EQUINOX POWER SOLUTIONS
Redefining Assets Reliability

Maximizing OEE & Asset Lifespan Through Adaptive Alignment

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FLUKE Reliability

Meet the Speakers

EQUINOX POWER SOLUTIONS
Redefining Assets Reliability

Paul Talla

Senior Reliability Expert at Equinox Power Solutions

- Reliability Expert: 15+ years in precision alignment, vibration analysis, and AI-driven monitoring.
- Strategic Fluke Partner: Implements cutting-edge diagnostic solutions to drastically reduce client downtime.
- Sector Specialist: Delivers proven results across Africa's energy, mining, and manufacturing industries.

Agenda

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The Evolution of Alignment Technology

Cost Implications of Misalignment

The Effect on OEE and Asset Lifespan

Documenting Adaptive Alignment

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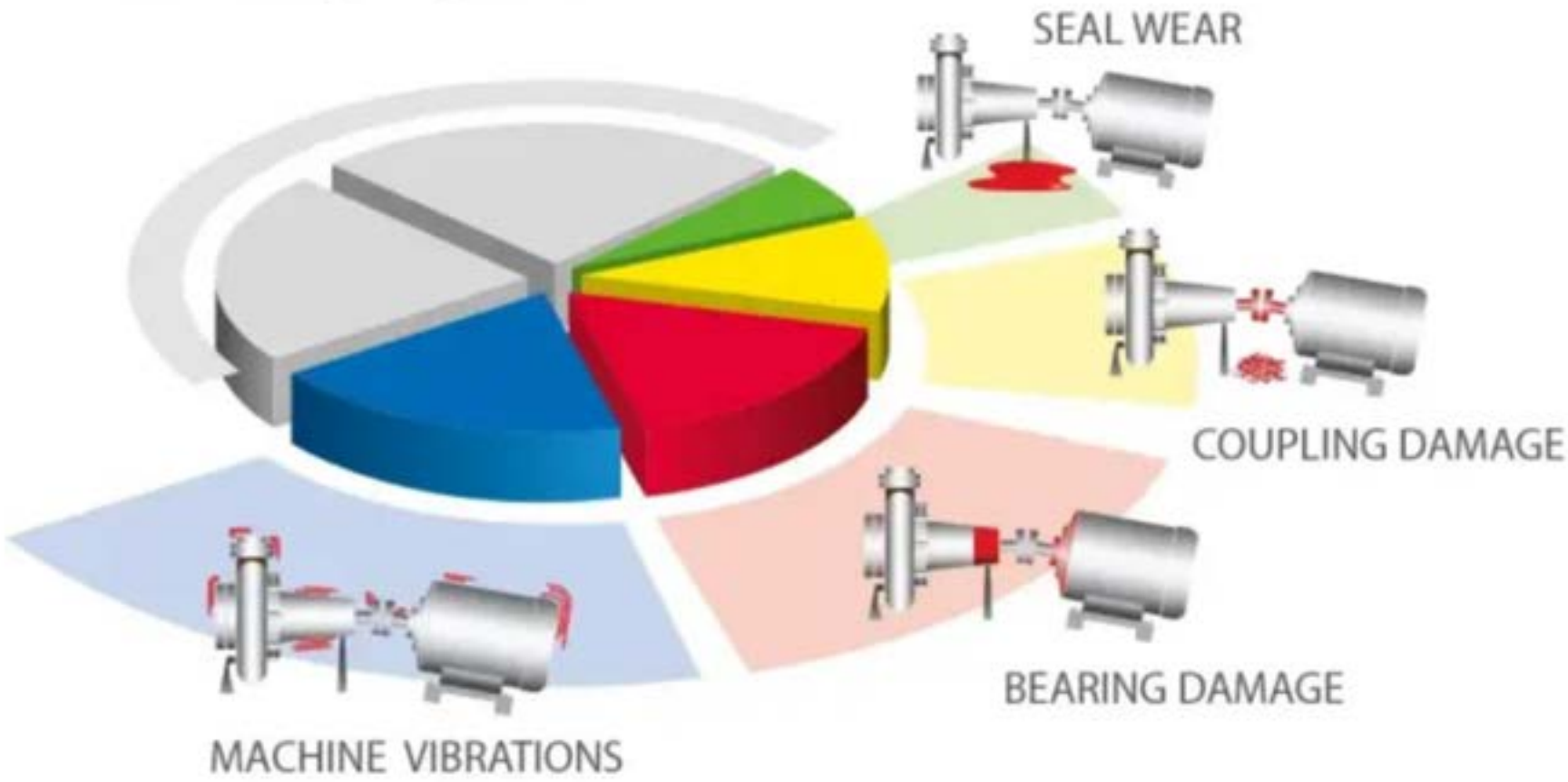
Evolution of Alignment Technology

- Consequence of Misalignment
- Common Failure Modes
- Evolving Technology

The major consequences of misalignment on the condition of the machine

Over 50% of machine failures are caused by misalignment



How to recognise the symptoms of misalignment?

