

KISSsoft Release 2019

Changes from Release 03/2018 to
Release 2019

Date of Issue: June 2019



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 2019, with new modules, calculations or user-friendliness.

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General

Modules	Changes/Enhancements
General	<p>Setting in KISS.ini for default number of decimal places added. Extended display of toolbar is available (activate flag in 'Extras - Settings – General'). Additional result window for special calculation added. The results of standard and special calculation are shown side by side now. The unit Nm per minute (Nm/'') is added for values which show torque per angle. The magnification for the parameters and indices is enlarged to improve the visibility. The handling of the data input tables is improved with single click instead of double click and inactive cells displayed with grey background.</p> <p>2D graphics: Changes in graphic properties from the user are restored, when switching to another graphic and coming back. Content based axis range for 2D diagrams added to the graphic properties (curved-based axis). Measuring in graphics that contain 2 diagrams is possible now (see 'profile diagram'). The axis can be hidden, so that only the graphs are displayed. This allows the export of the graphs only.</p> <p>Multiple columns for docking windows are provided now. The settings of the arrangement are stored per module specifically, so when restarting KISSsoft, the same arrangement of the windows is provided again.</p> <p>3D graphics: 3D graphics are using parallel/orthographic projection by default. User can switch back to perspective projection in the graphic settings. Animations in 3D graphics can be recorded as videos. Video encoding settings can be configured in graphics settings.</p> <p>Reports: The layout of the result overview and some reports were improved. The result overviews are now defined by res?.rpt files (result windows for shaft and bearings calculation excluded). For floating numbers, the alignment was improved to be more consistent with integer numbers and strings. Own report templates might need some realignments.</p> <p>A new report editor is implemented. The report images are generated in SVG format. The report can be exported in PDF and docx format. The previous editor is available on request.</p> <p>FE calculations: New versions of Code aster (previous 10.03.03, new 13.4.0) and Salome (previous 7.6.0, new 8.3.0) are additionally provided. However, it is recommended to still work with the previous versions. But in case of severe issues, the new versions are alternatively available.</p> <p>A proxy server can be configured through KISS.ini to override the default system proxy settings.</p>
Database	<p>Material selection is done with 2 combo boxes now. The first box is to select the type, the second box is to select the material entry from the filtered data set.</p> <p> Rolling bearings: Data for SKF bearings has been updated. Additionally, the internal geometry data are added: for all bearings the values for the roller / ball diameter [Dw], the pitch diameter [Dpw] and the number of rolls / balls [i] are available. Data for KOYO bearings has been updated (no changes). Data for IBC bearings with inner geometry (single row angular contact ball bearings, single and double row cylindrical roller bearing) has been updated. New bearing types from IBC with inner geometry are added (single row deep groove ball bearings, angular contact thrust ball bearing (one and two side)). Data for Schaeffler bearings (INA, FAG) has been updated. Data for TIMKEN bearings (INA, FAG) has been updated. Now, also the number of rollers of TIMKEN bearings are included in the database.</p> <p>Improved filtering of rolling bearing provided, which considers now case sensitive entries.</p>



Lubrication: Lubrication data from the manufacturer Klüber has been updated. Some new lubrication data from the manufacturer Shell are added to the database (product family: Shell Omala S2, S4, S5).

Base Packages

Modules	Changes/Enhancements
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ZPK	Cylindrical gear basic package
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Material: Specially for PA plastic materials it is well known, that strength values for dry or for humid condition are significantly different. Now dry material properties (Young's modulus, sigFb, sigFs) can be activated for strength calculation of plastic gears. This option can be selected in Module specific settings->Plastic. Additional inputs are needed in the dat files.

New plastic material added from Lehmann&Voss

- Luvocom 1-1119
- Luvocom 1-8181
- Luvocom 19-8074 VP
- Luvocom 19-9499 BK
- Luvocom 1105 XCF15
- Luvocom 1301-0915

4 new Kuraray materials (root fatigue data available)

- Genestar G1300A
- Genestar G1301A
- Genestar G1352A
- Genestar G1500A

New material from BASF: Ultramid N4H UN (root fatigue data available).

Wohler line added for

- SABIC material Verton RVL29
- DuPont Delrin 311DP



Young's modulus, sigFb and sigFs values slightly changed for Ultramid A4H.

