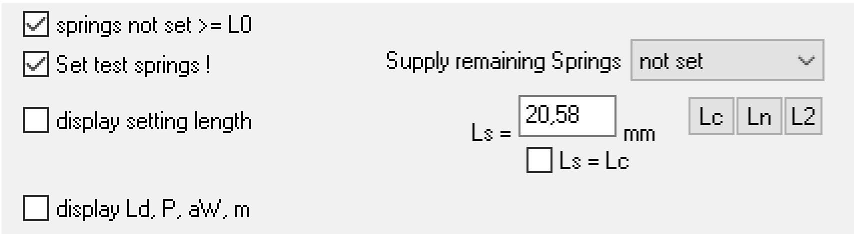
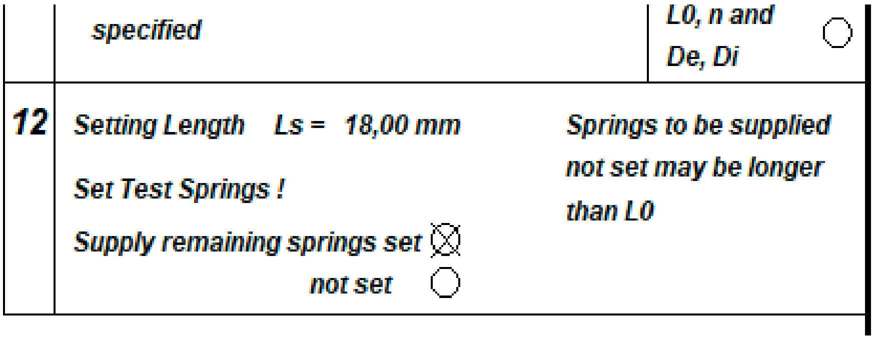
HEXAGON Newsletter 197 Jan./Feb. 2023

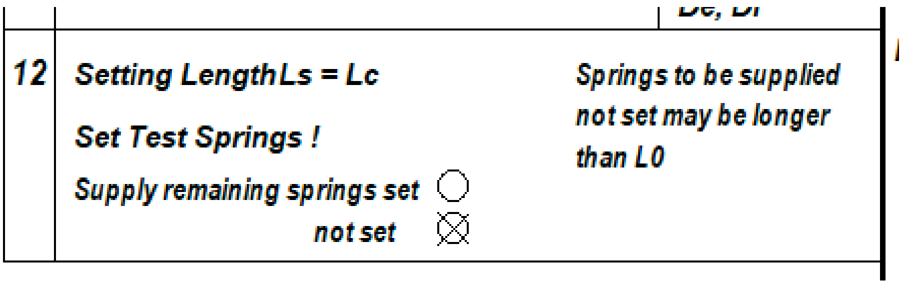
by Fritz Ruoss

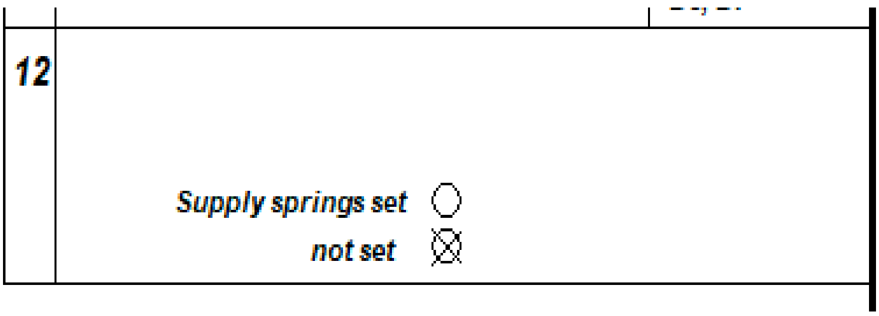
FED1+, FED5, FED6, FED7, FED17: „Set Spring“ Options in Production Drawing



