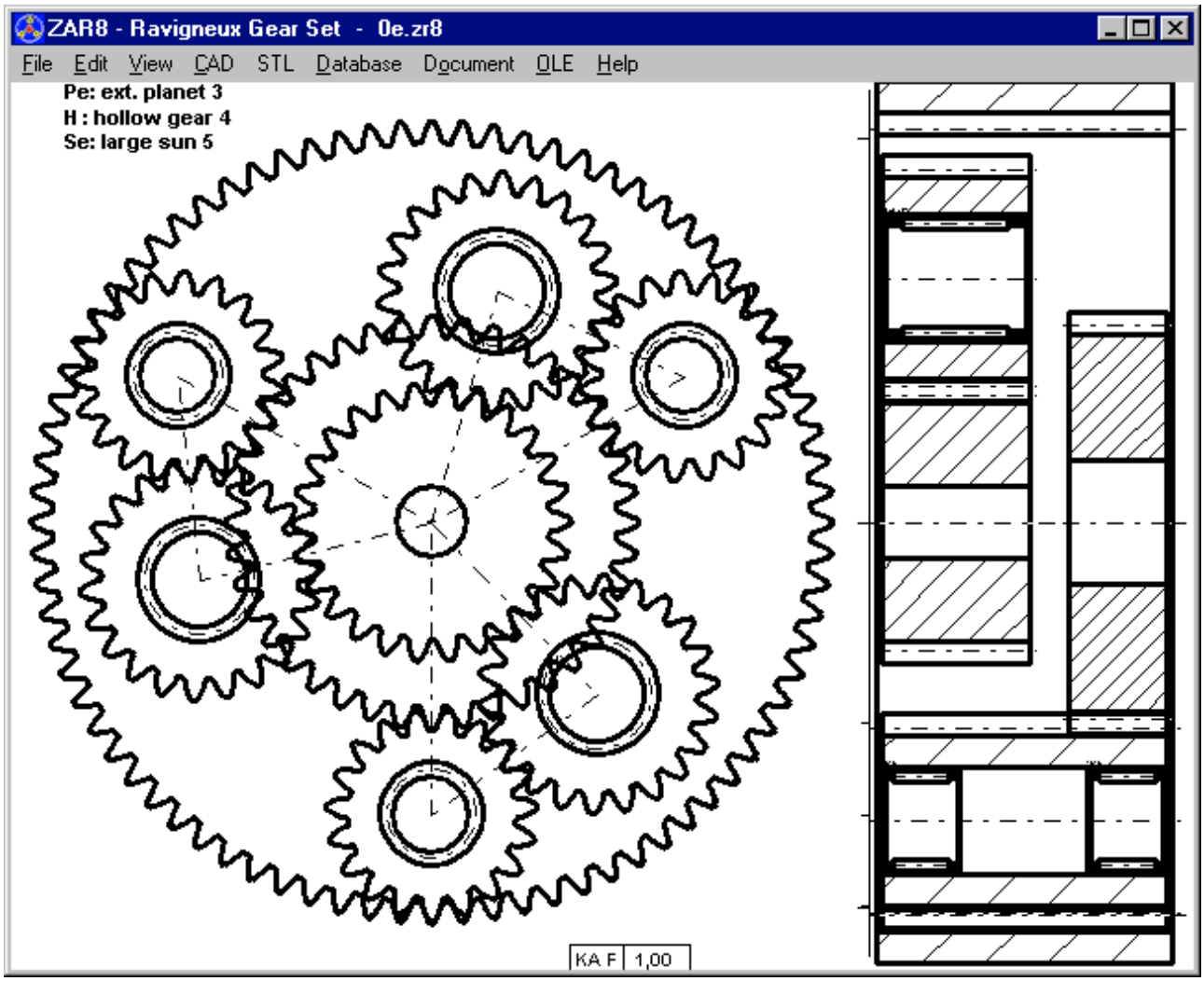
by Fritz Ruoss

ZAR8 - Software for Ravigneaux Gears

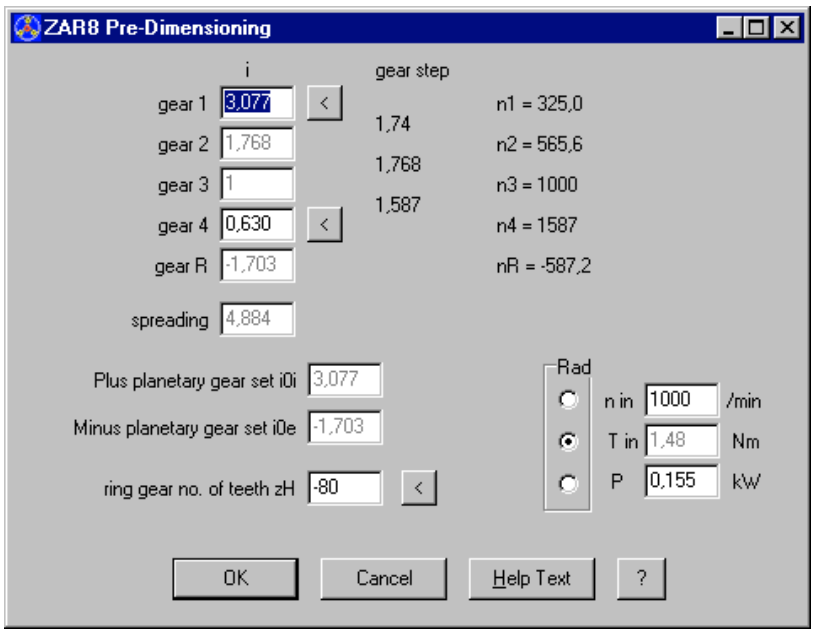
A Ravigneaux gear contains two planetary gear stages: one (minus) planetary gear set and one plus planetary gear set with planet gear pairs instead of planet gears. Carrier as well as ring gear of both planetary gear sets are connected or common. And planet wheel of the minus planetary set is used as outer planet wheel of the plus planetary gear set.



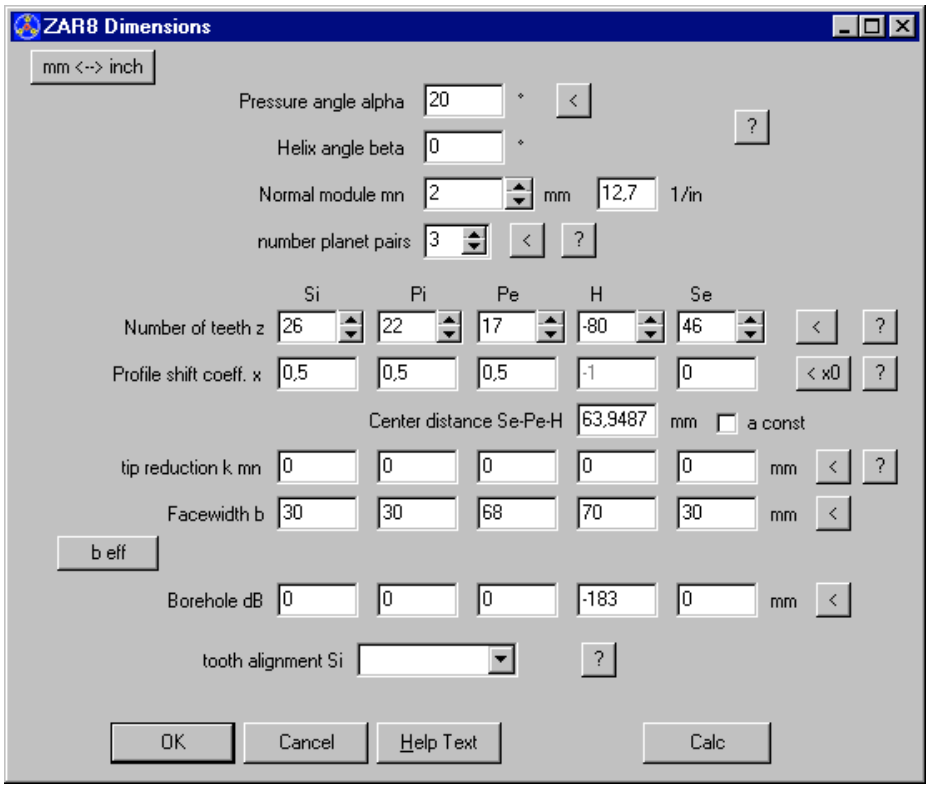
Five gear wheels in two planetary gear sets: Si (small sun wheel), Pi (inner planet wheel), Pe (outer planet wheel), H (hollow wheel), Se (large sun wheel) are calculated by ZAR8 in one pass.

