



FLUKE®

Reliability

**Industrial machine alignment:
Tips for getting precise
measurements in
demanding conditions**

Matt Joinson

Payam Assadi

Accelix™
Webinar Series

Speaker Bio



Matt Joinson

Owner-Operator, Jaffray Millwright and Welding



- Offers quality laser alignments using Proftechnik technology, backed by mechanical support and CWB certified welding services
- 15 years of experience working in tough environments, including lumber and mining
- Based in British Columbia, Canada
- Uses the RotAlign Touch laser shaft alignment system

Speaker Bio



Payam Assadi

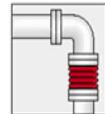
Sales Manager, Pruftechnik Canada | Fluke Reliability

- Mechanical Engineering degree from the Concordia University
- Been with the company since 2014
- Hired as a Sales and Service Engineer. Moved up the ranks to become Sales Manager and Site Leader for Canada in Jan. 2020
- Conducted customer training, and executed field machinery services related to Pruftechnik products and technology in North America

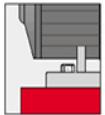
Pre-alignment checklist



Machines tagged out -
Padlock on switchgear



Pipe/bracket
strain
eliminated?



Base OK?



Shafts OK?
Run out, bending,
bearing play?



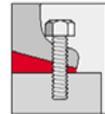
Shims OK?
(maximum 4 shims!)



Coupling OK?
Proper fit on shaft, looseness,
eccentricity, flexible elements OK?



Bent bolts?
Cupped washers?



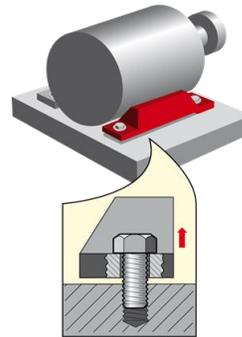
Soft foot
eliminated?



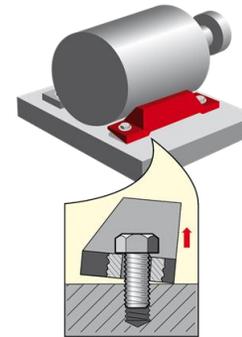
Hold-down bolts,
jacking bolts
lubricated?



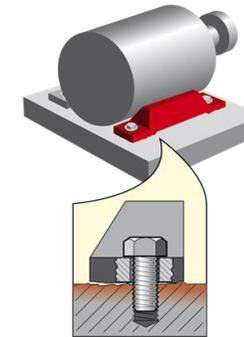
Targets,
tolerances
established?



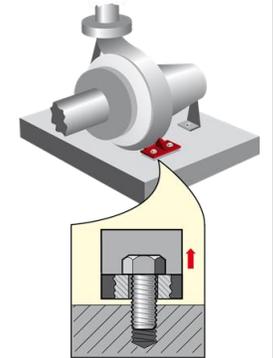
Parallel
soft foot



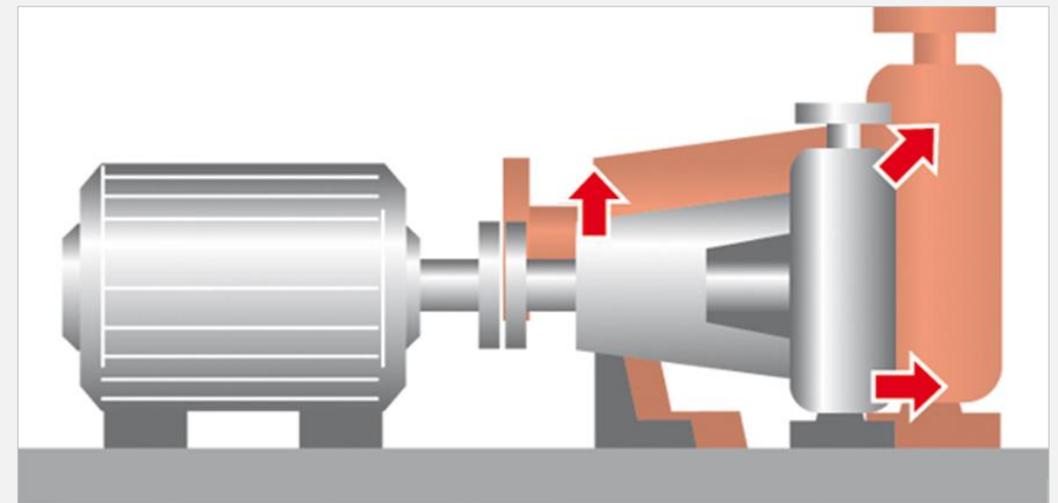
Angular
soft foot



'Squishi foot'
(corrosion)



Soft foot from
external force



Machine installation guidelines

The installation of machinery such as a pump, gearbox, compressor, or other plant machinery require some general rules to be followed.

