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Reseller Meeting 2017
- Bevel Gear Modification Sizing

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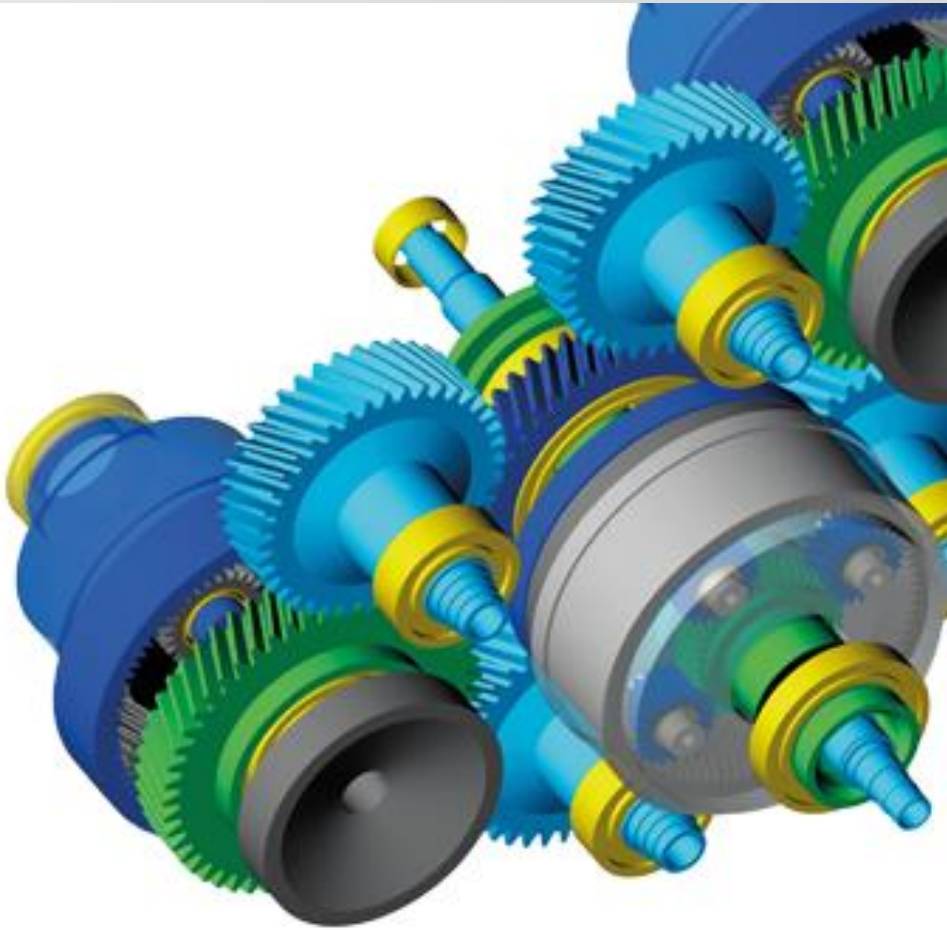
KISSsoft AG



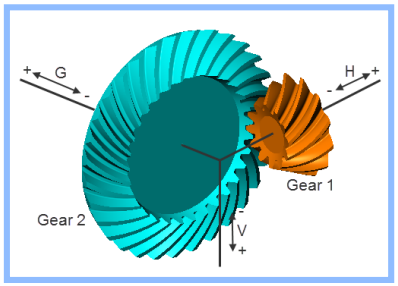
Where is the Modification Sizing used / What for ?

