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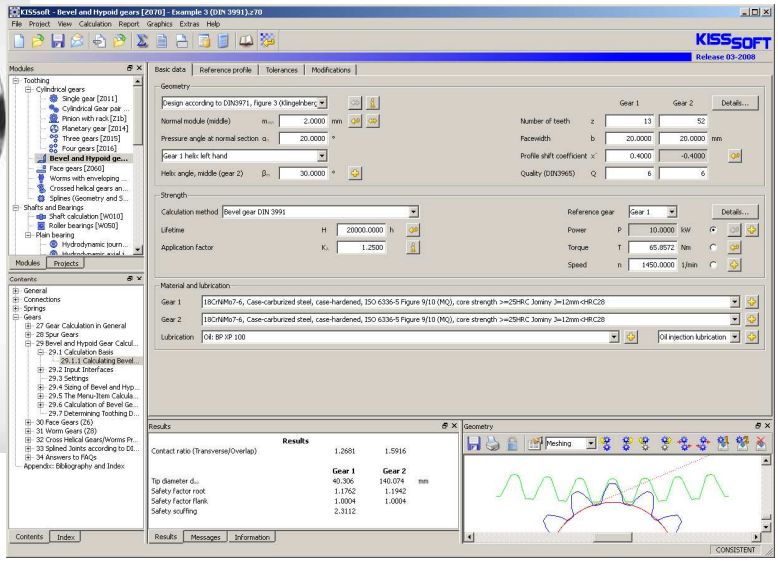
EES KISSSOFT
Engineering | Education | Software

Bevel gear calculation in KISSsoft

1 Bevel gear windows in KISSsoft



1.1 Summary

Below, input of bevel gear data, sizing option and conversion of Gleason data is described.
The various input windows are explained briefly in order to ensure correct data input.

2 Document information

2.1 Table of content

2.2 Document change record

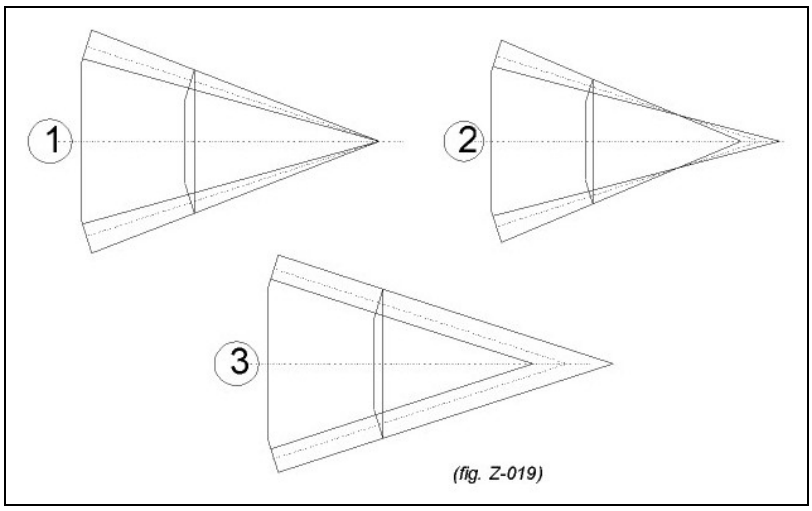
Revision	Dated	Who	Comments
0	11.3.08	HD	Original document

3 Data input

3.1 Geometry

Input of basic gear data. Select gear geometry from list:

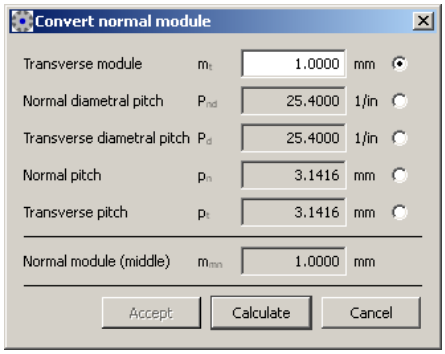
Note:



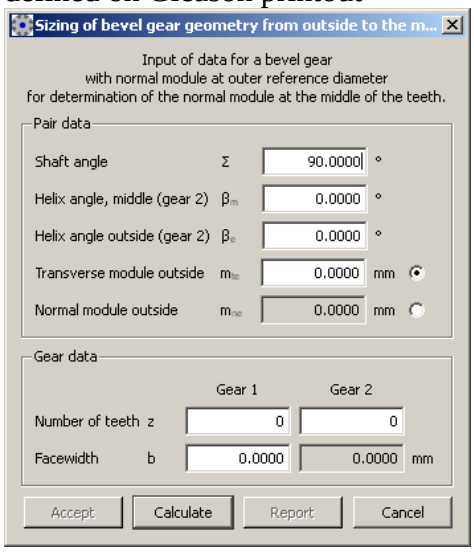
(fig. Z-019)

Note with respect to:

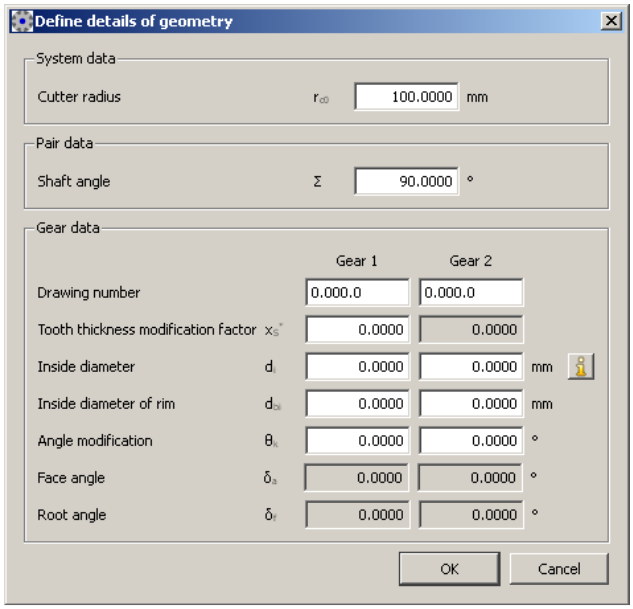
Convert button: will convert different types of module:



Sizing button will give module at mean diameter from module at outer diameter as typically defined on Gleason printout



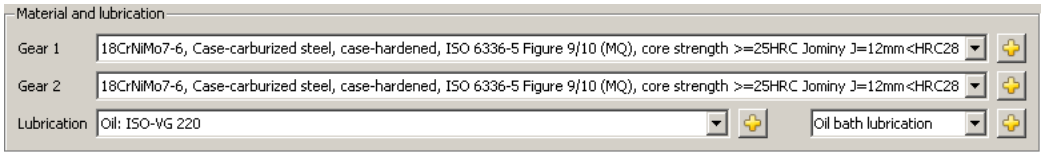
Note with respect to Details..., the following geometry data can be given:



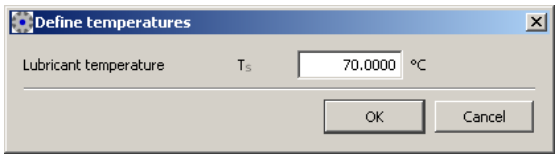
Cutter radius	Scuffing calculation, injection has less effect on cooling (injection is not as good as bath), little difference on results though
Shaft angle	Angle between pinion and gear shaft
Tooth thickness modification factor	
Inside diameter	
Inside diameter of rim	
Angle modification	
Face angle	
Root angle	

3.2 Material and lubrication

See Tab “Basic data”:



Lubricant and materials are selected from database. Scroll to top of list to choose “own input”. Then, use  button to add/modify data on a case by case basis. Choose type of lubrication. To enter lubricant temperature, press  button next to selection of type of lubrication and enter temperature as shown below:

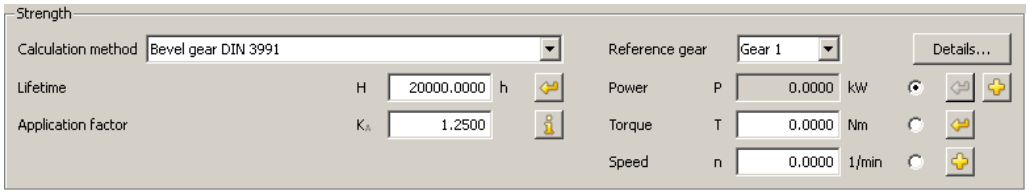


Note the following effects / details:

Type of lubrication	Scuffing calculation, injection has less effect on cooling (injection is not as good as bath), little difference on results though
Oil / Grease type	Viscosity data, scoring (Fresslaststufe) test stage (modern lubricants are on 12 anyway)
Lubricant temperature	Viscosity
Ambient temperature	Dry running (for plastics gears)

3.3 Data for strength calculation

See Tab “Basic data”

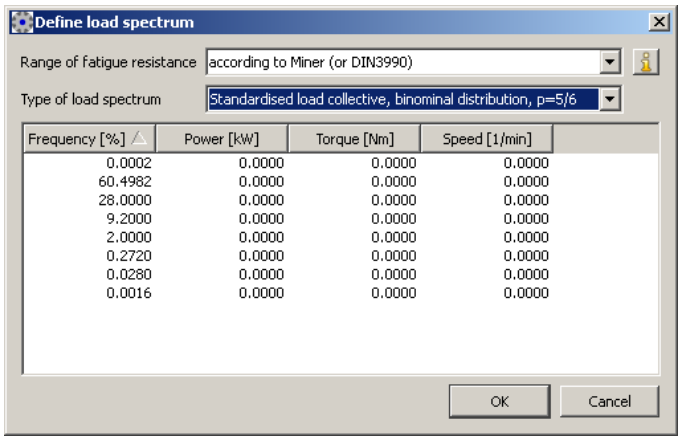


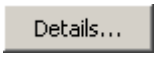
Calculation method	Select between different rating methods, DIN, ISO, AGMA, Klingelnberg rating (and plastic gear rating along VDI2545)
Lifetime	Define required lifetime. Use sizing button to calculate resulting lifetime from given torque/speed/target safety factors
Application factor	Set KA e.g. along DIN3990
Reference gear	Gear for which torque/speed input is given. Select from list.
Power/Torque/Speed	Select – through radio button – which property is to be calculated from the two other properties given
Sizing button next to lifetime	Reverse calculates lifetime from given torque/speed/application factor/load spectrum based on target safety factors as given in module specific settings

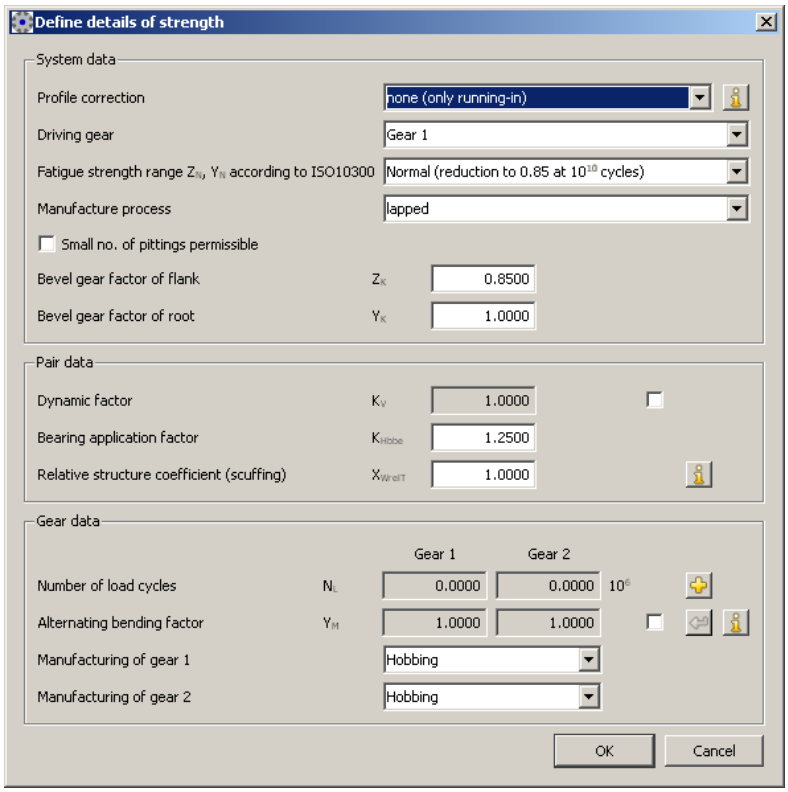
Plus button next to power	Selection of load spectrum. Once load spectrum is selected,  symbol will appear
Sizing button next to torque (or power)	Reverse calculates torque from given lifetime/speed/application factor/load spectrum based on target safety factors as given in module specific settings
Plus button next to speed	Define sense of rotation
Button “Details”	See below

