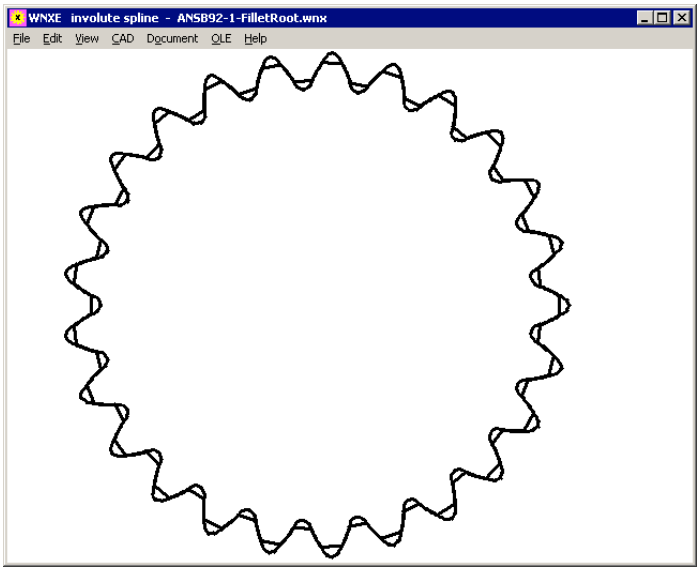
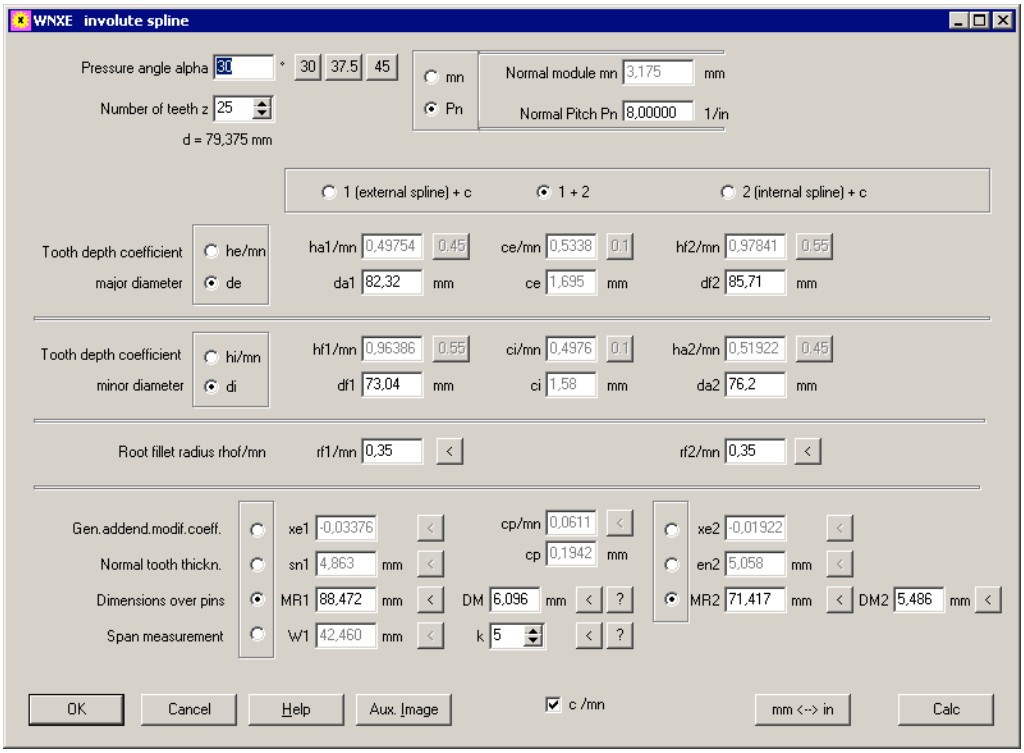
HEXAGON Info 152 **July / August 2015**

by Fritz Ruoss

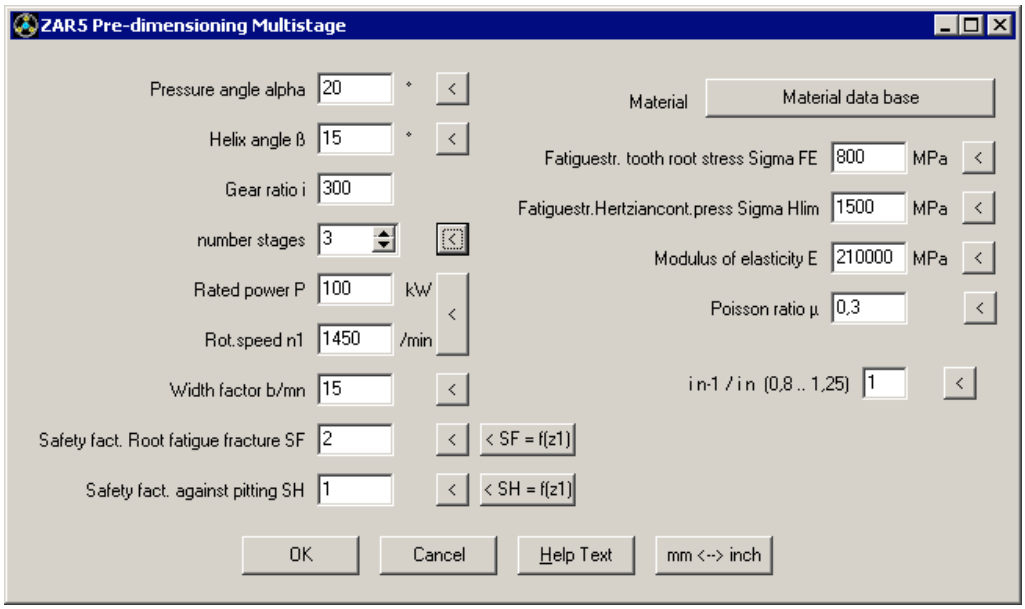
WNXE - New Software for Involute Splined Joints



