

GL 112

Investigation of cam mechanisms



Description

- record elevation curves of cam mechanisms
- four different cam members, two different engaging members
- influence of spring stiffness and mass on the dynamic behaviour

Cam mechanisms play an important role in the conversion of rotary motion into oscillatory motion. The most common application of cam mechanisms is the activation of valves in engines. This application is highly dynamic: valves must be opened and closed in very quick succession. The contact between the valve and a cam must not be lost, otherwise it would result in uncontrolled oscillations, valve float and possible damage to the engine.

The GL 112 experimental unit allows the dynamic investigation of a cam mechanism at various speeds. Four typical cams with corresponding engaging members are compared in terms of their motion behaviour. The valve is simulated with a mass and a spring.

By varying the spring stiffness, spring preload and oscillating mass, it is possible to study the dynamic limits of the respective cams. The cam motions and valve raising can be clearly demonstrated using a stroboscope (not included).

A recorder synchronised with the cam member records the actual elevation curve of the cam mechanism. A speed-controlled drive motor with a large flywheel generates a speed as constant as possible. The open design means that the motion is clearly visible in every detail.

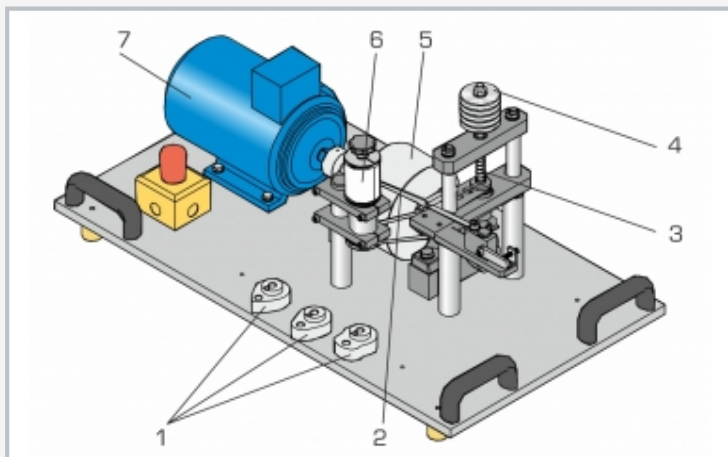
A transparent protective cover ensures safe operation. The experimental unit is intended for demonstration in engineering education. It is not suitable to be used as a test bench in the field of endurance testing/tribology.

Learning objectives/experiments

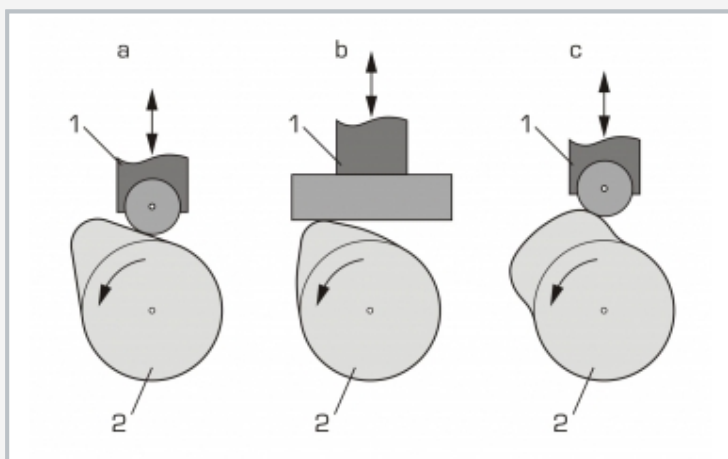
- elevation curves in non-matching engaging member
- elevation curve in sprung-engaging member
- determine the limit speed and compare with theory
- influence of moving mass on the motion of cam member/plunger
- influence of return-spring stiffness and preload on the motion of cam member/plunger
- comparison of the elevation curves of different cam-member shapes
- comparison of elevation curves with theory

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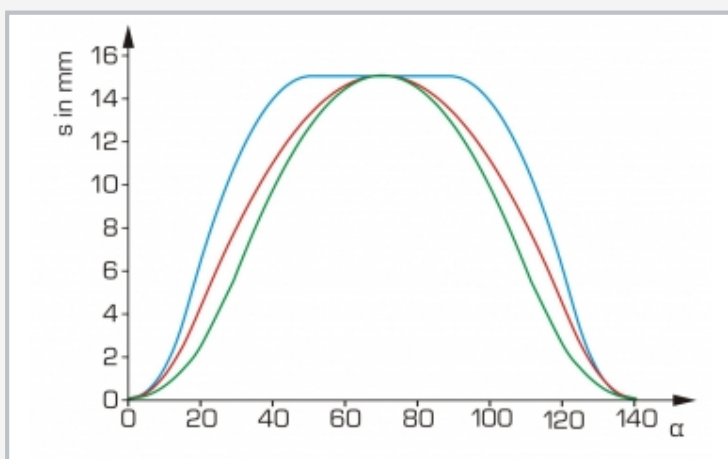
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1 interchangeable cam-shaped cam member, 2 nib, 3 spring, 4 mass disks, 5 flywheel, 6 recorder drum, 7 drive motor



1 engaging member (rolling receiver with plunger / flat receiver with plunger), 2 cam-shaped cam member; a tangent cam with roller plunger, b circular arc cam with flat plunger, c hollow cam with roller plunger



Elevation curves; s stroke, α opening angle; blue: hollow cam, red: circular arc cam, green: tangent cam

Specification

- [1] investigation of cam mechanisms
- [2] cam-shaped cam members: tangent cam, hollow cam, 2 circular arm cams with different head radius
- [3] 2 different engaging members: flat receiver with plunger or rolling receiver with plunger
- [4] 3 interchangeable return springs and spring preload
- [5] drive motor with variable speed
- [6] oscillating mass can be increased with 5 additional weights
- [7] mechanical drum recorder with nib and coated paper
- [8] optical speed sensor
- [9] transparent protective cover for safe operation

Technical data

Drive motor

- DC asynchronous motor with frequency converter
- power: 250W
- speed: 60...670min⁻¹

Cam-shaped cam member

- stroke, each: 15mm
- opening angle, each: 140°

Spring stiffness

- hard: 5026N/m
- medium: 2601N/m
- soft: 613N/m

Masses

- additional weight: 200g
- plunger: 530g
- flat receiver: 93g
- rolling receiver: 20g

Recorder: toothed belt drive

- 230V, 50Hz, 1 phase
- 230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase
- UL/CSA optional
- LxWxH: 800x440x440mm (experimental unit)
- Weight: approx. 40kg
- LxWxH: 360x320x160mm (display and control unit)
- Weight: approx. 5kg

Scope of delivery

- 1 experimental unit
- 1 display and control unit
- 4 cam-shaped cam members
- 2 engaging members
- 3 return springs
- 3 blocks of recorder paper
- 1 set of tools
- 1 set of instructional material

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Optional accessories

020.30009

WP 300.09

Laboratory trolley