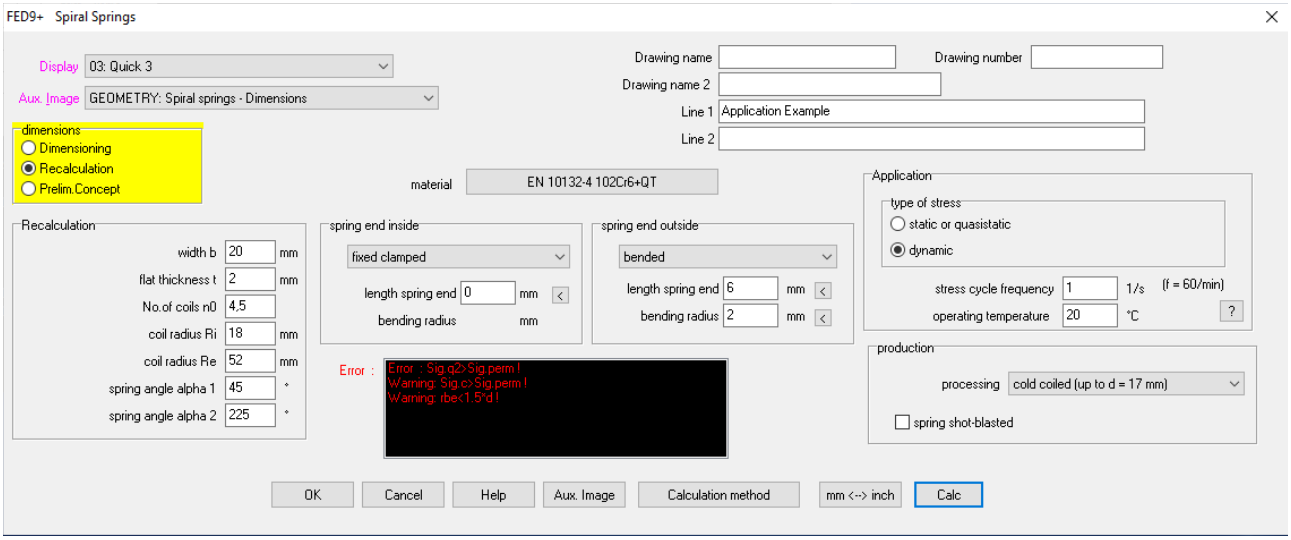
HEXAGON Info 189 **Sept. / Oct. 2021**

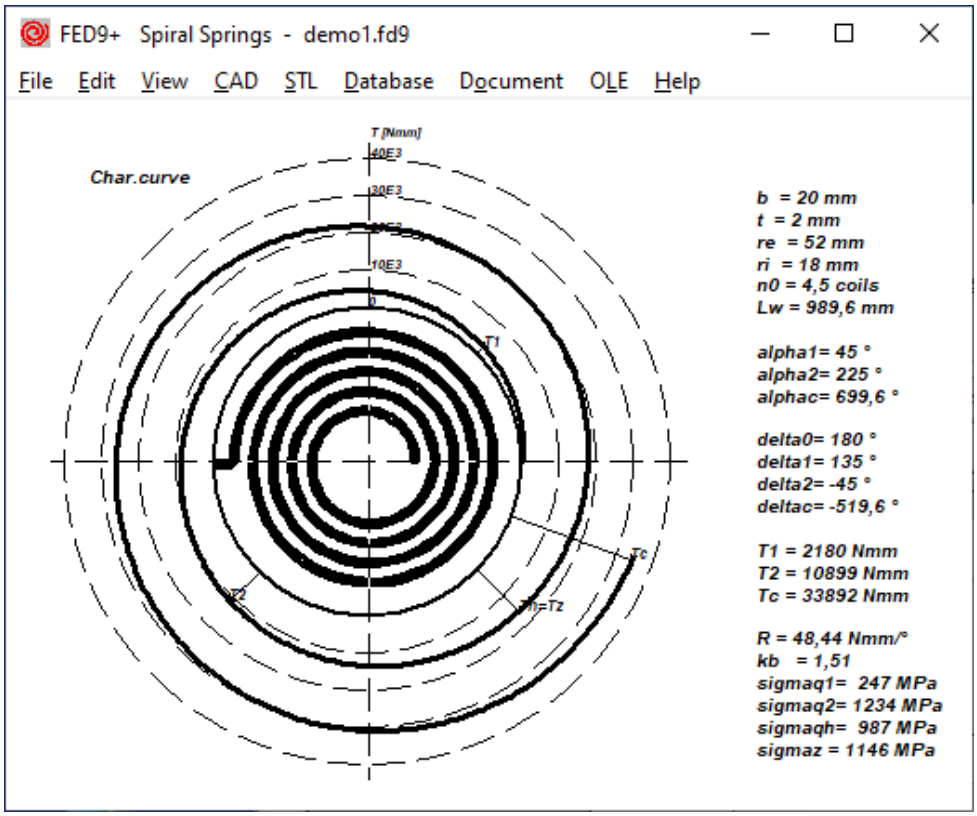
by Fritz Ruoss

FED9 +: Spiral spring software with production drawing, animation, Quick input, Quick4
We have created a new plus version of FED9. FED9 + contains all the functions of FED9 plus production drawing, animation, Quick4 view, online input and spring characteristics as polar diagram.