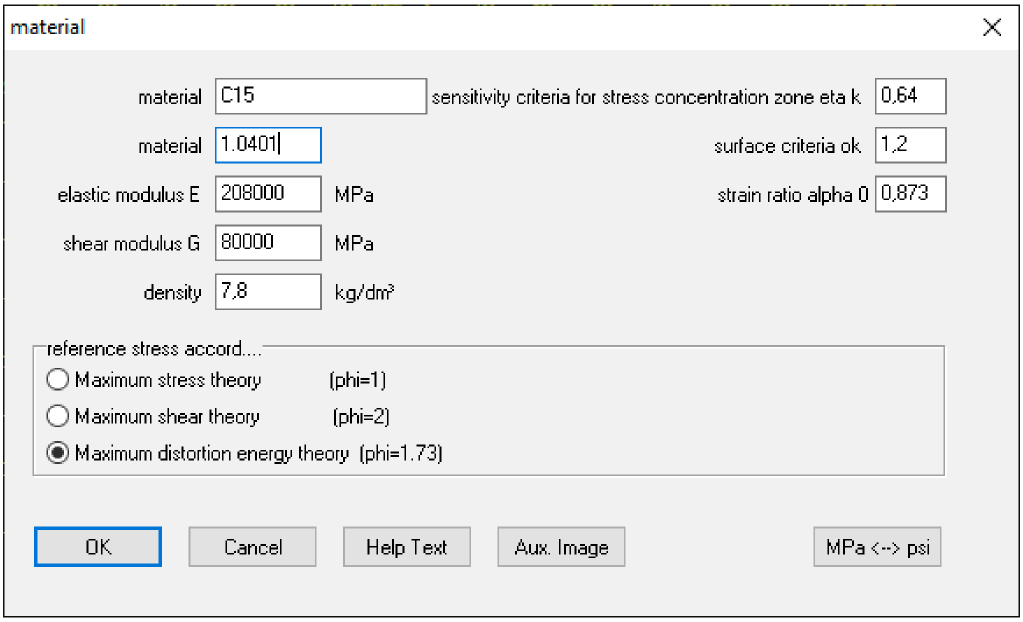
Under „Edit\Production drawing” you can now click whether the texts "Set test springs!" and "Springs to be supplied not set may be longer than L0" should be displayed. If the springs are not set, you can hide the text.



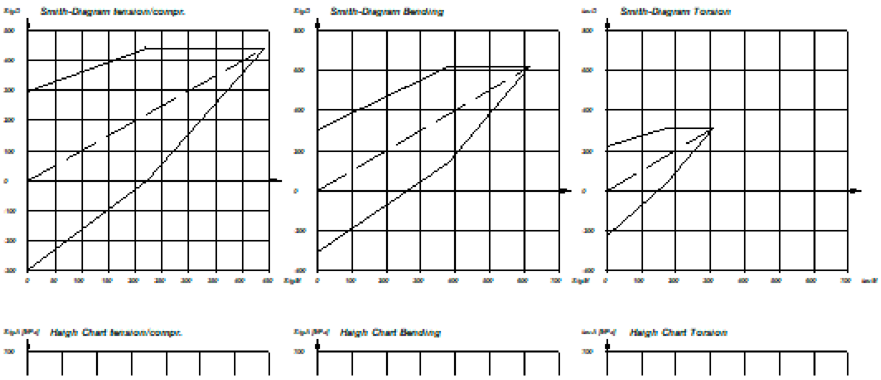




WL1+, TR1: Input Material Number



The entry of the material number was added to the material data input and saved as well (material number was previously taken from the WST1 database when the material was selected, but could not be entered or edited in the individual entry).



