

## SE 110.12 *Lines of Influence on the Gerber Beam*



The picture shows SE 110.12 in a the frame SE 112.

- \* **Articulated beam with two cantilever beams and a suspended beam as an example of a typical bridge**
- \* **Direct indication of reactions**
- \* **Lines of influence for different load cases**

### Technical Description

Many bridges are executed as Gerber beams. Bridges are subjected to moving loads. Consequently, it is important to take these moving loads into account in the design process. To that end, the so-called lines of influence are determined. Lines of influence describe static reactions to a moving load, such as the internal reactions of the beam or support reactions. The lines of influence are determined by way of method of sections and the conditions of equilibrium, in the same way as the bending moment diagram for a static load for example.

A Gerber beam is an articulated beam, in the case of SE 110.12 with two cantilever beams and a suspended beam between them. Two bearings support each cantilever beam. The suspended beam is mounted on articulated supports on each of the cantilever beam arms. As a result the entire beam is statically determinate.

The cantilever beam supports are equipped with force gauges which indicate the support reactions.

Single weights and a moving load are provided to place load on the beam. This means the beam can be subjected to point or distributed loads, or to a moving load. The force gauges indicate the effect of a moving load directly in the support reactions. The supports are movable.

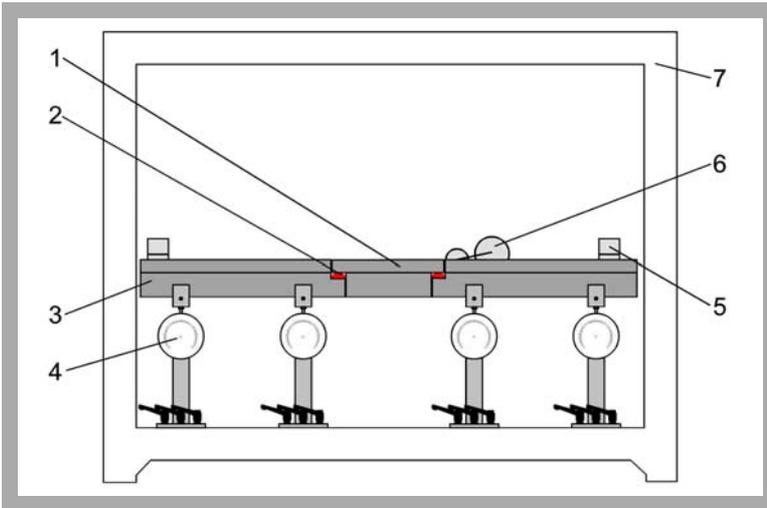
The various elements of the experiment are clearly laid-out and housed securely in a storage system. The complete experimental set-up is arranged in the frame SE 112.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

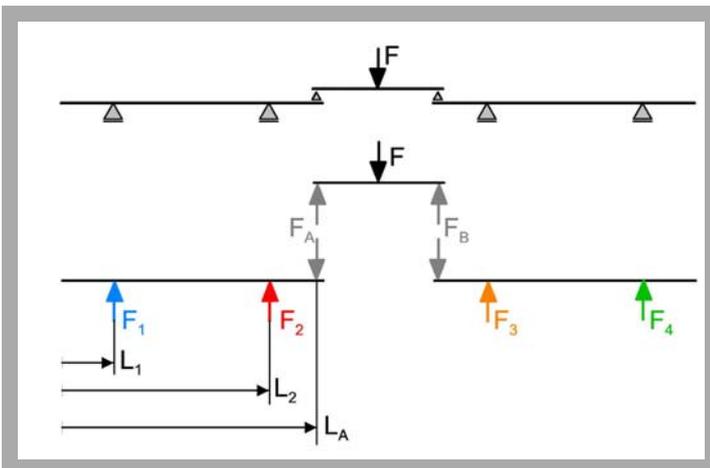
### Learning Objectives / Experiments

- Familiarisation with a Gerber beam
- Application of the method of sections and the conditions of equilibrium to calculate the support forces for
  - \* point load
  - \* distributed load
  - \* moving load
- Determination of the internal reactions under static load
  - \* shear force curve
  - \* bending moment diagram
- Determination of the lines of influence under moving load
- Comparison of the calculated and measured reactions for static and moving load

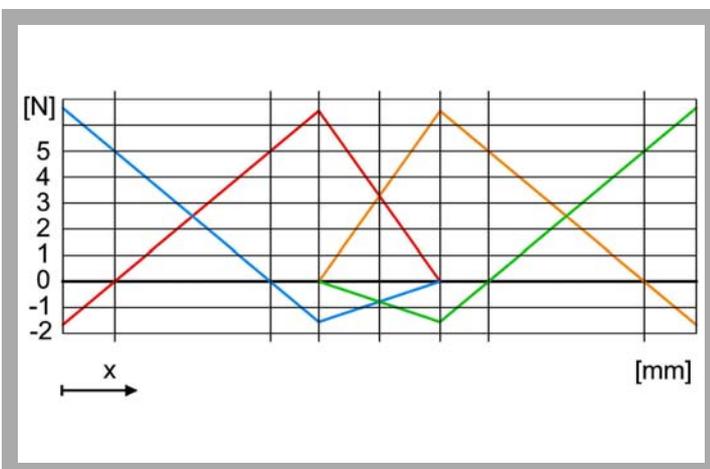
## SE 110.12 Lines of Influence on the Gerber Beam



1 suspended beam, 2 articulated support, 3 cantilever beam, 4 support with force gauge, 5 weight, 6 moving load, 7 frame SE 112



Top: simplified experimental set-up (Gerber beam),  
bottom: free body diagram:  $F$  applied load,  $F_A + F_B$  reactions of the articulated supports,  $F_1 - F_4$  reactions of the supports with force gauge,  $L_1, L_2, L_A$  positions of the supports



Lines of influence for a moving point load (see also free body diagram):  
blue: support 1, red: support 2, orange: support 3, green: support 4

### Specification

- [1] Investigation of the lines of influence in a statically determinate Gerber beam under different loading
- [2] Gerber beam comprising 2 cantilever beams and 1 suspended beam
- [3] Suspended beam mounted by articulated supports on cantilever beams
- [4] Beam subjected to moving load or loaded down by single weights
- [5] 4 movable supports with force gauge
- [6] Storage system to house the components
- [7] Experimental set-up in frame SE 112

### Technical Data

- Beam
- total length: 1220mm
  - cantilever beam length: 503mm
  - suspended beam length: 250mm
- Force gauge: -50...+50N
- Weights
- 24x 5N
  - 12x 1N
  - moving load: 10+20N

### Dimensions and Weight

Weight: approx. 28 kg

### Scope of Delivery

- Gerber beam (2 cantilever beams + 1 suspended beam)
- 4 supports with force gauge
- 1 moving load
- 1 set of weights
- 1 storage system
- 1 set of instructional material

### Order Details

022.11012 SE 110.12 Lines of Influence on the Gerber Beam