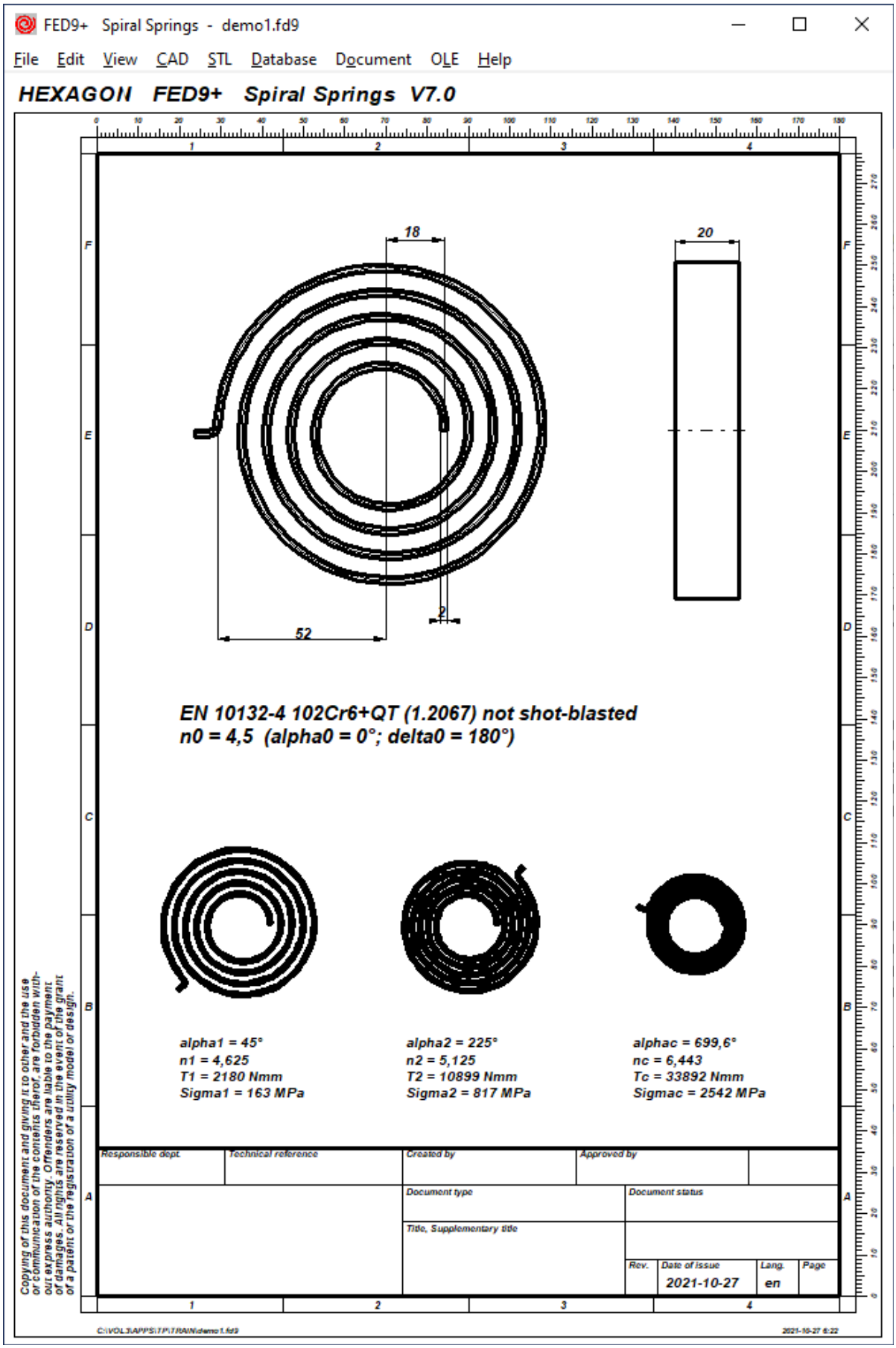
FED9+ Quick input



Load-deflection curve of the spiral spring as polar diagram in FED9+

