

Engineering mechanics

The basic engineering discipline is engineering mechanics, which describes the motions of bodies and the forces associated with these motions.

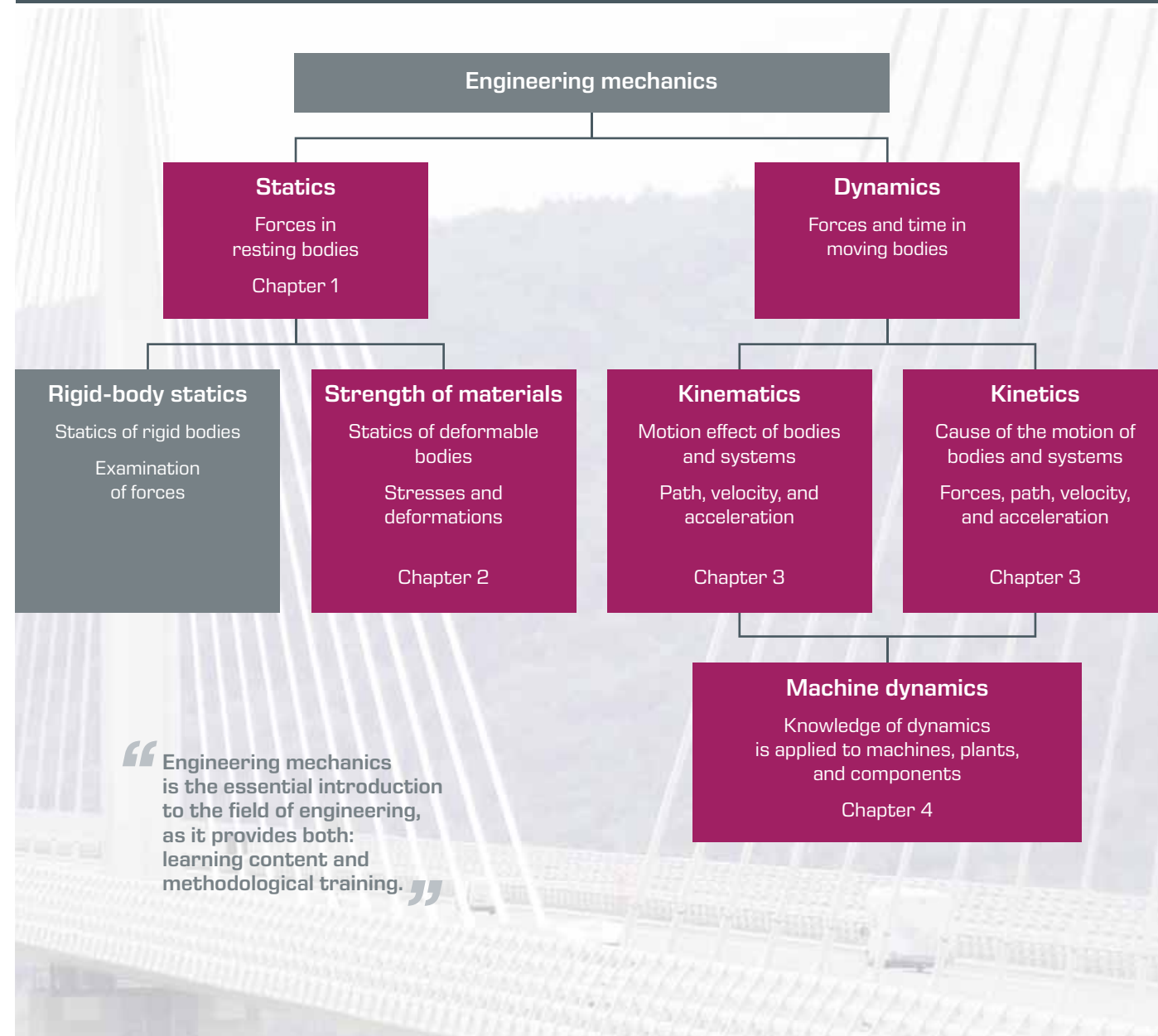
Engineering mechanics investigates the equilibrium of forces as well as the resulting components' stresses and deformations. Based on characteristics such as strength, permissible stresses, or deformations, a component is designed by comparing the applied stress with the capacity to withstand stress. This requires that the stress on a component is less than its capacity to withstand stresses.

