FL 102
Determining the gauge factor of strain gauges

Description

- **measurement of deflection and strain**
- **determination of the gauge factor of strain gauges**

As universal aids to experimental stress and strain analysis, strain gauges enable mechanical strain to be converted into electrical signals. The signal obtained is processed by a strain measuring amplifier to give a display of the resulting strain.

It is expected that the quantity measured by a measuring device and the readout subsequently indicated are identical. Consequently, the planning and evaluation of measurements makes allowance for the sensitivity to elongation (gauge factor) of strain gauges. A key character value of strain gauges – the gauge factor – indicates the correlation between the strain and the change in resistance.

The FL 102 experimental unit is used to measure deformation by means of a dial gauge and at the same time to measure strain by means of four strain gauges in full bridge configuration. The gauge factor of the strain gauges is then calculated arithmetically from the measurements.

In the experiment, a bar is mounted on ball bearings at two points, thereby permitting purely bending stress to be applied. The bar is placed under load by means of a spindle and the resulting deflection is recorded by a dial gauge. As a result, the deformation can be read-off directly. At the same time the strain on the surface of the bar is recorded by two strain gauges on the compression side and two on the tension side. The strain gauges are wired in the full bridge. The measuring amplifier supplies the bridge supply voltage, and displays the load-dependent "bridge detuning" digitally in voltage values. The digital display also features a zero balancing function to allow for any preloading.

The unknown gauge factor, as a key characteristic, can then be calculated from the deflection ascertained by the strain gauge measurements.
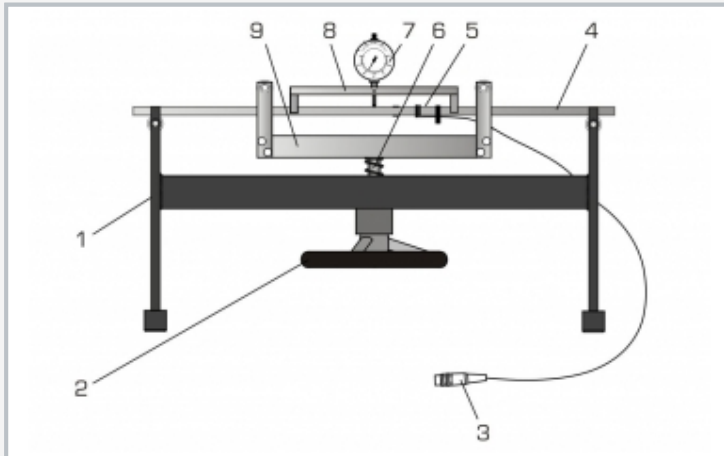
Practical fundamentals, such as gauge application and configuration to form a measuring bridge, can be easily integrated into the overall teaching concept.

Learning objectives/experiments

- fundamentals of measurement using strain gauges
- measurement of deflection using a dial gauge
- determination of the gauge factor of strain gauges

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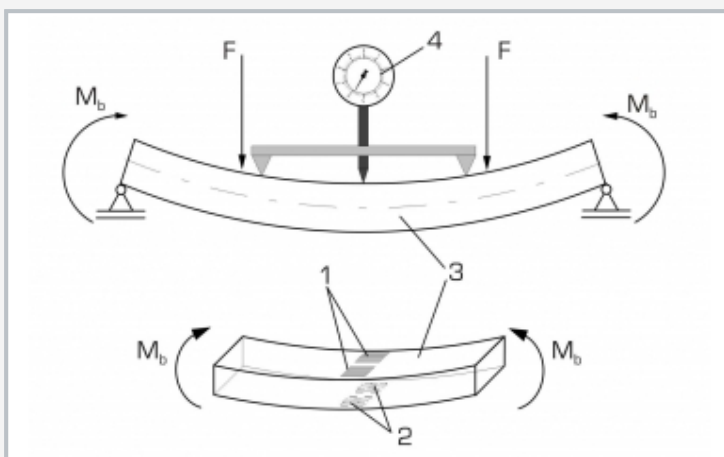Page 1/3 - 10.2017

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1 base frame, 2 handwheel, 3 connection to measuring amplifier, 4 bending bar, 5 strain gauge measuring point, 6 spindle, 7 dial gauge, 8 fixture for dial gauge, 9 cross-arm
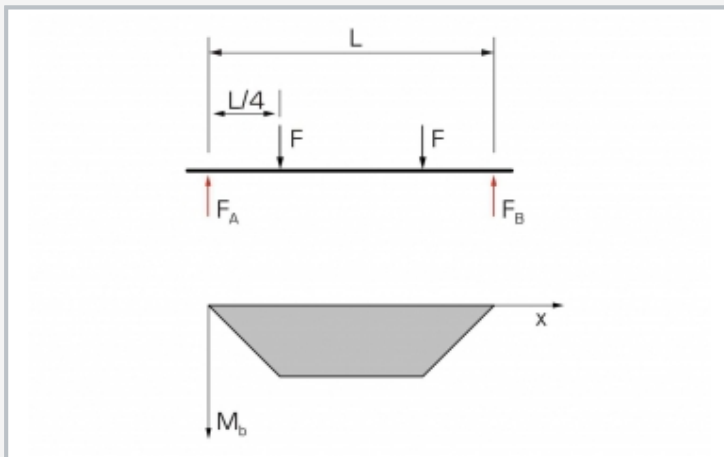
Force and bending moment characteristic on the bending bar: black: applied force, red: support reactions

1 strain gauge on top of bar (compression side), 2 strain gauge on underside of bar (tension side), 3 bending bar, 4 dial gauge; M_b bending moment, F applied force

Specification

[1] investigation of deflection and strain to determine gauge factor
[2] bending bar with 2 strain gauges on the compression side and tension side respectively
[3] strain gauge configured as full bridge
[4] 2-point ball bearing mounting of bar permits purely bending load application
[5] mechanical load application device with spindle, handwheel and cross-arm
[6] dial gauge with adjustable dial for direct measurement of deflection
[7] measuring amplifier with 4-digit digital display

Technical data

Bending bar made of steel: 660x25x12mm

Strain gauge application
- full bridge, 350 Ohm
- 2 strain gauges on the top and underside of the bar respectively

Amplifier
- measuring range: ±2mV/V
- resolution: 1µV/V
- zero balancing adjustment range: ±1mV
- supply voltage: 10VDC

Dial gauge
- 0...20mm
- graduation: 0,01mm

230V, 50Hz, 1 phase
230V, 60Hz, 1 phase, 120V, 60Hz, 1 phase
UL/CSA optional
LxWxH: 660x200x430mm
Weight: approx. 20kg

Scope of delivery

1 experimental unit
1 measuring amplifier
1 set of accessories
1 set of instructional material

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Optional accessories

020.30009	WP 300.09	Laboratory trolley

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