

KISSsoft Exercise 1

Bevel Gear 01

Input of a Gleason Dimension Sheet

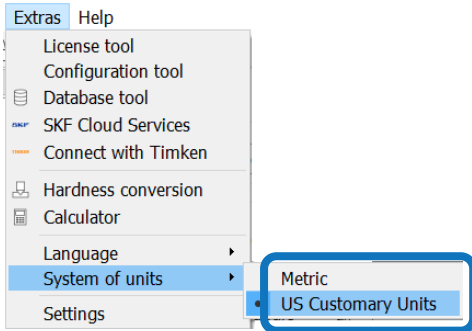
1 Task

- Enter the data from Gleason dimension sheet in KISSsoft, by using the conversion functionality.
- Check the geometry data in the KISSsoft report.

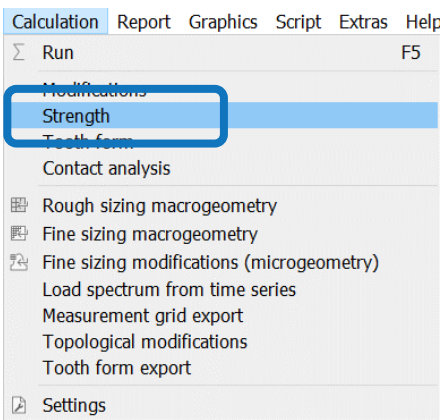
SPIRAL BEVEL GEAR DIMENSIONS		VERSION:1.0.3.6		10/ 7/2011		8:36	
NUMBER OF TEETH.	21	PITCH APEX TO CROWN.	3.737"	PINION	GEAR	2.018"	
PART NUMBER.		FACE ANG JUNCT TO PITCH APEX					
DIAMETRAL PITCH.	1.496"	MEAN CIRCULAR THICKNESS.	0.315"			0.205"	
FACE WIDTH.	20D 0M	OUTER NORMAL TOPLAND.	0.112"			0.095"	
PRESSURE ANGLE - PIN CONCAVE	20D 0M	MEAN NORMAL TOPLAND.	0.120"			0.110"	
PRESSURE ANGLE - PIN CONVEX.	20D 0M	INNER NORMAL TOPLAND.	0.130"			0.100"	
SHAFT ANGLE.	90D 0M	PITCH ANGLE.	28D 56M			61D 4M	
TRANSVERSE CONTACT RATIO		FACE ANGLE OF BLANK.	33D 1M			63D 44M	
FACE CONTACT RATIO		INNER FACE ANGLE OF BLANK.					
MODIFIED CONTACT RATIO		ROOT ANGLE	26D 16M			56D 59M	
OUTER CONE DISTANCE.	4.400"	DEDENDUM ANGLE	2D 40M			4D 5M	
MEAN CONE DISTANCE	3.652"	OUTER SPIRAL ANGLE				36D 42M	
PITCH DIAMETER	7.702"	MEAN SPIRAL ANGLE.				30D 0M	
CIRCULAR PITCH	4.256"	INNER SPIRAL ANGLE				23D 48M	
WORKING DEPTH.	0.637"	HAND OF SPIRAL	RH			LH	
WHOLE DEPTH.	0.361"	DRIVING MEMBER	PIN				
CLEARANCE.	0.399"	DIRECTION OF ROTATION-DRIVER	REV				
ADDENDUM	0.236"	OUTER NORMAL BACKLASH.	MIN			0.008"	
DEDENDUM	0.164"	DEPTHWISE TOOTH TAPER.	TRL				
OUTSIDE DIAMETER	4.669"	GEAR TYPE.				GENERATED	
THEORETICAL CUTTER RADIUS.	3.755"	FACE WIDTH IN PCT CONE DIST.				34.000	
CUTTER RADIUS.	3.750"	DEPTH FACTOR - K					
CALC. GEAR FINISH. PT. WIDTH		ADDENDUM FACTOR - C1					
GEAR FINISHING POINT WIDTH	0.065"	GEOMETRY FACTOR-STRENGTH-J	0.2594			0.2452	
ROUGHING POINT WIDTH	0.079"	STRENGTH FACTOR - Q.	4.00801			2.34297	
OUTER SLOT WIDTH	0.089"	EDGE RADIUS USED IN STRENGTH	0.030"			0.050"	
MEAN SLOT WIDTH.	0.079"	CUTTER RADIUS FACTOR - KX.	1.000				
INNER SLOT WIDTH	0.050"	FACTOR	0.9480				
FINISHING CUTTER BLADE POINT	0.014"	STRENGTH BALANCE DESIRED	GIVN				
STOCK ALLOWANCE.	0.055"	GEOMETRY FACTOR-DURABILITY-I	0.0878			0.095	
MAX. RADIUS - CUTTER BLADES.	0.065"	DURABILITY FACTOR - Z.	2592.30			1927.10	
MAX. RADIUS - MUTILATION	0.047"	GEOMETRY FACTOR-SCORING -G	0.003116				
CUTTER EDGE RADIUS	0.045"	SCORING FACTOR - X	0.2070				
CALC. CUTTER NUMBER.	7	ROOT LINE FACE WIDTH	1.496"			1.496"	
MAX. NO. OF BLADES IN CUTTER		PROFILE SLIDING FACTOR	0.00391			0.00408	
CUTTER BLADES REQUIRED	STD DEPTH	RATIO OF INVOLUTE/OUTER CONE				1.198	
	DEPTH	RATIO OF INVOLUTE/MEAN CONE.				1.443	
GEAR ANGULAR FACE - CONCAVE.	25D 10M	AXIAL FACTOR - DRIVER CW	IN			0.171	OUT
GEAR ANGULAR FACE - CONVEX	27D 57M	AXIAL FACTOR - DRIVER CCW.	OUT			0.401	OUT
GEAR ANGULAR FACE - TOTAL.	29D 51M	SEPARATING FACTOR-DRIVER CW. SEP				0.366	ATT
NUMBER OF BLADE GROUPS		SEPARATING FACTOR-DRIVER CCW SEP				0.050	SEP
EFFECTIVE CUTTER RADIUS.		DUPLEX SUM OF DEDENDUM ANG	6D 45M				
SLOT WIDTH PCT FOR BLADE PT.		ROUGHING RADIAL.	3.702"				
		INPUT DATA	4				
		INPUT DATA					1

