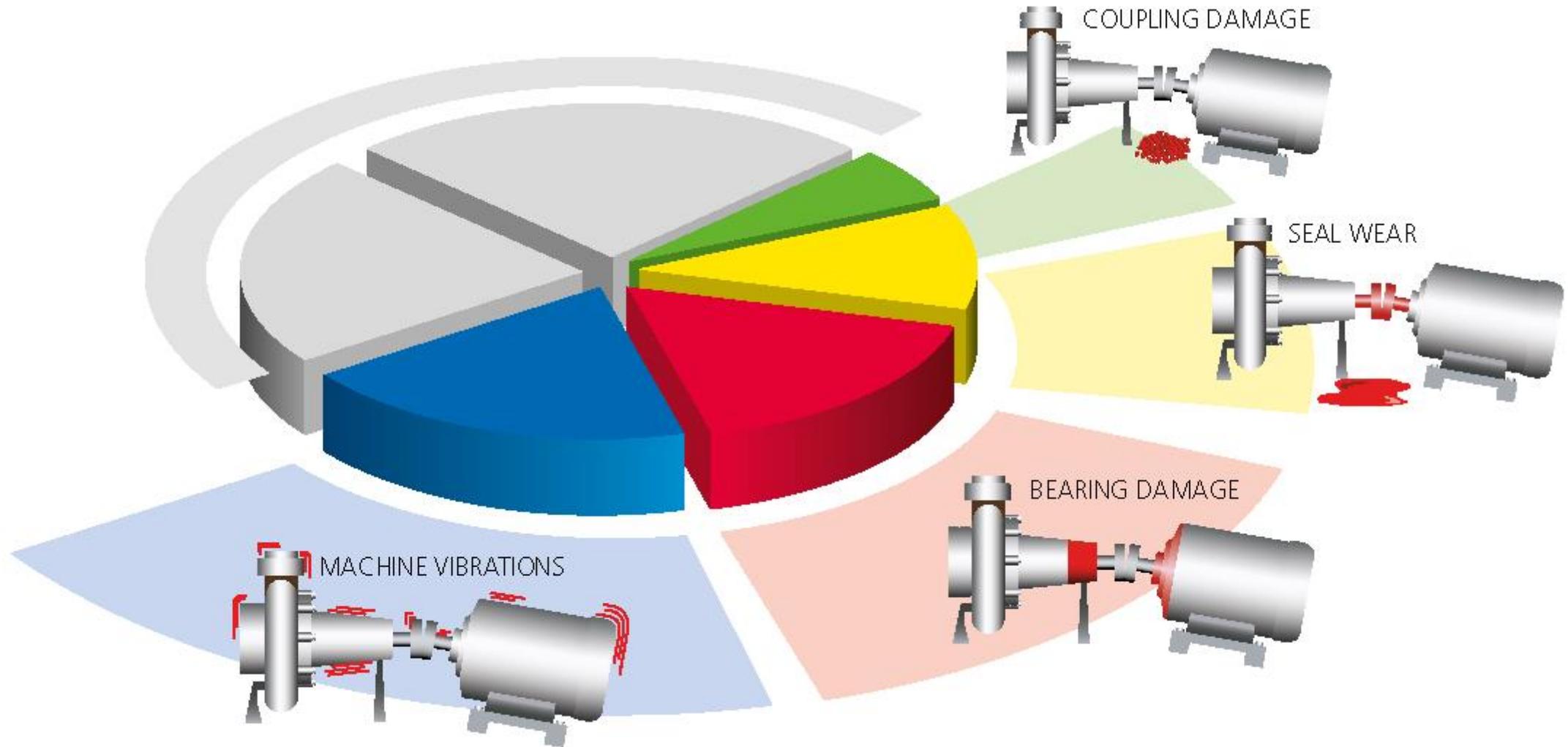


Mobile measurement



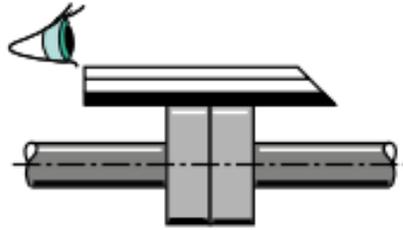
Geometric alignment

# Consequences of misalignment on machine condition



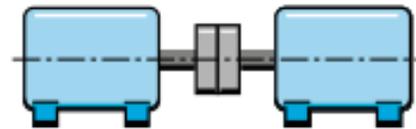
# Shaft alignment methods

## STRAIGHT EDGE



Measurement  
Messen

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

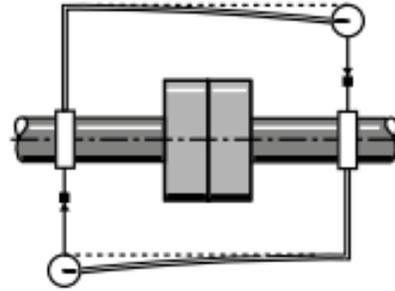


Correction  
Korrigieren

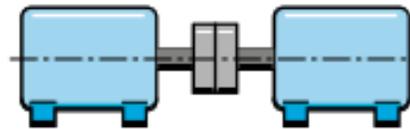


THE WIZARD

## DIAL INDICATOR

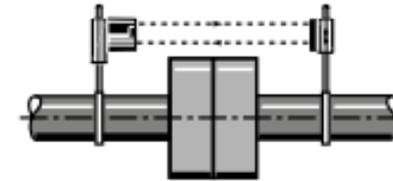


0.5 mils  
 $\frac{1}{100}$  mm

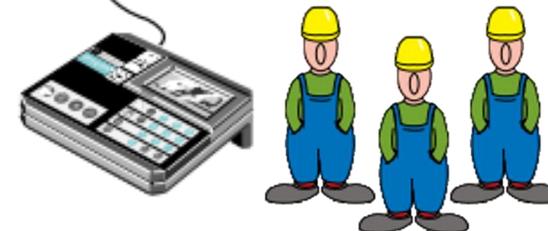
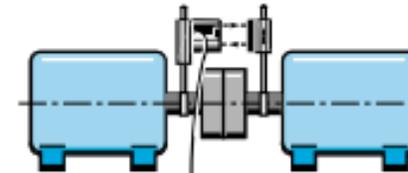


