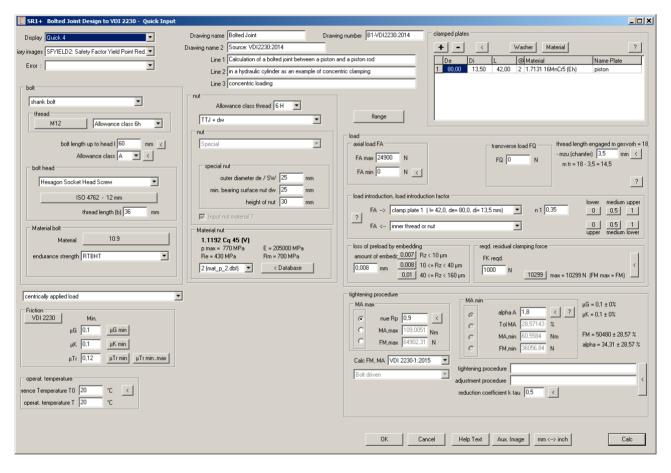
HEXAGON Info 159

Sept. / Oct. 2016

by Fritz Ruoss

SR1+: Quick Input Window

New Quick Input Window of SR1 and SR1+ integrates all former input windows in only one dialogue window.



Quick Input Window provides a new option if you want to study the influence of one or more parameters in a specific diagram: select required diagram at "Display", then change input value and click "Calc" button to actualize the diagram. Until now, you could do so with the result graphic (Quick3) only.

If you configure help level 2, Quick Input opens automatic at program start.

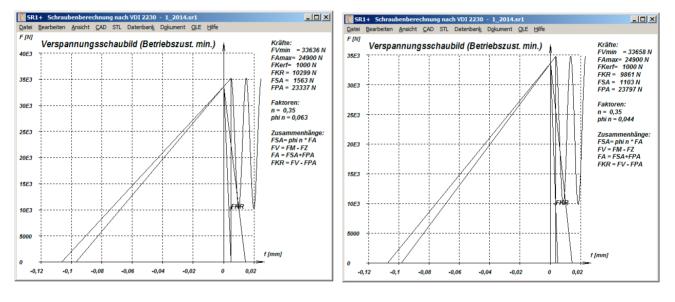
The new Quick Input window in SR1+, due to large variety of input values, became relative large, 1280x900 pixel. If you want to display it together with the graphic result window on one screen, resolution should be 2560x1080 or higher. Minimum screen resolution required for SR1+ Quick Input is 1280x1024, but in this case result graphic window is covered completely by the Quick Input window.

You can skip Quick Input, well-known input windows of earlier versions are available furthermore.

SR1+: Compare FKR in Load-Extension Diagram

A customer asked why the residual clamping load FKR is not equal with the point of intersection in the load-extension diagram, as shown in VDI2230-1 figure 2. In fact, FKR is the intersection point for TBJ with bolt, but not for TTJ. And the reason is the "supplement for plate resilience δ Pzu" (equation 80,81,82). Thus, for TTJ the axial additional load FSA no longer calculated from the ratio of δ P and δ S only, but distorted by δ Pzu. Deviation is huge, using example 1 of VDI 2230, FKR is calculated 10.3kN, but the intersection poiunt in the diagram is only 2 kN. Deformation fPA is calculated with δ P, not (δ P+ δ Pzu).

To get residual clamp load for TTJ from the intersection point of the diagram, you either must switch to TBJ, or at "Edit->Calculation method" "Elasticity" switch to "deformation sleeve (VDI2230-1986)". Then select "Load-Extension diagram->working condition min." to display residual clamp load FKR.



B1 of VDI 2230-1: FKR does not intersect in FKR

B1 as TBJ: FKR correct in intersection point

To get the required residual clamp load "FKerf" instead of "FKR", display "Load-Extension diagram->working condition reqrd.". Same situation here: intersection point is correct for TBJ, but not for TTJ.

It seems that equation (80) in VDI2230-1:2015 is wrong.

 $\Phi K = \delta P / (\delta S + \delta P)$ is the deformation ratio of plate load ratio. If " δPzu " used in numerator to increase δP , it must also be used in denominator to increase δP .

According to VDI 2230-1:2015: $\delta Pzu = (w-1)*\delta M$

According to VDI, w is the ,,joint coefficient for the type of bolted joint". w is predefined for two values only: w=2 for TTJ and w=1 for TBJ

To say it less complicated and more straightforward than VDI, without w: $\delta Pzu = \delta M$ for TTJ $\delta Pzu = 0$ for TBJ

SR1+: Calculation Method δPzu

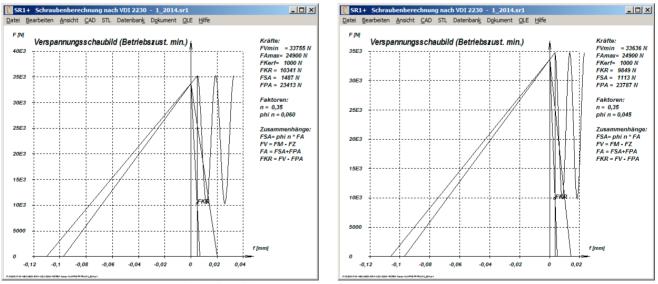
5R1+ calculation base							
Calculation base FM, MA C Elasticity C VDI 2230 : 1986 ? C VDI 2230-1:2015 C deformation cone (VDI 2230-1:2015) C	p max deformation sleeve deformation cone						
dPzu (80) VDI 2230-1:2015 ▼ TTJ -> TBJ (phiD, dw nut) dPzu (80) VDI 2230-1:2015 □ D'A max = 10 dw dP=dP+dPzu (ESV) dPzu=0	🔲 washer dwa=dw+1.6hs						
T thread length engaged to Dose	MA pre						
🔽 calc.min.thread length engag.for FSmax (=FMzul+FSA)	FA pre						
Tolerances for friction coefficients ?	Fpre						
tolerances d2, d3 for FM, MA ? max (d2=d2max, d3=d3max) Multi-bolted joint (FA,FQ,FKR = f (MV) ? No Flange VDI2230-2 (43): FAma	?						
T tightening angle incl. torsion bolt ?							
TTJ: thread engagement mgeo and mtr reduced by bolt length tolerance							
Units metric/imperial metric (mm, N, MPa, Nmm, °C)							
OK Cancel Help Text Calc							

In SR1 and SR1+, you can now configure at "calculation method":

- 1. δPzu (80) VDI2230-1:2015: phiK calculated according to VDI2230-1:2015
- 2. $\delta P = \delta P + \delta P z u$ (TTJ): if TTJ, elasticity of nut thread " $\delta P z u$ " added to δP .
- 3. δ Pzu=0: elasticity of nut thread not considered (as for TBJ).

