KISSsoft Live Stream Training
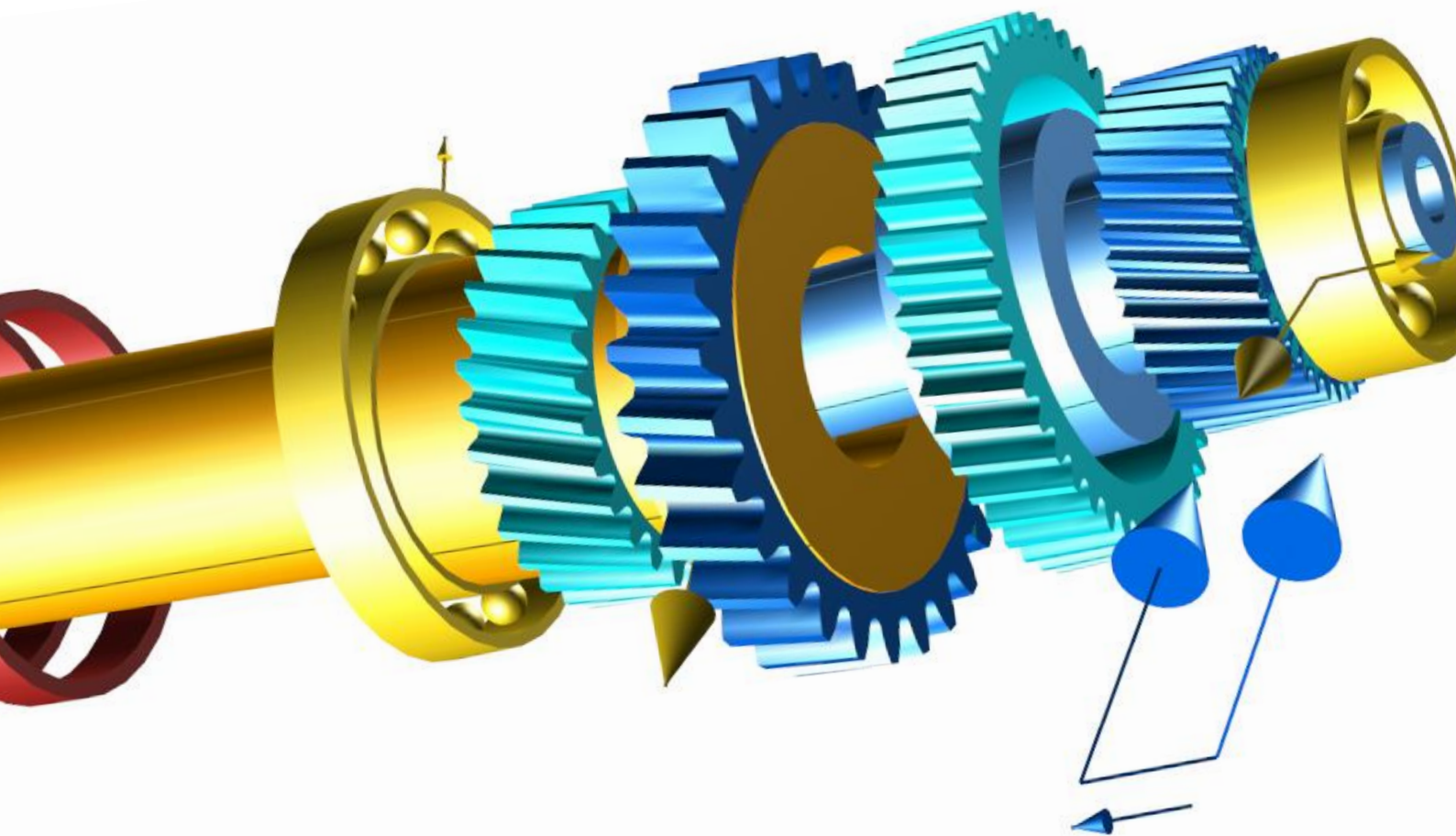
Shaft and Bearing Calculation and Optimization

April 27-30, 2020

Day 1: April 27, 2020

08:30 – 08:40	Welcome
08:40 – 10:10	KISSsoft software introduction
10:10 – 10:30	Break
10:30 – 12:00	KISSsoft software introduction Shafts' basics (shaft editor)
Exercises	**Exercise (a): "Extending the KISSsoft database"**

Day 2: April 28, 2020

08:30 – 08:40	Exercise follow up
08:40 – 10:10	Shafts' basics (strength calculation)
10:10 – 10:30	Break
10:30 – 12:00	Shafts' basics (inputs and graphics)
Exercises	**Exercise 1: "Editor modeling"**