THE SPECIALIST

## LASER SYSTEM



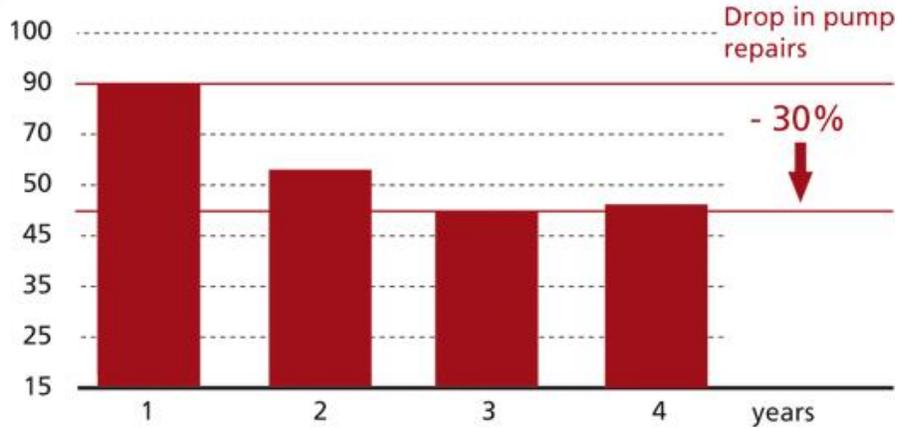
0.05 mils  
 $\frac{1}{1000}$  mm



THE TECHNICIAN

# Benefits promised by laser alignment

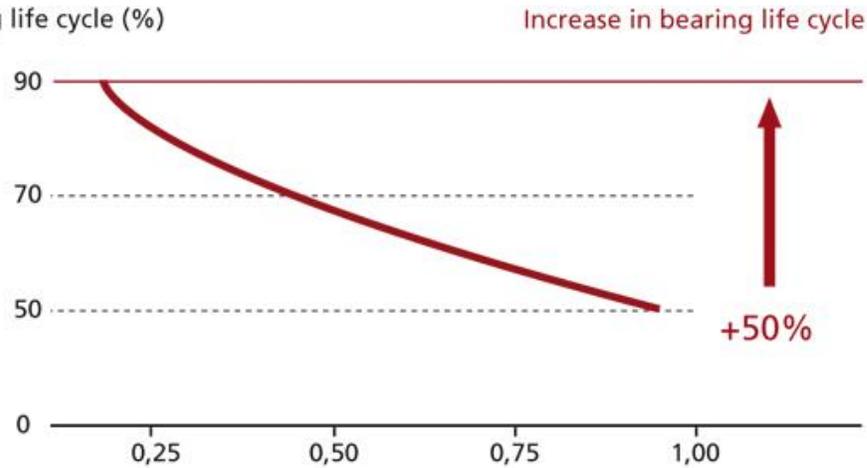
Number of pump repairs



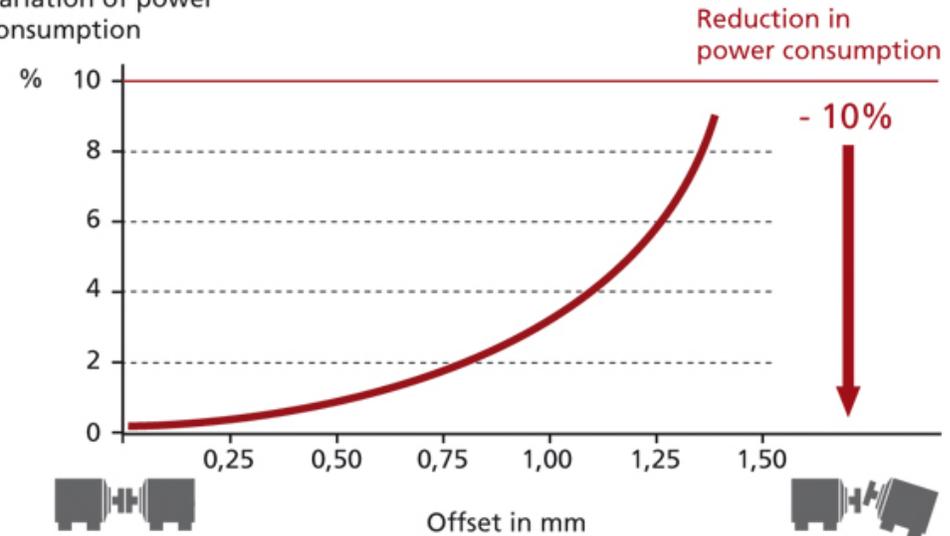
Number of mechanical seal repairs



Bearing life cycle (%)



Variation of power consumption



Offset (mm)