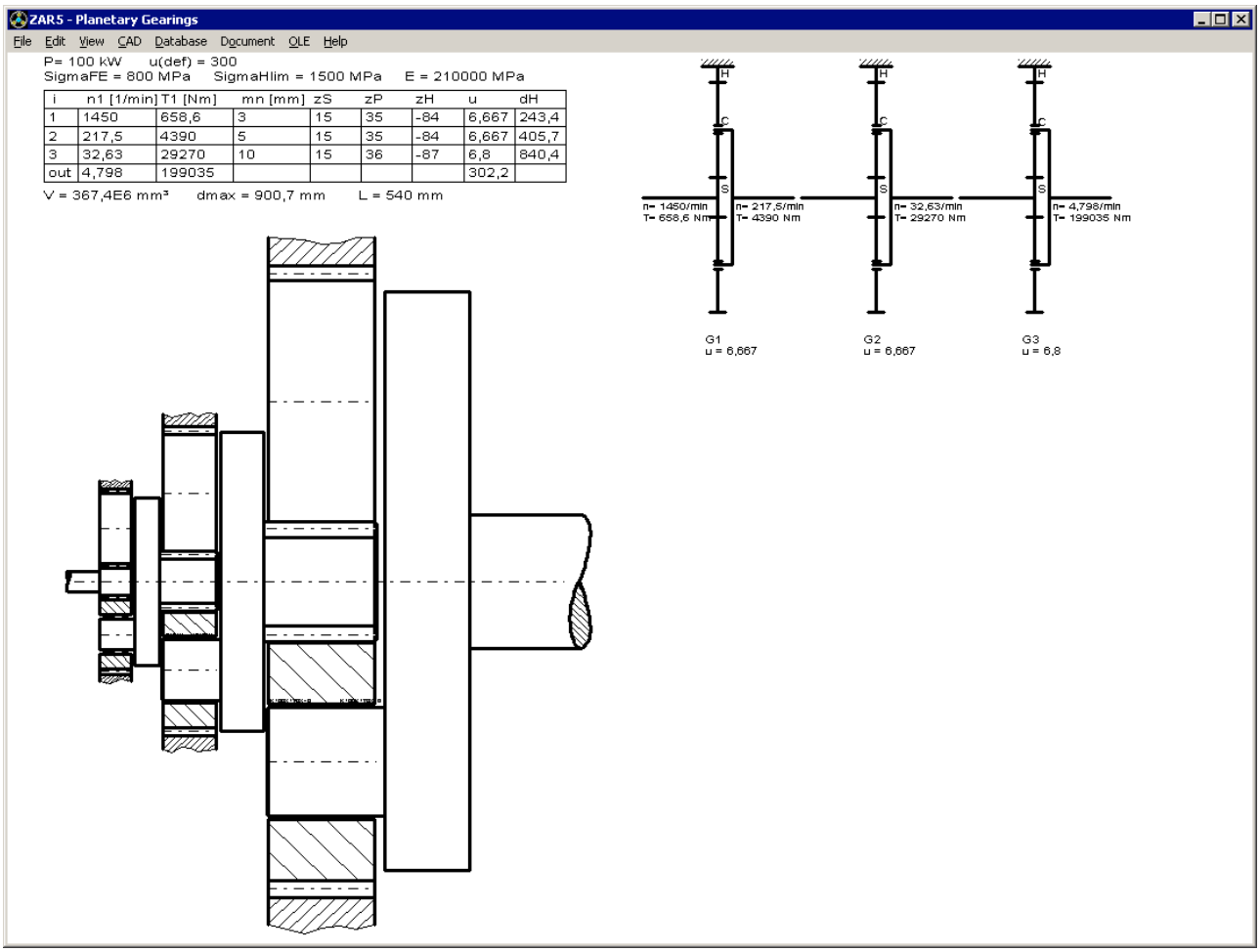
WNXE is a flexible tool for calculation of any involute spline. Internal and external involute splines can be designed in short time, with output of true-scale profile drawing, or designing the counterpart internal/external spline. Input options are various: module or pitch, tooth heights or tooth height coefficients or major and minor diameter, in millimeters or inches, profile shift coefficient, addendum modification or tooth thickness or gap width or dimensions over/between pins or span measurement. And the counterpart spline optionally can be calculated from flank clearance and backlash. WNXE is available now, price is 375 Euro for individual license.



ZAR5 – Pre-Dimension for Multistage Planet Gears

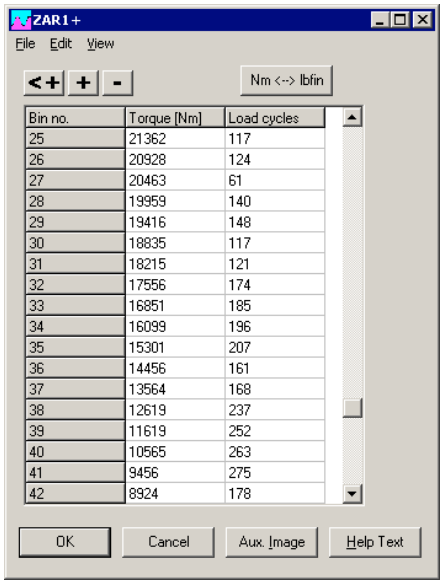


Pre-Dimension of multistage planet gears to achieve a large transmission ratio, is a new option in ZAR5. With only few input data you can estimate size of the sequential planet gear stages. Hence input of material data is equal for every gear and every stage. And every stage is a planetary gear with input sun, output carrier which drives next sun gear, and blocked ring gear. By means of a factor you can define dividing of transmission ratios: If „in-1/in“=1, equal transmission ratio for each stage. For „in-1/in“=1.25, transmission ratio of the next stage is 25% higher than former stage.

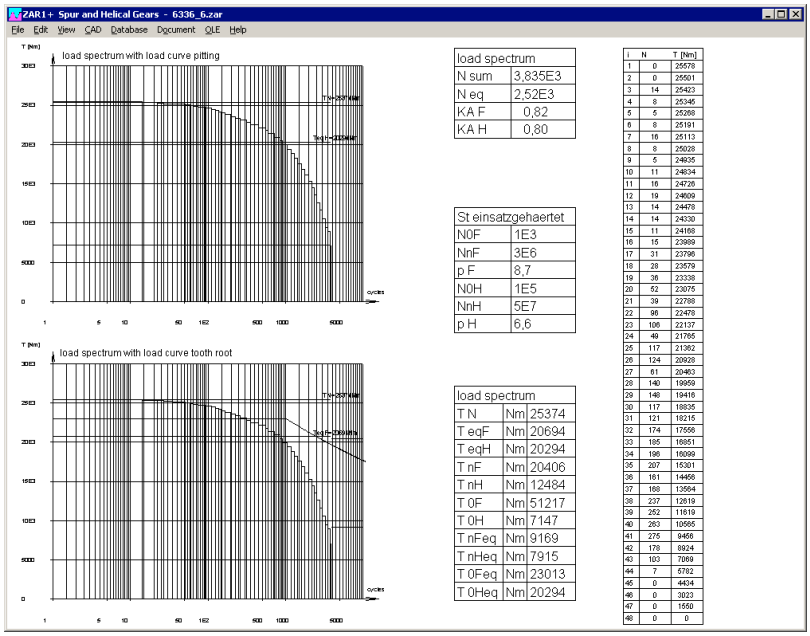


i	n1 [1/min]	T1 [Nm]	mn [mm]	zS	zP	zH	u	dH
1	1450	658,6	3	15	35	-84	6,667	243,4
2	217,5	4390	5	15	35	-84	6,667	405,7
3	32,63	29270	10	15	36	-87	6,8	840,4
out	4,798	199035					302,2	

ZAR1+, ZAR2, ZAR5, ZAR6: Load Spectrum: Input Table with copy and paste



Bin no.	Torque [Nm]	Load cycles
25	21362	117
26	20928	124
27	20463	61
28	19959	140
29	19416	148
30	18835	117
31	18215	121
32	17556	174
33	16851	185
34	16099	196
35	15301	207
36	14456	161
37	13564	168
38	12619	237
39	11619	252
40	10565	263
41	9456	275
42	8924	178



load spectrum	
N sum	3,835E3
N eq	2,52E3
KA F	0,82
KA H	0,80

St einsatzgehaertet	
N0F	1E3
NnF	3E6
p F	8,7
N0H	1E5
NnH	5E7
p H	6,6

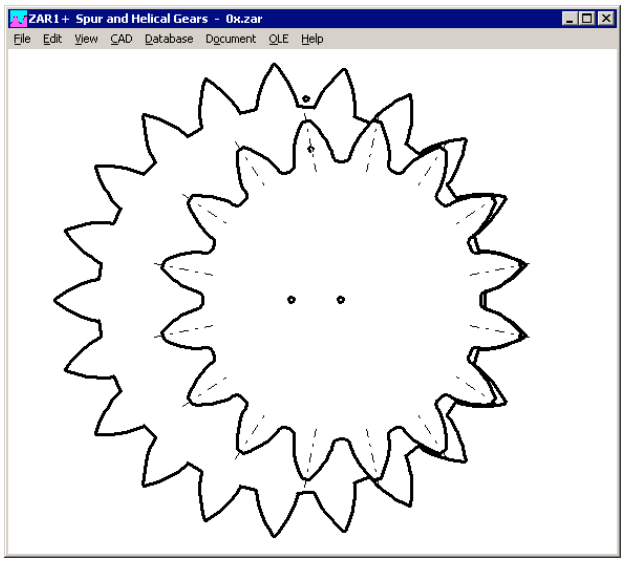
load spectrum		
T N	Nm	25374
T eqF	Nm	20694
T eqH	Nm	20294
T nF	Nm	20406
T nH	Nm	12484
T 0F	Nm	51217
T 0H	Nm	7147
T nFeq	Nm	9169
T nHeq	Nm	7915
T 0Feq	Nm	23013
T 0Heq	Nm	20294

