KISSsoft
Berechnungsprogramme für den Maschinenbau

KISSsoft Release 03/2017

Changes from Release 03/2016 to Release 03/2017

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Contents

 **These changes affect the results if you open an existing KISSsoft calculation from an older release.**

NEW These new features bring improvements to the functionality in Release 03/2017, with new modules, calculations or user-friendliness.

General

Modules	Changes/Enhancements
General	 You can now enter a mesh fineness value in all FE calculations (planet carrier, gear body and tooth root stresses).
Database	**Database structure:** The databases have been separated into KDB files, supplied with the KISSsoft installation, and UDB files, which contain user-defined datasets. **Materials:** 4 new plastics have been added: - Genestar N1000A, Genestar N1001A and Genestar N1002A (manufactured by Kuraray) - Grivory HTV5H1 (manufactured by EMS-Grivory) S-N curves (Woehler lines) for tooth root have been added for 4 Sabic plastics: - Lubricomp KA000M, Lubricomp KL004, Lubricomp RAL23 and Lubricomp RCP36 **Lubricants:** Greases and oils made by Interflon have been added. The oil data from Klüber has been updated.  **Rolling bearings:** Data for **SKF bearings** has been updated according to the current manufacturer specifications. Some bearing data for hybrid bearings have been added.  **Rolling bearings: D**ata for Schaeffler (**FAG, INA bearings**) has been updated according to the current manufacturer specifications.  **Rolling bearings:** Additional bearing types have been added for **TIMKEN bearings**: Single-row deep groove ball bearings and axial spherical roller bearings. The bearing data has been updated according to the current manufacturer specifications.  **Rolling bearings:** Data for **KOYO bearings** has been updated according to the current manufacturer specifications. **Rolling bearings:** The bearing types "hybrid bearing" and "axial tilted roller bearing" have been added. Bearing data for axial tilted roller bearings from INA has been added. Hybrid bearings (with ceramic rollers or balls) have been added. Manufacturer comments are displayed in a new comments field.

Base packages

Base packages

Modules	Changes/Enhancements
ZPK	**Cylindrical gear basic package** NEW **Japanese JIS standards:** Reference profiles according to JIS 1701-1 and quality standards JIS B 1702-1:1998, JIS B 1702-1:2016 and JIS B 1702-2:1998 have been added.

Plastics: Material-pair-specific wear, friction and heat transfer coefficients according to VDI 2736 have been stored in dedicated DAT files (in the KISSsoft 03-2017/dat folder). If the relevant option is selected in the module-specific settings, the values from the DAT files are used during calculations.

Moment of inertia input: If required, you can enter the moment of inertia of the gears in the "Details" section, in the "Rating" tab. This value is used when calculating the dynamic factor.

 **Calculating the hardened layer according to DNV41.2:** The condition for the hardness on the surface is calculated with the required safety against pitting.

WPK **Basic shaft and bearing package**

Shaft editor: The pitch cone can now be displayed for the "bevel gear/hypoid gear" force element. Right-click to select the view. You can now use the KISSsoft file to convert the bevel gear or hypoid gear's position.

You can now load the gear body deformation of asymmetric gear bodies from a stiffness matrix for the "cylindrical gear" force element. This stiffness matrix can be in the formats that are used in ABAQUS, NASTRAN, CodeAster, native ANSYS or "KISSsys format".

Elements list: The elements list is now integrated in the elements editor. If you click on the outer contour, inner contour or other elements, the system displays the elements list directly in the elements editor window.

It also displays a list of shafts in the elements editor, by default, if you have not selected any other element. In this shafts list, you can modify the operating temperatures, speeds, direction of rotation and materials. Consequently, the speed dialog formerly used for this purpose in the Basic data tab has been removed.

NEW **Rough sizing of shaft:** You can size the shaft diameters according to the required safety and size the rolling bearings according to a required service life. You can define different strategies for specifying which priorities are to apply during sizing.

The system displays the reliability of the rolling bearings, individually and in combination, in the "Rolling bearing – Reliability" graphic.

Bearing lifetime calculation, classical: In new KISSsoft calculations, the method for calculating without the contact angle is no longer displayed, because the method is highly simplified. However, this method is still available in existing KISSsoft calculations.