ZAR8 Ravigneaux Gear Software

In pre-dimension, you can enter transmission ratio of first gear and fourth gear. The transmission of the other gears 2, 3 and R are directly calculated and displayed, also the gear step between gear 1,2,3,4. Transmission ratio i0i of plus planetary gear set is transmission ratio of the 1st gear, and transmission ratio of the minus planetary gear set i0e is transmission ratio of the rear gear.
Next enter power or input torque and input speed. You can define number of teeth of the ring gear zH, and ZAR8 calculates dimensions of all gear wheels under consideration of assembly conditions for planetary gear sets.

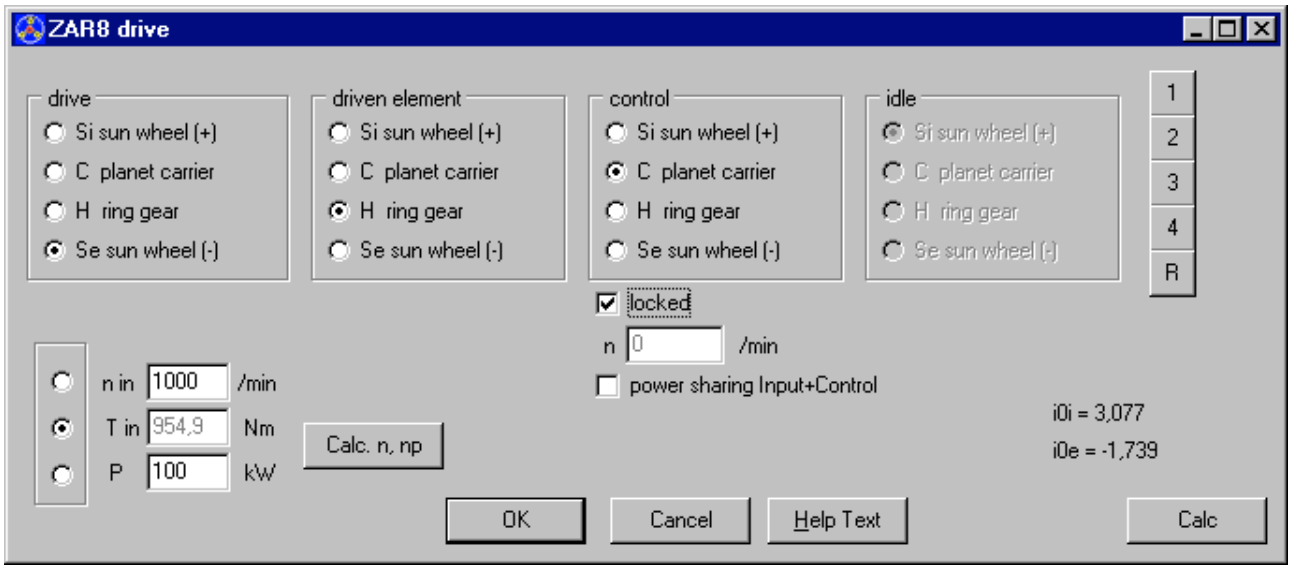


In the next input window you can modify dimensions such as profile shift coefficients, tooth tip reduction, face width of the gear wheels.



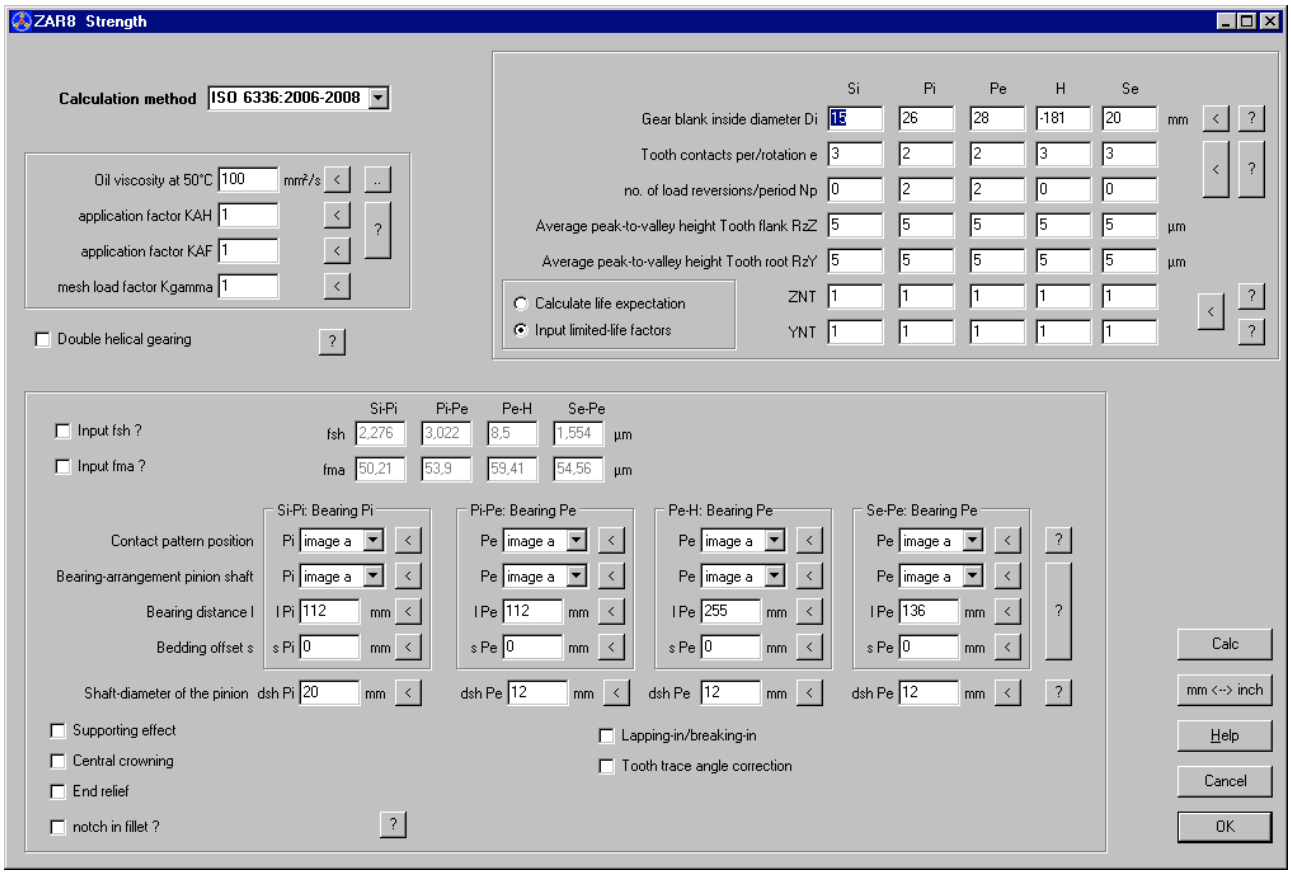
ZAR8 Ravigneaux Gear Software

Four connector shafts Si, C, H, Se can be defined as driving (in), driven (out), control or idle. By means of the buttons 1,2,3,4,R you can shift the standard gears of the Ravigneaux gear.



