

# Hofmann Mess- und Auswuchttechnik

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# Active Balancing Systems for Fans in Process Industry Applications



## Hofmann Global



**Hofmann Mess- und Auswuchttechnik**  
Pfungstadt close to Darmstadt / Germany



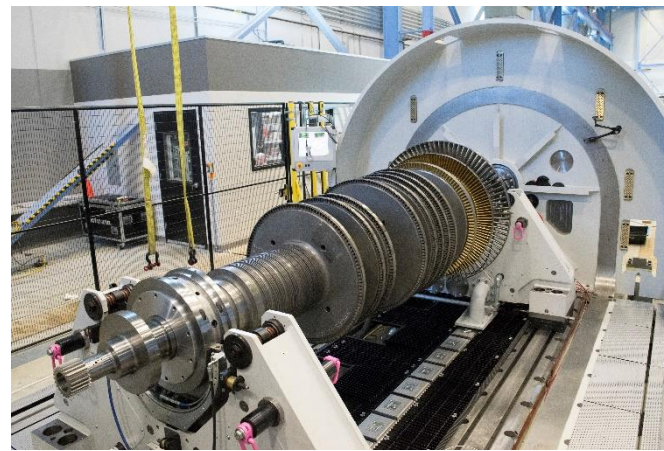
**American Hofmann Corporation**  
Lynchburg / VA / U.S.A

- ✓ **comprehensive product range of balancing and vibration measurement technology**
- ✓ **setting standards by innovative technology**
- ✓ **reacting flexibly regarding market requirements**

## Competence and Know-How

### Hofmann's Job

- measurement and evaluation of vibrations
- measurement and correction of unbalance
- machine monitoring
- machine development and production, e.g. for balancing and spin testing of generators and turbines up to 100 t



source  
Siemens plant  
Ohio / USA

## Product Portfolio

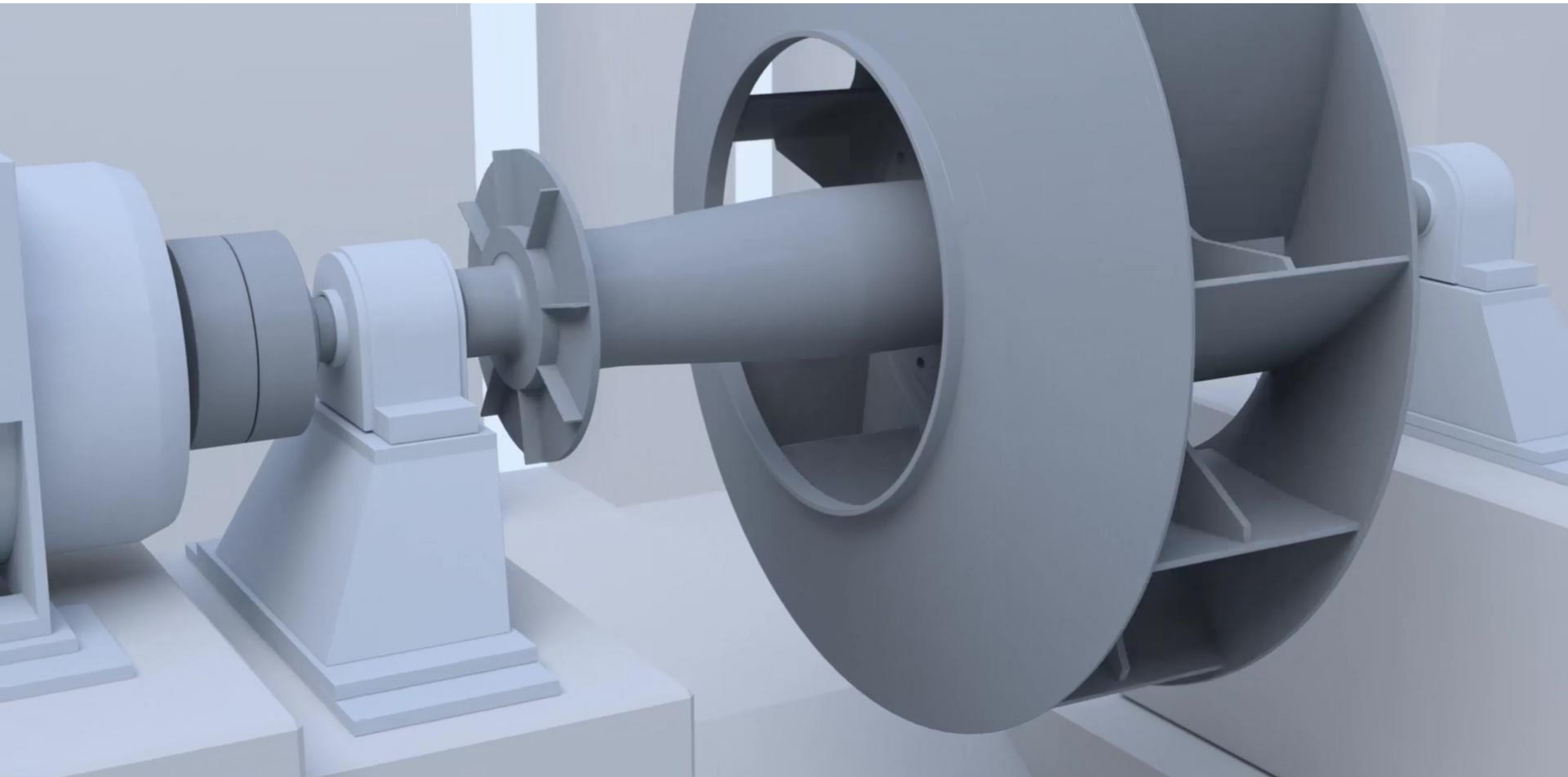
### Machines - Systems - Instruments

- universal balancing machines
- high-speed balancing and spin test equipment
- automatic balancing machines
- measuring instruments for vibration and balancing
- **active balancing systems for industrial fans**



source Wittekind / Erwitte / Germany

## Active balancing system on the fan



## Active Balancing Systems / Basics

### Active Balancing System = Integrated Balancing System

- integrated means “part of the machine (fan)”
- also known as
  - automatic balancing system
  - inprocess balancing System
  - autobalancer

### Benefit of using Active Balancing Systems

- measuring unbalance vibration during rotation
- unbalance correction during rotation
- **no stop of the fan needed !**



## Active Balancing System / Necessity

### When does it make Sense to use Active Balancing Systems

- **in case of process dependent unbalance change**
  - due to build up of material
  - loosening of material due to centrifugal force
  - due to wear of fan blades, shafts, clutches







## Active Balancing System / Necessity

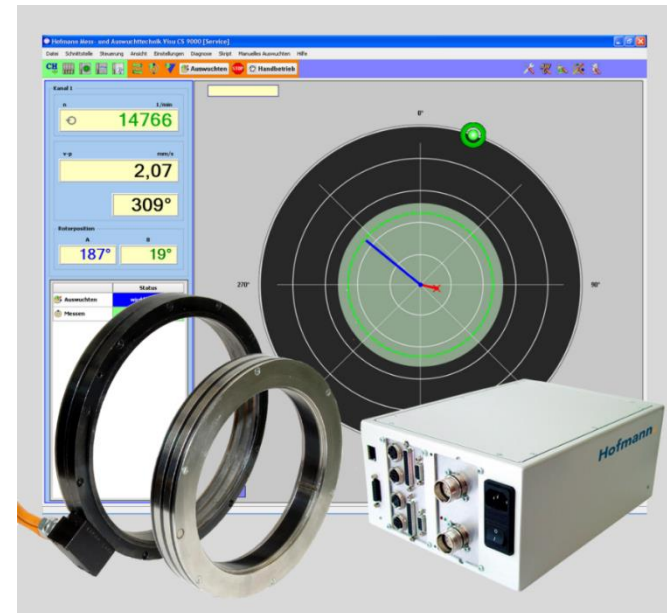
### Benefit using Active Balancing Systems

- **during the operation without an active balancing system**
  - the fan unbalance is only "observed"
    - vibration monitoring
  - the unbalance that occurs during operation cannot be corrected in advance
- **solution**
  - **active balancing system AB 9000**
  - **unbalance can be corrected during operation**

## AB 9000 Active Balancing System

### Active Balancing System AB 9000 in Ring Design

- fully automatic balancing during fan operation
  - at operation speed
  - high process reliability
  - in one and two planes
  - real-time monitoring of all measuring channels
- **advantage of ring design**
  - **simple integration**
  - **easy to retrofit at existing fans**



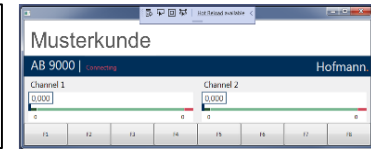
## AB 9000 Fan Application / System Design