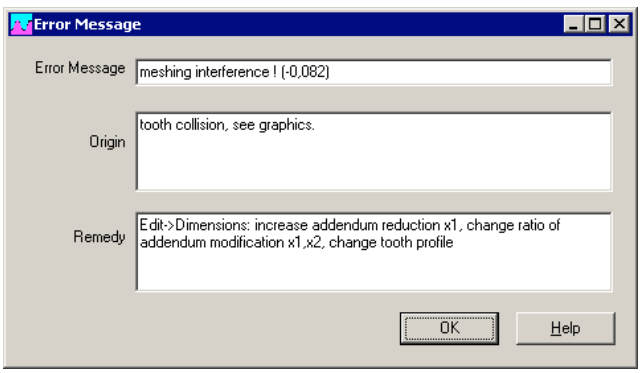
I	N	T [Nm]
1	0	25578
2	0	25501
3	14	25423
4	8	25345
5	5	25268
6	8	25191
7	16	25113
8	8	25028
9	5	24935
10	11	24834
11	16	24726
12	19	24609
13	14	24478
14	14	24330
15	11	24168
16	15	23989
17	31	23796
18	28	23579
19	36	23339
20	62	23075
21	39	22788
22	98	22478
23	106	22137
24	49	21765
25	117	21362
26	124	20928
27	61	20463
28	140	19959
29	148	19416
30	117	18835
31	121	18215
32	174	17556
33	185	16851
34	196	16099
35	207	15301
36	161	14456
37	168	13564
38	237	12619
39	252	11619
40	263	10565
41	275	9456
42	178	8924
43	103	7069
44	7	5782
45	0	4424
46	0	3023
47	0	1550
48	0	0

Load spectrum can be entered step by step, as used, or new as table with possibilty of copy and paste or import/export with other programs via Windows clipboard. In the table menu, you can configure if x coordinate in diagram (load cycles) should be linear or logarithmic scale. And at "View->Error" you can check load spectrum input for errors.

ZAR1+ Meshing Interference

If meshing interference in tooth contacts, you get an error message. This error message was enhanced by the overlap in mm as help parameter when optimizing the gear.





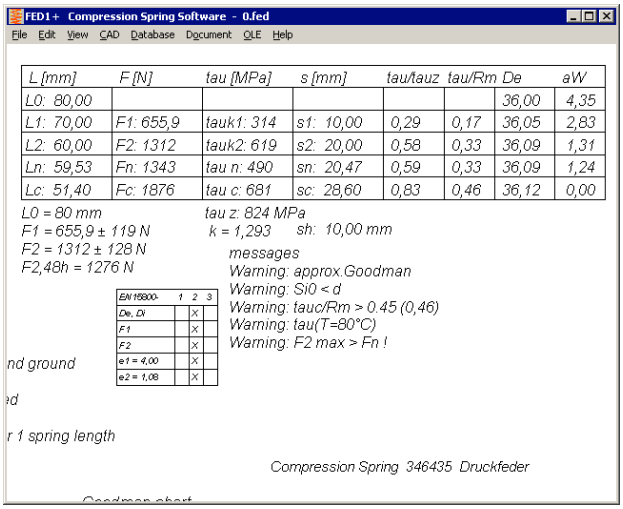
ZAR1+ Warning: z0 cutter !

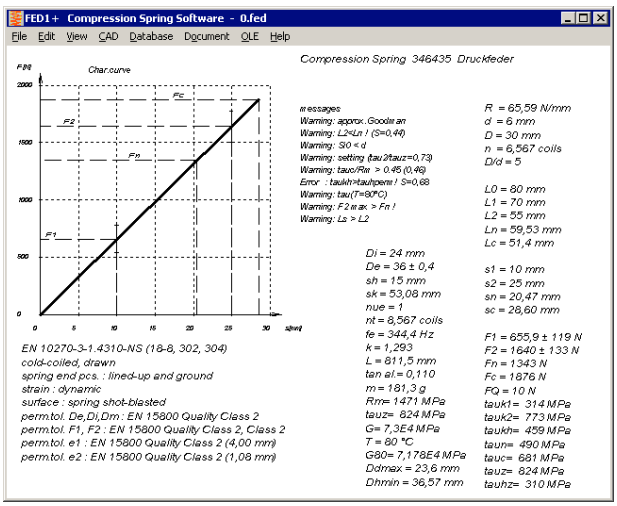
For calculation of ring gears, number of teeth z0 and profile shift x0 of the pinion cutter is needed for calculation of tooth form coefficients YF and YS according to ISO 6336. Because the input button "pinion cutter" at Edit -> Cutting Tool" can easily be lost of sight, you get now a warning „z0 cutter !“ if cutter pinion number of teeth is wrong or not defined.

FED1+ Coil distance aW and Tolerances e1,e2 in Quick1,3,4

Coil distance aW (0,1,2,n,c) has been added to the table with deflections, forces, and stresses in Quick3 and Quick4 View.

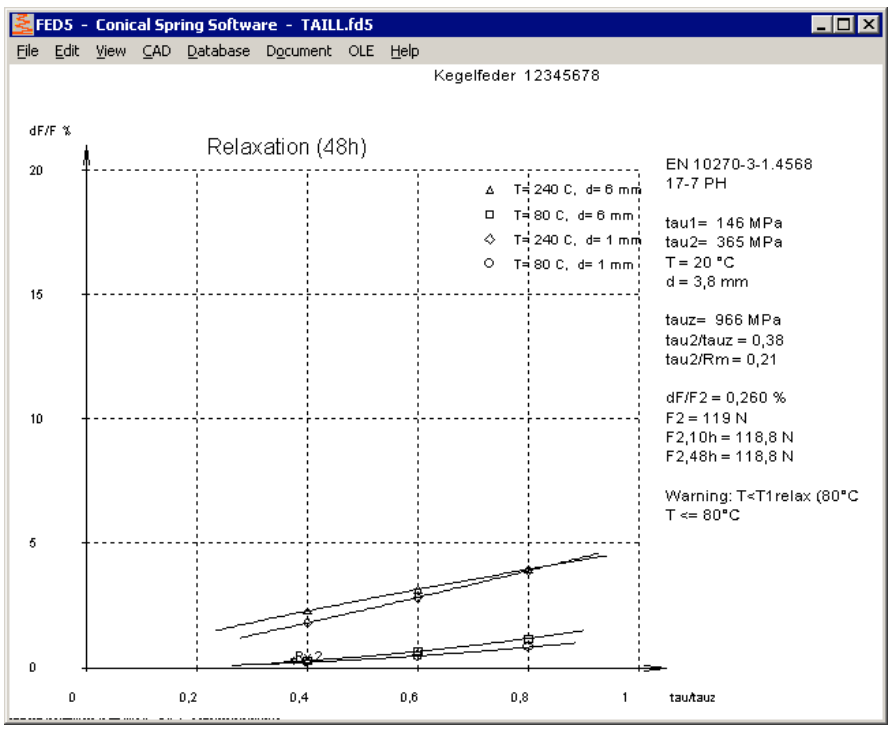
Tolerances for parallelism and angle e1 and e2 have been added in Quick1 View (in brackets). In tables with tolerance grades in Quick3 and Quick4, tolerances e1 and e2 are also printed now. However, tolerance grades and tolerances e1 and e2 are no longer displayed if end coils are lined-up, but not ground. And for hot-coiled springs and self-defined tolerances, a table with tolerances and tolerance grades is drawn now.