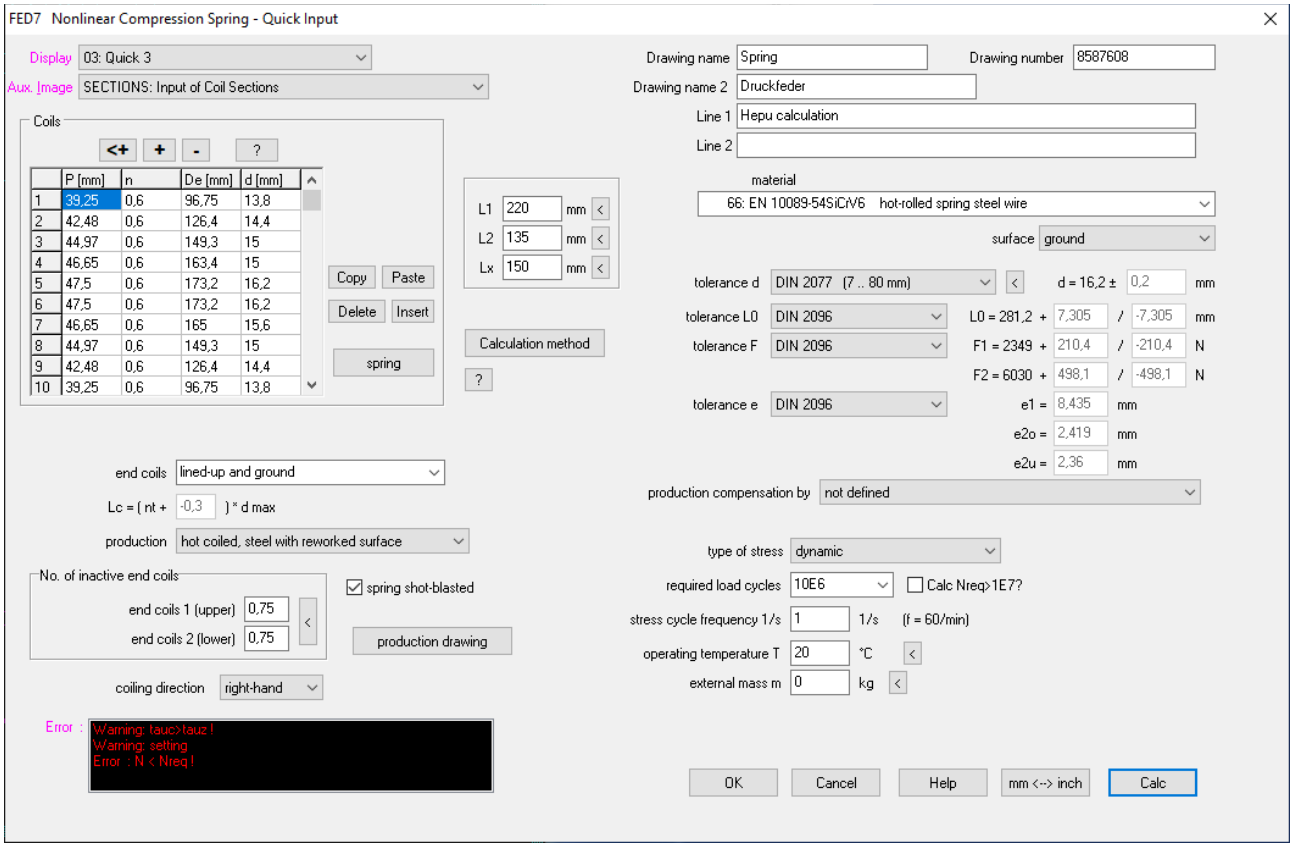


FED9+ Production drawing



FED9 + is available now at a price of 490 euros, or as an upgrade from FED9 to FED9 + for 194 euros.