MPK **Shaft-hub connections**

Splines: NEW The strength calculation for splines connections according to AGMA 6123-C16 has now been implemented. In addition, an option to select the axis misalignment and crowning have been added to the calculation according to AGMA 6123, as well as the calculation for verifying the rim fracture.

	Cylindrical interference fit: The documentation for the diameter increase during operation has been supplemented. **Conical interference fit:** During the "Verification according to Kollmann" calculation, you can now select between the options ‘Mounting pressing force’ or ‘Pressing distance for mounting’.
SPK	**Bolt calculation:** Additional parameters have been added to the "Clamping" graphic.
FPK	**Springs:**  The standard for compression springs, DIN EN 13906-1:2013, has been updated: You can select the geometry tolerances and force tolerances separately. If you do so, the system updates the materials.  The standard for torsion springs, DIN EN 13906-3:2014, has been updated. NEW Some tolerance standards for wire diameter have been added, and existing ones (DIN EN 10218:2012, DIN EN 10270-3:2012) have been brought up to date.
LPK	**Strength verification with local stresses:** Endurance limit calculation for surface treated parts according to the FKM Guideline, section 5.5, has been implemented. You can also set the core hardness from the tensile strength Rm.
HPK	**Hertzian pressure:** You can now calculate the Hertzian pressure for any contact geometry. The system outputs the contact deformations, stresses on the surface and stresses under the surface as the result. The calculation is performed according to "Contact Mechanics", K.L. Johnson, Cambridge University.

System Modules

KISSsys

Modules	Changes/Enhancements
SYS	**KISSsys** NEW **Reliability**: The system now calculates the reliability of the entire drive train according to Bertsche (to call this calculation, select "System – CalculateReliability"). It is displayed in the "System Reliability" and "System Failure" graphics (needs the KLR module). NEW **Fast group-based modeling:** New assemblies with different planet types, which include Wolfrom and Ravigneau kinematics, are now available. You can also define and save your own assemblies. **Splitting a shaft:** You can split the shaft at any point. (Right-click on the shaft to call the split function). **Setting a temperature reference point:** You can now set a reference point (x-,y- and z-coordinates) for the entire gear unit. This reference point is used to determine the corresponding local reference point for each shaft, which is then transferred into the shaft calculation (to call this function, select "System – SetThermalReference"). **Auxiliary results template:** In the "Auxiliary results" template, you can now calculate the drive train torsion under load, with the input or output shaft clamped (torsional stiffness). You can

	also carry out the calculation for drive trains with load distribution. You can also perform a cost calculation for the gear unit (the same functionality as for GPK models). The existing system backlash and inertia calculations have been improved for planetary stages. **Load spectra template:** You can now choose to apply the face load factor KHb and load distribution coefficient Kgamma from your 'Own Input' or from the calculation, for load spectra. For each load bin, you can set different temperatures and perform modal analysis. **Planet carrier deformation:** You can now call the planet carrier deformation calculation in KISSsys. To do so, select the function 'CalculateFEMCarrier' in the KISSsoft planet calculation. If you use this function, the system calculates the planet carrier deformation at nominal load. For partial loads, the deformations are scaled. **2D graphics:** You can now generate 2D graphics by entering X and Y values (similar to in Excel). **Handling:** You can now rename, cut and paste objects. You can search for references in the KISSsys model and then, if necessary, correct them (to enable this function, select Extras – Settings – General).  **Changes that user are required to make in KISSsys models:** Some improvements to templates and internal KISSsys programming may require user-generated code in previous KISSsys releases to be adjusted. A list of changes is available on request.
GPK	**Gearbox calculation package** **GPK models:** The GPK models have been brought up to date by adding the latest templates from Release 2017, such as for reliability calculation (needs the KLR module), drive train torsional stiffness and others.