In conjunction with the basic fields of materials science and machine elements, engineering mechanics provides fundamental calculation methods for creating engineering designs. Consequently, engineering mechanics should be understood as a bridge between theoretical knowledge and practical implementation, without which an understanding and comprehensive analysis of complex technical systems would not be possible.

In universities, the discipline of engineering mechanics is usually divided into the following subdisciplines:

- **engineering mechanics I**, focusing on statics
- **engineering mechanics II**, focusing on strength of materials (elastostatics)
- **engineering mechanics III**, focusing on kinematics and kinetics (dynamics)

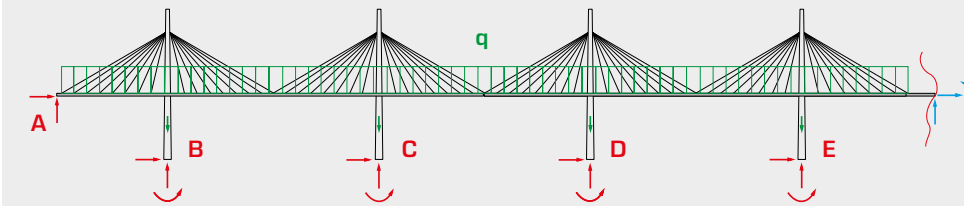
General classification of the discipline of engineering mechanics and placement in this catalogue



Topics in engineering mechanics

Statics

Statics courses include elementary knowledge for analysing loads on mechanical systems. This knowledge forms the basis for sizing and designing components and machine elements.

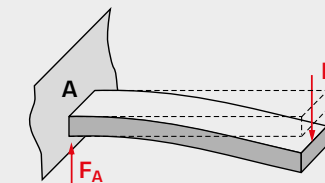


Distribution of forces using the example of Millau Viaduct



Strength of materials

Strength of materials deals with the deformation of elastic systems under loads such as pressure, tension, bending, torsion, and shearing as well as calculating the resulting stress states.

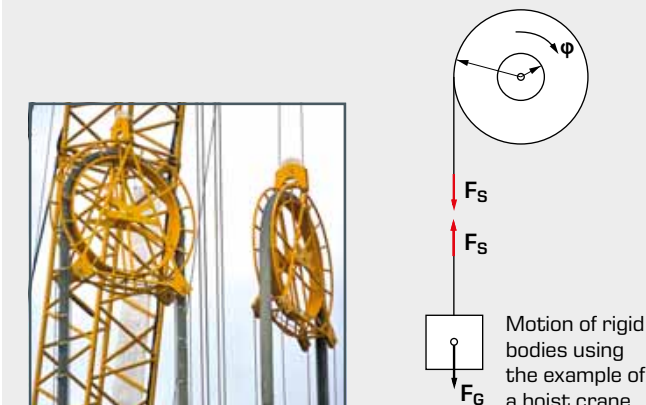


Bending stress of a cantilever beam using the example of a diving board



Dynamics (kinematics and kinetics)

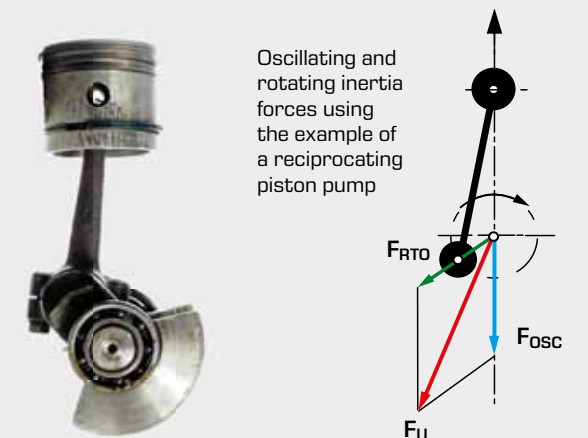
Dynamics investigates moving systems. Kinematics deals with motion sequences without enquiring into the cause of motion. Kinetics looks at the motion of rigid bodies under the action of forces.



Motion of rigid bodies using the example of a hoist crane

Machine dynamics

Building on the fundamentals of engineering mechanics, machine dynamics deals with the interaction between dynamic forces and motion quantities in machines.



Oscillating and rotating inertia forces using the example of a reciprocating piston pump