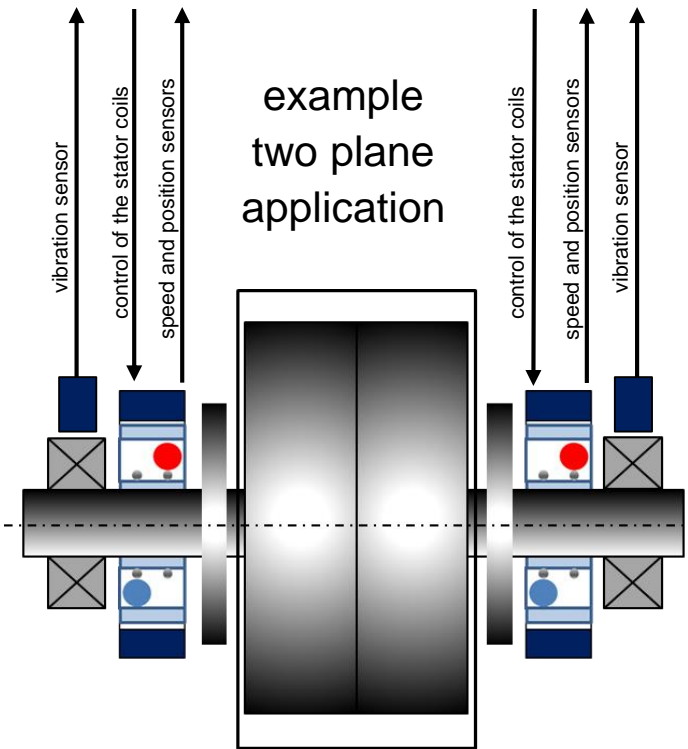
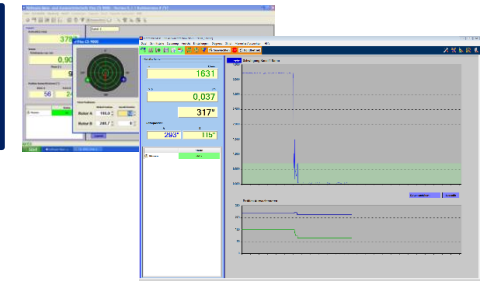
Profibus

Ethernet

- plant control system
- fan control system
- **HMI customised**

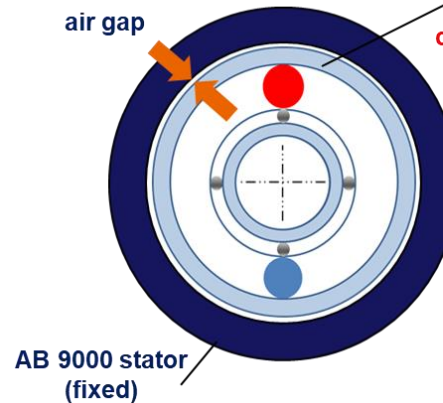


**AB 9000 HMI**  
for setup and service  
optional for operation



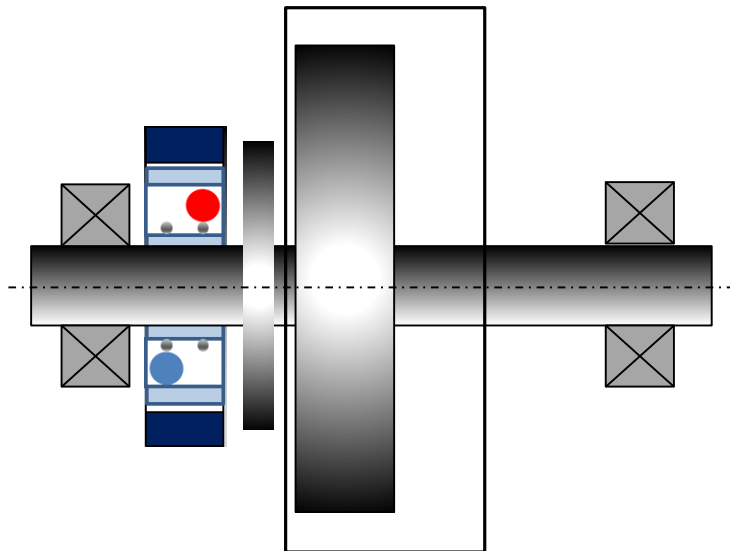
air gap

AB 9000 balancing ring (rotating) with compensation weights



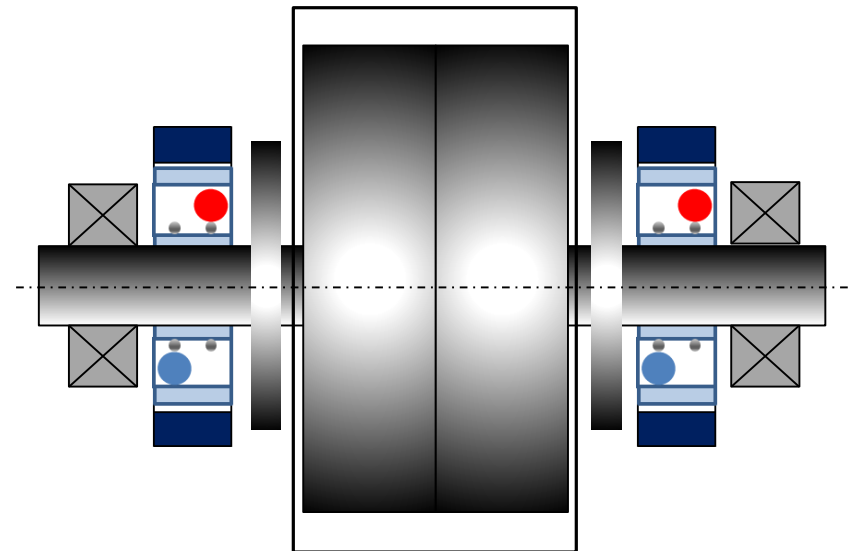
## AB 9000 Fan Application / Strategies

**One plane application**



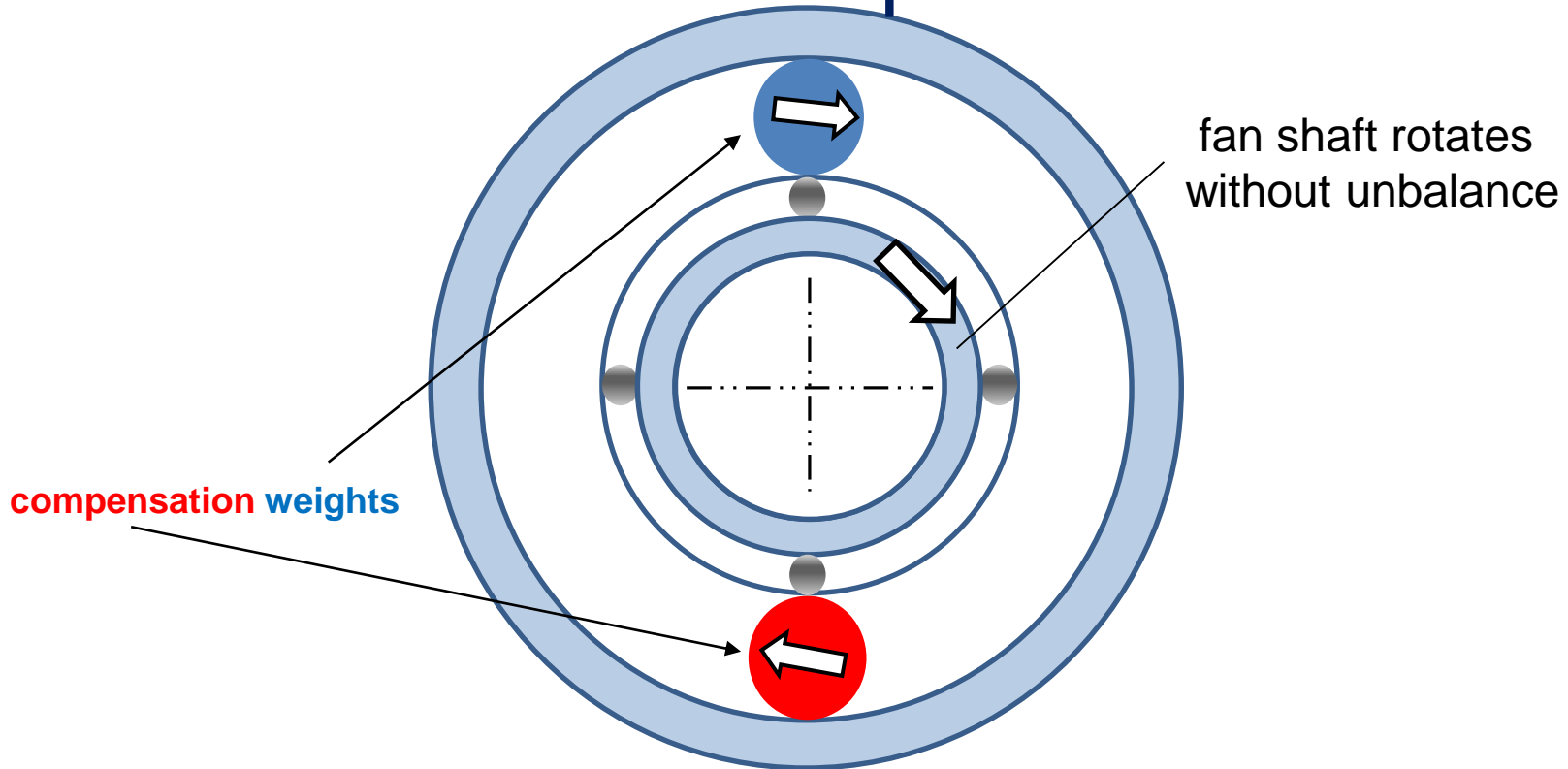
**single flow fan  
with one AB 9000  
balancing unit**