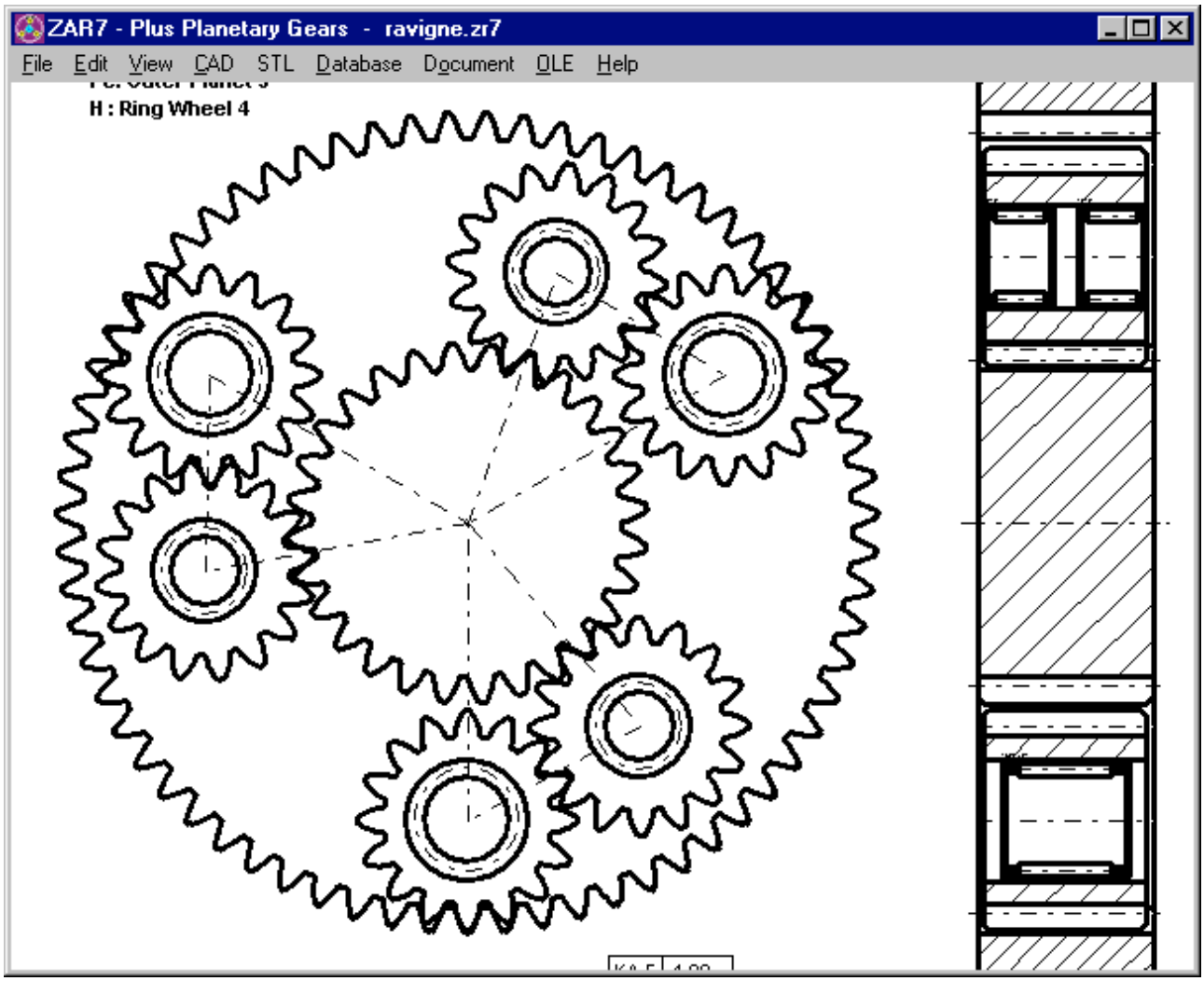
In an animation you can rotate the gear wheels of the Ravigneaux gear set on the computer screen.

To calculate load bearing capacity for each of the five gear wheels and four tooth contacts (Si-Pi, Pi-Pe, Pe-H, Se-Pe), select gear materials from integrated database and input additional data for strength calculation according to ISO 6336 or DIN 3990.



ZAR8 is available now for 1950 EUR.

ZAR7 Software for Plus Planetary Gears (double-planet gears)



A Ravigneaux gear is composed of one simple (minus) planetary gear stage and one plus planetary gear set. A minus planetary gear set can be calculated by means of ZAR5. For calculation of a plus planetary gear set, we have made a new software ZAR7. The carrier of a plus planetary gear carries planet gear pairs instead of single planets as in ZAR5. Planet wheel pairs may be on one axis to the center of the sun gear, but usually are offset mounted. This allows larger number of teeth and free definable profile shift coefficients. For number of teeth of ring gear (zH) and sun wheel (zS), assembly condition for plus planetary gears must be considered:

$(|zH| - zS) / q = f$

„f“ must be integer. „q“ is the number of planet pairs.

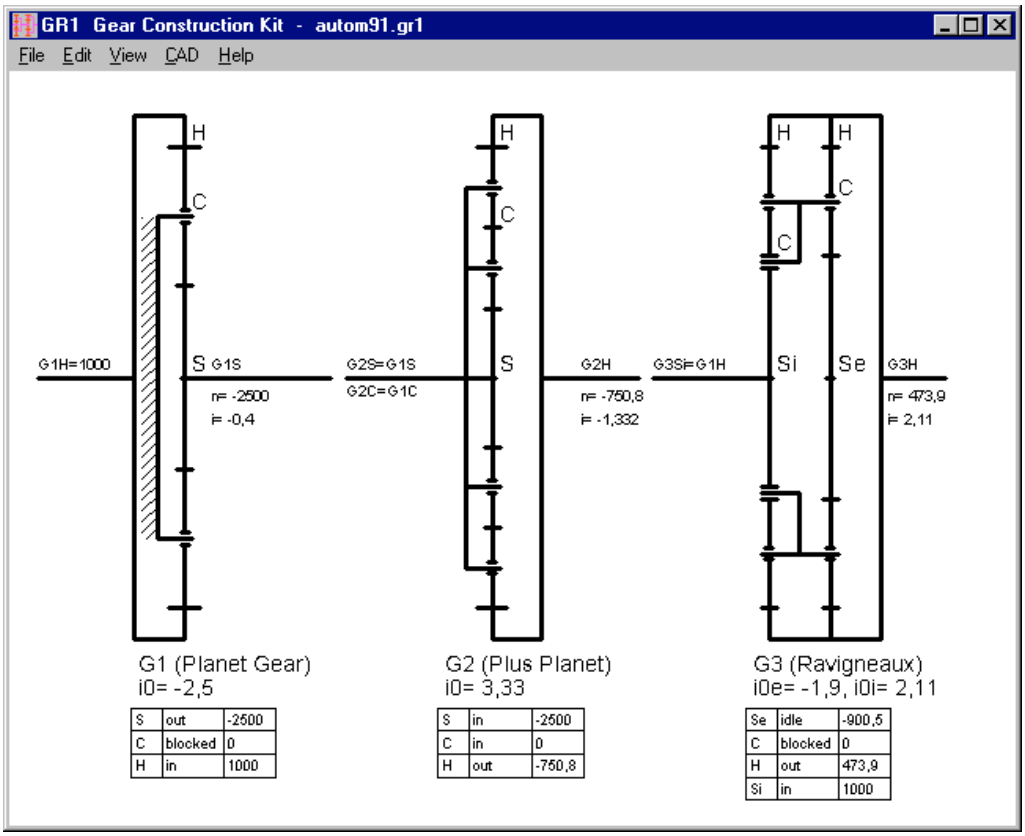
Dimensions and load capacity of the four gear wheels S (sun), Pi (inner planet), Pe (outer planet) and H (hollow gear) calculates ZAR7 in one pass. Additionally, you can select roller bearings for inner planets and outer planets and calculate in ZAR7.

