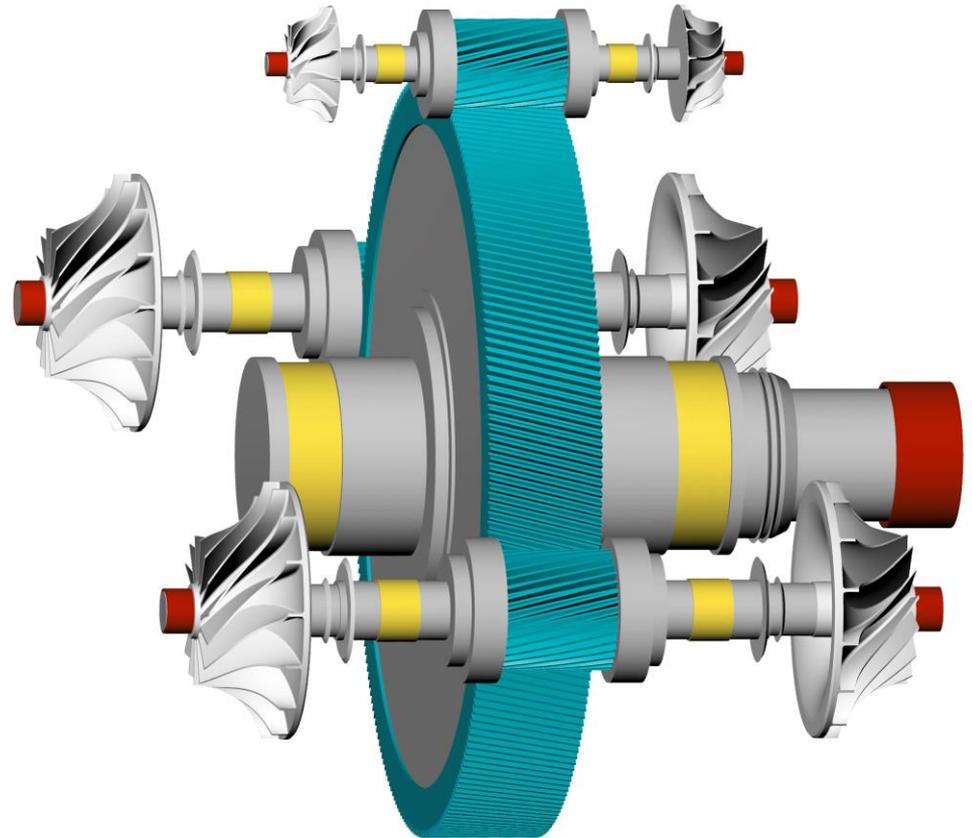


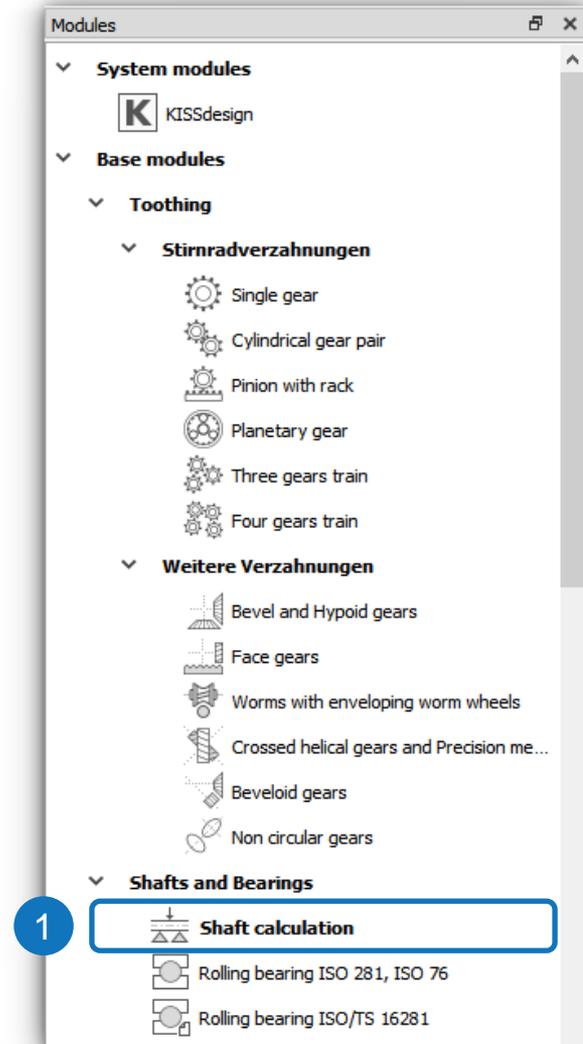
Shaft and Bearing Calculation with TIMKEN Cloud Services