Offset in mm

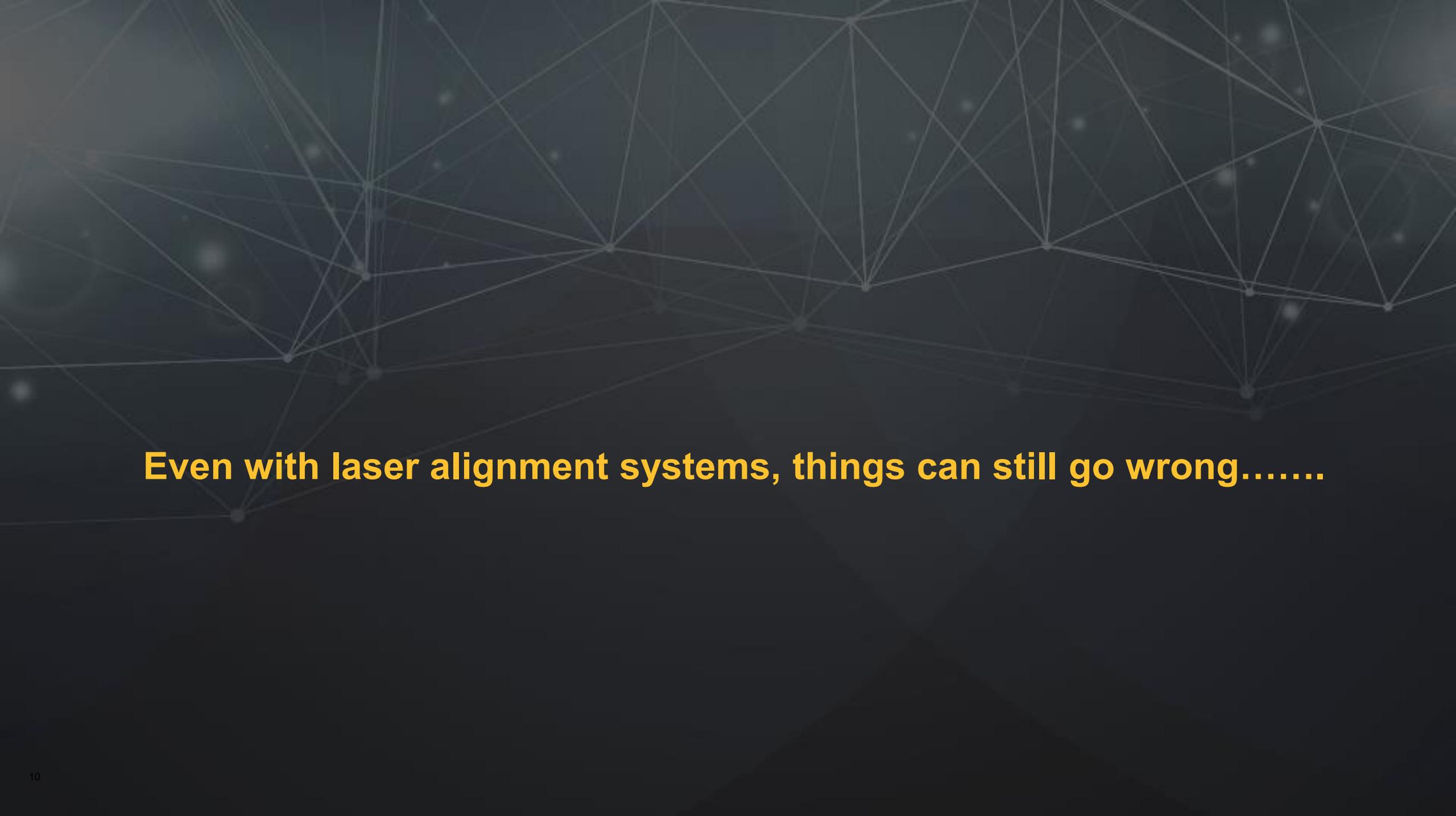


## **POLL QUESTION No. 1**

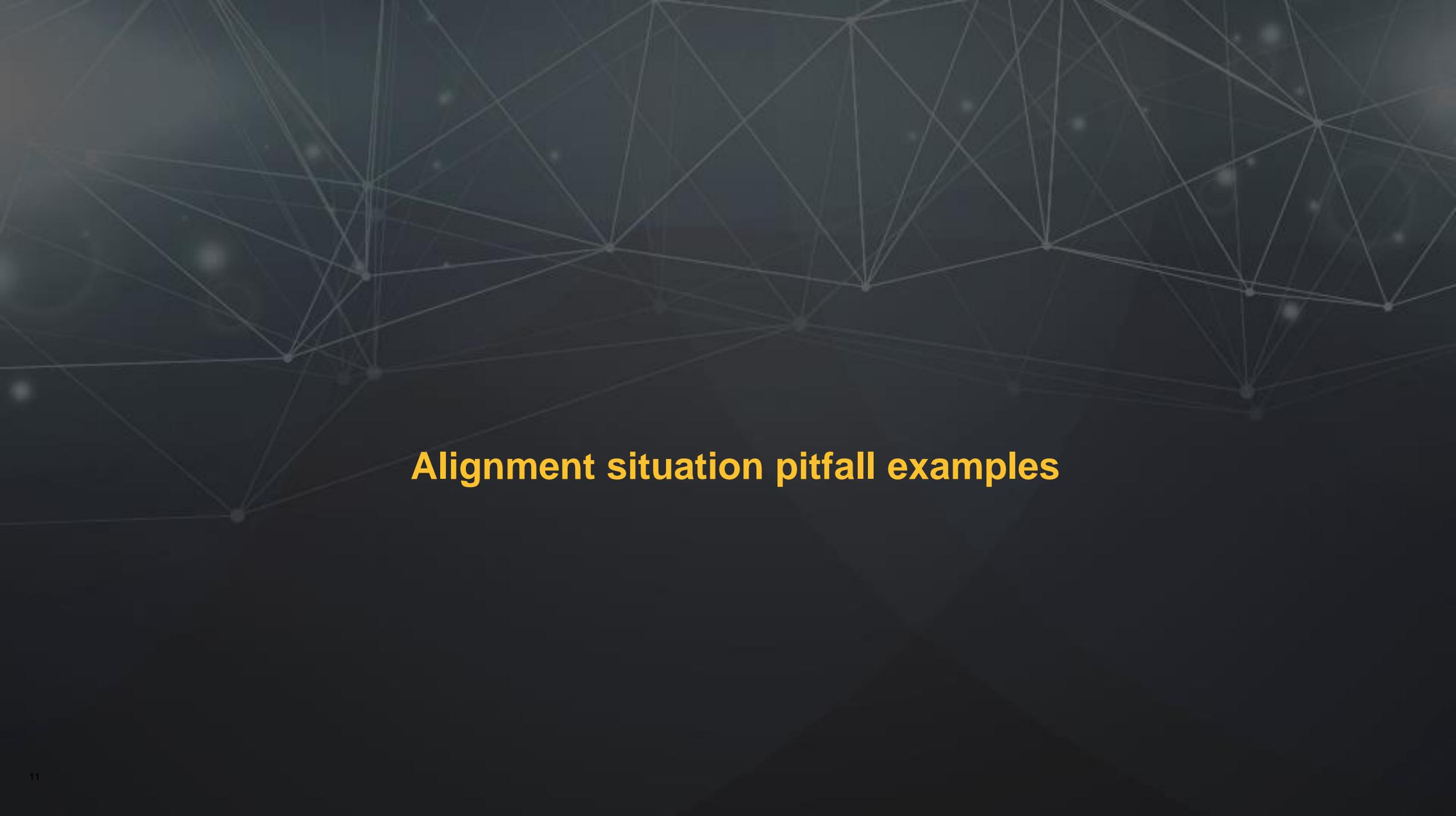


**What percentage of your coupling driven rotating machinery is currently aligned with laser alignment tools? (Click only one answer)**

- Less than 10%
