FLUKE® Reliability

What happens after the alignment?

Presented by:

Michael Ciocys
Chelsea Fiegel

September 15, 2021

Meet the Speakers

Mike Ciocys
Technical Service & Support Manager – Americas

- PRUFTECHNIK since 2009, Mechanical Engineer from Temple University.
- Currently lead the technical support team for the Americas from Philadelphia, PA
- Experience conducting complex alignments, troubleshooting machine conditions, and online condition monitoring
- CAT III certification for Vibration Analysis & Condition Monitoring

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Meet the Speakers

Chelsea Fiegel
Service sales team leader for North America

- PRUFTECHNIK since 2015, the sales and applications engineer holds an environmental engineering degree from Penn State.
- Broad base of expertise in providing reliability solutions for industries ranging from paper and corrugated to steel and film.
- She will soon be based in Chicago.

POLL QUESTION No. 1

After aligning new equipment before start-up, have plans been made to monitor the asset?

- Yes, asset will now be collected on our vibration routes
- Adding wireless vibration sensors to the asset right now
- Machine is super critical, it is directly wired into the PLC
- None of the above options, I use something different
- I don't understand the question?

Our goal (Agenda)

- **Service Element and Alignment as a Baseline Tool**
- **Plan to Monitor Asset Condition and Trend Parameters**
- **Interpret Data for Asset Health**
- **Reoccurring Service Element, Maintain and Sustain Asset Condition**

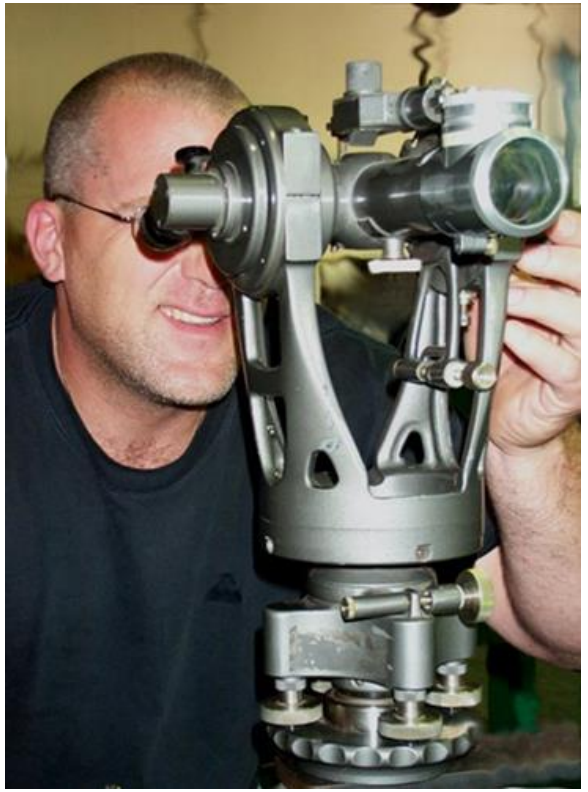
What is alignment?

- Alignment is the orientation and positioning of equipment relative to other equipment
- Different types of equipment require different alignments:
  - Shafts – Collinearity
  - Cylinders – Parallelism
  - Plates – Coplanarity
- Both absolute and relative alignments can be needed
  - Absolute: Equipment must be placed in exact position
  - Relative: Equipment must be placed in exact orientation

Traditional Alignment Techniques

- Tape Measure
- Plumb Bob
- Precision Level
- Dial Indicator
- Optics (Theodolite/Transit/etc.)