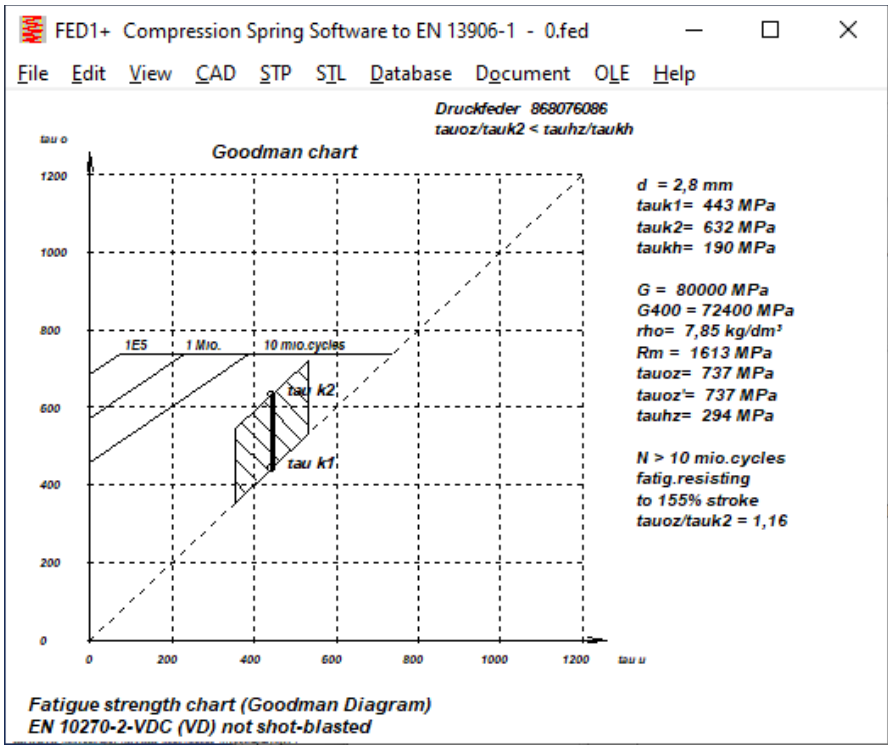
FED7: Quick Input



In the quick input, all input windows have been combined in one large window. With "Calc" the spring is calculated and the results are displayed in the background window.

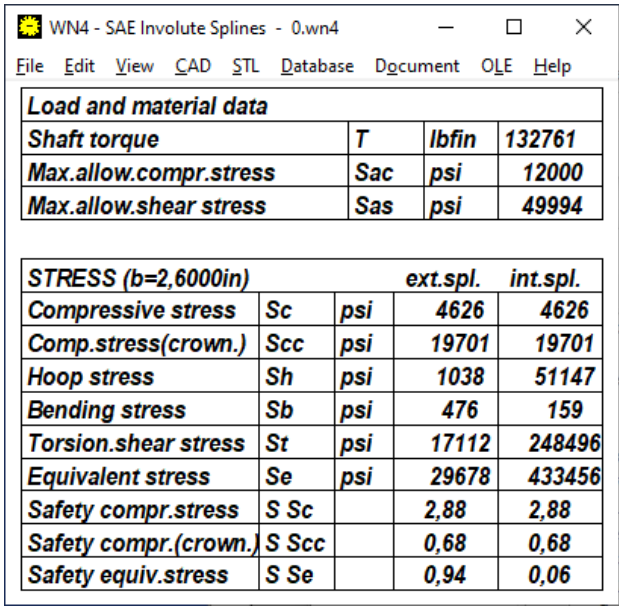
FED1+: tauoz/tauk2 in Goodman diagram

If the spring force F1 is relatively high, the spring stroke is not limited by the maximum stroke tension, but rather by the (static) upper tension (error message tauk2> tauz). That this can also be seen numerically in the Goodman diagram, the safety margin tauoz / tauk2 is now also displayed.