C15	1.0401	
E	MPa	208000
G	MPa	80000
rho	kg/dm3	7,80
Rm	MPa	740
Re	MPa	440
sig.W	MPa	296
sig.Sch	MPa	440
sig.bF	MPa	616
sig.bW	MPa	303
sig.bSch	MPa	516
tau tF	MPa	308
tau W	MPa	222
tau sch	MPa	296

SR1/SR1+: Thread Strip Safety Warnings and Errors

There are 2 different warnings and error messages for the engaged thread length:

Warning: mtr<mmin Rm (S=0.x)

Error: mtr<mmin FM (S=0.x)

According to VDI 2230, the minimum engaged thread length should be so large that the screw breaks when overloaded and the thread remains undamaged. In this way, the bolt connection can be repaired more easily in the event of damage, simply by replacing the screw instead of, at best, by inserting a thread in the nut thread. The stripping strength of the thread must therefore be greater than the tensile strength Rm of the screw. Some people are therefore surprised that they receive a warning "mtr<mmin Rm" for a minimally loaded bolted joint.

There is now a small change: the warning is no longer displayed for a through-bolt joint with a nut. In this case, it doesn't matter whether the screw breaks or the thread is stripped. In the event of damage, screw and nut will be both replaced. Up to now, the warning was also displayed at TBJ if "Input nut material" was selected.

And another small change: The option "Calculate min. thread length engaged for FSmax" is now set by default (unless other default values have been set in a "null.sr1" file). You can see in Quick View how large the actual thread strip safety is in relation to the entered load.

ZAR1+, ZAR4, ZAR5, ZAR7, ZAR8: Material Coefficient ZW according to ISO 6336-2:2019

The following material pairs are used according to ISO 6336-2:2006:

1. Surface-hardened pinion with through-hardened gear
2. Hardened pinion with hardened gear

Another material pair has been added in ISO 6336-2:2019:

3. Surface hardened pinion with ductile gear

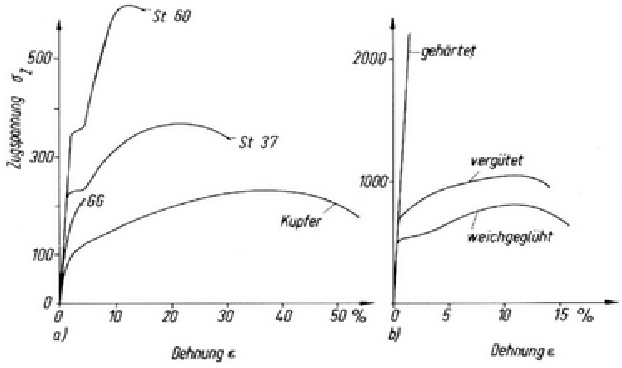


Bild 3: Spannungs-Dehnungs-Diagramme /2/

Ductility is the property of a material to permanently deform under load before fracture. In the picture on the left, St60, St37 and copper are ductile. But not GG (cast iron). In the right picture, tempered or annealed steels are ductile, but hardened ones are not. Surface-hardened steels have a soft core and therefore deform ductilely.

A surface-hardened or inductively hardened gear is now also rated as a ductile gear in ZAR. For a Brinell hardness greater than 314 HB, ZW = 1.0, which should be the normal case for surface-hardened gears.

For combinations other than those according to ISO 6336-2:2019, ZW = 1.0 is set.

Previously ZW was calculated for a case-hardened pinion with an inductively hardened gear according to case 1, which sometimes resulted in ZW < 1.

In the new version there is ZW1 for the pinion and ZW2 for the gear. The factor ZW calculated according to cases 2 and 3 applies only to the wheel (2) and not to the pinion (1), and in case 1 ZW1 (pinion) = 1 is set if less than 1 is calculated.

Also new in ZAR1+ is a warning if the selected material type and heat treatment do not match.

