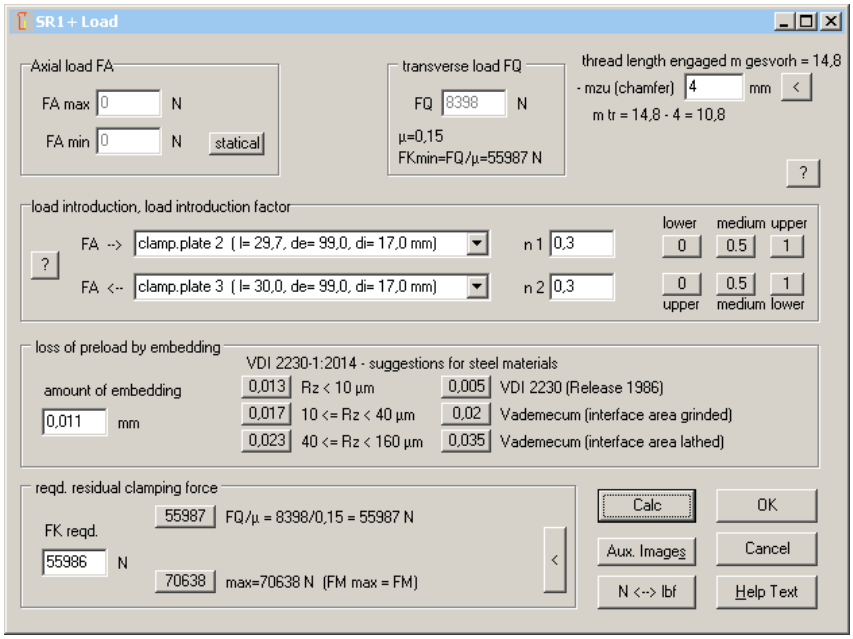
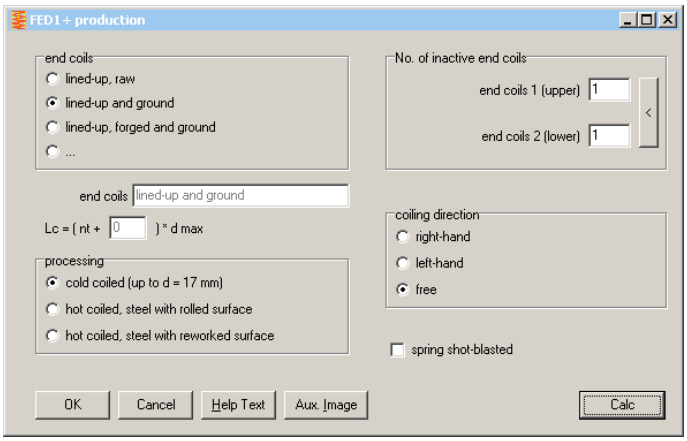
by Fritz Ruoss

SR1 – "Calc" Buttons



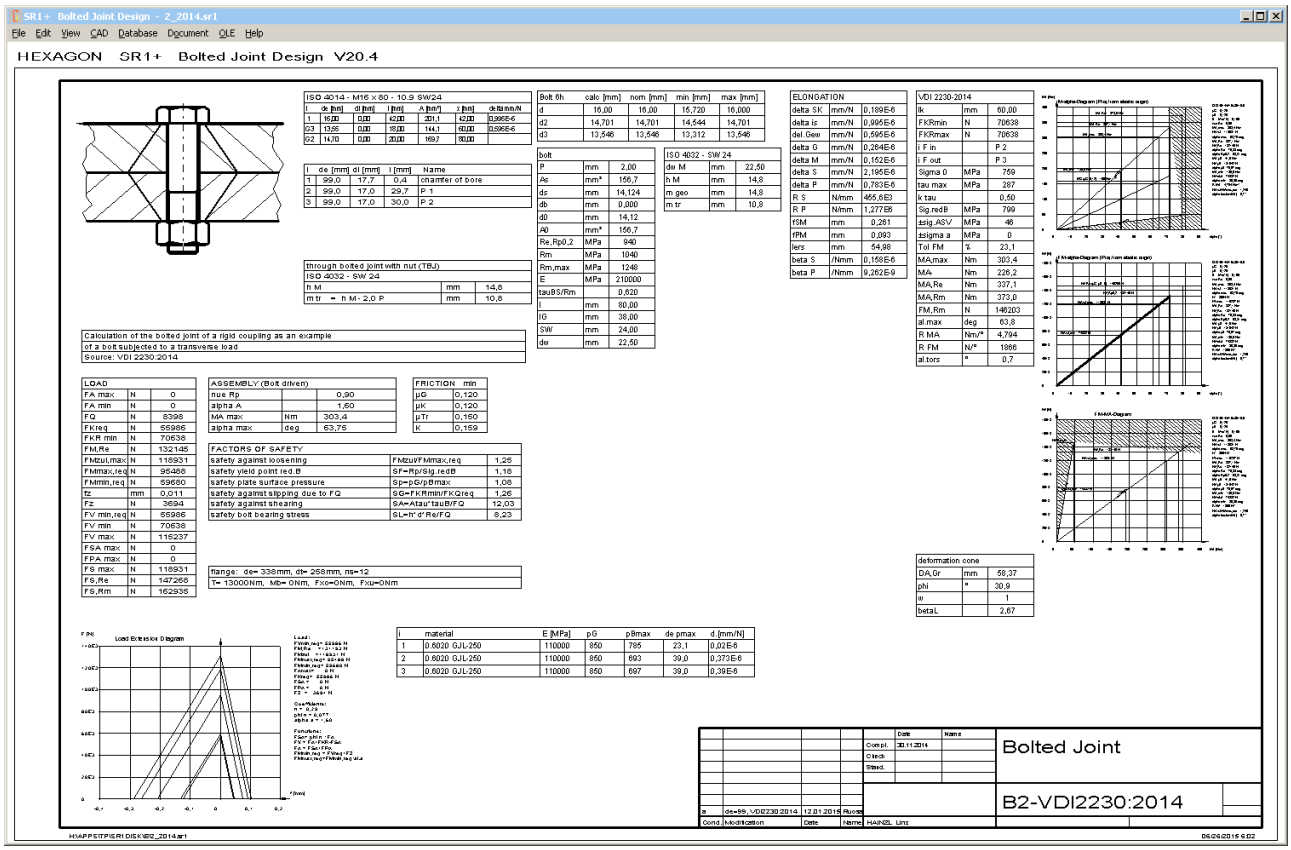
A new "Calc" button has been added into the input windows for friction, load, tightening, eccentric, flange and calculation method. Click "Calc" button to calculate the bolted joint and display results in the background graphic. "Calc" buttons help to get a desired value iterative, or to check the effect of variable input values.

DI1, FED1+, 2+, 3+, 4, 5, 8, 9, 11, 12, 13, 14,15, GEO3, LG1, LG2, SR1, WN1, 2, 3, 4, 5, 6, 7, 8, WN9, 10, 11, WST1, ZAR1+, 2, 3+, 4, 5, 6, ZARXP, ZAR1W, ZM1: Calc Buttons



Almost all of our programs got new "Calc" buttons in the input windows. "Calc" button causes recalculation of the machine element and shows results in the background window. "Calc" button is useful if you want to see the effect of a varied input value on the result. On earlier versions, you had to close and re-open the input window for these calculations.

SR1 – Quick4 View



New Quick4 View includes all the data known from Quick3 view, and additionally load-extension diagram, M-alpha diagram, FM-alpha diagram, FM-MA diagram, and radial distribution of pressure if eccentric load. All together on one screen in an A3 drawing frame. Without zoom, text on the computer screen is readable in highest resolution only.