- The driven unit is normally installed first, and the prime mover or motor is then aligned to the shaft of the driven unit.
- If the driven unit is driven through a gearbox, then the gearbox should be aligned to the driven unit and the driver aligned to the gearbox.
- Basic checks should be carried out to determine the accuracy of the machine couplings — check for “run-out” concentricity to the shaft centerlines (out of “true” coupling halves can cause out-of-balance problems).
- Preparation of the machinery baseplate and machine mounting surfaces, feet, pedestals, and similar foundation is of paramount importance. Otherwise, successful alignment may not be easily achieved.
- Clean, dress up, and file any burrs from mounting faces and securing bolt holes.

Machine installation guidelines (continued)

The installation of machinery such as a pump, gearbox, compressor, or other plant machinery require some general rules to be followed.

- Before mounting the shaft alignment system/instrumentation on the machines, take a few minutes to look at the coupling/shaft alignment. Remember, your eyes are your first measuring system!
- Check that the pump/motor set is sitting square to the base plate (soft foot check) and correct as required.
- Have quality shims available to align precisely and effectively.
- Keep shims to a minimum – if possible, use no more than a maximum of 3 shims under machinery feet/mounts.
- Always check manufacturers alignment figures prior to commencing work! Temperature growth may require specific "cold" alignment offsets.
- Correct alignment as required to ensure that, when the machinery is running, the machinery shafts are entered in their bearings and are aligned to manufacturers' tolerances.
- Ensure that any pipe work attached to machines is correctly supported but free to move with thermal expansion.

