



Quem é a R&D?



R&D

**R&D, foi criada com a função de dividir com seus clientes a
experiência de mais de 35 anos em distribuição de produtos e
Consultoria de vendas para as mais diversas aplicações industriais.**

R&D Consultoria

R&D Consultoria tem como finalidade orientar seus clientes a buscar melhorias em sua atual estratégia de vendas e capacitar seus profissionais de manutenção:

- Organização interna e externa para controle gerencial
- Organização de produtos de acordo com a área geográfica de atuação e perfil
- Analise e Gerenciamento de oportunidades de vendas
- Analise de mercado e desenvolvimento de canais de venda para empresas que pretendem entrar no mercado brasileiro
- Identificar e buscar produtos que complementem seu atual portfolio
- Centro de Capacitação para Profissionais de Manutenção
 - Termografia em aplicações elétricas
 - Termografia em aplicações mecânicas
 - Alinhamento a laser
 - Analise de vibração





R&D Produtos

R&D Produtos foi criada para atender todas as necessidades do profissional de manutenção em:

- Alinhamento
- Analise de Vibração
- Inspeções Termográficas
- Teste e Medição
- Monitoramento de Temperatura em Processos



Para isto buscamos:

- Liberes de Mercado com Produtos de Qualidade Assegurada
- Cobertura Nacional
- Assistência Técnica





R&D Produtos

Alinhadores a Laser.



FIXTURLASER XA
Express Alignment Through Key Innovation



FIXTURLASER
Express Alignment Through Key Innovation



Fundada em 1984 em Gotemburgo – Suécia, a ELOS Fixturlaser tem ajudado indústrias de todo o mundo a terem uma produção mais rentável e mais sustentável.

Presente em mais de 70 países e com 4 subsidiárias, a Fixturlaser comemora 30 anos como líder mundial em alinhadores, sendo reconhecida pelos usuários pela sua qualidade e facilidade de uso.

Esta posição foi alcançada graças sua ousadia em buscar novos rumos e é com este pensamento que vai se consolidar como líder no mercado brasileiro.



R&D Produtos

Analisadores de Vibração.



Brand of **acoem**





R&D Produtos

Analise de Vibração.

A ACOEM cuja sede é em Lyon, França, desenvolve e comercializa produtos e serviços compreendendo monitoração inteligente, diagnóstico e soluções, baseando-se em sua experiência exclusiva na área de vibrações e acústica. A empresa faz parte do Grupo EVOLEM.

Termovisores.



The World Leader in Thermal Imaging



Teste e Medição.





R&D Produtos

Termovisores.

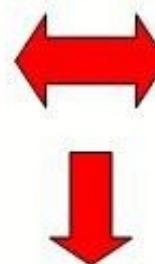
FLIR = Forward Looking InfraRed

- ✓ O primeiro sistema infravermelho para aplicação militar
- ✓ O primeiro sistema de varredura comercial
- ✓ O primeiro Termovisor infravermelho radiométrico
- ✓ O primeiro Termovisor portátil com FPA (Focal Plane Array)
- ✓ O primeiro Termovisor portátil radiométrico não resfriado
- ✓ O primeiro Termovisor portátil para detecção de gases
- ✓ O primeiro Termovisor portátil como comunicação WIFI

A União das Maiores Empresas do Mercado



Desde
1964



+ **inframetrics**



Monitoramento de processos. *IRtec Rayomatic 20*

- Faixas espectrais: 0.9 / 1.6 / 8~14 µm
- Range de temperatura: -25~1600°C
- Ampla resolução óptica



Monitoramento de processos. *IRtec Rayomatic 20*

Os sensores sem contato Raymatic 20 para medição de temperatura sem contato por infravermelho, possuem tecnologia italiana desenvolvida pela Eurotron. Fabricados no Brasil pela Ecil, empresa líder de mercado em sensores de temperatura por contato.





R&D Produtos

Cobertura.



Instrumentação
Eletrônica Ltda.



Inteligência em Saúde de Máquinas



R&D Produtos

Cobertura.

A R&D possui um rede de distribuidores que permite ter um cobertura nacional, o que proporciona a seus clientes um atendimento rápido dado por profissionais treinados e certificado pelo fabricantes.





R&D Produtos

Assistencia Técnica.

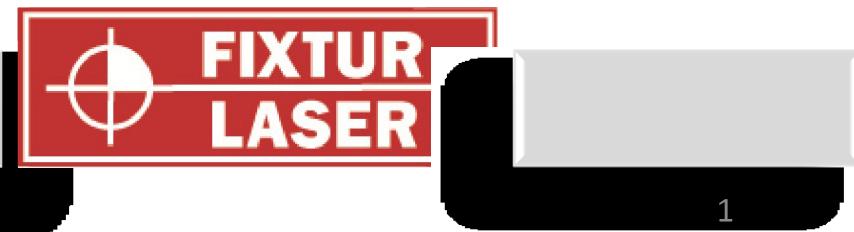
Todos os produtos comercializados pela R&D possuem assistência técnica no Brasil.



R&D

Introduction to shaft alignment

- 1.1 Basics in shaft alignment**
- 1.2 Methods**
- 1.3 Benefits of shaft alignment**



1.1 Basics in shaft alignment

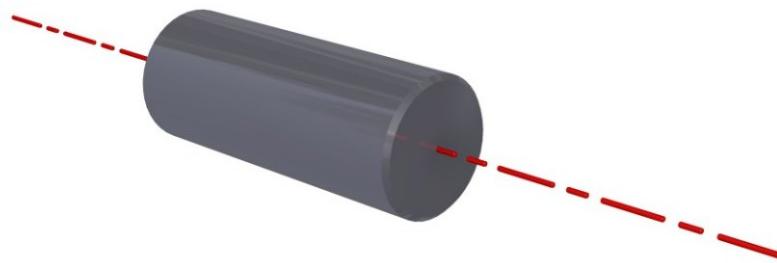
- **Axis of rotation**
- **Colinearity**
- **Misalignment**
- **Stationary and moveable machines**
- **Types of misalignment**
- **Tolerances**



Axis of rotation

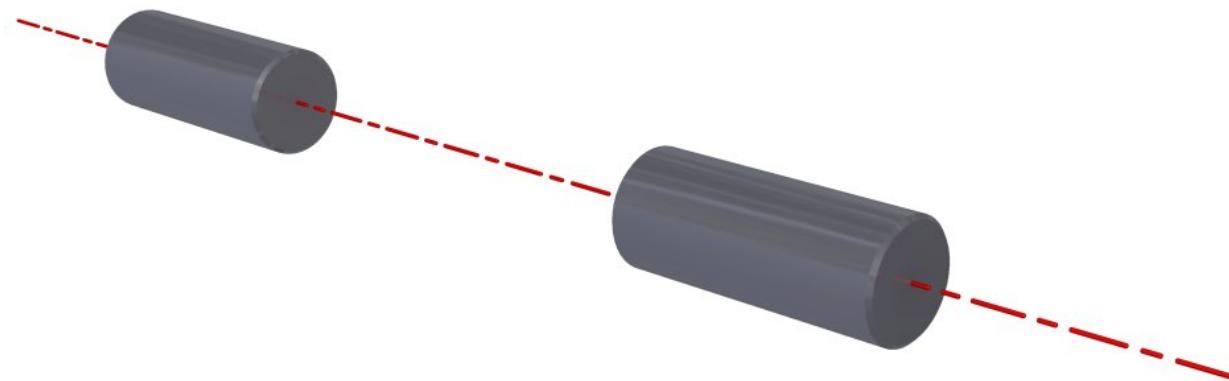
All shafts, bent or straight, rotates around their axis of rotation.

Axis of rotation is described a straight line.



