Shaft and Bearing Calculation with TIMKEN Cloud Services



Introduction



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Introduction

- KISSsoft® is a calculation program for the design, optimization and verification of machine elements according to international standards.
- Supports numerous machine elements.
- Has 3 modules where rolling bearings can be calculated.
- TIMKEN Cloud Services can be used within the Shaft calculation module (1).

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Toothing	
 Stirnradverzahnungen 	
Single gear	
Cylindrical gear pair	
Pinion with rack	
Planetary gear	
Three gears train	
當意 百世 Gears train	
✓ Weitere Verzahnungen	
Bevel and Hypoid gears	
Face gears	
Worms with enveloping worm wheels	
Crossed helical gears and Precision me	
Beveloid gears	
Non circular gears	
Shafts and Bearings	
$\stackrel{\downarrow}{\longrightarrow}$ Shaft calculation	
Rolling bearing ISO 281, ISO 76	
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Requirements

- KISSsoft release 2022
- Valid Timken account
- Basic knowledge about KISSsoft
 - Use tutorials (1-5)
 - Use manual (6, 7)





- When calculating bearings acc. to ISO/TS 16281 one must know internal geometry of the bearing (Z, D_w, D_{pw}, L_{we}, etc.).
- Calculation is more precise if we have exact internal geometry → TIMKEN cloud services!
- Unknown internal geometry will be estimated by KISSsoft based on known external dimensions and bearing capacities C₀ and C.
- It has no effect on bearing calculation acc. to ISO 76/ISO 281.





Connect to TIMKEN (1/4)

- In KISSsoft main window go to Extras (1) and choose
 Connect with Timken (2).
- A new window will appear.
- If you don't have a valid
 Timken account, click on
 Register here (3) to create a
 new account and follow the
 procedure described in the
 next slide.



	K Connect to Timken X
3	Sign in with your Timken account You can connect (ISSoft with Timken technical data to easily perform bearing calculations. During the sign-it process, a browser window will open in which you must grant KISSsoft access to your Timken account to use this service. Register here if you do not have a TIMKEN account yet. When you sign and use Timken information, Timken uses your personal data in accordance with their <u>Privacy Notice</u> . If have read the <u>Terms of Use</u> and accept them.
	Sign In with Timken Account Close



Creating a new TIMKEN account

- Fill in the necessary data, accept Terms and conditions (1) and click on Sign up (2).
- In a new window that appears click on OK (3) and wait for the account registration to be confirmed by email by Timken company.

Registration The Timken Comp × +	-
ightarrow $ ightarrow$ $ ig$	dc/OrgRegistration.html 🏠 😌 生 💵 🗊 🦉 🐽 » 🚍
Please register here to conne	MKEN ect KISSsoft with Timken technical data.
Company Information	Your Information
Company Name *	First Name *
Industry *	✓ Last Name *
Street Address *	Company Email Address *
City *	Phone Number *
Country *	✓ Your Role * ✓
Postal Code *	
Website	
L have read the Terms & Conditions and	the Privacy Policy and agree to them
SIGN UP	the Filledy Fondy and agree to them.

TIMKEN





Connect to TIMKEN (2/4)

- Once you have a valid and confirmed TIMKEN account go back to KISSsoft.
- In a window Connect to Timken confirm Terms of Use (1) and click on Sign In with Timken Account (2).
- A default web browser will open, and a login page will appear as shown in the next slide.

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	Sign in with your Timken account You can connect KISSsoft with Timken technical data to easily perform bearing calculations. During the sign-in process, a browser window will open in which you must grant KISSsoft access to your Timken account to use this service.	
1	Register <u>here</u> if you do not have a TIMKEN account yet. When you sign and use Timken information, Timken uses your personal data in accordance with their <u>Privacy Notice</u> .	
	2 Sign In with Timken Account Close	

Connect to TIMKEN (3/4)

- Enter username (1) and password (2) that you have selected when registering a Timken account and click on Sign in button (3).
- If at this point you still don't have a TIMKEN account, click on Register (4) and follow the procedure to create an account as described 2 slides back.
- After signing in a new page will open where button Grant Consent (5) must be clicked.
- If signing in was successful a new page will appear which can be closed (6).