PA66 from VDI 2736: fatigue data is now considered to be measured for dry material properties.

Dry material properties available for:

- Ultramid A4H
- PA66 (VDI 2736)
- Ultramid N4H UN

New steel materials requested by the Swiss watch industry were added.

Load Cycles: A plus button has been added to the required service life in the tab "Rating" with additional inputs for defining load cycles. Note: In earlier versions, this feature was included in the 'Details'-Sub window of tab "Rating".

NEW! Manufacturing Tab: This new tab resumes manufacturing related data. Tool used for premanufacturing and final machining. To access the selection of a dresser/worm grinder tool, in the selection list for 'Final machining' the option 'Worm grinder' must be selected. Additional option defines modification values on tip form circle with tolerances. Additional convert button added to calculate start of modification at height coefficient h^*_{corr} from start of modification diameter d_{corr} .

Modifications Tab: New modifications **Crowning I** and **Crowning II** were added. **NEW!** It is now possible to apply **individual modifications per tooth**, which are considered in gear tooth form and in the 3D model (activate under 'module specific settings – general', available on request).



Chordal tooth thickness: Values in the main report and special tooth thickness calculation were slightly wrong and have been fixed.

Tooth form calculation:

Base tangent length W_k is now also available in the special tooth calculation report. A conversion function for the normal module was added in the tab Tooth form. A conversion function for the profile shift was added in the tab Tooth form for pinion type cutter. **NEW!** A new operation in the tab tooth form to cut the tip diameter was added. Root rounding added for cycloid tooth form.

Tooth form graphics 2D: Additional display sections were added to the single tooth graphics

- Transverse (tooth)
- Transverse (gap)
- Axial (tooth) – for worms only
- Axial (gap)-for worms only



The calculation of **equivalent tip relief C_{eq}** for scuffing and micropitting calculation is now executed for the working flank (the right flank was always used before).

Backlash calculation from tooth form: Results can now be displayed also as gap in mm. In addition, the diameter for the backlash calculation from the effective tooth form is displayed in the text field of the graphics.

Micropitting: The name ISO TR 15144 was changed to ISO/TS 6336-22 (same content)

Generation of 3D Models: A new option was added to consider the axial expansion of the cylindrical gear 3D model (activate under 'module specific settings – generation of 3D').

A flag to deactivate surface fitting operation to give smaller file size of the model (Default was true in older KISSsoft version) was added. Set false if the native model is needed. The model will give very small difference less than the operation tolerance in the surface topology. However, both models satisfy g_2 -curvature and have no problem in practical usage such as CNC machining or FEA.

Alternative algorithm for the modeling of cylindrical gear was added. This will remove the waviness at the tip when larger flank line crowning is applied (activate under 'module specific settings – generation of 3D').



Grinding notch calculation in case of **form grinding** was not correct, this bugfix will affect the calculation results.

WPK

Shaft and bearing basic package:

Info button added inside the window for 'Own input' of materials, explaining that the material values Rm and Rp for own input are not diameter dependent. The option is added, that the calculation continues despite of wrongly defined cross section (activate flag in 'Modul specific settings – Calculations').

Shaft editor: NEW! A new tab '3D graph' is added, where the shaft geometry, but also forces etc. are shown during the shaft modelling. The toolbar is extended, and replacement for general context menu. A shaft can be selected with a double click on one of its contour elements in the shaft editor (until now selecting a shaft was only possible with a click on its tree element). A shaft (including its elements) can be moved with the mouse via a grip point on its origin (grip point comes up when the shaft is selected). Layer handling in shaft editor improved: bring frontward and send backward functionality is added to the context menu of the shaft. Added an editable column 'Layer' to the 'Shaft overview' (appears in the window 'Element Editor', when clicking in the empty part of the element tree). Also, an editable column 'Color' is added to the 'Shaft overview'.

Rolling bearing calculation: The option 'display rating life in scientific notation' is added (activate under 'module specific settings – rolling bearings'). **NEW!** When sizing a rolling bearing (by right mouse click on bearing in the shaft editor or the element tree), an additional column 'price' can be displayed. Improved handling of user-defined bearing data: a new option allows the prioritization of data which are saved in the calculation file. So far, the data were read always from database (activate under 'module specific settings – rolling bearings').

