



# Spur gearing, Helical gearing [mm/ISO]

<b>i</b>	<b>Calculation without errors.</b>	<b>Pinion</b>	<b>Gear</b>	
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<b>ii</b>	<input type="checkbox"/> <b>Project information</b>			
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## ? Input section

### 1.0 Options of basic input parameters

1.1	Transferred power	Pw [kW]	9.670	9.603	
1.2	Speed (Pinion / Gear)	n [/min]	479.8	116.5	[/min]
1.3	Torsional moment (Pinion / Gear)	Mk [Nm]	192.46	787.02	[Nm]
1.4	Transmission ratio / from table	i	4.12		
1.5	Actual transmission ratio / deviation	i	4.12	0.00%	

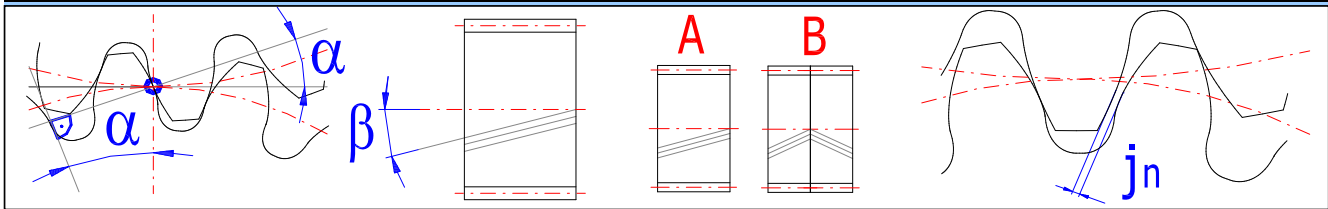
### 2.0 Options of material, loading conditions, operational and production parameters

2.0	Material identification according standard :		ISO		▼
2.1	Material of the pinion :		E...Carbon cast steel 36 Mn 5 (Rm=700 MPa) tooth face hard.		▼
2.2	Material of the gear :		E...Carbon cast steel 36 Mn 5 (Rm=700 MPa) tooth face hard.		▼
2.3	Loading of the gearbox, driving machine - examples		B...Light shocks		▼
2.4	Loading of gearbox, driven machine - examples		C...Moderate shocks		▼
2.5	Type of gearing mounting		Double-sided symmetrically supported gearing - type 1		▼
2.6	Accuracy grade - ISO1328  Ra max v max		6.....(Ra max.= 1.6 / v max.= 30)		▼
2.7	Coefficient of one-off overloading	KAS	2.00		
2.8	Desired service life	Lh	20000		[h]
2.9	Coefficient of safety (contact/bend)	SH / SF	1.30	1.60	
2.10	Automatic design				

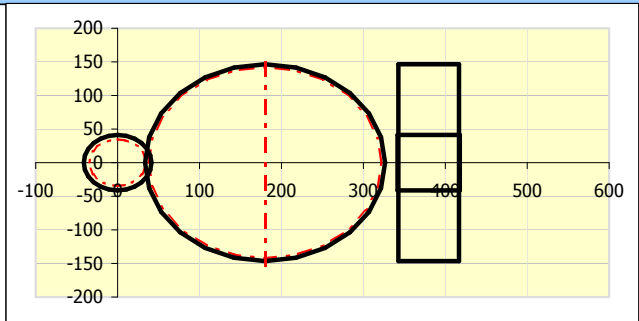
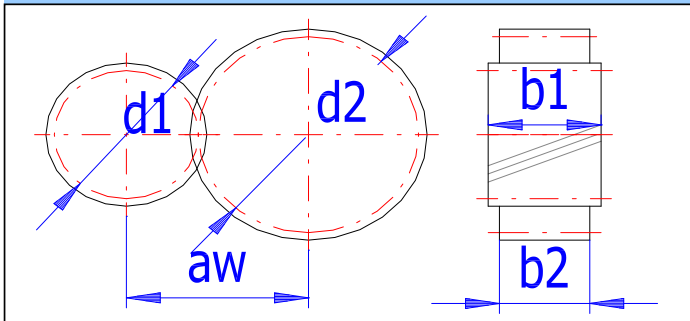
### 3.0 Parameters of the cutting tool and tooth profile



