

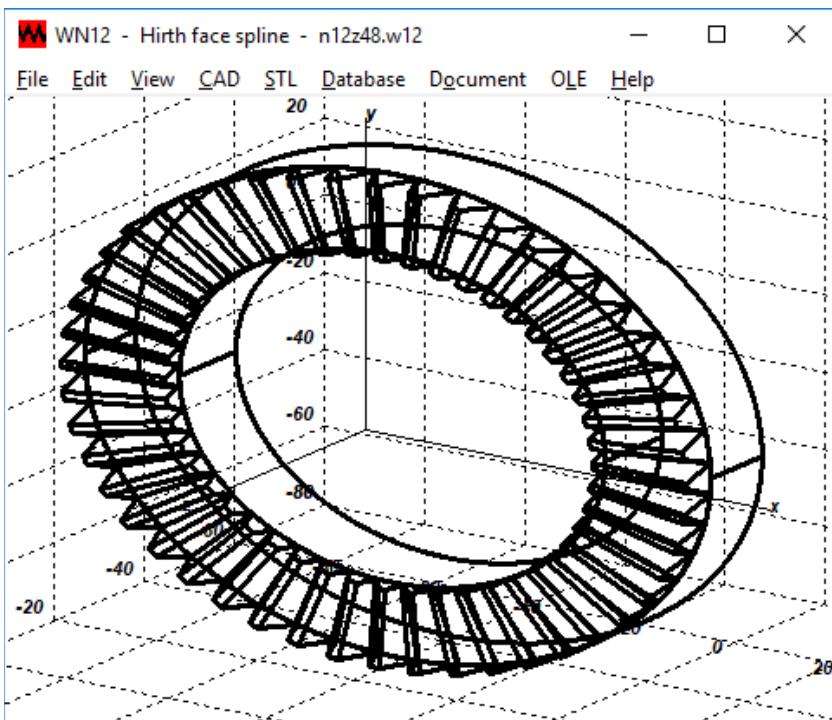
# WN12



www.hexagon.de

## Software for Face Splines (Hirth Axial Spline)

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### Calculation and Design

WN12 calculates dimensions and strength of Hirth face splines. WN12 calculation is not restricted to 60 deg tooth gap angle. Input dimensions are inner and outer ring diameter, number of teeth, tooth root fillet, tip clearance, and tooth gap angle.

WN12 calculates pressure area, permissible flank pressure and safety coefficient from torque, axial preload and material data.

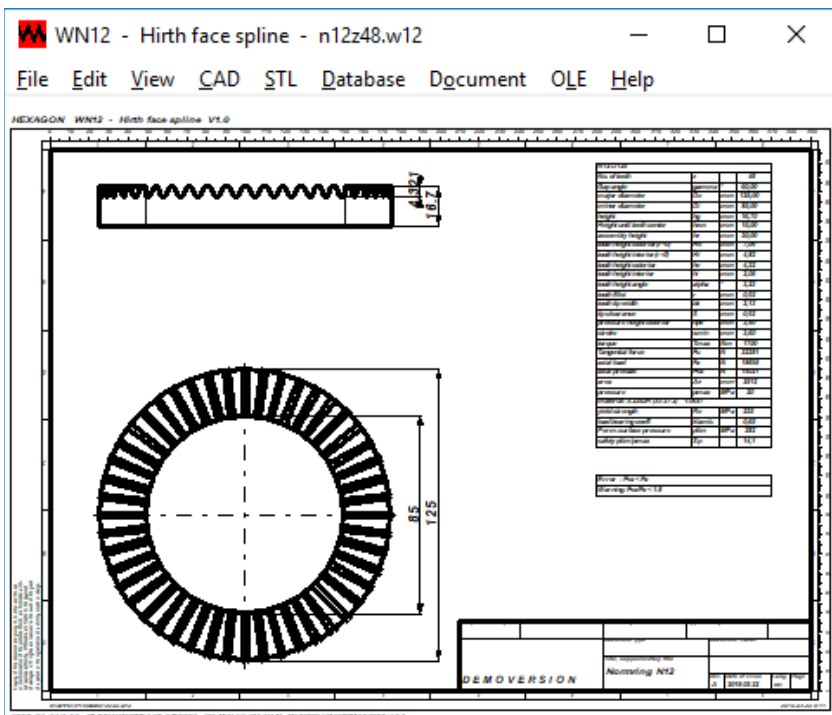
WN12 generates drawings (2D and 3D) that can be used with CAD. A model with face spline can be produced with 3D printer by means of a STL file generated by WN12.

### Dimensions

Standard dimensions and sizes can be loaded from database, or you enter dimensions for self-defined face splines directly.

### Database Dimensions

Database provides standard rings with Hirth face spline of external diameter 50 mm until 900 mm. Database may be modified and extended by user.