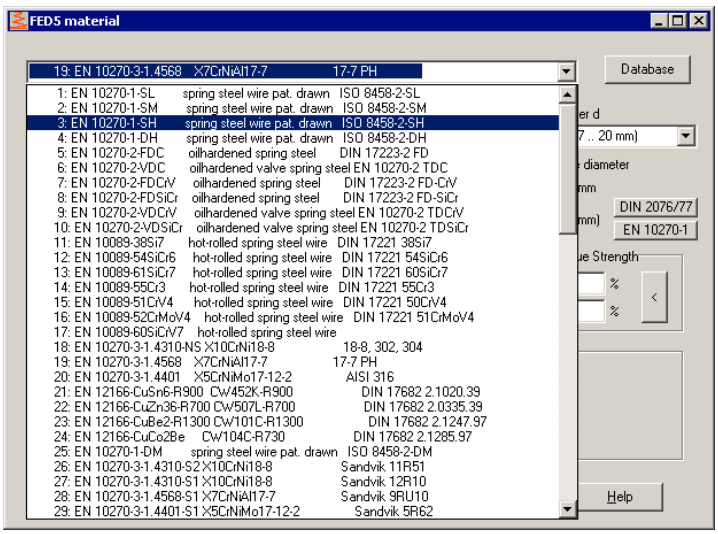


FED1+, 2+, 5, 6, 7: Relaxation as function of tau/tauz

Relaxation curves with the coefficient tau/tauz (instead of tau) has been added into all compression spring programs now. Tauz is the permissible shear stress as function of wire diameter. I compared the curves of all materials to check if relaxation as function of wire diameter is similar than permissible shear stress as function of wire diameter. In this case the curves for different wire diameter would be equal. Unfortunately, most material curves differ. Only the curves for VDC and TDC according to EN 10270-2 and 1.4568 according to EN 10270-3 are nearly identical for wire diameters d=1 mm and d=6mm.



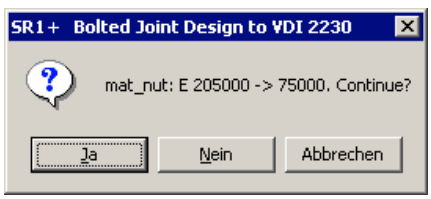
Database Spring Materials – ISO 8458 and EN 10270
Material values according to ISO 8458-2 and EN 10270-1 are equal, and material types are equal: SL, SM, DM, SH, DH. (S for static, D for dynamic, L for low, M for middle, H für high). In the spring material database, ISO 8452-2 names has been added in NAME3 of EN 10270-1 materials. Old names (DIN 17223-1) were moved or deleted.



FED3+ V17.5
In FED3+ V17.5 and V17.5.1 at "Edit->Material", input data (shot-blasting, coiling direction) were not used in every case. Click first "Calc" button and then "OK" to accept the data. Or you can request a free update from release V 17.5 to V17.5.2.

FED1+, FED5, FED6: Mandrel and Bore diameter with 2 digits
If the diameter of mandrel or bore is less than 16 mm, it is printed in mm with 2 (instead of 1) decimals now in the production drawing.

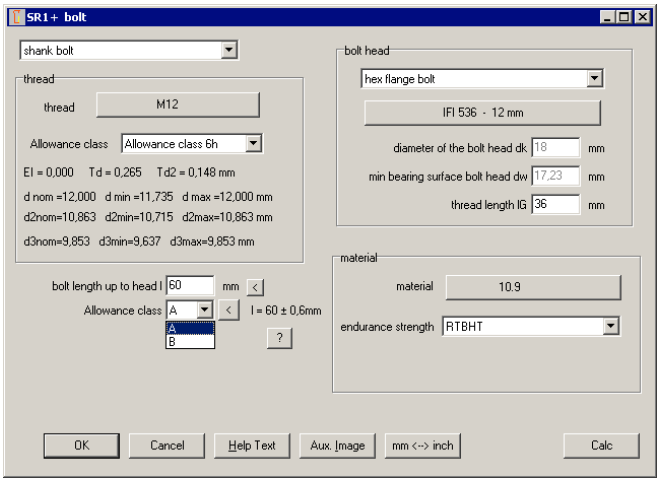
SR1 – Material Data
When opening an old SR1 file, program detects if material data Rm, Re, pG or E module differ with the actual material database and show an error message. This indicates that material data in the database has been modified. Compare calculation with printout of old calculation to see the difference. To remove warnings, just resave the file.



SR1 – Compare Material Data and Database Data
Since release 20.2, a warning "old value <> new value" appeared if material database data differed between stored values and new database values when opening an old SR1 file. Because of updating many old material names with new material names, since Version 20.6 idle messages like „ St 50 <> E295“ are not reported any more. Warnings are reported only if material data have been changed in the database and this may influence calculation results.

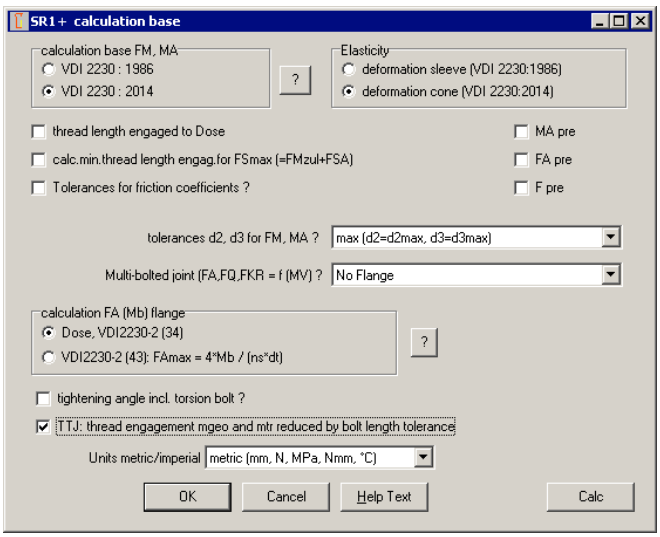
SR1 – Consider Bolt Length Tolerance

Bolt length tolerance for hexagon head bolts according to ISO 4014 and ISO 4017 is "IT 15" for allowance class A and "IT 17" for allowance class B. Bolts larger than M30 and longer than 160 mm get class B tolerances. For hexagon socket head bolts to ISO 4762 is no selection, tolerances are equal with allowance class A. And the same for hex flange bolts to EN 1662 and EN 1665. Length tolerances and elongation of the bolt and deflection of the clamping plates are considered now when checking available thread depth. A new error message „LK+tG < Lmax“ shows that in worst tolerance case bolt collides with end of thread in TTJ joint. If you get additionally the old message "thread depth !", this is even the case with nominal dimensions without tolerances.



Should bolt length tolerance also be considered for thread strip safety calculation? Or is it already considered in the addition mzu?

The user can decide himself if he wants to consider bolt length tolerance for calculation of engaged thread length "mtr" or not at "Edit->Calculation Method".



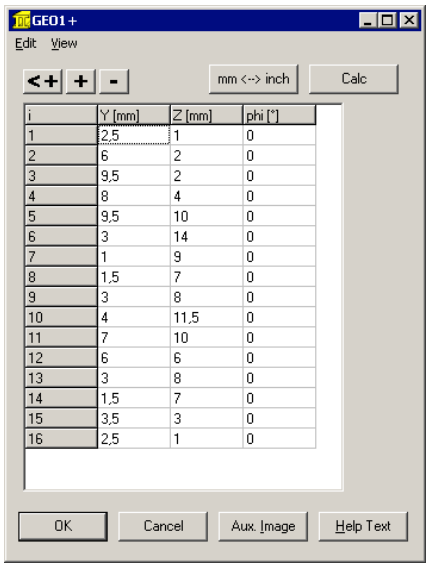
SR1 – E Module of Nut for Calculation of deltaM

According to VDI 2230-1:2014, elastic resilience deltaM of the nut thread is calculated with the E module of the nut thread if TTJ (tapped blind hole joint), but with the E module of the bolt if TBJ (through bolted joint with nut). But why??