4.0  Design of a module and geometry of toothings



4.1 Number of teeth Pinion / Gear	z	17	70	
4.2 Normal pressure angle	$\alpha$	20		[°]
4.3 Base helix angle	$\beta$	10		[°]
4.4 Setting of the ratio of the width of the pinion to its diameter				
4.5 The ratio of the pinion width to its diameter	$\Psi_{d / \max}$	1.1	< 1.1	
4.6 Module / Standardized value	mn	4		[mm]
4.7 Reference diameter Pinion / Gear	d1/d2	69.05	284.32	[mm]
4.8 Recommended width of gearing		40.7 - 76		[mm]
4.9 Face width (Pinion / Gear)	b1/b2	76.00	74.00	[mm]
4.10 Working face width	bw	74		<input checked="" type="checkbox"/> [mm]
4.11 The ratio of the pinion width to its diameter	$\Psi_{d / \max}$	1.10	< 1.1	
4.12 Working center distance	aw	180.000		[mm]
4.13 Approximate weight of the gearing	m	39.505		[kg]
4.14 Minimum coefficient of safety	SH / SF	1.447	2.447	



4.15 <b>Normal backlash</b>				
4.16 - Recommended min.   max. value		0.080	0.322	[mm]
4.17 - Selected normal backlash	$j_n$	0.0000		[mm]

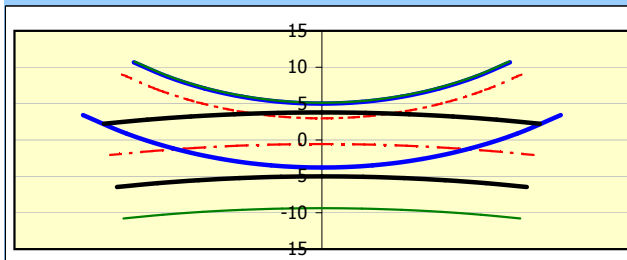
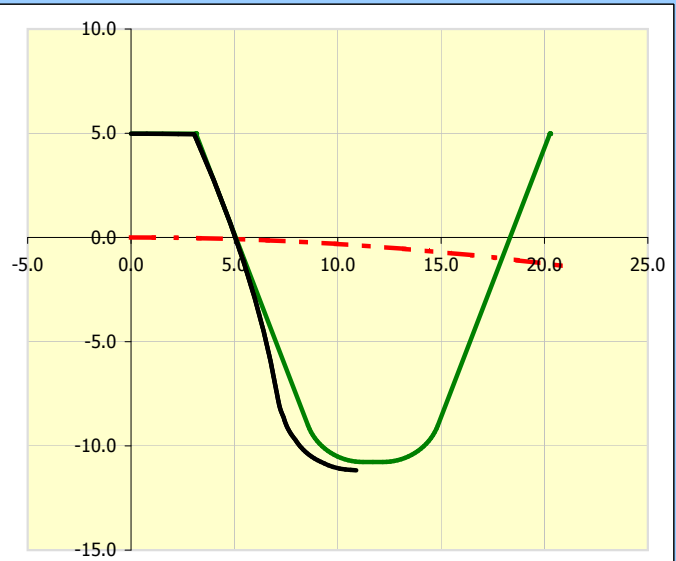
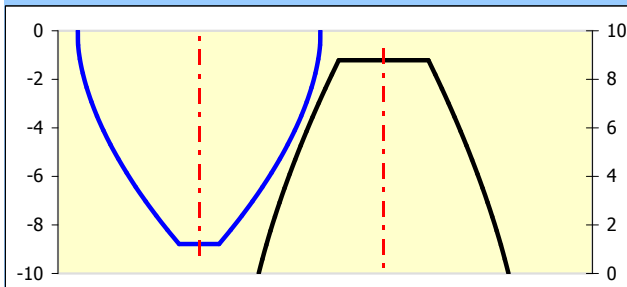
## 5.0 Correction of toothing (Addendum modification)

