

KISSsoft 2019 – Instruction 015

KHb settings from KISSsys

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Sharing Knowledge

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1 Description

1.1 Situation

It is not possible to set "KHb" (Face load coefficient) value automatically in details at the moment between KISSsoft modules. "KHb" can be calculated in details in shaft module, but the value needs to be manually transferred to the gear calculation and standard based value needs to be overwritten. In gear calculation some simple dimensions for the shaft and gear position can be anyway added to make the calculation according to the standard. These values can be operated from the KISSsys and shaft length and diameter can be taken from the shaft geometry. This allows user to do the calculation of the "KHb" with "real" values. Standard has some limitations for the gear arrangement and therefore this method can be only used in simple cases and therefore more detailed calculation is recommended to be done in shaft module.

2 Model setup

2.1 TranslationTable

To be able to modify "I", "s" and "dsh" values for "KHb" calculation, "Own Input" needs to be flagged in gear calculation.

Model	Basic data Reference profile Manufacturing Tolerances Ratin	g Factors
✓ □	General factors Dynamic factor K _v 1.0790	Transverse load factor K _{Ha} 1.4253
🎭 GP2	Alternating bending factor (mean stress influence coefficient) Predefined	Y _M 1.0000 1.0000
	Face load factor Calculation according calculation method Tooth trace modification None Position of Contact pattern favorable	Type of pinion shaft ISO 6336 Picture 13a < 1 Factor K' with stiffening no
	Pinion sha Bearing di Distance External d	ace load factor ×
	Information Tooth trac due to def due to def due to def due to def due to ma The Check button defines if you want to enter the value The Pacific button defines which values of a group checked	e deviation formation (without tooth trace modification) f_{sh0} 0.2049 µm formation (with tooth trace modification) f_{sh} 0.0000 µm nufacturing f_{ma} 10.2591 µm OK Cancel

Figure 1. Flag "Own inputs" to change values

Then new variable type "array" and named "TranslationTable" needs to be created for the calculation file.

Model 🗗 🗙 Properties		5
Model B Properties Variables Functions GB GB GB GD1 GB GP2 CDP s1 SWmin_EQ_1 R SWmin_LE_05 R SWminUsed R T1 I Info Go Input Output TTTol1 System TypeOfLub System WoehlerType	Type Array Name TranslationTable Reference	

Figure 2. Creating a new array "TranslationTable" in the gearpair calculation

New variables to translate can be found from the protocol template.

Name	KISSsoft name
	ZP[0].KHdat.l
S	ZP[0].KHdat.S
dsh	ZP[0].KHdat.dsh

Now open the report and check the description of the relevant variables:

General influence factors

		Gear 1 Gear 2
Nominal circum. force at pitch circle (N)	[Ft]	492.4
Axial force (N)	[Fa]	86.8
Radial force (N)	[Fr]	182.0
Normal force (N)	[Fnorm]	532.1
Nominal circumferential force per mm (N/mm)	[W]	32.83
Only as information: Forces at operating pitch circle:		
Nominal circum ferential force (N)	[Ftw]	500.0
Axial force (N)	[Faw]	86.8
Radial force (N)	[Frw]	159.9
Circumferential speed reference circle (m/s)	[V]	4.25
Circumferential speed operating pitch circle (m/s)	[v(dw)]	4.19
Running-in value (µm)	[yp]	0.5
Running-in value (µm)	[yf]	0.5
Correction factor	[CM]	0.800
Gear blank factor	[CR]	1.000
Basic rack factor	[CBS]	0.975
Material coefficient	[E/Est]	1.000
Singular tooth stiffness (N/mm/µm)	[c']	9.411
Meshing stiffness (N/mm/µm)	[сγα]	14.115
Meshing stiffness (N/mm/µm)	[cγβ]	11.998
Reduced mass (kg/mm)	[mRed]	0.00415
Resonance speed (min-1)	[nE1]	27855
Resonance ratio (-)	[N]	0.072
Subcritical range		
Running-in value (µm)	[γα]	0.5
Bearing distance I of pinion shaft (mm)	[]	72.000
Distance s of pinion shaft (mm)	[s]	51.000
Outside diameter of pinion shaft (mm)	[dsh]	35.000

Figure 3. Variables to be changed from the report

Open the main-report .RPT file:

📄 Z01	2Le0.RPT
165	1 <execute=z010geometrye.rpt></execute=z010geometrye.rpt>
166	<pre>lIF (%i==0) {ZS.NurGeometrie}</pre>
167	9
168	5 <bf></bf>
169	5General influence factors
170	5
171	<pre>lIF (%i == 0) {ZS.AGMArech}</pre>
172	<pre>lIF (%i) {RechSt.RechenMeth != 9}</pre>
173	// ISO. DIN. VDI General Factors
174	1 <execute=z010isogeneralfactorse.rpt></execute=z010isogeneralfactorse.rpt>

Figure 4. Main-report.RPT

Search for the Z010GeneralFactorse.rpt file

2Le0.RPT 🗵 🔚 Z010ISOGeneralFactorse.rpt 🗵			
<pre>lIF (%i==0) {Zst.KHbVariant}</pre>			
9Bearing distance 1 of pinion shaft (mm)	[1]	%10.3f	{ZP[0].KHdat.1}
9Distance s of pinion shaft (mm)	[5]	%10.3f	{ZP[0].KHdat.S}
9Outside diameter of pinion shaft (mm)	[dsh]	%10.3f	{ZP[0].KHdat.dsh}

Figure 5. Variable names from KISSsoft protocol template

See more detailed information on the use of the "TranslationTable" in the instruction on the homepage "ins-006-TranslationTable.pdf".

2.2 Add variables

Add new variables to the gear-pair calculation:



Figure 6. Adding new variables I,s and dsh

2.3 TranslationTable definition

When variable names and new variables in KISSsys are known, those can be added in the TranslationTable use following method for each new variable separated with comma:

["new variable in KISSsys","Variable name from KISSsoft"]

```
[["l", "ZP[0].KHdat.I"], ["s", "ZP[0].KHdat.S"], ["dsh", "ZP[0].KHdat.dsh"]]
```



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2.4 Expressions for the variables

Expression to the new variables can be then created to make them changeable automatically according to geometry.

Note: In the example only case "A" defined of pinion shaft configurations.



Figure 8. Pinion shaft configuration cases

Variable "I" pinion shaft bearing distance.

Expression for variable "I":

_O.GB.s1.b2.position - _O.GB.s1.b1.position

• Variable "s" is gear distance from the center of the bearings.

Expression for variable "s": I - (_O.GB.s1.z1.position-_O.GB.s1.b1.position)

• Variable "dsh" is shaft diameter in the place of the pinion.

Expression for variable "dsh":

kSoft_RotCADDiameter(_0.GB.s1.OBJ_GetMember("outerGeometry"),_0.GB.s1.z1.position)

Model 🗗 🗙	Properties	8
 ✓ □ ✓ □ ✓ ○ ✓ □ ✓ □	Variables Functions Type Real Image: Real Name Name Name Reference Value Value <td< th=""><th></th></td<>	
	Variables Functions Type Real I SafetySizeDependent I savingMode R SB R SBmin R SBmin R SBmin_GE_2 R SBmin_LE_05 I SBmin_Lead	
	Properties Image: Constraint of the second seco	

Figure 9. Definition of the expression of the variables "I", "s" and "dsh"

Once either shaft geometry is changed or position of the components are changed, new values for the "KHb" calculations are adopted and used in the gear calculation.

See also referenced model "015-KHb-settings-simplified.ks" for the functionality in KISSsys.

Note! This method is very much simplified and to do the "KHb" calculation precisely, select calculation method according to ISO 6336-1 Annex E, and use the shaft files (module "W10") from the gearpair calculation.

Basic data Reference profile Manufacturing Tolerances Rating Factors
General factors
Dynamic factor K _V 1.0997
Z-Y factors
Alternation banding factor (mean stress influence coefficient)
Predefined Y _M 1.0000 1.0000
Face load factor
Calculation without manufacturing allowance, according to ISO 6336-1 Annex E
Axis alignment
K Define axis alignment (calculation of the face load factor)
Avia Signment Constants Tracing
Important: All inputs here refer to the nominal load. I nom defined in the Rating tab.
Constant Proportional (T ₁ = 17.150 Nm)
Shaft Gear 1 file necht\AppData\Local\Temp\KSYS_0\S2_A.w10
Deviation error of axis Gear 1 - Gear 2 f _{zp} 0.0000 0.0000 µm
Indination error of axis Gear 1 - Gear 2 fza 0.0000 0.0000 µm
Shaft Gear 2 file necht\AppData\Local\Temp\KSYS_0\S3_B.w10
Shaft/Gear suppress plausibility check
Permissible deviation Shaft/Gear 1.0000 %

Figure 10. Calculation of KHbeta according to ISO 6336-1 Annex E with using the shaft files