**Two plane application**

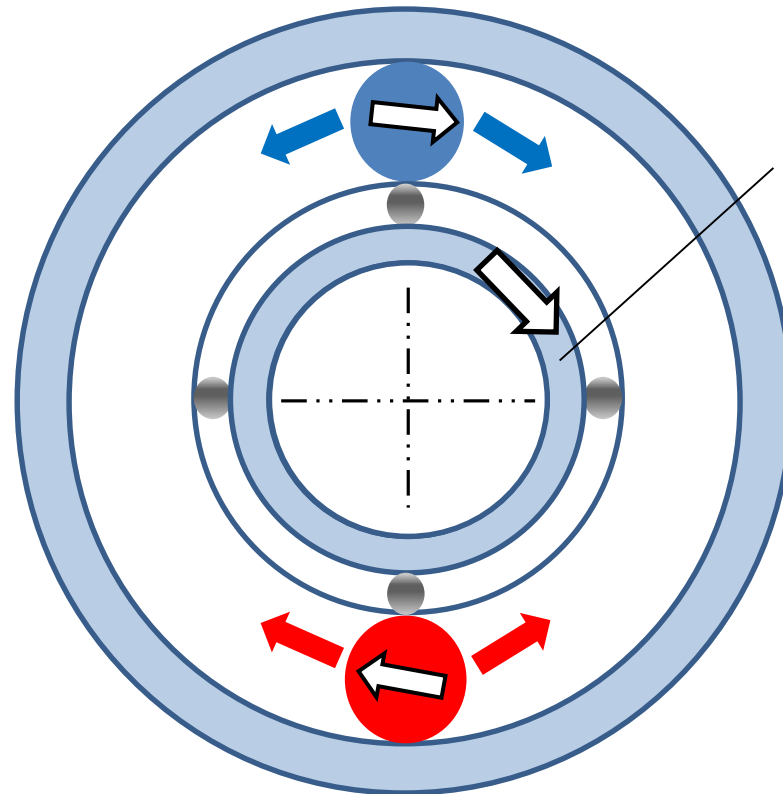


**double flow fan  
with two AB 9000  
balancing units**

## AB 9000 / Principle of Function

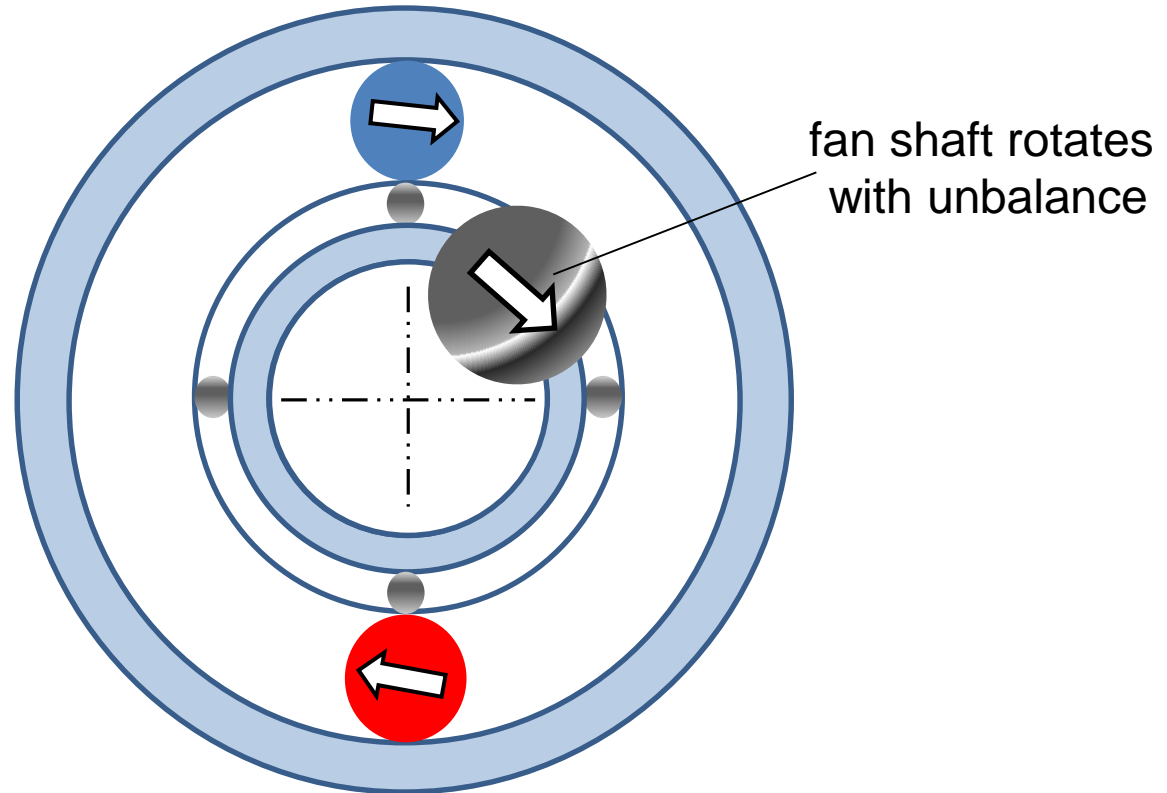


**compensation weights**  
compensate each other and rotate synchronously with the fan shaft

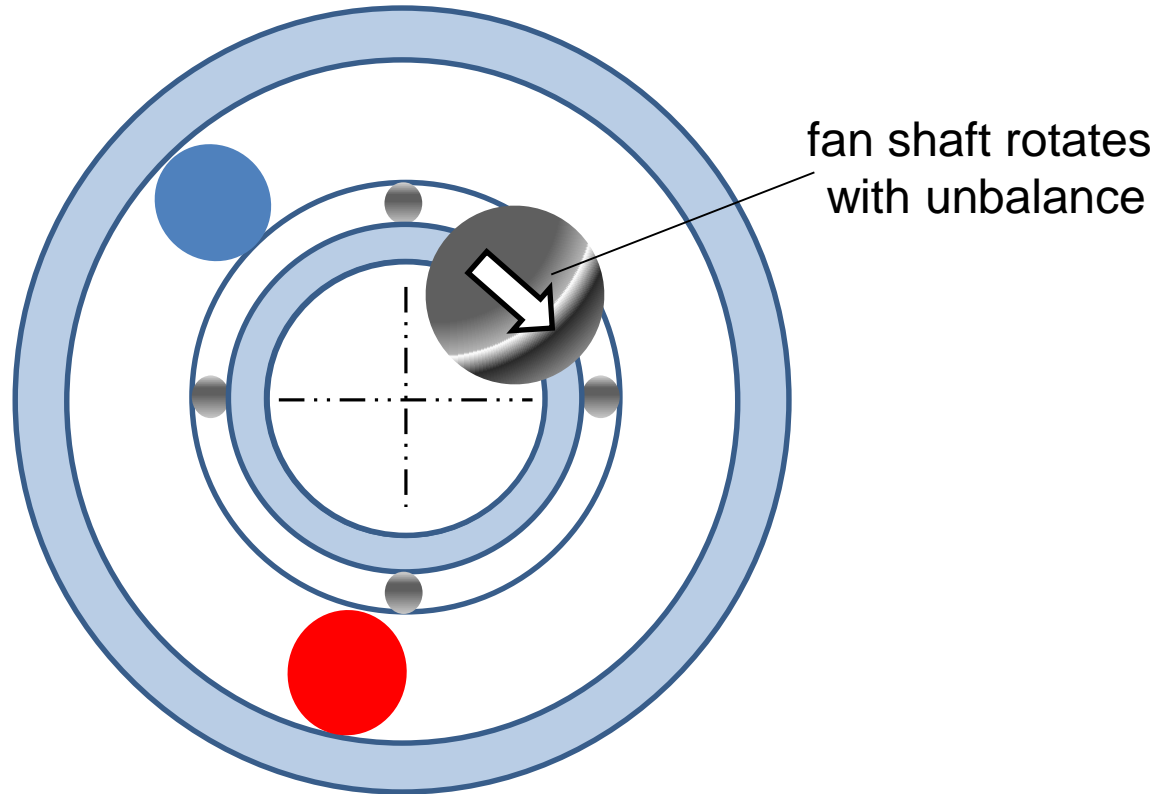


fan shaft rotates  
without unbalance

**compensation weights**  
are adjustable relative to the fan shaft

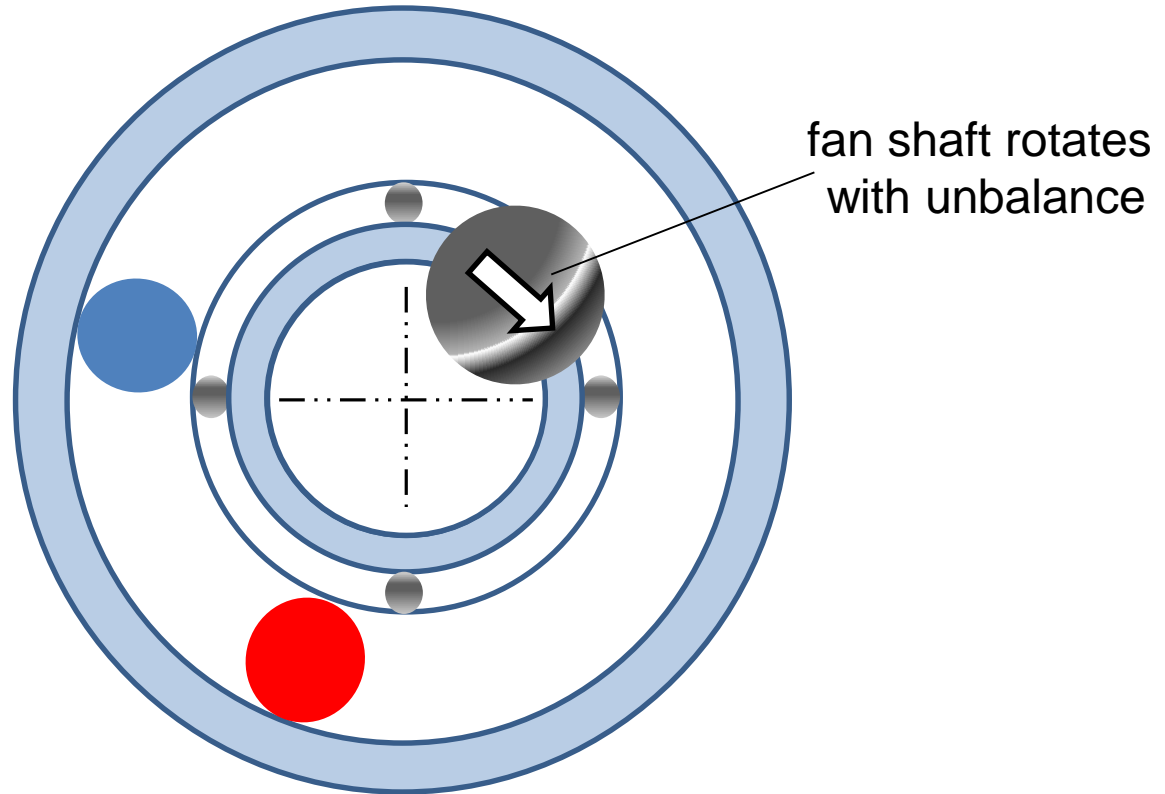


unbalance has to be measured  
positions of the **compensation weights** have to be calculated