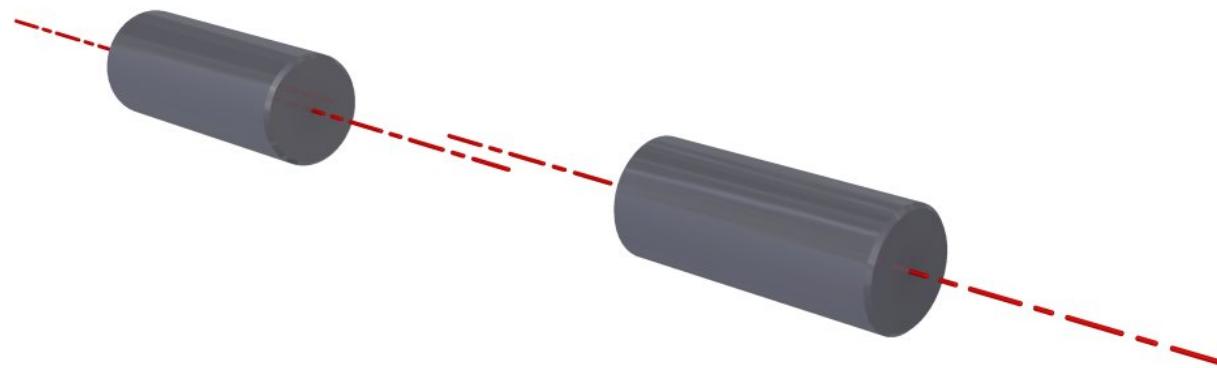
Colinearity

- When two shaft have the same axis of rotation they are colinear



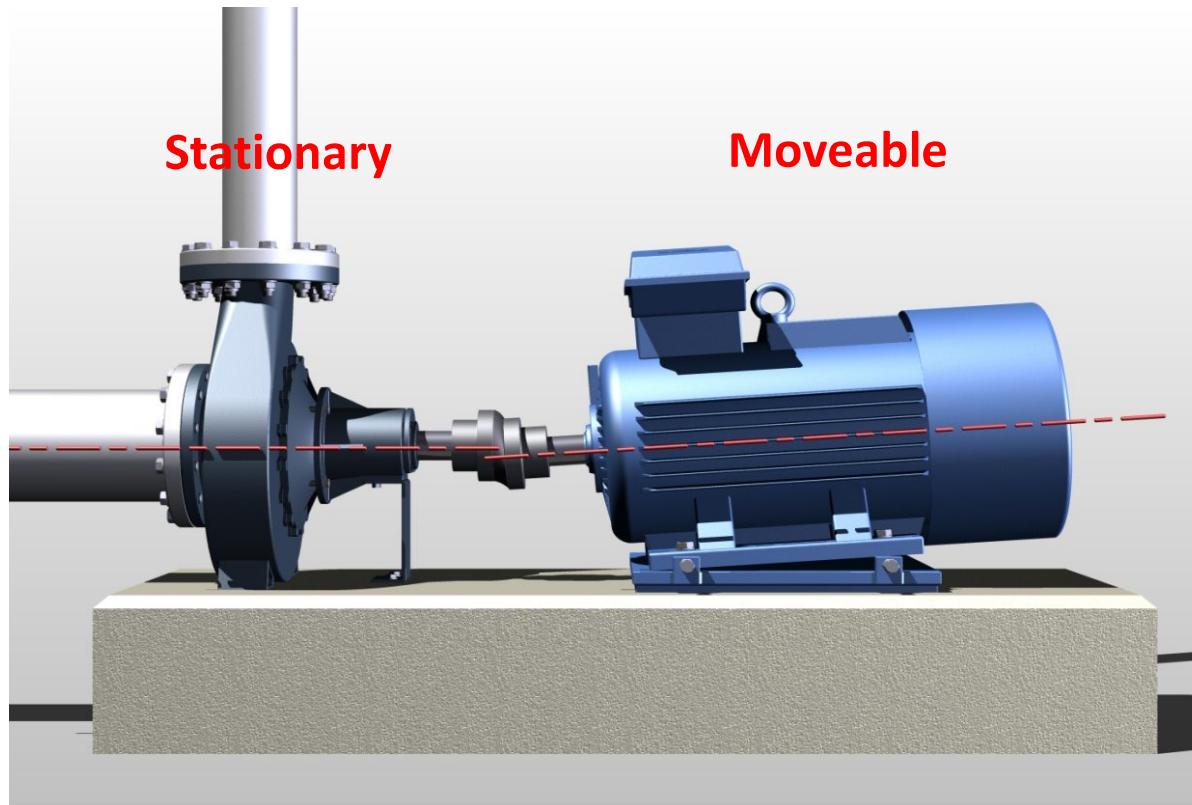
Misalignment

- Misalignment appears when the two axes of rotation isn't colinear



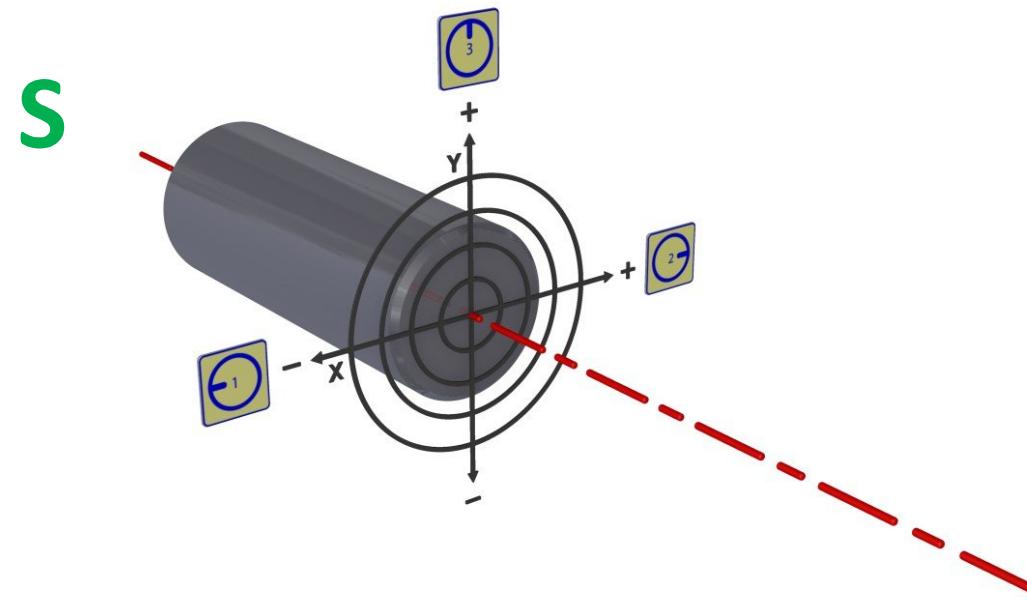
Stationary and moveable machine

Relative measurement- the moveable machine is adjusted to the stationary



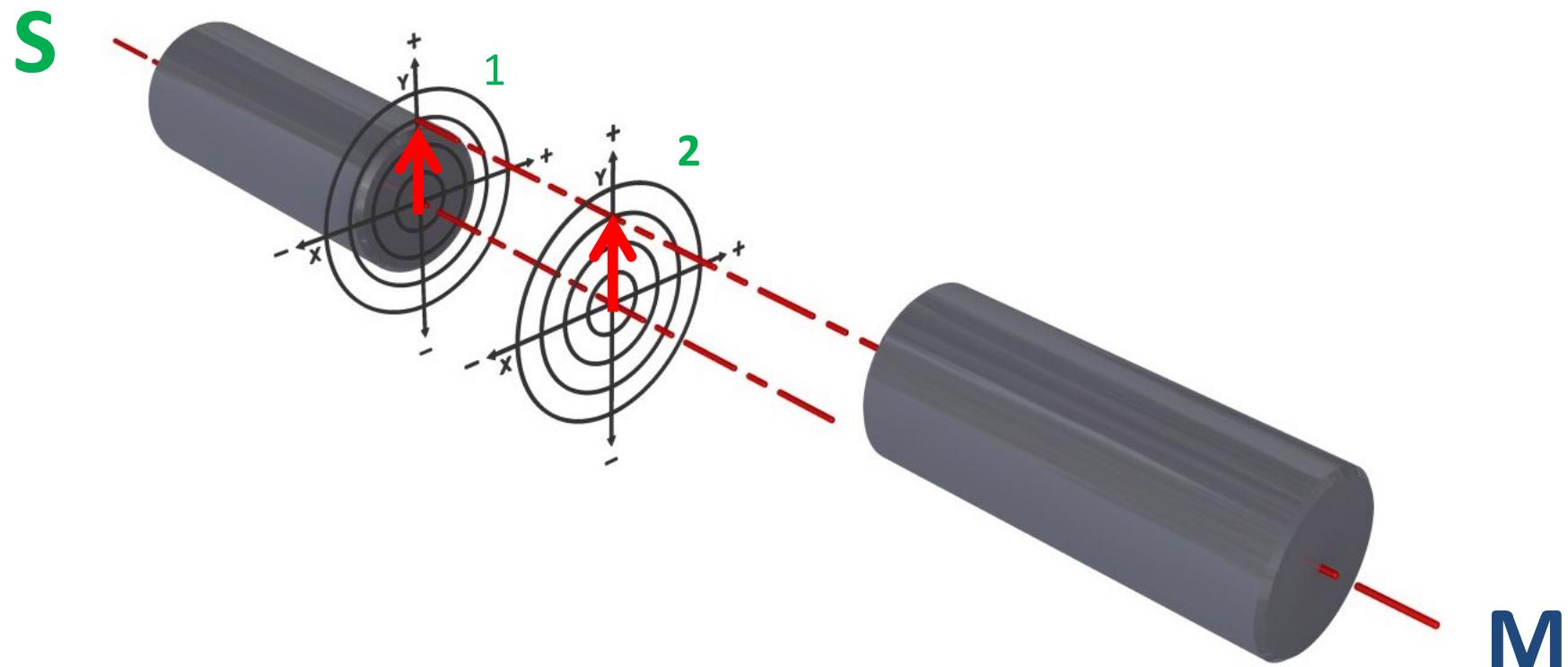
Determine misalignment

The axis of rotation of the stationary machine is the reference.



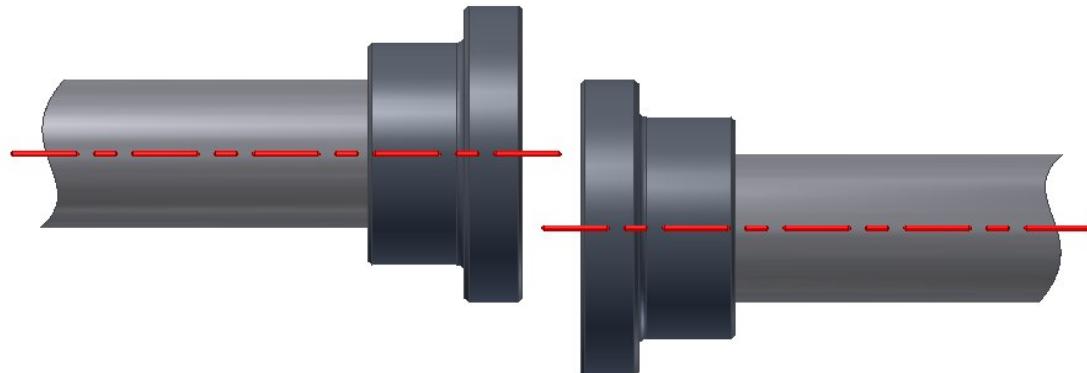