Using load spectrum

Press  button next to “Power” to be able to select S-N curve type and load spectrum. Note that load spectrum is taken from database, see below:



Using button  will allow for more detailed data input with respect to strength rating:

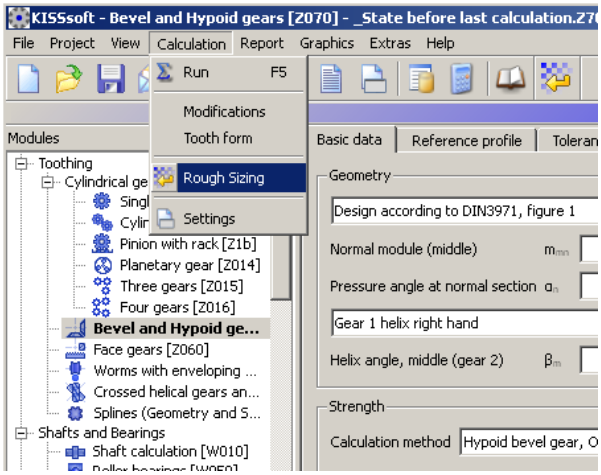


Type of profile correction	Scuffing / scoring (little bit of effect on KV) High end: with tip / root relief
Driving gear	
Fatigue strength…	Type of S-N curve as per ISO standard
Manufacturing	Quality, checks whether desired quality can be achieved with the machining method chosen.
Pitting permissible	In automotive vehicles, in case of low required life, some amount of pitting may be permitted (Din3990-41)
Bevel gear factor Flank ZK	Correction factors since strength calculation is based on helical gears
Bevel gear factor of root YK	Correction factors since strength calculation is based on helical gears
Dynamic factor	Calculated as per standard
Bearing application factor	See manual, 29.2.4.1, depending on support of gears and checks, for calculation of Khbeta
Rel. structure coefficient	See manual
Number of load cycles	Instead of using speed and lifetime to calculate cycle number, it may be given directly
Alternating bending factor	To account for influence of reverse bending or mean stresses
Manufacturing	Type of manufacturing method has some influence on Khbeta

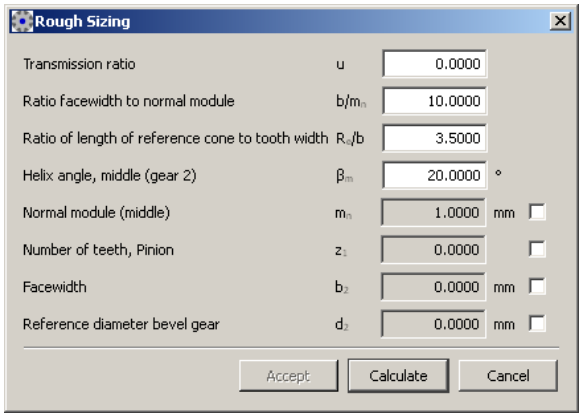
Note that Khbeta itself is calculated from formulas, considering bearing factor