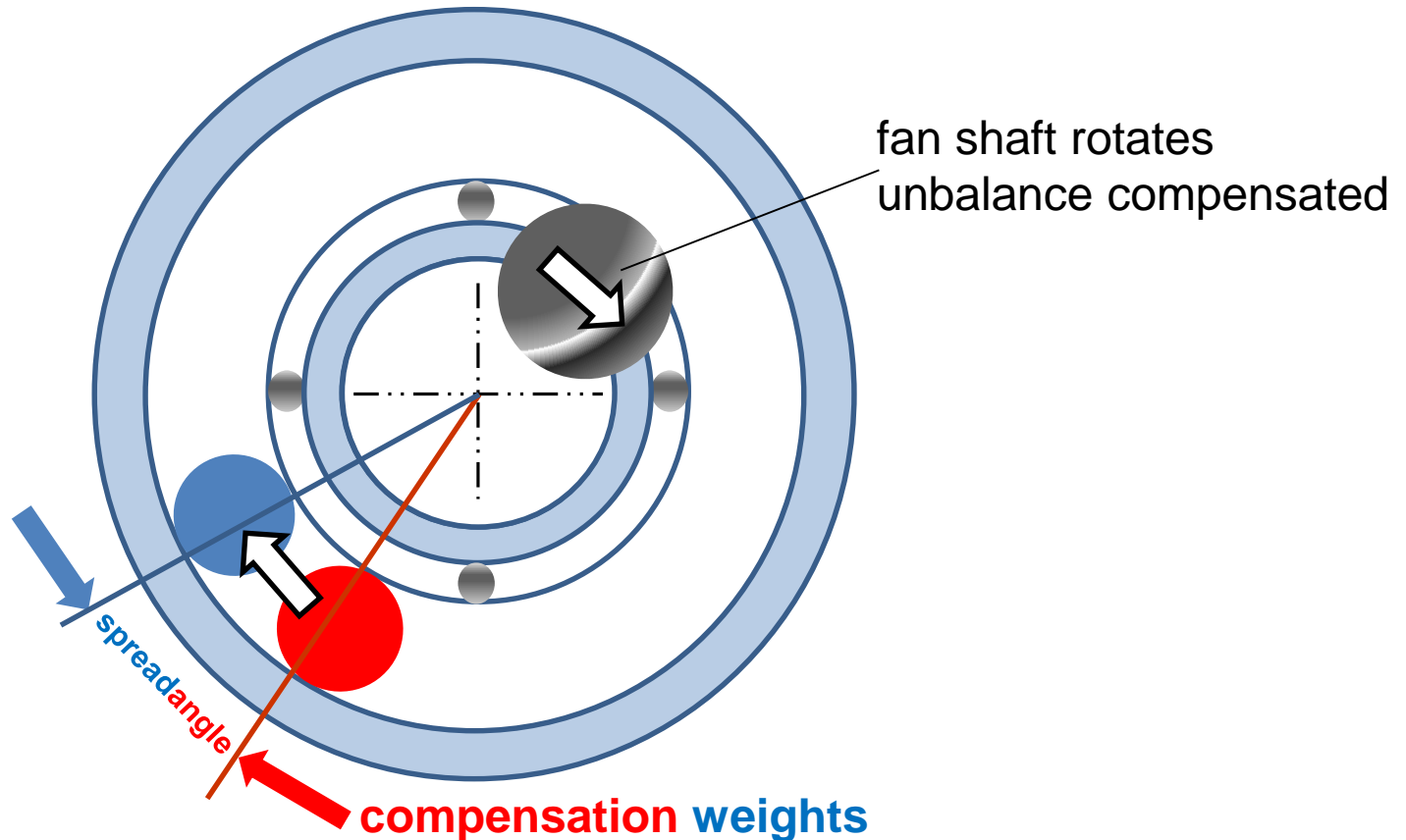
**compensation weights** are moved





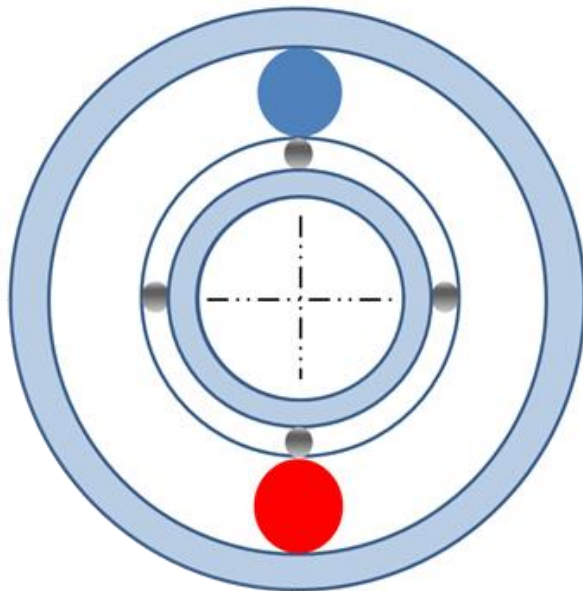
**compensation weights** are moved

## Unbalance correction is done according to Spread Angle Method

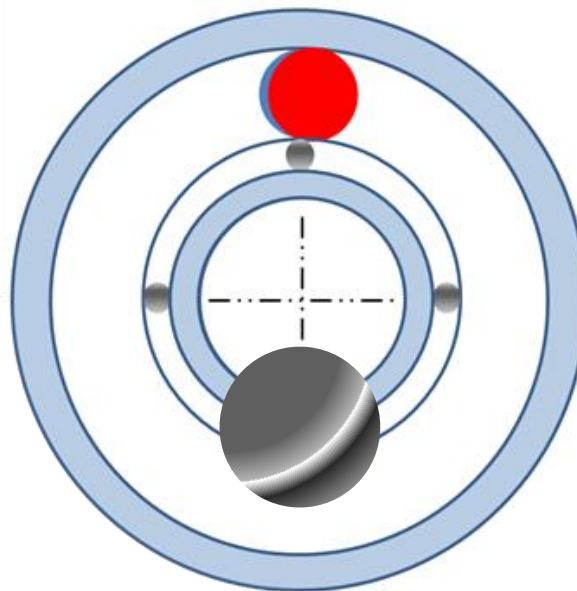


in balancing position rotate again synchronously with the fan shaft

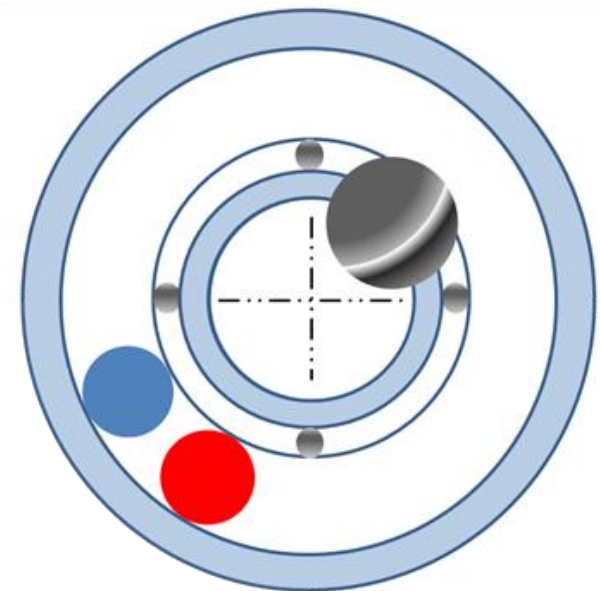
## AB 9000 Fan Application / Conditions



**neutralised**  
entire capacity  
available after  
cleaning of the fan



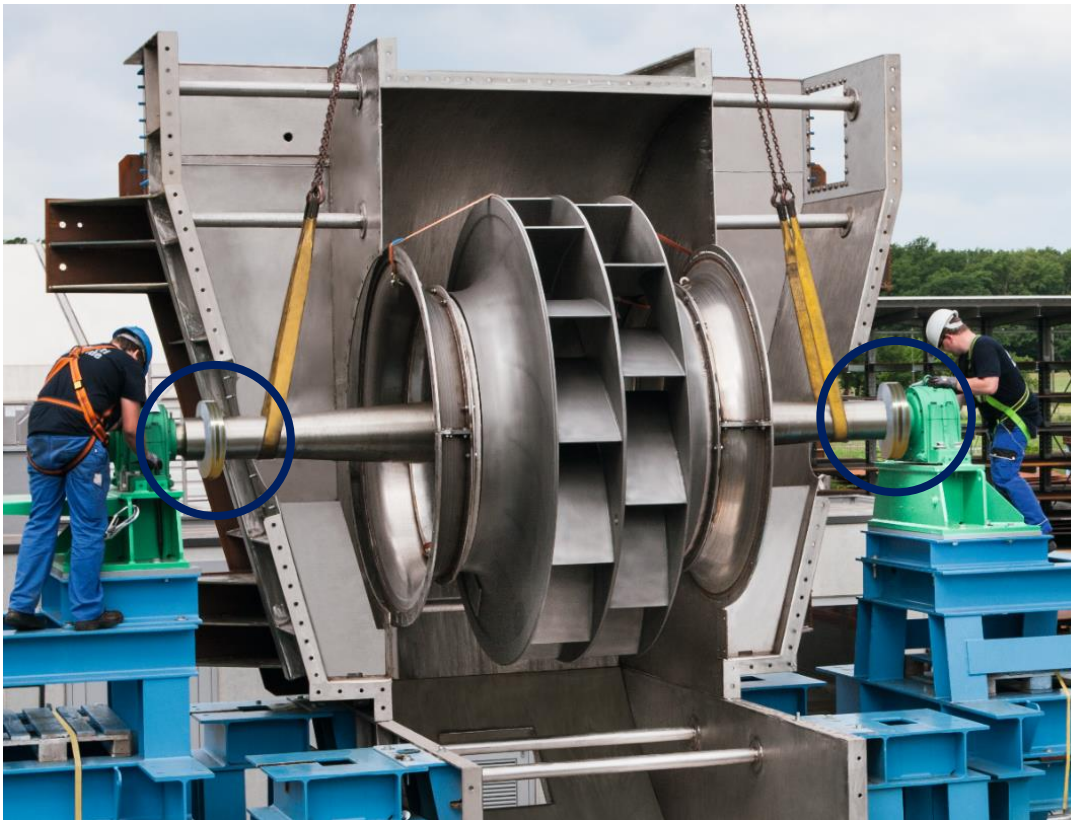
**maximum capacity  
reached**  
the fan must be cleaned