Introduction



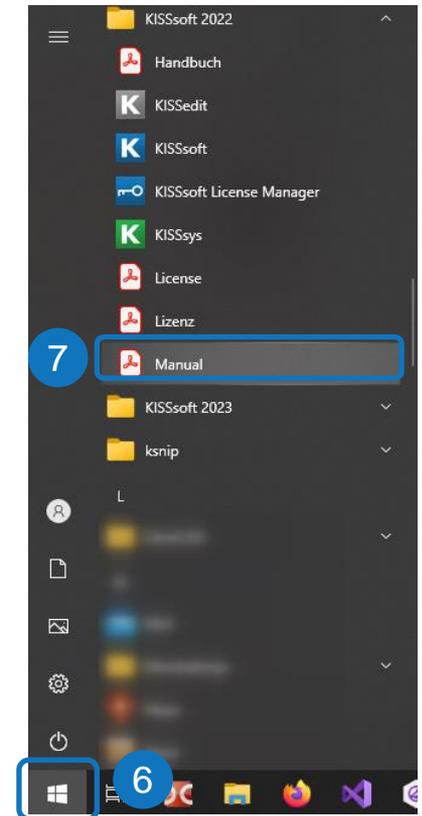
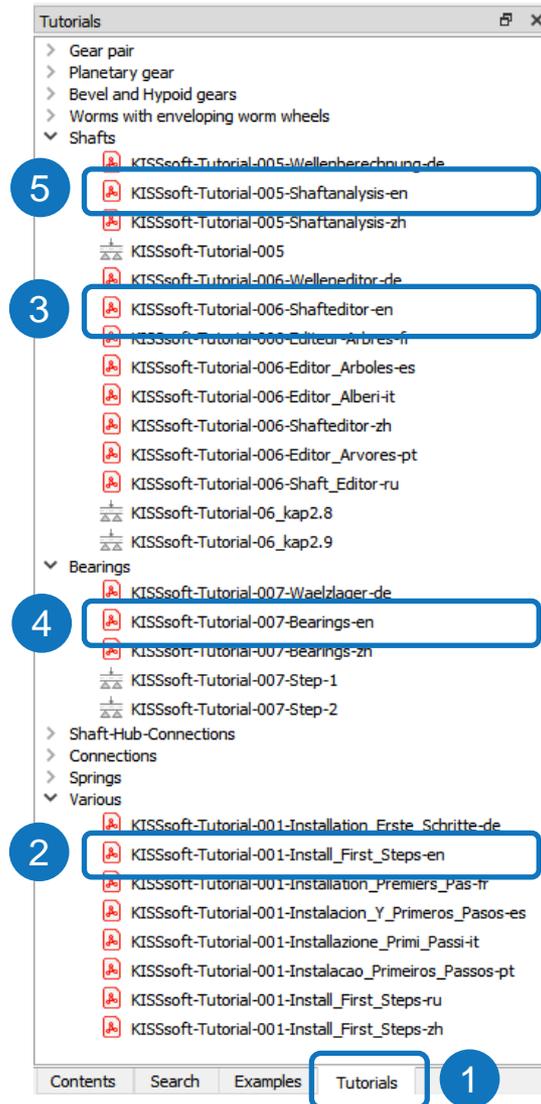
Introduction

- 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).