Use default method 1 if you think that calculation according to VDI2230-1:2015 is correct.

Configure method 2 if elasticity of nut thread should be considered in δP . Configure method 3 if elasticity of nut thread should not be considered in δP .



Example 1 of VDI 2230-1 with $\delta P = \delta P + \delta P z u$

Example 1 of VDI2230-1 with δPzu=0

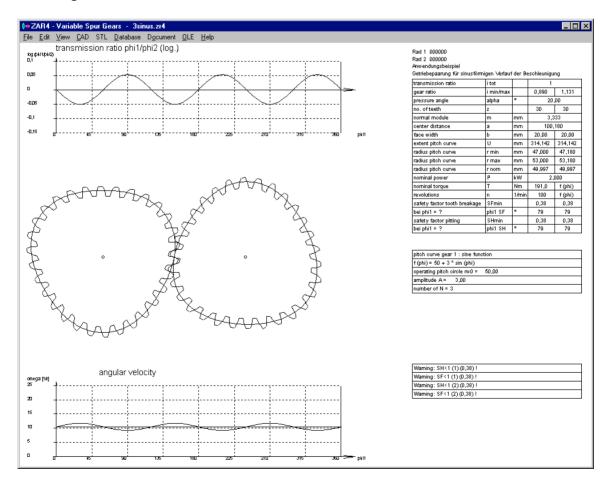
If you configure method 2 or method 3, FKR is drawn correct in the intersection point of the loadextension diagram. With method 2 (,, $\delta P = \delta P + \delta P z u^{\circ}$), FKR=10.34kN (larger than 10.3 kN of VDI). With method 3 ($\delta P z u = 0$), FKR=9.85kN (less than 10.3 kN of VDI).

ZAR4: Quick View

ZAR4 Software for noncircular spur gears got new Quick Views with drawing, diagrams and tables altogether on one screen.

¢∞ZAR4 - Variable Spur Gears - ellipsee.zr4					_ 0 >
<u>File E</u> dit <u>V</u> iew <u>C</u> AD STL <u>D</u> atabase D <u>o</u> cument <u>O</u> LE <u>H</u> elp	-				
Ellipse Gear 000000 Gear 2 000000	transmission ratio	i tot		1	
Application example	gear ratio	i min/max		0,650	1,475
fo ellipsoidal gear	pressure angle	alpha	۰	20	,00
	no. of teeth	z		30	30
pitch curve gear 1 : ellipse	normal module min.	m min	mm	2,667	2,601
half length a = 60,000	normal module max.	m max	mm	4,000	3,935
half width b = 40,000	center distance	а	mm	99,1	018
	face width	b	mm	50,00	50,00
	extent pitch curve	U	mm	304,661	304,661
	radius pitch curve	r min	mm	40,000	39,018
	radius pitch curve	r max	mm	60,000	59,018
	radius pitch curve	r nom	mm	48,488	48,488
	nominal power	Р	k₩	5,	000
	nominal torque	Т	Nm	19,1	f (phi)
AAAA	revolutions	n	1/min	500	f (phi)
	safety factor tooth breakage	SFmin		28,53	28,60
Secondary & J	bei phi1 = ?	phi1 SF	°	90	90
x3	safety factor pitting	SHmin		3,59	3,59
\checkmark \checkmark 4	bei phi1 = ?	phi1 SH	•	90	90
Esseness Barris					

For different screen size and resolutions different Quick View 1, 2, 3, 4 is provided. In Quick4 view, drawing, diagrams and tables are drawn together with an ISO 7200 drawing header. Quick View drawings can be loaded into CAD.



ZAR5: Pre-Dimension

🕘 ZAR5 drive		
drive sun wheel planet carrier ring gear Input n, T, P n 1000 /min T 9,549 Nm	driven element sun wheel planet carrier ring gear n 250 /min 67 < n < 476	safety 1
	Cancel Help Text	b/mn 15 <

In Pre-Dimension of ZAR5 you have the choice to input two of the tree values speed, torque and power, and the third value is calculated.

And you can define a coefficient for safety and ratio face width / module. Safety less than 1 calculates smaller gears, and safety > 1 calculates larger planetary gears.

WN3: Shaft Stress

If you enter torque and additional bending moment in WN3, bending moment has no influence on pressure and safety pperm/pmax. According to DIN 6892, WN3 calculates bending stress Sigmabmax at the ground of the notch in the shaft from from bending moment.

WN3 now calculates reference stress of shear stress and bending stress

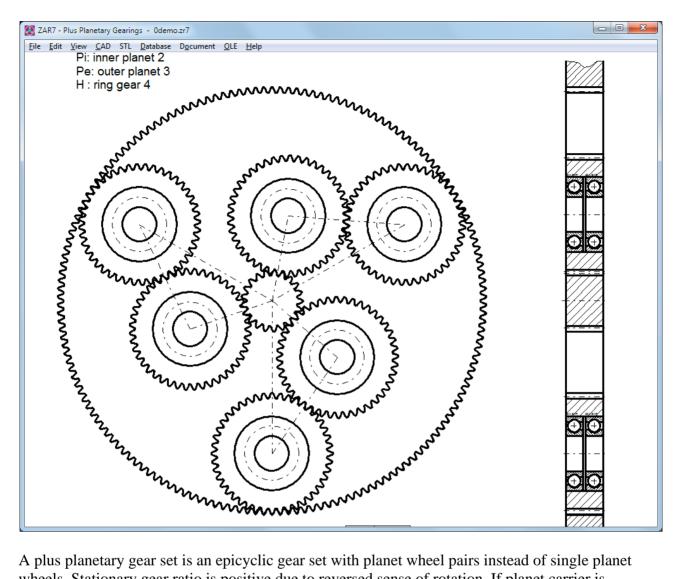
Sigmav = $\sqrt{\text{(Sigmabmax}^2 + 3 * taumax}^2)$, and shows an error message if yield point of shaft material is less than reference stress.