4 Rough sizing

The sizing function in the bevel gear calculation is a simple yet efficient method to find a good starting point for a bevel gear pair quickly. It can be started from the menu “Calculation/Rough sizhing” as shown below:

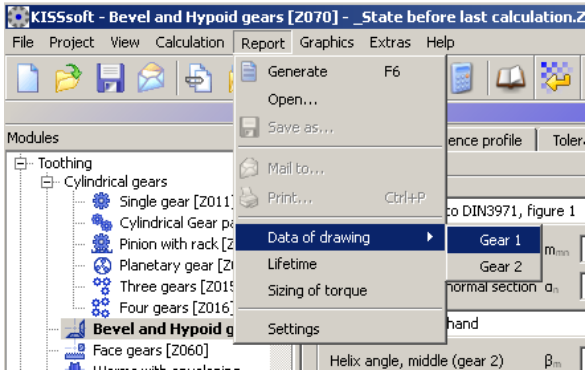


There, desired ratio, aspect ratios and helix angle can be given. Using load data as given in main windows and target safety factors as given in module specific settings, sizing will be done. Note that only one proposal is given as opposed to helical gear rough sizing function. The data of the proposed gear set will be automatically given to the main window.



5 Graphics

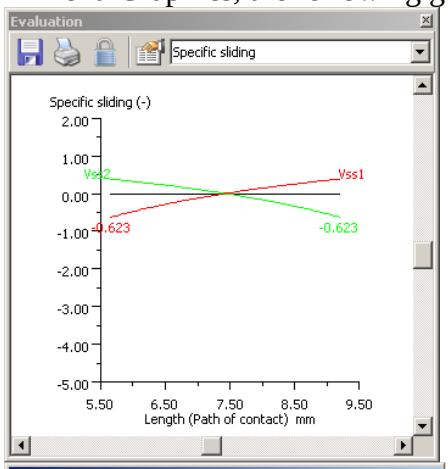
Gear data for drawing may be generated using menu “Report/Data of drawing”



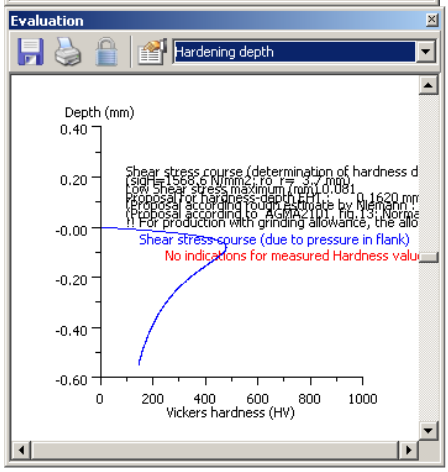
Then, gear data is generated as shown below:

MANUFACTURING DATA for CYKLO-PALLOID-BEVEL-GEAR	
Number of teeth	39.00
Facewidth (mm)	7.00
Mean normal module (mn) (mm)	0.7000
Mean helix angle (grd)	20.0000
Pressure angle at normal section (grd)	20.000
Production process	lapped
Accuracy grade according DIN 3965	6
Profile shift coefficient	0.0000
Tooth thickness variation factor	0.0000
Angle of cone (grd)	45.000
Mean reference diameter (mm)	29.052
Medium tip diameter (mm)	30.042
Mean root diameter (mm)	27.815
Length of reference cone outside (mm)	24.043
Length of reference cone middle (mm)	20.543
Length of reference cone inside (mm)	17.043
Tooth thickness tolerance DIN 3967	DIN3967 cd25
Tooth thickness deviation (upper)	-0.054
in normal section (mm) (lower)	-0.084
Chordal tooth thickness (without backlash) (without back lash)	
	1.099
in the middle (upper)	1.042
Facewidth (lower)	1.010
Reference chordal height (mm)	0.703

In menu Graphics, the following graphics are available



Specific sliding



Shear stress course