- Up to 25%
- Up to 75%
- More than 75%

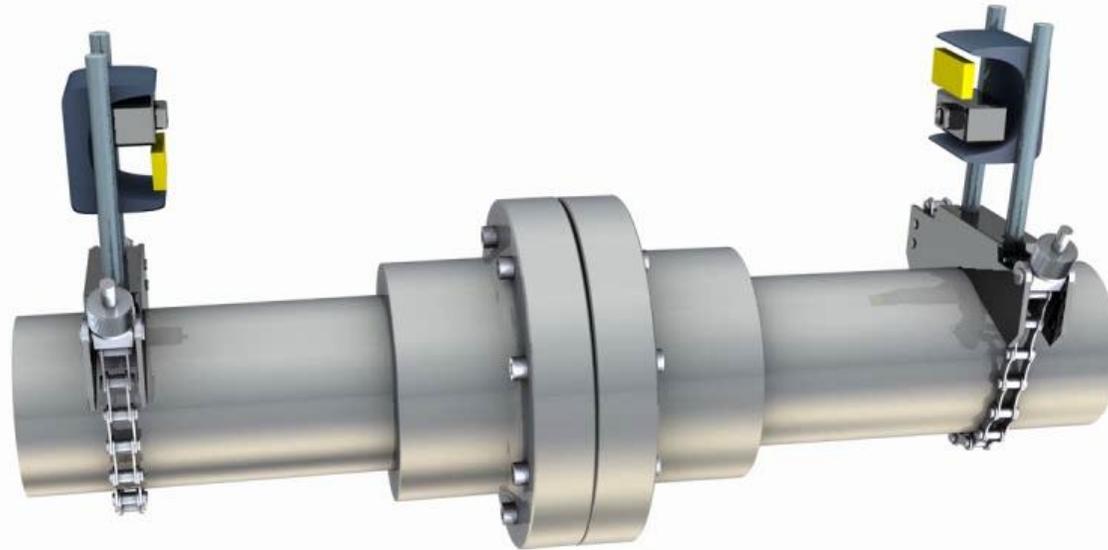


**Even with laser alignment systems, things can still go wrong.....**



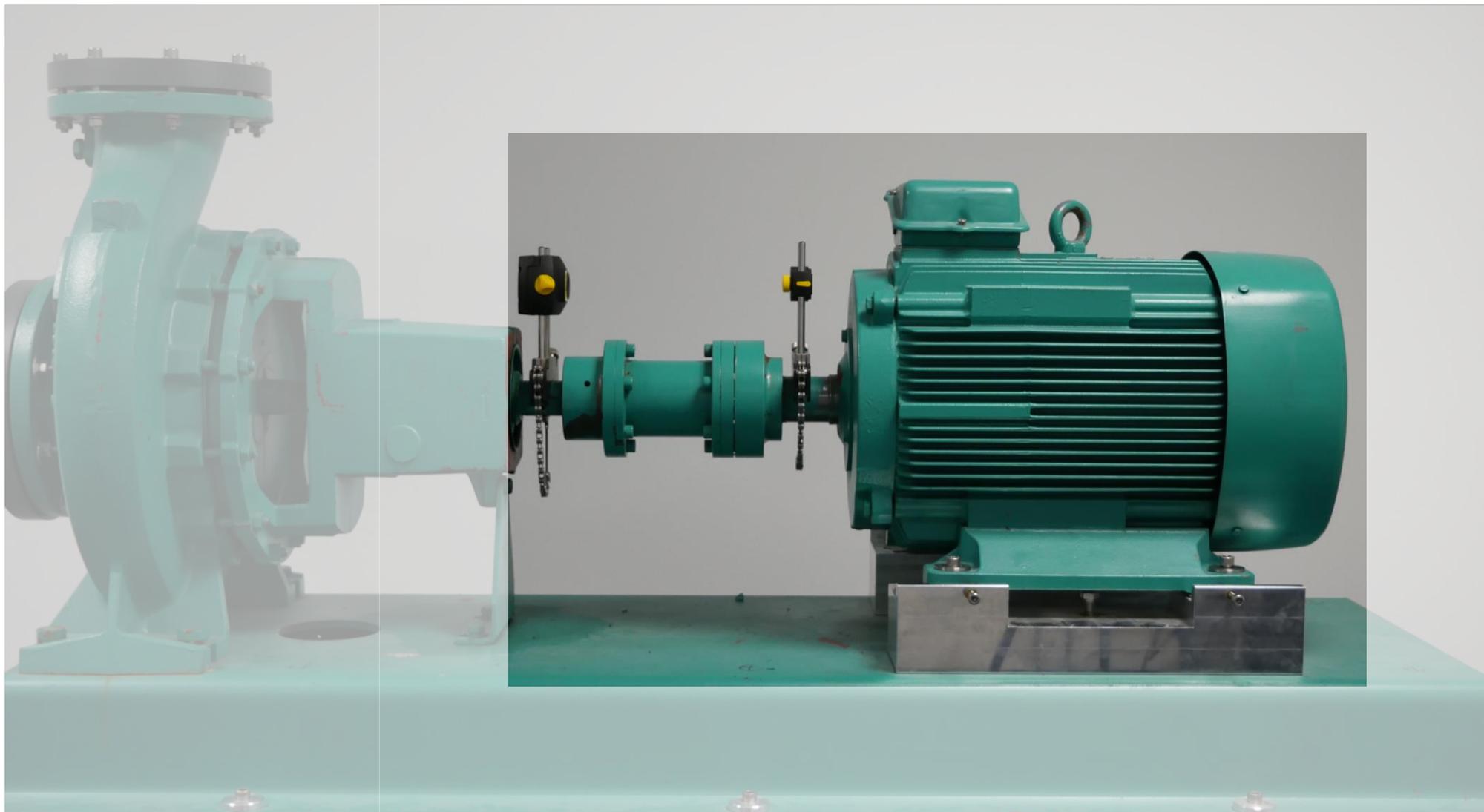
## **Alignment situation pitfall examples**

