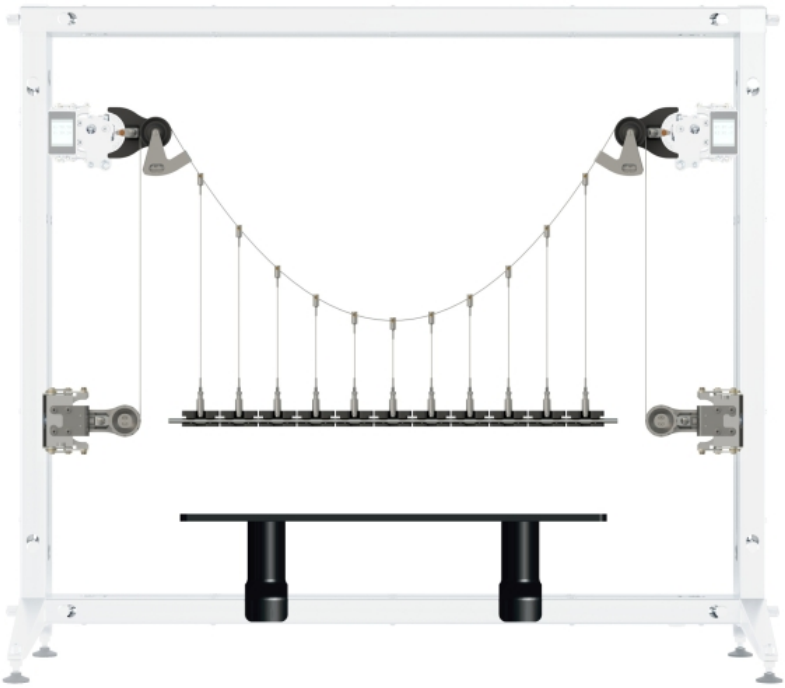
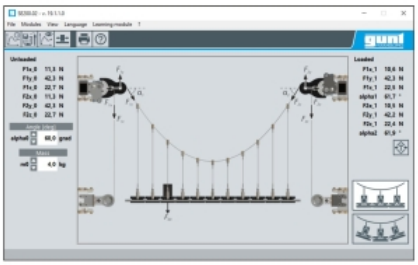
SE 200.02

MEC - Forces on a suspension bridge





Description

- **wireless setup of a suspension bridge together with smart, communication-enabled accessories**
- **experiments with rigid or flexible roadway**
- **click system for easy setup and reconfiguration**
- **automatic identification in the GUNT software and assignment of optional loads**

Suspension bridges consist of sagging suspension cables to which a walkway or roadway is attached. They are used to span long distances.

SE 200.02, in combination with other accessories of the MEC Line, enables the smart, digitally supported experimental setup of a suspension bridge. The experiment includes a suspension bridge with hangers and a horizontal roadway. Supports and loads are available as smart accessories. The experimental arrangement is set up in the SE 200 mounting frame. The stainless steel mounting frame provides direct and wireless data transmission and power supply for the smart components. The click system ensures the components easily snap into place.

A load can be placed at each of eleven positions on the roadway. By combining several load elements, it is possible to generate distributed loads or the prefabricated distributed load can be used. It is also possible to investigate a moving load.

The roadway is flexible and can assume a rigid behaviour by using rods. In experiments, the forces on the supports and the loads are measured and displayed as a measured value both directly on the smart components and in the GUNT software. The exact position of the loads on the roadway is recorded using a binary code (Gray code). The GUNT software identifies the position and location of the applied loads and reacts dynamically to changes. The angle of application of the forces is displayed directly on the suspension cable. The suspension cable forces on the supports are calculated and also displayed in the GUNT software. The measured values are analysed in real time.

A support for the bridge as a setup aid and when taring the weights makes the unit easier to handle. All components are clearly laid out and well protected in a storage system.

Learning objectives/experiments

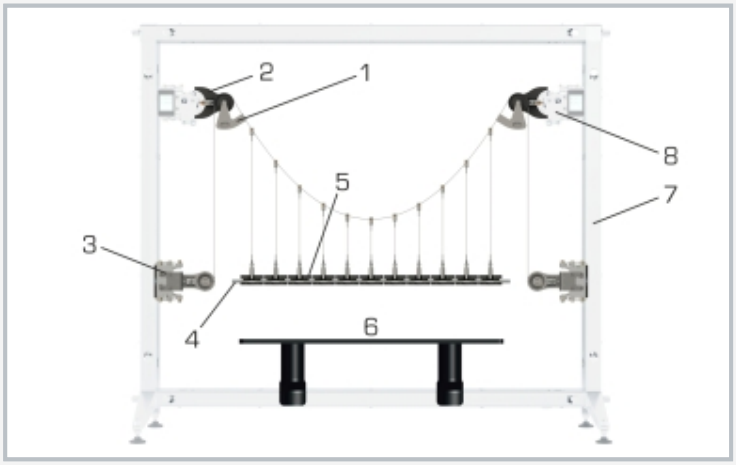
- measurement of the suspension cable forces on a
  - ▸ unloaded suspension bridge
  - ▸ loaded suspension bridge
- measurement of the support forces as a function of the loading on the suspension bridge
- effect of a moving load
- behaviour of a suspension bridge with a rigid or flexible roadway
- accessories of the MEC Line can be combined in a modular way for setup and extension of the experiments