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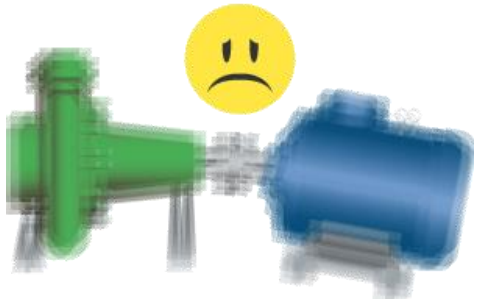
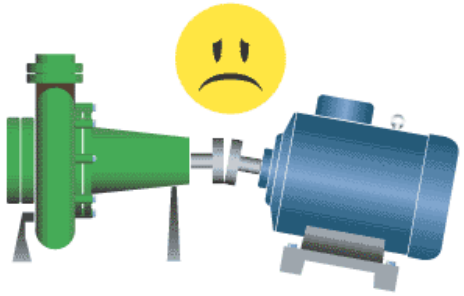
Excessive vibration

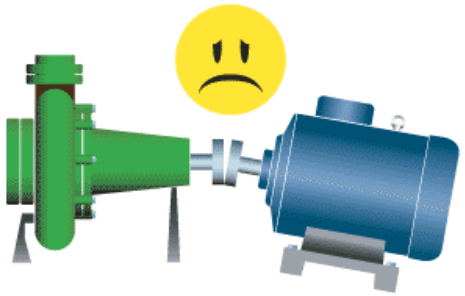


Reduced bearing life

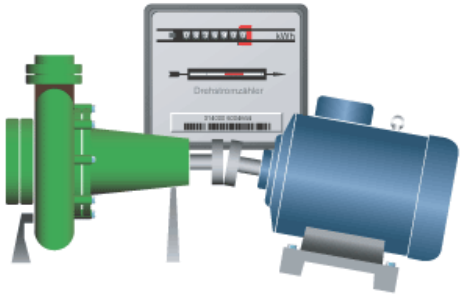
Increased seal wear from shaft bending



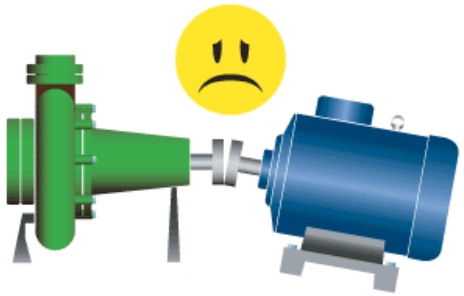
Increased temperature



Higher Energy consumption



Coupling wear



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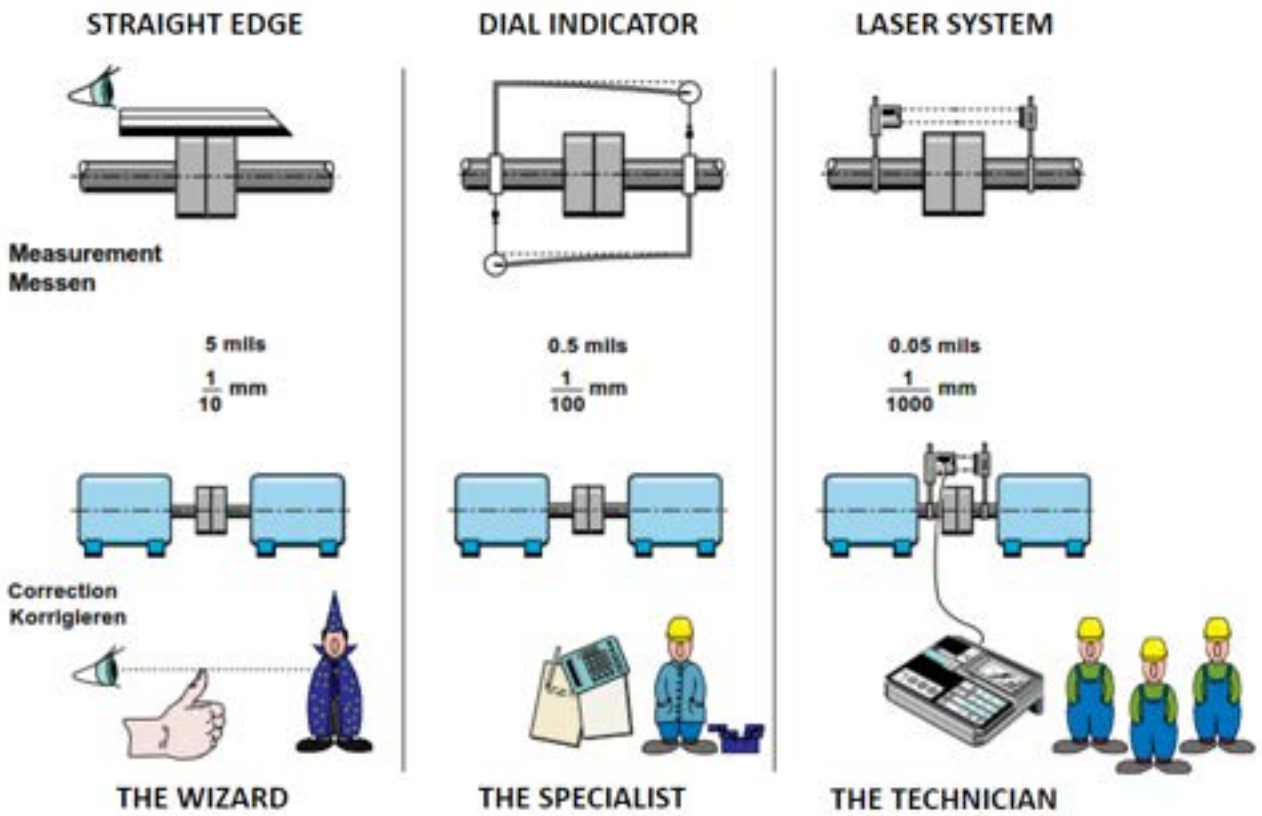
Alignment Evolution

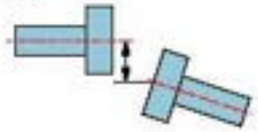
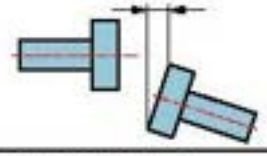
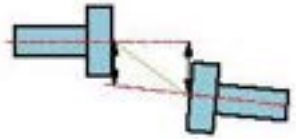
The accuracy of alignment using laser technology has increased accuracy by a factor of 100.

The speed of alignment has increased hence reducing tool-time significantly

Repeatability of measurements and ability to record and store alignment reports digitally provides historic data which can be pulled into CMMS software