WN4, WN5: Hoop Stress

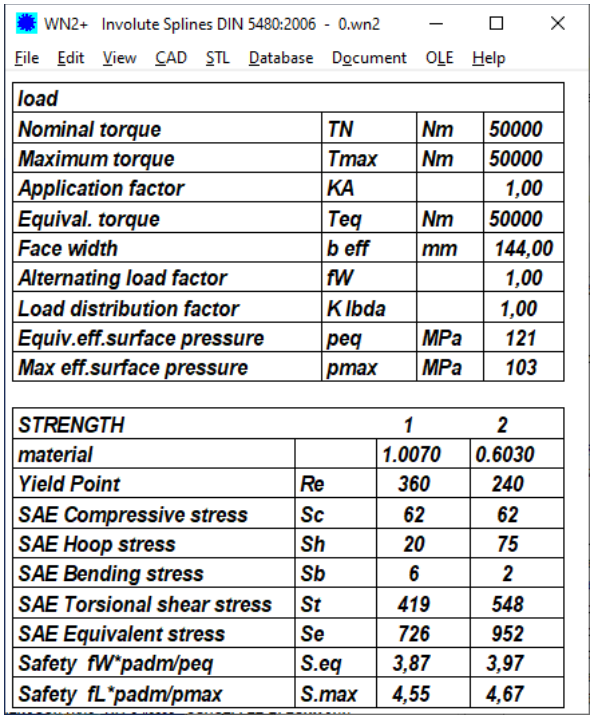
In the strength calculation according to the “SAE Design Guide”, the hoop stress Sh is the hoop stress in the hub, which can be quite high if the wall thickness is small. However, the hoop stress Sh was output too small, this has been corrected. The shear stress St in the hub can be even higher; in contrast to the “hoop stress”, this is independent of the overlapping face width. In contrast to the shear stress of the shaft, the shear stress of the hub can be neglected if the forces are directly derived radially, e.g. if the hub is a gear or a pulley. If torsion does not occur, then “torsional shear stress” in the hub is not relevant. Otherwise the outside diameter of the hub should be increased.


WN4 - SAE Involute Splines - 0.wn4

File Edit View CAD STL Database Document OLE Help

Load and material data			
Shaft torque	T	lbfin	132761
Max.allow.compr.stress	Sac	psi	12000
Max.allow.shear stress	Sas	psi	49994

STRESS (b=2,6000in)			ext.spl.	int.spl.
Compressive stress	Sc	psi	4626	4626
Comp.stress(crown.)	Scc	psi	19701	19701
Hoop stress	Sh	psi	1038	51147
Bending stress	Sb	psi	476	159
Torsion.shear stress	St	psi	17112	248496
Equivalent stress	Se	psi	29678	433456
Safety compr.stress	S Sc		2,88	2,88
Safety compr.(crown.)	S Scc		0,68	0,68
Safety equiv.stress	S Se		0,94	0,06


WN2+ Involute Splines DIN 5480:2006 - 0.wn2

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load			
Nominal torque	TN	Nm	50000
Maximum torque	Tmax	Nm	50000
Application factor	KA		1,00
Equival. torque	Teq	Nm	50000
Face width	b eff	mm	144,00
Alternating load factor	fW		1,00
Load distribution factor	K lbda		1,00
Equiv.eff.surface pressure	peq	MPa	121
Max eff.surface pressure	pmax	MPa	103

STRENGTH		1	2
material		1.0070	0.6030
Yield Point	Re	360	240
SAE Compressive stress	Sc	62	62
SAE Hoop stress	Sh	20	75
SAE Bending stress	Sb	6	2
SAE Torsional shear stress	St	419	548
SAE Equivalent stress	Se	726	952
Safety fW*padm/peq	S.eq	3,87	3,97
Safety fL*padm/pmax	S.max	4,55	4,67

WN2+, WN10: Load stress according to SAE Design Guide

The strength calculation in WN2 + and WN10 has so far been limited to the surface pressure on the tooth flanks and the torsional stress of the shaft, using various methods: according to Niemann (2005), according to Niemann (1981), according to Roloff / Matek. Now the calculation according to the SAE Design Guide (1994) has been added. There have already been several drafts of DIN 5466 specifically for splines according to DIN 5480, but these have all been withdrawn. It was not possible to analytically calculate stress distribution, notch factors, maximum stress, suitable for any size.