FED2+: Quick3 with Loop position angle

Loop position rot. angle with tolerance has been added to Quick 3 View.

FED2+	Ex	tensio	n Spring S	oftware -	0.fd2							_ 🗆 ×
<u>F</u> ile <u>E</u> dit	⊻iew	<u>C</u> AD	<u>D</u> atabase	D <u>o</u> cument	<u>O</u> LE	<u>H</u> el	р					
					LH LH LH LH LO LO R M fe LO F1 F2	$\frac{1}{1} = \frac{1}{2}$ op 1: op 2: op ro = 498 = 2,5 = 34 = 5,1 = 34 0 = 10 0 = 10 0 = 11 0 = 11 0 = 11	pic. A	9 (hoo ion: C nm 4,78 N 4,86 N 5,69 N	1	wed i		F2: 70,82 Fn: 92,33

New Software ZAR7 for Plus Planetary Gears



A plus planetary gear set is an epicyclic gear set with planet wheel pairs instead of single planet wheels. Stationary gear ratio is positive due to reversed sense of rotation. If planet carrier is blocked, sun gear and ring gear rotate in same direction.

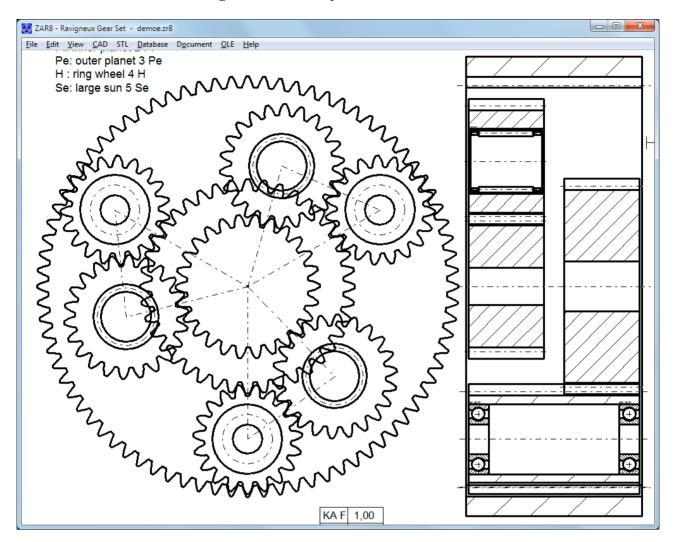
For calculation of load-bearing capacity, contact ratio, specific sliding,..., meshing gear pairs have to be calculated separately. A plus planetary gear has 3 meshes: sun wheel with inner planet wheel, inner planet wheel with outer planet wheel, outer planet wheel with ring wheel. ZAR7 calculates all gear pairs and meshes in one sequence.

Animation simulates rotating gear wheels and planet on screen.

Roller bearings for the planet wheels can be selected from included database, ZAR7 calculates bearing life expectation.

ZAR7 will be available soon.

New Software ZAR8 for Ravigneaux Planetary Gears



Ravigneaux gear sets are used in modern automatic and manual transmissions. Ravigneaux gear set is composed of two planetary gear sets: one plus planetary gear set and one simple (minus) planetary gear set. Plus and minus planetary set use a common ring gear and a common planet carrier. And the outer planet wheel of the plus planetary set is the planet wheel of the minus planetary gear set.

Ravigneaux gears have 4 ports (shafts, clutches): small sun, large sun, carrier, and ring gear. To be used as driving shaft, driven shaft, control shaft and idle shaft. If control shaft is blocked, 24 gears could be shifted in theory. Practically, Ravigneaux gears use 4 forward gears and one rear gear, and driven gear is always the ring gear.

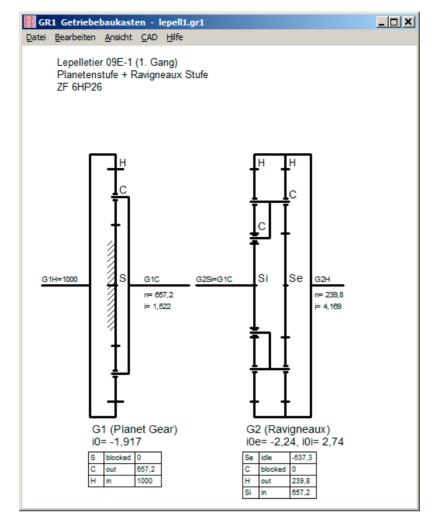
For calculation of load-bearing capacity, contact ratio, specific sliding, ..., meshing gear pairs have to be calculated separately. A Ravigneaux planetary gear has 4 meshes: small sun wheel with inner planet wheel, inner planet wheel with outer planet wheel, outer planet wheel with ring wheel, large sun wheel with outer planet.

ZAR8 calculates all gear pairs and meshes in one sequence.

Roller bearings for the planet wheels can be selected from included database, ZAR8 calculates bearing life expectation.

ZAR8 will be available soon.

New Software GR1 Gear Toolkit



GR1 calculates speed and transmission ratio of multistage gears composed of gear pairs, planetary gear sets, plus planetary gear sets, Ravigneaux planetary gear sets or Simpson planetary gear sets.

GR1 - 2		
Gear Type C Spur/Helical Gear C Planet Gear C Ravigneaux	i0e = zH/zSe (-) -2.24 < i0i = -zH/zSi (+) 2.74 < Name	n in 1000
C Simpson C Plus Planet Gear		
	Driven by	
Drive T Sun Gear Se ide Planet Carrier C blocked Ring Gear H out Sun Gear Si in		0 R © [] C 2 C 3 C 4
OK	Abbrechen <u>H</u> ilfetext	Calc

GR1 will be available soon.

Making network versions running faster

Main reason if network versions run slowly is too much network traffic: too much data sent to and requested from file server. At "File->Settings->Directories" you can configure important settings and thus make network versions faster:

FED1+ Configuration	
Directories Graphics CAD Colour Printer	Printout Settings external Drawing
	User: Fritz
Database directory (dbf)	x:\apps\hexagon\dbffed
Directory help(hlp), images(plt), demo(dem)	C:\HEXAGON\FED1\
Temporary directory	C:\TEMP\ <
.fed Directory	x:\apps\hexagon\train
CAD Directory	
HEXAGON EXE Directory	x:\apps\hexagon\fed1\
EDI Directory	
Working Directory	C:\VOL3\APPS\TP\DELPHI ?
ОК	Cancel Save Export Import

Most important setting: **Temporary directory must be a local drive!** Best choice is to configure a RAM disk.