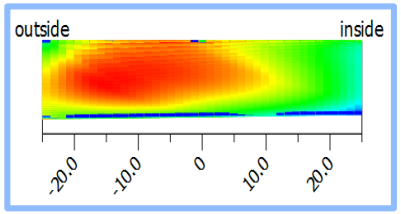
Layout Process of a Gear Set

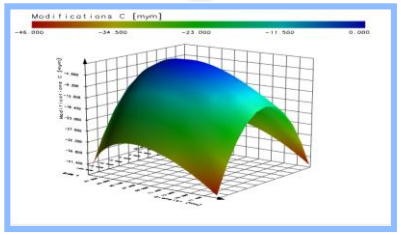
STAGE I
- Define Raw Dimensions
- a (center distance), b (face width)

STAGE II
- Define Macro Geometry
- m_n, z, α, β, x, h_{aP}, h_{fP}, …

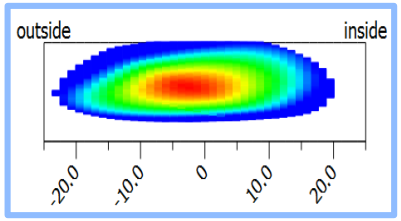
STAGE III
- Define Micro Geometry
- Tooth flank modifications







TARGETS
- Optimal load distribution
- Manufacturing error compensation
- Lower noise, vibration, loss, …
- Higher safety of scuffing, (micro)pitting, …



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Where is the Modification Sizing used / What for ?

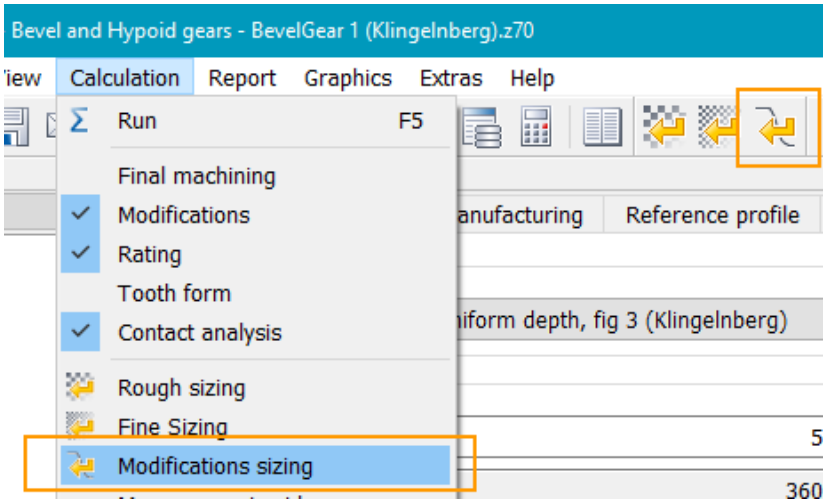
Modification Sizing Process

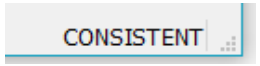
INPUT
- Operating conditions (power, speed, …)
- Macro geometry
- Shafts / Housing deformation

MODIFICATION SIZING
- Partial load levels
- Combination of modifications

OUTPUT
- PPTE
- Maximum Hertzian stress
- Maximum root stress
- Maximum contact temperature

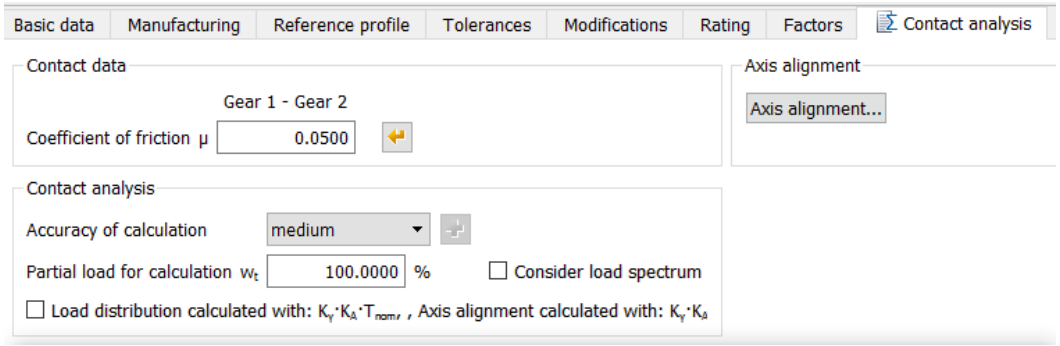
- Select Calculation > Modifications sizing or Click the sizing icon