ZAR7 is available now for 1380 EUR.

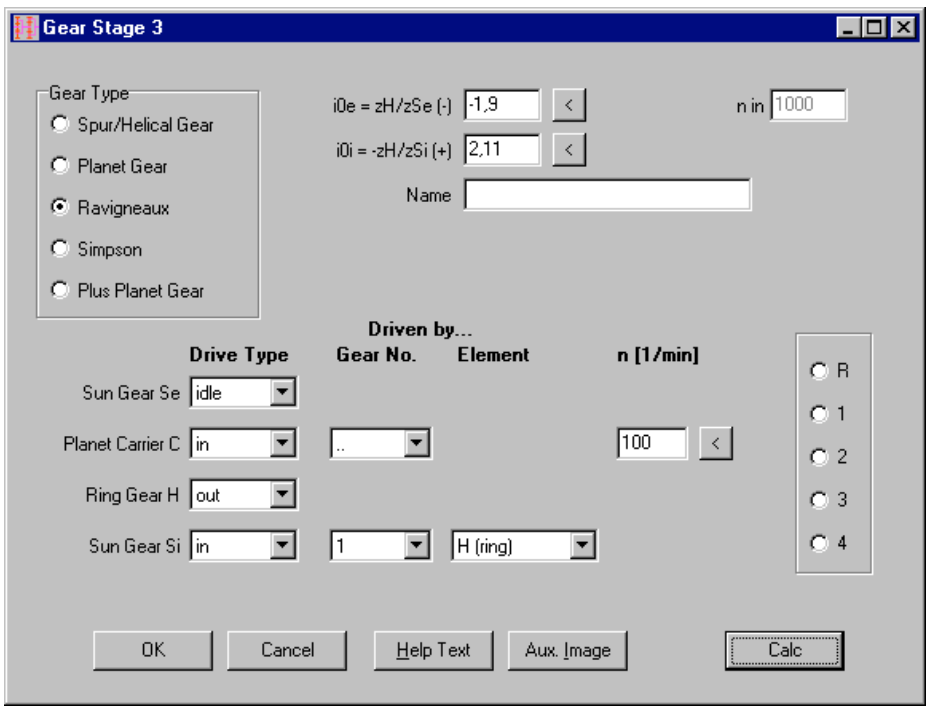
Planetary Gear Package

Our new planetary gear package contains the programs for design and calculation of planetary gears ZAR5, ZAR7, ZAR8, GR1, and also ZAR1+ for a price of 3600 Euros. If upgrade from ZAR1+ or ZAR5 or spur gear package, old licenses are credited 75%.

GR1 - Gear Construction Kit Software

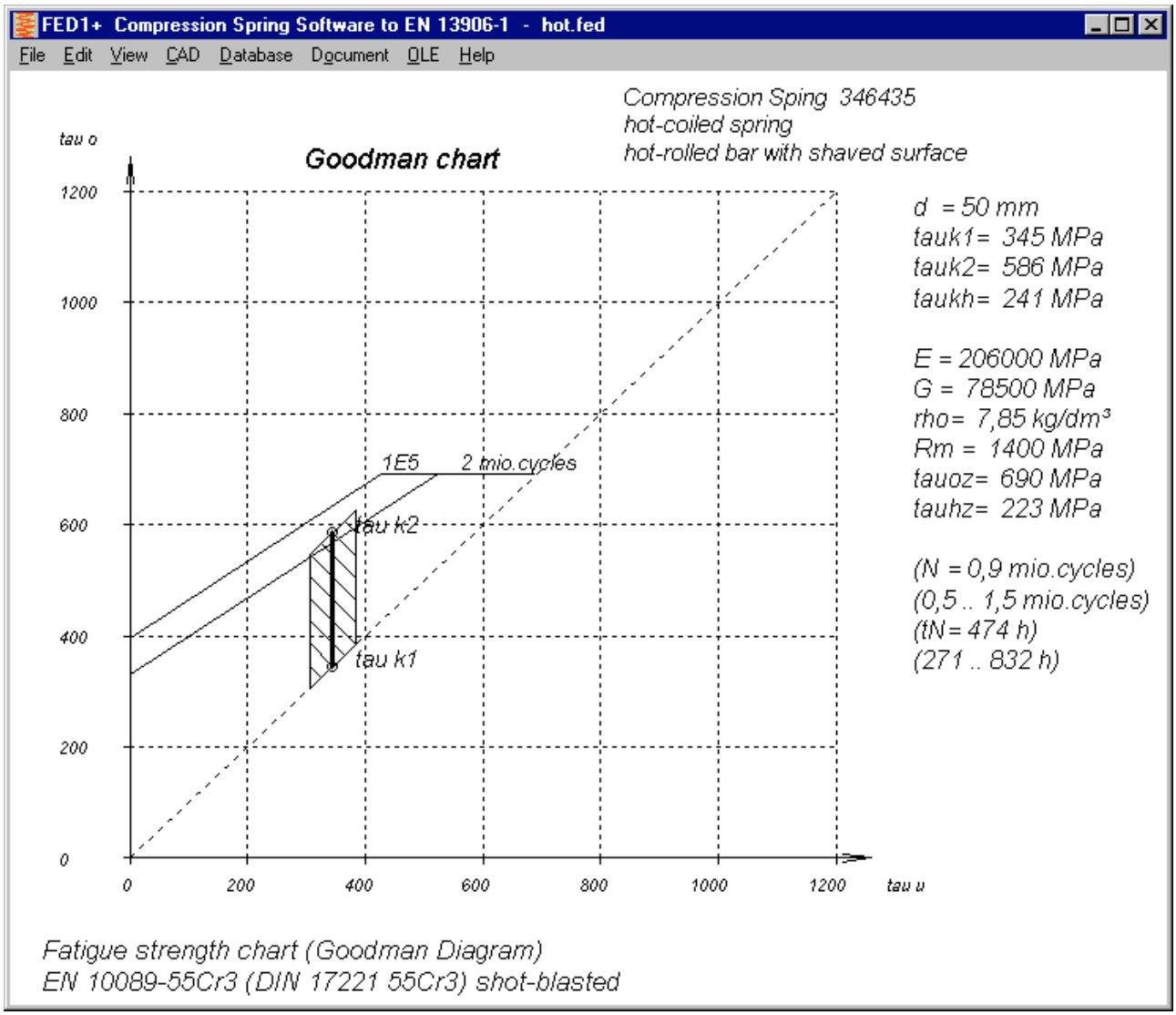


By means of GR1 you can "build" multistage gears composed of simple gear pairs, planetary gear sets, Ravigneaux gear sets, Simpson gear sets and plus planetary gear sets. For each gear stage element you can define if it is driving (in), driven (out), blocked or idle. For driving elements (i9) you can enter input speed or select a predecessor gear element.

