

KISSsoft Training

Shaft and Bearing Calculation and Optimization

2 Days

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This 2-day training for shaft and bearing design focuses on sizing and optimization of shafts and their supports using the calculation modules in KISSsoft and learning about the underlying theory of the calculation procedures. The target audience are engineers working in gear transmission design or manufacturing.

The focus of the introduction is placed on the handling of the software and its user interface. The objective of the first day is to understand the input fields including the underlying theory, to understand the messages created during the calculation process and how to interpret the results in graphics and reports.

With help of prepared exercises, participants will learn how to operate with the shaft and bearing module. Using a hands-on approach, the participants will gain confidence in using the software correctly, so it can be applied efficiently in their design work.

The second part goes deeper into the sizing and optimization of shafts and bearings. The extended calculation possibilities in KISSsoft such as coaxial shaft systems, thermally critical speeds and even tooth trace modifications based on shaft deflection (in order to get an optimum load distribution in the meshing) will be explained. The determination of bearing lifetime and stiffness will occupy a significant part because it often affects all subsequent results (bending line, shaft strength and/or gear modifications). Participants will get an insight into different service life calculation methods including inner geometry, taking into account bearing stiffness and tilting under load and even contact stress in ring material.

Typical applications of bearings and shaft calculations are analyzed and introduced in KISSsoft to show the procedures to perform the advanced calculations. Participants will do various exercises individually, which helps to deepen the presented topics. This will also give room to ask specific individual questions and get the knowledge you need from our engineers.

Day 1: Introduction

All the input windows of KISSsoft shaft and bearing calculation as well as the underlying theory will be explained. Several practical exercises will help to understand the functionalities and to interpret the results' output in results window and in reports.

General Scope of the Program:

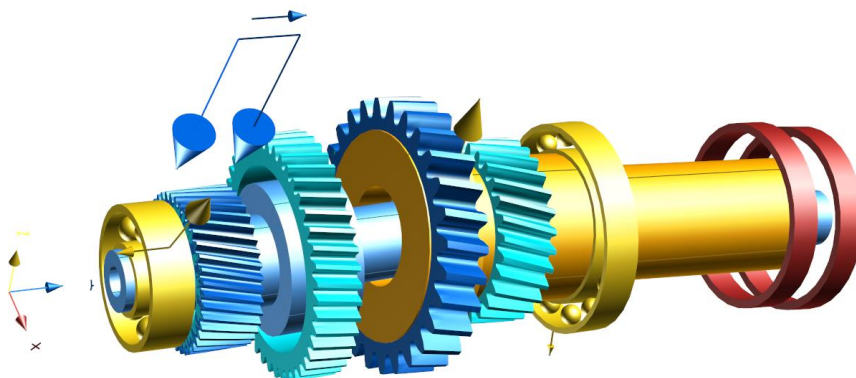
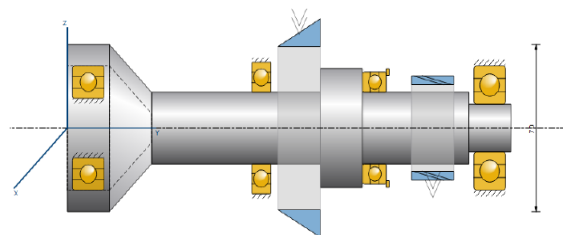
- General software structure
- Maintenance of technology data base for materials, surface roughness, bearings, bearing clearance, tolerance, load spectra, lubricants
- Settings and adaptations for reports, graphics and module specific settings
- Possibilities of project administration
- Generation and application of calculation templates
- Explanation of KISSsoft buttons
- Settings in kiss.ini file

Shaft Editor:

- Shaft modelling in shaft editor and use of elements tree:
input of a single shaft with geometry, stress concentration elements, forces, supports
- Results' interpretation in graphics and reports:
deflections, forces, stresses
- Sizing of cross sections for shaft strength calculation
- Beam models: Euler-Bernoulli versus Timoshenko, linear versus non-linear

Shaft Calculation:

- Calculation of deformation (deflection lines etc.)
- Overview on shaft strength calculation
- Explanatory notes on graphics and reports
- Several stress cases
- Gear modeling effects in shaft calculation



Day 2: Advanced Topics of Shaft and Bearing Analysis

After successfully finishing the introductory part, participants will become experts in handling the KISSsoft shaft and bearing calculation. With the help of practical engineering examples, a multitude of advanced cases will be analyzed and optimized.

Bearing Calculation:

- Overview on ISO calculation methods
- Influence of bearing stiffness on deformations and forces
- Influence of the inner geometry on bearing life time
- Bearing reliability

Advanced Bearing Topics:

- Classic calculation, reference geometry calculation, non-linear stiffness
- Clearance and clearance change from interference fit, temperature and speed
- Thermally permissible service speed
- Pretension
- Friction calculation
- Rolling bearing pretension, offset, friction
- Rolling bearing deformed and/or elastic rings
- Fine sizing
- Own roller profiles
- Contact stress in ring material

Advanced Shaft Topics:

- Coaxial shaft calculation
- Calculation with a load spectrum:
 - Equivalent design loads
 - Finite life analysis
- Stability and Dynamic Behavior:
 - Buckling
 - Eigenfrequencies
 - Critical speeds
 - Campbell diagram
 - Forced response
- Calculations for Gear Optimization
 - Tooth trace modification based on shaft deflection
 - Gear body deformation
- Journal bearing calculation