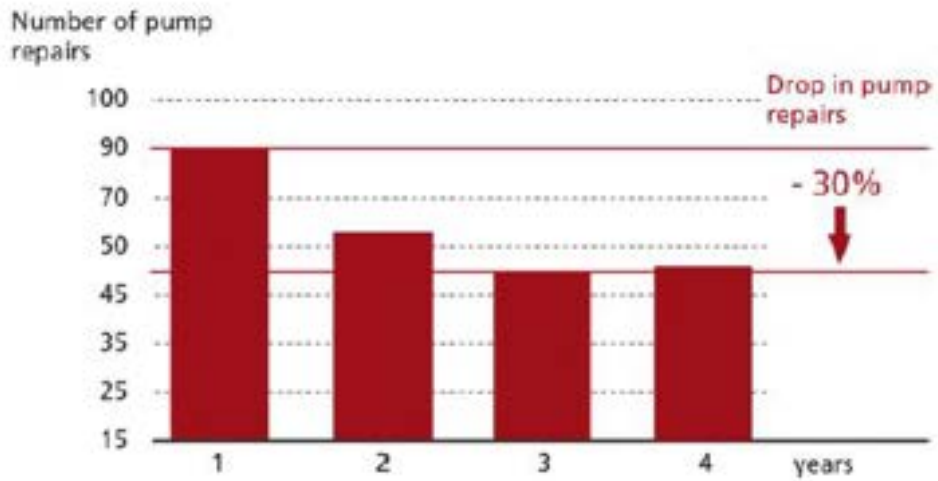


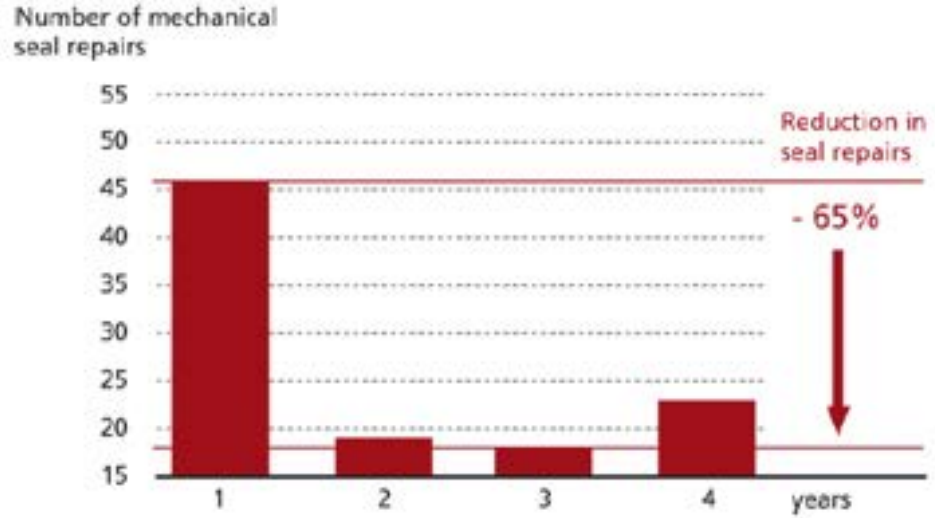
Tolerances information

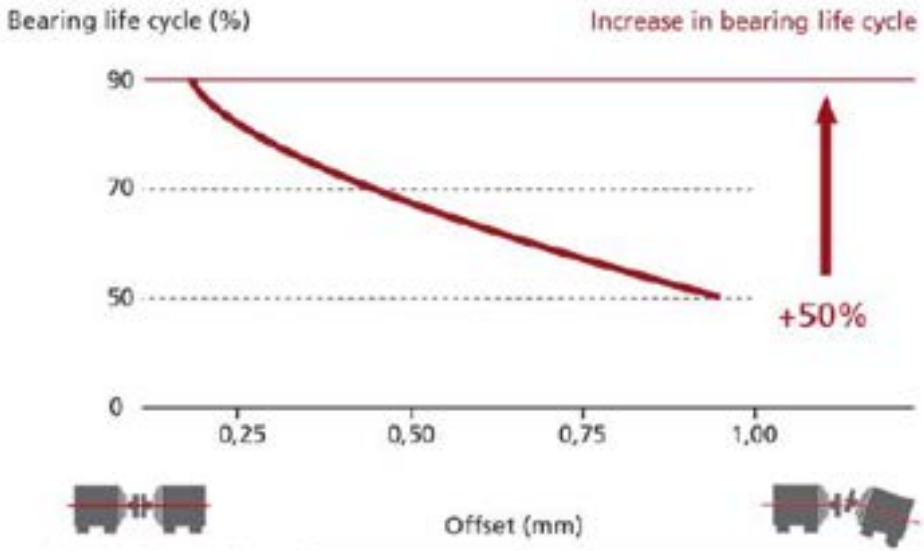
	[RPM]	metric [mm]		inch [mils]	
Soft foot	any	0.06 mm		2.0 mils	
Short "flexible" couplings		Acceptable	Excellent	Acceptable	Excellent
		OK	☺	OK	☺
Offset 	600			9.0	5.0
	750	0.19	0.09		
	1500	0.09	0.06		
	1800			3.0	2.0
	3000	0.06	0.03		
	3600			1.5	1.0
	6000	0.03	0.02		
	7200			1.0	0.5
Angularity (gap difference at coupling edge per 100 millimeters diameter 	600			15.0	10.0
	750	0.13	0.09		
	1500	0.07	0.05		
	1800			5.0	3.0
	3000	0.04	0.03		
	3600			3.0	2.0
	6000	0.03	0.02		
	7200			2.0	1.0
Spacer shafts and membrane (disk) couplings Offset (per 100 millimeters spacer length or per inch of spacer length) 	600			3.0	1.8
	750	0.25	0.15		
	1500	0.12	0.07		
	1800			1.0	0.6
	3000	0.07	0.04		
	3600			0.5	0.3
	6000	0.03	0.02		
	7200			0.3	0.2