- Considerations:
  - Basic measurement tools (tape measure, plumb bob) have low precision
  - Optics require line of sight
  - Dial indicators are only as good as measurements provided



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Laser Tracker

- Involves very accurately obtaining an object's geometrical data in 3 dimensions (X, Y, Z)
- Optical Target = Spherically Mounted Retroreflector (SMR)
- SMR is placed against surface of object to be measured
- Data points are collected, and ideal geometry is best fit to these points
- Measured geometries are displayed in computer-aided measurement software (FARO CAM2)
- Coordinate systems are established, and then valuable measurement results can be determined

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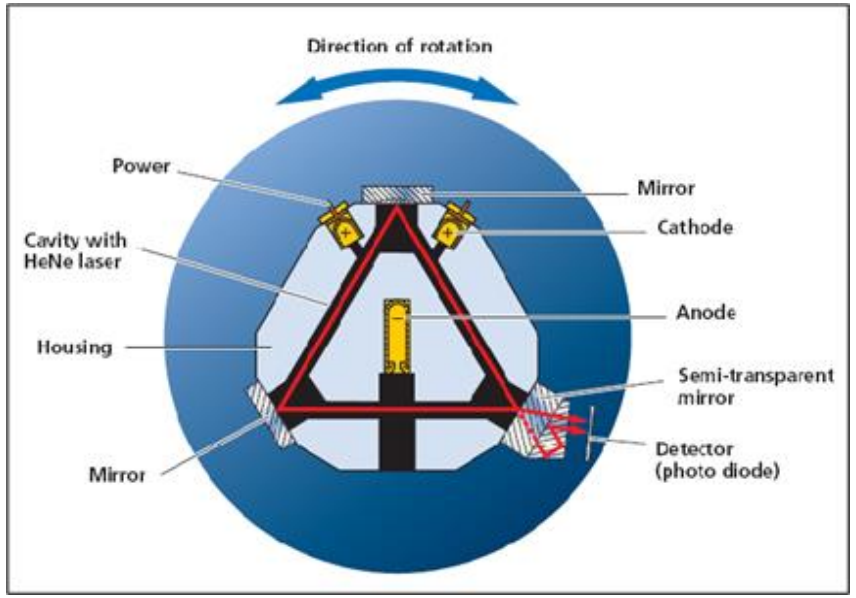
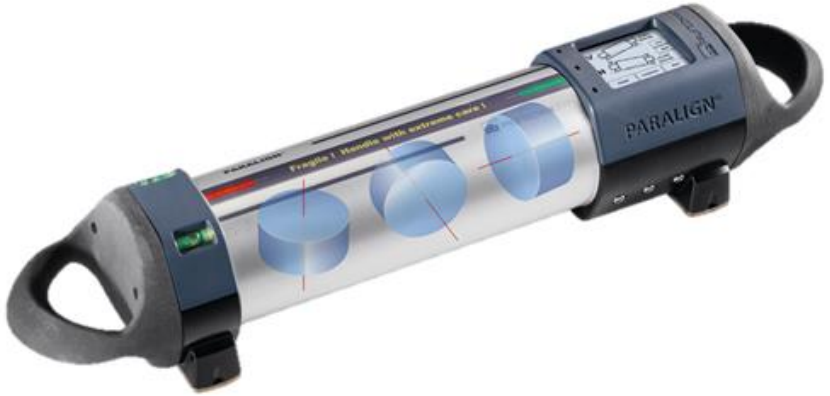
PARALIGN