Bearing calculation ISO 281, ISO 76 (single bearing module): individual definition for axial load available, by user input or import through shaft calculation.

MPK

Shaft-hub connections:

Keys: for the calculation with 2 keys, it is possible to arrange 2 keys symmetric in the graph. Until now in the graphic 2 keys were always arranged with a shift of 120° (activate in 'module-specific settings').

Splines: The calculation for splines is updated to the new standard DIN 5481:2018. The content is the same like in the DIN 5481:2005 with the corrigendum 1 from 2009. Input of tip alteration factor is not possible anymore in 2019 version for splines. In the update file, if $kmn < 0$, we change the reference profile to own input and change haP, so results do not change.

Own input of the support factors fs for shaft, hub (and key) is possible in the module specific settings. For splines in the tab 'rating' for the calculation method Niemann. In the standard DIN 6892:2012 (feather key) a range for this factor fs is proposed, in KISSsoft we take the minimum value.

SPK

Bolt calculation according to VDI 2230: In tab conditions, the maximum and minimum tightening torque is renamed with maximum and minimum tightening torque achieved, for better understanding.

In the graphic 'Pretension force', the axes are swapped now, which is according to VDI 2230. In the multibolt calculation, the clamping force for seal FKP is defined for one bolt, not for all bolts.

In the multibolt calculation, the required clamping force Fkerf is changed so that it is now the maximum from FKQ and FKD.

	When calculating with operating temperatures higher than assembly temperatures, for the sliding safety the minimum values is now shown in the result window.
	The values in the sub-window 'length of engagement' are now updated automatically. So far, the values were updated only when sized by the user.
FPK	Springs: The standards for disk springs are converted as follows: DIN 2092 is now DIN EN 16984:2017 (Calculation), the DIN 2093 is now DIN EN 16983:2017 (Quality specifications – Dimensions). The content of both standards is the same.
DPK	Gear body deformation: Added symmetry axis in the preview geometry of the gear body.

System Modules

KISSsys

Modules	Changes/Enhancements
SYS	KISSsys: The calculation for shafts and coaxial shafts includes now cross section variables for safety against incipient crack. The number of shafts KISSsys can handle is increased to 40. The variable for angular position of masses (aPos) was added to the kSysMass properties.

KISSdesign

Modules	Changes/Enhancements
KSD NEW!	KISSdesign: New system module to model complete gearboxes within KISSsoft, using submodules as gear and shaft calculations. Rights: S20

KISSsys Expert Modules

KISSsys Modal Analysis

Modules	Changes/Enhancements
KS3	Calculation of the drives eigenfrequencies: Change of the model used for the hysteretic (material) damping used in forced response, from one of constant damping versus forcing frequency, to a frequency dependent model (based on Kelvin-Voigt material model). This leads to a difference in the result of unbalance response value at resonance.

KISSsys export interfaces

Modules	Changes/Enhancements
KS20 NEW!	REXS Export: The export of drivetrains in the format of REXS is now available. Geometry data of the gearbox can be exported (gears, shafts and bearing dimensions, and its positions). It is currently limited to industrial gearboxes without planetary stages. Rights: K11k, K11k7

Reliability

Modules	Changes/Enhancements
KLR	Reliability: Reliability calculation for gears, shafts and bearings for planetary system is available.