# Example 1: INITIAL MISALIGNMENT

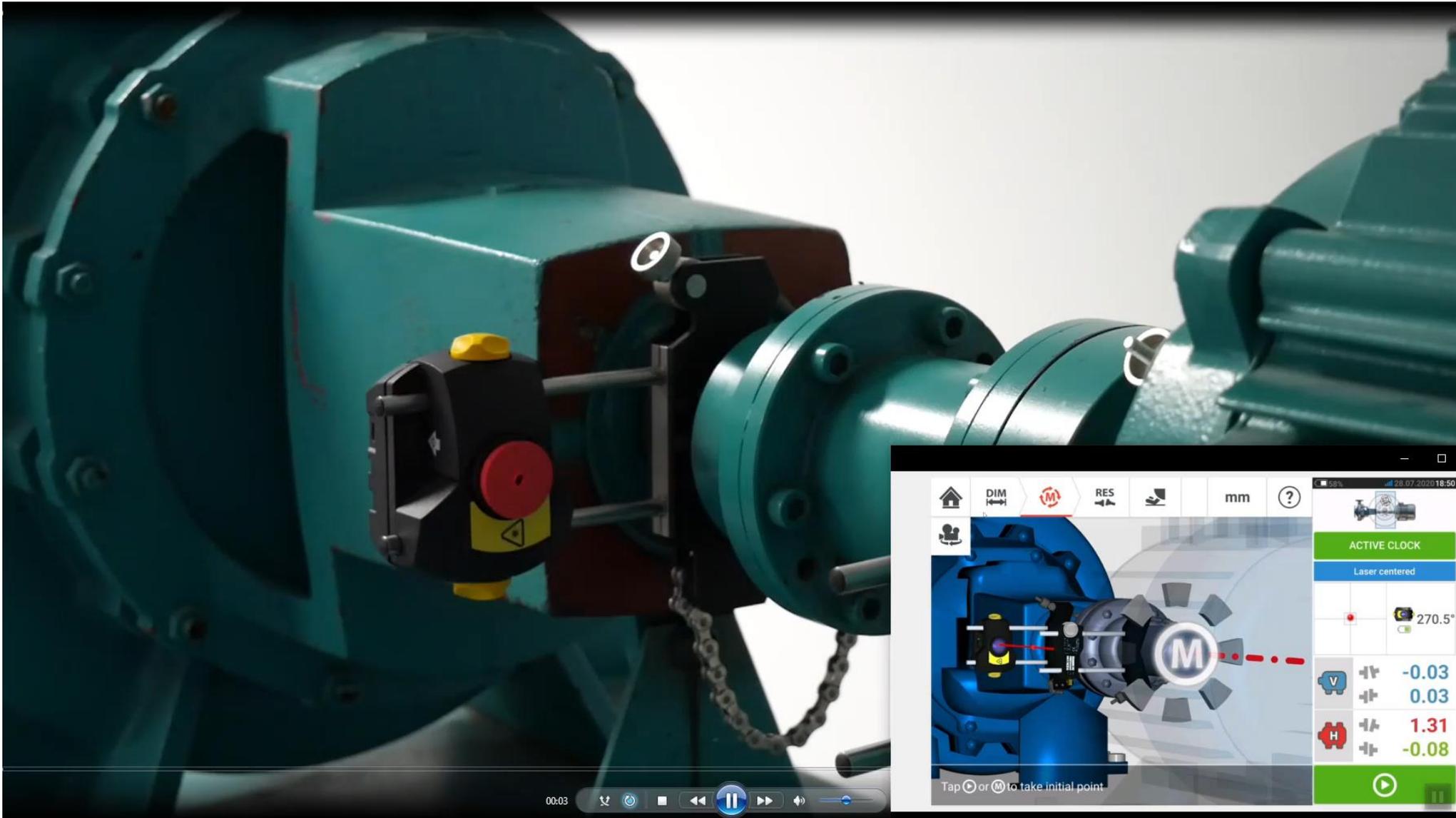


<https://www.youtube.com/watch?v=4JO3JwGgToE&feature=youtu.be>

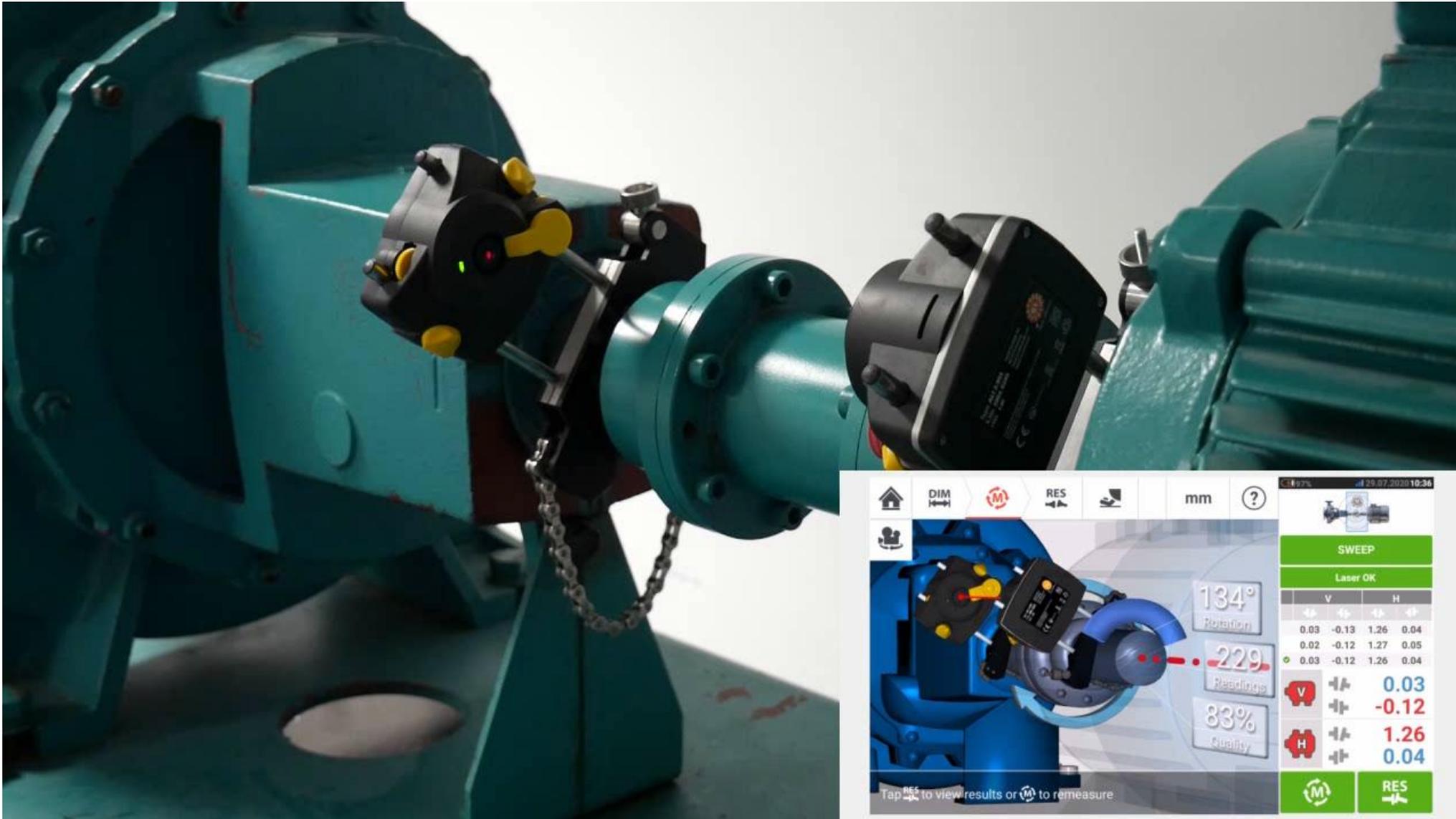
