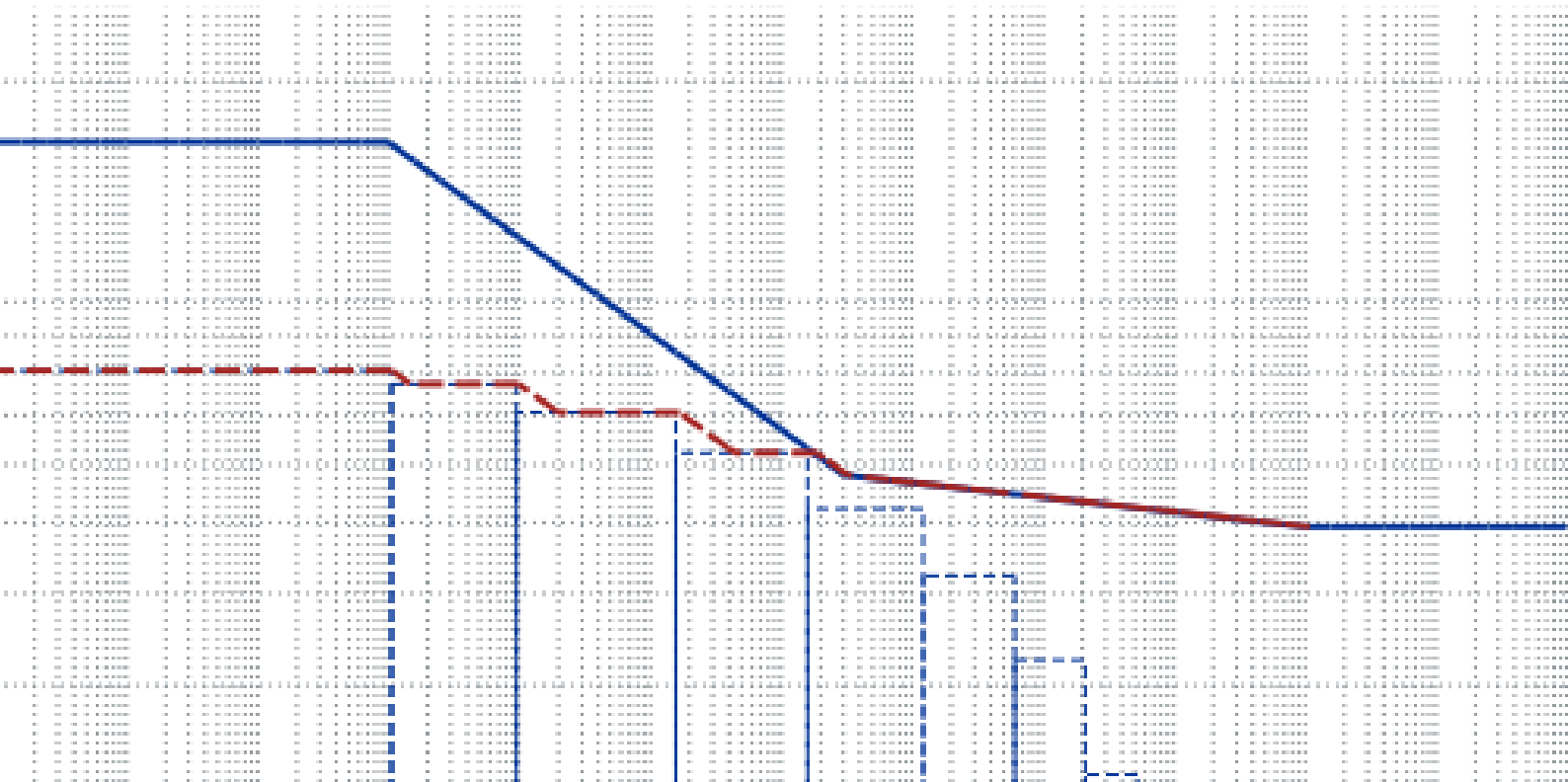


# KISSsoft Training

Advanced: Cylindrical Gear Design, Analysis and Optimization

3 Days



## Geometry of Cylindrical Gears with Involute Profile, Part I

- Gearing law, Involute tooth form
- Reference profile and tool geometry
- Tooth form for spur and helical gears, external and internal gears
- Profile shift, Grinding stock allowance, Manufacturing profile shift
- Sizing profile shift coefficient and deep tooth form
- Path of contact, Specific sliding
- Definition of various circles

## Geometry of Cylindrical Gears with Involute Profile, Part II

- Backlash (Theoretical and Operating), Tip clearance
- Operating backlash calculation
- Tolerances and allowances, Quality and deviation
- Various methods for inspection
- Tooth flank modifications (Profile and tooth trace)
- Profile and tooth trace diagram (K chart)
- Measurement grid report
- Most frequent errors found in the geometric design of gear pairs
- Exercises

## Strength of Cylindrical Gears, Part I

- Calculation of safety factors
- Definition of material data and Woehler Line (S-N curve)
- Calculation of the flank safety according to ISO 6336:2019
- Calculation of the root safety according to ISO 6336:2019
- Alternative methods for root stress calculation (Graphical method and FEM)
- Static strength calculation
- K factors
- Identifying required safety factors
- Exercises



## Strength of Cylindrical Gears, Part II

- Load spectrum analysis
- Load spectrum from time series data (Rainflow counting)
- Reliability, lifetime, and damage calculation
- Calculation of scuffing (flash temperature and integral temperature)
- Micropitting
- Exercises

## Strength of Cylindrical Gears, Part III, Basics of Tooth Contact Analysis

- Tooth flank fracture
- Subsurface fatigue
- Effect of profile and flank modifications on strength
- Face load factor calculation according to ISO 6336-1 Annex E
- Loaded tooth contact analysis according to Weber/Banaschek
- Actual path of contact and identification of entry and exit impact
- Actual normal force and stress distribution
- Transmission error and its relationship with vibration and noise
- Effect of the deviation and inclination error of the axis
- Exercises

## Strategies for Gear Design Optimization

- Rough sizing to define the raw dimension of gears
- Fine sizing to define the macro geometry of gears
- Modification sizing to define the micro geometry of gears
- Finding an optimal solution well-balanced for various criteria
- Incorporating contact analysis results in sizing functions
- Strategies for optimizing tooth flank form for strength and noise
- Sizing modifications considering load spectrum
- Sizing modifications considering manufacturing errors
- Exercises

The training topics can be adapted to the knowledge level of the participants and upon special request from the participants. If you have any questions, please send an email to [training@kisssoft.com](mailto:training@kisssoft.com).