SR1 – Material database for clamping plates and nuts

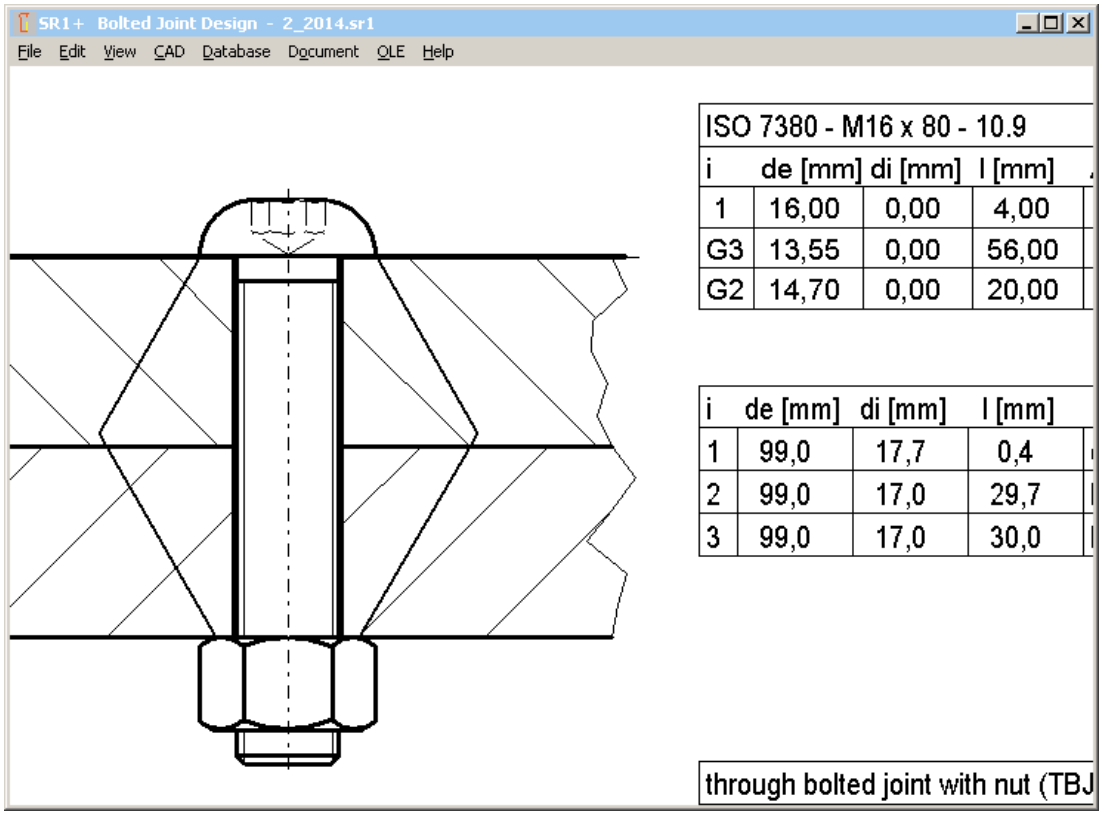
Selected material is identified by record number. Therefore, record number must not change. If you want to delete materials, just use "-" button to mark as deleted. Marked records are no longer listed as material to be selected. Do not use "Pack" function for physical erase of the records.

If you extend databases with self-defined materials, you have the problem to synchronize databases if you later want to integrate updated databases from HEXAGON. Another difficulty may be, that sr1 files are no longer exchangeable with other SR1 users who work with the original dbf files. I suggest that you send us your desire for database extensions, and we extend the databases with your data.

For material of clamping plates and nut, you meanwhile can choose between 3 databases: pressung.dbf with all data, mat_p_1.dbf with material data to VDI 2230:2003, and mat_p_2.dbf with materials according to VDI2230:2014. The "mat_p_1.dbf" is out of date and will no longer be updated, so this one can be used to be extended with your own internal materials.

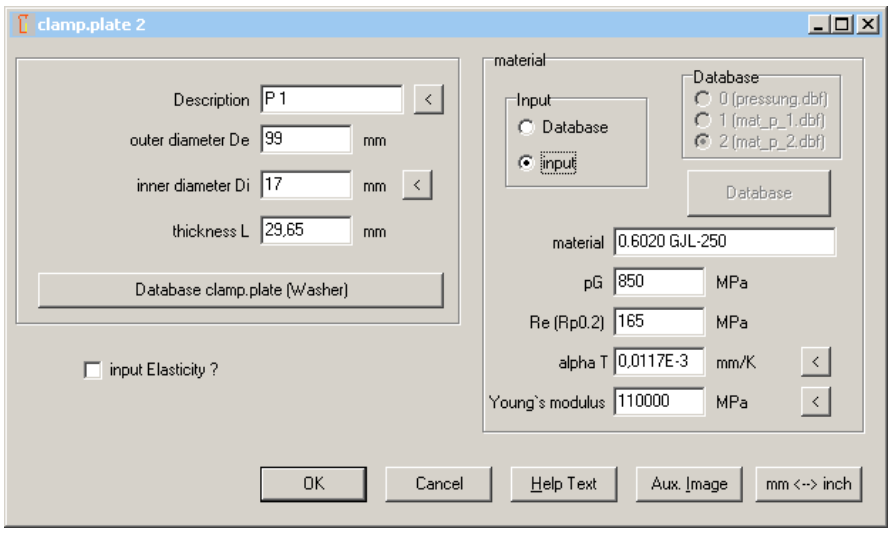
Since Version 20.2, clamping plate material data of the database are compared with data from sr1 file and you get a message if data are not equal. This means that database had been changed. If only material name has been changed, or modified data are ok, just re-save sr1 file and the message disappears. If the messages are tiresome, as at "File->Open (Table)", you can configure help level 0 to suppress the messages.

SR1 – Flat-headed screw according to ISO 7380



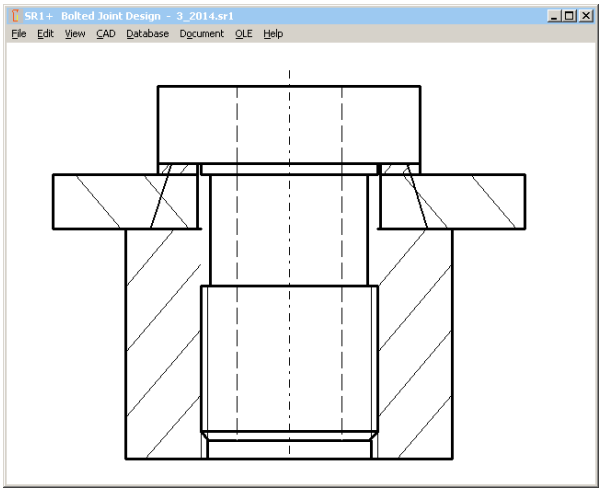
Flat-headed screws according to DIN EN ISO 7380 have been added to hexagon socket head bolt database. Bolt head radius is equal than head height for this bolt type.