Day 3: April 29, 2020

08:30 – 08:40	Exercise follow up
08:40 – 10:10	Shafts' advanced (bearing lifetime)
10:10 – 10:30	Break
10:30 – 12:00	Shafts' advanced (bearing lifetime, clearance, thermal envelope)
Exercises	**Exercise 2: "Bearing lifetime - thermal envelope – spectrum"**

Day 4: April 30, 2020

08:30 – 08:40	Exercise follow up
08:40 – 10:10	Shafts' advanced (shafts systems)
10:10 – 10:30	Break
10:30 – 12:00	Shafts' advanced (shaft dynamics, tooth trace modification) Q&A session
Exercises	**Exercise 3a: "User-defined bearing in database"**
	Exercise 3b: "Planetary stage modeling"
	Exercise 4: "Dynamic behavior of planet stage – Preliminary tooth trace correction"
	Exercise 5: "Forced response"

The follow up of the exercises of the last day will be done via email (if needed).

Day 1 and Day 2: 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 modeling 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
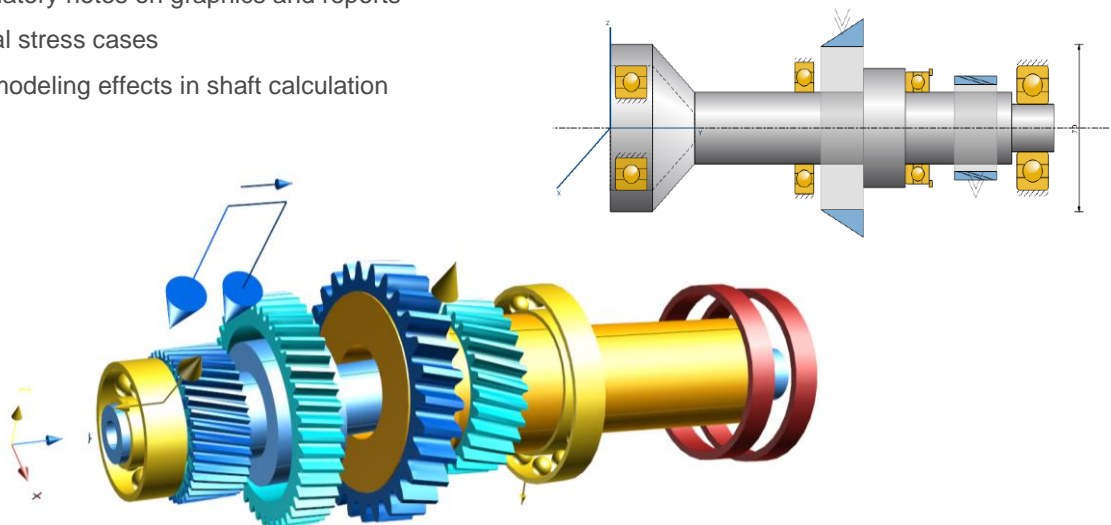
# Day 3 and Day 4: Advanced Topics of Shaft and Bearing Analysis

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, how to model spring pretensioned bearings
- Friction calculation
- Rolling bearing pretension, offset, friction
- Rolling bearing deformed and/or elastic rings
- Fine sizing, own roller profiles
- Contact stress in ring material
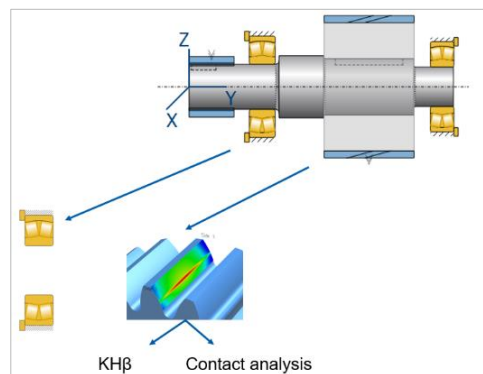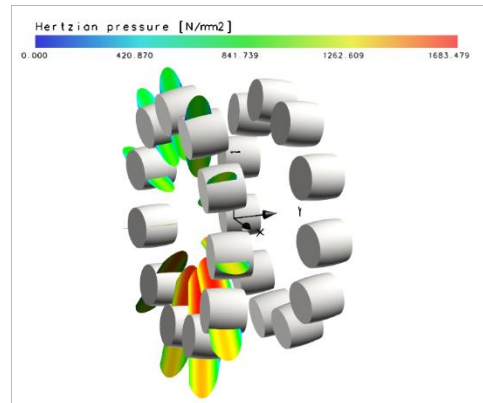
Advanced Shaft Topics:

- 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