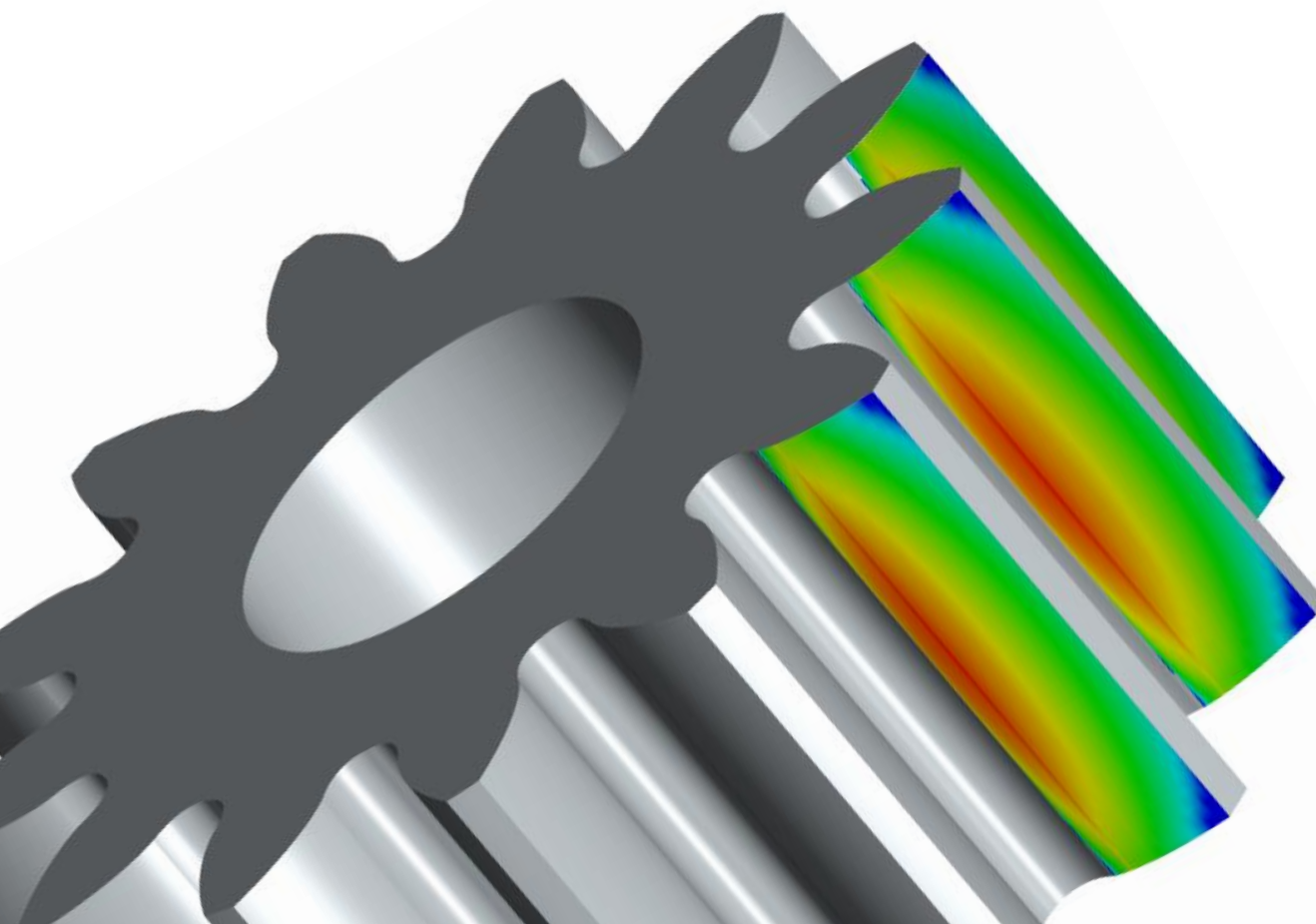


# KISSsoft Live Stream Training

Contact Analysis for Cylindrical Gears, Bevel Gears  
and Planetary Systems (Special)

December 7-9, 2021



## Day 1 - December 7, 2021

|                  |   |
|------------------|---|
| 08:30 – 08:45    | Welcome   |
| 08:45 – 10:10    | Face load factor according to ISO 6336-1 (Method C, Annex E) Part 1                             |
| 10:10 – 10:30    | Break   |
| 10:30 – 12:00    | Face load factor according to ISO 6336-1 (Method C, Annex E) Part 2                             |
| <b>Exercises</b> | <b>“Tooth trace modification on a gear pair”<br/>“Flank line optimization with load cycles”</b> |
| 16:00 – 17:00    | Questions   |

## Day 2 – December 8, 2021

|                  |  |
|------------------|--|
| 08:30 – 08:40    | Summary day 1  |
| 08:40 – 10:10    | Contact analysis: Theory of contact stiffness calculation; how to use it in KISSsoft |
| 10:10 – 10:30    | Break  |
| 10:30 – 12:00    | Contact analysis: interpretation of results; profile modifications Part 1            |
| <b>Exercises</b> | <b>“Profile modification on a gear pair”</b>   |
| 16:00 – 17:00    | Questions  |

