# Calculation of Shafts and Bearings

Graphical shaft editor

- Customized load implementation
- Export to a variety of 3D CAD systems

You can use the graphical shaft editor to define a shaft's geometry, including the notches, supports and loads. You can either enter the loads in the "traditional" manner, by inputting the forces and torques, or directly, via force elements such as toothing (cylindrical gears, bevel gears etc.).
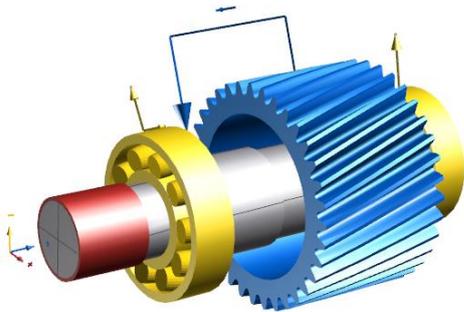
Individual load spectra can be assigned to every force element. The shaft geometry can be exported to a range of 3D CAD systems for further processing.

Strength analysis

The strength calculation defined in DIN 743 "Calculation of load capacity of shafts and axes" is a simple, but widely applicable method, and is very often used in mechanical engineering.

The FKM Guideline (Strength verification, edition 2012) is the most comprehensive calculation method, and is often used for certification purposes.

The calculation according to the FKM Guideline can be used to perform strength analysis with load spectra. The latest edition of DIN 743 (2012) also includes the calculation of strength analysis in the fatigue strength range and with load spectra.

The shaft strength calculation method according to AGMA 6101-E08/6001-E08 has also been implemented and includes both a static and dynamic proof. The static proof takes peak loads into account, depending on a range of different toothing types. The dynamic proof takes different notch factors into account and uses the shape modification hypothesis method (von Mises) to perform the evaluation. The material properties are generally derived from the material core hardness.

Shaft calculation

- Animation of deformation
- Improved calculation core

Graphics in the shaft calculation process provide a clear 3D view of shafts and bearings, along with the bearing forces and loads. These graphics can also be animated to illustrate rotation and bending, making even the most complex shaft systems easy to display and to understand.
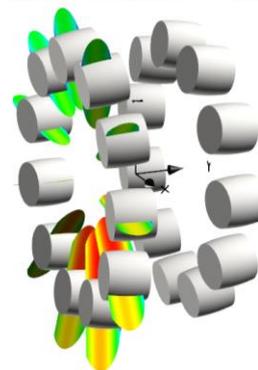
The calculation core of the shaft analysis, which was newly developed for the Release 03/2017 has been enhanced and optimized once again. This not only leads to noticeable shorter calculation times and to improved stability, but also to reduced storage requirements. This has an impact especially on coaxial shafts or planetary stages and several load steps – as well as

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on the gear calculation, where the shaft calculation offers a basis for tilting.

Additional features have been implemented in the shaft editor, which make the input of shafts much easier. Pulling on grid points to size cylinder elements is one of these additional features. The positions of the grid points can either snap to a grid or be free-floating.

Reading in a background drawing as DXF when you are remodeling existing shafts, is another. This makes it easy to check the shaft geometries accurately, and correct them if required, especially for coaxial shafts such as those used in automobile gearboxes.
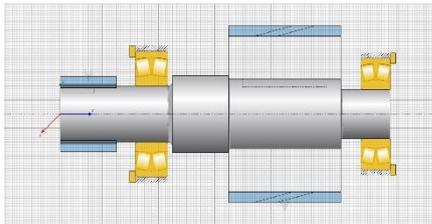
Other functions, such as an enhanced elements box, the separate display of shafts and configurable overviews in the elements editor round off the numerous extensions to the functionality.

Rolling bearing calculation

- Takes internal geometry into account
- Pressure on the rolling body
- Determines bearing power loss

The bearing calculation software is also available as a separate KISSsoft module. The calculation basis specified in ISO/TS 16281 (2008), which considers the bearing's internal geometry, and determines the pressure on the rolling body, can be implemented as an alternative to the classic calculation method.

In addition, bearing power loss can be calculated either according to SKF 1994, SKF 2013 or Schaeffler catalogue 2017 (INA, FAG) for every bearing type, for example, when a gear unit efficiency analysis is performed. The oil level for inclined shafts can also be taken into account, so that bearings can be subjected to different infeed factors.

Deformation of the bearing ring

The elasticity of the rings can also be considered. External loads or arbitrary boundary conditions can be defined on the outer or inner ring. As this calculation is often performed for planetary gears, the load can be transferred directly from the gear calculation.
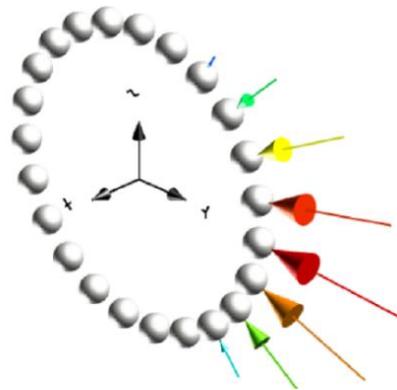
Database with a selection of bearings

You can select a required rolling bearing from a database of more than 20 types from a wide range of manufacturers, making it easy to define multiple bearings.

KISSsoft's useful sizing wizard searches the bearings database to find bearings with a suitable geometry. It then calculates the service life, and the static safety, and displays the results in a table together, with the geometry data (width and diameter).

If you are interested in acquiring a test license, please contact us at info@KISSsoft.AG