KISSsys Expert Modules

Modules	Changes/Enhancements
KS2	**Power loss and efficiency:** The power losses from plain bearings are now also calculated as part of the efficiency calculation. The KISSsoft plain bearing calculation can now be assigned to a "Support" element. You can enter the default temperature loss experienced by coolers manually.
KS3	**Vibration calculation:** The modal analysis can now be applied to three-gear gear chains, four-gear chains and planetary systems. Use the "ShaftsSystems – ExportSystemModelData" function to export the data from the KISSsys model in XML format.
KS4	**Housing deformation:** You can now also load the stiffness matrix in native ANSYS format and in the format used by ALTAIR OptiStruct.

Reliability

Modules	Changes/Enhancements
KLR NEW	**Reliability:** The reliability is now calculated according to Bernd Bertsche, with 3-parameter Weibull distribution. The results for the gears (bending, pitting) are displayed in the reports (Service life section) and for rolling bearings in the graphics. Right: K18

Expert Modules For Gears

Cylindrical gears

Configuration / Dimensioning

Modules	Changes/Enhancements
ZA4	NEW **Fine sizing:** You can define the cutter and pinion type cutter lists per gear individually.
ZA6 NEW	**Profile modifications with grinding worms / dressing wheels:** You can check whether a required tip relief can be generated with an available grinding worm / dressing wheel. For this check, the system lists all available grinding worms / dressing wheels from a user-defined file. It then displays the grinding worms / dressing wheels that are suitable in a table and shows the manufactured tip relief for the current gear. (This does not work in conjunction with single-gear calculation Z11). Right: Z19j

Methods for strength calculation

Modules	Changes/Enhancements
ZA24 NEW	**Tooth root stresses with FEM:** Using 2D FEM, you can calculate the tooth root stresses for cylindrical gears (with straight or helical teeth). This is of special interest for the rating of grinding notches in the tooth root. Right: Z38

Contact analysis

Modules	Changes/Enhancements
ZA30 ZA34	**Contact analysis cylindrical gears and planetary gear** Calculation of the wear volume per tooth has been added. The system also displays the results during modification sizing. Σ **Proportional (load-dependent) deformation of the axis alignment:** You will still enter load-dependent deformations in µm (related to the current nominal torque). In the system, the values are saved now as stiffness values. The applied nominal torque is displayed. If you modify the nominal torque, the system scales the deformation accordingly.
ZA33	**Modification sizing:** When you are sizing modifications with contact analysis and linked shaft files, you can now switch to a quicker calculation. In it, the shaft deformation is only calculated once per partial load.
ZA35	**Face load factor calculation $K_{H\beta}$:** You can now include the gear body deformation according to the stiffness matrix, for example from DPK, when performing the calculation according to

	ISO 6336-1 Annex E. You can use the stiffness matrix in the formats that are used in ANSYS, ABAQUS and ALTAIR OptiStruct.
ZA36	**Planet carrier deformation:** You can now enter planet carrier parameters using coefficients or absolute values. You can now select the carrier material from the shaft calculation materials database.

Bevel gears

Modules	Changes/Enhancements
ZC1	**Bevel gears geometry:** An option for grinding the root and/or flank has been added to the "Final Machining" tab. The report now also contains the additional backlash created by the gear's axial displacement (calculated according to ISO/TR 22849). You can set the additional backlash value with the j* coefficient (to do so, select "Module specific settings – General").
ZC33 NEW	**Modification sizing for bevel gears:** Including the optimization of tooth flank and tooth profile modifications, optimized combinations and different variations such as cross-variations of amounts and coefficients, classification of all solutions relative to different criteria and graphic display of classifications. Also works with topological modifications. Right: Z7o

Further gear specific modules

Modules	Changes/Enhancements
ZZ4	**Tooth flank fracture:** ISO/DTR 19042-1 (July 2016), Methods B1 and B2 have been implemented. They now include two variants for calculating the hardness curve in the depth.
ZZ6 NEW	**Plastics Manager:** This new module provides an easy way to generate plastics material files (DAT files) from the measurement data from a test bench according to VDI 2736-4. After creating the DAT files, you can save the new materials to the KISSsoft database directly (needs the ZA21 or ZE5 module). Right: K17

