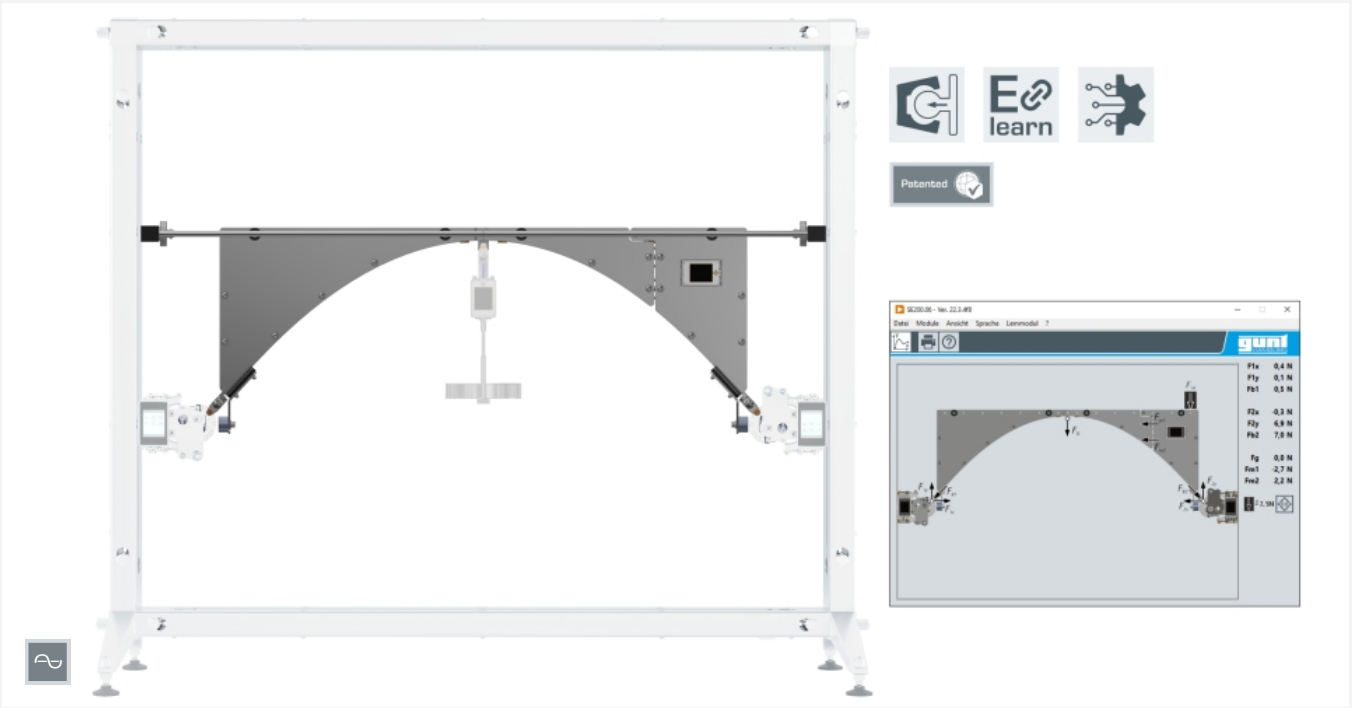
# SE 200.06
## MEC - Three-hinged arch




## Description

- **wireless setup of a statically determinate three-hinged arch together with smart, communication-enabled accessories**
- **symmetrical or asymmetrical setup possible**
- **click system for easy setup and reconfiguration**
- **automatic identification in the GUNT software and assignment of optional loads**

Three-hinged arches are commonly used in bridge construction. A three-hinged arch consists of a curved beam that is mounted on two fixed bearings and usually contains the crown hinge at the crown. The system is statically determinate due to the crown hinge.

SE 200.06, in combination with other accessories from the MEC Line, enables the smart, digitally supported experimental setup of a three-hinged arch. The experiment contains two large and one small partial arch. Two partial arches are hinged together to form a symmetrical or an asymmetrical three-hinged arch. A partial arch is cut at a defined point and fitted with an electronic module for measuring the forces and displaying measured values.

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.

The three-hinged arch being studied can be loaded with individual loads, line loads and in the centre with a vertical load. It is also possible to investigate a moving load. The forces on the supports and loads are measured and the display is shown directly on the smart components in experiments. The bending moment The measured value is calculated and displayed in the GUNT software.

The GUNT software identifies the position and location of the applied loads and reacts dynamically to changes. The visualisation in the software corresponds to the actual three-hinged arch. The analysis is performed in real time.

All components are clearly laid out and well protected in a storage system.

## Learning objectives/experiments

- familiarisation with three-hinged arches (asymmetrical and symmetrical)
- establishment of the conditions of equilibrium in statics for calculating the support forces for
  - point load
  - moving load
- measurement of internal forces on a beam, clamped on one end, and three-hinged arch
- influence of the load on the horizontal thrust in the supports
- determination of the lines of influence for the supports under a moving load
- comparison of the calculated and measured support reactions for static load and moving load
- accessories of the modular MEC Line can be combined for any setup and extensions of the experiments