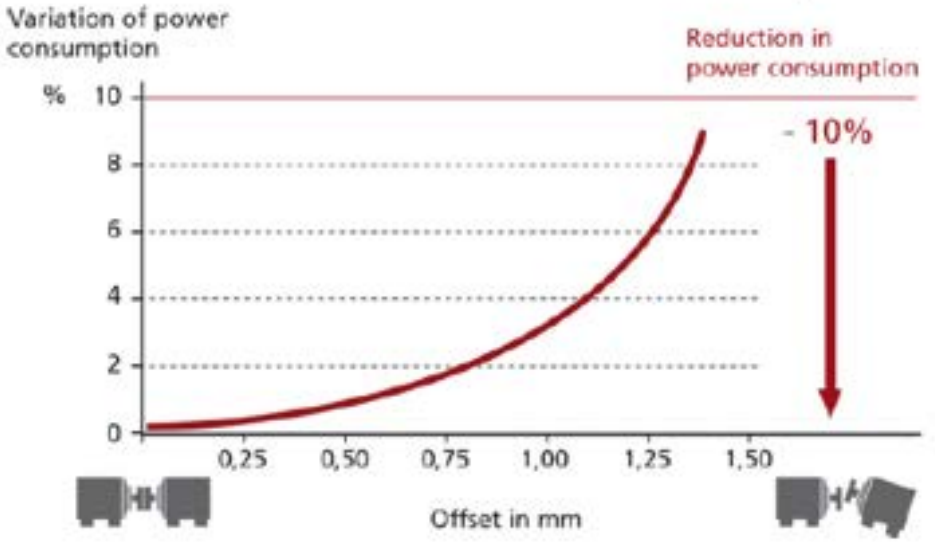
Cost Implications of Misalignment

- Impact on maintenance
- Power consumption
- Pump Set Cost Calculation
- Other cost affected by Alignment





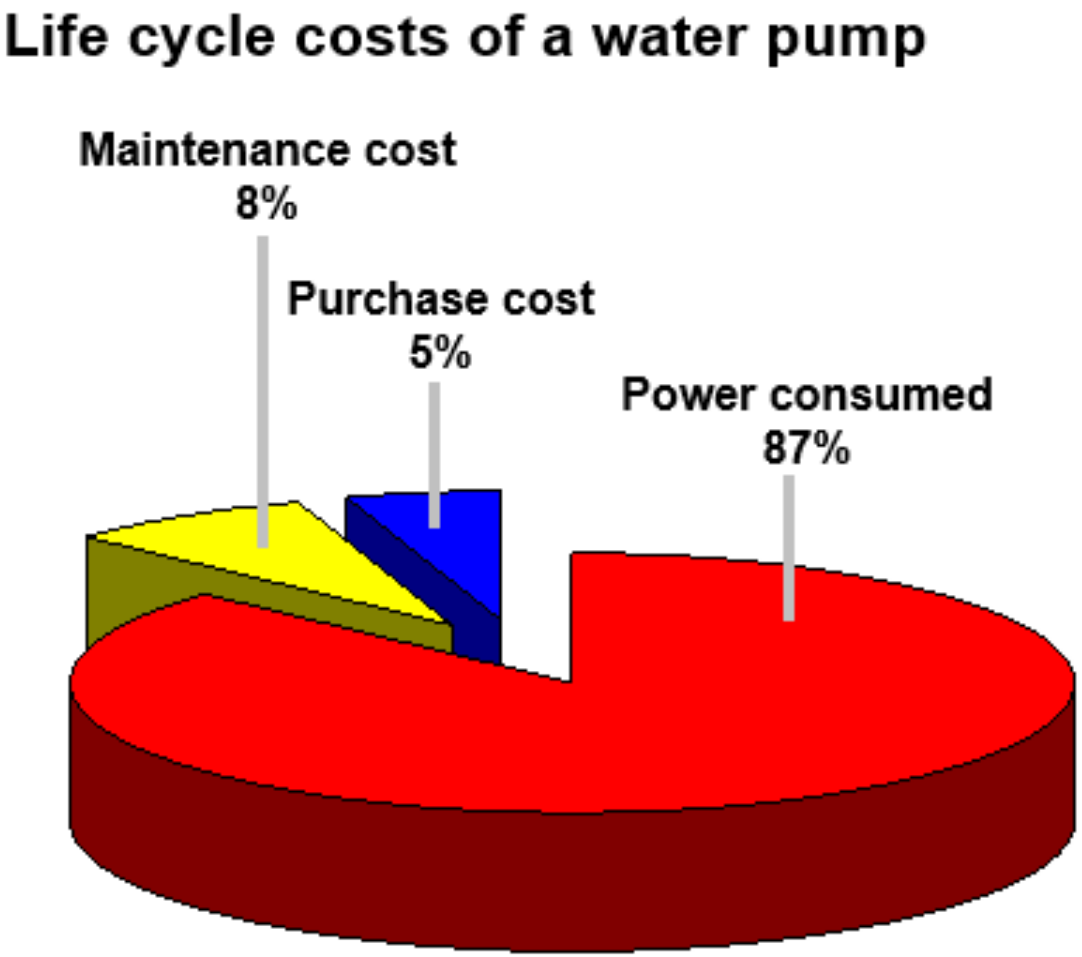




Power Consumption

The power consumption can reach 90% of total life cycle cost of operating in general