STRESS CALCULATIONS ACCORDING TO SAE DESIGN GUIDE

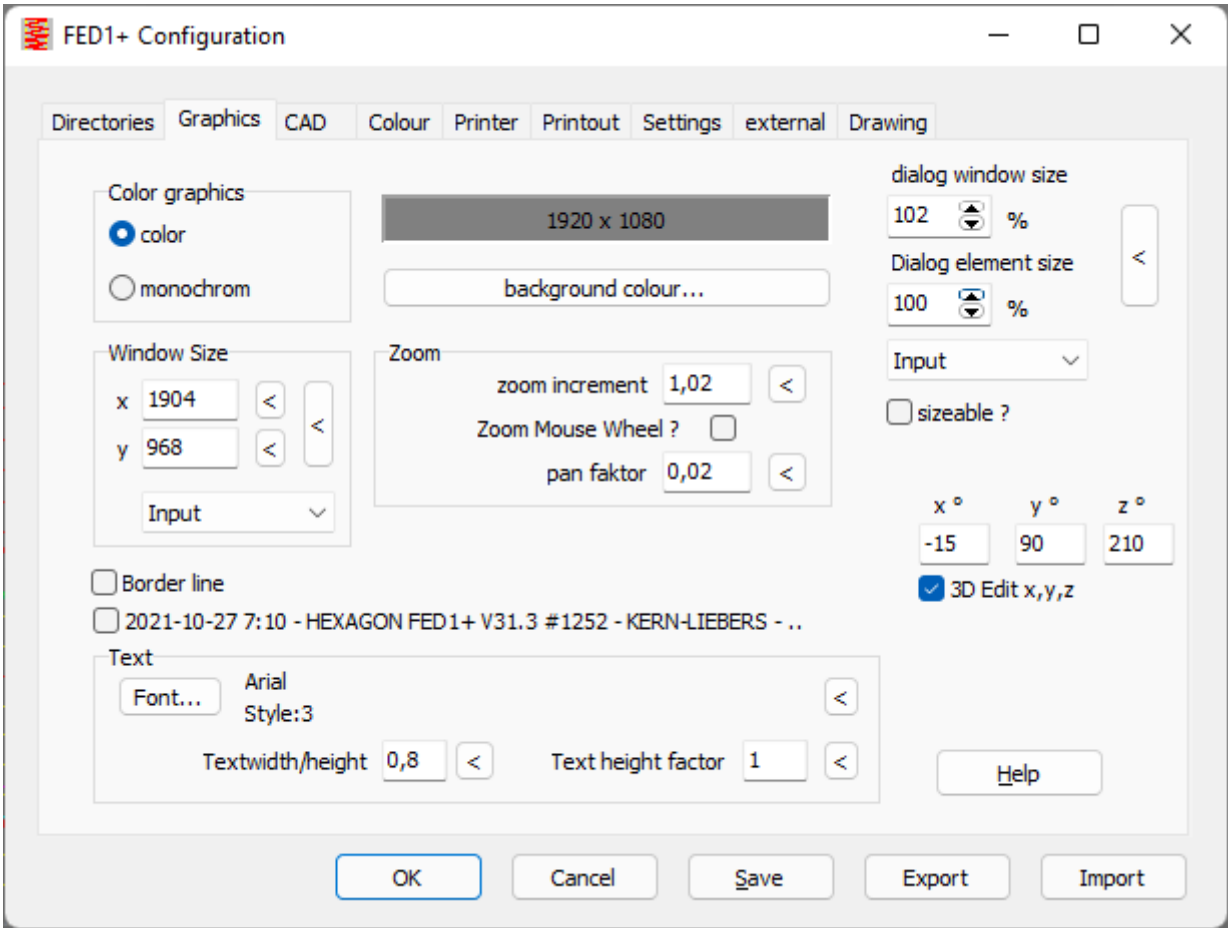
Compressive stress	Sc	MPa	62	
Spline teeth shear stress	Ss	MPa	68	
Hoop stress	Sh	MPa	20	75
Bending stress	Sb	MPa	6	2
Stress concentration factor	Kt		2,2	2,2
Torsional shear stress	St	MPa	419	548
Equivalent stress	Se	MPa	726	952

SR1+: New warning messages

Warning if deformation of clamping plate > 5%

Warning if assembly angle > 360°

Windows 11
Windows 11 has been around since October 2021. All HEXAGON programs run without problems with Windows 11. Even 15 year old versions.