2 Solution

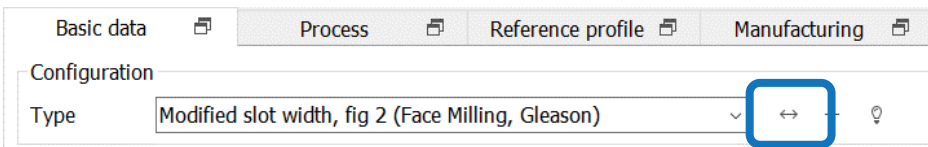
As the most values are given in inches, change the units under “Extras – System of units”.



Also, as no operating data are given, unclick the tab 'strength'.



To enter the data from the Gleason data sheet, select 'Modified slot width, fig 2 (Face Milling, Gleason)' and use the conversion button beside 'Type'.



Enter the corresponding data. To enter the 'mean circular thickness', activate the checkbox beside 'mean circular thickness'.

Conversion from GLEASON dimension sheet

Pair data

Transverse module gear 2 (outside)	m_{et2}	0.2027	in	<input type="radio"/>
Outer pitch diameter gear 2	d_{e2}	7.7020	in	<input checked="" type="radio"/>
Normal pressure angle	α_n	20.0000	°	
Mean spiral angle, gear 1	β_{m1}	30.0000	°	
Shaft angle	Σ	90.0000	°	
Hypoid offset	a	0.0000	in	
Cutter radius	r_{c0}	3.7500	in	
Number of blade groups	z_0	1.0000		

Gear data

		Gear 1	Gear 2	
Number of teeth	z	21	38	
Facewidth	b	1.4960	1.4960	in
Tip diameter (outside)	d_{be}	4.6690	7.8240	in
Tooth depth (outside)	h_e	0.3990	0.3990	in
Face angle	δ_a	33.0167	63.7333	°
Mean circular thickness	s_{mt}	0.3150	0.2050	in <input checked="" type="checkbox"/>
Tooth thickness at tip (middle, arc)	t_{LN}	0.1208	0.1106	in
Normal backlash	j_{en} (min/max)	0.006	0.008	in

Accept Calculate Report Cancel

Press 'Calculate' and 'Report'. Check the values in the KISSsoft intermediate report. A preview of the reference profile data is shown.

Transformation to Gleason geometry

Addendum angle	(°) [θ_a]	4.090	2.660
Face angle	(°) [δ_a]	33.017	63.733
Dedendum angle	(°) [θ_f]	2.660	4.090
Root angle	(°) [δ_a]	26.267	56.983
Profile shift coefficient	[x_{hm}^*]	0.312	-0.312
Addendum coefficient	[haP^*]	0.939	0.939
Dedendum coefficient	[hfP^*]	1.194	1.194
Root radius coefficient	[pfP^*]	0.250	0.250

Press 'Accept'. The data are transferred to the KISSsoft calculation.

Check the values in the report. The values for tooth thickness are:

		Gear 1	Gear 2	
Number of teeth	z	21	38	
Facewidth	b	1.4960	1.4960	in
Profile shift coefficient	x_{mn}	0.5119	-0.5119	↔
Tooth thickness modification factor	x_{sm}	0.0406	-0.0593	<input checked="" type="checkbox"/>
Quality (DIN 3965)	Q	6	6	
Shaft angle	Σ		90.0000	°
Hypoid offset	a		0.0000	in

7.1 Backlash

		----- Gear 1 -----	----- Gear 2 -----
Circumferential backlash, middle (in)	[j _{mt}]		0.0085/0.0063
Circumferential backlash, outside (in)	[j _{et}]		0.0102/0.0076
Normal backlash, middle (in)	[j _{mn}]		0.0009/0.0051
Normal backlash, outside (in)	[j _{en}]		0.0077/0.0057
Axial displacement for the predefined backlash:			
Required backlash due to axial displacement (in)	[Δ _j]		0.0029
Additional backlash per gear (in)	[Δ _{j1,2}]	0.0007	0.0022
Required axial displacement per gear (in)	[α _{1,2}]	0.0019	0.0035
Backlash for the predefined axial displacement:			
Change of mounting distance (in)	[α _{1,2}]	0.0039	0.0039
Additional backlash per gear (in)	[Δ _{j1,2}]	0.0014	0.0025