Misalignment can increase power consumption by up to 10%



75kW Pump Set Misalignment Cost Evaluation

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Data in yellow boxes can be modified to suit plant details and costs

	Alignment Data	KW Rating	Number of Units
Measured misalignment	0.75 mm	15 KW	0
Power loss	1.68%	35 KW	0
Cost of power per KWh	1.61	75 KW	1
Operating hours per day	24	125 KW	0
Operating days per year	320	300 KW	0

Total additional cost of power consumed across plant **14786.06**

R14 786.06

Data in yellow boxes can be modified to suit plant details and costs

	Alignment Data	KW Rating	Number of Units
Measured misalignment	0.10 mm	15 KW	0
Power loss	0.15%	35 KW	0
Cost of power per KWh	1.61	75 KW	1
Operating hours per day	24	125 KW	0
Operating days per year	320	300 KW	0

Total additional cost of power consumed across plant **601.05**

R601.06

Cost of power consumption on a poorly aligned 75kW pump set versus a well aligned pump is 23.5x higher

Other costs affected by Alignment Results

- Bearing replacement
- Seal replacement
- Pump repair
- Down time
- Maintenance labour

- Equipment availability
- Reliability
- Operating life cycle
- Plant safety

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Effects on OEE and Asset Lifespan

- Operational Efficiency
- Benefits of Alignment

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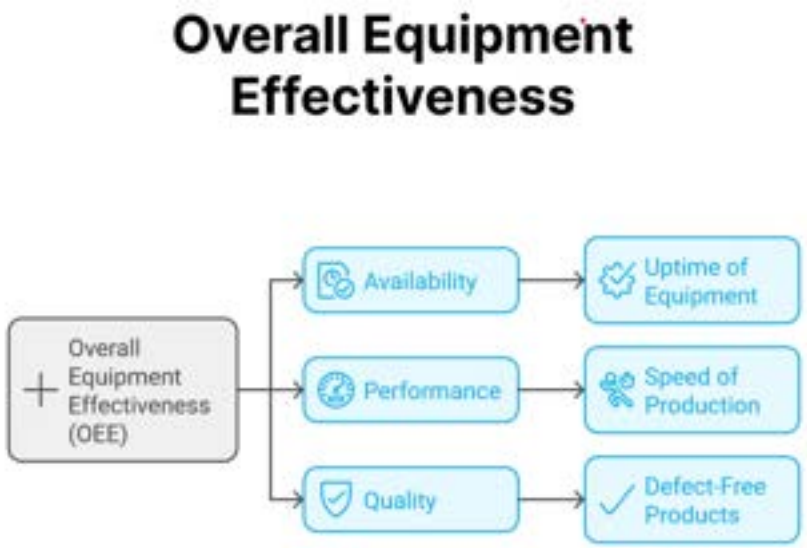
Operational Efficiency



Here is an example to illustrate how to calculate OEE with misalignment-related losses.
Scenario: An 8-hour shift (480 minutes) with a 30-minute planned break.

- Shift length: 480 minutes
- Planned break: 30 minutes
- Ideal cycle time: 60 parts per minute (1 second per part)

Availability calculation

Planned production time: 480−30=450 minutes
Downtime due to misalignment-induced bearing failure: 45 minutes
Run time: 450−45=405 minutes
Availability: $\frac{405}{450}$=0.90 or 90%

Performance calculation

Small stops and speed reductions caused by misalignment: Over the course of the shift, these issues result in a reduced overall output.
Total parts produced: 21,000 parts (including defects)
Performance: $\frac{(1\ \text{second}\times 21{,}000\ \text{parts})}{(405\ \text{minutes}\times 60\ \text{seconds})} = \frac{21000}{24300}$ =0.864 or 86.4%

Quality calculation

Total parts produced: 21,000 parts
Defective parts due to misalignment: 630 parts (3% of total parts)
Good parts: 21,000−630 = 20,370 parts
Quality: $\frac{20370}{21000}$ = 0.97 or 97%