Determine misalignment

The misalignment is determined by measure the distance between the axis of rotation of the stationary and the moveable one, in two planes.

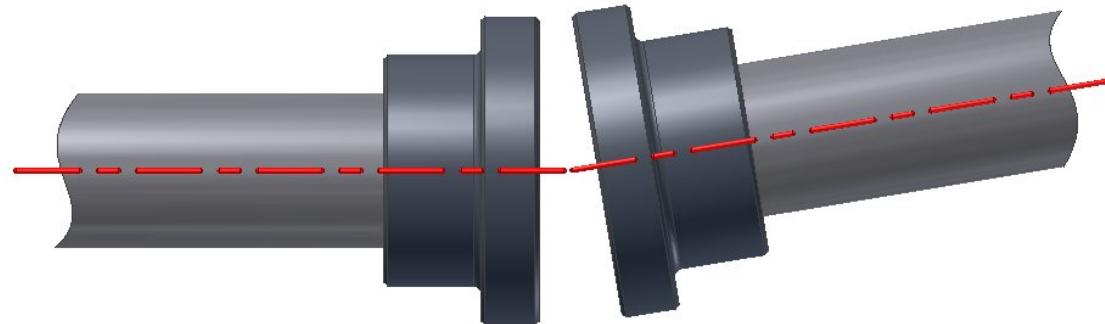


Types of misalignment

- Offset

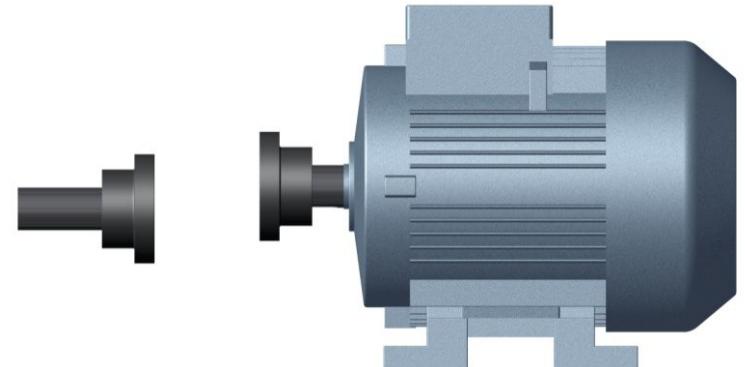


- Angular

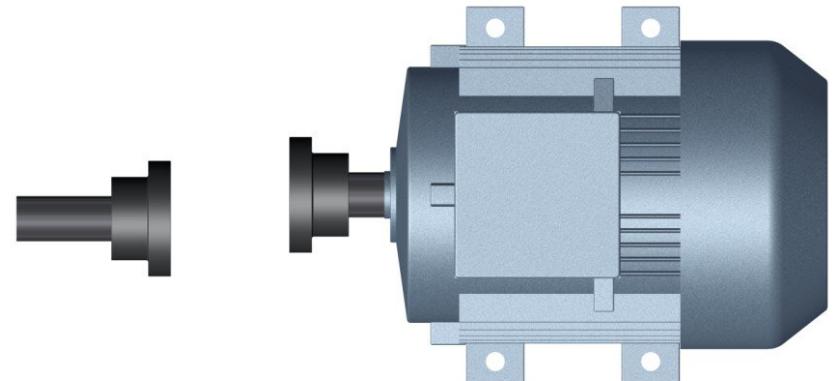


Directions of misalignment

Vertically – seen from the side



Horizontally – seen from above



Tolerances

rpm	mm	mm / 100mm
0 - 1000	0.13	0.10
1000 - 2000	0.10	0.08
2000 - 3000	0.07	0.07
3000 - 4000	0.05	0.06
4000 - 6000	0.03	0.05