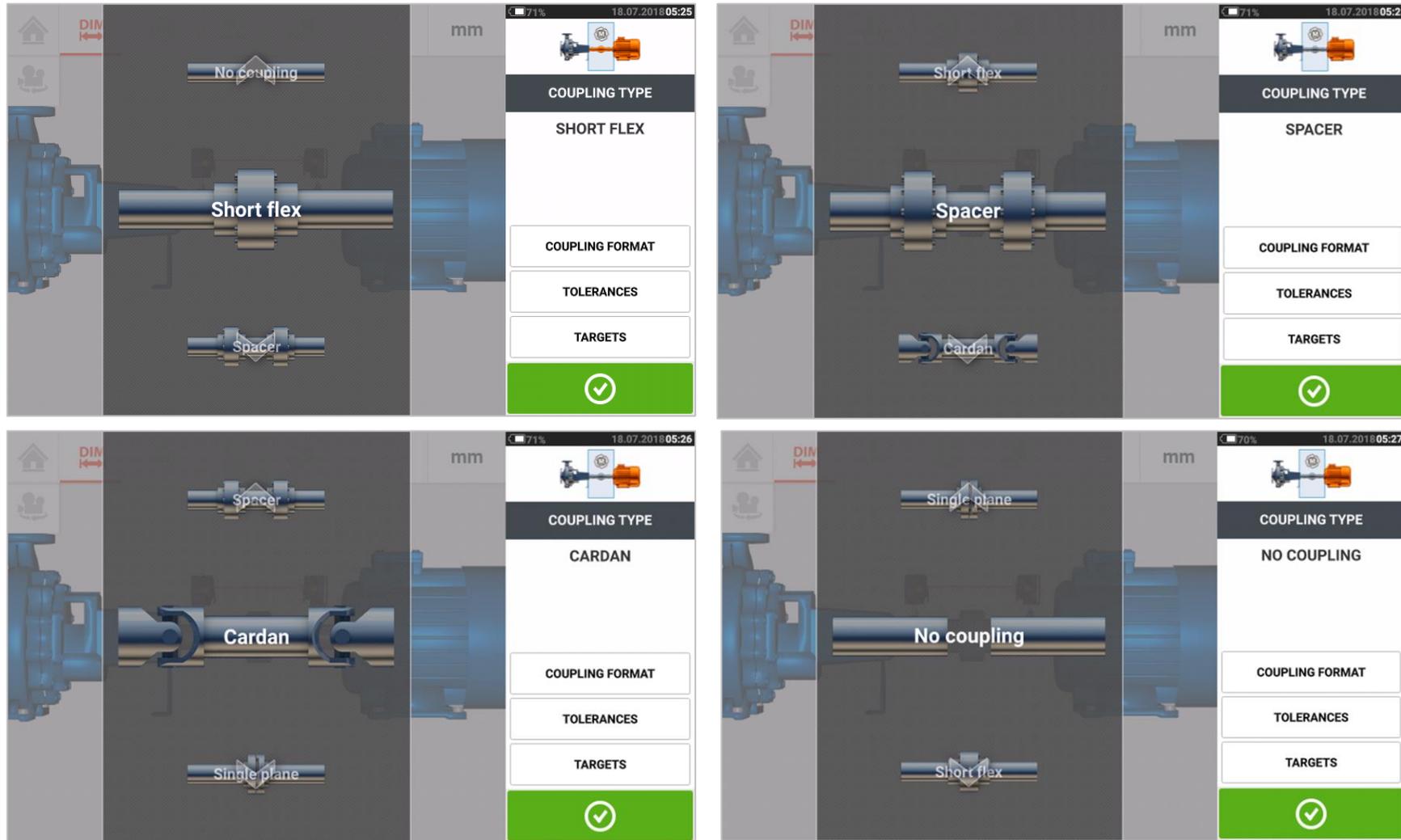
POLL QUESTION No. 1



What is the most common pre-alignment step that people tend to neglect?
(Click only one answer)

- Not checking flatness of the base
- Verifying no more than 3-4 shims
- Not checking for pipe strain
- Not checking / correcting soft foot
- Not inputting targets / thermal expansion values

RotAlign screen shots of couplings





Alignment scenarios in specific environments

Work environment



Mining



Sawmills



Pulp and Paper



RotAlign Touch overview

Why this tool?

- Durable and extremely tough
- The gorilla glass is very impressive
- Touch housing
- Use it with gloves in very dirty environment
- Repeatability and comprehensive measurement tables
- Measurement modes for different needs (shafts)
- Coupling backlash
- Move Simulator
- Digital sunlight compensation -- suitable for external use
- Quality of the brackets



Simple and straightforward alignment



Typical report for straightforward alignment

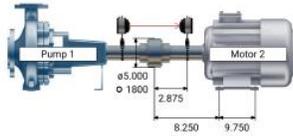


Machine alignment information

Location: ██████████
 Asset ID: ██████████
 Operator: Matt Joinson
 Notes: Had to re-use old pump coupling hub that was in rough condition. Gear teeth were filed and cleaned with emery cloth and then unit was greased before being turned over to operations.

Dimensions

inch



Measurements

thou

AS FOUND:

Coupling #1		Date	Type	V		H	
				↔	↔	↔	↔
🔴		11.07.2020 11:31:17	IntelliSWEEP	2.6	10.6	-38.3	-82.6
🟢		11.07.2020 11:31:57	IntelliSWEEP	2.6	10.6	-38.4	-82.8

2 CC Scrubber Pump 27.07.2020 12.32.59.pdf 27.07.2020 1/3

Measurements

thou

AS LEFT:

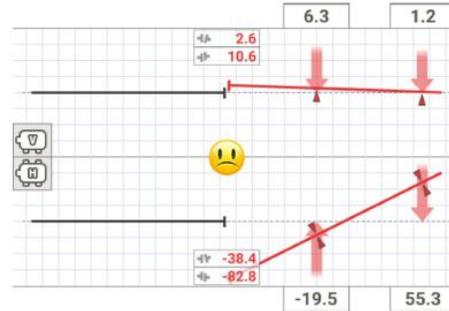
Coupling #1

Coupling #1		Date	Type	V		H	
				↔	↔	↔	↔
🔴		11.07.2020 12:36:47	IntelliSWEEP	0.5	1.5	-1.2	-0.0
🔴		11.07.2020 12:37:14	IntelliSWEEP	0.4	1.6	-1.1	-0.0
🟢		11.07.2020 12:37:40	IntelliSWEEP	0.5	1.5	-1.2	0.1