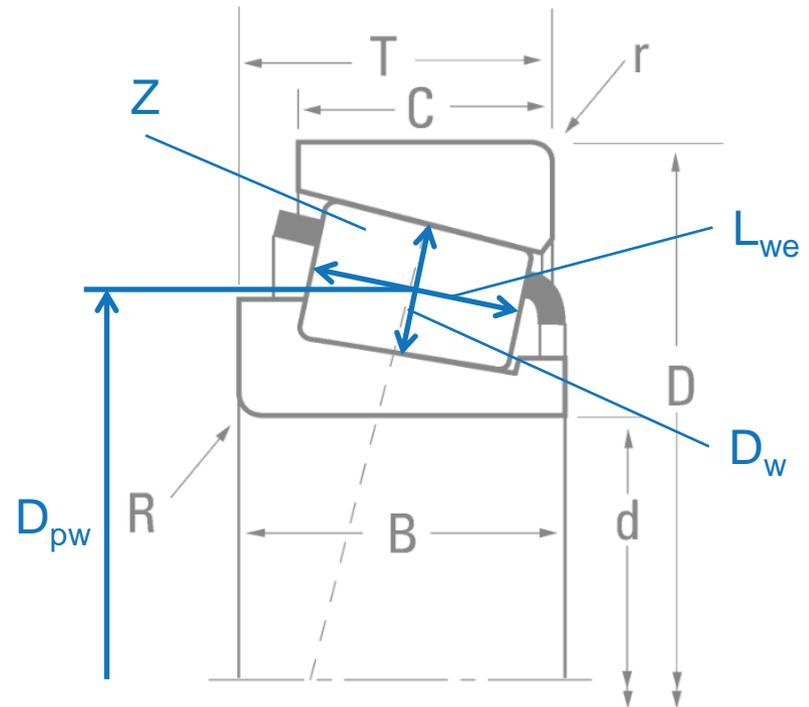
Requirements

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



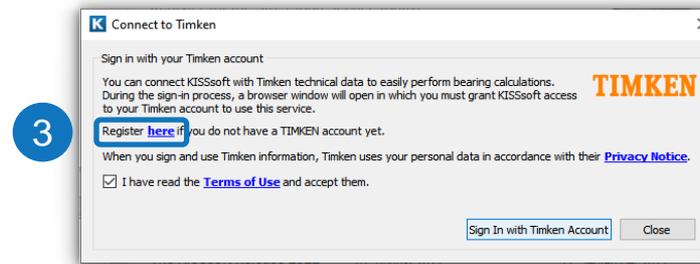
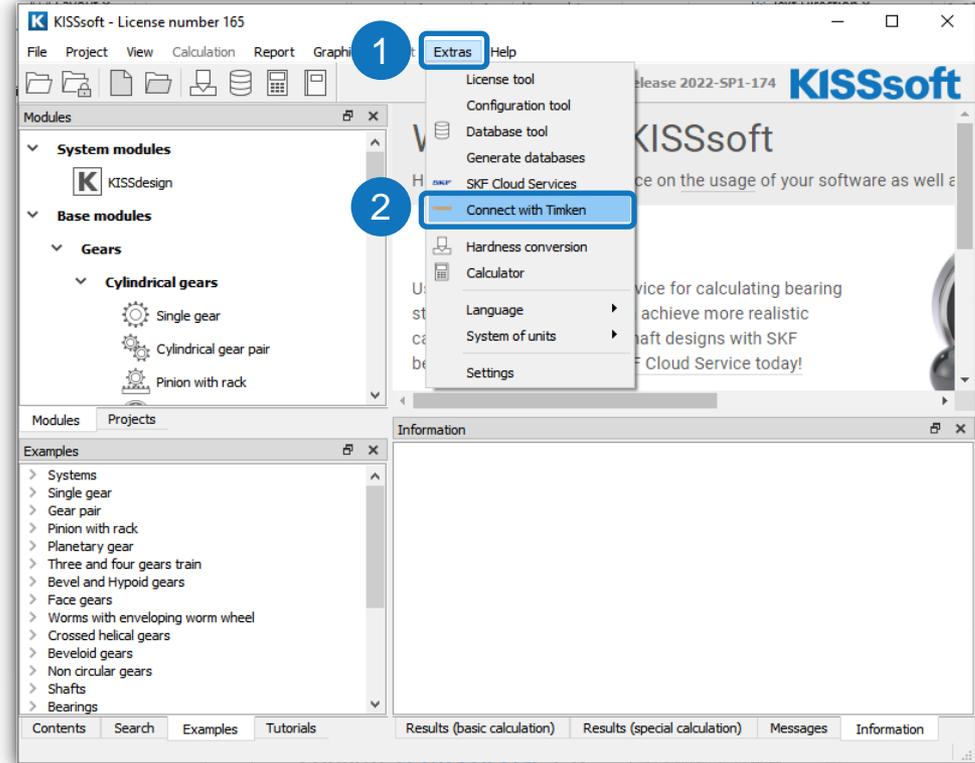
Why using TIMKEN cloud services?