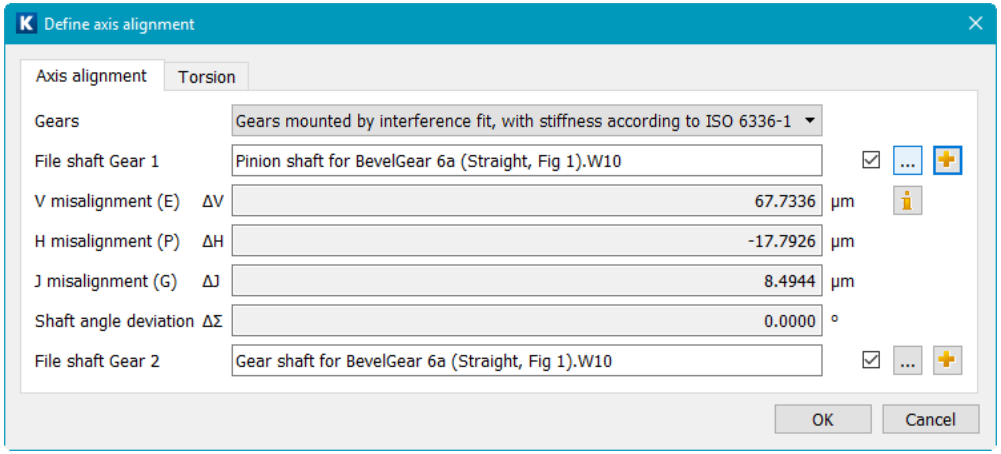
- Main calculation should be consistent 

Where is the Modification Sizing used / What for ?

- Settings in contact analysis tab are used (except the partial load settings)

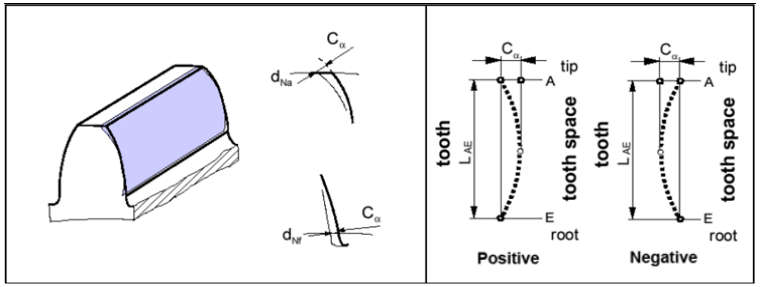


- Set the proper accuracy of calculation to reduce the computation time
- Shaft / Housing deformation can be included from Axis alignment window

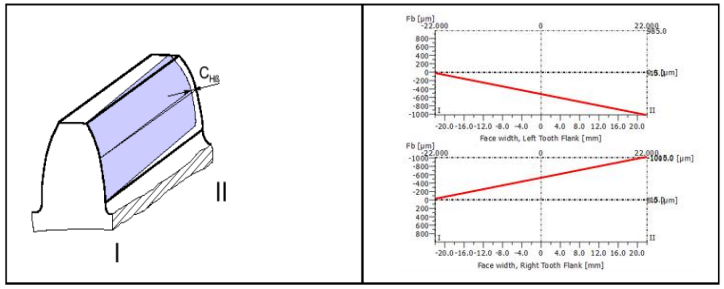


Available Modification Types for Bevel Gear

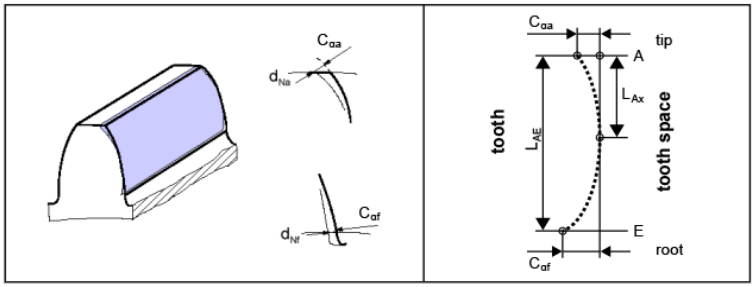
- Profile crowning (Barreling)