Expert Modules for Gears

Cylindrical gears

Modules	Changes/Enhancements
ZA1	<p>Planetary Gears: In addition to set the correct gears on the shaft calculation to get the correct bending line, also the carrier couplings have to be selected now. This improves stability of ISO 6336 Annex E and Contact Analysis calculation since the bending line of the carrier is determined correctly.</p> <p> Planetary systems with floating sun got a wrong path of the sun center, this issue is now fixed.</p>
ZA2	<p>Gear Rack: Input fields for the rim thickness coefficient s_r^*, the web thickness factor b_s/b and the web thickness b_s in 'Details' for gear in mesh with a rack added.</p> <p>ISO6336-1, Annex E and contact analysis can now consider shaft, gearbody and torque twist deflection of the pinion in mesh with the gear rack.</p>
ZA3	<p> Rough Sizing: For strength calculation according to DIN 3990 the module series according to DIN 780 is used in the rough sizing procedure. For all other calculation methods, the module series according to ISO 54 is now used. First 6 results of rough sizing produced slightly different results compared to standard calculation.</p>
ZA4	<p>Fine Sizing: Conditions II to perform an iteration over the reference profile is now also available for planetary gears, 3 gear and 4 gear chains.</p> <p>NEW! Fine sizing of 4 gear chains: If gear 4 is an external gear, center distances from the tab 'Basic Data' are used. The requested gear ratio corresponds to z_4/z_1.</p>
ZA5	<p>Profile and flankline diagrams: It is now possible to save the profile and flankline diagram curves in dxf / igs format.</p>
ZA7	<p>Asymmetric gears: a sizing function for the gear root radius / tool tip radius of asymmetric gears was added. NEW!</p> <p>This module is no longer a beta version but some functionality is still limited for asymmetric gears:</p> <ul style="list-style-type: none">▪ No premanufacturing▪ Only for cylindrical gears▪ Only ISO 6336 and VDI plastic calculation methods available▪ No rough and fine sizing▪ No operating backlash calculation▪ No modification sizing

ZA8 NEW!	Manufacturing with power skiving: a new functionality was added to estimate the manufacturability of gears using power skiving. On one hand, the tooth geometry is checked regarding machine and tool limitations, on the other hand, the gear can also be checked for collisions with the tool. Note: All checks are only a first assessment of the setup and do not replace a final evaluation with the machine manufacturer. Rights: Z19p
ZA9 NEW!	Double pinion planetary set (included in 4 Gear Train): If gear 4 is an internal gear, the software checks if the system can be used as a double pinion planetary set. A note is provided in the general report under "supplementary data". If a double pinion planetary condition is met, the software displaces in the report the center points under the assumption, that M1 and M4 coincide. Following results are represented: angle M2-M1-M3 and clearance between Gear 3 and Gear1. Fine sizing of double pinion planetary sets: If gear 4 is an internal gear, the sizing can be performed as a double pinion planetary set. The requested gear ratio then corresponds to z_3/z_2 . All center distances will be varied and all possible solutions will be shown. This module requires ZA1 and ZA4 for fine sizing. Rights: Z1c

Strength Calculation Methods

Modules	Description
ZA18	Static calculation: If static calculation method is selected, lifetime hours are set to 0. If changed back to non-static calculation the old number of hours is restored in the user interface.
ZA20	AGMA Standards: AGMA 6015 (Rolling mills) was added.
ZA21	Calculation of plastic gears according to VDI 2736 and root form factors YF according to Method B: The VDI Standard suggests using Method C, because the factors YF and YS can be extracted from diagrams. However, method B is typically more accurate (except for deep tooth form).

Contact analysis

Modules	Changes/Enhancements
ZA30 ZA34	Orders of Harmonics: The number of orders of the amplitude spectra calculated for the Transmission Error, Contact Stiffness and Force Excitation can now be set by the user in the <i>module specific settings – face load factor / contact analysis</i> . Graphics: All contact analysis graphics are now grouped for Noise, Efficiency, Forces / Stresses and Safeties. Rotation direction is now shown in the 3D graphics. A new graphic for tooth root stresses along the face width was added. Rotation direction is now shown for the CA results that include gear geometry. NEW! Contact analysis for cylindrical gears provides now contact pattern graphic like the bevel gear contact analysis. For root stresses 2D and 3D graphics, two stress curves can now be selected: The stress calculated at the 30° tangent point and the stress according the graphical method.  Algorithm: General improvement of the planetary contact analysis convergence algorithm. In some cases, the planetary contact analysis was not able to find a solution for the system. This problem is now handled by a more robust algorithm.

 **Bugfix:** The contact analysis had an error in scuffing and micropitting calculation when a load spectrum was used. Several calculation parameters such as cg, scoring_wbt haven't been scaled correctly.

Sizing of pitch error in contact analysis changed from $0.5 \cdot \sqrt{a^2 + b^2}$ to $\sqrt{a^2 + b^2}$.

Speed (rpm) of gear 2 and **efficiency** was added to the results in the contact analysis. In addition, the graphic “speed curve” and “efficiency curve” were added.