- 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 C_0 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.



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 Company

https://kisssoft.timken.com/cdc/OrgRegistration.html

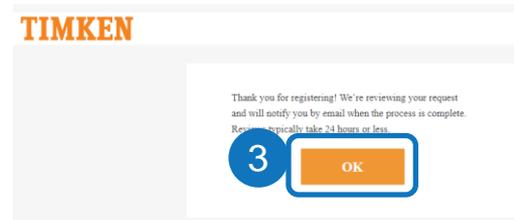
TIMKEN

Please register here to connect KISSsoft with Timken technical data.

Company Information	Your Information
<input type="text" value="Company Name *"/>	<input type="text" value="First Name *"/>
<input type="text" value="Industry *"/>	<input type="text" value="Last Name *"/>
<input type="text" value="Street Address *"/>	<input type="text" value="Company Email Address *"/>
<input type="text" value="City *"/>	<input type="text" value="Phone Number *"/>
<input type="text" value="Country *"/>	<input type="text" value="Your Role *"/>
<input type="text" value="Postal Code *"/>	
<input type="text" value="Website"/>	

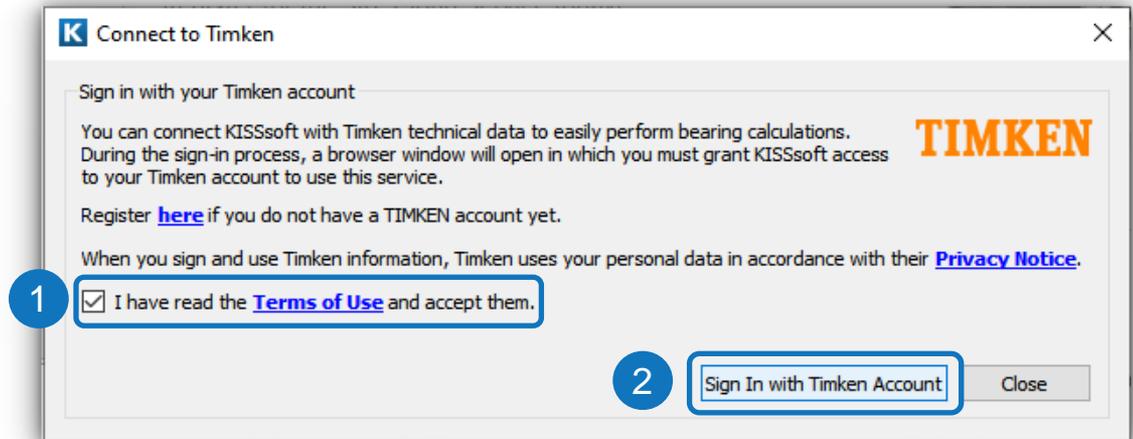
I have read the Terms & Conditions and the Privacy Policy and agree to them.