New Option "Copy DBF -> TEMP"

Another optimization is to copy the dbf database files into a local directory and configure this local drive as database directory. But in this case an actualization problem remains: you must regularly synchronize database files, or copy from network into local drive. Therefore a new option is available now: if "copy DBF -> TEMP" is checked, dbf files are copied at program start from R/O network directory into temporary directory, and used from temp directory during the session. Using this new option, you do not have to copy dbf files nor change configurations: database directory remains the write-protected network database directory.

If you, furthermore, copy the help files (hlp, plt, dem) into a local directory and configure this local directory (Directory help, images, demo), you have only one network access at program start and the network version runs as fast as a locally installed individual license.

Printer Portrait-Landscape

When changing printer at "File->Printer", sometimes the printing orientation changed into the standard setting of the new printer. This was changed now, printing orientation portrait or landscape remains unchanged when selecting another printer.

HEXAGON PRICELIST 2016-11-01

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FED9 Version 6.0 Spiral Spring 394, FED10 Version 3.3 Leaf Spring (complex) 600, FED11 Version 3.3 Spring Lock and Bushing 210, FED12 Version 3.4 Elastomere Compression Spring 220, FED13 Version 3.4 Wave Spring Washers 185, FED14 Version 1.4 Helical Wave Spring 395, FED15 Version 1.3 Leaf Spring (simple) 180, FED16 Version 1.1 Constant Force Spring 225, GE01+ V6.1 Cross Section Calculation incl. profile database 294, GEO2 V2.6 Rotation Bodies 194, GEO2 V2.6 Rotation Bodies 194, GEO4 V4.1 Cam Software 265, VG2.1 Month Bearings 296, GI2 V2.2 Hydrodynamic Plain Journal Bearings 296, GI2 V2.2 Hydrodynamic Plain Journal Bearings 460, SR1 V22.1 Bolted Joint Design incl. Flange calculation 750, TOL1 CON V1.5 Conversion Program for TOL1 281, TOL2 V2.5 Involute Splines to DIN 5480 495, VN1 V V3.5 Conversion Program for TOL1 281, TOL2 V2.5 V4.1 Library for ISO tolerances 107, TN1 V4.0 Girder Calculation 757, WN1 V V3.6 Involute Splines to DIN 5480 250,		
FED10 Version 3.3 Leaf Spring (complex) 500 FED11 Version 3.3 Spring Lock and Bushing 210 FED12 Version 3.4 Elastomere Compression Spring 220 FED13 Version 3.4 Helical Wave Spring Washers 185 FED14 Version 1.4 Helical Wave Spring 2395 FED15 Version 1.3 Leaf Spring (simple) 180 FED16 Version 1.1 Constant Force Spring 225 GE01+ V6.1 Cross Section Calculation incl. profile database 2394 GE02 V2.6 Rotation Bodies 194 GE03 V4.1 Cross Section Calculation incl. profile database 284 GE04 V4.1 Cam Software 265 HPGL-Manager Version 9.0 383, LG1 V6.4 Roli-Contact Bearings 296 LG2 V2.2 Hydrodynamic Plain Journal Bearings 296 C2 V2.2 Hydrodynamic Plain Journal Bearings 296 C3 V2.1 Bolted Joint Design incl. Flange calculation 750 TOL1 V1.1 8 Tolerance Analysis 506 TOL1 V1.5 Conversion Program for TOL1 281 TOL2 Version 3.1 olerances 107 TR1 V4.0 Girder Calculation incl. Roli-contact Bearings 945 WN1 Version 11.6 Cylindrical and Conical Press Fits		
FED11 Version 3.3 Spring Lock and Bushing 210. FED12 Version 2.4 Elastomere Compression Spring 220. 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. HPGL-Manager Version 9.0 383. GE1 V6.4 Roll-Contact Bearings 286. GE1 V2.2 Hydrodynamic Plain Journal Bearings 460. SR1 V22.1 Bolted Joint Design incl. Flange calculation 750. TOL1 CON V1.5 Conversion Program for TOL1 281. TOL2 Version 3.3 Tolerance Analysis 495. TOL2 Version 3.3.1 Tolerance Analysis 495. TOL2 Version 3.1 Tolerance Analysis 495. TOL4 Vortiofer Calculation 757. TOL4 Version 3.1 Tolerance Analysis 495. TOL4 Version 3.3 Tolerance Analysis 495. WN2 V 9.6 Invol		
FED12 Version 2.4 Elastomere Compression Spring 220, 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 1.4 Lelical Wave Spring 225, GEO1+ V6.1 Cross Section Calculation incl. profile database 294, GEO2 V2.6 Rotation Bodies 194, GEO2 V2.6 Rotation Bodies 205, GEO4 V4.1 Cam Software 265, GEO4 V4.1 Cam Software 266, LG2 V2.2 Hydrodynamic Plain Journal Bearings 460, SR1 V22.1 Bolted Joint Design 640, SR1 V22.1 Bolted Joint Design incl. Flange calculation 750, TOL2 Version 3.3 Tolerance Analysis 506, TOL2 Version 3.3 Tolerance Analysis 495, TOL2 Version 3.3 Tolerance A		
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. FPGL-Manager Version 9.0 383. LG1 V6.4 Roll-Contact Bearings 460. SR1 V22.1 Bolted Joint Design 640. SR1 V22.1 Bolted Joint Design 640. SR1 V22.1 Bolted Joint Design incl. Flange calculation 750. TOL1 V1.8 Tolerance Analysis 506. TOL12 Version 3.3 Tolerance Analysis 495. TOL2 Version 3.3 Tolerance Analysis 495. TOL2 Version 3.3 Tolerance Analysis 495. TOL4 V1.8 Girder Calculation 757. W1 Version 11.6 Cylindrical and Conical Press Fits 485. WN2 V 9.6 Involute Splines to DIN 5480 and non-standard involute splines 380. WN3 V 5.4 Parallel Key Joints to DIN 5480 and ANSI B 92.2 M 225. WNS V 4.5 Involute Splines to DIN 5480 and ANSI B 92.2 M	FED12 Version 2.4 Electomere Compression Spring	