Results

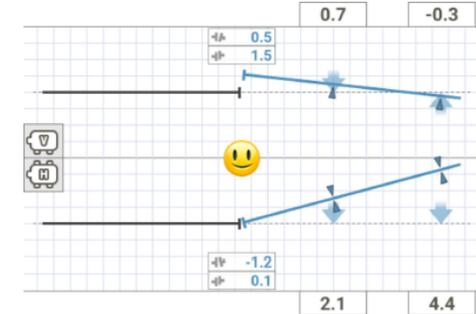
thou

AS FOUND:



2 CC Scrubber Pump 27.07.2020 12.32.59.pdf 27.07.2020 2/3

AS LEFT:



Tolerances

thou

Coupling Short flex 60 Hz Linear interpolation

🔴		🟢 OK	
↔	↔	↔	↔
1.5	2.0	2.5	3.0

Alignment measurement components used

DEVICE:

Type:ROTALIGN touch Serial number:50202681 Firmware version: 2.3

SENSOR:

Type:sensALIGN 7 Serial number:49007849 Calibration due: 26.08.2021

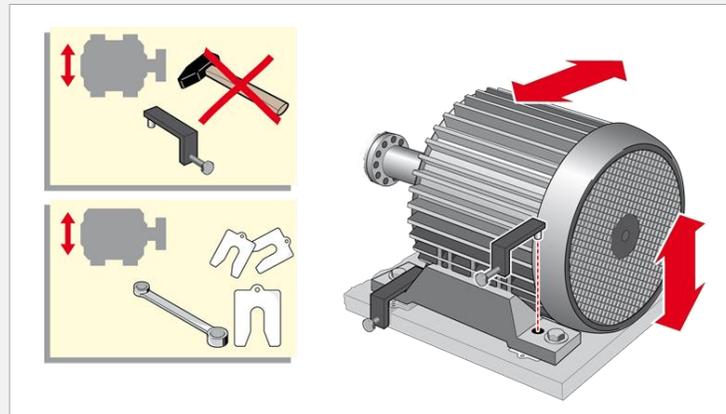
LASER:

Type:sensALIGN 7 Serial number:49106098 Calibration due: 28.08.2021

Matt Joinson

2 CC Scrubber Pump 27.07.2020 12.32.59.pdf 27.07.2020 3/3

Challenging and unique alignments



Machine alignment information

Location: Elview breaker station
 Asset ID: Fluor South feeder remeasure
 Operator: Matt Joinson

Dimensions Inch

Measurements thou

Coupling #1	Date	Type	V	H
●	04.04.2020 12:53:52	IntelliSWEEP	-1.5	0.8
●	04.04.2020 12:54:14	IntelliSWEEP	-1.5	0.8
●	04.04.2020 13:13:01	IntelliPASS	-1.7	1.4

Results thou

Tolerances thou

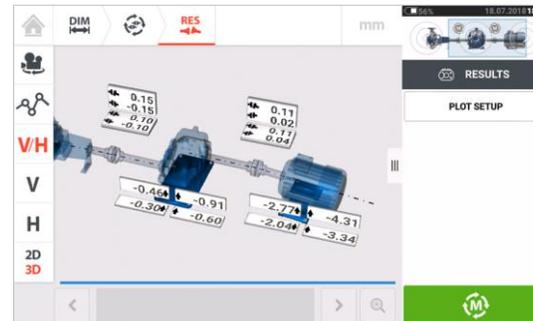
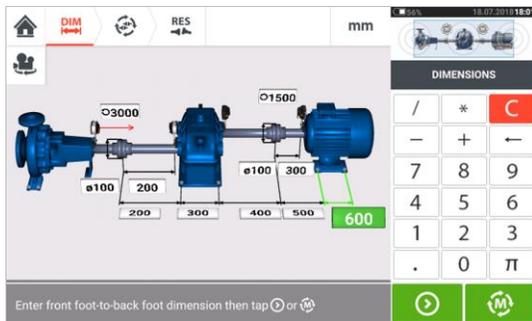
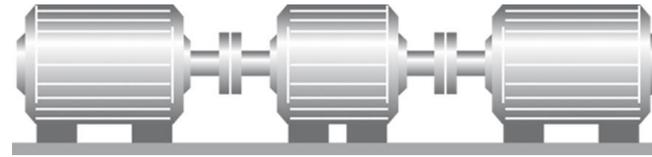
Coupling #1 Short flex 60 Hz Linear interpolation

Warning		OK	
V	H	V	H
1.8	2.0	3.0	3.0

Matt Joinson

06.04.2020

Complex alignments



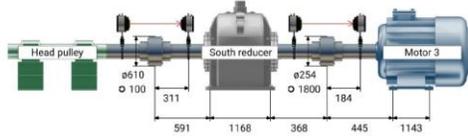
Reports and features



Machine alignment information

Location: [REDACTED]
 Asset ID: South train pulley, reducer, motor
 Operator: Matt Joinson
 Notes: South gear box was moved .075 south to improve hub gap. Motor was moved .075 south as well.