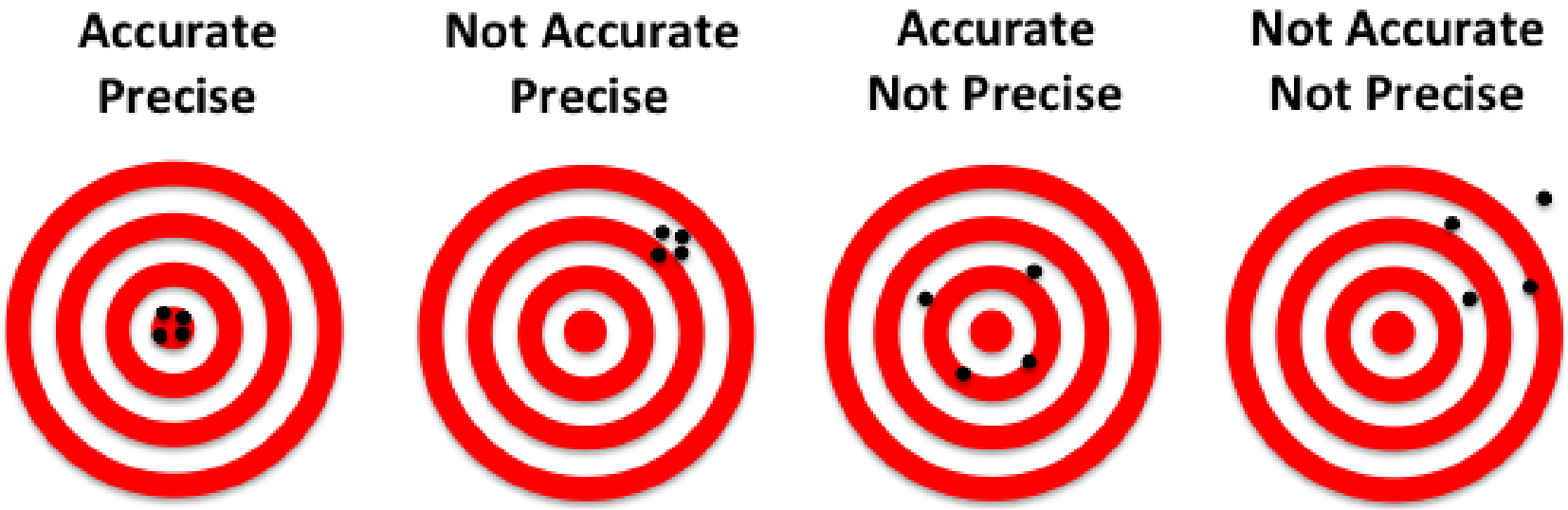
- **Inertial** - in which bodies continue at rest or in uniform straight motion unless acted on by a force



  - 3 Ring Laser Gyroscopes: Roll, Pitch, Yaw or X, Y, Z
  - Same gyroscopes used in aerospace, aircraft, etc.
  - Does not require a line of sight



Precision vs Accuracy



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Alignment fails

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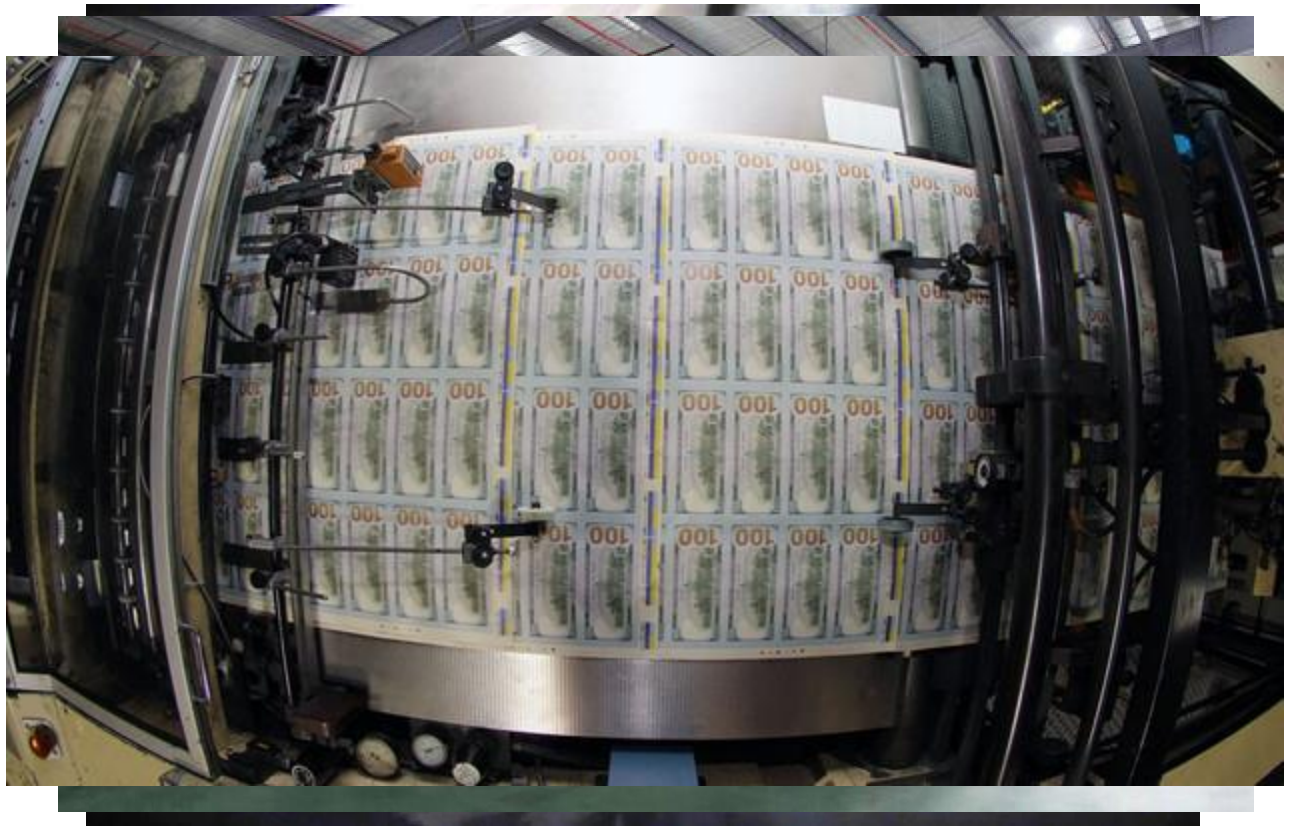
“Industry worldwide is losing billions of dollars a year due to misalignment of machinery”