The corners are now more rounded and some controls look a bit different, otherwise you won't notice a big difference to Windows 10.

Network floating licenses: Key code for UNC path
With a floating license, all clients must use the same network path. If this path is a UNC path, a problem with some versions was that only one client computer could access the software. There is no problem if the key code request is ”Request key code for wxxxx-10247: xxxx” or the network drive is a logical drive. The problem no longer occurs with new versions or updates.

Tip: Individual configuration for the network version
With the network version it is important that each user uses his own configuration (cfg file in the working directory). The working directory is configured by clicking the program icon with the right mouse button, then “Properties”, “Shortcut”, “Execute in”. Write “C: \ HEXAGON”, then the cfg file will be read from there. When the program is started by clicking on a calculation file, the cfg is also loaded from “C: \HEXAGON”.

Tip on installation and data backup
After downloading, unzip the zip file directly onto a CD-ROM or SD card, then install the software from this CD or SD.

HEXAGON PRICE LIST 2021-11-01

Base price for single licences (perpetual)	EUR
DI1 Version 2.1 O-Ring Seal Software	190.-
DXF-Manager Version 9.1	383.-
DXFPLOT V 3.2	123.-
FED1+ V31.3 Helical Compression Springs incl. spring database, animation, relax., 3D,..	695.-
FED2+ V21.9 Helical Extension Springs incl. Spring database, animation, relaxation, ...	675.-
FED3+ V21.4 Helical Torsion Springs incl. prod.drawing, animation, 3D, rectang.wire, ...	600.-
FED4 Version 8.0 Disk Springs	430.-
FED5 Version 17.0 Conical Compression Springs	741.-
FED6 Version 18.0 Nonlinear Cylindrical Compression Springs	634.-
FED7 Version 15.0 Nonlinear Compression Springs	660.-
FED8 Version 7.4 Torsion Bar	317.-
FED9 Version 7.0 Spiral Spring	394.-
FED9+ Version 7.0 Spiral Spring incl. production drawing, animation, Quick input	490.-
FED10 Version 4.5 Leaf Spring	500.-
FED11 Version 3.6 Spring Lock and Bushing	210.-
FED12 Version 2.7 Elastomer Compression Spring	220.-
FED13 Version 4.2 Wave Spring Washers	228.-
FED14 Version 2.6 Helical Wave Spring	395.-
FED15 Version 1.6 Leaf Spring (simple)	180.-
FED16 Version 1.3 Constant Force Spring	225.-
FED17 Version 2.1 Magazine Spring	725.-
GEO1+ V7.5 Cross Section Calculation incl. profile database	294.-
GEO2 V3.3 Rotation Bodies	194.-
GEO3 V4.0 Hertzian Pressure	205.-
GEO4 V5.3 Cam Software	265.-
GEO5 V1.0 Geneva Drive Mechanism Software	218.-
GEO6 V1.0 Pinch Roll Overrunning Clutch Software	232.-
GEO7 V1.0 Internal Geneva Drive Mechanism Software	219.-
GR1 V2.2 Gear construction kit software	185.-
GR2 V1.2 Eccentric Gear software	550,-
HPGL-Manager Version 9.1	383.-
LG1 V6.6 Roll-Contact Bearings	296.-
LG2 V3.1 Hydrodynamic Plain Journal Bearings	460.-
SR1 V24.0 Bolted Joint Design	640.-
SR1+ V24.0 Bolted Joint Design incl. Flange calculation	750.-
TOL1 V12.0 Tolerance Analysis	506.-
TOL2 Version 4.1 Tolerance Analysis	495.-
TOLPASS V4.1 Library for ISO tolerances	107.-
TR1 V6.4 Girder Calculation	757.-
WL1+ V21.7 Shaft Calculation incl. Roll-contact Bearings	945.-
WN1 V12.4 Cylindrical and Conical Press Fits	485.-
WN2 V11.2 Involute Splines to DIN 5480	250.-
WN2+ V11.2 Involute Splines to DIN 5480 and non-standard involute splines	380.-
WN3 V 6.0 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892	245.-
WN4 V 6.1 Involute Splines to ANSI B 92.1	276.-
WN5 V 6.1 Involute Splines to ISO 4156 and ANSI B 92.2 M	255.-
WN6 V 4.1 Polygon Profiles P3G to DIN 32711	180.-
WN7 V 4.1 Polygon Profiles P4C to DIN 32712	175.-
WN8 V 2.6 Serration to DIN 5481	195.-
WN9 V 2.4 Spline Shafts to DIN ISO 14	170.-
WN10 V 4.4 Involute Splines to DIN 5482	260.-
WN11 V 2.0 Woodruff Key Joints	240.-
WN12 V 1.2 Face Splines	256.-
WN13 V 1.0 Polygon Profiles PnG	238.-
WN14 V 1.0 Polygon Profiles PnC	236.-
WNXE V 2.3 Involute Splines – dimensions, graphic, measure	375.-
WNXK V 2.2 Serration Splines – dimensions, graphic, measure	230.-
WST1 V 10.2 Material Database	235.-
ZAR1+ V 26.7 Spur and Helical Gears	1115.-