## Example 1: INITIAL MISALIGNMENT



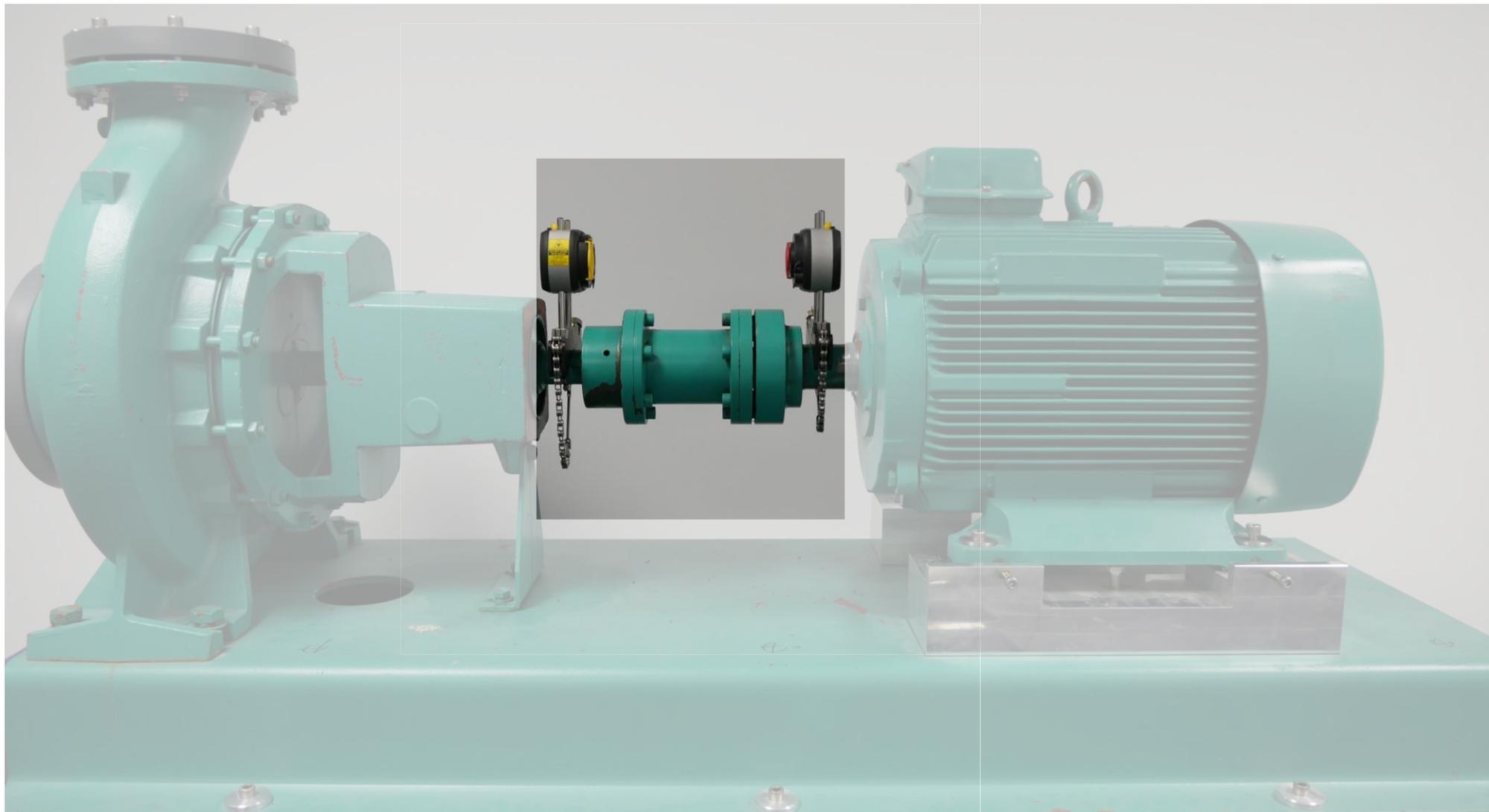
# Example 1A: INITIAL MISALIGNMENT – Freeze Frame: Standard



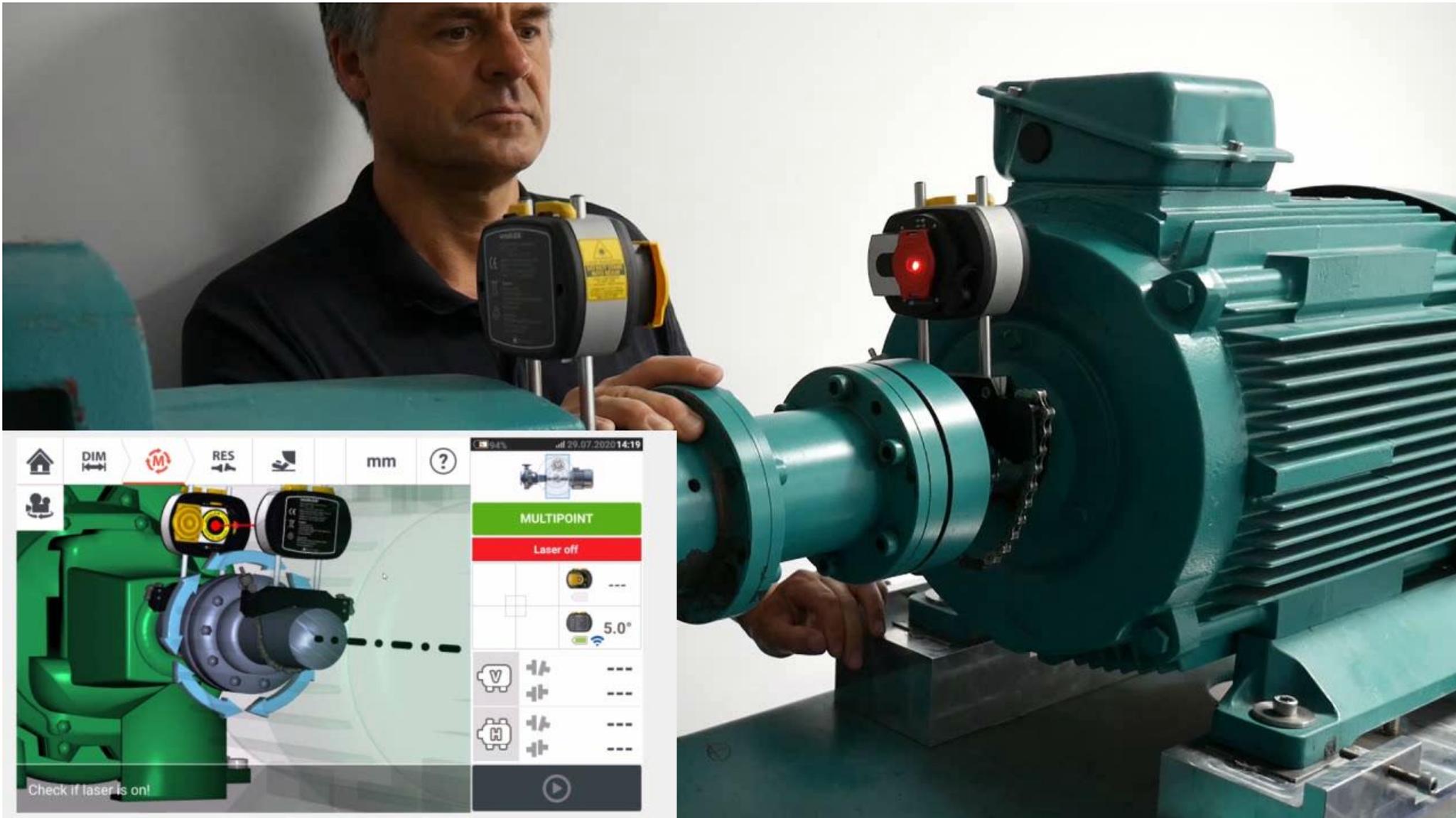
# Example 1B: INITIAL MISALIGNMENT – Freeze Frame: Advanced