Shaft Alignment Handbook
John Piotrowski

Alignment should be step 1. Why?

- Proper machine alignment can:
  - Increase reliability of assets by decreasing wear and damage
  - Increase product quality by reducing defects
  - Increase machine running speeds
  - Decrease power consumption
- Proper alignment minimizes waste, decreases downtime, and reduces maintenance costs



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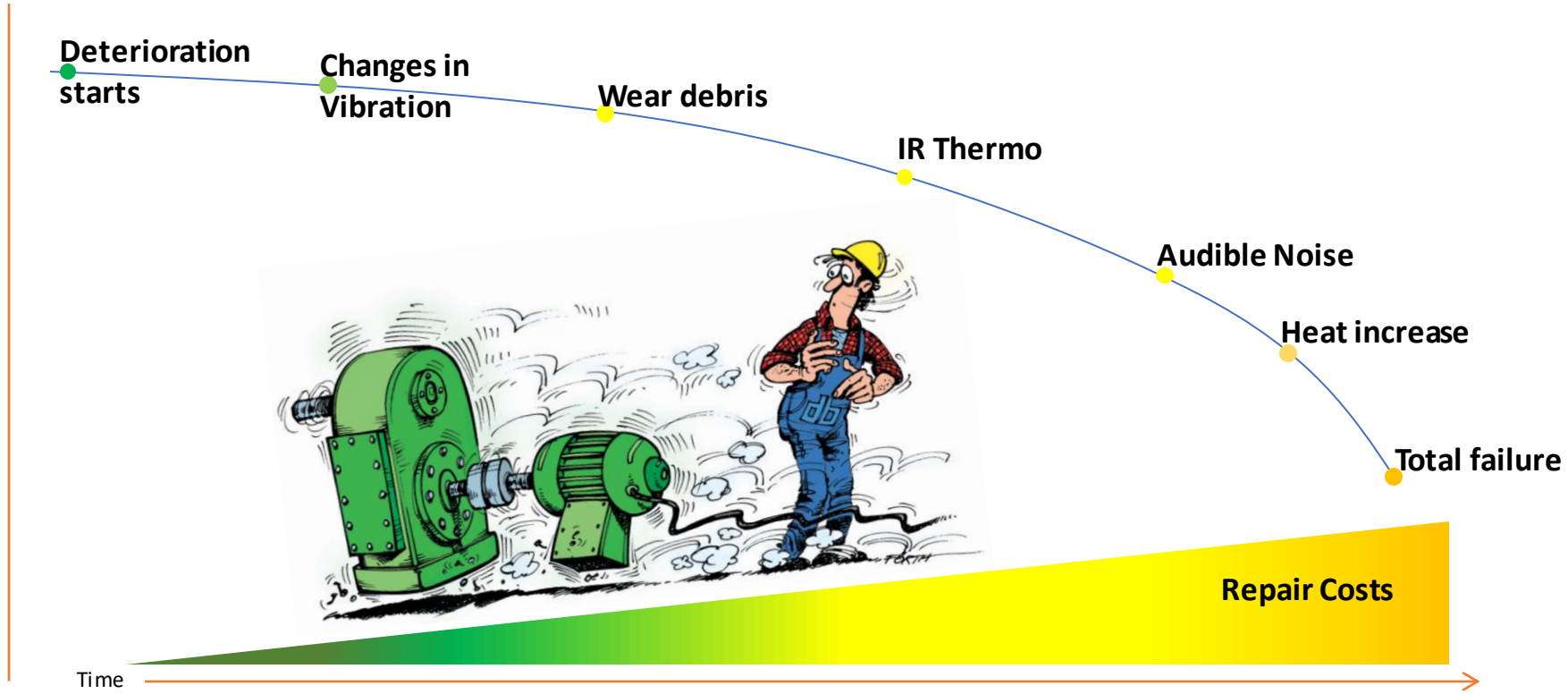
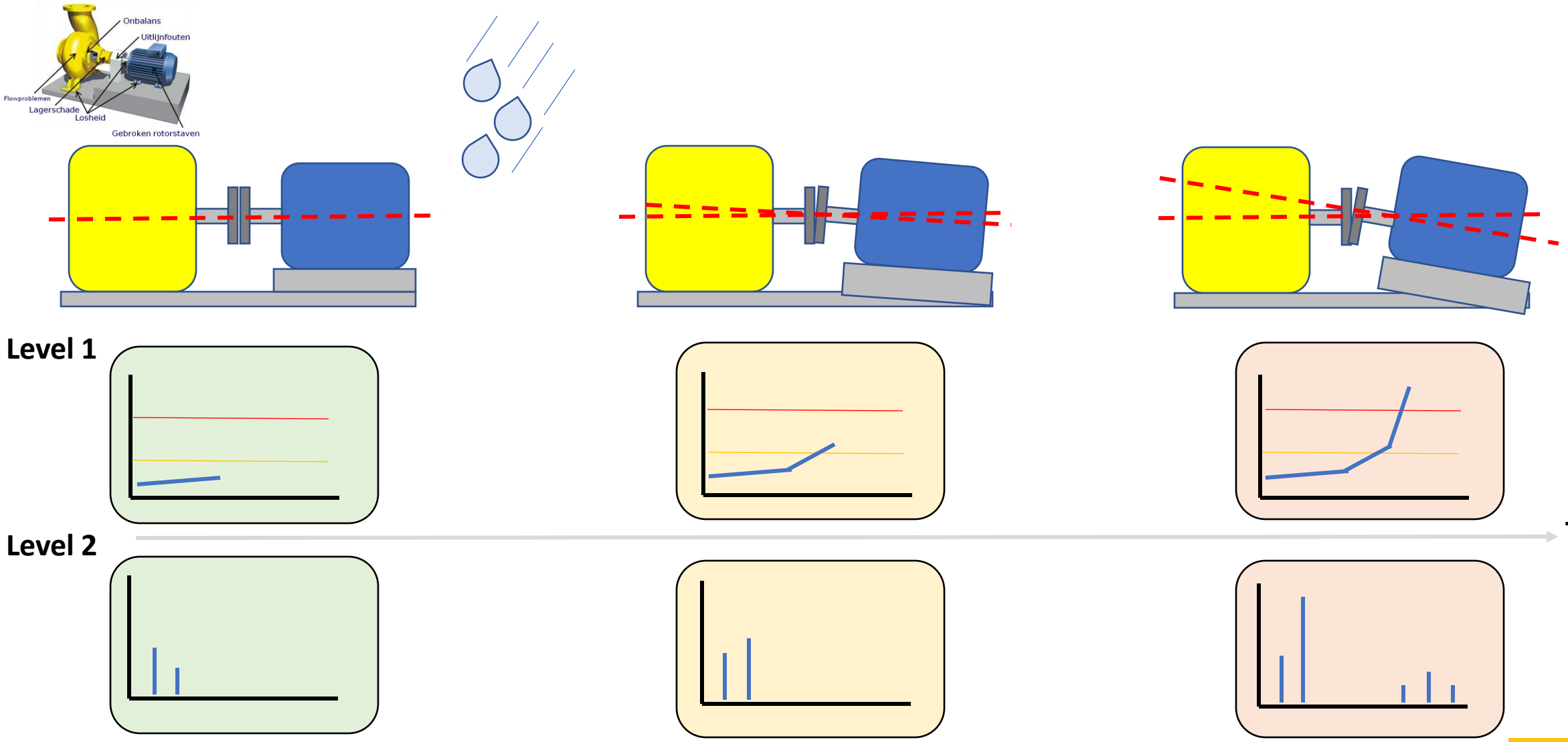
Condition Monitoring Decreases Long Term Costs