CALCULATION METHOD: ISO 6336		1	2
Sigma-FG = SigmaFE * YNT * YdrelT * YRrelT * YX * YA	MPa	639	522
Sigma-F0 = Ft /(b*mn) * YF * YS(g)* Yß * YB * YDT	MPa	234	260
Sigma-F = Sigma-F0 * KA * Kv * KFß * KFalfa	MPa	301	334
SF = Sigma-FG / Sigma-F	SF	2,120	1,563
Sigma-H0 = ZH * ZE * Zeps * Zß * sqrt(Ft /(d1*b)*(u+1)/u))	MPa	1036	
Sigma-HG = SigmaHlim * ZNT * ZL * Zv * ZR * ZW * ZX	MPa	2028	1630
Sigma-HC = Sigma-H0 * sqrt(KA * Kv * KHß * KHalfa)	MPa	1237	
Sigma-H1,2 = (ZB,ZD) * Sigma-H0 * sqrt(KA*Kv*KHß*KHalfa)	MPa	1282	1237
SH1,2 = Sigma-HG1,2 / Sigma-H1,2	SH	1,581	1,318

driving		1	2
P	kW	1,717	1,717
T	Nm	41000,0	439285,7
n	1/min	0,4	0,0373

MATERIAL		1	2
Sig.Hlim	MPa	2244	1804
Sigma FE	MPa	666	601
Sig.Flim	MPa	333	301
Tempering:		case-hard.	ind.hard.
Brinell	HB	621	532

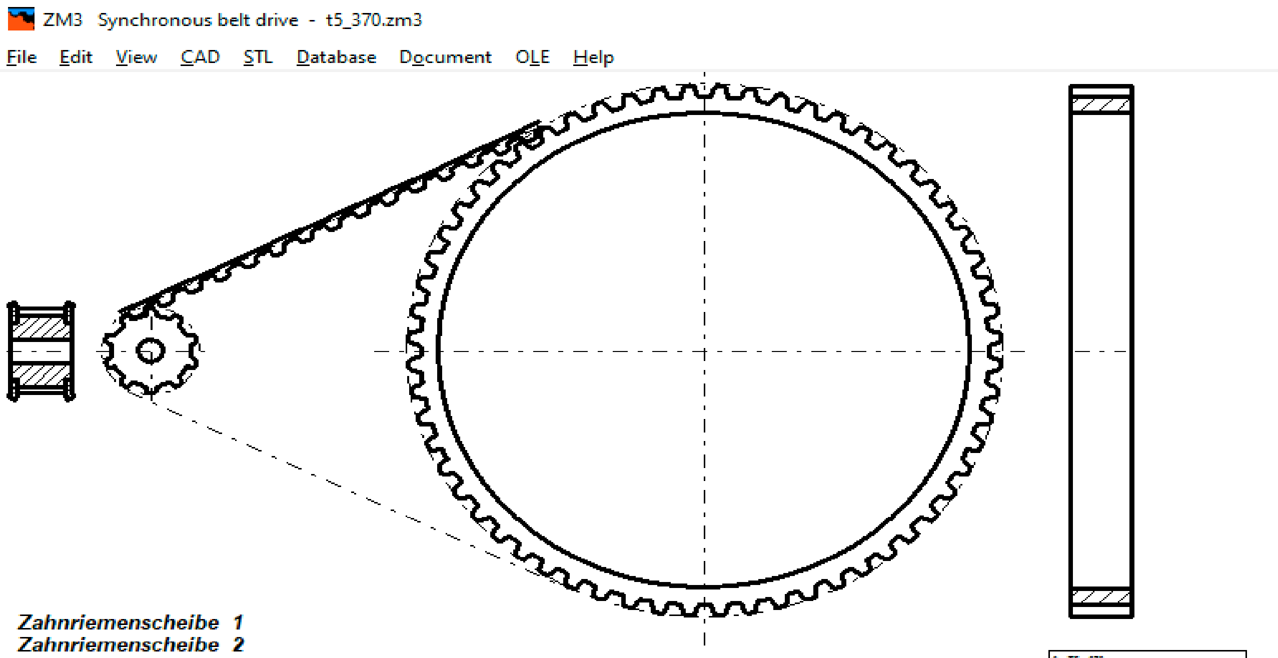
Y		1	2
b eff	mm	175,00	170,00
mn	mm	22,000	
YF		1,494	1,423
sFn	mm	46,600	52,101
rhoF	mm	7,390	5,994
hFe	mm	26,194	29,536