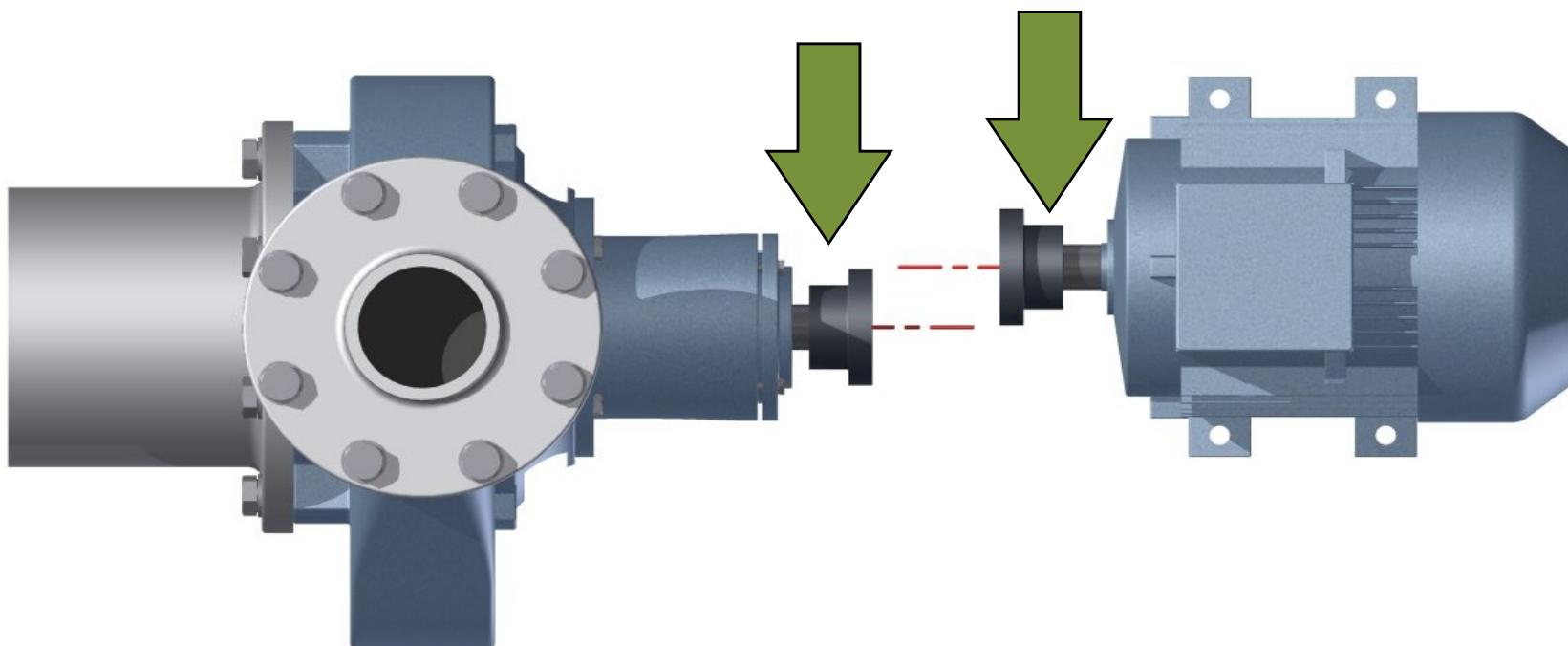
1.2 Methods for shaft alignment

- Different methods
- 3 phases of shaft alignment
- Overview of the alignment process



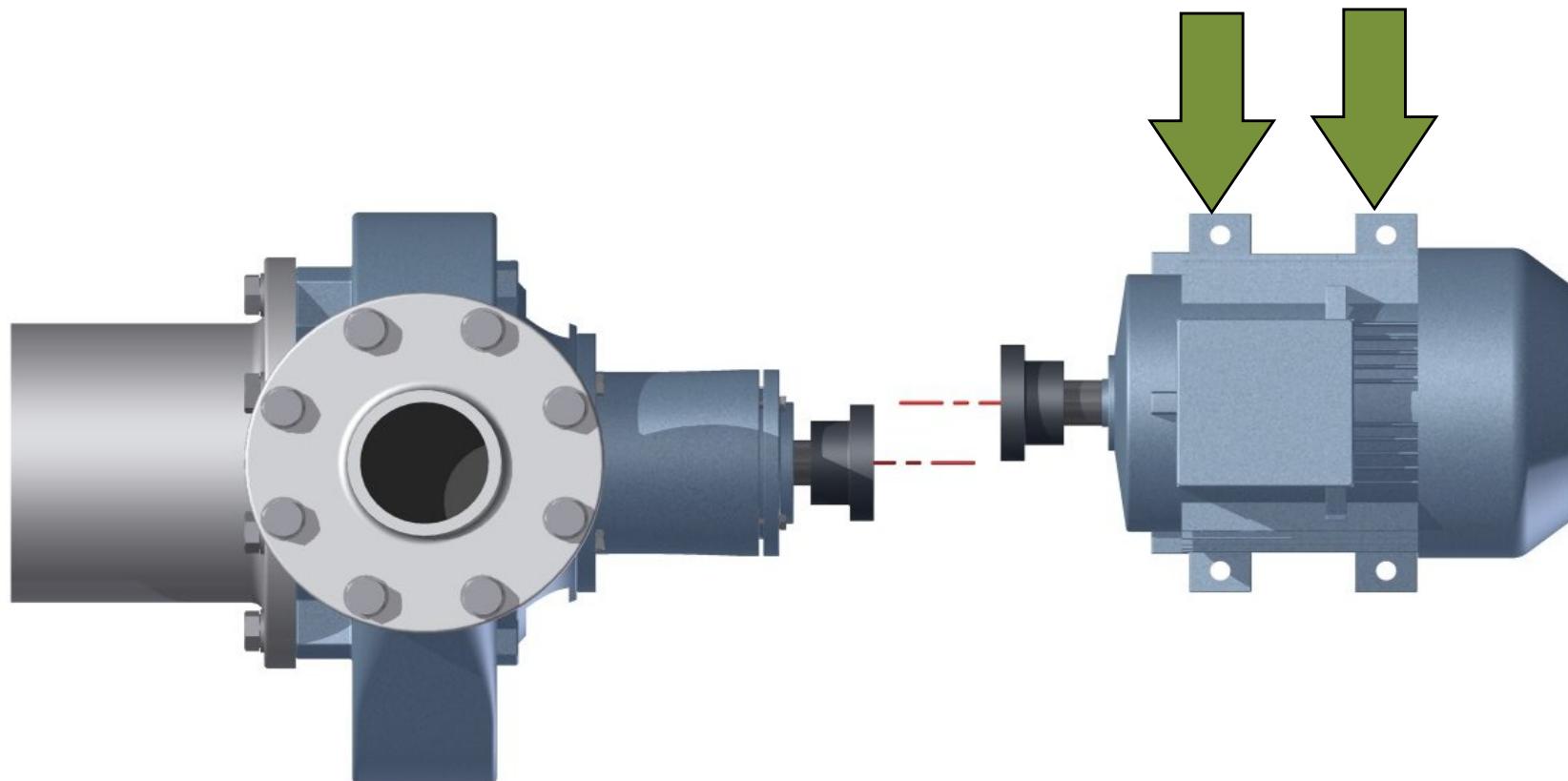
Methods

Despite of the method, the measurement is always performed on the shafts or on the coupling.



Alignment methods

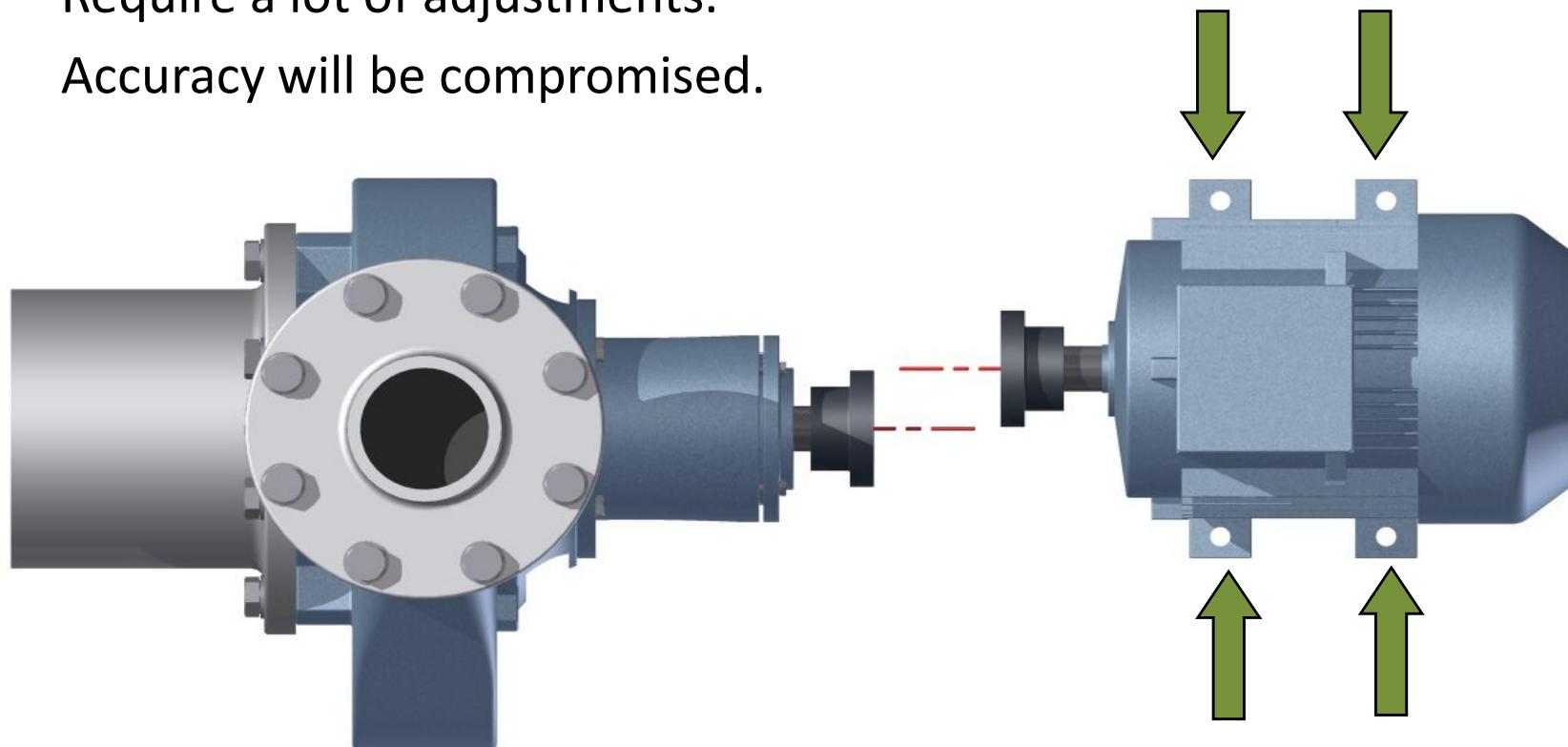
Adjustments are always done at the machine feet