## Example 2: COUPLING-PLAY / BACKLASH



# Example 2: COUPLING-PLAY / BACKLASH – Live Quality Enhancement

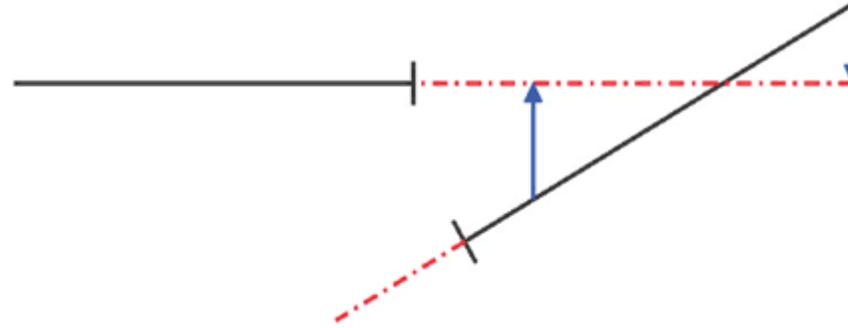


# Example 3: COUPLED Vs. UN-COUPLED SHAFT ALIGNMENT

## Coupling strain and shaft deflection

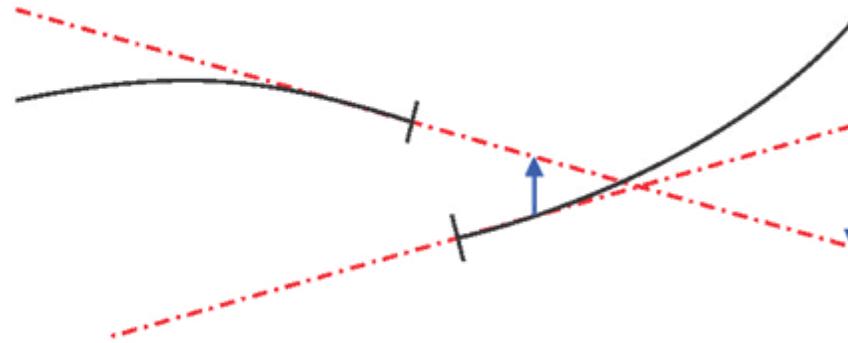
### Shaft uncoupled

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



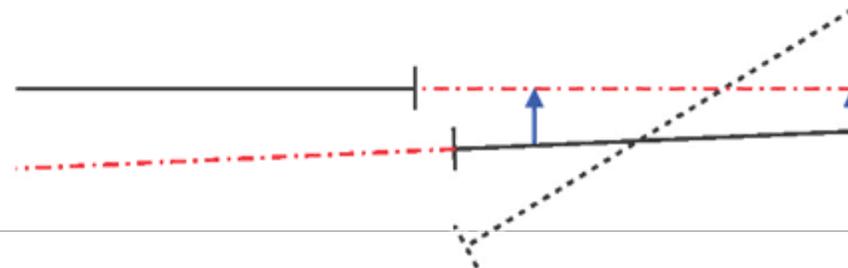
### Shaft coupled

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

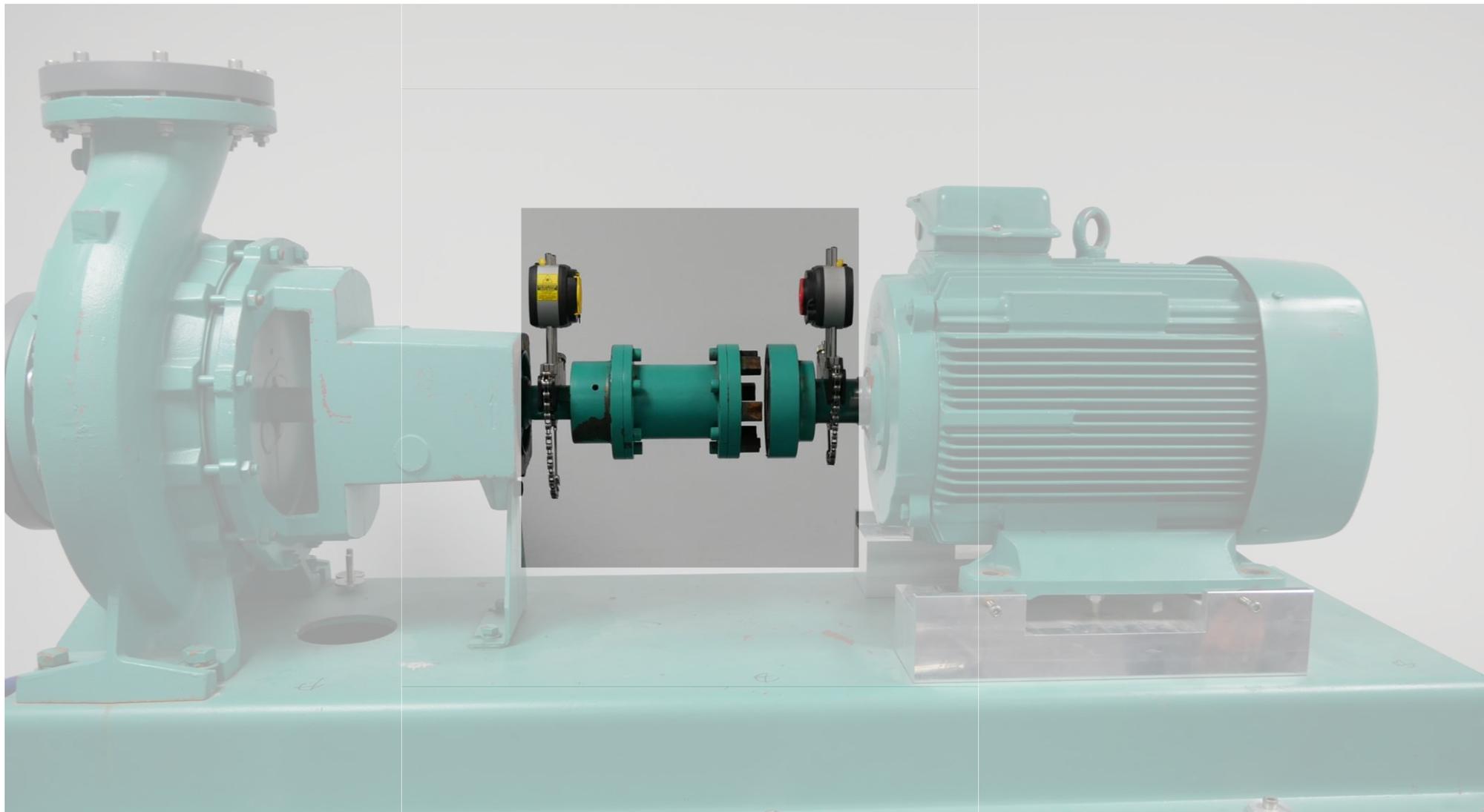


### Shaft after alignment

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



## Example 3: UNCOUPLED ALIGNMENT



## Example 3: UNCOUPLED ALIGNMENT – Uncoupled Shaft Awareness

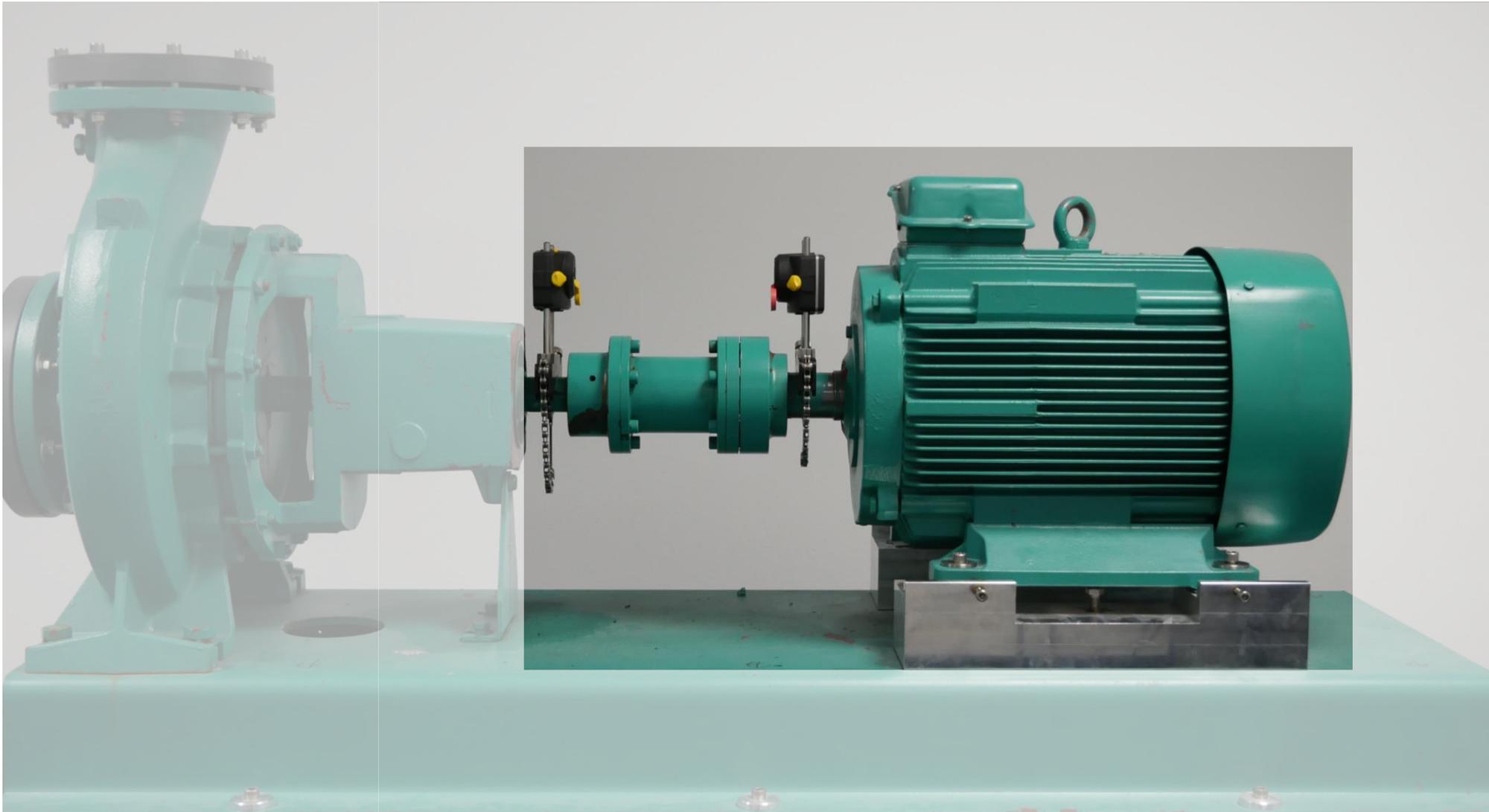


## Example 4: MOVEABLE MACHINE



<https://www.youtube.com/watch?v=Uou2vJTsgU4&feature=youtu.b>

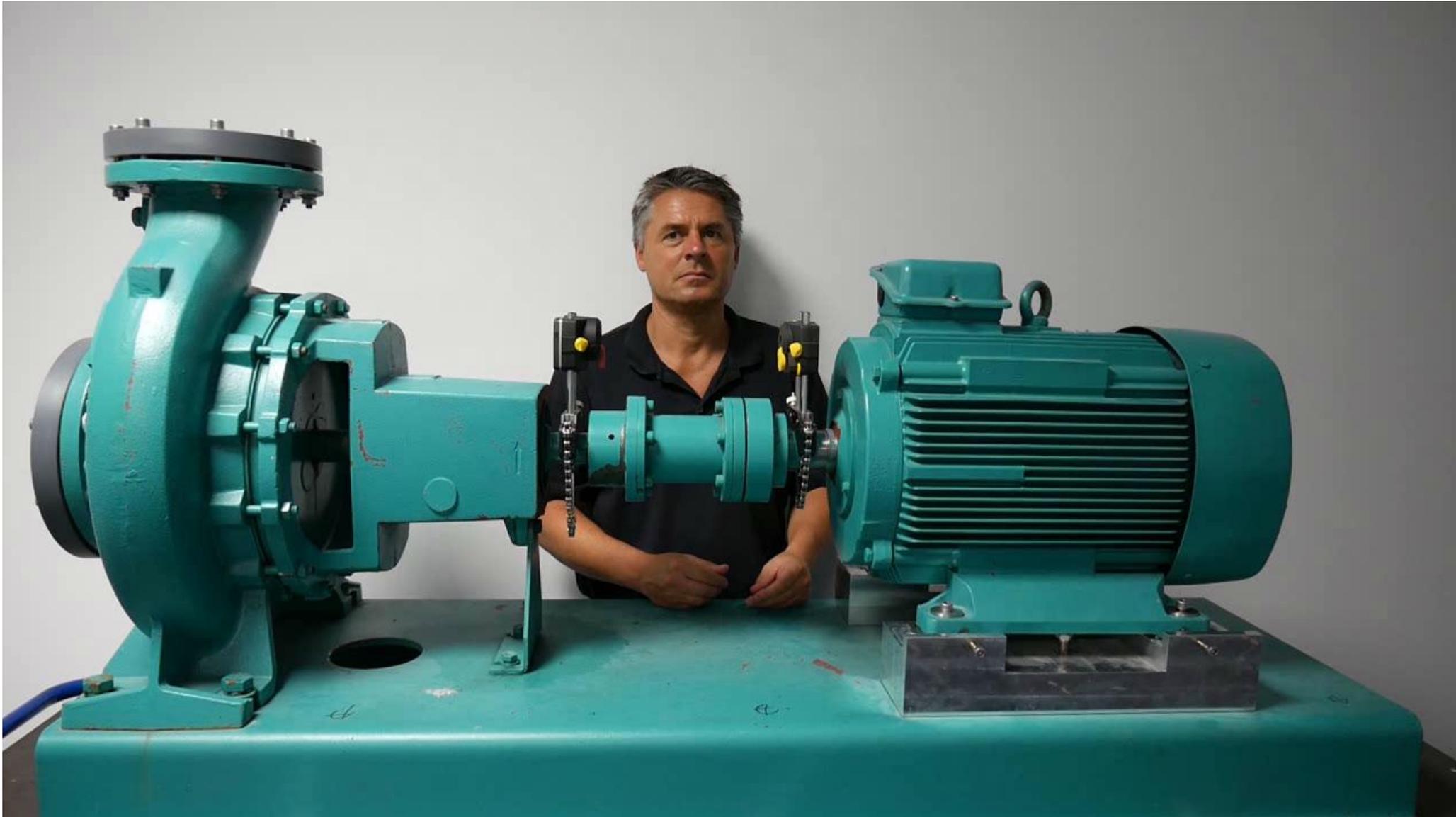
## Example 4: MOVEABLE MACHINE



## Example 4A: MOVEABLE MACHINE – Moveable Laser



## Example 4A→B: MOVEABLE MACHINE – Reposition Laser - Sensor



## Example 4B: MOVEABLE MACHINE – Moveable Sensor



# Asset Situation Examples Summary: Adaptive Alignment



Asset Situation Examples	INITIAL MISALIGNMENT	COUPLING-PLAY BACKLASH	UNCOUPLED ALIGNMENT	MOVEABLE MACHINE
Pitfall	Rough Pre-alignment Accuracy Time No initial protocol	Accuracy Repetitive Meas.-Move Time	Accuracy Repetitive Meas.-Move Time	Repetitive Move-Meas. Time
Active Situational Intelligence	Freeze Frame Measurement	Live Quality Enhancement	Uncoupled Shaft Awareness - Pass	Single laser/sensor Live monitor V & H
ASI Value	Single laser/sensor, Real-time automatic detection & elimination of erroneous data, High accuracy			
User Benefits	User guidance, Speed and consistent high precision results for all users			

## POLL QUESTION No. 2



How often have you experienced any of the 4 common alignment pitfalls?

(Click only one answer)

- Very often
- Somewhat frequently
- Occasionally