FED14 Version 1.4 Helical Wave Spring 395, FED15 Version 1.3 Leaf Spring (simple) 180, FED16 Version 1.0 Constant Force Spring 225, GE01+ V6.1 Cross Section Calculation incl. profile database 294, GE02 V2.6 Rotation Bodies 194, GE02 V2.6 Rotation Bodies 205, GE04 V4.1 Cam Software 205, GE04 V4.1 Cam Software 206, LG1 V6.4 Roll-Contact Bearings 296, LG2 V2.2 Hydrodynamic Plain Journal Bearings 460, SR1 + V2.1 Bolted Joint Design 640, SR1 + V2.1 Bolted Joint Design incl. Flange calculation 750, TOL1 V1.1.8 Tolerance Analysis 506, TOL2 Version 3.3 Tolerance Analysis 506, TOL2 Version 3.1 Golerance Analysis 495, TOLPASS V4.1 Library for ISO tolerances 107, TR1 V4.0 Girder 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, WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892 245, WN4 V 9, 6 Involute Splines to DIN 5480 255, WN3 V 4.5 Involute Splines to DIN 5481		
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 V4.1 Cross Section Calculation incl. profile database 295. GEO4 V4.1 Cam Software 265. HPGL-Manager Version 9.0 383. LG1 V6.4 Roll-Contact Bearings 296. LG2 V2.1 Hydrodynamic Plain Journal Bearings 460. SR1 V22.1 Bolted Joint Design 640. SR1 V22.1 Bolted Joint Design incl. Flange calculation 750. TOL1 V11.8 Tolerance Analysis 506. TOL2 Version 3.3 Tolerance Analysis 495. TOL2 Version 3.3 Tolerance Analysis 495. W11 Version 11.6 Cylindrical and Concial Press Fits 495. W11 Version 11.6 Cylindrical and Concial Press Fits 495. W11 Version 11.6 Cylindrical and Concial Press Fits 495. WN2 V 9.6 Involute Splines to DIN 5480 250. WN2 V 9.4 Inbrary for ISO tole ances 107. W11 Version 11.6 Cylindrical and Concial Press Fits 495. WN1 V 9.5 Involute Splines to DIN 5480		
FED16 Version 1.0 Constant Force Spring225,GEO1+ V6.1 Cross Section Calculation incl. profile database294,GEO2 V2.6 Rotation Bodies194,GEO3 V3.3 Hertzian Pressure205,GEO4 V4.1 Cam Software265,HPGL-Manager Version 9.0383,LG1 V6.4 Roll-Contact Bearings296,LG2 V2.2 Hydrodynamic Plain Journal Bearings460,SR1 V22.1 Bolted Joint Design640,SR1 V22.1 Bolted Joint Design incl. Flange calculation750,TOL1 V11.8 Tolerance Analysis506,TOL2 Version 3.3 Tolerance Analysis495,TOL2 Version 3.3 Tolerance Analysis495,TOL2 Version 3.3 Tolerance Analysis945,W14+ V19.8 Shaft Calculation incl. Roll-contact Bearings945,WN1 Version 11.6 Cylindrical and Conical Press Fits485,WN2+ V 9.6 Involute Splines to DIN 5480 and non-standard involute splines380,WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892245,WN4 V 4.5 Involute Splines to DIN 5480 and non-standard involute splines380,WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892245,WN4 V 4.5 Involute Splines to DIN 5480 and ANSI B 92.2 M255,WN6 V 3.0 Polygon Profiles P3G to DIN 32712175,WN8 V 2.2 Spline Shafts to DIN 5482260,WN1 V 1.3 Woodruff Key Joints240,WN1 V 1.4 Dinvolute Splines - dimensions, graphic, measure235,WN5 V 4.5 Involute Splines - dimensions, graphic, measure230,WN1 V 1.0 Material Database235,ZAR2 V7.7 Spiral Bevel		
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. GEO4 V4.1 Cam Software 265. GEO4 V4.1 Cam Software 266. GEO2 V2.2 Hydrodynamic Plain Journal Bearings 460. SR1 V22.1 Bolted Joint Design 640. SR1+ V22.1 Bolted Joint Design incl. Flange calculation 750. TOL1 V11.5 Conversion Program for TOL1 281. TOL2 Version 3.3 Tolerance Analysis 506. TOL2 Version 3.3 Tolerance Analysis 495. VDLPASS V4.1 Library for ISO tolerances 107. TR1 V4.0 Girder Calculation 757. WL1+ V19.8 Shaft Calculation incl. Roll-contact Bearings 945. WN2 V 9.6 Involute Splines to DIN 5480 250. WN2 V 9.6 Involute Splines to DIN 5480 250. WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892 245. WN4 V 4.5 Involute Splines to ISO 4156 and ANSI B 92.1 276. WN5 V 3.0		
GE02 V2.6 Rotation Bodies 194, GE03 V3.3 Herzian Pressure 205, GE04 V4.1 Cam Software 265, HPGL-Manager Version 9.0 383, LG1 V6.4 Roll-Contact Bearings 296, LG2 V2.1 Bolted Joint Design 640, SR1 V2.2.1 Bolted Joint Design incl. Flange calculation 750, TOL1 V11.8 Tolerance Analysis 506, TOL2 Version 3.3 Tolerance Analysis 495, TOL2 Version 3.3 Tolerance Analysis 495, TOL2 Version 3.3 Tolerance Analysis 495, TOLPASS V4.1 Library for ISO tolerances 107, TR1 V4.0 Girder Calculation 757, W11+ V19.8 Shaft Calculation incl. Roll-contact Bearings 945, WN2 V 9.6 Involute Splines to DIN 5480 and non-standard involute splines 380, WN3 V 5.4 Parallel Key Joints to DIN 6485, ANSI B17.1, DIN 6892 245, WN4 V 4.5 Involute Splines to INN 6485, ANSI B 92.2 M 255, WN5 V 4.5 Involute Splines to DIN 5480 107, WN5 V 2.5 Involute Splines to DIN 5481 195, WN8 V 2.2 Serration to DIN 5481 195, WN8 V 2.2 Serration to DIN 5482 260, WN8 V 2.2 Spline Shafts to DIN 1542 240, <td></td> <td></td>		