**unbalance corrected**  
operating condition

## AB 9000 Fan Application / Conditions

### AB 9000 Installation

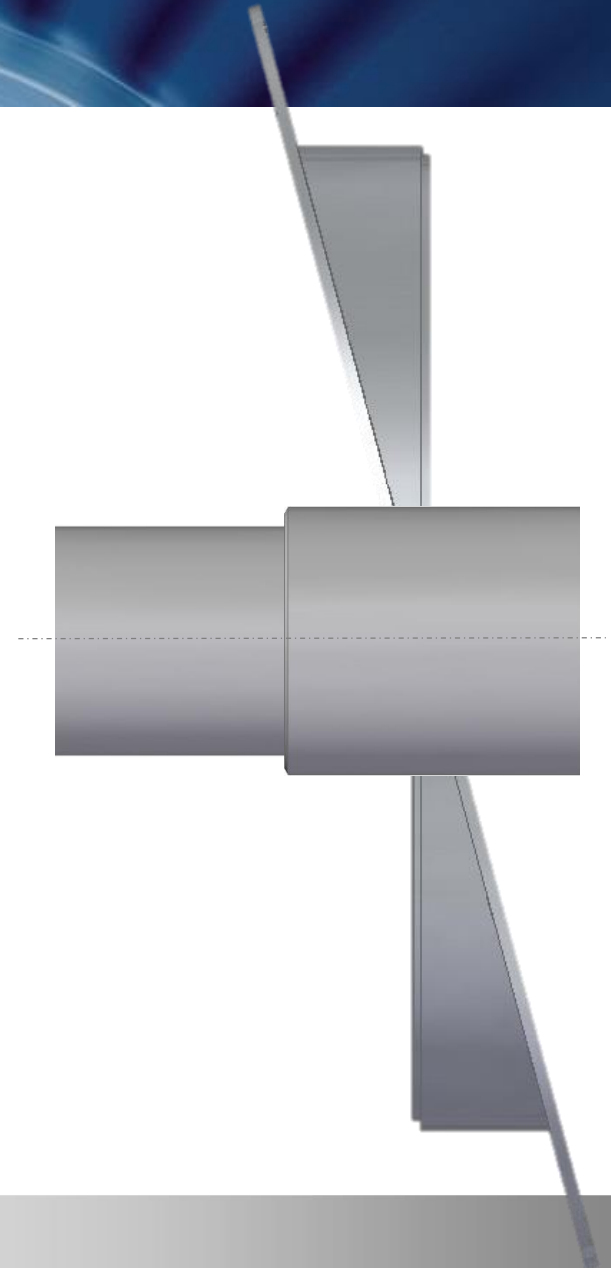


up to 3,24 kgm  
capacity per plane

# AB 9000 Fan Application / Integration

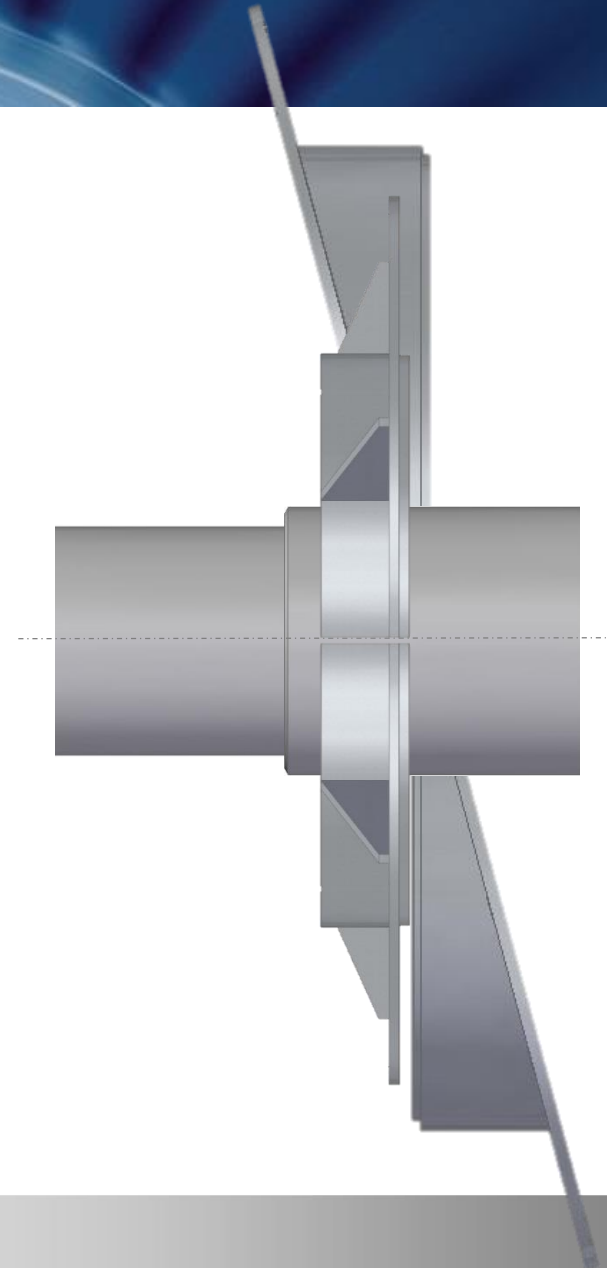
## Assembly Process

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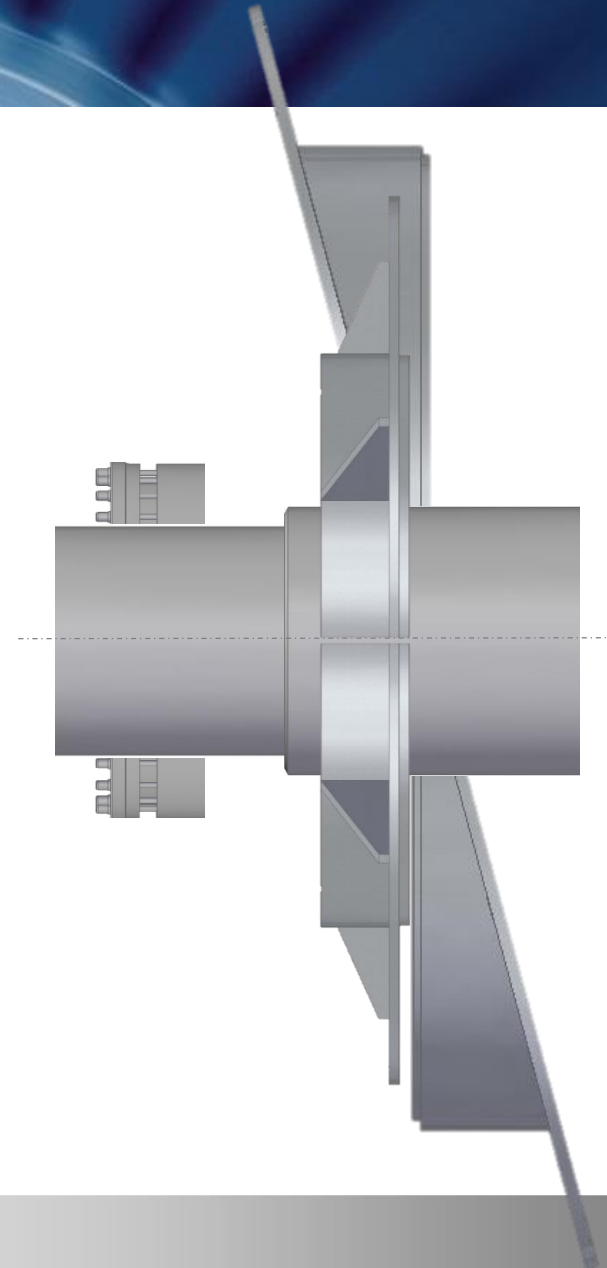
cooling disc (divided)



## Assembly Process

cooling disc (divided)

taper lock set for ...



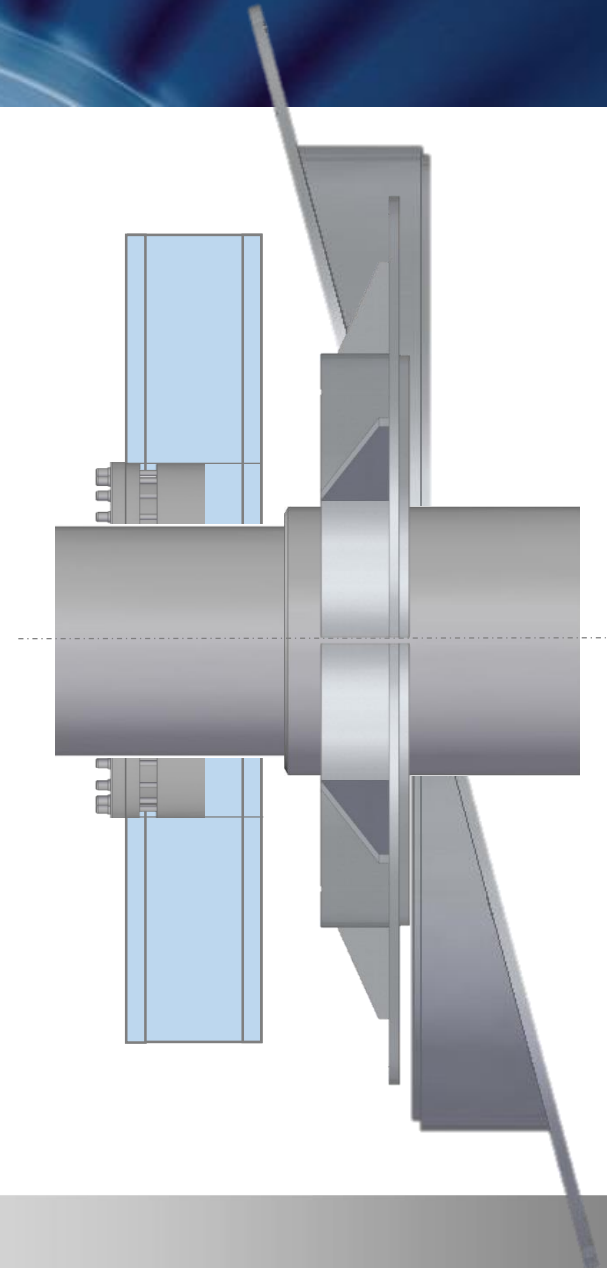


## Assembly Process

cooling disc (divided)

taper lock set for ...