SIGN UP



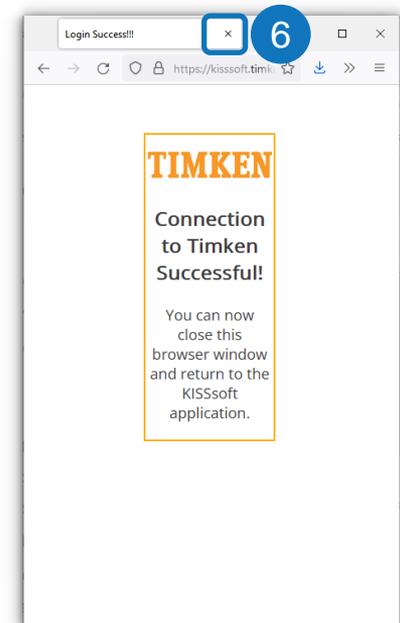
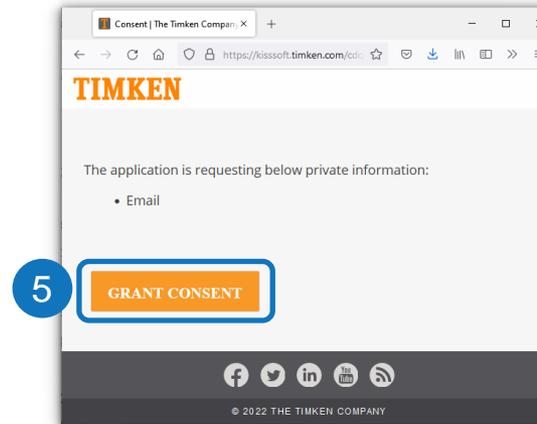
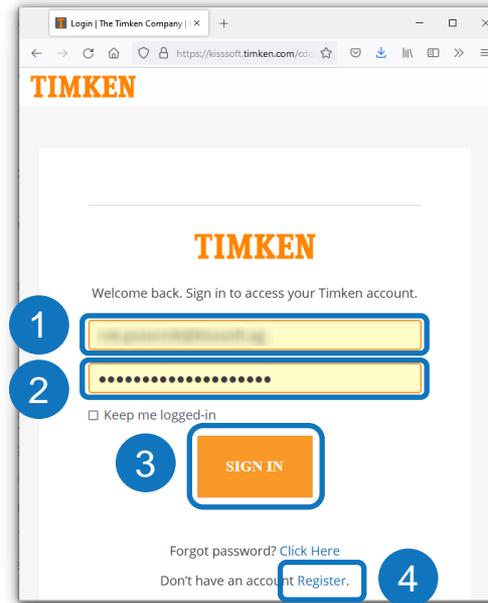
Connect to TIMKEN (2/4)

- 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.



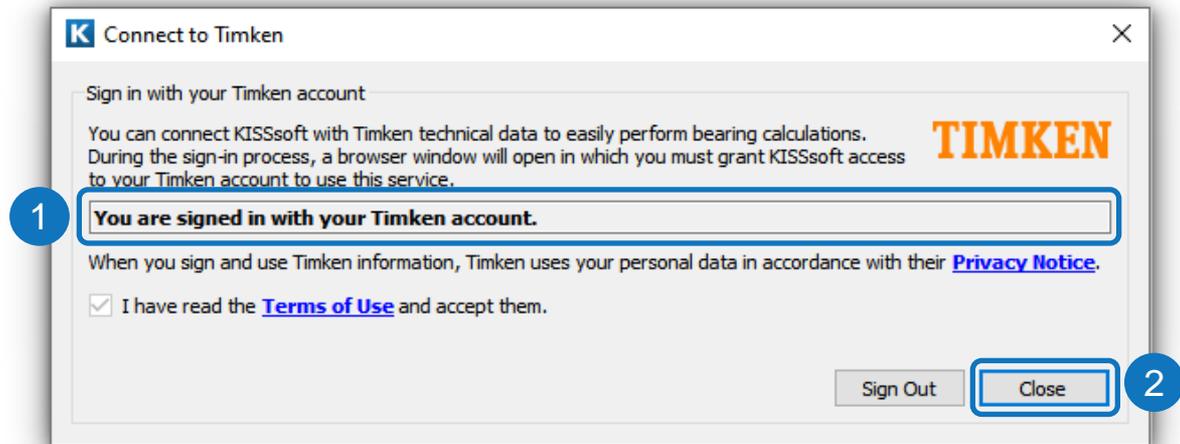
Connect to TIMKEN (3/4)

- 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).