### 5.1 Types

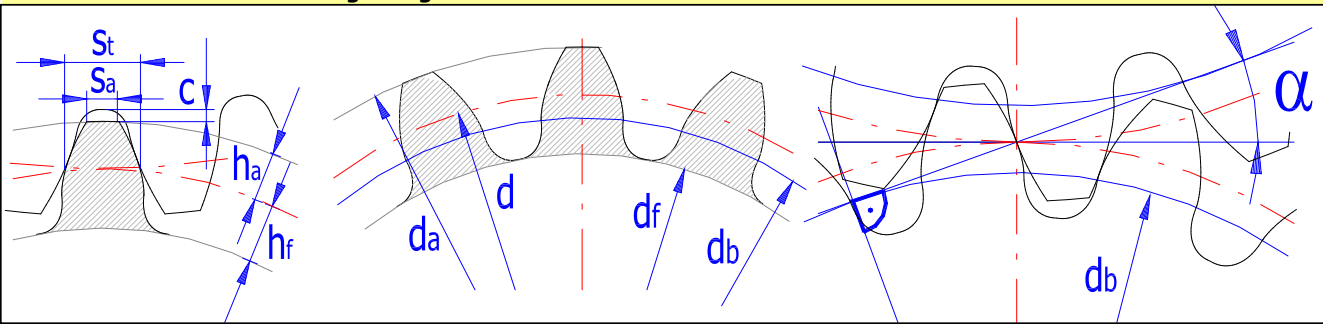
- 5.2 - Permissible undercutting of teeth (min. value)
- 5.3 - Preventing undercutting of teeth (min. value)
- 5.4 - Prevents tapering of teeth (min. value)
- 5.5 Pinion addendum modification coefficient setting
- 5.6 Addendum modification coefficient Pinion / Gear
- 5.7 Sum of addendum modification coefficients | min. value
- 5.8 Transverse / Total contact ratio
- 5.9 Unit tooth thickness on the tip diameter
- 5.10 Specific sliding on tooth root
- 5.11 Specific sliding on tooth tip
- 5.12 Sum of all specific slidings
- 5.13 Safety coefficient for surface durability
- 5.14 Safety coefficient for bending durability
- 5.15 Display of tooth and tool turn for:

	-0.176	-0.800	$\Sigma=$ -0.976
	-0.059	-0.771	$\Sigma=$ -0.830
	0.275	-3.363	$\Sigma=$ -3.089
	◀    ▶		
x	0.7441	0.1384	[modul]
$\Sigma x$	0.8826	> -1.861	[modul]
$\epsilon\alpha/\epsilon\gamma$	1.3401	2.3626	
sa*	0.3741	0.8388	
$\partial A1/\partial E2$	-0.5395	-1.3626	
$\partial E1/\partial A2$	0.5767	0.3504	
Sum  $\partial$	2.8293		
SH	1.45	1.65	
SF	2.77	2.45	
	◀    ▶		
		0	[°]

Gear



6.0  Basic dimensions of gearing



6.1 Number of teeth Pinion / Gear	z	17	70	
6.2 Face width (Pinion / Gear)	b	76	74	[mm]
6.3 Normal module	mn	4		[mm]
6.4 Transverse module	mt	4.0617		[mm]
6.5 Circular pitch	p	12.566		[mm]
6.6 Transverse circular pitch	pt	12.760		[mm]
6.7 Base circular pitch	ptb	11.969		[mm]
6.8 Center distance (pitch)	a	176.6842		[mm]
6.9 Center distance (production)	av	180.2145		[mm]
6.10 Center distance (working)	aw	180.0000		[mm]
6.11 Pressure angle	$\alpha$	20.00		[°]
6.12 Transverse pressure angle	$\alpha_t$	20.2836		[°]
6.13 Pressure angle at the pitch cylinder	$\alpha_{wn}$	22.7554		[°]
6.14 Transverse pressure angle at the pitch cylinder	$\alpha_{wt}$	22.9699		[°]
6.15 Helix angle	$\beta$	10.00		[°]
6.16 Base helix angle	$\beta_b$	9.3913		[°]
6.17 Tip diameter	da	82.5732	292.9979	[mm]
6.18 Reference diameter	d	69.0490	284.3195	[mm]
6.19 Base diameter	db	64.7672	266.6884	[mm]
6.20 Root diameter	df	65.0021	275.4268	[mm]
6.21 Operating pitch diameter	dw	70.3448	289.6552	[mm]
6.22 Addendum	ha	6.7621	4.3392	[mm]
6.23 Dedendum	hf	2.0235	4.4463	[mm]
6.24 Tooth thickness on the tip diameter	sna	1.4644	3.3012	[mm]
6.25 Tooth thickness on the tip diameter	sta	1.4966	3.3552	[mm]
6.26 Tooth thickness on the pitch diameter	sn	8.4499	6.6862	[mm]
6.27 Tooth thickness on the pitch diameter	st	8.5803	6.7894	[mm]
6.28 Tooth thickness on the root diameter	sb	9.0895	10.8655	[mm]
6.29 Unit tooth thickness on the tip diameter	sa*	0.3741	0.8388	[modul]
6.30 Unit correction	dY	0.0536		[modul]
6.31 Total unit correction	x1+x2	0.8826		[modul]
6.32 Addendum modification coefficient	x	0.7441	0.1384	[modul]