... balancing ring



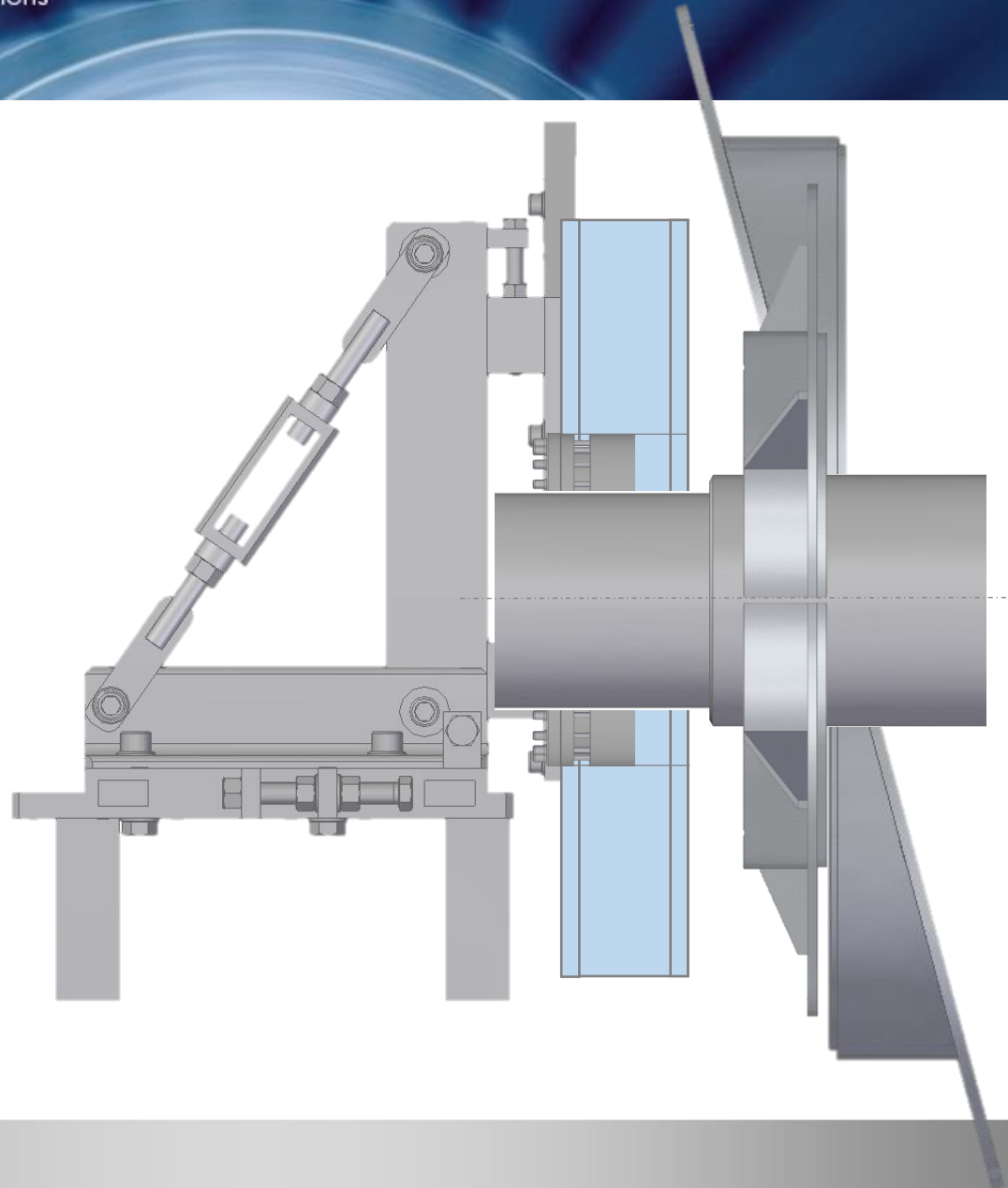
## Assembly Process

cooling disc (divided)

taper lock set for ...

... balancing ring

bracket for ...



## Assembly Process

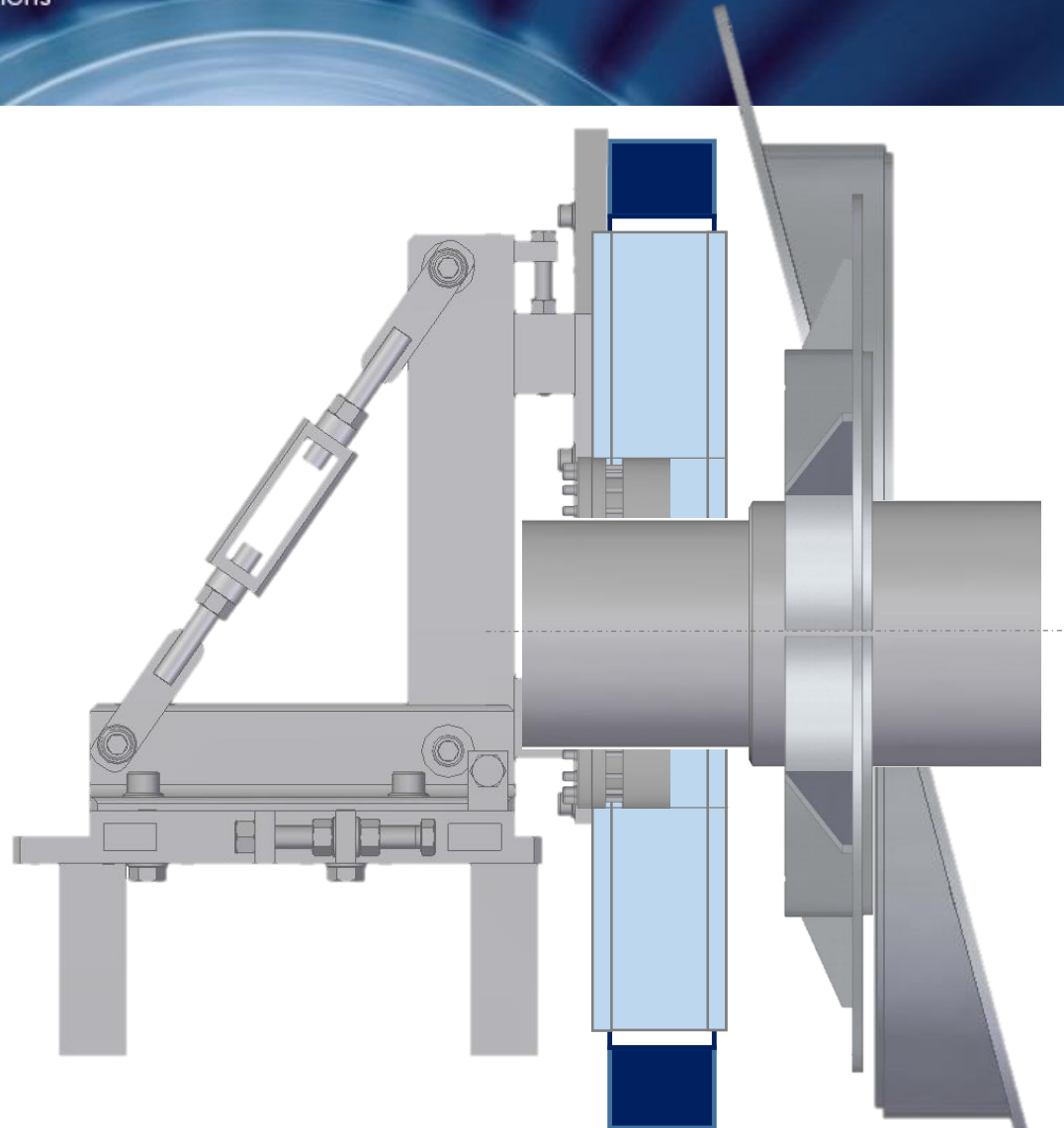
