TM 170
Balancing apparatus

Description

- **representation of the fundamental processes involved in balancing**
- **static and dynamic imbalance**

Imbalances on rotating machines are often the cause of disruptive vibrations and noise. During imbalance, the principal axis of inertia or centre of gravity of the rotating machine component is outside its axis of rotation. By adding or removing masses, the centre of gravity or the principal axis of inertia can be shifted so that both coincide with the axis of rotation. This process is called balancing. The machine component is then balanced and runs without vibration.

The TM 170 experimental unit can be used to demonstrate imbalance and the balancing process clearly. The difference between a static and a dynamic imbalance can be shown. Imbalance is determined and balanced by appropriate measures.

The main element of the experimental unit is a smooth shaft to which four variable imbalance masses are attached at any angular and longitudinal position. The shaft is mounted on ball bearings. It is driven by a variable-speed electric motor and a belt. The speed of the shaft is displayed digitally.

In order to determine the imbalance, a defined external moment is applied via an additional pulley with weights. This moment is compared to the moment of the imbalance masses. A transparent cover protects against contact with rotating parts and allows a clear view of the shaft. Unwanted vibrations are suppressed by using an elastic bearing for the foundation.
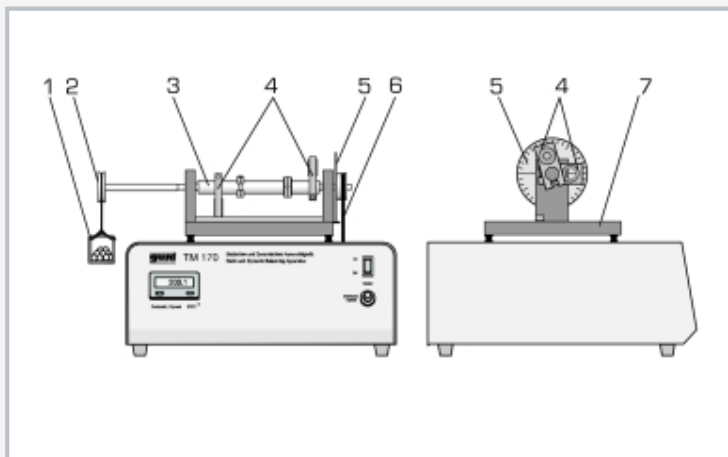
With the PT 500.04 accessory, the imbalance vibrations can additionally be recorded by acceleration sensors and the analysis software.

Learning objectives/experiments

- demonstration of imbalance vibrations at different speeds
- comparison of static, dynamic or general imbalance
- determine an imbalance
- perform a balancing operation

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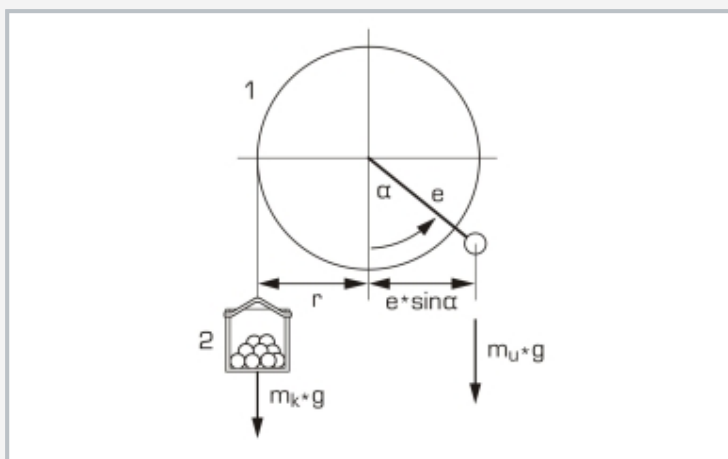Page 1/3 - 05.2022

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1 variable weight, 2 pulley, 3 shaft, 4 imbalance masses, 5 angular scale, 6 drive belt, 7 foundation with elastic bearing
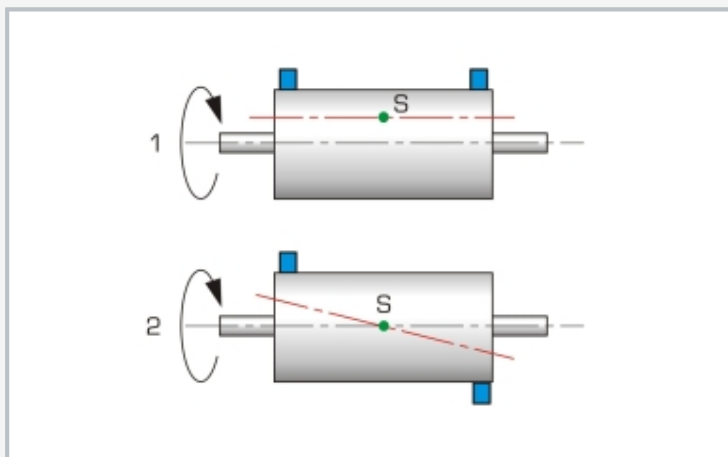
1 static imbalance, 2 dynamic imbalance; S centre of gravity; blue: mass distribution, red: principal axis of inertia

Determining imbalance:
1 pulley, 2 variable weight, r radius, e eccentricity, α angle of deflection, m_u mass of the imbalance, g gravitational acceleration, m_k mass of the variable weight

Optional accessories

052.50004	PT 500.04	Computerised vibration analyser
020.30009	WP 300.09	Laboratory trolley

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