SR1 – Input clamping plate material

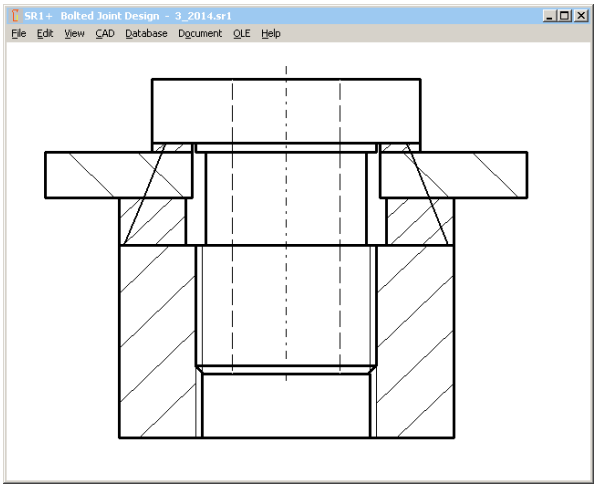


Since release 17.3 you have the option to input material data directly instead of selecting material from databases. Unfortunately, the entered data had been overwritten if in the material database was found a material with equal name. This has been corrected now, so that the self-defined data of pressure limit, modulus of elasticity, yield point and thermal expansion coefficient always are loaded correctly.

SR1 – nut thread with counterbore or necked-down bolt with incomplete thread engagement
A new error message "lG3 bolt < 0" indicates that non-bearing part of bolt thread was calculated smaller than 0, because either a necked-down bolt is incompletely engaged in the nut thread, or a part of the nut thread is countersunk. In this case, the clamped part of the nut has to be defined as clamping plate, and nut height reduced by the countersunk height. Application example 3 of VDI 2230 shows such case: elastic resilience is increased by necked-down bolt and countersunk of the nut thread in the crank shaft. The clamped part of the nut thread (crank shaft) must be defined as additional clamping plate.

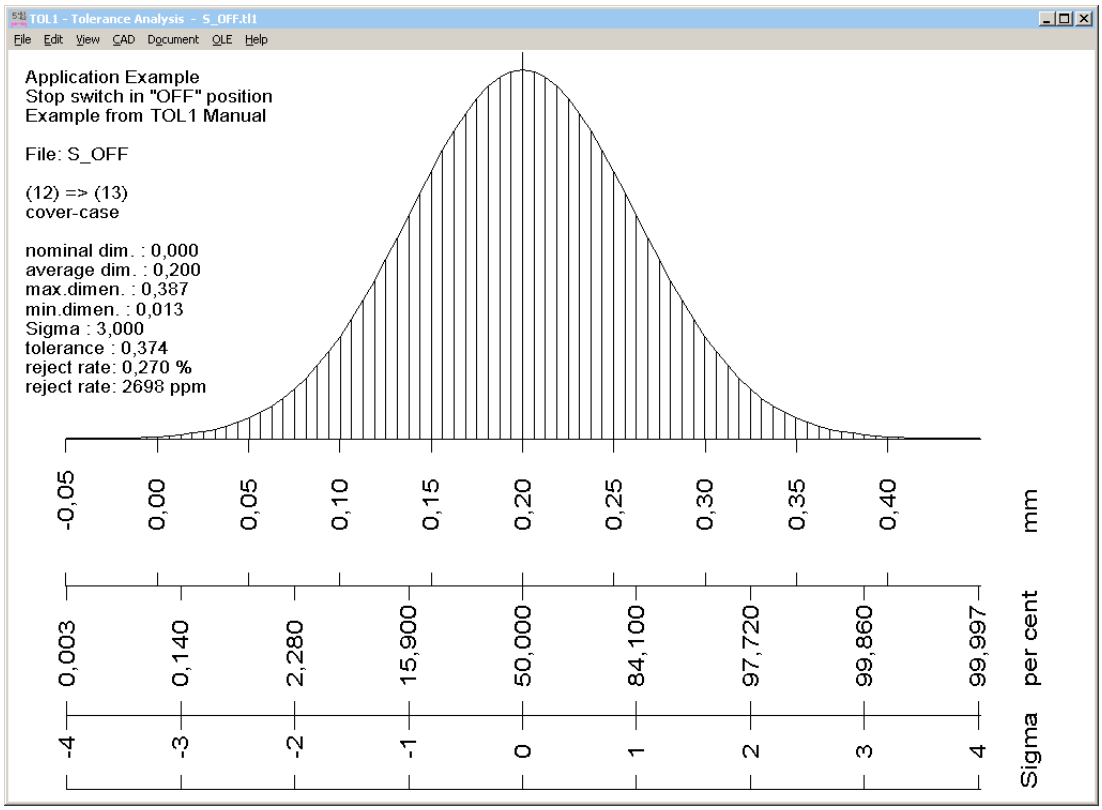


Application example A3 of VDI 2230-1



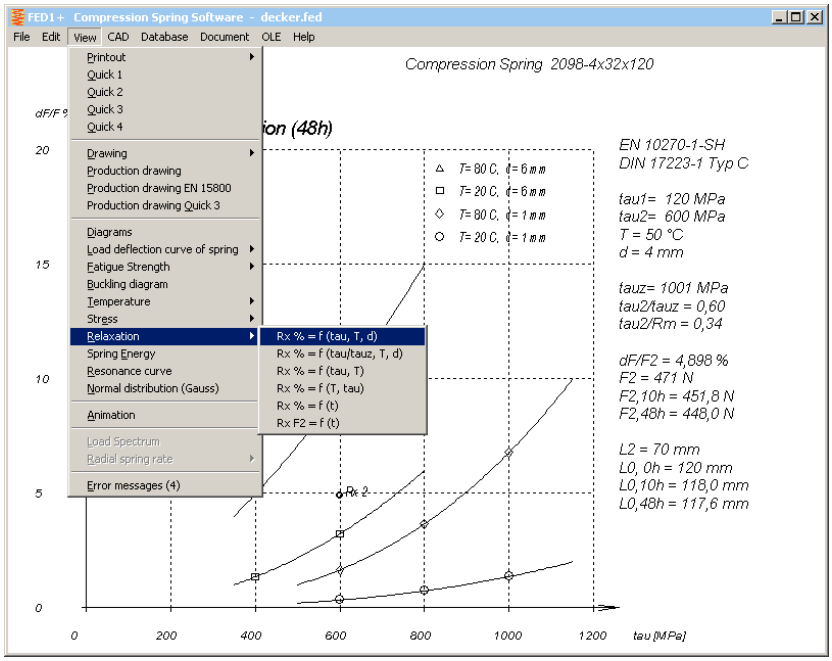
sunk part of the net defined as clamping plate

TOL1, TOL2: Reject Rate added in Gaussian Graphic
Input of sigma coefficient defines reject rate of tolerances. Reject rate in % (per cent) and ppm (parts per million) for the calculated closing dimension tolerance has been added in the Gaussian curve graphic.



FED1+ 2+ 3+ 5 6 7 – Additional Relaxation Diagrams

New relaxation diagrams are Rx = f (tau/tauz, T, d) t with the coefficient tau/tauz (shear stress divided by permissible shear stress), and f (tau,T) with wire diameter of the calculated spring and shear stress on the x-axis, and f (T,tau) with temperature on the x axis.