GUNT 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

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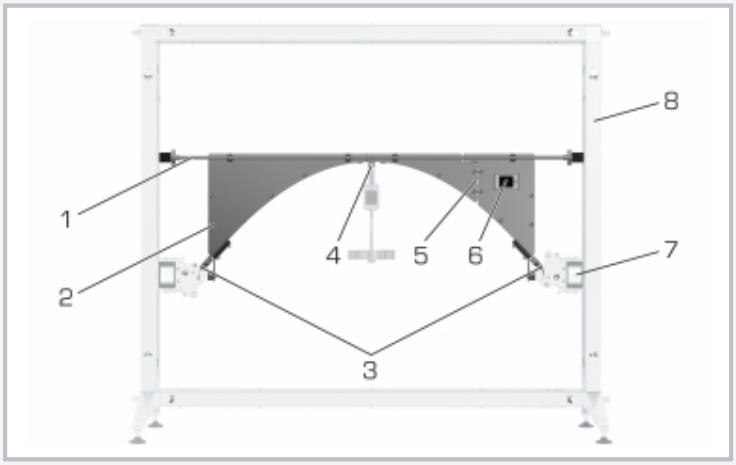
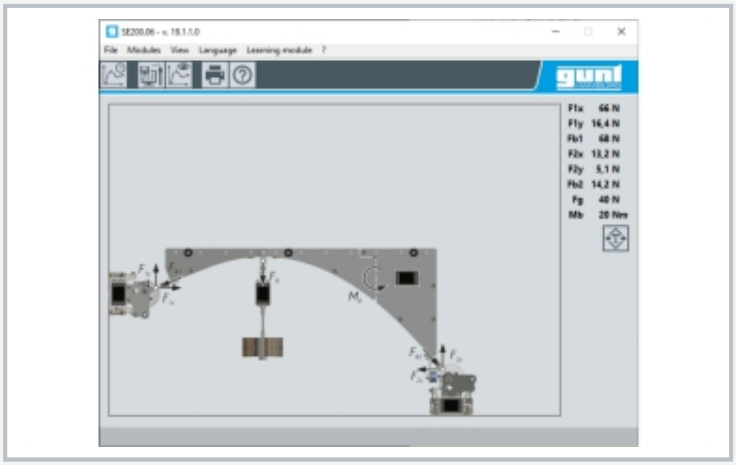
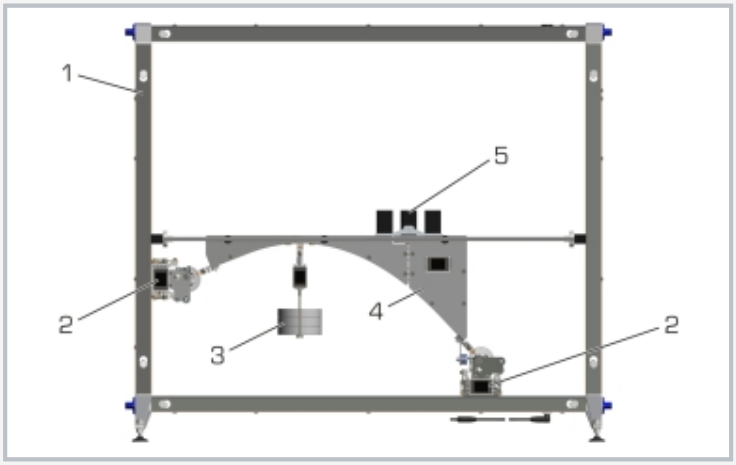



1 strut, 2 three-hinged arch: symmetrical setup, 3 holder for support, 4 holder for vertical load, 5 measurement of the forces, 6 electronic module with display, 7 support SE 200.21, 8 mounting frame SE 200



Screenshot of the GUNT software: automatically transmitted experimental setup, display of measured forces




Setup example: 1 mounting frame SE 200, 2 support SE 200.21, 3 vertical load SE 200.24, 4 three-hinged arch: asymmetrical design, 5 line load SE 200.26

## Specification

[1] measurement of the support forces of a three-hinged arch under different loading
[2] three partial arches for setting up a symmetrical or asymmetrical three-hinged arch or a beam, clamped on one end
[3] one partial arch fitted with electronic module for measuring the forces with direct display
[4] calculation and display of the bending moment in the GUNT software
[5] setup of the entire experiment arrangement in the SE 200 mounting frame
[6] click system for simple, fast experimental setup without cabling
[7] loading of the three-hinged arch with optional individual loads (including as moving load), line load, vertical load
[8] automatic identification and exact position detection of the loads on the roadway by means of a binary code (Gray code)
[9] display of the measured values and visual representation of the forces in the GUNT software
[10] GUNT software via USB under Windows 11
[11] digital multimedia teaching material online in the GUNT Media Center: E-Learning course, worksheets

## Technical data

Number of partial arches: 3

Holders for positioning loads
- symmetrical three-hinged arch: 14
- asymmetrical three-hinged arch: 11

Roadway lengths
- symmetrical three-hinged arch: 800mm
- asymmetrical three-hinged arch: 620mm

Measuring ranges
- bending moment: 0...10Nm

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

## Required for operation

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

## Scope of delivery

3 partial arches for setting up a three-hinged arch
1 GUNT software
1 set of instructional material
1 online access to the GUNT Media Center
1 storage system with foam inlay

# SE 200.06
## MEC - Three-hinged arch

Required accessories

| | |
|---|---|
| SE 200 | MEC - Frame digital & smart |
| 2x | |
| SE 200.21 | MEC - Support |
| min. 1, max. 2 | |
| SE 200.25 | MEC - Load |

Optional accessories

| | |
|---|---|
| max. 1 | |
| SE 200.24 | MEC - Vertical load |
| max. 1 | |
| SE 200.26 | MEC - Line load |