Connect to TIMKEN (4/4)

- Now go back to KISSsoft again where a window
 Connect to Timken should give you a notification that you are signed in with your
 Timken account (1).
- Close the windows by clicking button Close (2).

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Sign in with your Timken account You can connect KISSsoft with Timken technical data to easily perform bearing cal During the sign-in process, a browser window will open in which you must grant KI to your Timken account to use this service.	culations.	MKEN
You are signed in with your Timken account.		
When you sign and use Timken information, Timken uses your personal data in ac	cordance with their Priv	vacy Notice.
✓ I have read the <u>Terms of Use</u> and accept them.		
	Sign Out	Close

Enable use of proprietary internal geometry data from TIMKEN cloud services

- In order to make use of Timken proprietary internal geometry data you must first enable it in Shaft calculation module.
- Open Shaft module or an existing shaft calculation and select menu Calculation (1) and click on Settings (2).
- A window Module specific settings will open. Select tab Rolling bearings (3).
- Enable both Timken proprietary data (4) and Use proprietary bearing internal geometry (5).
- Close the window.



Calc 3 Rolling bearings Reliability	Shaft editor and 3D viewer		
General			
Display critical bearing			
Display rating life in scientific notation			
Save user defined bearings in calculation fi	le		
Read user-defined rolling bearings from ca	culation file		
Define lubrication for each bearing individu	ally		
Axial clearance (classical calculation) u _A	0.0100	mm	Õ
Maximum life modification factor 0150,max	50.0000		
Surface roughness of housing	N7 Rz=8.0 (Turned with diamond)		
✓ Timken: Use proprietary internal geometry	data (used for calculation only, not available in reports etc.)		

- Run a calculation with some Timken bearing(s) (1).
- Several reports with different data are available. Results referring to Timken proprietary internal geometry bearing data will be shown in the shaft report (1) and in the Rolling bearing report (2).
- Pay attention to the notes given in the reports which explain that the proprietary internal geometry data will not be shown in the reports (see next slides).







"Normal" rolling bearing

3.3 Bearing 3.3.1 Rolling bearing (TIMKEN 32010X-32010X) Bearing inner geometry data provided by TIMKEN Cloud Services TIMKEN For further information, Please visit www.timken.com Bearing position (mm) (Youw] 201.000 Bearing position (mm) (Youw] 201.000 Bearing position (mm) (g) Set fixed bearing right Inner diameter (mm) (g) Set fixed bearing right Inner diameter (mm) (g) 80.000 Width (mm) (g) 80.000 Corner radius (mm) (g	ISSsoft
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[fc] 1.000	
Correction factor Basic static load rating	
[f _{c0}] 1.000	

"Connecting" rolling bearing

		KISSso	ofi
5 Connections			
5.1 Connecting rolling bearing (TI)	WKEN 6210-28 S)		
	,		
-			
Bearing inner geometry data provide	ed by TIMKEN Cloud Service	s	
TIMKEN .For fur	ther information, Please visi	www.timken.com	
Bearing type	Dee	groove ball bearing (single row)	
Position (mm)		45.000	
Shaft 'Shaft 1' <-> Shaft 'Shaft 2'			
Fixed bearing			
Inner diameter (mm)	[d]	50.000	
External diameter (mm)	[D]	90.000	
Cospor radius (mm)	[0]	20.000	
Resis dynamic load rating (kN)	[1]	35 100	
Basic static load rating (kN)	[C]	23.200	
Fatique load limit (kN)	[C.,]	0.000	
Basic dynamic load rating (kN)	[Ctree]	35.074	
Basic static load rating (kN)	[Cotheo]	23.180	
Correction factor Basic dynamic load	rating		
	[f _c]	1.000	
Correction factor Basic static load rat	KISSSoft INCLOS g inner geometry data provided by TIMKEN Cloud Services INTREN • For further information, Please visit www.tim.ken.com type Deep groove ball bearing (single row) (mm) (d) type Deep groove ball bearing (single row) (mm) (d) (Imm) (d) Sonoon (Imm) (d) (Imm) (Imm) (d) (Imm) (Imm) (d) (Imm) (Imm) (d) (Imm) (Imm) (Imm) (Imm) (Imm) (Imm) (Imm) (Imm) (Imm) </td		
	[fco]	1.000	
Calculation was performed using real available for reports.	bearing internal geometry p	ovided by bearing manufacturer. These values are however not	
Nominal diametral clearance* (µm) (*) ISO 5753-1:2009 C0	[Pd]	14.500	
	(D -1	101.000	