Active flank of gear 1 and 2 represented as diameter is now shown in CA results.

Active tip and root diameters (load-free and under load) are now shown in the graphics “Meshing” and “tooth form gear 1 / 2” in case of a consistent contact analysis calculation.

Runout error can now be considered in the contact analysis.

Iterative wear graphics added in the contact analysis.

ZA33 **Modification sizing:** $\epsilon\alpha$, $\epsilon\beta$, $\epsilon\gamma$ and dB(A) added to modification sizing

Modification sizing can now use **load spectra** directly. If a load spectrum is available and the flag ‘consider load spectrum’ is active, the modification sizing uses directly the loads from the load spectrum.

ZA35 **ISO 6336 Annex E Tolerances:** The parameter name for axis non-parallelism is now changed from fma to fpar as described in ISO 6336-1. According to definition of fma in ISO 6336-1 Chapter 7.5.3 eq. 62 $f_{par} = f_{\Sigma\beta} \cdot b/l$. ($f_{\Sigma\beta}$ according to ISO10064). So far $f_{par} = f_{\Sigma\beta}$ was used. Additional gear quality parameters are shown in the sizing of tolerances when calculating with manufacturing allowances.

ZA37 **Root stresses with 3D FEM** is no longer beta version.
NEW!

ZA38 **Contact analysis of asymmetric gears:** Contact analysis does now support **asymmetric teeth** according to dissertation of Langheinrich (Stiffness calculation according to Weber/Banaschek is now adapted to support asymmetric teeth). Requires modules ZA30 or ZA34 and ZA7. Rights: Z32a
NEW!

Bevel gears

Modules	Changes/Enhancements
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ZC1	Bevel gear geometry: In the tab ‘Basic data’, the thickness modification coefficient (theoretical) x_{smn} is changed to the thickness modification coefficient (backlash included) $x_{sm1,2}$, if backlash is considered.
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ZC2 ZC9	 Calculation of scuffing for bevel and hypoid gears are updated according to ISO/DTS 10300-20:2018 (Draft).
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ZC14 NEW!	Sizing functionality for webbings of forged differential bevel gears is available now. Rights: Z7t
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Worm Gears with Globoid Worm Wheel

Modules	Changes/Enhancements
ZD3	NEW! Strength calculation of worm gears according to DIN 3996: 2018 (Draft) is now available.
ZD2/ZD3	 The calculation of temperature safety ST with ISO 14521 or DIN 3996 standard changed from $ST = \text{ThetaSlim} / \text{ThetaOil}$ to $ST = \text{ThetaSlim} / \text{ThetaS}$.

Crossed helical gears

Modules	Changes/Enhancements
ZE1	NEW! Internal crossed helical gear geometry: Crossed Helical Gear Pairs with an INNER gear can be calculated (only geometry, no strength). Crossed Helical Gear Pairs can also be calculated if gear 1 or gear 2 is a spur gear. Gear 2 can have a negative cross axis angle. The helix angle of gear 1 must be positive, the direction is determined by left or right hand.
ZE7 NEW!	Crossed helical gear with gear rack: It is now possible to calculate crossed helical gear with a gear rack (often used in steering mechanisms for automotive applications). Rights: Z17g

Tooth form calculation

Modules	Changes/Enhancements
ZY2	Tooth Form Import: A new option was added to approximate the normal vector and curvature radius when importing cylindrical gear tooth form as .DXF file.
ZY9 NEW!	Elliptic expansion is available now. Rights: Z5b

Other gear-specific modules

Modules	Changes/Enhancements
ZZ4	Tooth Flank Fracture: Calculation of flank breakage for bevel gears now according to ISO/DTS 10300-4 (2019) for bevel gears and NEW! for Hypoid gears. The method according to Annast (2002) is no longer available. For the cylindrical gears, the name ISO 19042 was changed to ISO/DTS 6336-4 (same content).
ZZ6	Plastics manager: NEW! Measurement points now shown in the SN graphics for the plastics manager. Calculation method in test file automatically is set to plastics, even in cases when only geometry is selected in the test file. Improved algorithm for merging the files. Additional results for the VDI2736mod (YF method B) available in the DAT files. Additional inputs are available for considering dry material properties and are also written to the dat file.
ZZ7	Backlash calculation based on actual tooth form: Results can now be displayed also as gap in mm.
ZZ8 NEW!	Special functions for the watch industry: Import of DXF in special format, Dry-run and other special functions for very small gears. Rights: Z19w