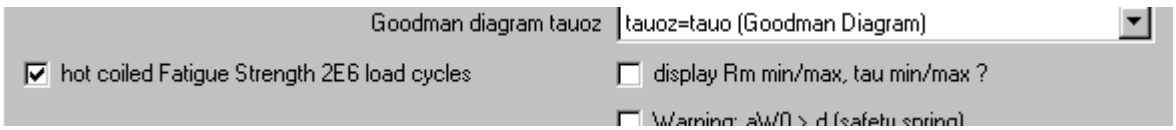


GR1 calculates speed and transmission ratio of all gear elements.
GR1 does not calculate power, torque nor dimensions.
GR1 is available now for 185 Euros.

FED1+,2+,3+,5,6,7,8: Hot-Coiled Springs: 2E6 Load Cycles



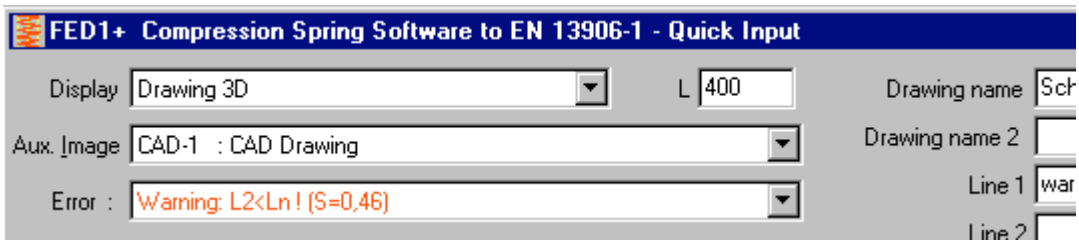
Cold-coiled springs are fatigue strength safe if enduring more than ten million load cycles. In the spring calculation software, this was treated equal for hot-coiled springs until now. But Goodman diagrams in EN 13906-1 for hot-coiled springs are drawn for 2E6 load cycles (fatigue strength safe) and for 1E5 load cycles. The EN 13906 Goodman diagram for hot-coiled springs shows curves for bar diameters of d=10mm, 15mm, 25mm, 35mm and 50mm. These diagrams with fatigue strength safety for 2E6 instead of 1E7 load cycles (for hot-coiled springs only) are used now in our software for compression springs, extension springs, torsion springs and torsion bars. However, at "Edit->Calculation Method" you can configure the calculation as used until now with fatigue strength safety at 10 million load cycles for all spring materials.



Goodman diagrams for hot-coiled springs are valid for spring materials to EN10089 with ground or shaved surface. At "Edit->Production" you must set "hot-coiled, steel with reworked surface" and at "Edit->Material->Surface" "ground" or "shaved". For hot-rolled spring steel with drawn or rolled surface is no Goodman diagram available. Instead of 3 curves for 10 million, 1 million and 100,000 load cycles, new Goodman diagram for hot-rolled springs shows only 2 curves: for 2 million cycles and 100,000 cycles.

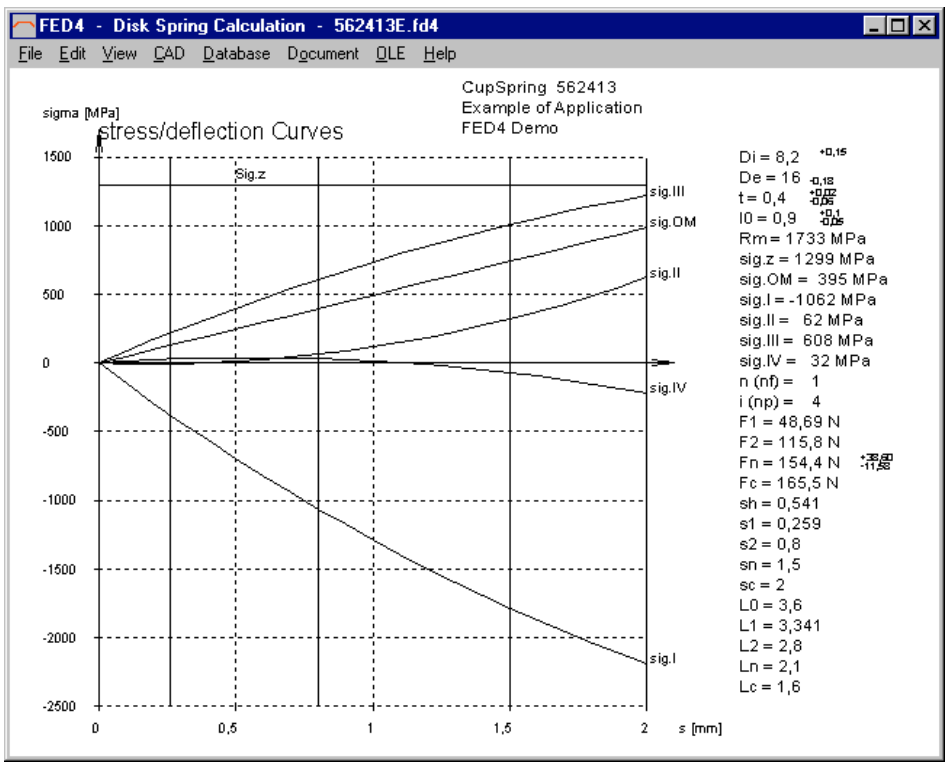
FED1+, 2+,3+,5, FED6, 7,9: Spring drawings in command line mode
Drawings created in command line mode (i.e. „wfed1 test.fed /CAD1:27“) were drawings of the unloaded spring with spring length L0 until now. This has been changed, spring drawings are created in the defined spring length now. This enables you to automate spring drawings as DXF or IGES file in various spring lengths.

FED1+: Quick Input Window: Assembly length L for spring drawings
If you selected spring drawings (front view, section drawing, 3D), you can input assembly length L next to "Display" field now.



In FED1+, indices for drawings and diagrams used in command line mode are now equal with indices in Quick Input window, this begins with index 1 = "Quick 1" until Index 35 „stress Rm-d Quick". Index 25, 26, 27 for spring drawings (view, section, 3D centerline). Example command line: `"wfed1 actual.fed /cad1:25"`

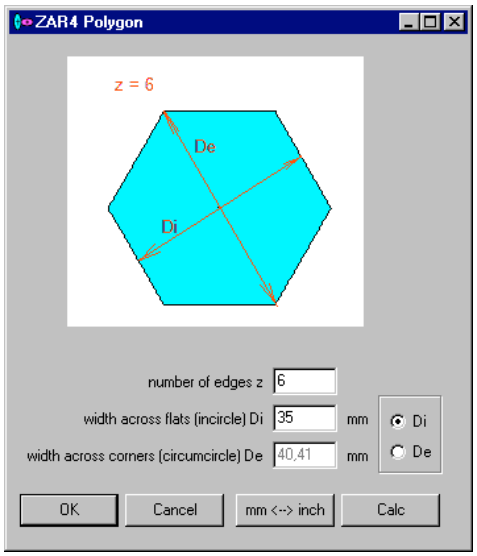
FED4: SigmaOM
Bending stress SigmaOM of the disk spring is mainly used to calculate static stressed disk springs. SigmaOM has been added to stress diagrams and printout.

