Design of Machine Elements (2)

(Autumn 2025)

Instructor: H. Golpira

Course Description and Objectives

It follows and completes the Machine Design (1) with a focus on power transmission systems components, including clutch, brake, belt, bearing, and gear. The theoretical calculations that derived from the book, combined with manufacturers' catalogs, guidance, and simulations, advance students' design skills for graduate programs and/or working in manufacturing companies.

Topics Covered

1. Bearing type, load, and life
2. Combined radial and thrust loads
3. Variable loading
4. Selection of roller bearing
5. V-belt
6. Design a flat-belt drive
7. Frictional-contact axial clutches
8. Disk brake (uniform pressure)
9. Cone clutch (uniform wear)
10. Temperature rise
11. Friction material
12. Type of gears and nomenclature
13. Gear fundamentals
14. Lewis bending factor
15. Design software

October 2025

Homework/Assignments

The course assignments will be performed throughout the semester. Homework are determined in the classroom. They upgrade the student's ability to deal with real design problems.

1. Homework 1: design of a roller bearing for a torque converter of a bulldozer
2. Homework 2: design of a pulley and belt system for a CVT gearbox
3. Homework 3: design of a safety clutch for a forage maize chopper

References

[1] *Budynas, R. G., & Nisbett, J. K. (2021). Shigley's mechanical engineering design. New York: McGraw-Hill.*

Grading

- Homework: 25%
- Final Exam: 50%
- Midterm: 25%