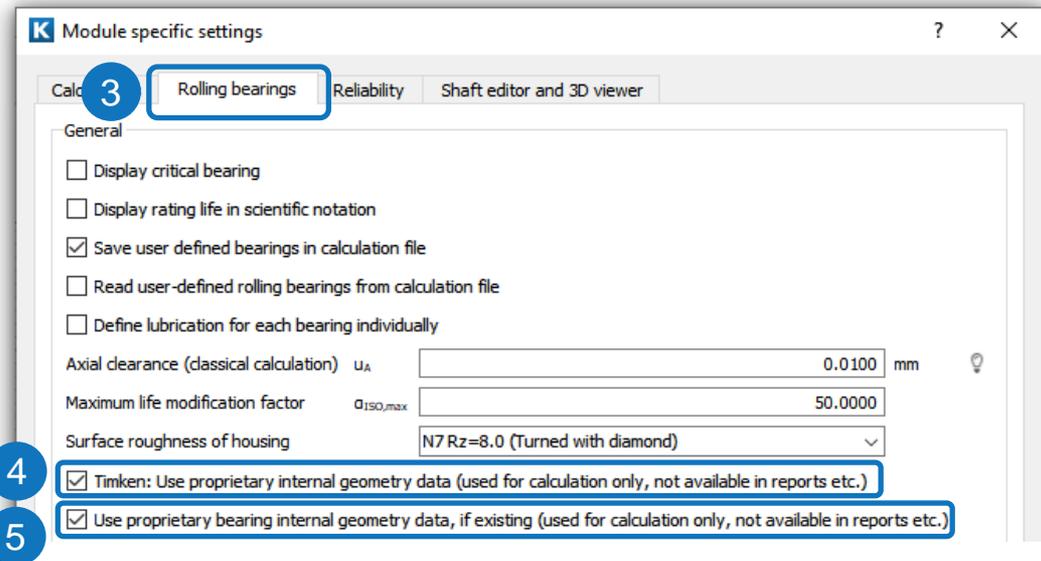
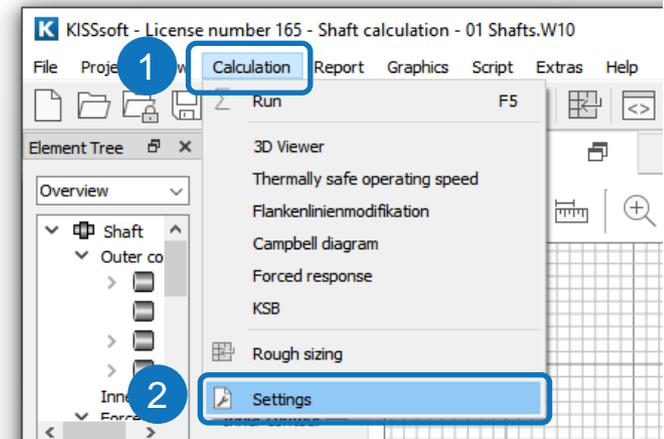
Connect to TIMKEN (4/4)

- 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).



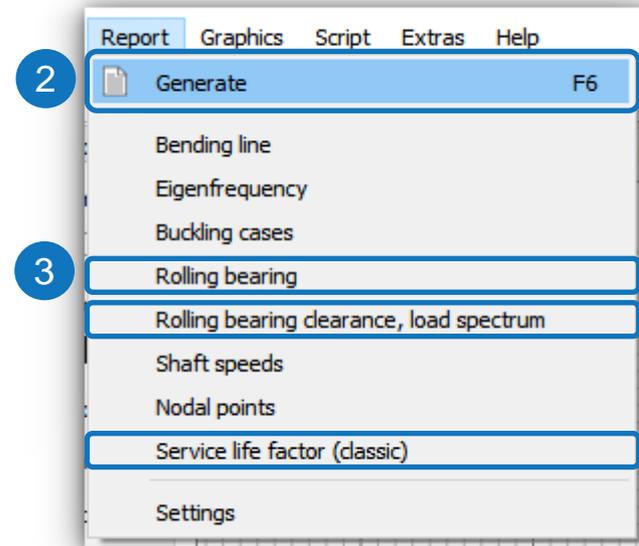
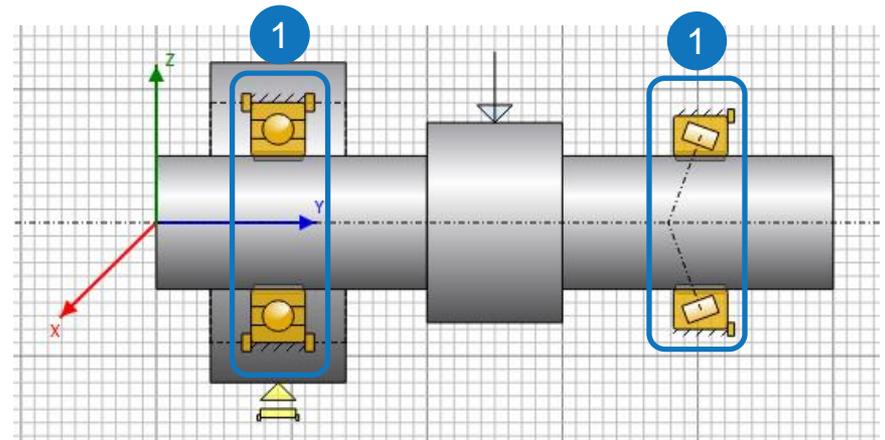
Enable use of proprietary internal geometry data from TIMKEN cloud services

- 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.