Expert Modules Shafts and Bearings

Shafts

Modules	Changes/Enhancements
WA1	<p>Coaxial shafts: Improved approximation of full compliment cylinder roller bearings (single and double). The filling ratio is assumed as 99.9%.</p> <p>Fixed implementation of angular thrust roller bearings: References on corresponding catalogue height 'H' were not taking into account the pressure angle correctly. Improved handling and inner geometry approximation of bearings without an inner- or outer ring (as e.g. needle bearings).</p> <p>For bearing inner geometry with incomplete data sets, the approximation is improved: If for example the pitch diameter D_{pw} and roller diameter D_w are defined, the unknown roller number Z and roller length L_{we} are approximated based on these parameters. An info message is notifying the user that some values are approximated. Improved selection of inner geometry approximation based on least difference from statistical characteristics.</p>
WA4	<p>Eigenfrequency: The input for 'Number of eigenfrequencies' is moved to the tab Eigenfrequency.</p>
WA8	<p>Load spectra: The properties of gear elements and couplings which defines whether the input is made absolute or relative using a factor, is now stored in the file.</p>
WA10	<p>AGMA 6101/6001: Define strength values (σ_u, σ_y) for the materials through the database or own input (option can be selected in the element editor). So far it was only possible to convert the values from the core hardness value.</p>

Bearings

Modules	Changes/Enhancements
WB1	<p>Modified service life: Calculation of the bearing performance with 'SKF bearing module' for the classical bearing method (when modified rating is activated) is available in the shaft calculation. Updated grease service life calculation to SKF 2018 catalogue. Updated bearing friction calculation to SKF 2018 catalogue, having changes in the consideration of the effect of lubrication on sliding friction as well as geometric constants for angular contact ball bearings. New info graph provided, explaining the levels of contamination (under 'basic data – contamination – own input of contamination factor ec').</p>
WB3	<p>Plain hydrodynamic bearings: Adaptions to the new DIN 31657-4:2019 added and sizing value of clearance changed.</p>

CAD Interfaces

3D Export

Modules	Changes/Enhancements
CB2	<p>Siemens Solid Edge: Interface to Solid Edge 2019 has been implemented. Only versions back to Solid Edge 2016 are still supported.</p>

CB3	SOLIDWORKS: An interface to SOLIDWORKS 2019 has been implemented. Only versions back to SOLIDWORKS 2016 are still supported.
CB4	Autodesk Inventor: Interface to Autodesk Inventor 2019 has been implemented. Only versions back to Autodesk Inventor 2016 are still supported.
CB6	Creo Parametric: Interface to Creo Parametric 5 has been implemented. Only versions back to Creo Parametric 1 are still supported.
CB7	Siemens NX: Interface to NX 1847 has been implemented. Only versions back to NX 10 are still supported.

COM Interfaces and skript

Modules	Changes/Enhancements
CC1	COM Interface Basic: Two different COM interfaces are available now. So far, only a COM interface without a release number was available. Additionally, a COM interface including a release number is available.
CC2	COM Interface Expert: Bevel gear differentials can now be calculated over COM calling function "CalculateBevelDifferential" with number of steps and convergence threshold as parameters.
CC3 NEW!	Skript: an internal programming language for scripting is now implemented inside KISSsoft. It can be used to implement proprietary calculations, data ex- and import, and so on. There is also the possibility to access the same functions that are available via COM interface and all variables of the respective module directly. Rights: k22

Interfaces for Data Exchange

Modules	Changes/Enhancements
CD1	GDE Import and Export from GDE files (Gear Data Exchange) is now possible via XML-format (Selection under File/Import/GDE eg. File/Export/GDE).
CD3	Interface to GEMS®: It is now possible to import / export bevel gear geometry from / to Gleason GEMS Software. Rights: k5j
CD4 NEW!	Export of gear / tool geometry: Under "calculation" a new functionality was added to export the tooth form of the gear or of the tool in a text file. Rights: Z5b

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