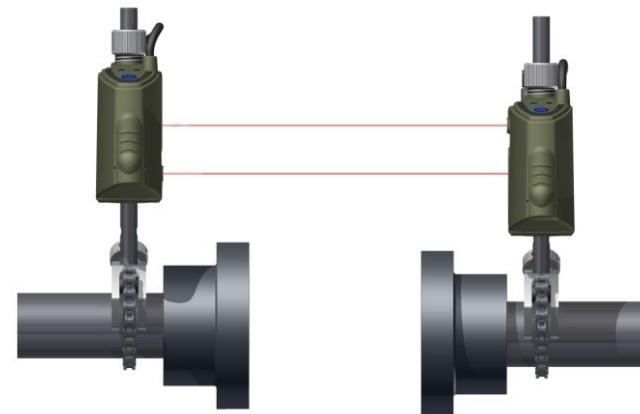
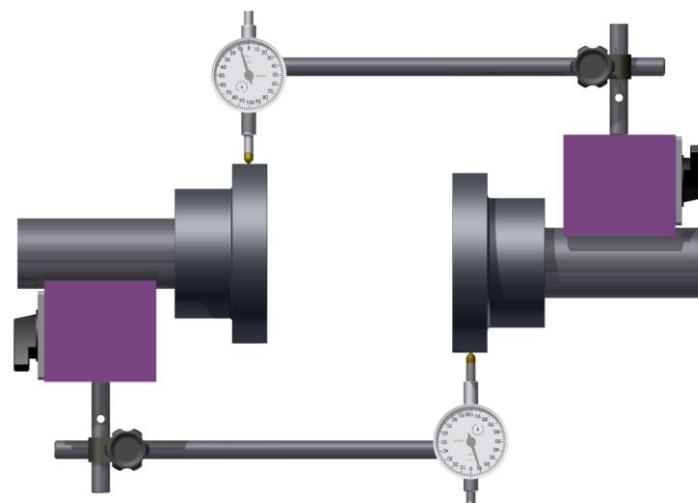
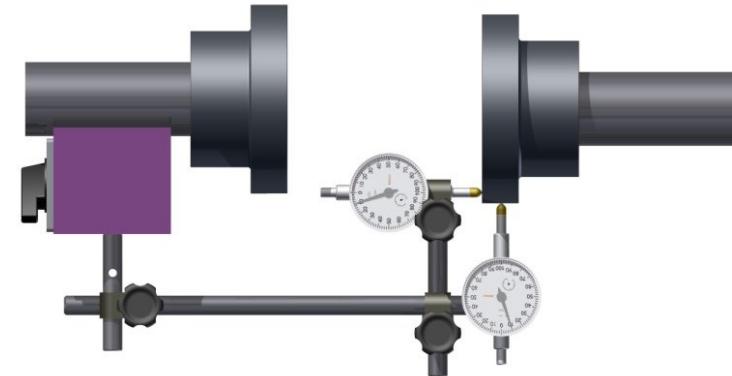
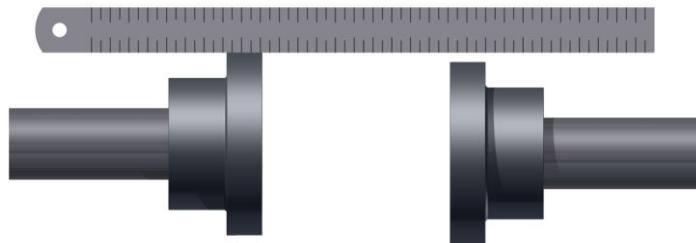
Alignment methods

If the feet position aren't calculated...

- the quality of the alignment is dependent of how lucky you are.
- Require a lot of adjustments.
- Accuracy will be compromised.



Alignment methods

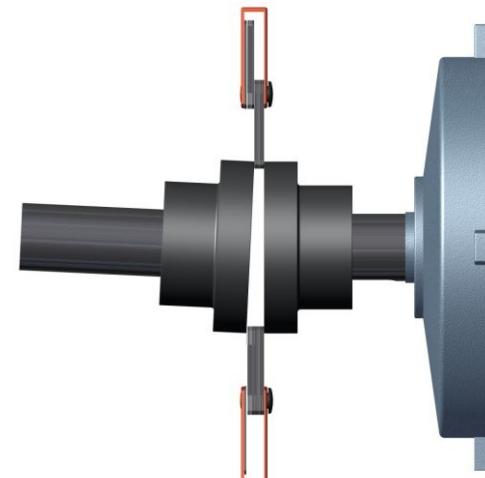
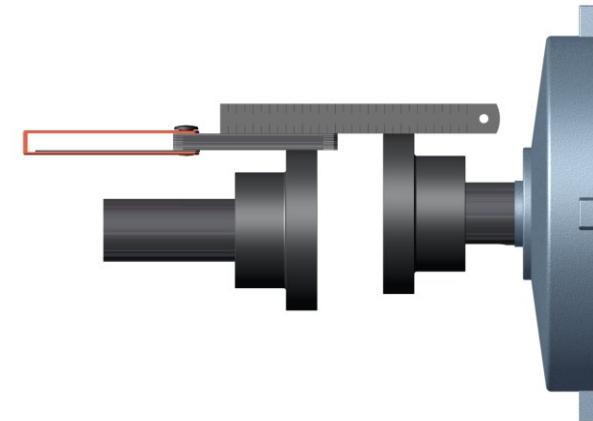


 **FIXTUR**
LASER

Mechanical

Callipers, feeler gauge and ruler

- Determine the size and direction of the offset
- Determine the angular misalignment by measuring the difference in coupling gap.