ZAR2 V8.2 Spiral Bevel Gears to Klingelnberg	792.-
ZAR3+ V10.4 Cylindrical Worm Gears	620.-
ZAR4 V6.3 Non-circular Spur Gears	1610.-
ZAR5 V12.3 Planetary Gears	1355.-
ZAR6 V4.3 Straight/Helical/Spiral Bevel Gears	585.-
ZAR7 V2.2 Plus Planetary Gears	1380.-
ZAR8 V1.8 Ravigneaux Planetary Gears	1950.-
ZAR9 V1.0 Cross-Helical Screw Gears	650.-
ZARXP V2.6 Involute Profiles - dimensions, graphic, measure	275.-
ZAR1W V2.6 Gear Wheel Dimensions, tolerances, measure	450.-
ZM1.V3.0 Chain Gear Design	326.-
ZM2.V1.0 Pin Rack Drive Design	320.-
ZM3.V1.0 Synchronous Belt Drive Design	224.-

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, ZM3, WN6, WN7, LG2, FED12, FED13, WN8, WN9, WN11, DI1, FED15, 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.-
HEXAGON Graphic Package (DXF-Manager, HPGL-Manager, DXFPLOT)	741.-
HEXAGON Helical Spring Package (FED1+, FED2+, FED3+, FED5, FED6, FED7)	2,550.-
HEXAGON Complete Spring Package (FED1+, FED2+, FED3+, FED4, FED5, FED6, FED7, FED8, FED9+, FED10, FED11, FED12, FED13, FED14,, FED15, FED16, FED17)	4,985.-
HEXAGON Tolerance Package (TOL1, TOL1CON, TOL2, TOLPASS)	945.-
HEXAGON Complete Package (All Programs)	14,950.-

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+, FED2+, FED3+, FED4, FED5, FED6, FED7, FED9+, FED10, FED13, FED14, FED15, TOL1, TOL2.
- **Italiano**: FED1+, FED2+, FED3+, FED4, FED5, FED6, FED7, FED9+, FED13, FED14, FED17.
- **Swedish**: FED1+, FED2+, FED3+, FED5, FED6, FED7.
- **Portugues**: FED1+, FED17
- **Spanish**: FED1+, FED2+, FED3+, FED17

Updates:

Software Update (software Win32/64 + pdf manual)	40 EUR
Software Update (software 64-bit Win + pdf manual)	50 EUR

Update Mechanical Engineering Package: 800 EUR, Update Complete Package: 1200 EUR
Maintenance contract for free updates: annual fee: 150 EUR + 40 EUR per program

Hexagon Software Network Licenses
Floating License in the time-sharing manner by integrated license manager.

Conditions for delivery and payment
Delivery by Email or download (zip file, manual as pdf files): EUR 0.
General packaging and postage costs for delivery on CD-ROM: EUR 60, (EUR 25 inside Europe)
Conditions of payment: bank transfer in advance with 2% discount, or PayPal (paypal.me/hexagoninfo) net.
After installation, software has to be released by key code. Key codes will be sent after receipt of payment.

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