

KISSsoft Exercise

Bevel Gear 05

Topological modification and measurement grid of bevel gear

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Sharing Knowledge

1 Purpose of exercise

In this exercise, we will learn about:

- How to calculate topological modifications in KISSsoft based on measurement data.
- How to export measurement grid data from the KISSsoft bevel gear topology.

2 Task

Open the KISSsoft file "12 Bevel (GEMS Example 2 FM)" from the tab "Examples".

2.1 Step 1: Calculation of topological modifications

Calculate the topological modifications for pinion and ring gear. Use the measurement data 'Pinion.txt' and 'Gear.txt'.

Use the setting for convergence tolerance = 3 μ m and permissible number of points outside of tolerance = 3. Don't remove edge points.

2.2 Step 2: Export the measurement grid data from KISSsoft

Export the measurement grid data from KISSsoft for any external use. This can be on measuring machines, to measure bevel gears or to make any comparisons with other bevel gears.

3 Solution

3.1 Step 1: Calculation of topological modifications

Open the window 'Topological Modifications'.

Ca	lculation	Report	Graphics	Script	Extras	Help
Σ	Run					F5
× ×	Modifica Strength Tooth fo Contact	tions) orm analysis				
₽	Rough sizing macrogeometry					
Ð	Fine sizing macrogeometry					
퀄	Fine sizing modifications (microgeometry)					
	Load spectrum from time series					
	Measurement grid export					
	Topolog	jical mod	ifications			
	Tooth fo	orm expo	rt			
×	Settings					

Enter the convergence tolerance and permissible number of points with 3. Select the measurement grid file for the pinion.

K Calculate topological modifications from predefined measurement points X					
Measurement machir	ne	Gleason			
Maximum no. of iterations			20		
Convergence tolerance 3 µm					
Permissible number of pointnce (excluding edge points)					
Measurement grid file	e				
5-Topological_modif	fication_measurement	t_grid_en-de-v2200-j	il-public/Pinion.txt 🖯		
Tremove edge points in the measurement data					
Gear	Gear 1	Data format	Gleason		
Numbelumns	9	Numbrows	5		
Tooth thickness mod	lification factor	X _{sm}	0.0317		
	Accept	Save Report	Calculate Close		

Start the calculation. As the manufacturing by conventional machines can result in flank modifications, which are outside of the nominal topology, the tooth thickness needs to be enlarged for the calculation of the topological modifications.



After accepting the proposal, the calculation of topological modification is continued. When finished successfully, the topological modification data are to be saved. If you use the name 'Topo_mod', the files will be saved with the full name Topo_ModGear1LF and ...RF.

<u> </u>	Topo_ModGear1LF.DAT
	Topo_ModGear1RF.DAT
	Topo_ModTopologyConvergenceHistoryGear1.DAT

Also the history of the convergency will be saved. Here, the achieved result can be check for each flank.

```
# DEVIATION [μm] : STEP 3 #
COLUMNS=13
DATA
1 -1.000 0.000 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900 1.000
2 1.000 8.000 3.000 -2.000 0.000 1.000 1.000 2.000 3.000 1.000 1.000 1.000
3 0.896 6.000 2.200 -1.900 0.200 1.500 1.600 1.900 2.800 0.700 1.700 2.700
4 0.703 2.000 -0.200 -2.600 0.700 2.400 2.200 3.200 1.000 2.900 4.800
5 0.509 3.000 0.200 -2.100 1.600 3.200 2.800 2.600 3.200 1.100 3.600 6.100
6 0.316 8.000 3.500 -0.500 2.100 3.200 2.500 2.200 3.000 0.600 3.300 6.000
7 0.123 12.000 5.100 -1.400 -0.100 0.400 -0.400 -0.500 0.600 -2.400 0.100 2.600
8 0.000 14.000 6.100 -2.000 -1.500 -1.400 -2.200 -2.200 -0.900 -4.300 -1.900 0.500
END
* Number of points bigger than tolerance (excluding edge points): 3
```

!!! CONVERGED !!!

After saving the topological modification files, the files can be accepted. This attaches the files automatically into the tab 'modifications'.

Calculate topological modifications from predefined measurement points ×					
Measurement machin	e	Gleason	~		
Maximum no. of itera	tions		20		
Convergence tolerance					
Permissible number o	Permissible number of pointnce (excluding edge points)				
Measurement grid file	2				
5-Topological_modification_measurement_grid_en-de-v2200-jl-public/Pinion.txt					
\Box Remove edge points in the measurement data					
Gear	Gear 1	Data format	Gleason		
Numbelumns	9	Numbrows	5		
Tooth thickness modification factor		X _{sm}	0.0675		
	Accept	Save Report	Calculate Close		

The modifications are saved in the tab 'Modifications'.

Additional modifications						
Variant for c	alculation	No variant defined		~	+	
Gear	Flank	Modification type	Value [µm]	Data file	Status	Information
Gear 1	right	Topological modification	1.0000	C:/Users/jlanghart/Docu	active	^Q Drive fl
Gear 1	left	Topological modification	1.0000	C:/Users/jlanghart/Docu	active	♀ Coast fl

In the Graphic 'Geometry 3D – Modifications – Gear 1', the modifications are shown in 3D.



This is repeated for the ring gear in the same manner.

See file Exercise-Bevel-05-Topological_modification_measurement_grid_STEP_1-v2200-jl-public.Z70

3.2 Step 2: Export the measurement grid data from KISSsoft

To create the measurement grid data of a bevel gear, select the calculation 'Measurement grid export'.



Select the gear and the format of the machine. Enter the distance values from toe, root form circle and tooth tip. Press calculate.

K Calculate measurement grid		?	×	
General				
Drawing number	0.000.0			
Gear	Gear 1 v			
Measurement grid area	Tooth flank ~	J		
Save report for active root di	ameter and root form diameter			
□ Save report for slot width				
Format				
Measuring machine	Gleason ~			
Number of columns	9			
Number of rows	5	J		
Generate nominal coordinates (Grid points lie on the flank)				
Measurement grid limit				
Distance from toe	3.0000	nm	↩	
Distance from heel	3.0000	nm		
Distance from root form circle	0.9500	nm	÷	
Distance from tooth tip	0.9500	nm	←	
	Calculate Report Save	Clo	se	

The message will be shown, in case the distance values don't match exactly with the slices from the 3D. There is very minor difference possible. Click **Yes** to continue. Save the files with 'Export_KISSsoft'. Repeat the process with the ring gear (gear 2).

Finally, the files will be saved in the folder. They can be used for measuring machines or any other validation process.