W N 1 4

Software for Polygon Profiles
PnC (incl. P4C)

for Windows
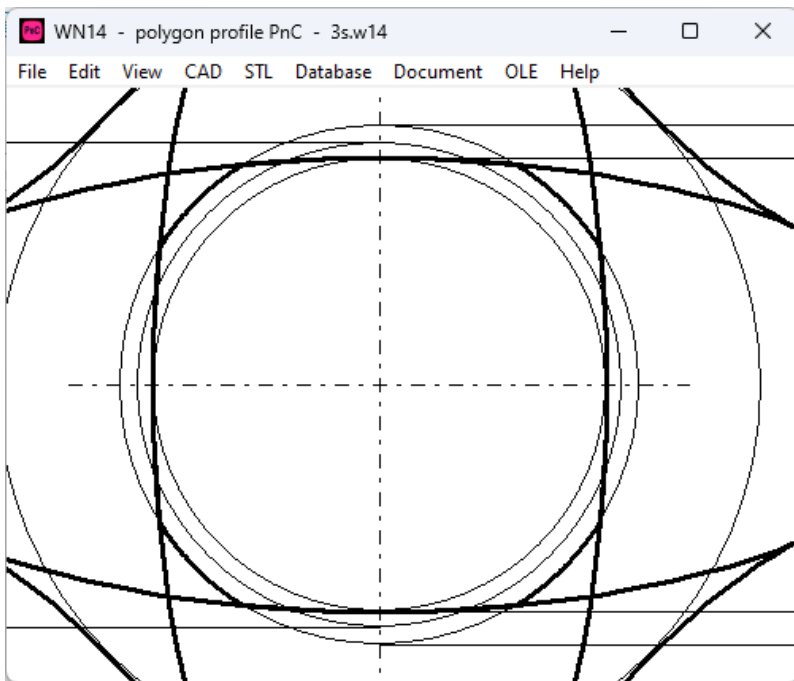
PnC Calculation

WN14 calculates dimensions, tolerances, stress and safety factors for PnC polygon profiles, inclusive P4C according to DIN 32712. Polygon trochoide profiles with other number of teeth (P2C, P3C, P5C, P6C) can also be calculated. P4C sizes according to DIN 32712 (size 14 mm to 180 mm) can be selected from database. The database may be extended by the user.
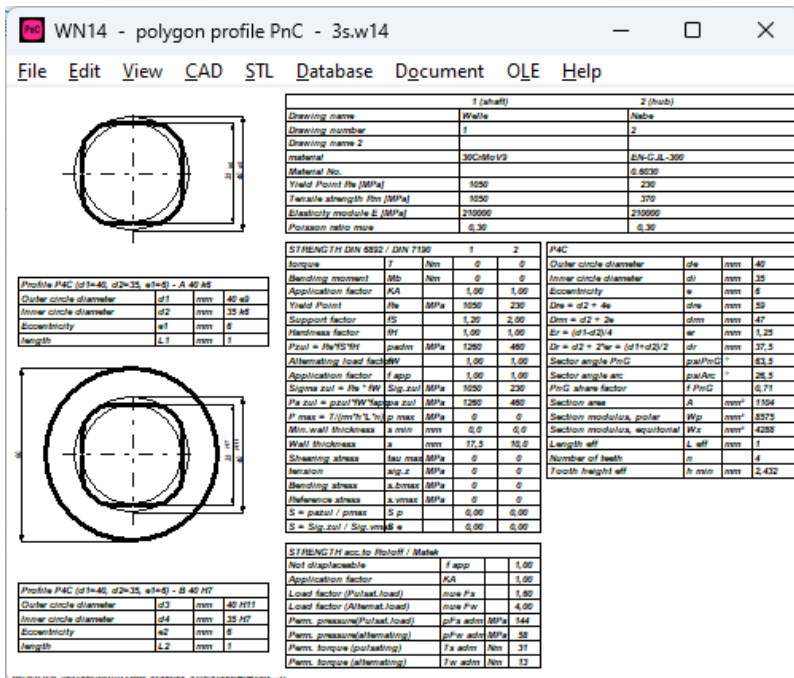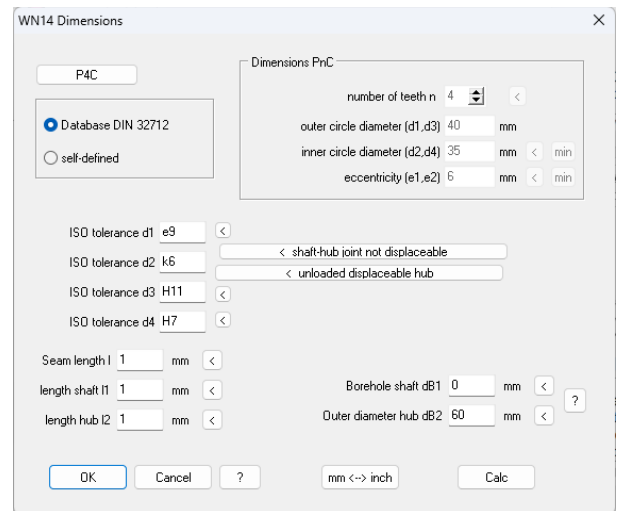
Pre-Dimensioning