Expert modules shafts and bearings

Shafts

Modules	Changes/Enhancements
WA1	**Coaxial shafts:** If two shafts are supported with a connecting thrust bearing, you can now position the thrust bearing at the end of a shaft, in KISSsoft. Consequently, you no longer need to vitually extend the shaft geometry to carry out the calculation. NEW **Internal geometry:** Thrust needle roller bearings with inner geometry are now also approximated by KISSsoft.
WA4	**Critical speeds:**  If coaxial shafts with general connections have a fixed rotating connection, the speeds are now transferred to all sub-shafts in the Campbell diagram calculation. If you modify the bearing clearance for rolling bearings, this is also taken into account in the Campbell diagram calculation.
WA6 WA7	**DIN 743, FKM Guideline:** You can now define whether the heat treatment for hollow shafts is to be performed as if they were solid shafts. The corresponding coefficients in DIN 743 and the FKM Guideline are then affected.

WA7	NEW **FKM Guideline:** Endurance limit calculation for surface treated parts according to section 5.5 of the FKM Guideline has been implemented. You can also apply the options for coefficient Kf according to sections 4.3.2 and 4.3.3 of the FKM Guideline, and the determining of the core hardness from the tensile strength Rm.
WA8	NEW **Load spectra:** You can preset a separate temperature for each load bin. This is taken into account when the bearing clearance is calculated, and is therefore taken into account in the service life according to ISO/TS 16281.
WA10	**AGMA 6001/6108:** You can now calculate load bins individually, similar to in DIN or the FKM Guideline.
WA11 NEW	**Forced vibration:** The vibration on the shaft is now calculated on the basis of the unbalance response. The eccentric mass is defined as an additional mass. The amplitude etc. are evaluated at documentation points which can be positioned at any point on the shaft. Right: W14

Other shaft-specific modules

Modules	Changes/Enhancements
DPK	 **Gear body deformation:** The stiffness matrix is now output instead of the influence matrix. You can now also calculate the gear body deformation for internal toothing. You can enter parameter values using coefficients or absolute values.

Bearings

Modules	Changes/Enhancements
WB1	**Modified bearing calculation:** You can now enter the impurity for each rolling bearing individually, if required (to do so, select "Module-specific settings – Rolling bearings"). You enter the impurity value in the elements editor, in the "Lubrication" tab.
WB2	**Rolling bearings ISO/TS 16281:** You can now carry out a bearing service life calculation for thrust needle roller bearings with inner geometry. **Graphic:** NEW There is a new graphic showing stresses under the contact surface. The system now also displays the stress curve on the raceway for ball bearings.
WB3	NEW **Hydrodynamic bearings:** Standard DIN 31652 is now available. It is similar to ISO 7902, but has some additional parameters and covers a larger B/d range. Right: W7e
WB4	**Verification of rolling bearings according to ISO/TS 16281:** NEW Bearing rings can now be handled as elastic. To do so, external loads are defined on the outside or inside ring, and the deformation of the bearing ring is determined iteratively with the deflection of the rolling bodies. As this calculation is usually carried out for planetary gears, the load can be overtaken directly from the planetary stage calculation. The modification to the bearing clearance is listed in the "Rolling Bearing" report. Bearing rings can now also be tilted. You now define the properties of the bearing rings in the "Inner ring" or "Outer ring" tab.
WB5 NEW	**Rolling bearing fine sizing:** You can use variation calculation to optimize the internal geometry of bearings. The variants are displayed in a list, or graphically (needs the WB4 module). Right: W51a

CAD Interfaces

3D Export

Modules	Changes/Enhancements
CB2	**Siemens Solid Edge:** An interface to Solid Edge ST9 has been implemented.
CB3	**SOLIDWORKS:** An interface to SOLIDWORKDS 2017 has been implemented.
CB4	**Autodesk Inventor:** An interface to Autodesk Inventor 2017 has been implemented.
CB7	**Siemens NX:** An interface to NX 11 has been implemented. Only versions as far back as NX 8 are supported.
CB8	**Think3 integration:** This interface is no longer available nor supported in KISSsoft.
CB9	**Creo Elements/Direct Modeling:** This interface is no longer available nor supported in KISSsoft.
CB10	**Ascon Kompas:** This interface is no longer available nor supported in KISSsoft.