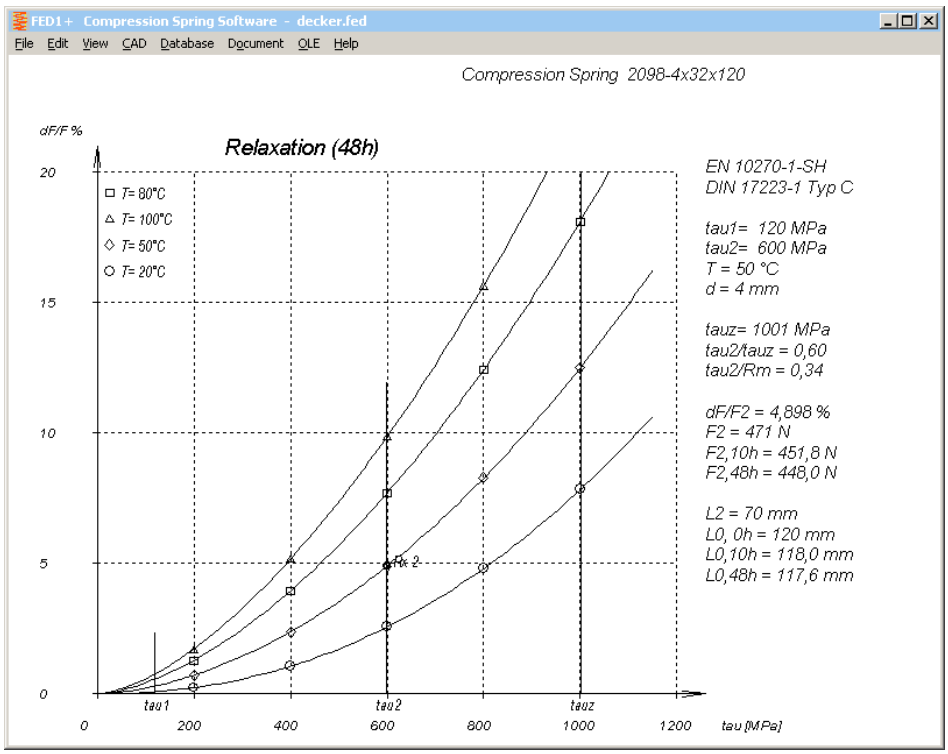


FED1+ 2+ 3+ 5 6 7 – Relaxation curves for various temperatures

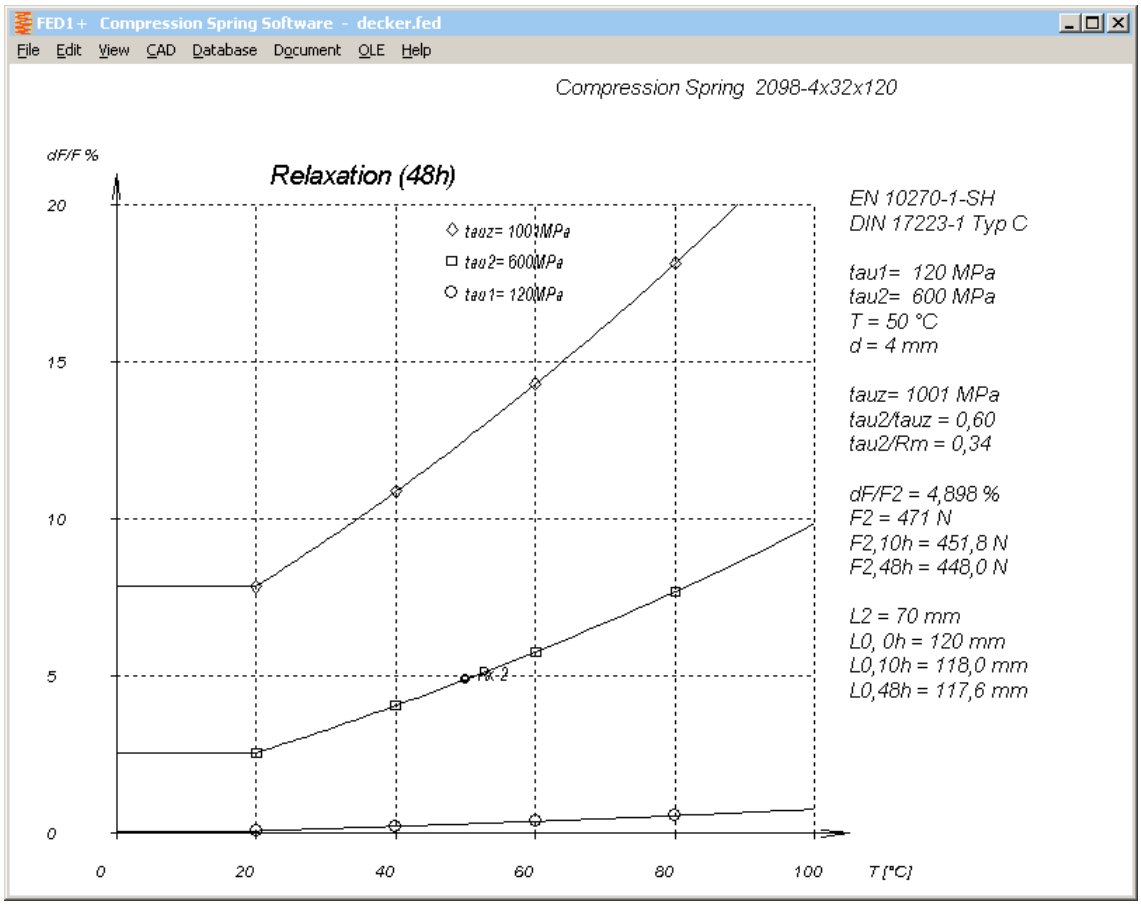
New relaxation curves with wire diameter of the calculated spring and shear stress on the x axis are drawn for this temperatures:

- temperature limit T1 (min) of database fedwstr.dbf
- temperature limit T2 (max) of database fedwstr.dbf
- operating temperature from "Edit->Application"
- max. range of working temperature from Edit->Production Drawing

If operating temperature or max working temperature is equal with T1 or T2, only one curve will be drawn.



FED1+ 2+ 3+ 5 6 7 – Relaxation curves as function of temperature
Another new diagram indicates relaxation with temperature on the x axis and curves for shear stress tau1, tau2 and tauz (permissible) of the calculated spring.



FED1+ 2+ 3+ 5 6 7 – Relaxation for small wire diameter and low temperature
Relaxation is calculated from the parameters in fedwstr.dbf database: wire diameter D1 (min) and D2 (max), temperature limits T1 (min) and T2 (max). Relaxation for other values is calculated by interpolation. If temperature is below T1, relaxation is calculated with T1.
If wire diameter is smaller than D1, relaxation will be calculated with D1. In earlier versions, relaxation of a smaller wire diameter was logarithmic interpolated. But the calculated relaxation was too low in this case (even smaller than 0 for a wire diameter smaller than 0.5 mm).

FED1+ 2+ 3+ 5 6 7 – New records added in relaxation database
Relaxation data of EN13906 are used now following materials, too:
18: 1.4310: -> 26 (11R51), 27 (12R10), 42 (302/304), 59 (Loniflex)
19: 1.4568: -> 28 (9R10), 43 (17-7PH), 86 (GARBA177Supreme), 87 (GARBA177PH)
56: 1.4462 Springflex: -> 78 (1-4462-NS)
57: 1.4462 Springflex-SH: -> 79 (1-4462-HS)
8: -> 41 (CrSi)
10: VD-SiCr : modified acc.to Bosch (lower relaxation for higher stress and temperature)
10: VD-SiCr: -> 49 (Oteva70SC shaved.), 50 (Oteva70 not shaved)
FD CrV: 40 (CrV)