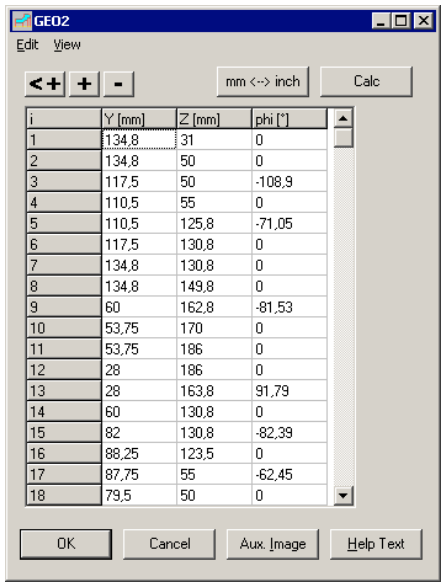
SR1 calculates according to VDI 2230, however in earlier versions the E module of the nut material had been replaced by standard E module of 205000 Mpa when switching between TTJ and TBJ joints.

GEO1+, GEO2: Coordinate Input Table

Coordinates and angles of the cross-section or rotation area can be entered in a new table now. With copy and paste you can move cells or import/export data from/to MS Excel or other programs. Cells are marked by cursor keys together with shift key.



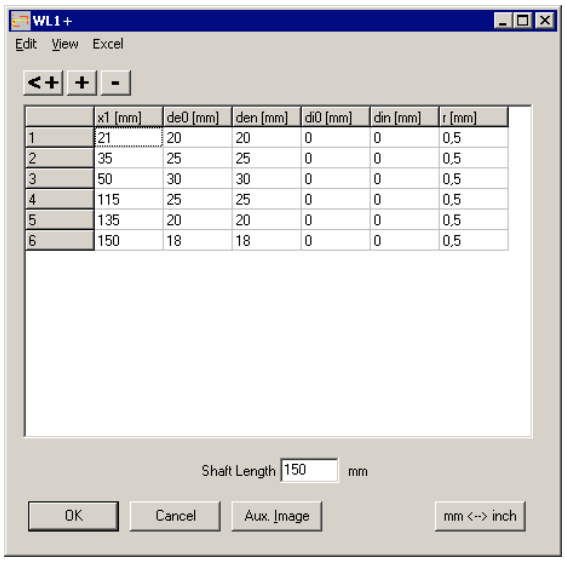
i	Y [mm]	Z [mm]	phi [°]
1	2,5	1	0
2	6	2	0
3	9,5	2	0
4	8	4	0
5	9,5	10	0
6	3	14	0
7	1	9	0
8	1,5	7	0
9	3	8	0
10	4	11,5	0
11	7	10	0
12	6	6	0
13	3	8	0
14	1,5	7	0
15	3,5	3	0
16	2,5	1	0



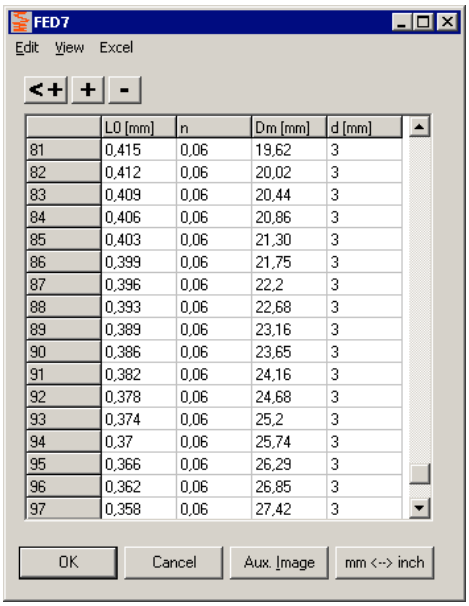
i	Y [mm]	Z [mm]	phi [°]
1	134,8	31	0
2	134,8	50	0
3	117,5	50	-108,9
4	110,5	55	0
5	110,5	125,8	-71,05
6	117,5	130,8	0
7	134,8	130,8	0
8	134,8	149,8	0
9	60	162,8	-81,53
10	53,75	170	0
11	53,75	186	0
12	28	186	0
13	28	163,8	91,79
14	60	130,8	0
15	82	130,8	-82,39
16	88,25	123,5	0
17	87,75	55	-62,45
18	79,5	50	0

WL1+: Copy and Paste via Clipboard

Input of dimensions, radial and axial forces, path loads, bending moments and torque gets copy and paste functions to move or import/export data via Windows clipboard.



	x1 [mm]	de0 [mm]	den [mm]	di0 [mm]	din [mm]	r [mm]
1	21	20	20	0	0	0,5
2	35	25	25	0	0	0,5
3	50	30	30	0	0	0,5
4	115	25	25	0	0	0,5
5	135	20	20	0	0	0,5
6	150	18	18	0	0	0,5

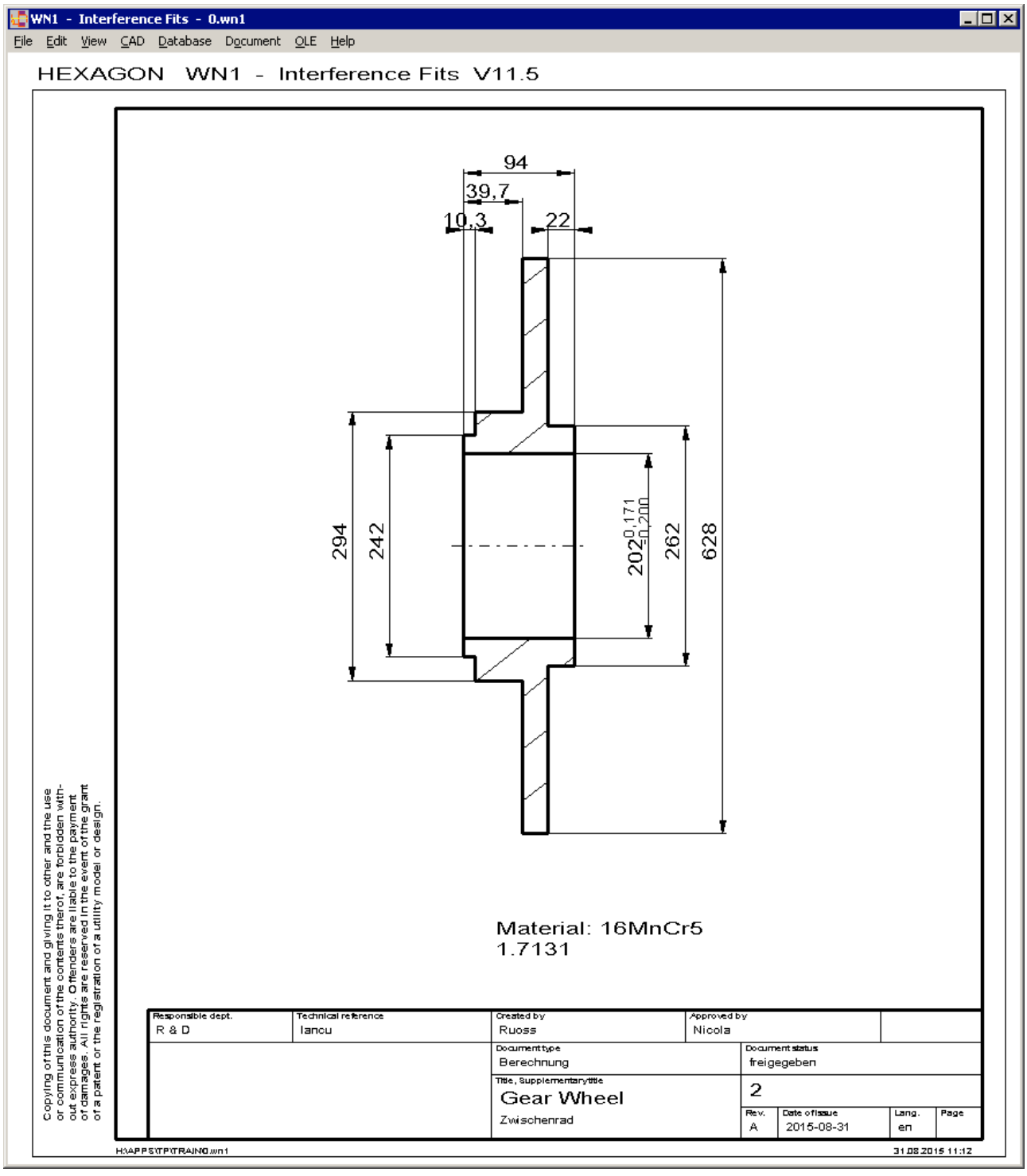


	L0 [mm]	n	Dm [mm]	d [mm]
81	0,415	0,06	19,62	3
82	0,412	0,06	20,02	3
83	0,409	0,06	20,44	3
84	0,406	0,06	20,86	3
85	0,403	0,06	21,30	3
86	0,399	0,06	21,75	3
87	0,396	0,06	22,2	3
88	0,393	0,06	22,68	3
89	0,389	0,06	23,16	3
90	0,386	0,06	23,65	3
91	0,382	0,06	24,16	3
92	0,378	0,06	24,68	3
93	0,374	0,06	25,2	3
94	0,37	0,06	25,74	3
95	0,366	0,06	26,29	3
96	0,362	0,06	26,85	3
97	0,358	0,06	27,42	3