GEO3 V3.3 Hertzian Pressure 205, GEO4 V4.1 Cam Software 265, HPGL-Manager Version 9.0 383, LG2 V2.2 Hydrodynamic Plain Journal Bearings 460, SR1 V22.1 Bolted Joint Design 640, SR1 V22.1 Bolted Joint Design incl. Flange calculation 750, TOL1 V11.8 Tolerance Analysis 506, TOL2 Version 3.3 Tolerance Analysis 506, TOL2 Version 3.3 Tolerance Analysis 107, TOL4 V1.5 Conversion Program for TOL1 281, TOL2 Version 3.3 Tolerance Analysis 107, TOL4 V1.6 Girder Calculation 757, W1 Version 11.6 Cylindrical and Conical Press Fits 4485, WN1 Version 11.6 Cylindrical and Conical Press Fits 4485, 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 ISO 4156 and ANSI B 92.2 M 255, WN5 V 4.5 Involute Splines to DIN 5480 175, WN5 V 2.0 Polygon Profiles PAG to DIN 32712 175, WN4 V 3.0 Polygon Profiles PAG to DIN 32712 175, WN4 V 2.2 Spline Shafts to DIN 5482 260, WN1 V 1.		
GEO4 V4.1 Cam Software 265, HPGL-Manager Version 9.0 383, LG1 V6.4 Roll-Contact Bearings 296, LG2 V2.2 Hydrodynamic Plain Journal Bearings 460, SR1 V22.1 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, 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 5480 and non-standard involute splines 380, WN3 V 4.5 Involute Splines to DIN 5480 and ANSI B 92.2 M 226, WN5 V 4.5 Involute Splines to DIN 5480 and ANSI B 92.2 M 276, WN5 V 4.5 Involute Splines to DIN 5480 and ANSI B 92.2 M 276, WN5 V 3.0 Polygon Profiles P4C to DIN 32711 180, WN7 V 3.0 Polygon Profiles P4C to DIN 32712 175, WN8 V 2.2 Serration to DIN 5481 197, WN1V 1.0 Material Database 2		
HPGL-Manager Version 9.0383, 296, CG1 V6.4 Roll-Contact Bearings296, 296, 296, 296, 296, 297, 298, 298, 298, 298, 298, 298, 298, 299, 299, 299, 2010, 299, 2010, <b< td=""><td></td><td></td></b<>		
LG1 V6.4 Roll-Contact Bearings296,LG2 V2.2 Hydrodynamic Plain Journal Bearings4600SR1 V22.1 Bolted Joint Design640,SR1+ V22.1 Bolted Joint Design incl. Flange calculation750,TOL1 V11.8 Tolerance Analysis506,TOL2 Version 3.3 Tolerance Analysis495,TOLPASS V4.1 Library for ISO tolerances107,TR1 V4.0 Girder Calculation incl. Roll-contact Bearings945,WN1 Version 11.6 Cylindrical and Conical Press Fits485,WN2 V 9.6 Involute Splines to DIN 5480250,WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B 17.1, DIN 6892245,WN5 V 4.5 Involute Splines to ANSI B 92.1276,WN5 V 4.5 Involute Splines to ANSI B 92.1276,WN4 V 3.0 Polygon Profiles P3G to DIN 32711180,WN4 V 2.2 Septines to DIN 5481195,WN4 V 2.2 Splines to DIN 5482260,WN1 V 2.2 Splines to DIN 5482260,WN1 V 1.3 Woodruff Key Joints240,WN1 V 2.0 Involute Splines to DIN 5482260,WN1 V 2.2 Spline Shafts to DIN 150 14170,WN1 V 2.0 Serration to DIN 5482260,WN1 V 1.0 Material Database235,ZAR2 V 7.7 Spiral Bevel Gears1115,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears160,ZAR5 V4.1 Involute Porfiles - dimensions, graphic, measure235,ZAR4 V5.1 Non-circular Spur Gears164,ZAR4 V5.1 Nolute Porfiles - dimensions, graphic, measure235,ZAR4 V5.1 Non-circular Spur Gears164,ZAR5 V4.1 Involute Porfi		
LG2 V2.2 Hydrodynamic Plain Journal Bearings460,SR1 V22.1 Bolted Joint Design incl. Flange calculation750,TOL1 V11.8 Tolerance Analysis506,TOL1CON V1.5 Conversion Program for TOL1281,TOL2 Version 3.3 Tolerance Analysis495,TOLPASS V4.1 Library for ISO tolerances107,TR1 V4.0 Girder Calculation757,WL1+ V19.8 Shaft Calculation incl. Roll-contact Bearings945,WN2 V 9.6 Involute Splines to DIN 5480250,WN2 V 9.6 Involute Splines to DIN 5480 and non-standard involute splines380,WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892245,WN5 V 4.5 Involute Splines to ANSI B 92.1276,WN5 V 4.5 Involute Splines to IN 5480 and non-standard involute splines380,WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892245,WN5 V 4.5 Involute Splines to ANSI B 92.1276,WN5 V 4.5 Involute Splines to INO 4480 and NOI B 92.2 M255,WN6 V 3.0 Polygon Profiles P4C to DIN 32712175,WN8 V 2.2 Serration to DIN 5481199,WN1 V 4.0 Involute Splines - dimensions, graphic, measure230,WN11 V 1.3 Woodruff Key Joints240,WN11 V 1.3 Woodruff Key Joints240,WN11 V 1.0 Material Database235,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V4.0 Non-circular Spur Gears1610,ZAR5 V4.1 Delanetary Gearings1625,ZAR5 V1.0 Planetary Gearings1625,ZAR5 V1.1 Profiles - dimensions, graphic, measure2		-
SR1 V22.1 Bolted Joint Design640,SR1 + V22.1 Bolted Joint Design incl. Flange calculation750,TOL1 V11.8 Tolerance Analysis506,TOL2 Version 3.3 Tolerance Analysis495,TOL2 Version 3.3 Tolerance Analysis495,TOL2 Version 3.3 Tolerance Analysis495,TOLPASS V4.1 Library for ISO tolerances107,TR1 V4.0 Girder Calculation757,WL1+ V19.8 Shaft Calculation incl. Roll-contact Bearings945,WN1 Version 11.6 Cylindrical and Conical Press Fits486,WN2 V 9.6 Involute Splines to DIN 5480250,WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892245,WN4 V 4.5 Involute Splines to ANSI B 92.1276,WN5 V 4.5 Involute Splines to ISO 4156 and ANSI B 92.2 M255,WN6 V 3.0 Polygon Profiles P3G to DIN 32711180,WN8 V 2.2 Serration to DIN 5481195,WN8 V 2.2 Spline Shafts to DIN 140170,WN1 V 1.3 Woodruff Key Joints240,WNXE V 2.0 Involute Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR2 V7.7 Spiral Bevel Gears404,ZAR4 V5.0 Non-circular Spur Gears404,ZAR4 V5.0 Non-circular Spur Gears404,ZAR4 V5.1 Involute Profiles - dimensions, graphic, measure235,ZAR4 V5.1 Non-circular Spur Gears404,ZAR4 V5.1 Non-circular Spur Gears404,ZAR4 V5.1 Non-circular Spur Gears404,ZAR4 V5.1 Non-circular Spur Gears585,ZAR4 V5.1 Non-circular Spur Gears585,		