Enter torque, select material and application: WN14 calculates minimum size required for a PnC shaft-hub joint.
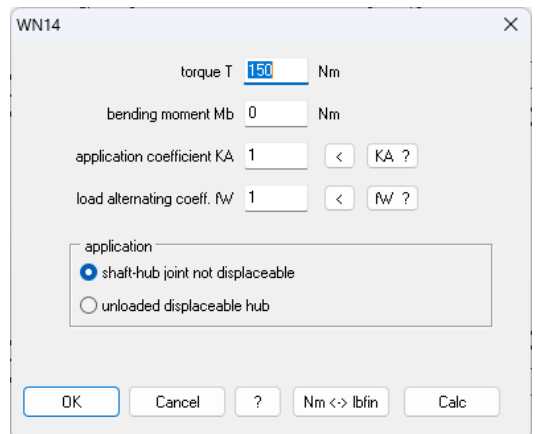
WN14 - polygon profile PnC - p4c.w14

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STRENGTH DIN 6892 / DIN 7190			1	2
torque	T	Nm	150	150
Bending moment	Mb	Nm	0	0
Application factor	KA		1,00	1,00
Yield Point	Re	MPa	300	300
Tensile strength	Rm	MPa	300	300
Support factor	fS		0,90	0,90
Hardness factor	fH		1,00	1,00
Pzul = Re*fS*fH	padm	MPa	270	270
Sigma zul = Re * fW	Sig.zul	MPa	300	300
Pa zul = pzul * fW * fapp	pa zul	MPa	270	270
P max = T / (rm * h * L * n)	p max	MPa	84	84
H = d1min - d4max	h	mm	1,94	1,94
Dm = (d1+d2)/2, rm = dm / 2	dm	mm	23,0	23,0
DAa = dB2	DAa	mm		32,0
QA = dm / DAa	QA			0,719
SigmatAl = pmax * (1+QA²) / (1-QA²)	Sig.tAl	MPa		263
SigmarAl = -pmax	Sig.rAl	MPa		-84
SigmavAl = SQRT(sig.t² + sig.r² - sig.t*sig.r)	Sig.vAl	MPa		314
QA max = SQRT((Re2-pmax) / (Re2+pmax))	QA max			0,750
DAa min = dm / QAmax	dAamin	mm		30,7
S min = (dAa min - dmax) / 2	s min	mm		3,83
S = (dB2 - d3) / 2	s	mm		3,50
Wt > pi/16 * dmin^3	Wp	mm³	1852	
Wb > pi/32 * dmin^3	Wx	mm³	926	
Tau max = T / Wt	tau max	MPa	81	
Sigma z max = sigma tAl	sig.z	MPa	-84	263
Sigma b max = Mb / Wb	sig.bmax	MPa	0	0
Sigma v = sigma z max + sigma b max	sig.vmax	MPa	140	263
S = pazul / pmax	S p		3,22	3,22
S = Sig.zul / Sig.vmax	S e		2,14	1,14

Profile P4C (d1=25, d2=21, e1=5) - A 25 k6			
Outer circle diameter	d1	mm	25 e9
Inner circle diameter	d2	mm	21 k6
Eccentricity	e1	mm	5
length	L1	mm	25

Profile P4C (d1=25, d2=21, e1=5) - B 25 H7			
Outer circle diameter	d3	mm	25 H11
Inner circle diameter	d4	mm	21 H7
Eccentricity	e2	mm	5
length	L2	mm	25

Warning: Sig.vAl > Rm !
Warning: s < smin ! (2)