FED6, FED7, FED10, ZAR4, GEO4: Tables with copy and paste

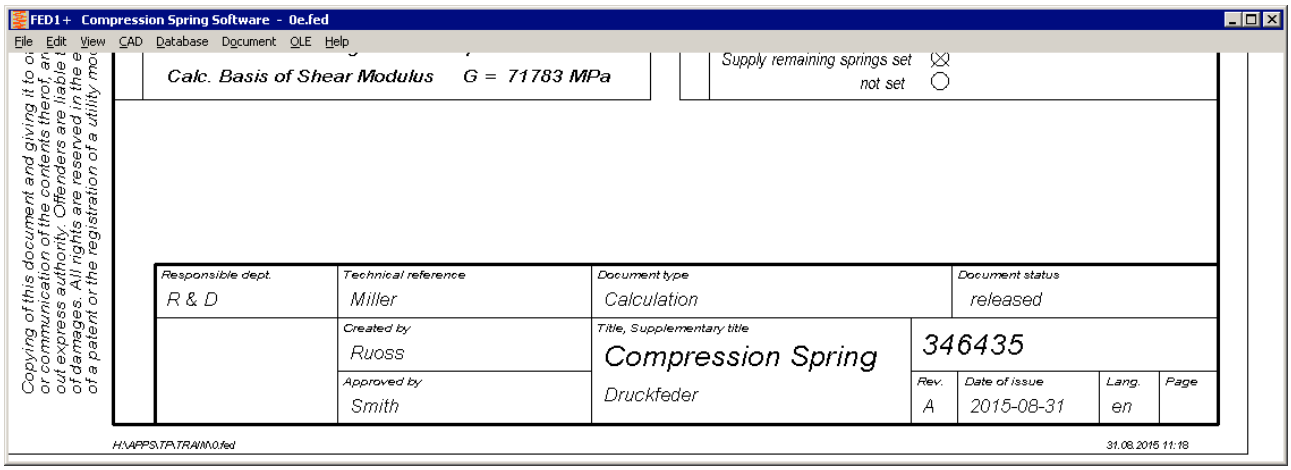
Tables for input of coil sections or load-deflection diagrams in FED6 and FED7, input of spring geometry in FED10, and input tables for pitch curve or cam geometry in ZAR4 and GEO4 got a menu with copy and paste and import/export functions.

WN1 – Production Drawing
New in WN1 is hub drawing with dimensions as production drawing. Drawing header is configurable, and drawing data, names and modifications can be entered in WN1.



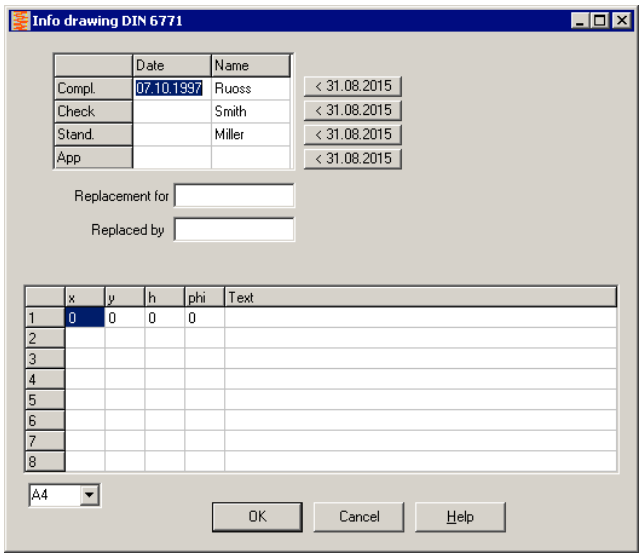
FED1+ Dimensioning or Recalculation after Modification of Temperature
If you change operating temperature at "Edit->Application", you have to select "Dimensioning or Recalculation?". If dimensioning, number of coils will be modified. Else spring loads are recalculated.

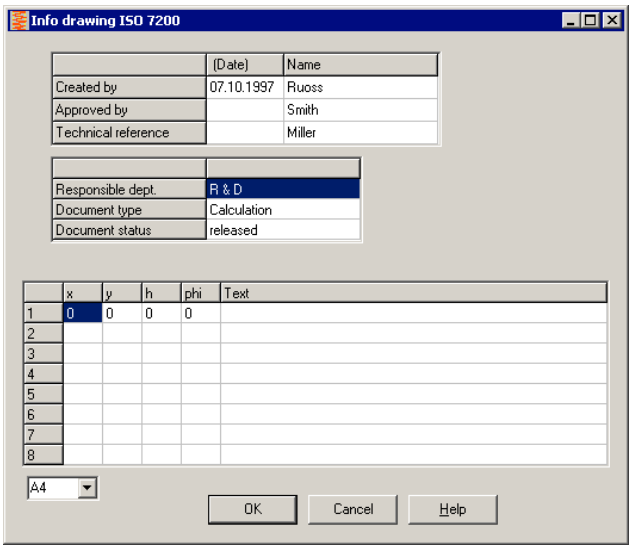
All Programs: Drawing Header Configurable, Default Setting ISO 7200



The drawing header of all production drawings and table drawings is configurable now (at "File->Settings->Drawing). Default Setting is „ISO 7200 Fig.2“.
In spring drawings, cell 13 or cell 12 (additional indications) was removed. But text, if any, is printed, without cell and 6 mm higher than before.
ISO 7200 header and DIN 6771 header differ. Self-defined changes in drawing and calculation are not documented in ISO 7220 header, only the index letter. And only the issue date is listed.
However, ISO 7200 header includes additional fields "Responsible dept.", "Document type", "Document status". At "Document->Drawing data" you can input these texts, if an ISO 7200 drawing header was defined at "File->Settings->Drawing". Other data are used commonly for DIN and ISO drawing header:

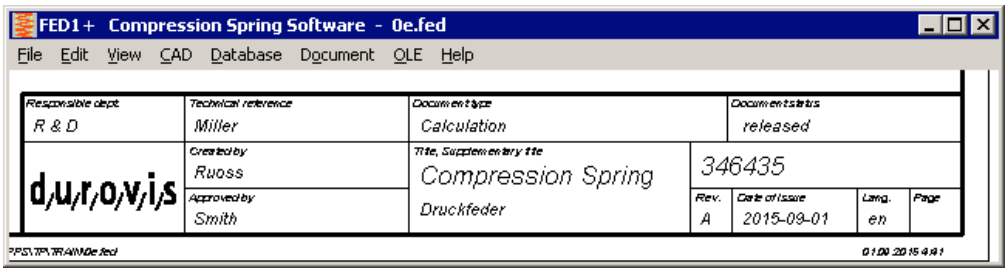
```
Technical reference: stand.
Created by:          compl.
Approved by:         check.
Changes:             modification index +1
```