- Never

# 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.

# Adaptive Alignment – Web content and information

## Learn More

### Adaptive Alignment Whitepaper

Next-generation technology for solving every shaft alignment challenge

DOWNLOAD >



### Adaptive Alignment systems

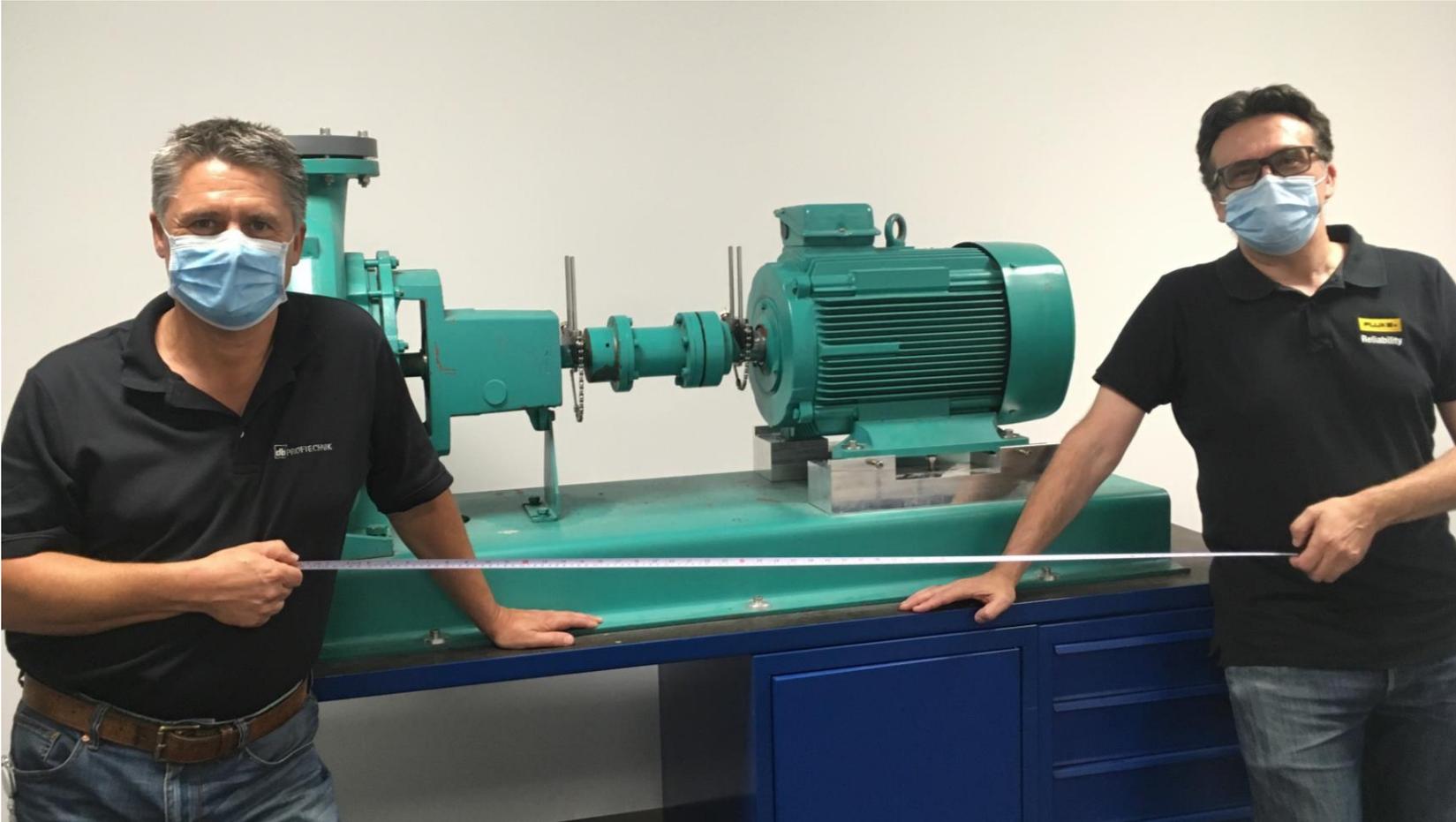
Frequently asked questions

DOWNLOAD >



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

## Best Practice webinar → Thanks



A big thank you to **Hans Lenz** from **PRUFTECHNIK Fluke Reliability** who greatly contributed in the creation of the Asset Situation videos

# QUESTIONS?



Thank you!

**Jonathan Gough**

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Product Manager, PRUFTECHNIK, Fluke Reliability

# Next webinar Aug. 19: Build a game plan to manage your assets

## BEST PRACTICE WEBINAR

Wednesday, Aug. 19, 11 a.m. ET

### How to build a game plan to proactively manage your assets

With COVID-19 causing uncertainty, many reliability and maintenance professionals are concerned about how to meet production goals. For football fans, there's also some anxiety—what's in store for America's favorite fall pastime? Maybe there's something we can learn from considering production and football goals at the same time.

In this webinar, Life Cycle Institute educator and Reliability Engineering expert **Mike Smith** shares how football and asset management are very similar, and how you can apply winning football tactics to your asset management strategies. He'll explain the role of the Reliability Engineer as the plant's attacking, ball-hawking defensive specialist, and how REs can best understand the risks and failure modes of their plant's assets.



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### **DEMO**

Visit [Accelix.com](https://www.accelix.com) for a free demo of our Connected Reliability Framework.



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