KSM-036

STABILITY: BAR BUCKLING UNDER LOAD

Buckling is a stability issue that occurs when slender components are subjected to compressive loads. A system in equilibrium will return to its original state when the loading is removed. However, if the compressive load exceeds a critical threshold, instability arises. The component buckles and fails. The critical compressive load at which instability occurs is known as the buckling force**.**

A simple model for representing stability problems is a two-part bar with an elastic joint, which remains stable up to a certain load level. When the buckling force is exceeded, the bar suddenly buckles, causing instability.

The **Stability: Bar Buckling under Load Model KSM-036** is designed to investigate basic stability problems in a buckling bar under varying conditions. The bar consists of two parts, connected by a central articulated joint. A compressive load is applied to the bar using a lever and weights. The variable loading is measured precisely with a scale on the load application lever.

Experiments can be conducted with different support conditions, such as an elastic joint or an elastic clamp fixing. For the elastic joint, two tension springs are used. When the elastic clamp fixing is chosen, a steel leaf spring is mounted in the bottom joint. The variable length of the leaf spring allows for different degrees of clamping. Both options can be combined for additional flexibility.

Another experiment explores the influence of shear forces by applying a shear force to the joint of the buckling bar using a cable and a weight.

In all experiments, the buckling bar is loaded until it reaches an unstable state. The length of the lever arm at the point of buckling is recorded using the scale, from which the buckling force is then determined.

The well-structured instructional material provides a clear explanation of the fundamental concepts and offers a step-by-step guide for conducting the experiments.

Note: Specifications and Photos can be altered without prior notice in our constant efforts for improvement.

Features

- Representation of simple stability problems on a buckling bar.
- Determination of the buckling load under different conditions.
- Infinitely variable load application on the buckling bar.

Specifications

- Investigation of the buckling load under different conditions (elastic joint, elastic fixed end).
- Two-part buckling bar with central joint.
- Loading infinitely variable with lever and set of weights.
- Determination of loading via scale on load application lever.
- Various degrees of clamping via leaf spring with variable length on bottom support.
- Thrust pad guided friction-free inside spherical shell.
- Low-friction joints with roller bearings.
- Device to generate shear forces.
- Storage system to house the components.

Technical Specifications

- Two-Part Buckling Bar with Central Joint:
  - WxH: 20x20mm.
  - Length: 2x250mm.
  - Support: Pinned-pinned (articulated-articulated).
- Elastic Joint:
  - 2 tension springs, rigidity: 2N/mm.
  - Lever arm: 50mm.
- Elastic Clamp Fixing with Steel Leaf Spring:
  - Length: 500mm.
  - Cross-section: 10x2mm.
  - 2nd moment of area: 6.66mm^4.
  - Modulus of elasticity: 205,000N/mm^2.
  - Compressive force range: 25...120N.
- Shear Force: 0...20N.
- Load Application Lever:
  - Lever ratio: 1:2 - 1:5.
- Weight Set:
  - 8x 1N.
  - 6x 5N.
  - 2x 1N (hangers).

Experiments

- Determination of the buckling force for the case of:
  - Elastic joint.
  - Elastic fixed end support.
- Investigation of the buckling behavior under the influence of:
  - Additional shear forces.
  - Pre-deformation.

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Scope of Delivery

- 1 two-part buckling bar.
- 1 set of weights.
- 4 supports.
- 1 deflection roller.
- 1 load application lever.
- 1 leaf spring.
- 2 tension springs.
- 1 cord.
- 1 hexagon socket wrench.
- 1 storage system with foam inlay.
- 1 set of instructional material.

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