WN14 - polygon profile PnC - p3c.w14

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Profile P3C (d1=25, d2=20, e1=4) - A 25 k6			
Outer circle diameter	d1	mm	25 e9
Inner circle diameter	d2	mm	20 k6
Eccentricity	e1	mm	4
length	L1	mm	25

WN14 - polygon profile PnC - p2c.w14

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STRENGTH DIN 6892 / DIN 7190			1	2
material				
torque	T	Nm	150	150
Bending moment	Mb	Nm	0	0
Application factor	KA		1,00	1,00
Yield Point	Re	MPa	370	370
Support factor	fS		1,00	1,00
Hardness factor	fH		1,00	1,00
Pzul = Re*fS*fH	padm	MPa	370	370
S = pazul / pmax	S p		4,57	4,57
S = Sig.zul / Sig.vmax	S e		1,66	1,73

Profile P2C (d1=25, d2=18, e1=4) - A 25 k6			
Outer circle diameter	d1	mm	25 e9
Inner circle diameter	d2	mm	18 k6
Eccentricity	e1	mm	4
length	L1	mm	25

Profile P2C (d1=25, d2=18, e1=4) - B 25 H7			
Outer circle diameter	d3	mm	25 H11
Inner circle diameter	d4	mm	18 H7
Eccentricity	e2	mm	4
length	L2	mm	25

Strength Calculation
WN14 calculates pressure, tension, torsional stress, bending stress, and equivalent stress according to DIN 6892 (pressure) and DIN 7190 (stress spectrum).

Material Database
Materials for shaft and hub can be selected from the integrated material database with 900 steel and non-iron materials.

material shaft
File View Help

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IDENT	MATERIAL	MAT_NR	NR	RM	RE	E_MODUL	A5	Z
1.0312	DC05	1.0312	1	300	160	210000	40	
1.0330	DC01 (St 2; St 12)	1.0330	1	330	280	210000	28	
1.0332	DD11 (StW 22)	1.0332	1	300	250	210000	28	
1.0333	DC03G1 (USt3;USt13	1.0333	1	300	250	210000	28	
1.0334	DD12G1 (UStW 23)	1.0334	1	390	300	210000	22	
1.0335	DD13 (StW 24)	1.0335	1	300	250	210000	33	
1.0338	DC04 (St4; St14)	1.0338	1	310	180	210000	38	
1.0345	P235GH (H I)	1.0345	3	360	235	210000	25	
1.0347	DC03 (RRSt 13)	1.0347	1	320	200	210000	34	
1.0389	DD14	1.0389	1	280	220	210000	36	
1.0398	DD12	1.0398	1	300	240	210000	30	
1.0401	C15	1.0401	7	740	440	208000	12	
1.0402	C22	1.0402	13	500	340	210000	20	
1.0402+N	C22+N	1.0402+N	13	430	240	210000	24	
1.0406	C25	1.0406	13	550	370	210000	19	
1.0406+N	C25+N	1.0406+N	13	470	260	210000	22	
1.0420	GE200 (GS-38)	1.0420	42	380	200	210000	25	
1.0425	P265GH (H II)	1.0425	3	410	265	210000	23	

Production Drawing
PnC dimension table together with PnC profile in an ISO 7200 drawing header may be printed directly, or exported to CAD via DXF-/IGES interface. Drawing name, date, users and modifications are described in WN14.

CAD Interface
WN14 generates a true scale PnC profile as DXF or IGES file to be used in CAD or CNC system. Resolution and tolerances can be configured.

STL Interface
WN14 generates a true scale 3D model of shaft and hub, ready to be produced by means of any 3D printer.

User Interface
The dialogue windows of WN14 allow even the less experienced PC user to find his way around the program quickly. WN14 provides users with a help text. When the demo mode is selected, WN14 runs through a demo program in which an example calculation is performed. WN14 contains auxiliary pictures with geometrical signs and formulas used by the program.

System Requirements
WN14 is available as 32-bit app or as 64-bit app for Windows 11, Windows 10, Windows 7.

Scope of Delivery
WN14 Software with user manual (pdf), example applications and help images, non-expiring license for unlimited time use with update rights.

Software Maintenance
HEXAGON Software is continuously improved and updated. Registered users are regularly kept informed of updates and new editions.

Guarantee
HEXAGON gives a 24 month guarantee on full functionality of the software.