SR1+ V22.1 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, WN3 V 5.4 Parallel Key Joints 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, WN5 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 Seriation to DIN 5481 195, WN1 V 1.3 Woodruff Key Joints 240, WNXK V 2.0 Involute Splines - dimensions, graphic, measure 375, WNXK V 2.0 Involute Splines - dimensions, graphic, measure 230, WXXK V 2.0 Seriation Splines - dimensions, graphic, measure 230,		
TOL1 V11.8 Tolerance Analysis506,TOL1CON V1.5 Conversion Program for TOL1281,TOL2 Version 3.3 Tolerance Analysis495,TOLPASS V4.1 Library for ISO tolerances107,TR1 V4.0 Girder Calculation757,WL1+ V19.8 Shaft Calculation incl. Roll-contact Bearings945,WN1 Version 11.6 Cylindrical and Conical Press Fits485,WN2 V 9.6 Involute Splines to DIN 5480 and non-standard involute splines380,WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892245,WN4 V 4.5 Involute Splines to ANSI B 92.1276,WN5 V 4.5 Involute Splines to SISO 4156 and ANSI B 92.2 M255,WN6 V 3.0 Polygon Profiles P4C to DIN 32711180,WN7 V 3.0 Polygon Profiles P4C to DIN 32712175,WN8 V 2.2 Serration to DIN 5481195,WN11 V 1.3 Woodruff Key Joints240,WNXE V 2.0 Involute Splines - dimensions, graphic, measure237,WNXE V 2.0 Serration Splines - dimensions, graphic, measure237,ZAR2 V7.7 Spiral Bevel Gears240,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR4 V5.1 Non-circular Spur Gears1610,ZAR4 V5.1 Non-circular Spur Gears585,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		
TOL1CON V1.5 Conversion Program for TOL1281,TOL2 Version 3.3 Tolerance Analysis495,TOLPASS V4.1 Library for ISO tolerances107,TR1 V4.0 Girder Calculation757,WL1+ V19.8 Shaft Calculation incl. Roll-contact Bearings945,WN1 Version 11.6 Cylindrical and Conical Press Fits485,WN2 V 9.6 Involute Splines to DIN 5480250,WN3 V 5.4 Parallel Key Joints to DIN 5480 and non-standard involute splines380,WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892245,WN4 V 4.5 Involute Splines to ANSI B 92.1276,WN5 V 4.5 Involute Splines to ISO 4156 and ANSI B 92.2 M255,WN6 V 3.0 Polygon Profiles P3G to DIN 32711180,WN7 V 3.0 Polygon Profiles P4C to DIN 32712175,WN8 V 2.2 Seriation to DIN 5481196,WN1 V 4.0 Involute Splines to DIN 5482260,WN1 V 4.0 Involute Splines to DIN 5482260,WN1 V 1.3 Woodruff Key Joints240,WNXE V 2.0 Involute Splines - dimensions, graphic, measure375,WNXK V 2.0 Seriation Splines - dimensions, graphic, measure230,WST1 V 1.0. Material Database235,ZAR1 + V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR4 V5.1 Non-circular Spur Gears585,ZAR4 V5.1 Involute Profiles - dimensions, graphic, measure585,ZAR4 V5.1 Involute Profiles - dimensions, graphic, measure585,ZAR4 V5.1 Involute P		
TOL2 Version 3.3 Tolerance Analysis495,TOLPASS V4.1 Library for ISO tolerances107,TR1 V4.0 Girder Calculation757,WL1+ V19.8 Shaft Calculation incl. Roll-contact Bearings945,WN1 Version 11.6 Cylindrical and Conical Press Fits485,WN2 V 9.6 Involute Splines to DIN 5480250,WN2 V 9.6 Involute Splines to DIN 5480 and non-standard involute splines380,WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892245,WN4 V 4.5 Involute Splines to ANSI B 92.1276,WN5 V 4.5 Involute Splines to ISO 4156 and ANSI B 92.2 M255,WN6 V 3.0 Polygon Profiles P3G to DIN 32711180,WN7 V 3.0 Polygon Profiles P4C to DIN 32712175,WN8 V 2.2 Serration to DIN 5481195,WN9 V 2.2 Spline Shafts to DIN 1SO 14170,WN11 V 1.3 Woodruff Key Joints240,WNXK V 2.0 Involute Splines - dimensions, graphic, measure230,WST V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V1.1.0 Planetary Gearings585,ZARAY V2.1 Involute Profiles - dimensions, graphic, measure235,ZAR1V V2.1 Involute Profiles - dimensions, graphic, measure235,ZAR4 V5.1 Nolute Profiles - dimensions, graphic, measure585,ZAR4 V5.1 Nolute Profiles - dimensions, graphic, measure585,ZAR4 V5.1 Novolute Profiles - dimensions, graphic, measure585,<		
TOLPASS V4.1 Library for ISO tolerances107,TR1 V4.0 Girder Calculation757,WL1+ V19.8 Shaft Calculation incl. Roll-contact Bearings945,WN1 Version 11.6 Cylindrical and Conical Press Fits485,WN2 V 9.6 Involute Splines to DIN 5480250,WN2 V 9.6 Involute Splines to DIN 5480 and non-standard involute splines380,WN3 V 5.4 Parallel Key Joints to DIN 6885, ANSI B17.1, DIN 6892245,WN4 V 4.5 Involute Splines to ANSI B 92.1276,WN5 V 4.5 Involute Splines to ISO 4156 and ANSI B 92.2 M255,WN6 V 3.0 Polygon Profiles P3G to DIN 32711180,WN7 V 3.0 Polygon Profiles P4C to DIN 32712175,WN8 V 2.2 Serration to DIN 5481195,WN9 V 2.2 Spline Shafts to DIN ISO 14170,WN10 V 4.0 Involute Splines - dimensions, graphic, measure230,WST1 V 1.0.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1355,ZAR4 V5.1 nvolute Profiles - dimensions, graphic, measure235,ZAR4 V5.1 Nolute Profiles - dimensions, graphic, measure235,ZAR1 V 1.0 Planetary Gearings1355,ZAR4 V5.1 Nolute Profiles - dimensions, graphic, measure235,ZAR4 V5.1 Nvolute Profiles - dimensions, graphic, measure235,ZAR4 V5.1 Nvolute Profiles - dimensions, graphic, measure235,ZAR1 V 1.7 Gear Wheel Dimensions, tolerances, measure240,ZAR1 V5.1 Nvolute Profiles - dimensions		