GUNT Science Media Center, develop digital skills

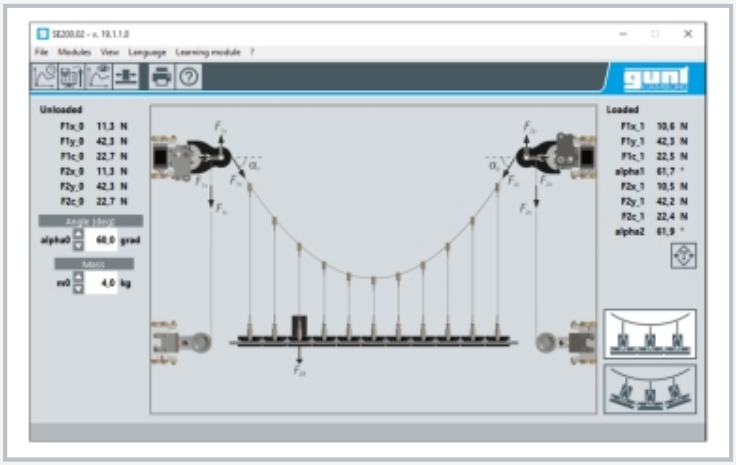
- retrieve information from digital networks
- E-Learning course with fundamental knowledge and detailed presentation of the experiment procedure and engaging animations
- assured learning success through digital worksheets

SE 200.02

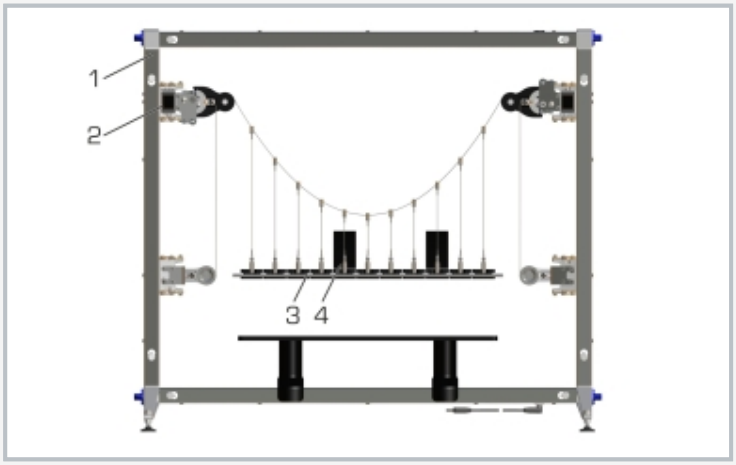
MEC - Forces on a suspension bridge



1 angle measurement, 2 deflection for mounting on support, 3 clamping device for suspension cable, 4 rods for stiffening the roadway, 5 roadway with 11 sections, 6 support for taring and as assembly aid; accessories: 7 mounting frame SE 200, 8 support SE 200.21



GUNT software screenshot: display of support and cable forces as well as the suspension cable angle at the supports



Setup example: 1 mounting frame SE 200, 2 two supports SE 200.21, 3 stiffened roadway, 4 two loads SE 200.25

Specification

[1] measurement of the support forces on a suspension bridge under different loads
[2] flexible roadway can be stiffened with metal rods
[3] display of the angle of application of the force directly on the suspension cable
[4] automatic identification and exact position detection of the loads on the roadway by means of a binary code (Gray code)
[5] setup of the entire experiment arrangement in the SE 200 mounting frame
[6] click system for simple, fast experimental setup without cabling
[7] support for the bridge serves as a setup aid and for taring the weights
[8] additional loads available as accessories
[9] display of measured values and visual representation of the forces in the GUNT software
[10] GUNT software via USB under Windows 10
[11] digital multimedia teaching material online in the GUNT Science Media Center: E-Learning course, worksheets

Technical data

Bridge sections
- 11 pieces
- each 1 holder for positioning the load

Roadway length: 658mm

Roadway stiffening: 2 stainless steel rods

Support for bridge: LxWxH: 672x110x167mm

LxWxH: 800x600x200mm (storage system)
Weight: approx. 19kg (total)

Required for operation

Accessories from the GUNT MEC Line series, PC with Windows recommended

Scope of delivery

1 suspension bridge
1 support (setup aid, for taring)
1 GUNT software
1 set of instructional material
1 online access to GUNT Science Media Center
1 storage system with foam inlay

SE 200.02
MEC - Forces on a suspension bridge

Required accessories

SE 200	MEC - Frame digital & smart
2x	
SE 200.21	MEC - Support

Optional accessories

min. 1, max. 2	
SE 200.25	MEC - Load
max. 1	
SE 200.26	MEC - Distributed load