cooling disc (divided)

taper lock set for ...

... balancing ring

bracket for ...

... stator



## Assembly Process

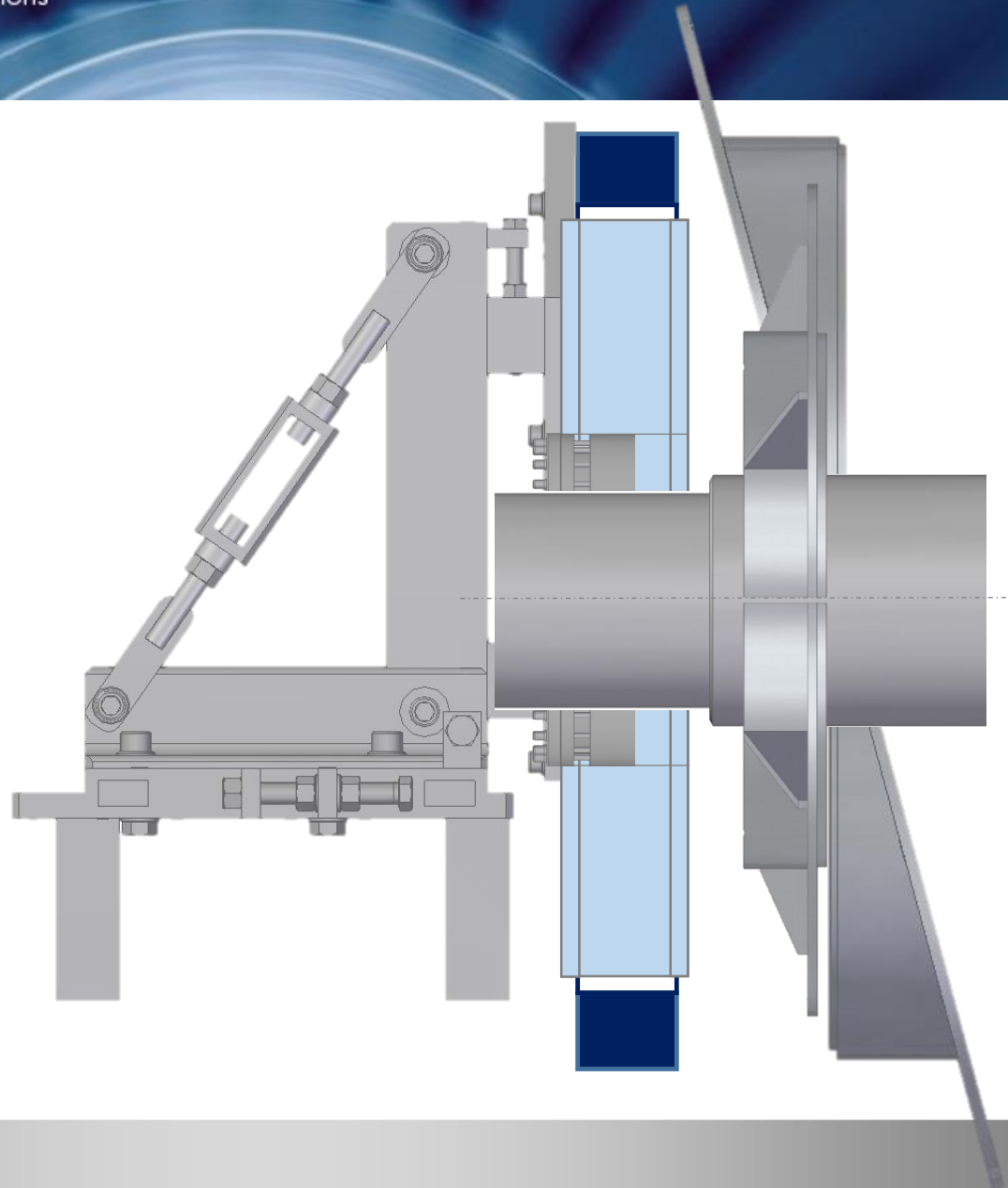
cooling disc (divided)

taper lock set for ...