- Helix angle modification (conical)

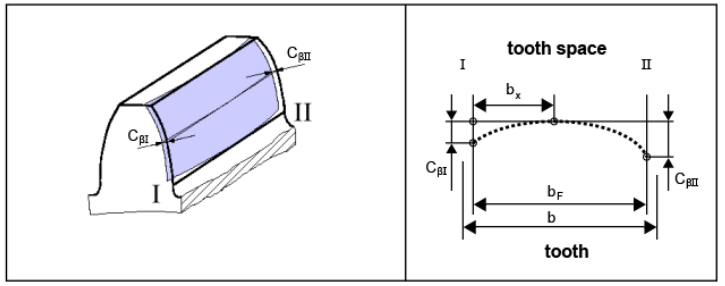


- Eccentric profile crowning



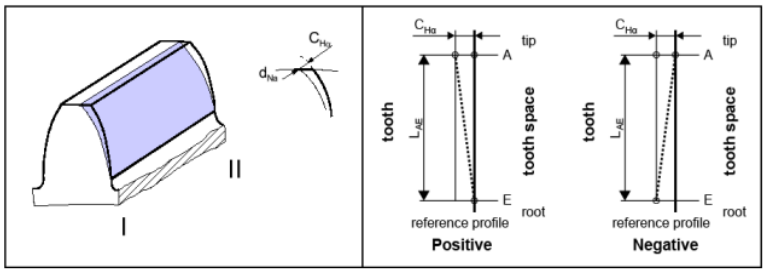
Factor 1	Factor 2
$L_{Ax} = (d_A - d_x)/(d_A - d_E)$	$C_{\alpha a}/C_{\alpha f}$