Pro-active Maintenance

- Most damage to rotating machinery is detectable by Condition Monitoring
- Catch issues sooner than other techniques of maintenance prevention
- Plan shutdowns only when necessary and with fewer extra spare parts

Condition Monitoring Example



Route Data Collection

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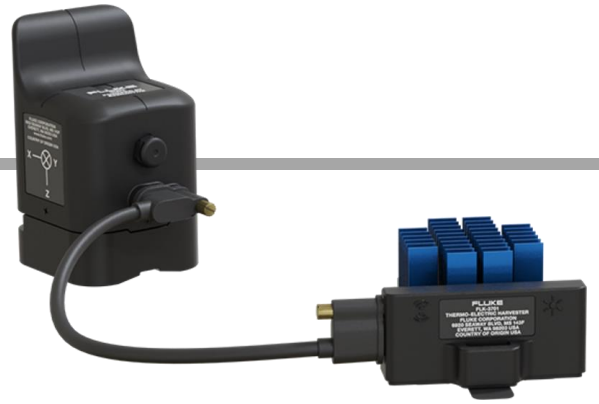
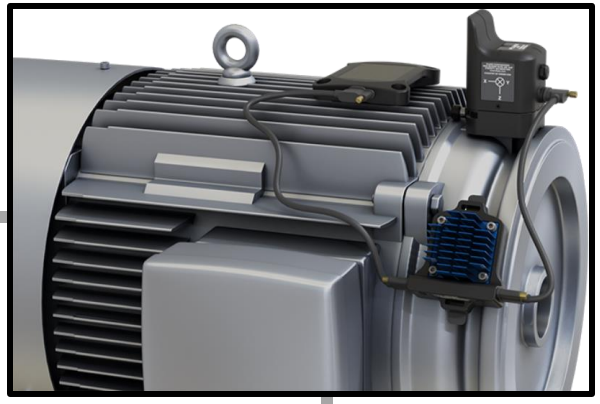
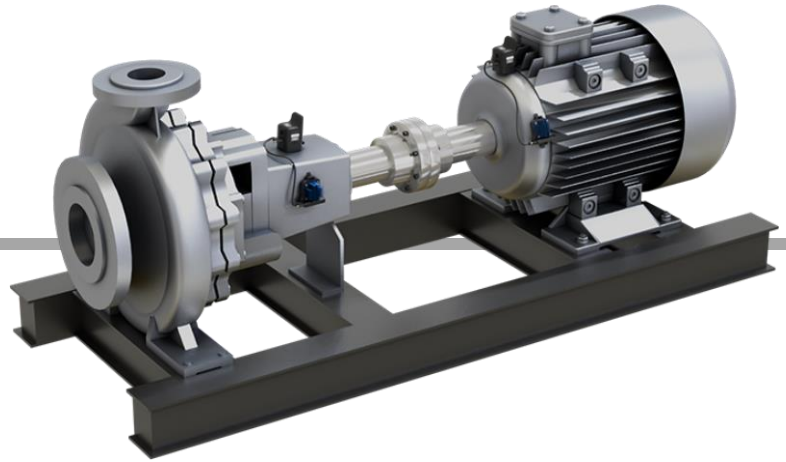
Wireless Condition Monitoring