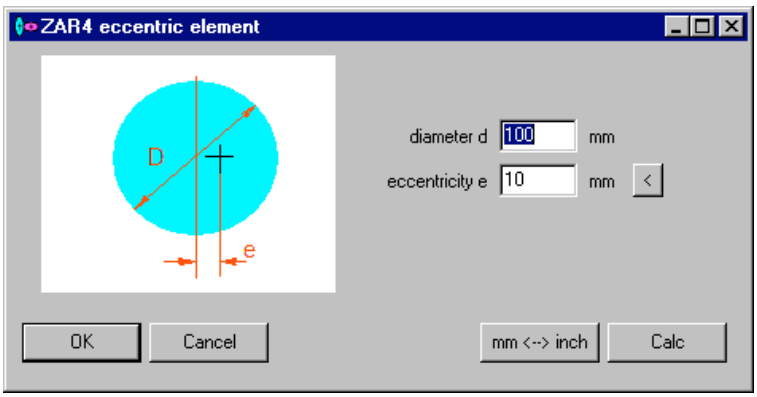


FED4: Load cycles for disk spring materials according to DIN 2093
In FED4 you can decide to use material according to DIN 2093 or from material database. Calculation of load cycles has been added to disk springs with material data to DIN 2093.

GEO4, ZAR4: New Input Windows Sinus-Linear, Polygon, Eccentric

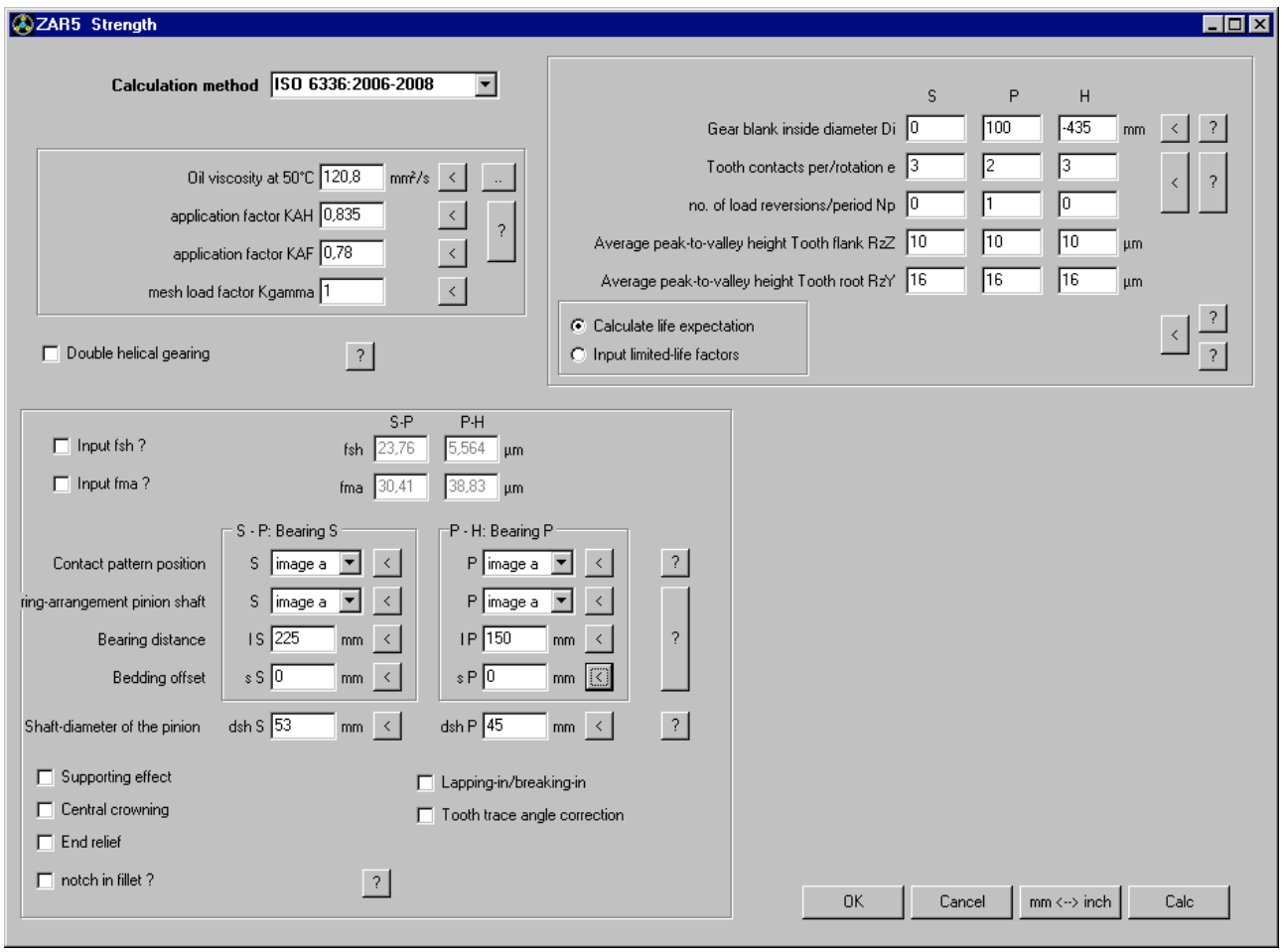
New input windows were created for cam geometry in GEO4 and for pitch curve of nonlinear gear in ZAR4 for sine-linear, polygon and eccentric element geometry.



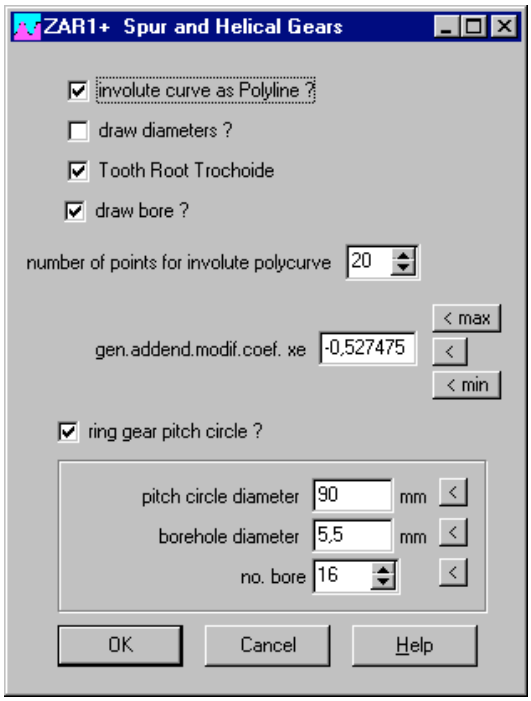


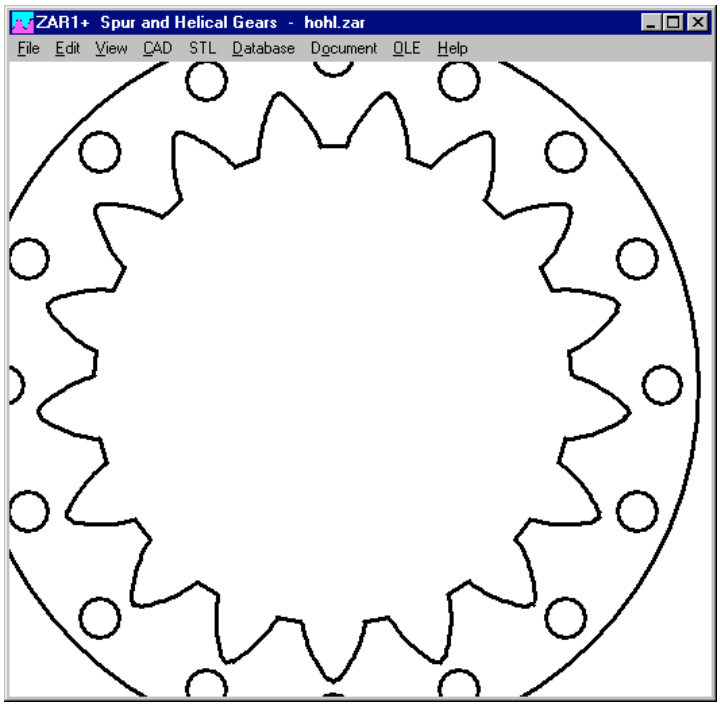
ZAR1+, ZAR5: New Dialogue Window for Strength Calculation Data

Input data for strength calculation to ISO 6336 and DIN 3990 have been integrated into one common dialogue window.