FED1+ 2+ 3+ 5 6 7 – Relaxation data

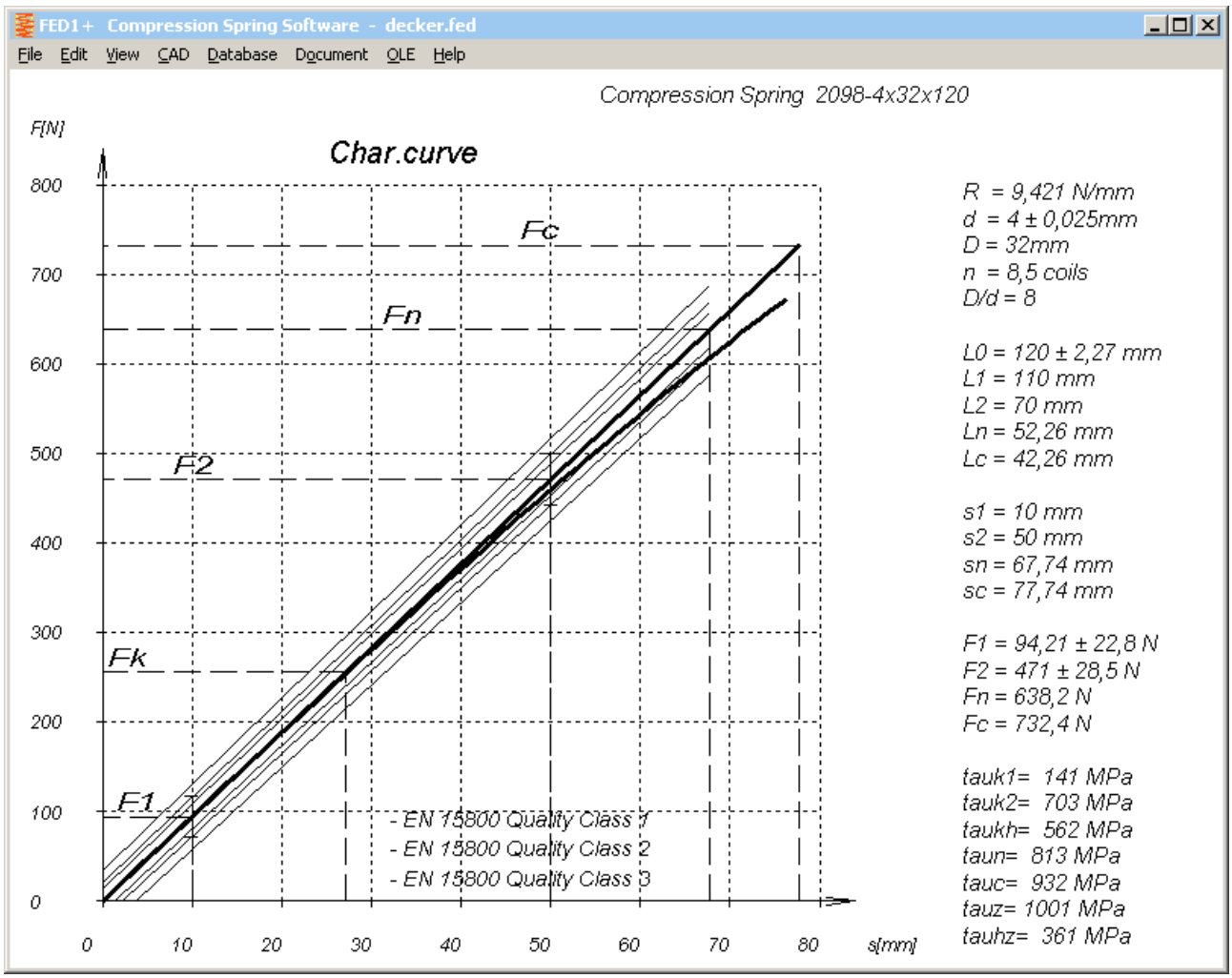
Relaxation database fedwstr.dbf was extended by info columns „SOURCE“ and „PRE_SET“. „Source“ is the source of the relaxation data (EN 13906). „Pre_set“ informs about presetting of the spring. Theoretically, relaxation diagrams should be based on non-preset springs. But practically, provided relaxation diagrams stand for springs „preset at room temperature“ (EN 13906), or „cold preset", “optimum preset“ (Bosch) or „hot preset“ (Oteva).

If the spring will be cold preset for 10 hours, relaxation is 75% according to the Rx=f(t) diagram, thus the remaining relaxation is 25%. This means that the relaxation curves of a preset (10 hours) spring should be 4 times lower compared with an untreated spring.

FED1+ Dimensioning Material -> Relaxation

This new function is useful if you want to compare relaxation of different materials. Select material in the input window, and check relaxation diagram in the background graphic.

FED1+ Load-deflection curve with tolerance zone: relaxation curve added



Relaxation curve has been added in the load-extension diagram with tolerance zones. This is the spring load less relaxation after 48 hours.

FED3+ Radial load warnings
If legs are held over lever arm R, FED3+ calculates forces F1=T1/R and F2=T2/R. These loads induce the torque T=F*R, but also a radial load on the spring body. If spring is used against coiling direction, coils may lift off from the spring body and thus reduce spring torque. FED3+ now calculates radial deflection sQ2 at spring position 2 from spring load F2=FQ. FED3+ generates a warning "FQ! sQ=..." if sQ is higher than the gap between inner coil diameter and mandrel diameter. And a further warning "FQ! MQ=..." if friction torque between spring body and mandrel is more than 5% of spring torque T2. With MQ=F2 * µr * Di/2, assumed friction coefficient µr=0.1.

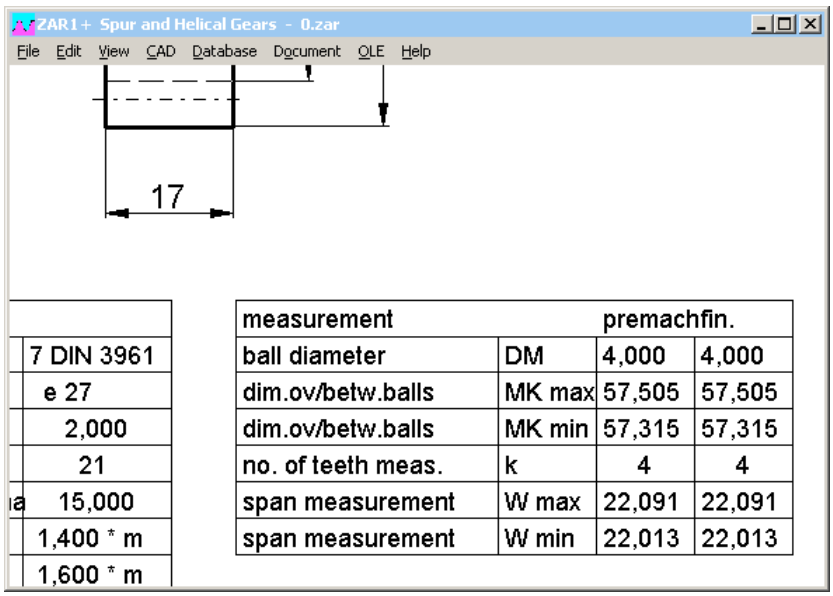
FED5 with EDI Export/Import
FED5 got EDI interface for data import/export from/to other programs (as in FED1+ and ZAR1+). Application example: FESTO uses the EDI interface for transfer of dimensions and technology data into the CAD system.

FED9 – Pre-dimension improved
In some cases the calculation was interrupted due to an error „al.c<0“ (negative block angle). Now, calculation continues until a suitable spiral spring was found.

FED14 - French version
New Software FED14 for helical wave spring is also available in a French version now.

FED4 - Italian version
Disk spring software FED4 is also available in an Italian version now.