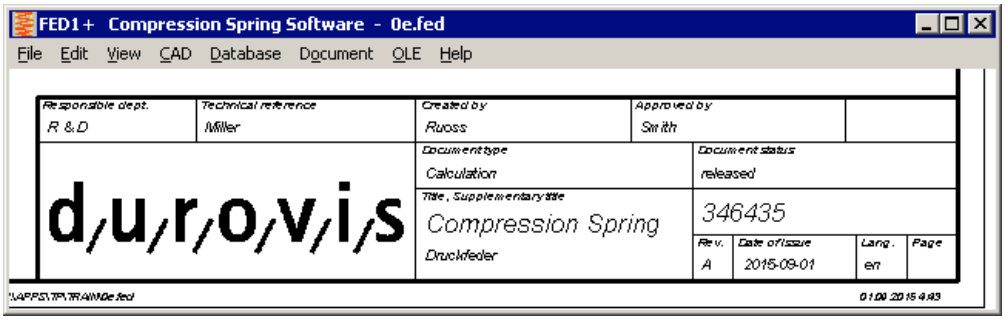


POLYLINE usable for logo drawing
Polylines are now allowed to be used in logo drawings and the modified dxf file for inserting your company logo in the drawing header. Use our free tool DXF2LOGO.EXE to convert your DXF drawing into the required $LOGO_1.DX$ file, then copy into temporary directory and set R/O file attribute.

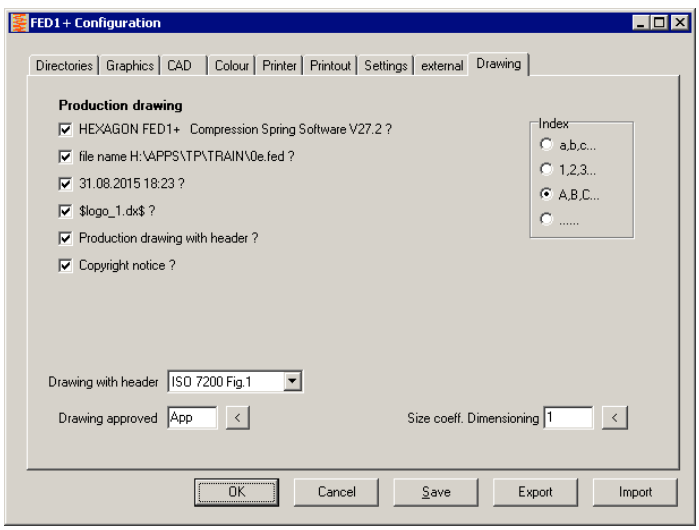
One Logo drawing for all drawing headers
Dependent on the configured drawing header, your logo drawing will be scaled and positioned to fit.



In ISO 7200 Fig.1, the "legal owner" field is only 30x16mm, but in ISO 7200 Fig.2 it is more than double size (70x26mm). If you do not create your own $LOGO_1.DX$ drawing, your company name from the license text is printed in the "legal owner" cell.

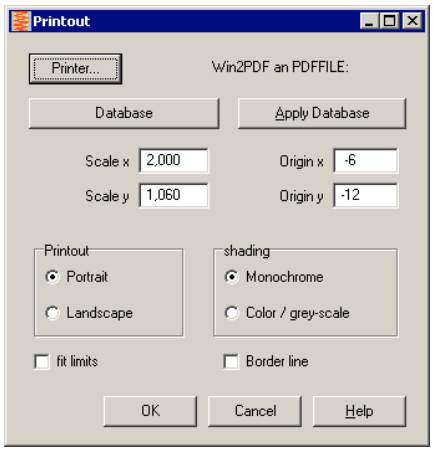


Drawing header with or without copyright note
At "File->Settings->Drawing" you can configure if a copyright note should be printed on the left border or not.



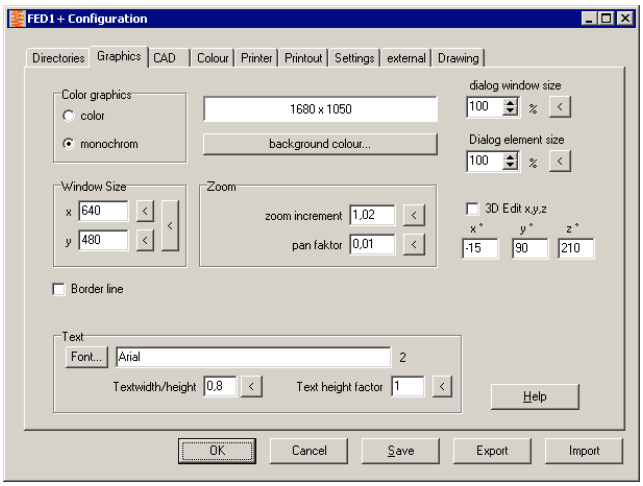
Print A4 Production drawing without Border to Printer

To print production drawing without border on printer, it must be lightly enlarged and moved. Settings can be saved in the printout database: Scale x/y: 2,0/1,06. Origin x/y: -6 / -12.



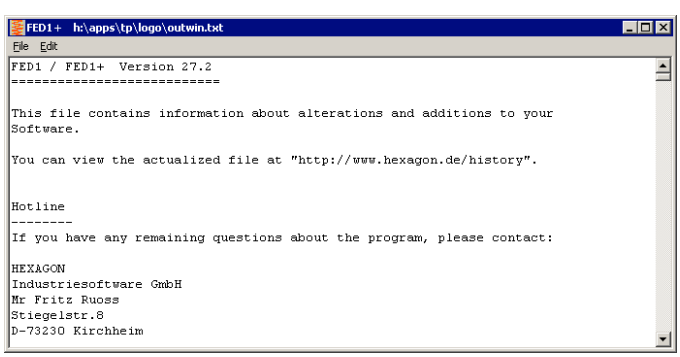
Configure Windows Size

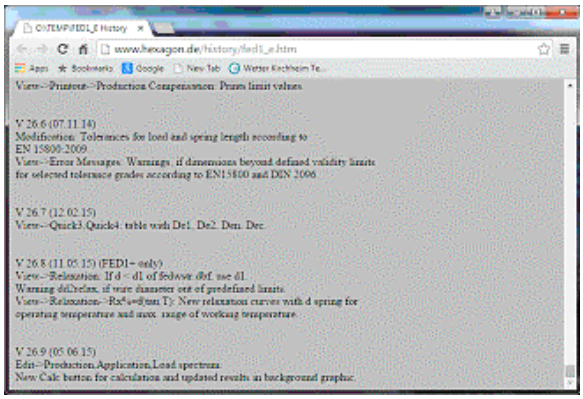
After Installation or "<" button, window size is set maximum. On wide screen display, drawings may appear stretched and circles appear as ellipses. Two new "<" buttons set the relation of horizontal to vertical pixels 4:3 to avoid this effect.



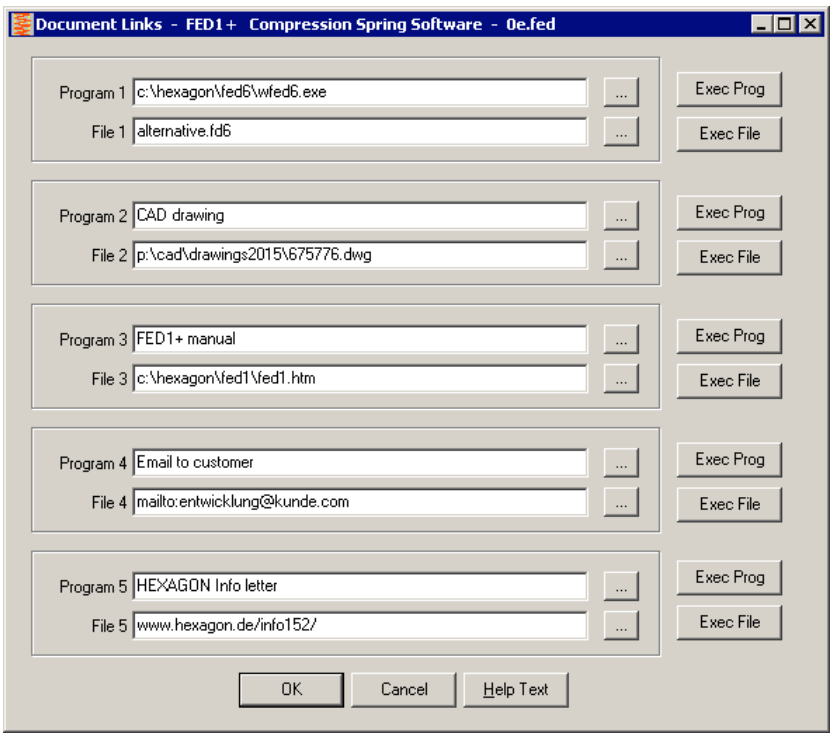
Update History online

At "Help -> History" you can show description of updates until your present release. To get update information about later updates from the web, a new menu item "Help -> History (www)" is available now with an internet link to the updated update history of your program. Login data are required for access to this page, see info email.