## Day 3 – December 9, 2021

|                  |   |
|------------------|---|
| 08:30 – 08:40    | Summary day 2   |
| 08:40 – 10:10    | Contact analysis: interpretation of results; profile modifications Part 2 |
| 10:10 – 10:30    | Break   |
| 10:30 – 12:00    | Contact analysis: Planetary and bevel gears                               |
| <b>Exercises</b> | <b>“Profile Modification Optimization”</b>                                |
| 16:00 – 17:00    | Questions   |

# Topics in the "Theory" Part

## Introduction to the Theory of Face Load Calculation

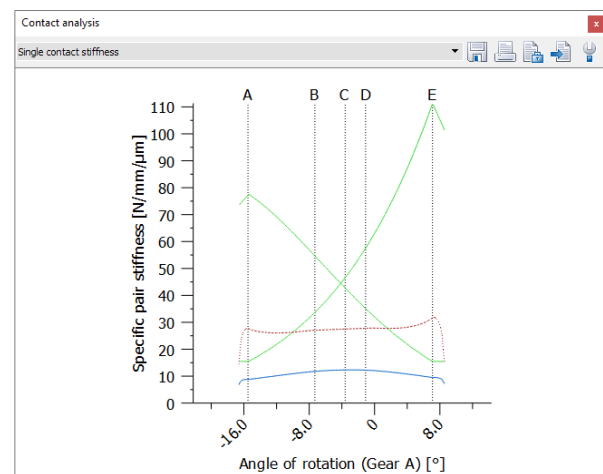
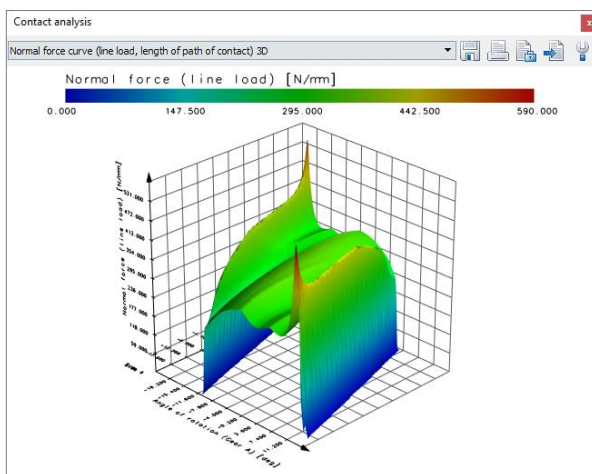
- Face load factor  $KH\beta$  according to ISO 6336-1, Appendix E
- Taking into account manufacturing allowances in  $KH\beta$  calculation according to ISO 6336-1, Appendix E
- Importance of tooth pair spring stiffness
- Characteristics of tooth pair spring stiffness according to ISO 6336-1
- Use of face load factors in load spectrum calculation

## Theory of Stiffness Calculation

- Tooth pair spring stiffness according to the Weber/Banaschek analytical method
- Importance of system, tangent and secant stiffness
- Possible methods for calculating contact stiffness
- Importance of the correction coefficient for Hertzian stiffness
- Differences to the FE approach and comparison with other programs commonly used in Germany
- Defining the slice coupling factor
- Approximation and effects of helical gear teeth
- Defining the border weakening factor and its consequences on the buttressing effect

## Interpretation of the most important Results

- Importance and interpretation of the transmission error
- Effect of transverse contact ratio and overlap ratio on the transmission error
- Identification of entry and exit impact
- Meaning of change of normal angle at the beginning of the profile modification
- How to identify and resolve numerical problems
- Importance and interpretation of the progressions of normal force, stress and kinematics



# Topics in the "Extended Contact Analysis, Planetary Systems, Sizing and Optimization" Part

## Extended Contact Analysis

- Defining the gear/planetary gear unit coordinate systems
- Defining the shaft coordinate system
- Importance of the inclination/deviation error of axis
- Taking the shaft calculation into account
- Problems of consistency in the shaft calculation
- KISSsys as an effective data management tool for designing/analyzing entire multi-stage drives

## Contact Analysis with Planetary Gear Units

- Analytical model for planetary gear unit calculation
- Options and limits of planetary gear unit calculation
- Importance of calculating iterative load distribution
- Importance and correct configuration of axis alignment

## Contact Analysis with Bevel Gear Units

- Analytical model for bevel gear unit calculation

## Interpretation of the most important Results for Planetary Gear Units

- Meaning and interpretation of planetary stage transmission error
- Load distribution for planets

## Sizing and Optimization of Modifications

- Defining profile and tooth trace modifications and their effects
- Sizing and optimizing modifications manually
- Sizing and optimizing modifications for load spectra
- How to use modification sizing effectively
- How to use iterative wear calculation