# KISSsys: Complete Gearbox Design

KISSsys applications

- Complete gear units and drive trains
- Use in a wide variety of areas
- Kinematic analysis

KISSsys is KISSsoft's system add-on that enables the user to model complete gear units and drive trains. KISSsys is used in many different sectors, such as: automobile and wind power industries, manufacturing of agricultural machinery, power tools, industrial gear units, and much more.
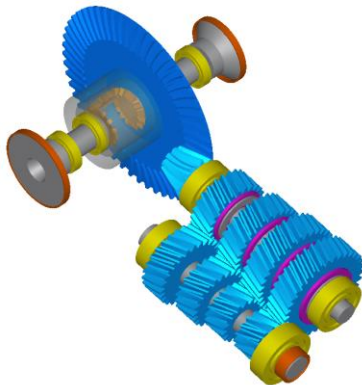
KISSsoft calculates the service life and strength of the different machine elements, and transfers the results to KISSsys, where they are displayed in clear overviews. To achieve this, KISSsys brings together kinematic analysis, service life calculation, 3D graphics, and user-defined tables and dialogs.

Functionalities at a glance

- Gear unit types with cylindrical, bevel, hypoid, worm, or face gear toothing
- Epicyclic gear sets with any power split and power distribution (Ravigneaux, cylindrical gear differentials, etc.)
- Modeling with simple or coaxial shafts
- Sizing functions for toothing, shafts and bearings, calculation of the maximum transmissible torque, etc.

- Modeling and calculation of transmission gearboxes with different power paths
- Definition of load spectra taking switch setting into account, and the possibility to process almost an unlimited number of load spectra
- Collision check with the housing, and shaft arrangements
- Calculation of relative position of bevel gears
- Export and import functions for exchanging results and data between, for example, KISSsys and FEM

Thermal Analysis

In KISSsys, it is now possible to calculate efficiency and perform a thermal analysis according to ISO/TR 14179: When performing the efficiency calculation, you can now also adjust the power losses on the basis of measurements using your own factors. A number of options, such as calculating the cooler power, have also been added to the thermal capacity evaluation. The calculation can be used for any gear unit type.
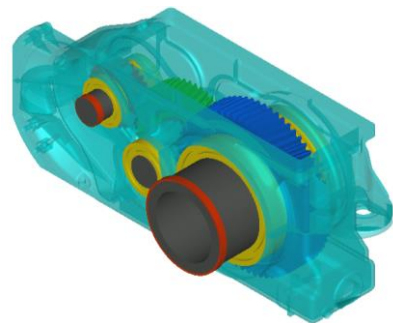
### Modal analysis of shaft systems

Eigenfrequencies and modes can be calculated for drives with more than one shaft in the system. The meshing stiffness of all toothing can now be taken into account. Purely torsional vibrations can be calculated, as can coupled vibrations with every possible degree of freedom.

The existing vibration calculation function has been extended, with the addition of Campbell diagram analysis and the calculation of the "unbalance response". To enable the vibration calculation to be performed with external software, a new interface to MSC Adams has been added. With it, shaft, toothing and bearing geometry data can be transferred from KISSsys in the required input format.

In static system analysis, the deformation of the housing is taken into account, and therefore its effects on the bearings. The resulting displacements of the bearing outer rings, deform the shaft to a greater or lesser extent, and therefore have a decisive effect on the toothing contact analysis, in particular when resilient housings and powerful forces are involved. To perform the calculation, a stiffness matrix for the housing is imported. This stiffness matrix can now be loaded directly into KISSsys in the formats used by the ABAQUS and NASTRAN FE programs.
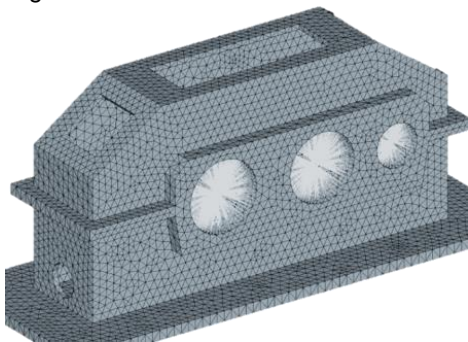
It is now also possible to use the damage data for all elements when performing a strength analysis for the entire gear unit or drive train. This enables the weakest element in the drive train to be identified quickly and easily, so that the user can make the necessary design changes immediately.

Integrated programming language

Another strength of KISSsys is its integrated programming language which enables users to define their own tasks and calculations. To do this, they can either use predefined templates or write their own functions.

The "Gearbox Variant Generator"

- Automatic generation of variants
- Number of stages and gear parameters
- Evaluation acc. to strength, weight etc.

The "Gearbox Variant Generator" provides the KISSsys system add-on with an efficient method for automatically generating variants of gear units.

Usually the maximum available volume is predefined, and at the same time, it must be ensured that the manufacturing costs are kept to a minimum. In addition, the designer must take into account weight, total power loss and other relevant factors.

"GPK" gearbox calculation package

- 17 base gear unit models
- Price calculation and collision check
- Easy handling without programming

GPK is a gear unit calculation package, based on KISSsys, which provides the user with 17 base gear unit models, which they can use as templates.

It includes a multitude of functions, for example: Sizing of gears, shafts and bearings on the basis of the operating data. Optimizations can be determined directly, using the price calculation functions, or the collision checks between the elements or with the housing.

GPK includes the KISSsys system add-on, but without the option of modifying the kinematics and programming.
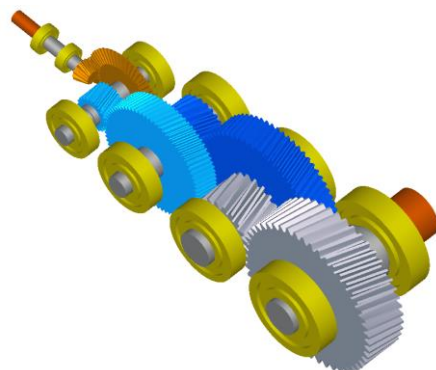
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