- Crowning / Eccentric crowning

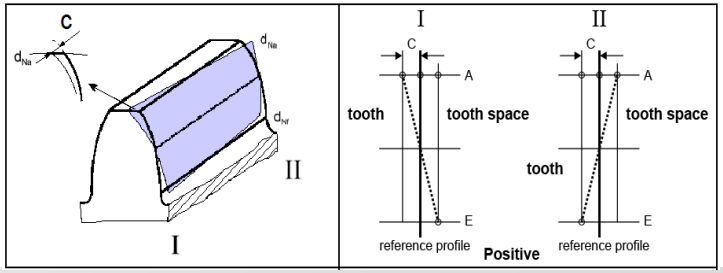


Factor 1	Factor 2
b_x/b_F	$C_{\beta II}/C_{\beta I}$

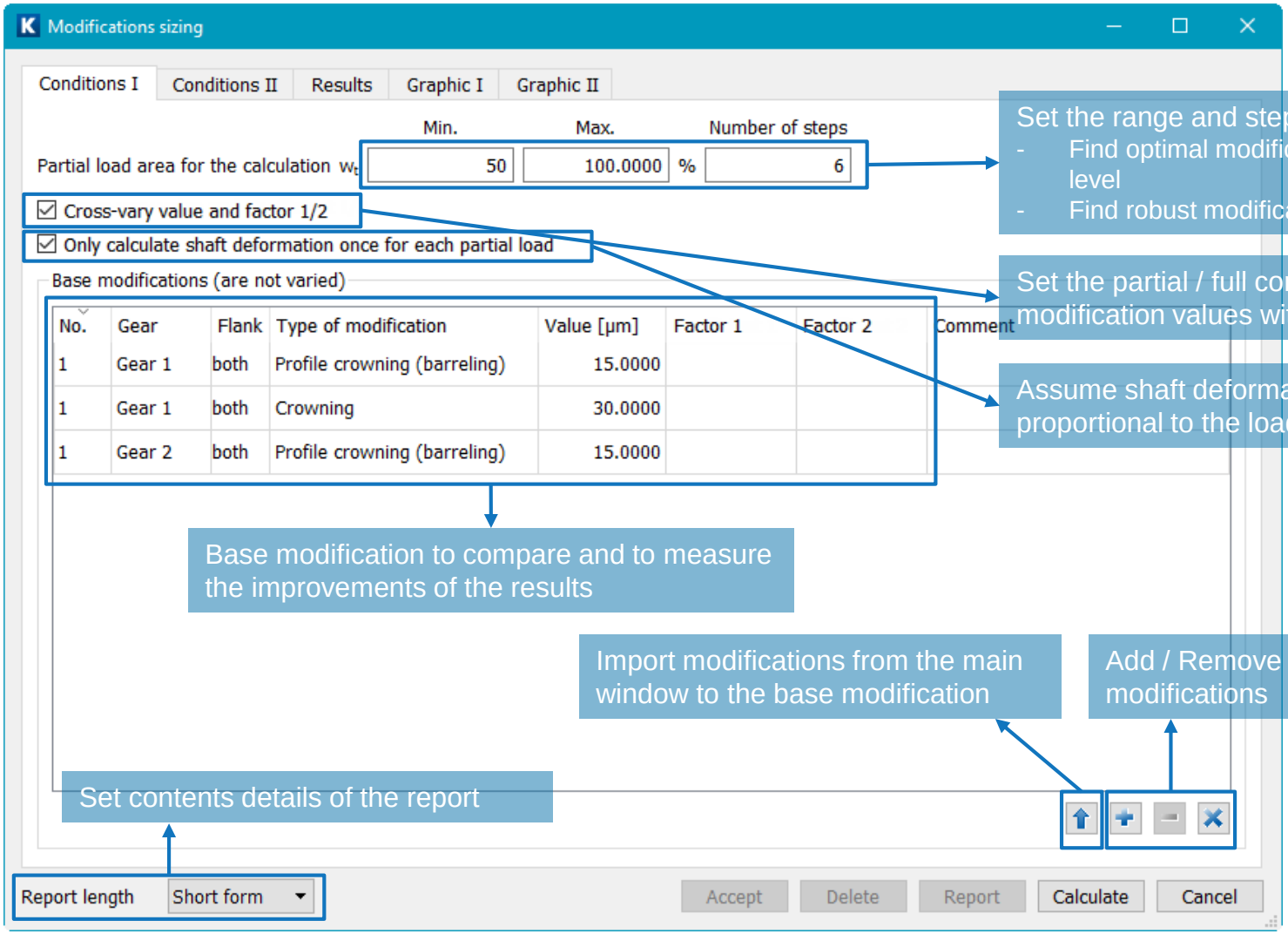
- Pressure angle modification



- Twist



Usage of ‘Modification sizing’ tool to find optimum design



Set the range and steps of partial load
- Find optimal modification for a specific load level
- Find robust modification for variable loads