... balancing ring

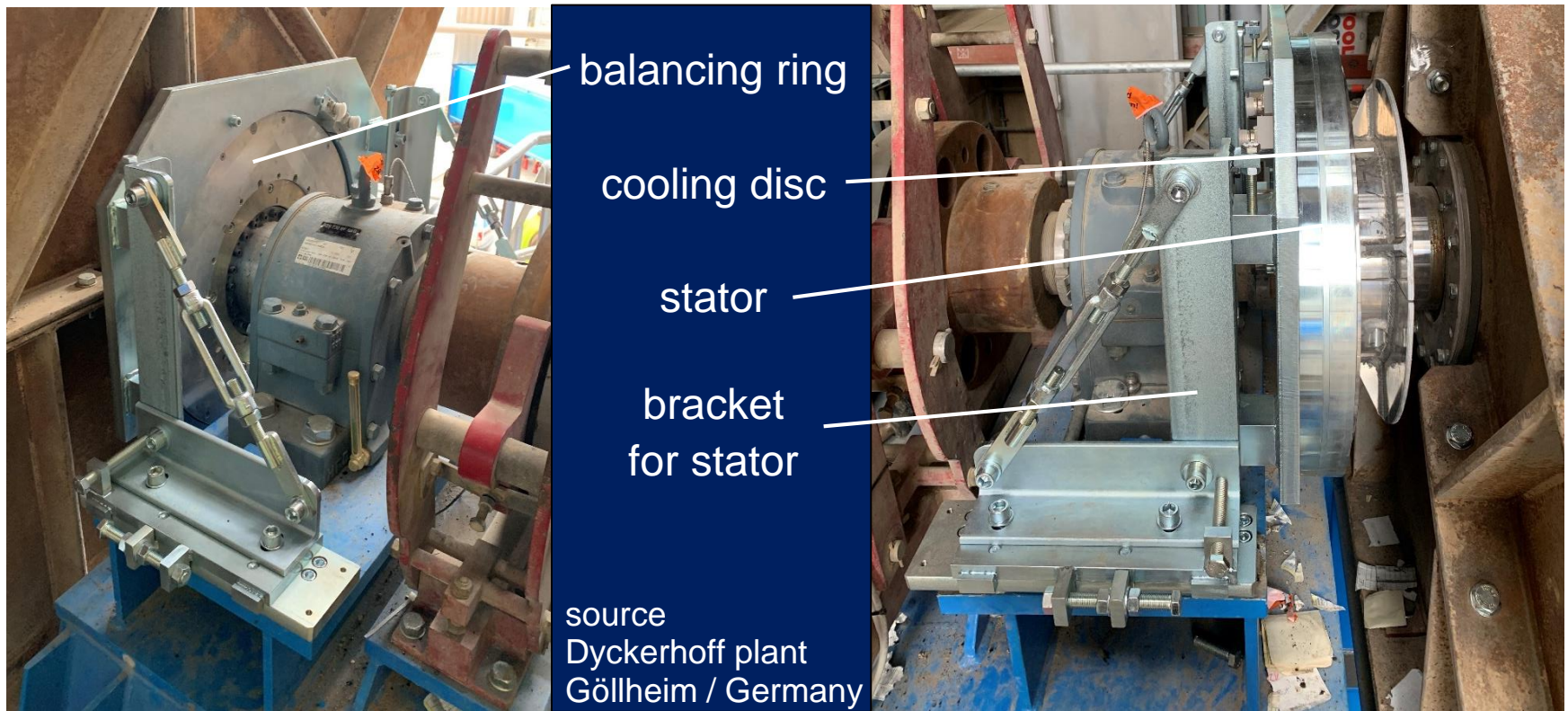
bracket for ...

... stator



## AB 9000 Fan Application / Integration

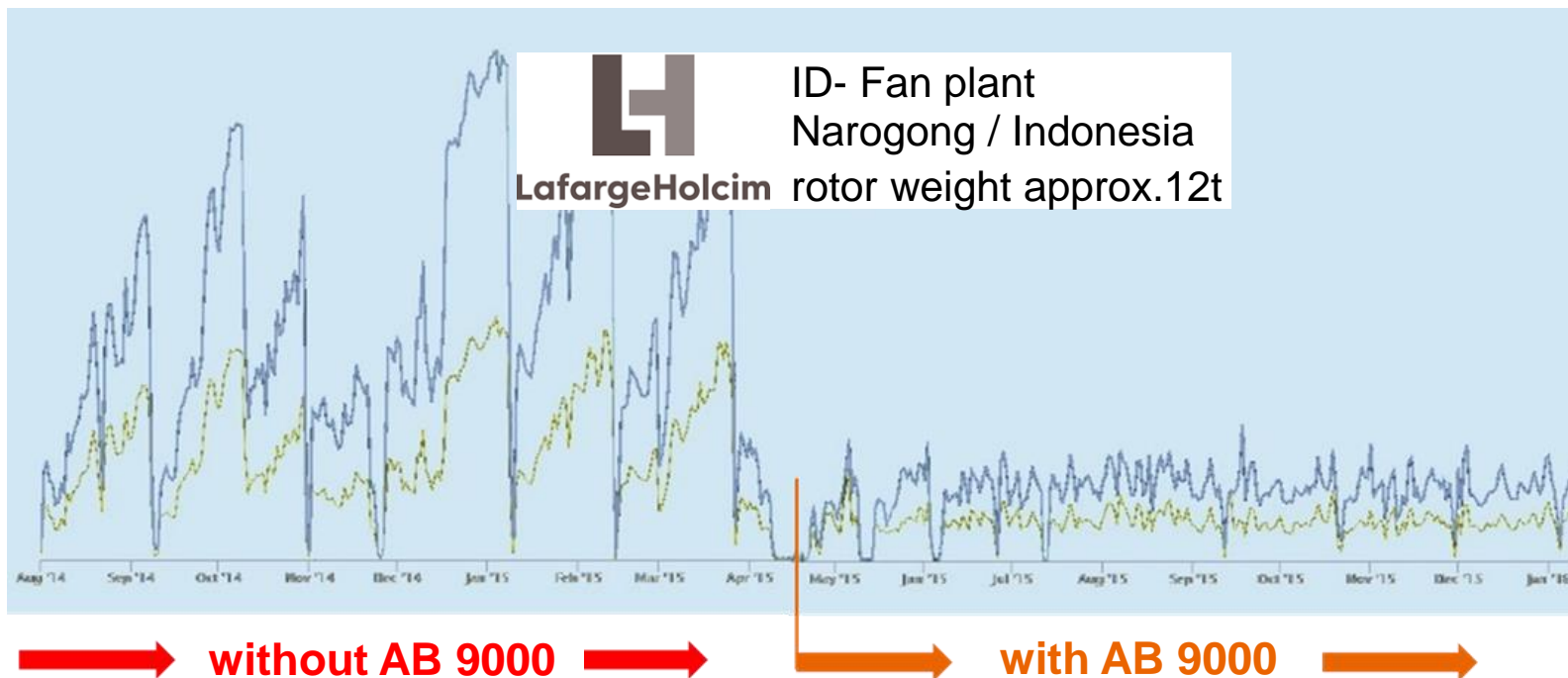
### AB 9000 Assembly on ID fan



## AB 9000 Fan Application / Benefit

### Optimised Vibration Behaviour of an ID Fan

- monitoring of bearing vibrations over 18 months



## AB 9000 Fan Application / Benefit

- ✓ low vibration level at fan and foundation structure
- ✓ reduced environmental load
- ✓ unbalance monitoring of the fan
- ✓ automatic unbalance correction if limit is reached
- ✓ balancing without fan shutdown
- ✓ retrofitting easily possible due to ring design
  
- ✓ **optimisation of the availability until the next scheduled maintenance stop**
- ✓ **short amortisation period of the investment**

## AB 9000

- ✓ **standardised product at the highest quality level**
- ✓ **optimal availability because of excellent process stability**
- ✓ **balancing in one and two planes at operating speed**
- ✓ **embedded controller / Windows independent**
- ✓ **HMI (user interface)**
  - ✓ **customized / Windows independent**
  - ✓ **optionally Windows based**
- ✓ **Profibus communication to**  
**plant control systems and fan controls**
- ✓ **conditional monitoring provided to **DALOG**® system**



## AB 9000 fan applications all over the world

### Well established in many Branches

- cement production
- titanium dioxide production
- steel and iron production
- woodchip- and fibreboard-  
production (MDF, HDF)
- waste incinerator plants
- pulp and paper industry
- ...



and many others



Kronos Titan



**Thank you for your attention**

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