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WN4 V 4.5 Involute Splines to ANSI B 92.1276,WN5 V 4.5 Involute Splines to ISO 4156 and ANSI B 92.2 M255,WN6 V 3.0 Polygon Profiles P3G to DIN 32711180,WN7 V 3.0 Polygon Profiles P4C to DIN 32712175,WN8 V 2.2 Serration to DIN 5481195,WN9 V 2.2 Spline Shafts to DIN ISO 14170,WN10 V 4.0 Involute Splines to DIN 5482260,WN11 V 1.3 Woodruff Key Joints240,WNXK V 2.0 Serration Splines - dimensions, graphic, measure375,WNXK V 2.0 Serration Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		380,-
WN5 V 4.5 Involute Splines to ISO 4156 and ANSI B 92.2 M255,WN6 V 3.0 Polygon Profiles P3G to DIN 32711180,WN7 V 3.0 Polygon Profiles P4C to DIN 32712175,WN8 V 2.2 Serration to DIN 5481195,WN9 V 2.2 Spline Shafts to DIN ISO 14170,WN10 V 4.0 Involute Splines to DIN 5482260,WNXE V 2.0 Involute Splines - dimensions, graphic, measure375,WNXK V 2.0 Involute Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZARA V5.1 Nuolute Profiles - dimensions, graphic, measure275,ZARA V5.2 Nuon-circular Spur Gears1355,ZARA V5.1 Nuolute Profiles - dimensions, graphic, measure275,ZAR4 V5.0 Non-circular Spur Gears1355,ZAR4 V5.0 Non-circular Spur Gears585,ZAR4 V5.0 Non-circular Spur Gears585,ZAR4 V5.1 Nuolute Profiles - dimensions, graphic, measure275,ZAR4 W V1.7 Gear Wheel Dimensions, tolerances, measure450,		
WN6 V 3.0 Polygon Profiles P3G to DIN 32711180,WN7 V 3.0 Polygon Profiles P4C to DIN 32712175,WN8 V 2.2 Serration to DIN 5481195,WN9 V 2.2 Spline Shafts to DIN ISO 14170,WN10 V 4.0 Involute Splines to DIN 5482260,WN11 V 1.3 Woodruff Key Joints240,WNXK V 2.0 Involute Splines - dimensions, graphic, measure375,WNXK V 2.0 Serration Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZARAP V2.1 Involute Profiles - dimensions, graphic, measure585,ZARAP V2.1 Involute Profiles - dimensions, graphic, measure450,		276,-
WN7 V 3.0 Polygon Profiles P4C to DIN 32712175,WN8 V 2.2 Serration to DIN 5481195,WN9 V 2.2 Spline Shafts to DIN ISO 14170,WN10 V 4.0 Involute Splines to DIN 5482260,WN11 V 1.3 Woodruff Key Joints240,WNXE V 2.0 Involute Splines - dimensions, graphic, measure375,WNXK V 2.0 Serration Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZARAP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR3 V8.9 VV1.7 Gear Wheel Dimensions, graphic, measure240,Y1.7 Gear Wheel Dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		
WN8 V 2.2 Serration to DIN 5481195,WN9 V 2.2 Spline Shafts to DIN ISO 14170,WN10 V 4.0 Involute Splines to DIN 5482260,WN11 V 1.3 Woodruff Key Joints240,WNXE V 2.0 Involute Splines - dimensions, graphic, measure375,WNXK V 2.0 Serration Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR5 V11.0 Planetary Gearings1355,ZAR4 V5.0 Non-circular Spur Gears585,ZAR4 V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		180,-
WN9 V 2.2 Spline Shafts to DIN ISO 14170,WN10 V 4.0 Involute Splines to DIN 5482260,WN11 V 1.3 Woodruff Key Joints240,WNXE V 2.0 Involute Splines - dimensions, graphic, measure375,WNXK V 2.0 Serration Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		175,-
WN10 V 4.0 Involute Splines to DIN 5482260,WN11 V 1.3 Woodruff Key Joints240,WNXE V 2.0 Involute Splines - dimensions, graphic, measure375,WNXK V 2.0 Serration Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		195,-
WN11 V 1.3 Woodruff Key Joints240,WNXE V 2.0 Involute Splines - dimensions, graphic, measure375,WNXK V 2.0 Serration Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		170,-
WNXE V 2.0 Involute Splines - dimensions, graphic, measure375,WNXK V 2.0 Serration Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		260,-
WNXK V 2.0 Serration Splines - dimensions, graphic, measure230,WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		240,-
WST1 V 10.0 Material Database235,ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		375,-
ZAR1+ V 25.3 Spur and Helical Gears1115,ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		230,-
ZAR2 V7.7 Spiral Bevel Gears to Klingelnberg792,ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		235,-
ZAR3 V8.9 Worm Gears404,ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		1115,-
ZAR4 V5.0 Non-circular Spur Gears1610,ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		792,-
ZAR5 V11.0 Planetary Gearings1355,ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,		404,-
ZAR6 V3.7 Straight/Helical/Spiral Bevel Gears585,ZARXP V2.1 Involute Profiles - dimensions, graphic, measure275,ZAR1W V1.7 Gear Wheel Dimensions, tolerances, measure450,	ZAR4 V5.0 Non-circular Spur Gears	1610,-
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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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