DE	Z	DI	HZM	HG	NAME	TORQUE
50	12	20	10	13,1	HS-212	340
50	24	20	10	11,6	HS-224	340
50	36	20	10	11,2	HS-236	340
50	48	20	10	10,7	HS-248	340
50	60	20	10	10,4	HS-260	340
100	24	60	12,5	14,5	M10	940
100	36	60	12,5	14,5	M10	940
100	48	60	12,5	14,1	M10	940
100	60	60	12,5	13,6	M10	940
100	72	60	12,5	13,7	M10	940
125	36	85	15	17,3	M12	1700
125	48	85	15	16,7	M12	1700
125	60	85	15	16,6	M12	1700
125	72	85	15	16,6	M12	1700
125	96	85	15	16,1	M12	1700
160	48	120	15	17,1	M16	2260
160	60	120	15	16,8	M16	2260
160	72	120	15	16,8	M16	2260

### Material Database

The material database includes material data of 900 steel and non-iron materials.

You can select material from database or input material data directly.

WN12 - Hirth face spline - n12z48.w12

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N12-D125			N12-D125				
No. of teeth	z	48	Torque	Tmax	Nm	1700	
Gap angle	gamma	°	80,00	axial preload	Fva	N	14021
major diameter	De	mm	125,00	material: S235JR (St 37-2)	1.0037		
minor diameter	Di	mm	85,00	yield strength	Re	MPa	235
Height until teeth center	hzm	mm	15,00	load bearing coeff.	klamb.		0,65

Symbol	Formula	Result	Unit
beta	beta=gamma/2	30	°
He	He=pi/2*tan(beta)*De/z	7,085	mm
Hi	Hi=pi/2*tan(beta)*Di/z	4,818	mm
Hm	Hm=(He+Hi)/2	5,952	mm
alpha	alpha=arctan(pi*tan(beta)/z)/2	3,234	°
lr	lr=Hm/sin(beta)	1,843	mm
lrs	lrs=r*(1/sin(beta)-1)+s	1,843	mm
hpe	hpe=He-2*lrs	3,4	mm
hpi	hpi=Hi-2*lrs	1,133	mm
he	he=He-lrs-lr+r	4,321	mm
hi	hi=Hi-lrs-lr+r	4,321	mm
la	la=Hm-2*lrs*cos(beta)	2,617	mm
bk	bk=tan(beta)*2*lrs	2,128	mm
hz	hz=2*hzm	30	mm
hg	hg=hzm-lrs+ha/2	30	mm
Fu	Fu=4*Tmax/(De+Di)	32381	N
Fa	Fa=Fu*tan(beta)	18895	N
Az	Az=la*(De-Di)/2*z	2512	mm²
pmax	pmax=(Fva+Fa)/Az/klamb	20,03	MPa
plm	plm=Re*th*fs	282	MPa
Sp	Sp=plm/pmax	14,08	

### Strength Calculation

From peak torque, axial preload, material data and load distribution factor, WN12 calculates flank pressure and safety coefficient.

### Calculation Sheet

Cause no ISO standard exists for face splines until now, WN12 displays a screen with terms and formulas used for calculation.

### Quick View

Quick View shows face spline drawing and tables with essential dimensions and calculation results on one screen.

### Text Output

Input data and calculation results may be printed, saved as text file or HTML file, or exported to MS Excel via OLE interface.

### Drawings and Tables

WN12 generates true-scale drawings of the face spline to be printed or loaded into CAD. Also tables with dimensions and calculation results.

WN12 - Hirth face spline - n12z48.w12

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N12-D125			
No. of teeth	z	48	
Gap angle	gamma	°	80,00
major diameter	De	mm	125,00
minor diameter	Di	mm	85,00
height	hg	mm	15,00
Height until teeth center	hzm	mm	15,00
tooth height exterior	He	mm	7,09
tooth height interior	Hi	mm	4,82
tooth height addendum	he	mm	4,32
tooth height insenor	hi	mm	2,05
tooth height angle	alpha	°	3,23
tooth fillet	r	mm	0,32
tooth tip width	bk	mm	2,13
tip clearance	s	mm	0,32
pressure height exterior	hpe	mm	3,40

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### Production Drawing

A table drawing with A4 drawing header according to ISO 7200 includes profile drawings and tables with dimensions of the face spline. Production drawing may be printed directly, or exported to CAD via DXF or IGES interface.

### STL-Model for 3D Printer

A 3D STL model of the face splined rings is generated by WN12 and can be produced on your 3D printer.

### Export Formats

DXF, IGES, STL, HTML, TXT, DBF, Excel, W12.

### HEXAGON Help System

WN12 provides help text and auxiliary images. Warnings and error messages occur if exceeding a limit. For error messages you can have a description and remedy suggestion.

### Units

Units can be switched between metric (mm) and imperial (inches).

### System Requirements

WN12 is available as 32-bit app or as 64-bit app for Windows 10, 8, 7, Vista, XP.

### Scope of Delivery

Program with example applications and help images, user manual (pdf), license agreement for an indefinite period of time.

### Guarantee

HEXAGON gives a 24 month guarantee on full functionality of the software. We provide support by email and hotline without extra charge. Registered users will be informed about news and updates.