			KISSsoft
7.5 Rolling bearing 'Connecting rolli	ng bearing'		
Position (Y-coordinate)	[v]	45.00	mm
Dynamic equivalent load	[P]	7.05	kN
Static equivalent load	[Po]	7.05	kN
Minimum EHL lubricant film thickness	[h _{min}]	0.186	μm
Spin to roll ratio	[ω_s/ω_roll]	0.049	
Life modification factor for reliability	[a ₁]	1.000	
7.5.1 Results according to ISO 281			
Lubricant	ISO-VG 220		
Lubricant with additive, effect on bearing	lifetime confirmed in tests.		
Lubricant - service temperature	[T _B]	70.00	°C
Oil lubrication, on-line filtration, ISO 4406	-/19/16		
Contamination factor	[e _c]	0.228	
Load ratio	[C/P]	4.977	
Operating viscosity	[V]	48.884	mm²/s
Reference viscosity	[V ₁]	13.887	mm²/s
Viscosity ratio	[K]	3.520	
Life modification factor	[a _{ISO}]	1.502	
Fatigue load limit	[C.,]	1.055	kN
Basic bearing rating life	[L _{nh}]	1369.64	h
Modified bearing rating life	[L _{nmb}]	2057.22	h
Static safety factor	[S ₀]	3.29	

7.5.2 Calculation with proprietary I	bearing internal geome	etry data (ISO/TS 16281)		
Operating diametral elearance	[7:0] [0:1]	11.500	P	
Contamination ractor	[80]	0.228	EN.	
r augue load iimit Deference reties life	[Cu]	1.1/0	KIN b	
Reference rating me	[Linth]	1336.96	n 5	
Fronting static as the factor	[Lomb]	2242.43	п	
E necuve static salety factor	[30w]	3.94		
Static safety factor	[Donet]	3.12	LN	
Static equivalent load	[Poret]	7.45	KIN	
Bearing reaction torce		0.000	KIN	
Searing reaction force		1.368	KIN I-N	
Dearing reaction force	[[7]]	-7.053	KIN I-N	
bearing reaction torce	61	7.053	кn •	
Inclination angle	[a _{Fr}]	-89.999		
Bearing reaction moment	[M _×]	-39.254	NM	
Bearing reaction moment	[My]	0.000	NM	
bearing reaction moment	[M ₂]	-0.002	n m	
searing reaction moment	[M]	39.254	Nm	
nclination angle	[a _{Mr}]	-179.997	•	
Isplacement of bearing	[u _x]	0.002	μm	
Displacement of bearing	[u _y]	-101.453	μm	
Displacement of bearing	[u _z]	41.334	μm	
) isplacement of bearing	[u ₇]	41.334	μm	
nclination angle	[a _{ur}]	89.998	*	
/lisalignment of bearing	[r _x]	0.171	mrad	
/lisalignment of bearing	[r _v]	-0.000	mrad	
Misalignment of bearing	[r _z]	0.000	mrad	
Misalignment of bearing	[r,]	0.171	mrad	
O il level	(H)	0.000	mm	
Rolling moment of friction	[M "]	0.235	Nm	
Sliding moment of friction	[M _{s1}]	0.228	Nm	
foment of friction, seals	[M _{seal}]	0.000	Nm	
Noment of friction for seals determine	ed according to SKF mai	n catalog 17000/1 EN:2018		
Moment of friction flow losses	[M drag]	0.000	Nm	
Forque of friction	[M _{loss}]	0.463	Nm	
Power loss	[Ploss]	72.663	W	
The moment of friction is calculated a	ccording to the details in	SKF Catalog 2018.		
The calculation is always performed	with a coefficient for addi	tives in the lubricant µbl=0.15.		



Thank you for your attention!



Sharing Knowledge

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