Z		1	2
b eff	mm	160,00	
d1	mm	308,00	
u		10,714	
ZD			1,00
ZX		1,00	1,00
ZW		1,00	1,00

K FACTORS	
KA H	1,00
KA F	1,00
Kv	1,00
KH-beta	1,43
KF-beta	1,29
KH-alfa	1,00

FORCES		
Ft	N	266234
Ftw	N	263155
Fxw	N	0
Frw	N	104974
Fnw	N	283320

ZM3: Tolerances added to Printout



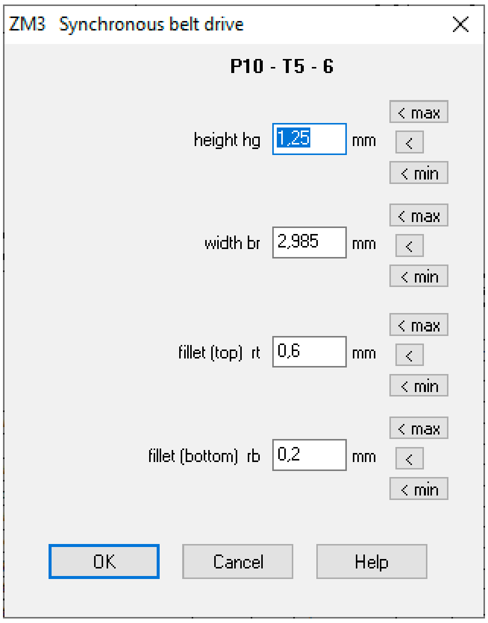
Zahnriemenscheibe 1 (P10 - T5 - 6)			
No. of teeth	z		10
pitch	p	mm	5,000
module	m	mm	1,592
Pitch diameter	d	mm	15,92
Tip diameter	d0	mm	15,07
height	hg	mm	1,25 ± 0,05
width	br	mm	2,96 +0,05
width	bh	mm	2,31
Tooth angle	2beta	°	40
fillet	rb	mm	0,40 -0,4
fillet	rt	mm	0,60 ± 0,05
Face width	bfmin	mm	7,50
Pulley width	b'fmin	mm	10,00
bore	dB	mm	4,20

Zahnriemenscheibe 2 (P60 - T5 - 6)			
No. of teeth	z		60
pitch	p	mm	5,000
module	m	mm	1,592
Pitch diameter	d	mm	95,49
Tip diameter	d0	mm	94,64
height	hg	mm	1,95 ± 0,05
width	br	mm	3,32 +0,05
width	bh	mm	1,91
Tooth angle	2beta	°	40
fillet	rb	mm	0,40 -0,4
fillet	rt	mm	0,60 ± 0,05
Face width	bfmin	mm	10,00
Pulley width	bmin	mm	10,00
bore	dB	mm	85,00

6 - T5 - 370	
b	6 (0,236")
p	5 (0,197")
X	74
L	370 (14,567")
2ß	40°
Sr	2,65
Sh	1,78
hr	1,20
hs	2,20
rr	0,40
ra	0,40

Synchronous belt drive	
i=z2/z1	6,00
e	88,38 (3,480")
alpha	26,8°
beta	126,5°
L trum	78,9
ze	3

The dimensions hg, br, bh, rb, rt are now printed out with tolerances in quick views and printouts. Although the tolerances had already been calculated and taken into account when generating the profile (min/max), they were not displayed in the quick views until now.



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Base price for single licences (perpetual)	EUR
DI1 Version 2.2 O-Ring Seal Software	190.-
DXF-Manager Version 9.1	383.-
DXFPLOT V 3.2	123.-
FED1+ V31.7 Helical Compression Springs incl. spring database, animation, relax., 3D,..	695.-
FED2+ V22.3 Helical Extension Springs incl. Spring database, animation, relaxation, ...	675.-
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WN1 V12.4 Cylindrical and Conical Press Fits	485.-
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WN2+ V11.4 Involute Splines to DIN 5480 and non-standard involute splines	380.-
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- **Portugues**: FED1+, FED17
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