**7.0**  Supplemental parameters of gearing

**8.0**  Qualitative indices of gearing

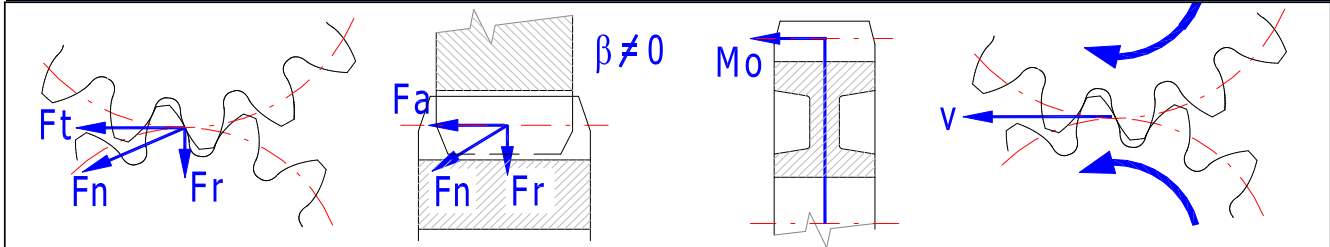
**9.0**  Coefficients for safety calculation

**10.0**  Safety coefficients

10.1	Safety coefficient for surface durability	SH	1.45	1.65	
10.2	Safety coefficient for bending durability	SF	2.77	2.45	
10.3	Safety in contact in one-time overloading	SHst	2.66	2.66	
10.4	Safety in bending in one-time overloading	SFst	4.14	3.72	
10.5	Variability coefficient for calculation of probability of a failu	vH/vF	0.08	0.1	
10.6	Probability of a failure	P	0.44		[%]
10.7	Nominal contact stress	SigmaH0	435.85		[MPa]
10.8	Contact stress	SigmaH	637.20	637.20	[MPa]
10.9	Pitting stress limit	SigmaHG	922.13	1049.09	[MPa]
10.10	Permissible contact stress	SigmaHP	709.33	806.99	[MPa]
10.11	Nominal tooth-root stress	SigmaF0	50.54	56.29	[MPa]
10.12	Tooth-root stress	SigmaF	106.17	118.25	[MPa]
10.13	Tooth-root stress limit	SigmaFG	294.12	289.37	[MPa]
10.14	Permissible bending stress	SigmaFP	183.82	180.85	[MPa]

**11.0**  Check dimensions of gearing

**12.0**  Force conditions (forces acting on the toothing)



12.1	Tangential force	Ft	5574.57		[N]
12.2	Normal force	Fn	6023.85		[N]
12.3	Axial force	Fa	982.95		[N]
12.4	Radial force	Fr	2060.28		[N]
12.5	Bending moment	Mo	40.58	144.00	[Nm]
12.6	Peripheral speed on the pitch diameter	v   vmax	1.73	< 30	[m/s]
12.7	Specific load / Unit load	wt   wt*	120.53	30.13	[N/mm   MPa]

**13.0**  Parameters of the chosen material

**Additions section**

**14.0**  **Calculation of gearing for the given axis distance**

14.1	Required axis distance / Standardized	aw [mm]	180	180.00				
14.2	<b>List of solutions</b>		ID.	z1	z2	i	$\beta$	Sum X
14.3	Combination of the teeth number		4.	17	70	4.118	14.835	0.8826
14.4	Number of teeth Pinion / Gear	z1/z2	17	70				
14.5	Transmission ratio / Deviation	i	4.1176	0.00%				
14.6	<b>A. Change of the addendum modification</b>							
14.7	Base helix angle	$\beta$	10.0000				[°]	
14.8	Total unit correction	Sum x	0.88256				[modul]	
14.9	Distribution of correction		According to Meritt					
14.10	Type of distribution of corrections to the pinion and gear	x	0.7441	0.1384			[modul]	
14.11	Press the button for transmitting values in to calculation							
14.12	<b>B. By a change of the helix angle</b>							
14.13	Base helix angle	$\beta$	14.8351				[°]	
14.14	Total unit correction	Sum x	0.0000				[modul]	
14.15	Press the button for transmitting values in to calculation							