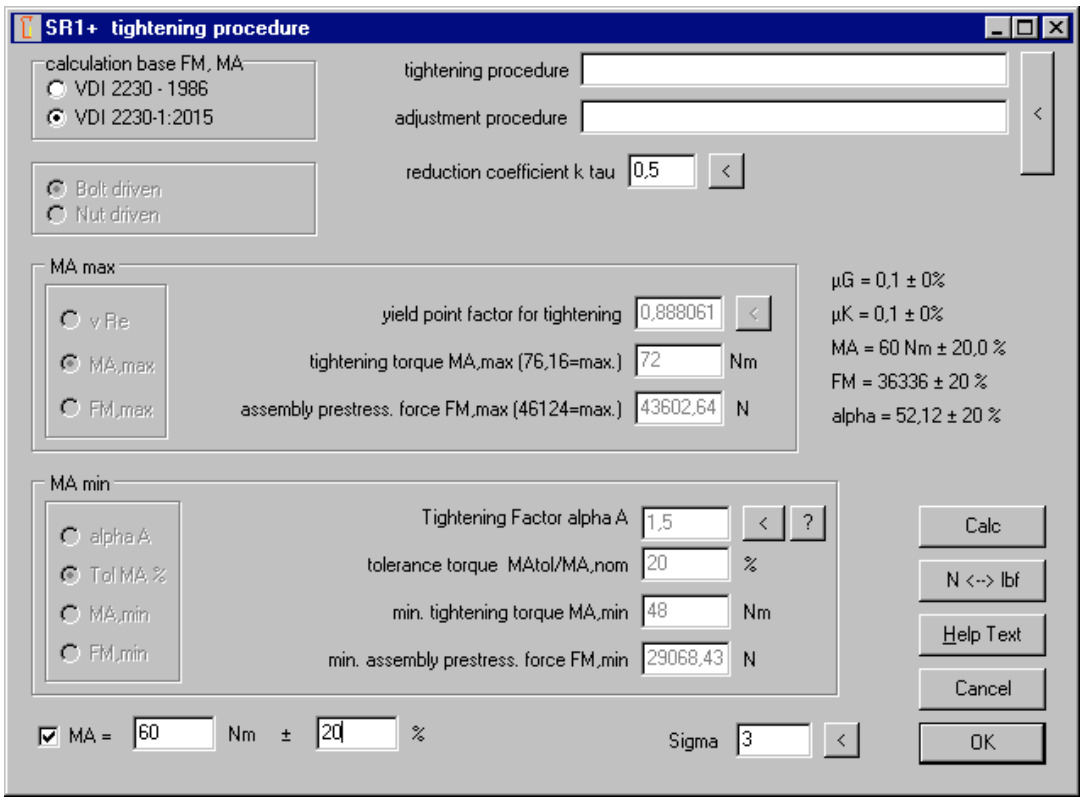


ZAR1+, ZARXP, ZAR1W, ZAR5: Drawing Options and Ring Gear with Bore Holes
Same as known from WN2, at „CAD->Gear Wheel“ and „STL->Gear Wheel“ you first get a dialogue window with settings. New for ring gears is the possibility to define a pitch circle with bore holes. This is useful if you produce ring gears directly with 3D printer.



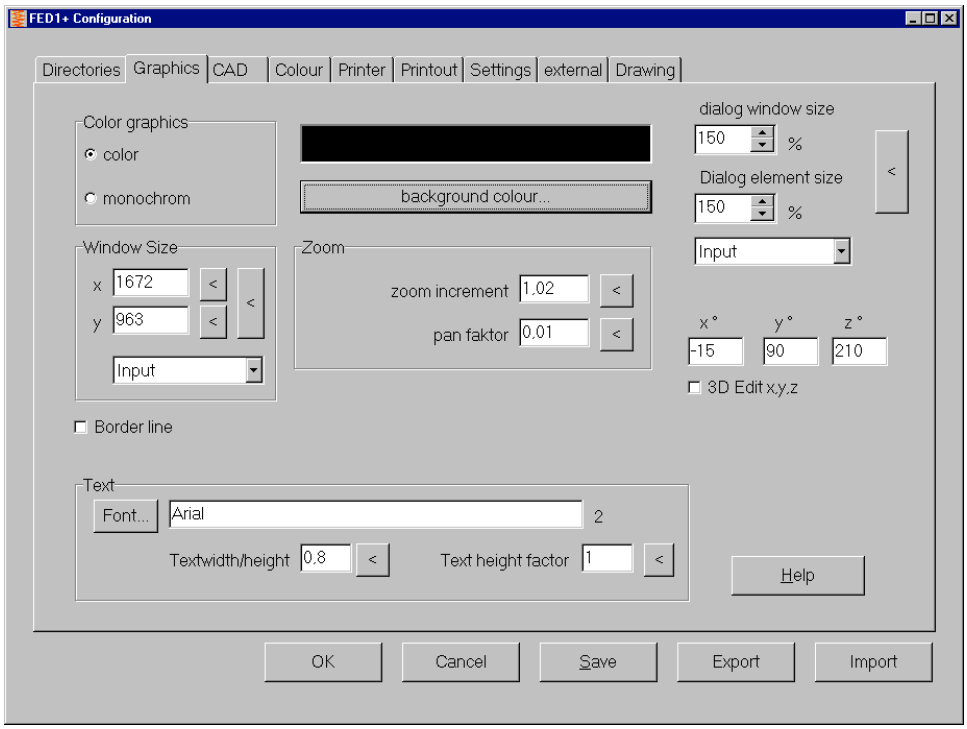


SR1/SR1+ : Tightening Torque

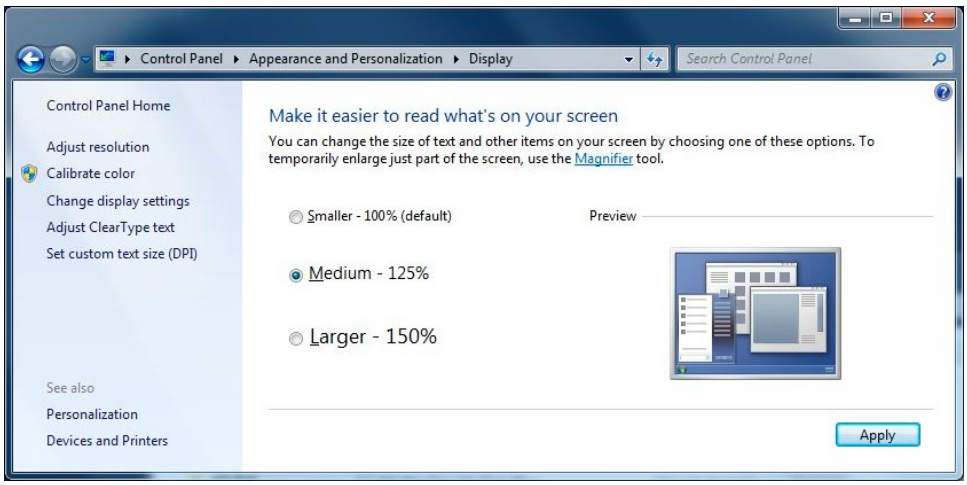


Instead of min/max tightening torque MA,max and MA,min, or nueRp and alphaA, you have a new alternative to input average tightening torque with tolerance in % instead.