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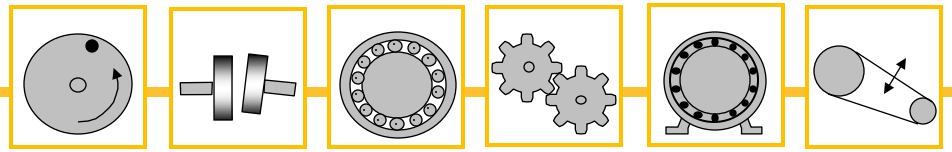
Online Condition Monitoring

Online Condition Monitoring is crucial for:

- High-value
- Non-redundant
- Complex
- Mission-critical assets



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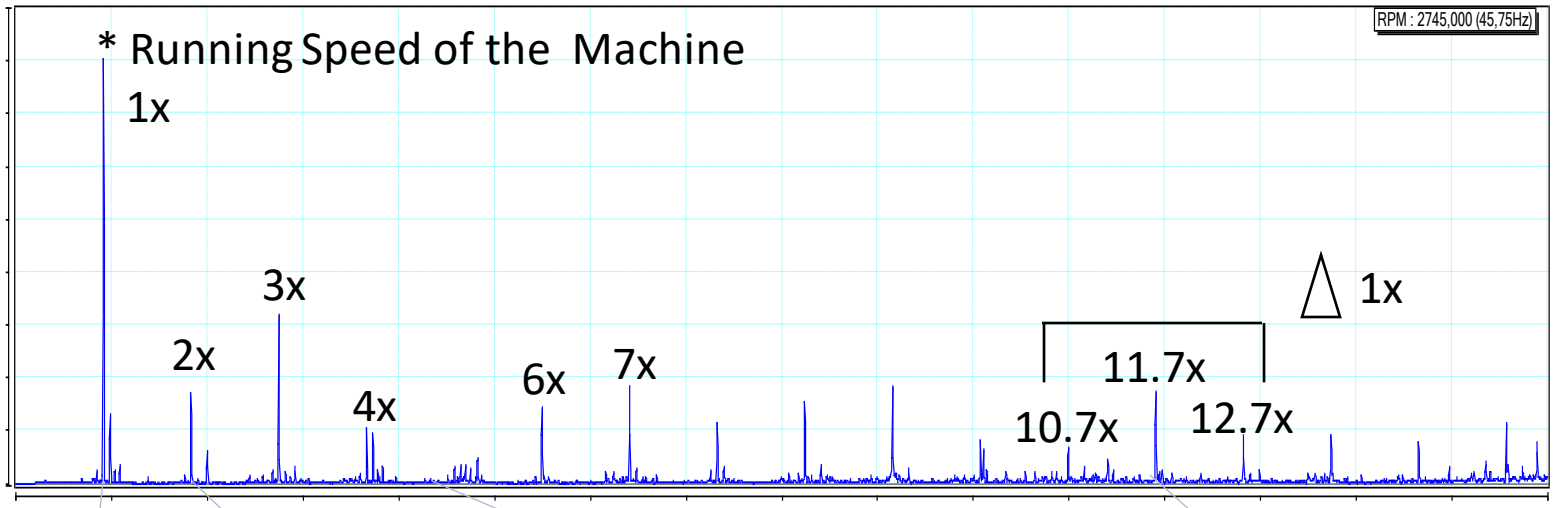
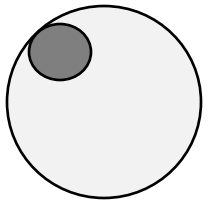
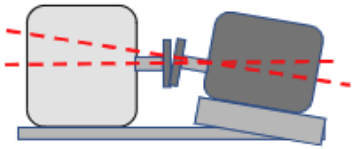
Interpreting the Data



Imbalance



Mis-Alignment



Looseness

Bearing Fault

Spectrum Analysis is an exercise in pattern recognition.