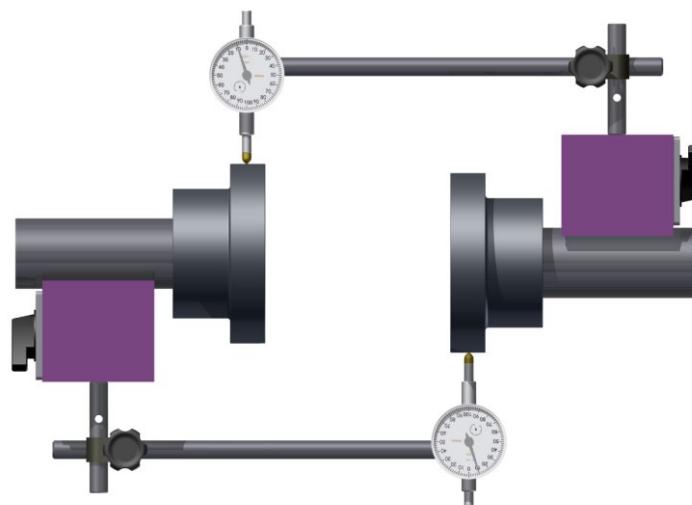


Dial indicators

Rim-Face method



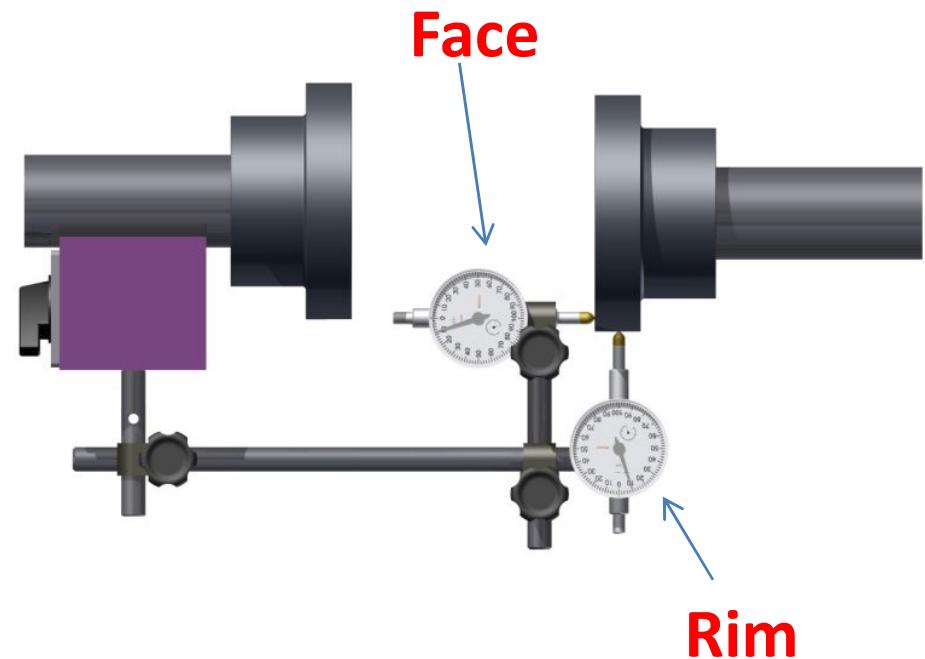
Reversed-Rim method



Rim/Face method

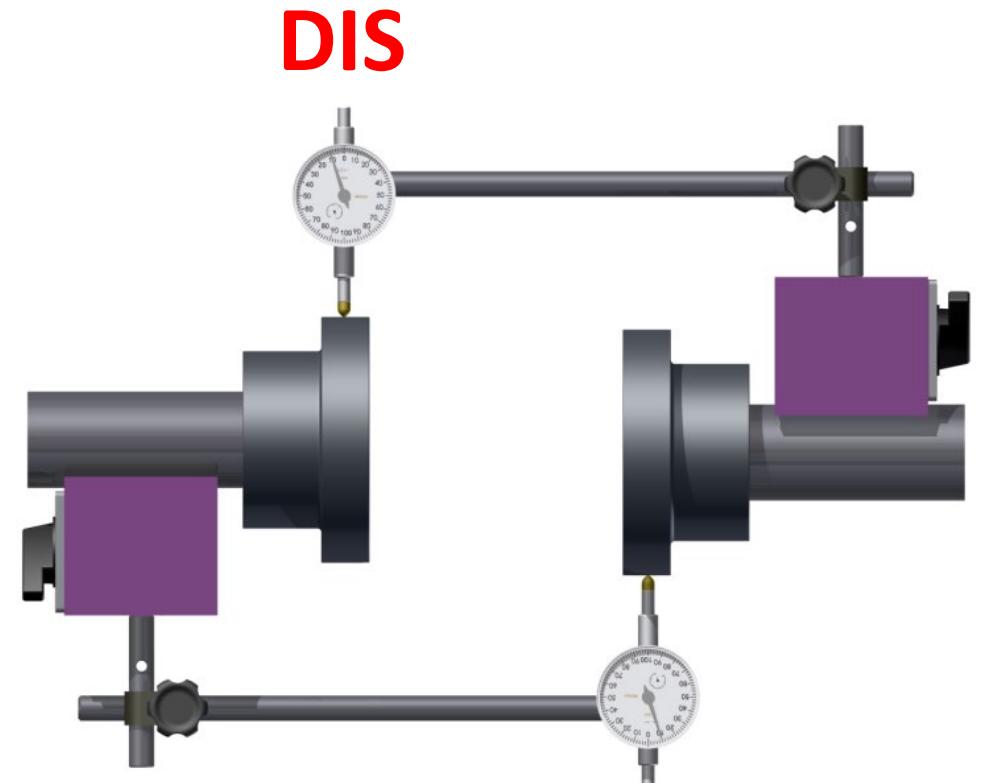
The dial mounted on the rim measures the offset.

The dial mounted on the face measures the angular misalignment.



Reversed-Rim metoden

- The dial measuring on the stationary shaft (or coupling) is called DIS.
- The dial measuring on the moveable machine is called DIM.
- The distance between the two rotational centres are measured in two planes by rotating both shafts.
- By measuring the distance between the dials the angular misalignment and offset is calculated

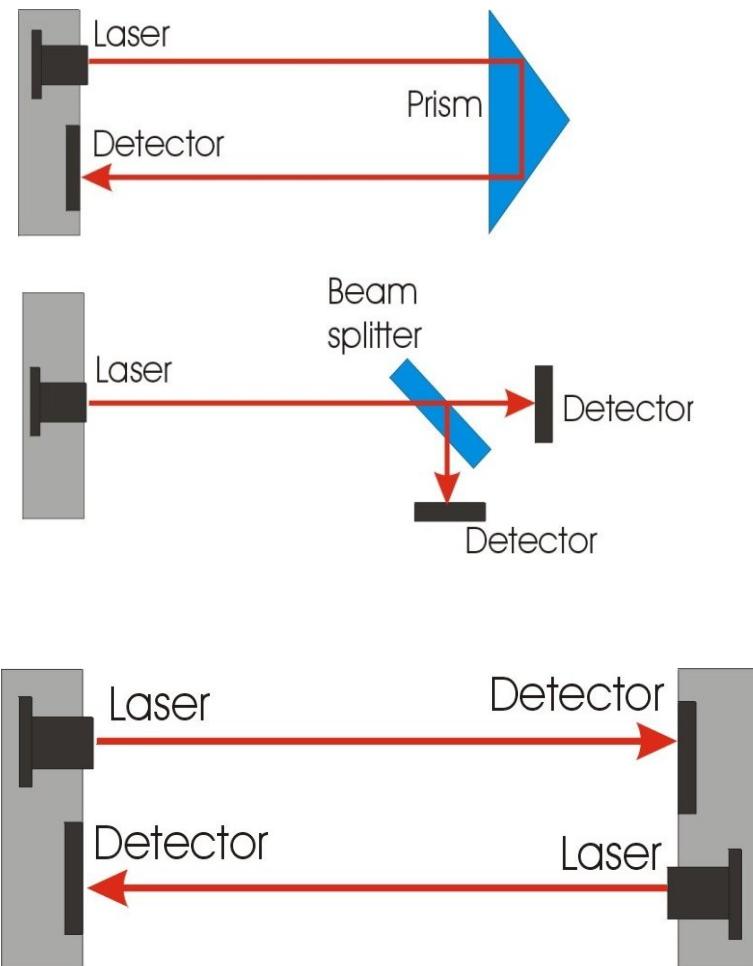


DIM

FIXTUR
LASER

Laser system

- Single laser systems using a reflector and/or a multi-axis detector .
- Dual laser system based on Reversed-Rim method uses two single axis detectors



shaft alignment - 3 phases

Preparations

- Preparations before you go on-site
- Overview On-site (accessibility)
- Checks on-site (soft-foot)

Course/rough alignment

- Makes sure that alignment can be performed
- Mechanical or laser system for rough alignment