OEE calculation

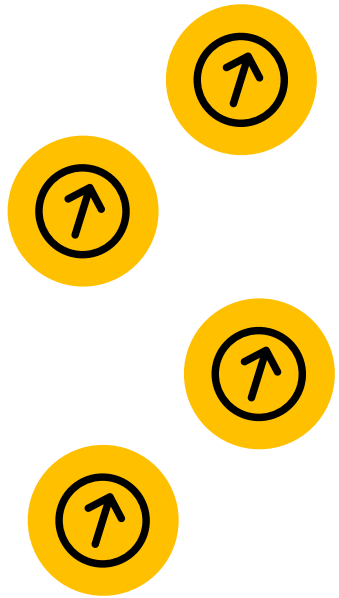
OEE: $Availability \times Performance \times Quality$
OEE: 0.90×0.864×0.97=0.755 or 75.5%

Operational Efficiency – Alignment Benefits

For this scenario, alignment is a key enabler to reclaim OEE percentages loss. This translates directly into:

- **Increased Availability:** Fewer breakdowns and longer Mean Time Between Failures (MTBF).
- **Improved Performance:** Smoother operation, allowing the pump to run at its intended capacity.
- **Enhanced Quality:** Reduced vibration minimizes the risk of seal failure and product defects or contamination.

This improvement boosts throughput, slashes maintenance costs, and maximizes the return on your asset.



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Documenting Adaptive Alignment

- Adaptive Alignment
- Software Reporting
- Historic Trends & Insights

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Adaptive Alignment

- Adaptive Alignment is a phrase used to encapsulate the ethos at Fluke Reliability and Pruftechnic. It is the next step in the evolution of alignment technology . Fluke Reliability understands that although laser alignment is beneficial in delivering higher accuracy alignment in faster time, it is still very dependent on external factors.
- Experience and technical skill for instance plays an important part in performing tasks such as alignment. Advancement in operating software called “Active Situational Intelligence” and optimizing the use of Single Laser Technology, Fluke Reliability has been able to address many on site issues and to adapt to the environment ensuring the alignment is carried out accurately, smoothly and with out delays.

Fluke Reliability Laser shaft alignment: Complete Portfolio

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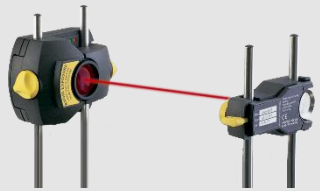
SHAFTALIGN® *touch*