Modify Dialogue Window Size and Dialogue Element Size (Text Size)



If text and input fields are too small (i.e. notebook with high graphic resolution but small display) you can modify dialogue window size and dialogue element size at "File->Settings->Graphics". Also in Control Panel of Windows you can modify size of text and dialogue elements. These Windows settings differ in Windows 10, Windows 8, Windows 7.



If you make changes in the Windows settings, you maybe next have to adapt the new settings in the HEXAGON programs. Or set "Auto" instead of "Input" to adapt Windows settings automatically. We improved handling with enlarged dialogue windows, input tables were not enlarged in previous versions. Also we fixed a bug at enlarging database windows. If you configure dialogue element size, save new configuration, then close and restart program to set new text size also for database windows. Anyway, if you plan to use HEXAGON software with enlarged dialogue elements and dialogue windows, we recommend first to update your programs to the latest version.

FED17 - New Software for Magazine Springs

Especially for compression springs with rectangular, oval or elliptic coil shape we can provide a new software in short.

HEXAGON PRICELIST 2017-01-01

PRODUCT	EUR
DI1 Version 1.2 O-Ring Seal Software	190,-
DXF-Manager Version 9.0	383,-
DXFPLOT V 3.2	123,-
FED1+ V29.3 Helical Compression Springs incl. spring database, animation, relax., 3D,..	695,-
FED2+ V20.1 Helical Extension Springs incl. spring database, animation, relaxation, ...	675,-
FED3+ V18.8 Helical Torsion Springs incl. prod.drawing, animation, 3D, rectang.wire, ...	480,-
FED4 Version 7.3 Disk Springs	430,-
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FED6 Version 16.0 Nonlinear Cylindrical Compression Springs	634,-
FED7 Version 12.8 Nonlinear Compression Springs	660,-
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FED9 Version 6.0 Spiral Spring	394,-
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FED13 Version 3.9 Wave Spring Washers	185,-
FED14 Version 1.4 Helical Wave Spring	395,-
FED15 Version 1.3 Leaf Spring (simple)	180,-
FED16 Version 1.0 Constant Force Spring	225,-
GEO1+ V6.1 Cross Section Calculation incl. profile database	294.-
GEO2 V2.6 Rotation Bodies	194,-
GEO3 V3.3 Hertzian Pressure	205,-
GEO4 V4.1 Cam Software	265,-
GR1 V1.0 Gear construction kit software	185,-
HPGL-Manager Version 9.0	383,-
LG1 V6.4 Roll-Contact Bearings	296,-
LG2 V2.2 Hydrodynamic Plain Journal Bearings	460,-
SR1 V22.2 Bolted Joint Design	640,-
SR1+ V22.2 Bolted Joint Design incl. Flange calculation	750,-
TOL1 V11.8 Tolerance Analysis	506,-
TOL1CON V1.5 Conversion Program for TOL1	281,-
TOL2 Version 3.3 Tolerance Analysis	495,-
TOLPASS V4.1 Library for ISO tolerances	107,-
TR1 V4.0 Girder Calculation	757,-
WL1+ V19.8 Shaft Calculation incl. Roll-contact Bearings	945,-
WN1 Version 11.6 Cylindrical and Conical Press Fits	485,-
WN2 V 9.6 Involute Splines to DIN 5480	250,-
WN2+ V 9.6 Involute Splines to DIN 5480 and non-standard involute splines	380,-
WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892	245,-
WN4 V 4.5 Involute Splines to ANSI B 92.1	276,-
WN5 V 4.5 Involute Splines to ISO 4156 and ANSI B 92.2 M	255,-
WN6 V 3.0 Polygon Profiles P3G to DIN 32711	180,-
WN7 V 3.0 Polygon Profiles P4C to DIN 32712	175,-
WN8 V 2.2 Serration to DIN 5481	195,-
WN9 V 2.2 Spline Shafts to DIN ISO 14	170,-
WN10 V 4.0 Involute Splines to DIN 5482	260,-
WN11 V 1.3 Woodruff Key Joints	240,-
WNXE V 2.0 Involute Splines - dimensions, graphic, measure	375,-
WNXK V 2.0 Serration Splines - dimensions, graphic, measure	230,-
WST1 V 10.0 Material Database	235,-
ZAR1+ V 25.4 Spur and Helical Gears	1115,-
ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg	792,-
ZAR3 V8.9 Worm Gears	404,-
ZAR4 V5.1 Non-circular Spur Gears	1610,-
ZAR5 V11.1 Planetary Gearings	1355,-
ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears	585,-
ZAR7 V1.0 Plus Planetary Gears	1380,-
ZAR8 V1.0 Ravigneaux Planetary Gears	1950,-
ZARXP V2.1 Involute Profiles - dimensions, graphic, measure	275,-

ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure	450,-
ZM1.V2.4 Chain Gear Design	326,-

PACKAGES	EUR
HEXAGON Mechanical Engineering Package (TOL1, ZAR1+, ZAR2, ZAR3+, ZAR5, ZAR6, WL1+, WN1, WN2+, WN3, WST1, SR1+, FED1+, FED2+, FED3+, FED4, ZARXP, TOLPASS, LG1, DXFPLOT, GEO1+, TOL2, GEO2, GEO3, ZM1, WN6, WN7, LG2, FED12, FED13, WN8, WN9, WN11, DI1, FED15, WNXE, GR1)	8,500.-
HEXAGON Mechanical Engineering Base Package (ZAR1+, ZAR3+, ZAR5, ZAR6, WL1+, WN1, WST1, SR1+, FED1,+, FED2+, FED3+)	4.900,-
HEXAGON Spur Gear Package (ZAR1+ and ZAR5)	1,585.-
HEXAGON Planetary Gear Package (ZAR1+, ZAR5, ZAR7, ZAR8, GR1)	3,600.-
HEXAGON Involute Spline Package (WN2+, WN4, WN5, WN10, WNXE)	1,200.-
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HEXAGON Complete Package (All Programs of Engineering Package, Graphics Package, Tolerance Package, Helical Spring Package, Planetary Gear Package, TR1, FED8, FED9, FED10, ZAR4, GEO4, WN4, WN5, FED11,WN10, ZAR1W, FED14, WNXK, FED16)	12,900.-

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- **Italiano**: FED1+, FED2+, FED3+, FED4, FED5, FED6, FED7, FED9, FED14.
- **Swedish**: FED1+, FED2+, FED3+, FED5, FED6, FED7.
- **Portugues**: FED1+
- **Spanish**: FED1+, FED2+, FED3+

Updates:

Update prices	EUR
Software Update (software + pdf manual)	40,-
Software Update (software 64-bit Win + pdf manual)	50,-

Update Mechanical Engineering Package: 800 EUR, Update Complete Package: 1000 EUR
Maintenance contract for free updates: annual fee: 150 EUR + 40 EUR per program

Upgrades
For upgrades to network licenses or plus versions or software bundles, upgraded licenses are credited 75%.

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General packaging and postage costs are EUR 60, (EUR 25 inside Europe)
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Conditions of payment: bank transfer in advance with 2% discount, or by credit card (Master, Visa) net.

Key Code
After installation, software has to be released by key code. Key codes will be sent after receipt of payment.

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