ZAR1+ Production drawing without nominal dimensions
To avoid confusion at production, nominal values of dimensions over pins/balls and span width were removed at production drawing, listed only in Quick3 and Quick4 View. The dimensions „nom“ or "theor" are normally even larger than the "max" values, because upper and lower tolerances Asne and Asni are both negative.

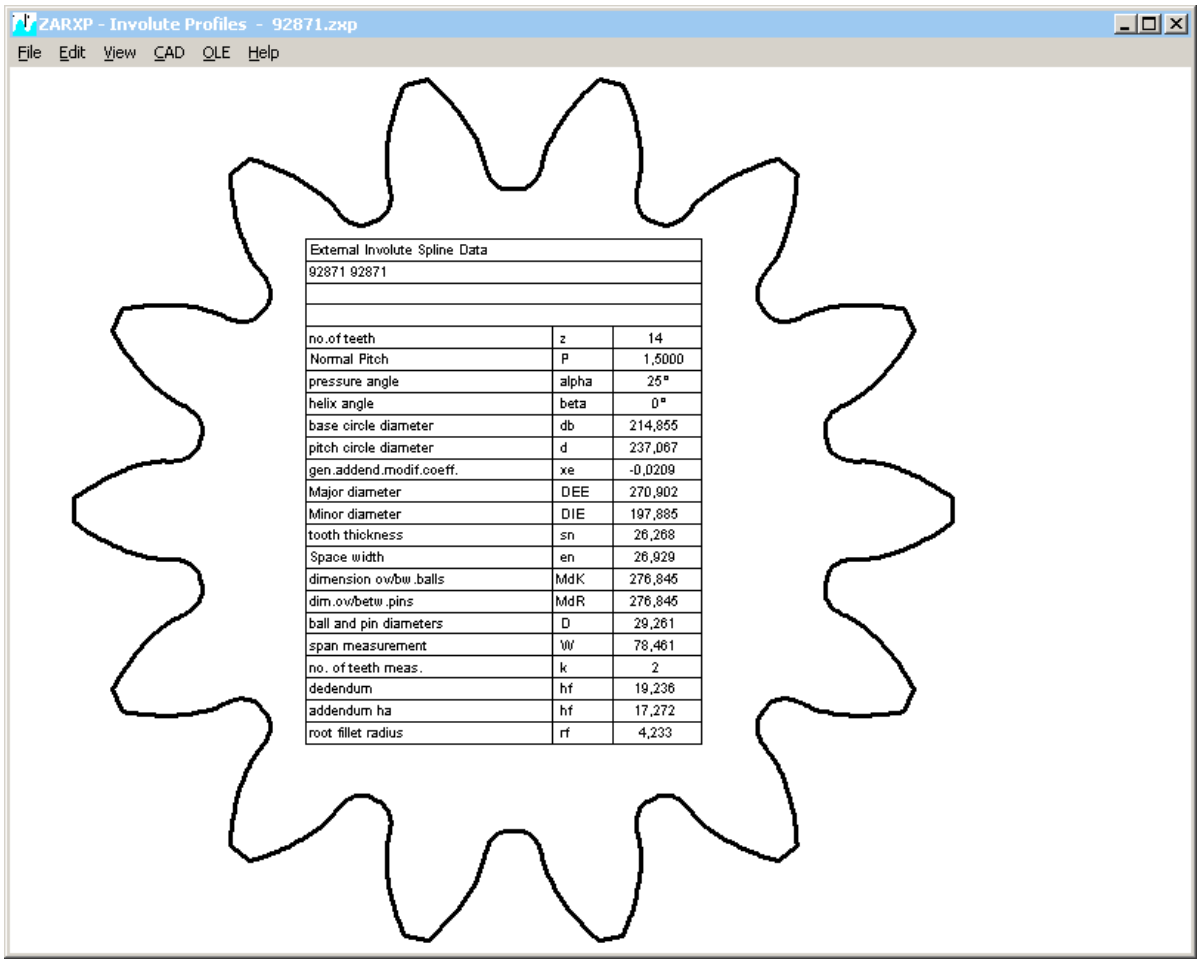


	7 DIN 3961
	e 27
	2,000
	21
a	15,000
	1,400 * m
	1,600 * m

measurement		premachfin.	
ball diameter	DM	4,000	4,000
dim.ov/betw.balls	MK max	57,505	57,505
dim.ov/betw.balls	MK min	57,315	57,315
no. of teeth meas.	k	4	4
span measurement	W max	22,091	22,091
span measurement	W min	22,013	22,013

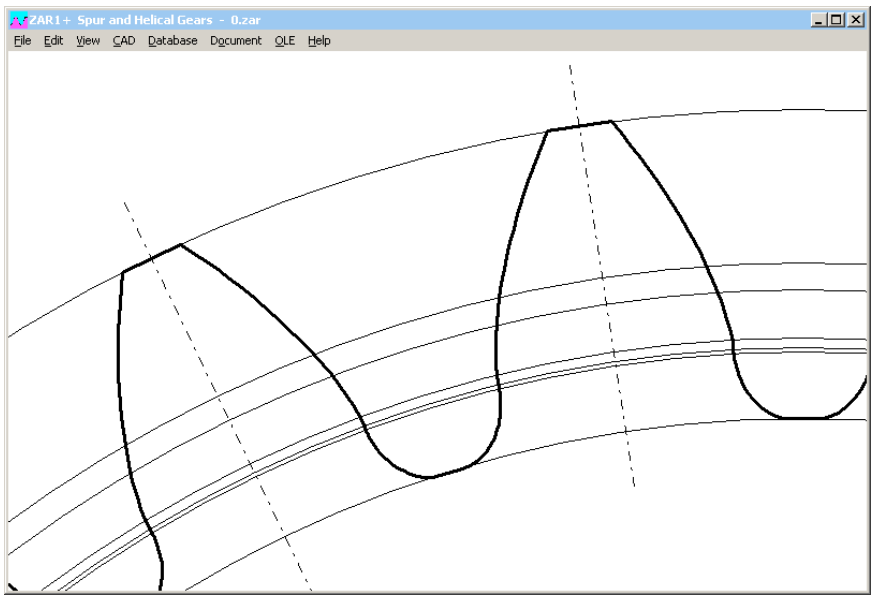
ZARXP – Quick View

A new Quick View with tooth profile and table with dimensions on one screen has been added in ZARXP involute profile software.

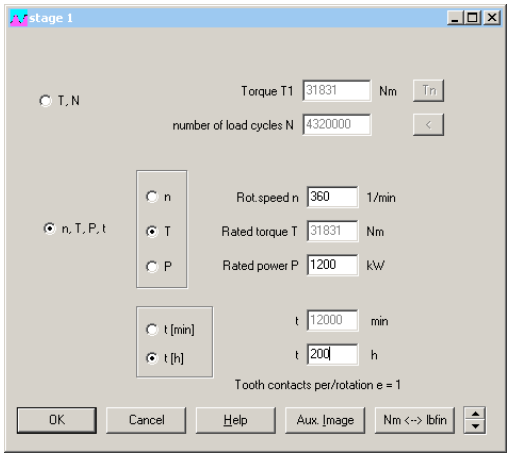


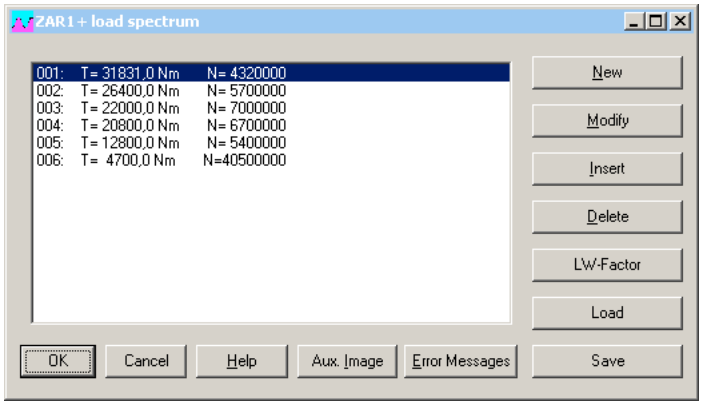
ZAR1+ Tooth profile drawing without gap

Because of different curves for involute and tooth fillet trochoide remained a small gap in the transition of the fillet into involute. Now both curves are connected to avoid the gap.