Set the partial / full combination of the modification values with factors

Assume shaft deformation is linearly proportional to the load

Base modification to compare and to measure the improvements of the results

Import modifications from the main window to the base modification

Add / Remove the base modifications

Set contents details of the report

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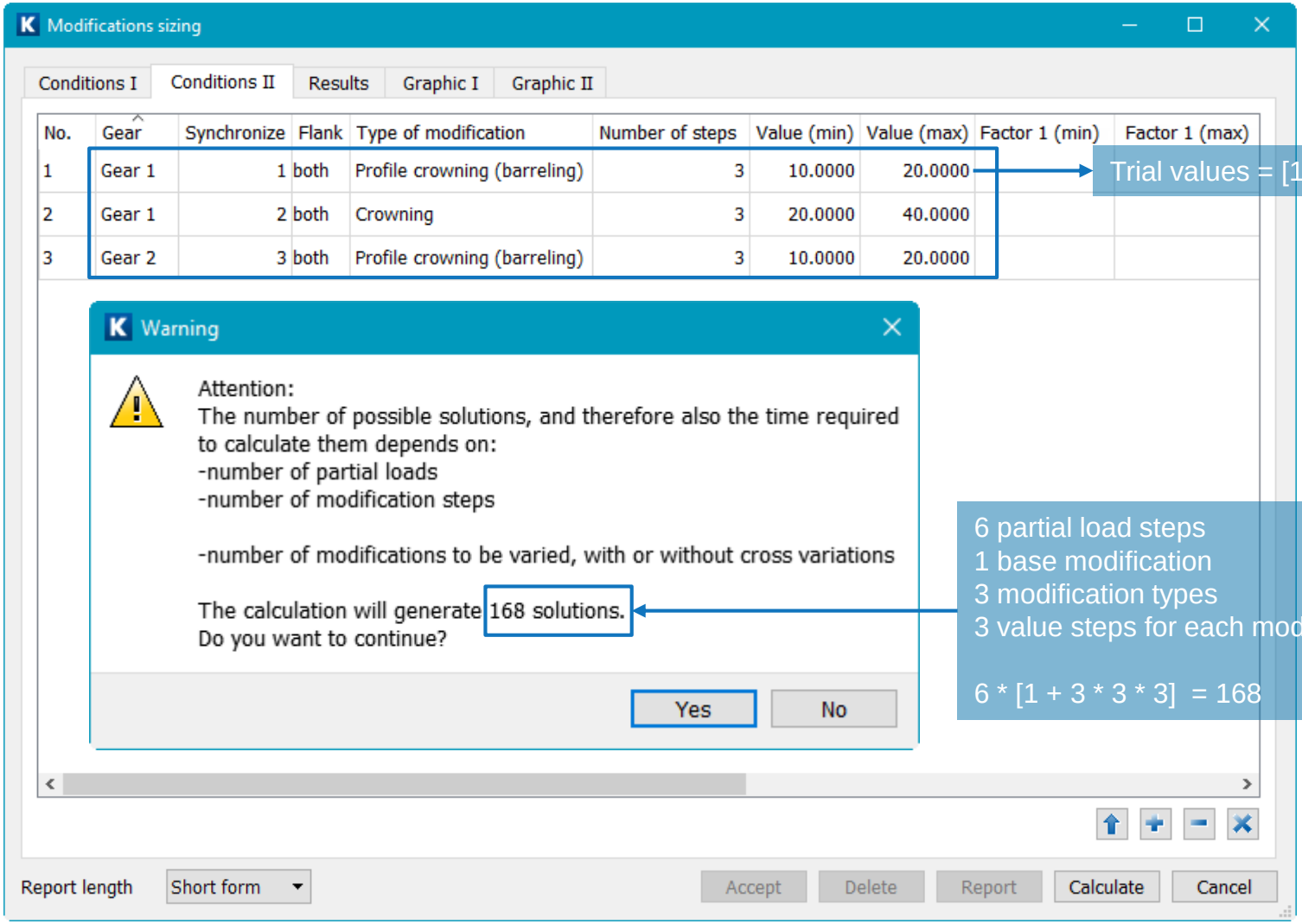
Usage of ‘Modification sizing’ tool to find optimum design