Precision alignment

- Measure, adjust and document the result
- Dial indicators or laser systems



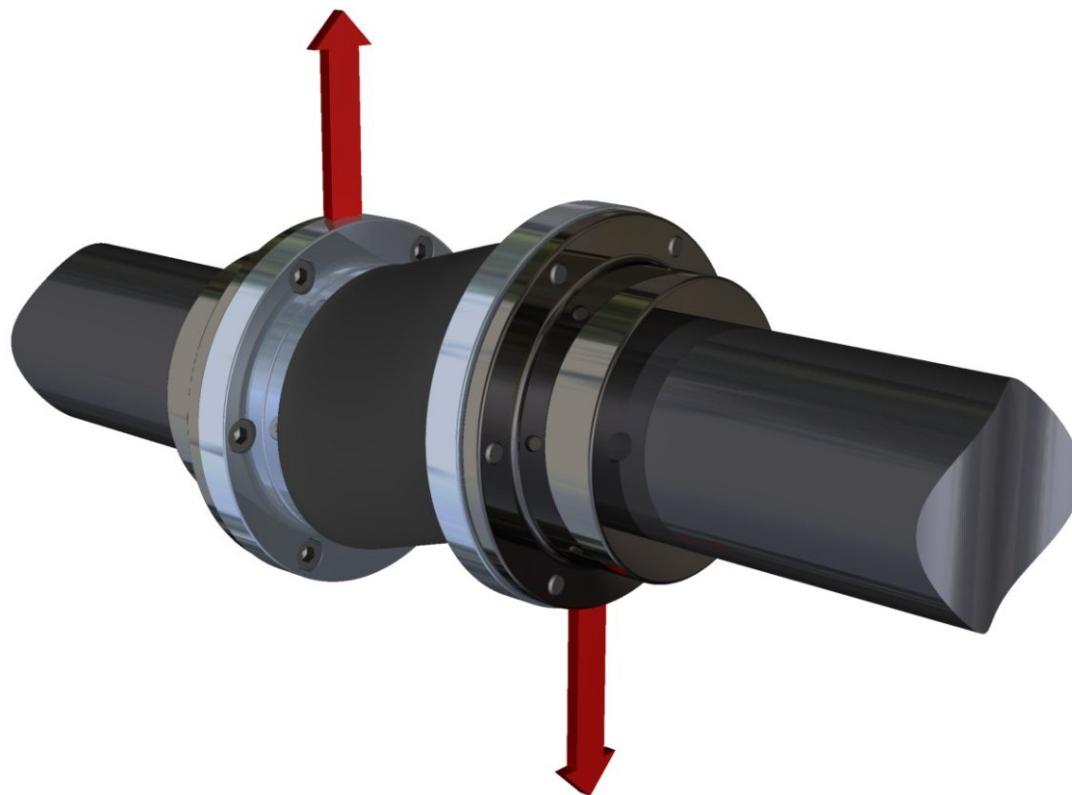
Shaft alignment process

1. Preform the preparations.
2. Mount the system on the shafts.
3. Measure and document the results (as found)
4. Evaluate the results.
5. Perform adjustments
6. Re-measure
7. Document the results after adjustment
(as left)



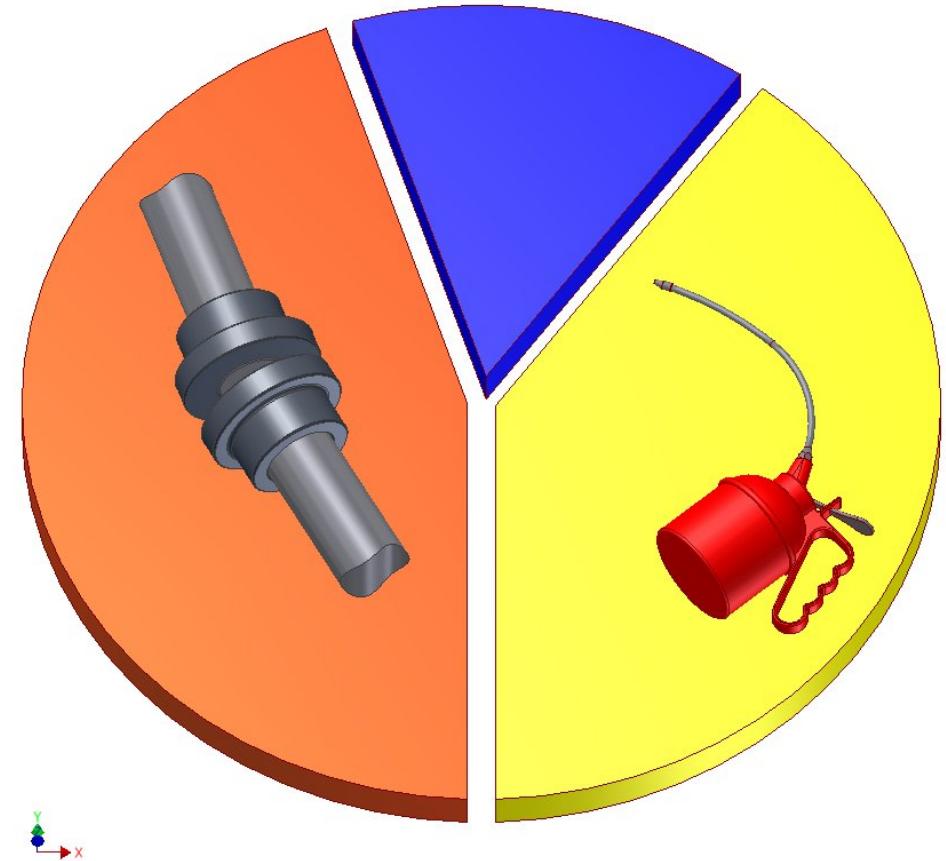
1.3 Benefits of alignment

Misalignment generates forces in the coupling.



Root cause

- Studies shows that misalignment is one of the root causes to 50% of the breakdowns of rotating machinery.
- It is also indicating that up to 90% of all rotating machinery is run outside the tolerances



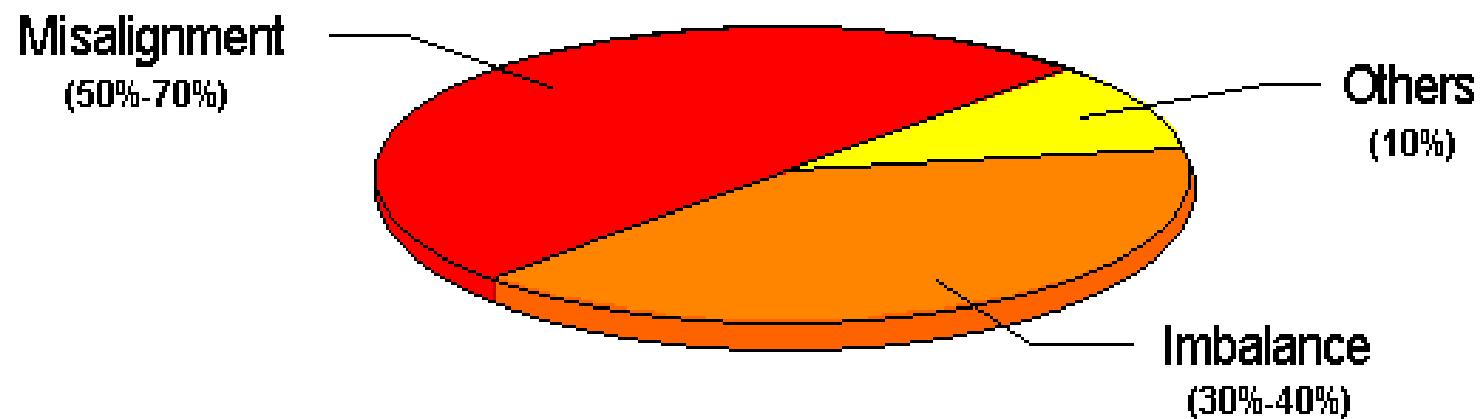
Benefits of alignment

- Decreased vibration levels
- Energy savings
- Less wear of components
- Increased productivity
- Increased product quality