Calculation example

- 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).



Shaft report – input data

“Normal” rolling bearing

KISSsoft

3.3 Bearing

3.3.1 Rolling bearing (TIMKEN 32010X-32010X)

Bearing inner geometry data provided by TIMKEN Cloud Services

• For further information, Please visit www.timken.com

Bearing type	Taper roller bearing (single row)	
Bearing position (mm)	[y _{lok}]	201.000
Bearing position (mm)	[y _{glob}]	201.000
Attachment of external ring	Set fixed bearing right	
Inner diameter (mm)	[d]	50.000
External diameter (mm)	[D]	80.000
Width (mm)	[b]	20.000
Corner radius (mm)	[r]	1.000

Calculation was performed using real bearing internal geometry provided by bearing manufacturer. These values are however not available for reports.

The bearing pressure angle will be considered in the calculation		
Contact angle (°)	[α]	15.732
Position (center of pressure) (mm)	[y _{D,lok}]	189.000
Position (center of pressure) (mm)	[y _{D,global}]	189.000
Basic static load rating (kN)	[C ₀]	92.700
Basic dynamic load rating (kN)	[C]	69.800
Fatigue load limit (kN)	[C _u]	0.000
Values for approximated geometry:		
Basic dynamic load rating (kN)	[C _{theo}]	58.367
Basic static load rating (kN)	[C _{theo}]	80.563
Correction factor Basic dynamic load rating	[f _t]	1.000
Correction factor Basic static load rating	[f _s]	1.000

“Connecting” rolling bearing

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5 Connections

5.1 Connecting rolling bearing (TIMKEN 6210-2RS)

Bearing inner geometry data provided by TIMKEN Cloud Services

• For further information, Please visit www.timken.com

Bearing type	Deep 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
Width (mm)	[b]	20.000
Corner radius (mm)	[r]	1.100
Basic dynamic load rating (kN)	[C]	35.100
Basic static load rating (kN)	[C ₀]	23.200
Fatigue load limit (kN)	[C _u]	0.000
Basic dynamic load rating (kN)	[C _{theo}]	35.074
Basic static load rating (kN)	[C _{theo}]	23.180
Correction factor Basic dynamic load rating	[f _t]	1.000
Correction factor Basic static load rating	[f _s]	1.000

Calculation was performed using real bearing internal geometry provided by bearing manufacturer. These values are however not available for reports.

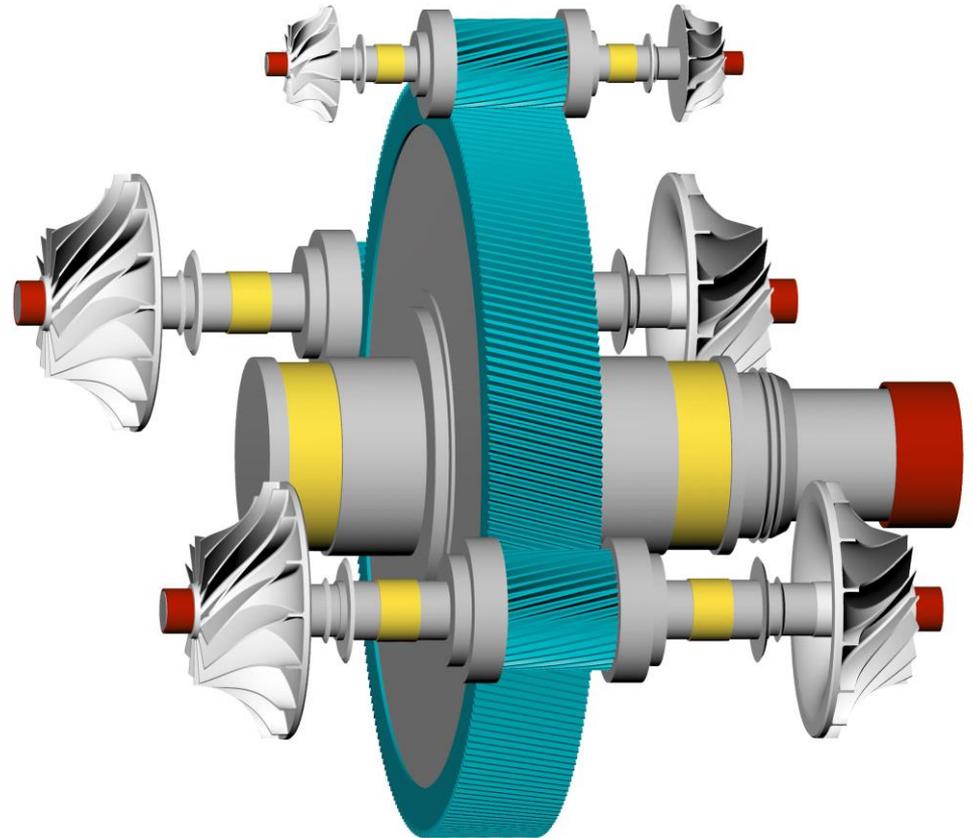
Nominal diametral clearance* (µm)	[Pd]	14.500
(*) ISO 5753-1:2009 C0		
Nominal axial clearance (µm)	[Pe]	191.363