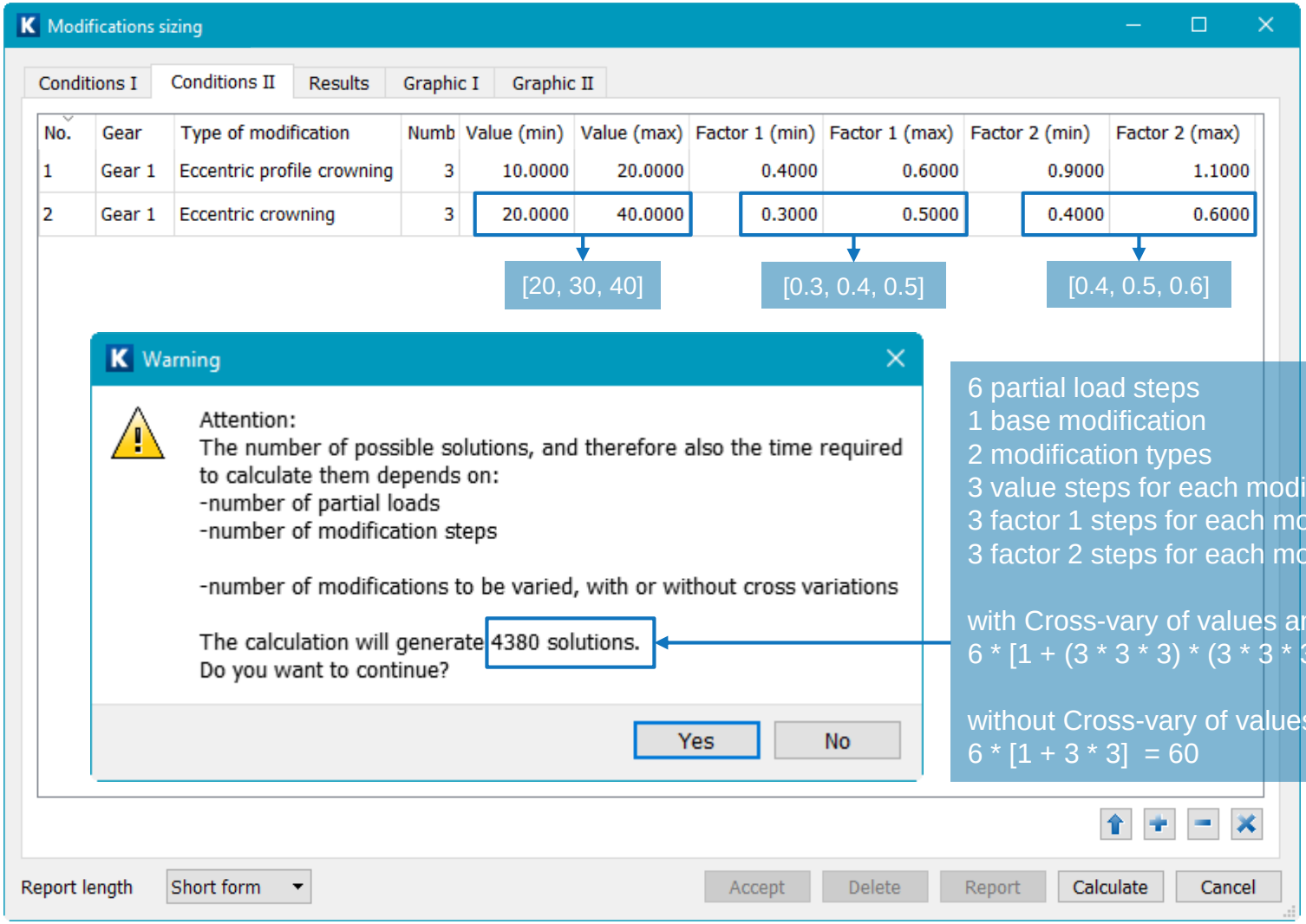


Trial values = [10, 15, 20]

6 partial load steps
1 base modification
3 modification types
3 value steps for each modification type