Android open or kiosked tablet with external housing

FRS Alignment App



sensALIGN 3 sensor

OPTALIGN® *touch*

Android open or kiosked tablet with external housing

FRS Alignment App

sensALIGN 5 sensor/laser

ROTALIGN® *touch*

Android open or kiosked tablet with external housing

FRS Alignment App

sensALIGN 7 sensor/laser

ROTALIGN® *touch* EX

Android kiosked tablet with external housing

ATEX

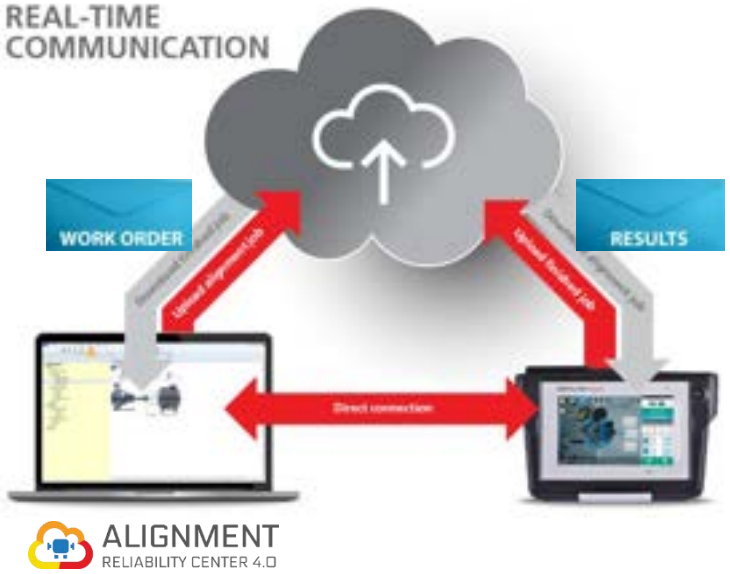
sensALIGN 5 EX sensor/laser

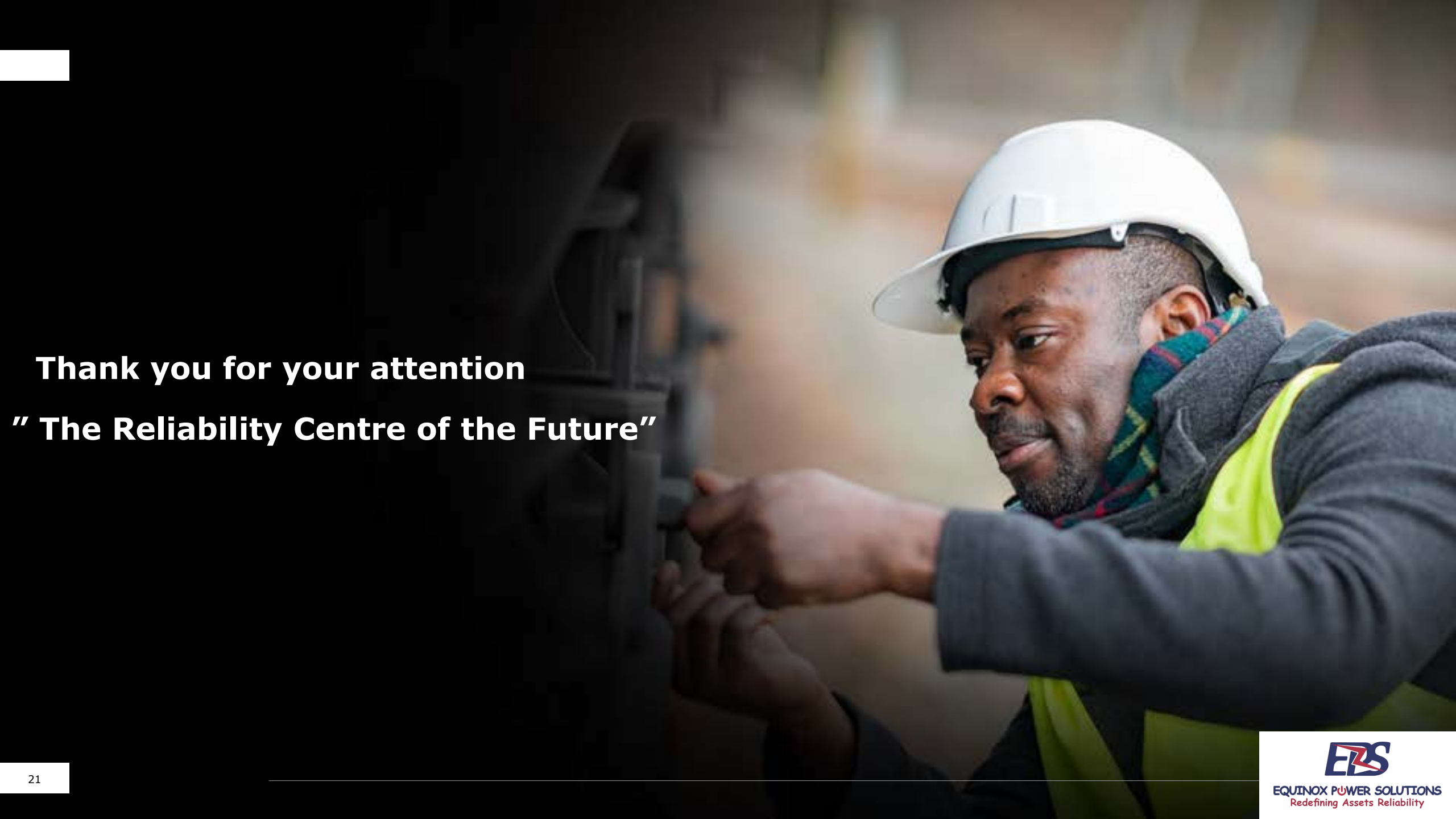
Cloud enabled Alignment Software

The alignment software for managing measured machine data

- Manage plants with an asset orientated machinery management
- Real-time communication via cloud to ROTALIGN touch
- Monitor the history and trend of the alignment status of assets
- Analyze measurement data in detail and report
- Consideration of bearing types and suggestion of adequate measurement modes
- Library with customizable templates for assets, couplings, industrial couplings tolerances, measurement modes and reports
- Coupling type optimized tolerances

ALIGNMENT
RELIABILITY CENTER 4.0





Thank you for your attention

” The Reliability Centre of the Future”

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Questions

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QUESTIONS?

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