Dimensions mm



Measurements mm

Coupling #1

	Date	Type	V		H	
			↔	↕	↔	↕
🔴	29.03.2020 17:01:29	IntelliPASS	-0.24	0.03	0.15	0.15
🟢	29.03.2020 17:12:12	IntelliPASS	-0.08	-0.06	0.24	0.10

Axial clearance: 11.0998 [mm] Low speed

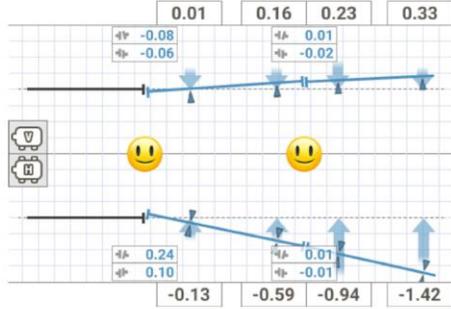
Coupling #2

	Date	Type	V		H	
			↔	↕	↔	↕
🔴	30.03.2020 15:20:21	IntelliSWEEP	0.01	-0.02	0.01	-0.00
🔴	30.03.2020 15:21:18	IntelliSWEEP	0.01	-0.02	0.01	-0.01
🟢	30.03.2020 15:21:45	IntelliSWEEP	0.01	-0.02	0.01	-0.01

Axial clearance: 6.5024 [mm] High speed

South train pulley, reducer, motor 02.02.2021 30.03.2020 1/2
 09.37.20.pdf

Results mm



Tolerances mm

Coupling #1 Short flex 60 Hz Linear interpolation

🟡	OK
↔	↕
0.61	0.13
↔	↕
0.91	0.23

Coupling #2 Short flex 60 Hz Linear interpolation

🟡	OK
↔	↕
0.08	0.05
↔	↕
0.13	0.08

Matt Joinson

South train pulley, reducer, motor 02.02.2021 30.03.2020 2/2
 09.37.20.pdf

POLL QUESTION No. 2



How do you handle complex alignments at your facility?
(Click only one answer)

- We have a range of people who can do it
- We have a designated in-house technician/specialist/millwright
- We contract it out
- Not sure

Brackets in the field



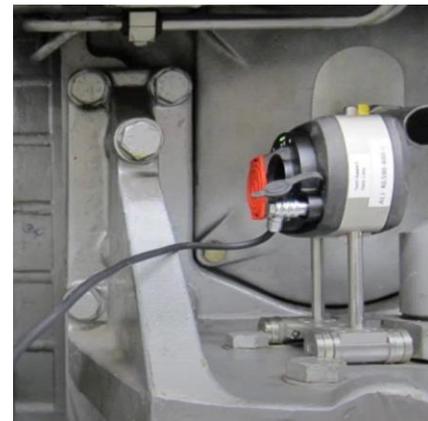
Compact magnetic bracket



Sliding magnetic bracket



Offset bracket



Live Trend bracket



QUESTIONS?



Thank you!

Matt Joinson

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Owner/operator,
Jaffray Millwright and Welding

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Pruftechnik Canada

Next Webinar: How a defect elimination program works

BEST PRACTICE WEBINAR | Wednesday, March 3, 11 a.m. ET

How a defect elimination program works and why it could work for you

"Defect elimination" has become a hot topic in the reliability world. But what exactly does it mean? Defect elimination is a bottom-up approach that uses small teams tackling small projects with broad participation. With that stronger involvement comes a greater understanding and buy-in to the reliability improvement effort.

In this webinar, expert **Michelle Ledet Henley** discusses how a defect elimination program can enhance traditional maintenance programs by bringing you enthusiastic front-line participation and eliminate work from the bottom up.



**Michelle Ledet
Henley**

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DEMO

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