Course: Mechanical Systems Engineering — credits: 5

Course code	WBVB24MSE
Name	Mechanical Systems Engineering
Study year	2026-2027
ECTS credits	5
Language	English
Coordinator	B. Heikema
Modes of delivery	Education
Assessments	Mechanical Systems engineering - Assignment

Learning outcomes

The student can:

- Translate the properties of a driven system into a load characteristic.
- Derive a motor characteristic from the motor parameters, calculate the optimal operating point based on motor and load characteristics.
- Select a motor based on information about the load characteristic and desired speed and calculate the power consumption and efficiency.
- Dimension shafts, calculate whether a shaft is strong enough, and ensure that the shaft does not exceed fatigue limits under (dynamic) loading.
- Select the appropriate machine components (e.g., bearings and belt drives) in conjunction with the correct fits and lubricants.

Content

During this 5 ECTS module, an existing machine is used as a "framework" to study several topics. Initially, the machine is used for a "reverse engineering" step. What are the specifications of the various components, and why are these components used? The parts that make up the drivetrain receive the most attention. After analysing the existing machine, an upgrade of the drivetrain must be engineered. This includes selecting an electric motor, several machine components (bearings, belt drives), and dimensioning the drive or support shaft, all for changed operating conditions. The following topics are covered:

- Selecting electric motors (AC and DC) for a drivetrain.
- Dimensioning shafts. This involves simplifying the situation from 3D to 2D by using vector summation of moments.
- Fatigue of shafts: Various factors influencing fatigue are discussed here. The static and dynamic checks for fatigue take all these factors into account.
- Rolling bearings: Different types of rolling bearings and determining a suitable rolling bearing for a specific situation.
- Belt drives: Different types of belt drives with a focus on belts and the corresponding belt types and calculations.

Included in programme(s)

Mechanical Engineering

School(s)

Engineering, Life Sciences & ICT

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