Vibrations

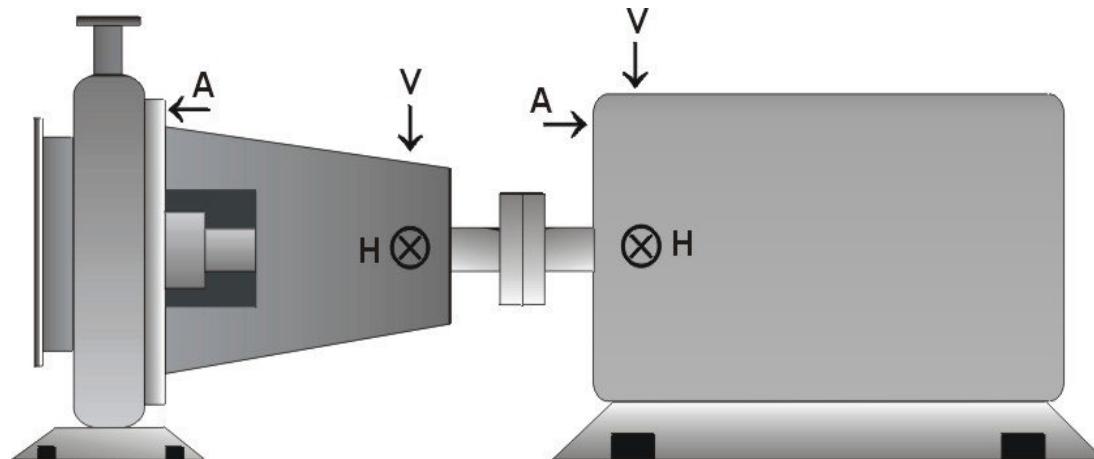
Major Sources of Machinery Vibration



Vibrations

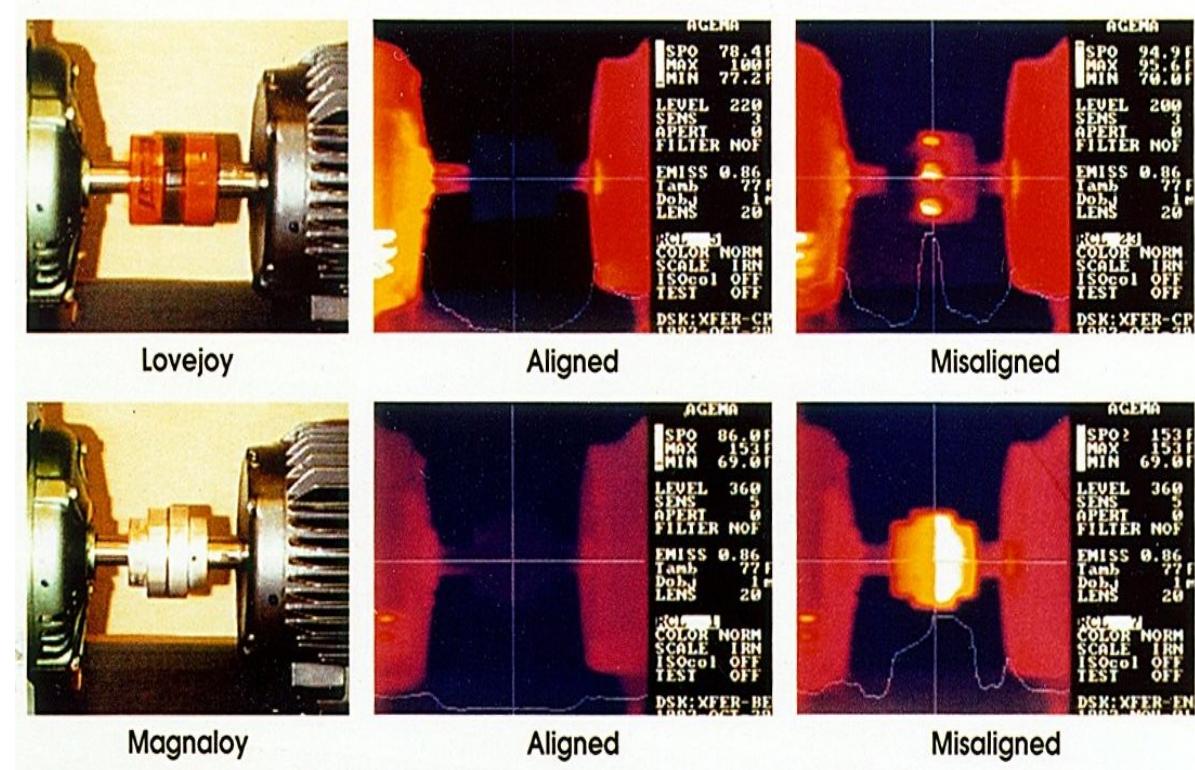
Guidelines:

- Horizontal vibrations indicates unbalance (H)
- Vertical vibrations indicates a weak or loose foundation (V)
- Axial vibrations indicates misalignment (A)



Energy savings

Alignment can reduce energy consumption up to 15%...



Energy savings

Could be calculated as....

- $P=U \times I$
- Effect (W) = Voltage(V) x Difference in amperage, before and after alignment (A)
- Including the efficiency factor (pf) of three-phase (1.732)

$$kW = \frac{\text{volts} * \text{amps} * \text{pf} * 1,732}{1000}$$

- Multiplied with price of energy EUR/kWh



Wear on components

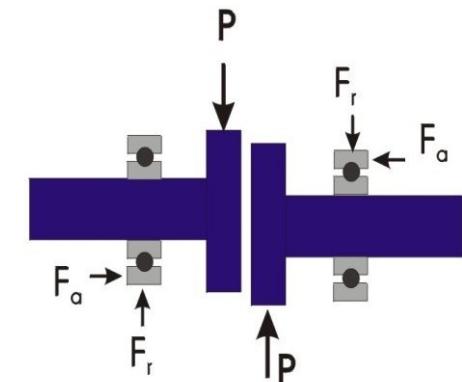
Bearings

- An increased load results in an exponential decrease in lifetime.
- Example: double bearing load reduces the bearing life to 1/8 of its designed life time.



Bearing life

$$L_{10} = \left(\frac{C}{P} \right)^3$$



$$P = F + F_r$$

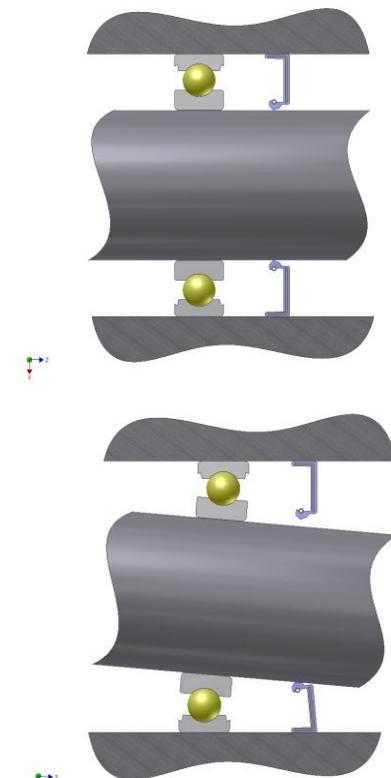
C=Constant depending on bearing type

L=Lifetime in million turns

Wear on components

Seals

- Misalignment can reduce the life time with 50-70%.
- Leakage can effect the lubrication of machine components.

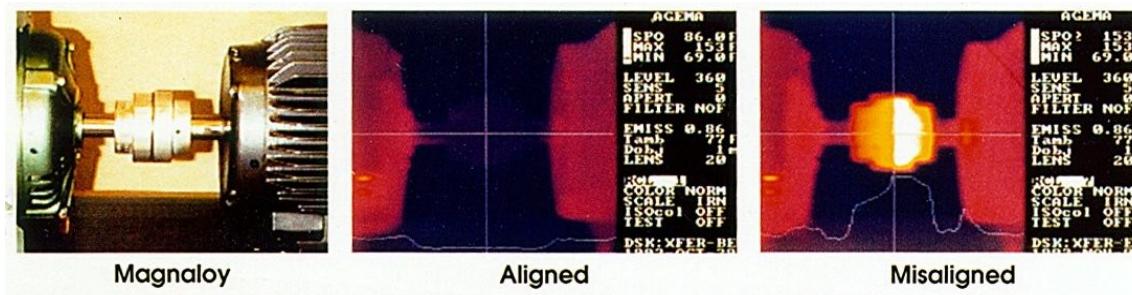


Wear on components

Couplings

Indications of misalignment:

- Heat in the coupling.
- Debris of metal, rubber or plastics.
- Wear of gears tooth's.



FIXTUR
LASER

Production capacity

- The profitability in a modern production process is directly dependent upon the up-time of the machines..
- Production stops costs up to 1-20 USD/h
- The cost for a production stop will sometimes be several times bigger than the cost for components.....



Product quality

Decreased vibration levels and less wear on components has sometimes a positive effect on the product quality.

- Sheet steel products
- Paper- or plastics laminating machines
- Pumps in food processing machines with lower contamination levels.

