



## Lacquers & Paints

### Suction systems - field balancing

case study

In addition to wear due to abrasion, fan wheels in suction systems in paint halls are also subject to irregular material and density distribution due to dust and paint mist build-up.

Over time, this change in mass distribution becomes noticeable through increased vibration values. A vibration and humming of the system is clearly noticeable and puts a particular strain on the roller bearings and the foundation. Accidental spalling of caking/material leads to particularly strong and sudden changes in the vibration behavior.

A thorough cleaning of the fan wheel becomes inevitable and it is usually dismantled for this purpose. The fan wheel is then rebalanced on a balancing bench. Anyone who now believes that everything is like new again and that the result is low-vibration running is unfortunately often disappointed. A lack of understanding about the poor result is then annoying for both sides and is usually associated with further financial expenditure.

The external service provider balanced the fan wheel perfectly according to DIN/ISO 1940 and even certified the desired balancing quality in a report. Unfortunately, the fan wheel does not work on its own. In order to fulfill its purpose, it must be mounted directly on a drive shaft or motor shaft.

In practice, additional, unavoidable errors occur during assembly due to fitting play. In addition, there are errors due to radial run-out and axial run-out deviations. 1) All of these errors cause the center of mass of the fan wheel to move outside the axis of rotation and make itself felt with renewed vibrations.

The only remedy here is the so-called "field balancing" on page 2



For many years, „Kaschub Karosserie + Lack“ has been a byword for solid craftsmanship in body construction and car painting. State-of-the-art suction systems are used to meet the high demands on the health of employees and the environment. A high system availability requires regular maintenance and care. This also includes cleaning the fan wheels from caking caused by dust and layers of paint mist. The subsequent operational balancing of the fan wheel together with the drive motor as a unit again guarantees low-vibration and safe operation of the system.

# Suction systems - field balancing

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Pic. 2/3) On the left, the drive motor for the fan wheel when installed. On the right the fan wheel mounted on the drive shaft of the motor.

**Field balancing means balancing the rotor while it is installed.**

The rotor is balanced as a whole with all its components (fan wheel, motor shaft, anchor). In practice, however, this means a different approach than on a balancing bench. Here, the bearing forces that occur can be measured directly using built-in force sensors in the bearings. From this, together with an integrated angle measurement (incremental encoder), the balancing weights and their angular position on the rotor for each bearing level can be calculated immediately after just one measuring run. This procedure is very effective and precise for series balancing of individual rotor parts.

During field balancing, the bearing forces must be determined indirectly, since no sensors can be placed in the force flow between the bearing and the shaft when the bearing is installed. The forces are determined via the resulting vibrations. For this purpose, one vibration sensor per bearing level (2-plane balancing) is mounted on the outside of the bearing shell or on the next fixed machine support with magnetic holders, clamping or screwing devices.

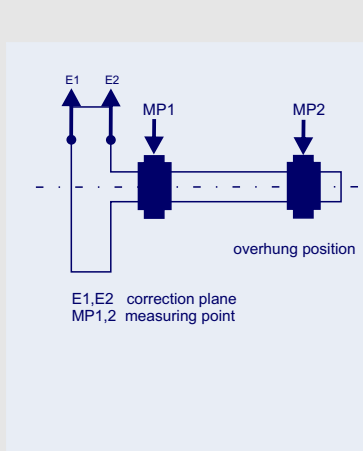


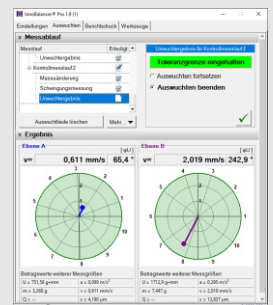
Fig. 5) Measurement position/planes



Pic. 6) Speed measurement

From these 3 runs (initial run, test run plane 1,2) the position and the weight for the balancing weights can be calculated. The software then specifies exactly where mass is to be removed or attached.

The "InnoBalancer" is there so that all of this can be carried out easily and comprehensibly. A module from the VibroMatrix software that makes field balancing routine. The user is guided through the process step by step and does not have to worry about the complex mathematics behind it.



Pic. 4) InnoBalancer-Modul

The necessary sensors, speed measurement, USB measuring device, cable and accessories are available as a complete set in the form of a measuring case for 1- and 2-plane field balancing from IDS Innomic for sale or rent.



VM-Set 01/02

## Benefit for the customer

You get perfect results in the shortest possible time and save additional costs for installing/removing and transporting the individual components.

A reflex sensor is also used to record the speed in relation to the highest amplitude of the measured rotational frequency. However, the amplitude of the measured vibration depends on the elasticity of the structure (roller bearing), so that with the same forces (imbalance -> centrifugal forces) and different rigidities of the construction, different high amplitudes of the vibrations occur.

All of these dependencies (residual unbalance after assembly, design of the motor mount, rigidity, bearing on the foundation and so on...) have an influence on the overall vibration behavior of the rotor.

When balancing in service, a so-called initial run (vibration measurement at a specified operating speed) is therefore carried out first. A test run with defined test weights at known angular positions is then carried out for each compensation plane.

