



APPLICATION

Field balancing under difficult conditions

Analyzing vibration causes

Improving balance conditions

Increasing system availability



Fig. 1 - Cover: Supply air fan of the central air system of an administration building

Field balancing under difficult conditions

Increased machine vibration is an undesirable phenomenon that is detrimental to product quality, places components under additional strain and reduces operational reliability.

Imbalance is the most common cause of increased levels of vibration

Imbalance is usually found in fans, blowers, belt pulleys and couplings. All possible causes of imbalance on fans are listed in Fig. 2.

The purpose of balancing a machine under operating conditions is to reduce vibrations, strain, bearing forces and shaft deformation to acceptable levels. Using VIBXPERT®, PRÜFTECHNIK service & diagnosis specialists are able to detect and quickly eliminate imbalance even under difficult conditions. The balancing results are automatically compared to the evaluation criteria for the balance condition of rotating, rigid bodies as stipulated in the DIN ISO 1940 standard.

Examples of field balancing

Fig. 3 shows the hammer shaft in a lignite power plant. The application of a 7 kg balance mass improved its balance quality and reduced vibration velocities (with a rotor weight of around 25 t).

For service & diagnosis specialists, it is a matter of course that frequency spectra are analyzed for further irregularities as part of the field balancing procedure. After all, it only



Fig. 3: Shaft of a hammer mill

<p>Manufacturing defects</p> <ul style="list-style-type: none"> ⊗ Difference in fit between the balancing and ventilator shafts ⊗ Centrifugal force deformation ⊗ Blade sag ⊗ Blade cracks ⊗ Improper paintwork or coating ⊗ Strain from rotor disk weld <p>Installation errors</p> <ul style="list-style-type: none"> ⊗ Faulty axial blade mounting ⊗ Loose or tilted hub-to-shaft fit ⊗ Bent shaft seat ⊗ Imbalance on belt pulleys 	<p>Imbalance from operation</p> <ul style="list-style-type: none"> ⊗ Fouling on rotor disk ⊗ Local corrosion ⊗ Droplet erosion ⊗ Heat deformation ⊗ Wear from solids ⊗ Stray imbalances ⊗ Solid and fluid inclusions in hub shell <p>Imbalance from repairs</p> <ul style="list-style-type: none"> ⊗ Missing balancing masses ⊗ Imbalance on coupling ⊗ Improper paintwork or coating ⊗ Detached coating
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Fig. 2: Causes of imbalance

makes sense to continue balancing until the overall vibrations are reduced – see Fig. 4.

Fig. 5 depicts a typical balance report showing the balancing of a radial fan during operation. Vibrations of more than 30 mm/s were reduced to 1 mm/s by applying balance masses of around 155 g. Upon request, all results can be documented in separate measurement reports.

How long does field balancing take?

The measurement itself takes only a few minutes. The greatest portion of time is required to start up the machines, let them coast down, apply the balancing masses and attach and remove the cover panels. Specialists require four balancing runs at most.

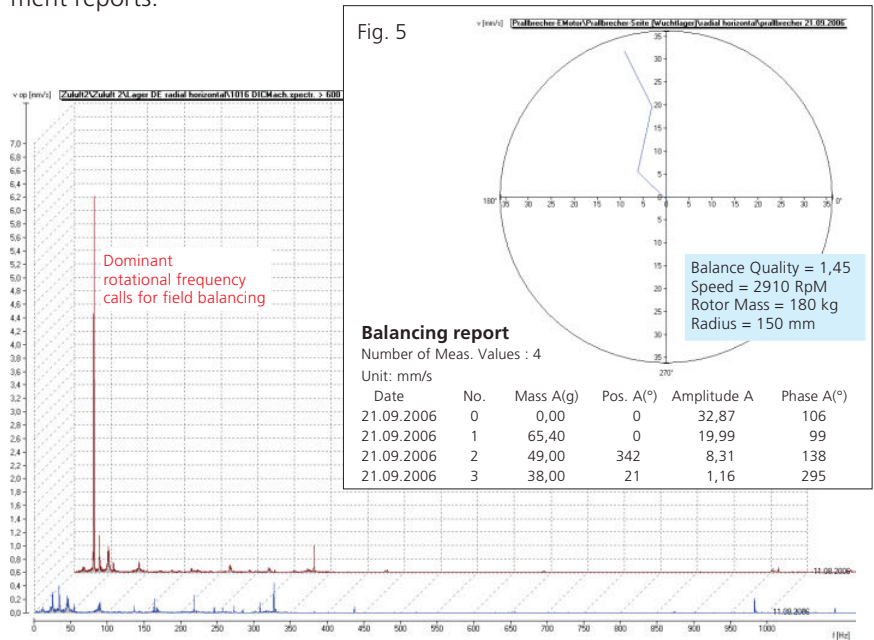


Fig. 4: Frequency spectrum of vibration velocity of two adjacent fans

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