6 * [1 + 3 * 3 * 3] = 168

Usage of ‘Modification sizing’ tool to find optimum design

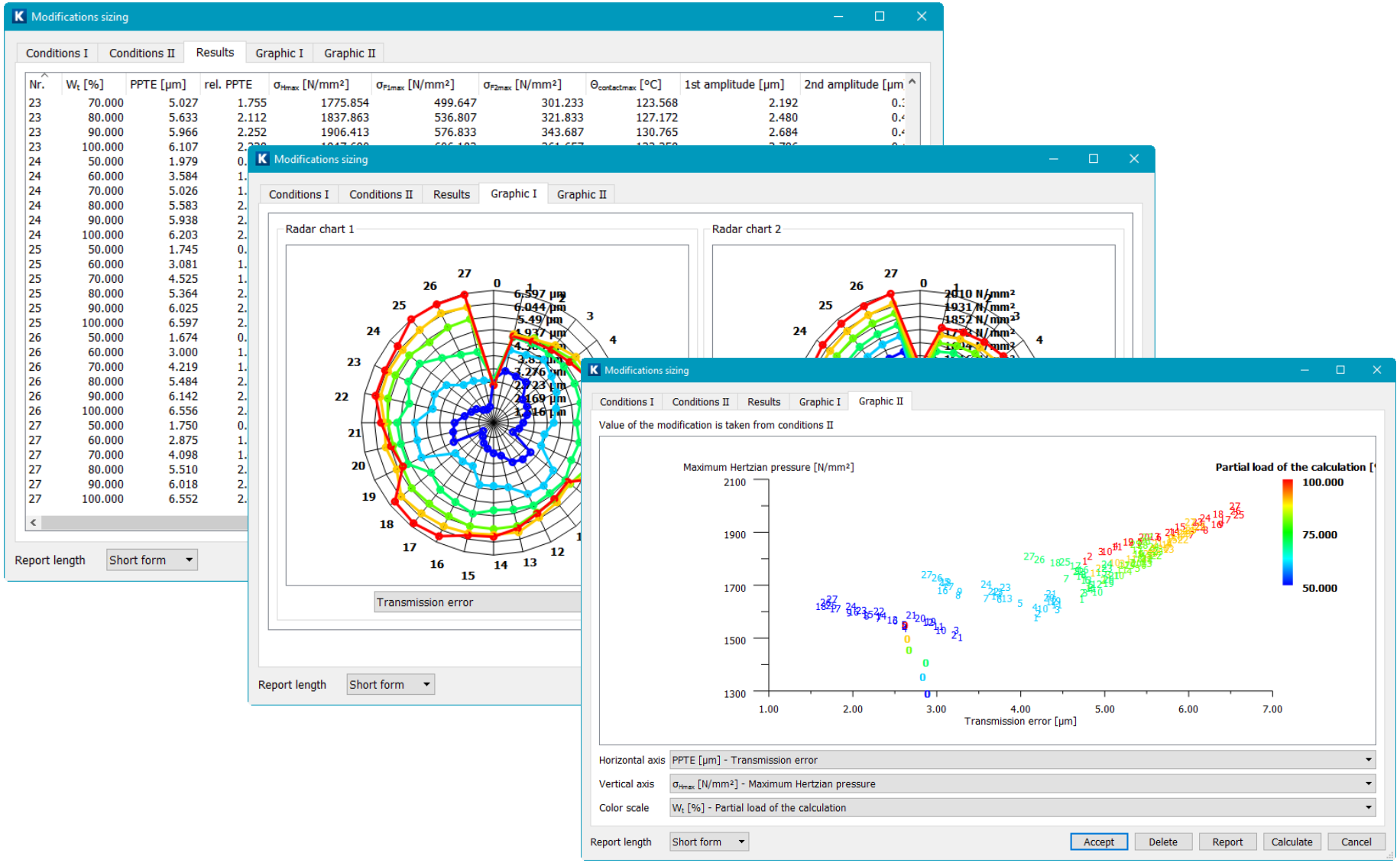


6 partial load steps
1 base modification
2 modification types
3 value steps for each modification type
3 factor 1 steps for each modification type
3 factor 2 steps for each modification type

with Cross-vary of values and factor 1/2
$6 * [1 + (3 * 3 * 3) * (3 * 3 * 3)] = 4380$

without Cross-vary of values and factor 1/2
$6 * [1 + 3 * 3] = 60$

Usage of ‘Modification sizing’ tool to find optimum design



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Thank you very much!

Any Questions?

KISSsoft AG
Reseller Meeting
April 2017