Shaft report – results

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7.5 Rolling bearing 'Connecting rolling bearing'			
Position (Y-coordinate)	[y]	45.00	mm
Dynamic equivalent load	[P]	7.05	kN
Static equivalent load	[P ₀]	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 _s]	70.00	°C
Oil lubrication, on-line filtration, ISO 4406 -/19/16			
Contamination factor	[ε _c]	0.228	
Load ratio	[C/P]	4.977	
Operating viscosity	[ν]	48.884	mm ² /s
Reference viscosity	[ν _r]	13.887	mm ² /s
Viscosity ratio	[κ]	3.520	
Life modification factor	[a _{SGF}]	1.502	
Fatigue load limit	[C _r]	1.055	kN
Basic bearing rating life	[L _{10B}]	1369.64	h
Modified bearing rating life	[L _{10m}]	2057.22	h
Static safety factor	[S ₀]	3.29	

KISSsoft			
7.5.2 Calculation with proprietary bearing internal geometry data (ISO/TS 16281)			
Operating diametral clearance	[P ₀]	14.588	µm
Contamination factor	[ε _c]	0.228	
Fatigue load limit	[C _r]	1.176	kN
Reference rating life	[L _{10B}]	1338.98	h
Modified reference rating life	[L _{10m}]	2242.43	h
Effective static safety factor	[S _{0e}]	3.94	
Static safety factor	[S _{0ref}]	3.12	
Static equivalent load	[P _{0e}]	7.45	kN
Bearing reaction force	[F _r]	0.000	kN
Bearing reaction force	[F _r]	1.368	kN
Bearing reaction force	[F _r]	-7.053	kN
Bearing reaction force	[F _r]	7.053	kN
Inclination angle	[α _e]	-89.999	°
Bearing reaction moment	[M _r]	-39.254	Nm
Bearing reaction moment	[M _r]	0.000	Nm
Bearing reaction moment	[M _r]	-0.002	Nm
Bearing reaction moment	[M _r]	39.254	Nm
Inclination angle	[α _ω]	-179.997	°
Displacement of bearing	[u _r]	0.002	µm
Displacement of bearing	[u _r]	-101.453	µm
Displacement of bearing	[u _r]	41.334	µm
Displacement of bearing	[u _r]	41.334	µm
Inclination angle	[α _r]	89.998	°
Misalignment of bearing	[r _r]	0.171	mrاد
Misalignment of bearing	[r _r]	-0.000	mrاد
Misalignment of bearing	[r _r]	0.000	mrاد
Misalignment of bearing	[r _r]	0.171	mrاد
Oil level	[H]	0.000	mm
Rolling moment of friction	[M _r]	0.235	Nm
Sliding moment of friction	[M _s]	0.228	Nm
Moment of friction, seals	[M _{seal}]	0.000	Nm
Moment of friction for seals determined according to SKF main catalog 17000/1 EN:2018			
Moment of friction flow losses	[M _{flow}]	0.000	Nm
Torque of friction	[M _{loss}]	0.463	Nm
Power loss	[P _{loss}]	72.663	W
The moment of friction is calculated according to the details in SKF Catalog 2018.			
The calculation is always performed with a coefficient for additives in the lubricant µ=0.15.			

Thank you for your attention!



Sharing Knowledge

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