ZAR1+, ZAR2, ZAR5, ZAR6: Input power, speed and interval time of load spectrum

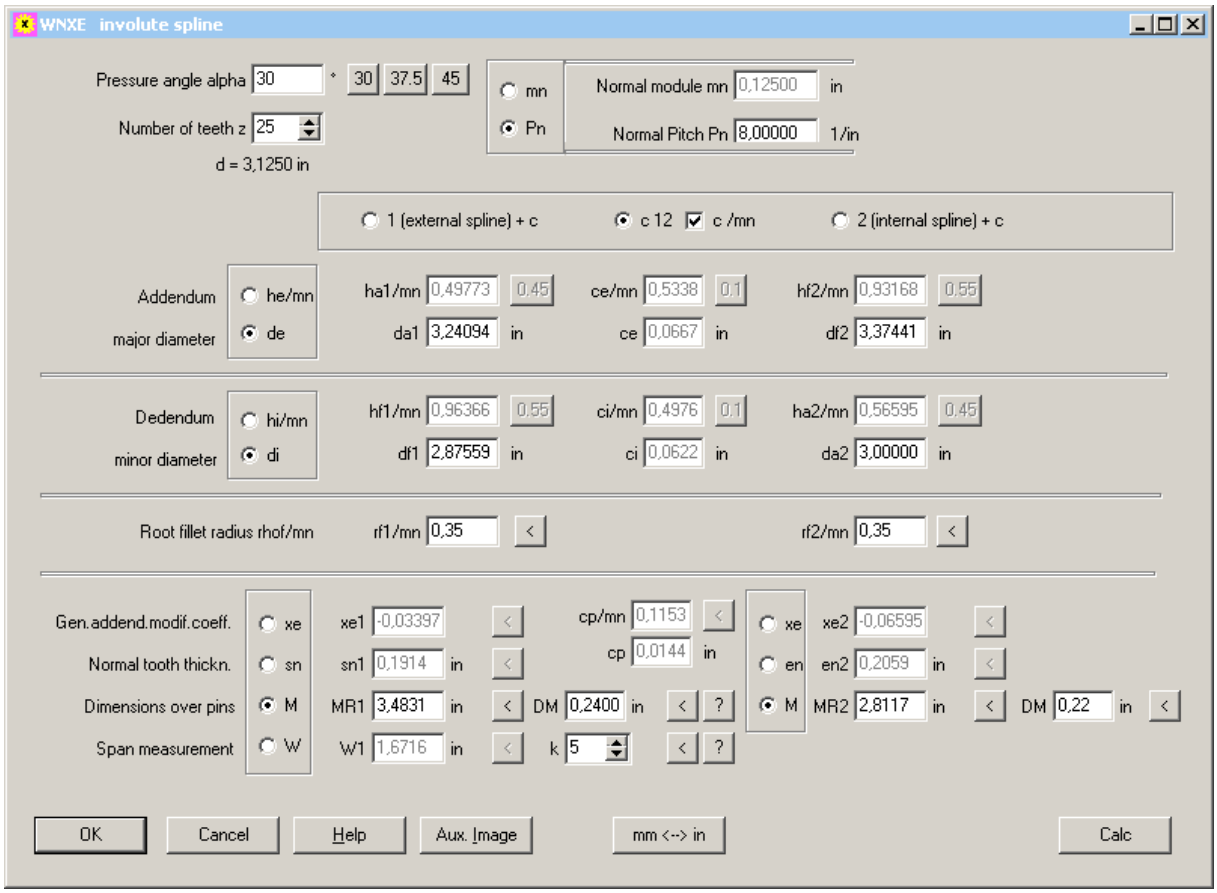




Instead input of torque and number of load cycles, you now have the option to enter speed, torque, power, and time interval for each load step as well.

WNXE – New software for involute splines

With WN2, WN4, WN5 and WN10 we already provide software for involute splines according to DIN 5480, ANSI B92.1, ISO 4156, and DIN 5482. Our new software WNXE enables you to calculate dimensions of any involute spline very quickly. WNXE is the ZARXP for involute splines. You can measure over pin dimension, calculate given splined shaft or splined hub, design counterpart, and create true-scale profile as drawing.

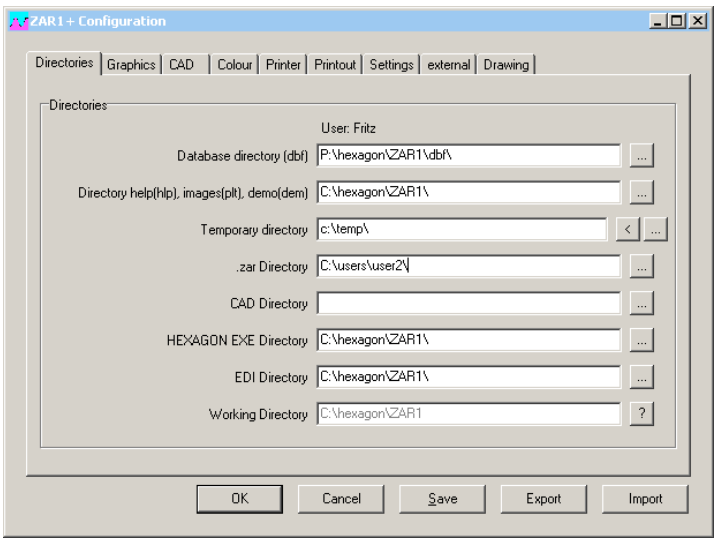


You can input dimensions of internal and external spline and calculate clearance and backlash, or input external spline and clearance and calculate internal spline, or input internal spline and clearance and calculate external spline. Even dimensions of exotic designs (i.e. JIS splines with 20° pressure angle and large profile shift) can be calculated easy and quickly.
In WNXE, you enter dimensions directly, same as in ZARXP. No nominal dimensions, no tolerances. If tolerances should be considered, you have to do two calculations: one with min tolerances for minimum clearance, and one with maximum tolerances for maximum clearance. And maybe one for average tolerances to create the true-scale profile drawing. Profile drawing can be generated as DXF or IGES file to be used for CAD, gear cutting, wire eroding, 3D plotting..

Comparison of WNXE, WN2+ and ZARXP

	WNXE	WN2+	ZARXP
Calculate dimensions and draw profile	X	X	X
Calculate load bearing capacity (torque etc.)	-	X	-
Tolerances and tolerance zones	-	X	-
Calculate gear pair of internal spline and external spline	X	X	-
Design counterpart from clearance	X	-	-
Calculate profile shift from measured dimensions	X	(X)	X
Calculate tooth height factors from diameters	X	-	X

Configuration of temporary path with network versions



Temporary path is used to create and shift temporary files for database operations and for creating CAD files and screen graphic. Temporary directory should be individual, fast, and local.
- If several users use the same temporary directory, you may get data collisions and even program crashes.
- Low-speed access to the temporary directory decelerates screen graphic drawings as well as index and sort functions of databases.
- Configuring a network directory as temporary directory generates unnecessary network traffic.