The Peaks in the spectrum are created by components in the machine moving repetitively
- ex. turning, pressing, pumping, etc.

The speed / frequency of the machine movement puts a peak in the spectrum.

POLL QUESTION No. 2

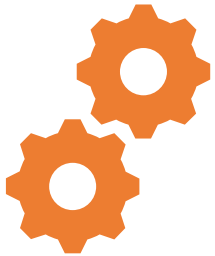
When a fault is found and work needs to be done...

(Click as many as apply)

- Handled fully in-house by our reliability and maintenance teams
- We pull in outside contractors for most work
- Mix of in-house and contractors
- It's complicated...case by case basis

In- House or Outsource?

Condition Monitoring Services



Vibration

Oil Analysis

Ultrasound

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User Options & Training

- Flexible & customizable options to do the following with condition monitoring products/services:
  - Rent/ Buy
  - Collect data in-house/ source certified Fluke Reliability team members for data collection
  - Analyze data in-house/ source certified Fluke Reliability team members for analyzing data
  - Lease/subscription model – combination of hardware, software, & service
- ISO CAT Certified Vibration Training available
- Onsite/offsite training on product use, data collection, and vibration analysis
- Adaptable support as per plant needs

Alternative Service Offerings

Roll Alignment with PARALIGN

Suitable for measuring roll misalignment that can cause inefficiency and quality issues

Geometrical Measurement

Suitable for complex industrial geometric alignment of various machine elements

Shaft Alignment

Suitable for measuring rotating axes of coupled shafts in various sizes and length

The Fluke Reliability Portfolio

FLUKE Reliability

FLUKE CONNECT

Condition-based Maintenance

Products
FC Vibration Sensors
FC Electrical Monitoring
FC Connected Tools

Software
Connect2Assets
Connected Reliability Suite for Maximo
- Fluke Mobile
- Connect2Assets
- Fluke Connect Adapter
- Integrated Condition Monitoring

Services
Connected Reliability Assessment

PRÜFTECHNIK

Production Reliability & Non-Destructive Testing Solutions

Products
ROTALIGN, OPTALIGN
SHAFTALIGN, PULLALIGN
VIBGUARD
VIBEXPERT
VIBSCANNER
SONOCHEK
OMNITREND Center
EDDYCHEK
NOVAFLUX

Services
PARALIGN
TELEDIAGNOSIS
Alignment, Calibration

eMaint

Asset Management Solutions

Software
CMMS Software
- Teams
- Professional
- Enterprise

Connected Reliability Suite for eMaint
- Fluke Mobile
- Connect2Assets
- Integrated Condition Monitoring

Enhanced Workflows

Services
Consulting
eMaint University
Experience Center

Accelix™

IIoT software platform supporting a suite of apps

Data Aggregation
Analytics
System Integration
Predictive
Machine Learning

Questions

QUESTIONS?

Thank you!

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Next webinar October 6, 2021

BEST PRACTICE WEBINAR

Wednesday, October 6, 11 a.m. ET

Why We Can't Proceduralize Everything

Presented by: Dr. Jake Mazulewicz, Founder and Owner, JMA Human Reliability Strategies

Unwanted errors & surprises are serious threats to reliability in any high-hazard industry. To address them, many leaders apply a mechanistic approach. They install controls, write procedures, and enforce compliance. But these mechanistic strategies often backfire in adaptive, human-based systems. Join us in this presentation to:

- Learn the difference between Mechanistic and Adaptive Systems
- See why we can't "Proceduralize Everything" in Adaptive Systems
- Get three practical, real-world strategies for increasing reliability and safety in adaptive, human-based systems

To learn more about Fluke Reliability and our Webinar Series

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DEMO

Visit Accelix.com for a free demo of our Connected Reliability Framework.

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THANK YOU!