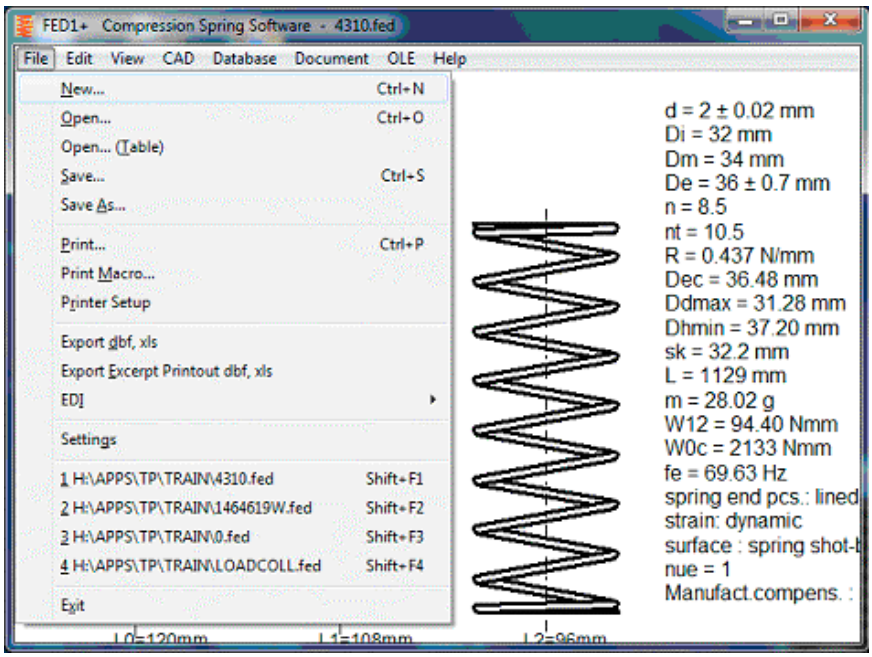


"Document Links" instead of "Document Setup" and "Document 1..5"
The functions for linking any external documents has been integrated in one dialog box.



At "File 1" .. "File 5" you define the documents to be linked. With "Exec File" you show or run the linked document. If document file is not linked with an application under Windows, you have to input the appropriate program and run with "Exec Prog". Else, you can use "program" input for description or remarks.

Tip: Compare Calculation Results
Use Shift-F2 keys to switch between latest 2 calculations, or Shift-F3 or Shift-F4 to compare 3 or 4 results. Result graphic can be configured at File->Settings->Settings: Result Screen.
To compare more than 4 calculations, copy the files in a subfolder, then "File->Open Table"



PRICELIST 2015-09-01

PRODUCT	EUR
DI1 Version 1.2 O-Ring Seal Software	190,-
DXF-Manager Version 8.6	383,-
DXFPLOT V 3.0	123,-
FED1 V27.2 Helical Compression Springs	491,-
FED1+ V27.2 Helical Compression Springs incl. spring database, animation, relax., 3D,..	695,-
FED2 V19.0 Helical Extension Springs	501,-
FED2+ V19.0 Helical Extension Springs incl. spring database, animation, relaxation, ...	675,-
FED3+ V17.6 Helical Torsion Springs incl. prod.drawing, animation, 3D, rectang.wire, ...	480,-
FED4 Version 6.6 Disk Springs	430,-
FED5 Version 14.0 Conical Compression Springs	741,-
FED6 Version 14.5 Nonlinear Cylindrical Compression Springs	634,-
FED7 Version 11.8 Nonlinear Compression Springs	660,-
FED8 Version 6.5 Torsion Bar	317,-
FED9 Version 5.6 Spiral Spring	394,-
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FED11 Version 3.1 Spring Lock and Bushing	210,-
FED12 Version 2.4 Elastomere Compression Spring	220,-
FED13 Version 3.8 Wave Spring Washers	185,-
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FED15 Version 1.2 Leaf Spring (simple)	180,-
GEO1+ V5.7 Cross Section Calculation incl. profile database	294.-
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GEO3 V3.3 Hertzian Pressure	205,-
GEO4 V3.9 Cam Software	265,-
HPGL-Manager Version 8.5	383,-
LG1 V6.3 Roll-Contact Bearings	296,-
LG2 V2.1 Hydrodynamic Plain Journal Bearings	460,-
SR1 V20.8 Bolted Joint Design	640,-
SR1+ V20.8 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 V3.7 Girder Calculation	757,-
WL1+ V19.7 Shaft Calculation incl. Roll-contact Bearings	945,-
WN1 Version 11.5 Cylindrical and Conical Press Fits	485,-
WN2 V 9.5 Involute Splines to DIN 5480	250,-
WN2+ V 9.5 Involute Splines to DIN 5480 and non-standard involute splines	380,-
WN3 V 5.3 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892	245,-
WN4 V 4.4 Involute Splines to ANSI B 92.1	276,-
WN5 V 4.4 Involute Splines to ISO 4156 and ANSI B 92.2 M	255,-
WN6 V 2.9 Polygon Profiles P3G to DIN 32711	180,-
WN7 V 2.2 Polygon Profiles P4C to DIN 32712	175,-
WN8 V 1.9 Serration to DIN 5481	195,-
WN9 V 2.0 Spline Shafts to DIN ISO 14	170,-
WN10 V 3.7 Involute Splines to DIN 5482	260,-
WN11 V 1.3 Woodruff Key Joints	240,-
WNXE V 1.1 Involute Splines - dimensions, graphic, measure	375,-
WST1 V 9.3 Material Database	235,-
ZAR1+ V 24.3 Spur and Helical Gears	1115,-
ZAR2 V7.6 Spiral Bevel Gears to Klingelnberg	792,-
ZAR3 V8.7 Worm Gears	404,-
ZAR3+ V8.7 Worm Gears incl. profile drawings, variable tooth height, OPD measure	620,-
ZAR4 V3.7 Non-circular Spur Gears	1610,-
ZAR5 V9.1 Planetary Gearings	1355,-
ZAR6 V3.6 Straight/Helical/Spiral Bevel Gears	585,-
ZARXP V2.0 Involute Profiles - dimensions, graphic, measure	275,-
ZAR1W V1.5 Gear Wheel Dimensions, tolerances, measure	450,-
ZM1.V2.3 Chain Gear Design	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, TOLPASS, LG1, DXFPLOT, GEO1+, TOL2, TOL1CON, GEO2, GEO3, ZM1, WN6, WN7, LG2, FED12, FED13, WN8, WN9, WN11, DI1, FED15, WNXE)	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.-

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Language Version:
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- **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%.

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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.

HEXAGON Industriesoftware GmbH
Stiegelstrasse 8 D-73230 Kirchheim Tel.+49 702159578 Fax +49 7021 59986
Kieler Strasse 1A D-10115 Berlin Tel. +49 30 28096996 Fax +49 30 28096997
Mobile: +49 163 7342509 E-Mail: info@hexagon.de Web: http://www.hexagon.de