Installation of HEXAGON Software on USB Disk
Individual license of HEXAGON Software can also be installed on USB disk. This enables you to have your software with you on your office computer, take with you on mobile notebook, and also use on your home computer. Key code are generated from hard disk data.

PRICELIST 2015-07-01

PRODUCT	EUR
DI1 Version 1.2 O-Ring Seal Software	190,-
DXF-Manager Version 8.6	383,-
DXFPLOT V 3.0	123,-
FED1 V26.9 Helical Compression Springs	491,-
FED1+ V26.9 Helical Compression Springs incl. spring database, animation, relax., 3D,..	695,-
FED2 V18.9 Helical Extension Springs	501,-
FED2+ V18.9 Helical Extension Springs incl. spring database, animation, relaxation, ...	675,-
FED3+ V17.4 Helical Torsion Springs incl. prod.drawing, animation, 3D, rectang.wire, ...	480,-
FED4 Version 6.5 Disk Springs	430,-
FED5 Version 13.8 Conical Compression Springs	741,-
FED6 Version 14.2 Nonlinear Cylindrical Compression Springs	634,-
FED7 Version 11.6 Nonlinear Compression Springs	660,-
FED8 Version 6.4 Torsion Bar	317,-
FED9 Version 5.6 Spiral Spring	394,-
FED10 Version 3.0 Leaf Spring (complex)	500,-
FED11 Version 3.0 Spring Lock and Bushing	210,-
FED12 Version 2.3 Elastomere Compression Spring	220,-
FED13 Version 3.7 Wave Spring Washers	185,-
FED14 Version 1.1 Helical Wave Spring	395,-
FED15 Version 1.1 Leaf Spring (simple)	180,-
GEO1+ V5.5 Cross Section Calculation incl. profile database	294.-
GEO2 V2.4 Moment of Inertia	194,-
GEO3 V3.2 Hertzian Pressure	205,-
GEO4 V3.8 Cam Software	265,-
HPGL-Manager Version 8.5	383,-
LG1 V6.3 Roll-Contact Bearings	296,-
LG2 V2.0 Hydrodynamic Plain Journal Bearings	460,-
SR1 V20.4 Bolted Joint Design	640,-
SR1+ V20.4 Bolted Joint Design incl. Flange calculation	750,-
TOL1 V11.7 Tolerance Analysis	506,-
TOL1CON V1.5 Conversion Program for TOL1	281,-
TOL2 Version 3.2 Tolerance Analysis	495,-
TOLPASS V4.1 Library for ISO tolerances	107,-
TR1 V3.6 Girder Calculation	757,-
WL1+ V19.5 Shaft Calculation incl. Roll-contact Bearings	945,-
WN1 Version 11.3 Cylindrical and Conical Press Fits	485,-
WN2 V 9.4 Involute Splines to DIN 5480	250,-
WN2+ V 9.4 Involute Splines to DIN 5480 and non-standard splines	380,-
WN3 V 5.3 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892	245,-
WN4 V 4.3 Involute Splines to ANSI B 92.1	276,-
WN5 V 4.3 Involute Splines to ISO 4156 and ANSI B 92.2 M	255,-
WN6 V 2.8 Polygon Profiles P3G to DIN 32711	180,-
WN7 V 2.1 Polygon Profiles P4C to DIN 32712	175,-
WN8 V 1.8 Serration to DIN 5481	195,-
WN9 V 1.9 Spline Shafts to DIN ISO 14	170,-
WN10 V 3.6 Involute Splines to DIN 5482	260,-
WN11 V 1.3 Woodruff Key Joints	240,-
WNXE V 1.0 Involute Splines - dimensions, graphic, measure	375,-
WST1 V 9.3 Material Database	235,-
ZAR1+ V 24.0 Spur and Helical Gears	1115,-
ZAR2 V7.4 Spiral Bevel Gears to Klingelnberg	792,-
ZAR3 V8.6 Worm Gears	404,-
ZAR3+ V8.6 Worm Gears incl. profile drawings, variable tooth height, OPD measure	620,-
ZAR4 V3.7 Non-circular Spur Gears	1610,-
ZAR5 V8.5 Planetary Gearings	1355,-
ZAR6 V3.4 Straight/Helical/Spiral Bevel Gears	585,-
ZARXP V2.0 Involute Profiles - dimensions, graphic, measure	275,-
ZAR1W V1.4 Gear Wheel Dimensions, tolerances, measure	450,-
ZM1.V2.2 Chain Gear Calculation	326,-

Packages

PACKAGES	EUR
HEXAGON Mechanical Engineering Package (TOL1, ZAR1+, ZAR2, ZAR3+, ZAR5, ZAR6, WL1+, WN1, WN2+, WN3, WST1, SR1+, FED1,+, FED2+, FED3+, FED4, ZARXP, HAERTE, TOLPASS, LG1, DXFPLOT, GEO1+, TOL2, TOL1CON, GEO2, GEO3, ZM1, WN6, WN7, LG2, FED12, FED13, WN8, WN9, WN11, DI1, FED15)	8,500.-
HEXAGON Mechanical Engineering Base Package (ZAR1+, ZAR3+, ZAR5, ZAR6, WL1+, WN1, WST1, SR1+, FED1,+, FED2+, FED3+)	4.900,-
HEXAGON Spur Gear Bundle (ZAR1+ and ZAR5)	1,585.-
HEXAGON Graphic Package (DXF-Manager, HPGL-Manager, DXFPLOT)	741.-
HEXAGON Helical Spring Package (FED1+, FED2+, FED3+, FED5, FED6, FED7)	2,550.-
HEXAGON Tolerance Package (TOL1, TOL1CON, TOL2, TOLPASS)	945.-
HEXAGON Complete Package (All Programs of Engineering Package, Graphics Package, Tolerance Package, Helical Spring Package, TR1, FED8, FED9, FED10, ZAR4, GEO4, WN4, WN5, FED11,WN10, ZAR1W, FED14)	11,500.-

Quantity Discount for Individual Licenses

Licenses	2	3	4	5	6	7	8	9	>9
Discount %	25%	27.5%	30%	32.5%	35%	37.5%	40%	42.5%	45%

Network Floating License

Licenses	1	2	3	4	5	6	7..8	9..11	>11
Discount/Add.cost	-50%	-20%	0%	10%	15%	20%	25%	30%	35%

(Negative Discount means additional cost)

Language Version:
- **German and English :** all Programs
- **French**: FED1, FED1+, FED2, FED2+, FED3, FED3+, FED5, FED6, FED7, FED9, WL1+.
- **Italiano**: FED1, FED1+, FED2, FED2+, FED3, FED3+, FED5, FED6, FED7, FED9, DXFPLOT.
- **Swedish**: FED1, FED1+, FED2, FED2+, FED3, FED3+, FED5, FED6, FED7, DXFPLOT.
- **Portugues**: FED1, FED1+
- **Spanish**: FED1, FED1+

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%.

Hexagon Software Network Licenses
Floating License in the time-sharing manner by integrated license manager
Individual licenses may not be installed in a network!

Conditions for delivery and payment
General packaging and postage costs are EUR 60, (EUR 25 inside Europe)
Delivery by Email (program packed, manual as pdf files): EUR 0.
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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