

KISSsoft evaluation

File

Name : Unnamed
 Changed by: jirri on: 25.07.2019 at: 17:11:03

Contact Analysis

Meshing gear 1 - gear 2

Accuracy of calculation

Medium

Partial load for calculation [w_t] **125.0000** (%)

Working flank

Left tooth flank

Center distance	[a]	250.0000	(mm)
Single pitch deviation	[f _{pt}]	0.0000	(μm)
Coefficient. of friction	[μ]	0.0000	
Proportional axis deviation error	[f _{Σβ-p}]	0.0000	(μm)
Proportional axis inclination error	[f _{Σδ-p}]	0.0000	(μm)
Torque	[T ₁]	763.8222	(Nm)
Speed	[n ₁]	11818.2857	(1/min)

Torsion (0: -, 1: <I, 2: <II, 3: <from shaft calculation)

gear A:

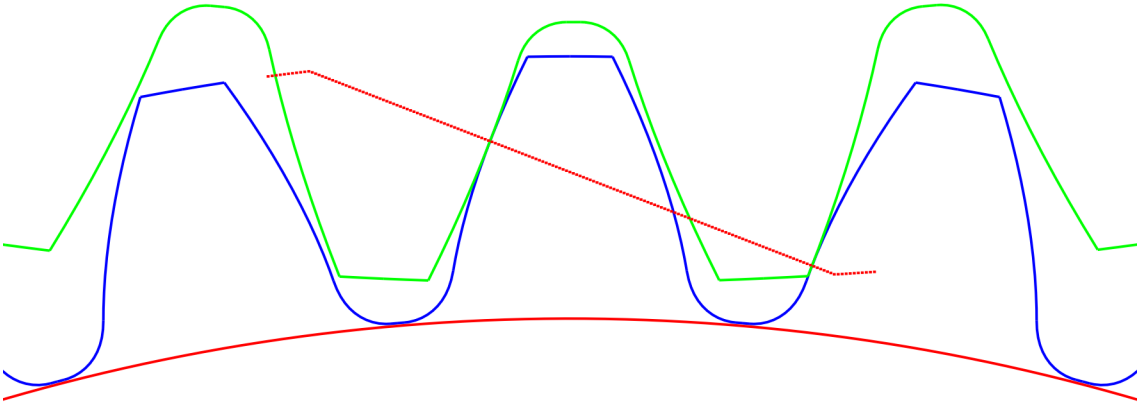
0, Rad B: 0

		min	max	Δ	μ	σ
Transmission error	(μm)	-15.8908	-13.4949	2.3960	-14.8872	0.9530
Excitation force	(N)	8787.8152	10536.2421	1748.4269	9503.7071	692.6106
Tangents Stiffness curve	(N/μm)	632.8814	714.7242	81.8428	668.5756	32.0343
Secants stiffness curve	(N/μm)	595.6448	701.7846	106.1399	638.6496	41.8731
Line load	(N/mm)	0.0000	300.9167	300.9167	169.2405	38.4122
Torque Gear 1	(Nm)	763.7497	763.8901	0.1404	763.8135	0.0294
Torque Gear 2	(Nm)	1443.6029	1445.8593	2.2564	1444.6264	0.6676
Power loss	(W)	0.0000	0.0000	0.0000	0.0000	0.0000
Contact temperature	(°C)	89.6517	162.6401	72.9883	113.3949	14.4466
Thickness of lubrication film	(μm)	0.5445	2.0876	1.5432	0.8296	0.1927
Hertzian pressure	(N/mm ²)		789.0570		486.6725	
Tooth root stress gear 1	(N/mm ²)		123.4852		76.5673	
Tooth root stress gear 2	(N/mm ²)		138.2750		83.5736	
Safety against scuffing			0.0000			
Transverse contact ratio under load	[ε _α]		1.8526			
		min	1.8316			
		μ	1.8410			
		max	1.8526			
Overlap ratio under load	[ε _β]		0.5579			
Total contact ratio under load (max)	[ε _γ]		2.4105			
Efficiency	[η]		100.0000			
Sound pressure level (according to Masuda)	[dB(A)]		94.4			

Amplitude spectrum of the transmission error

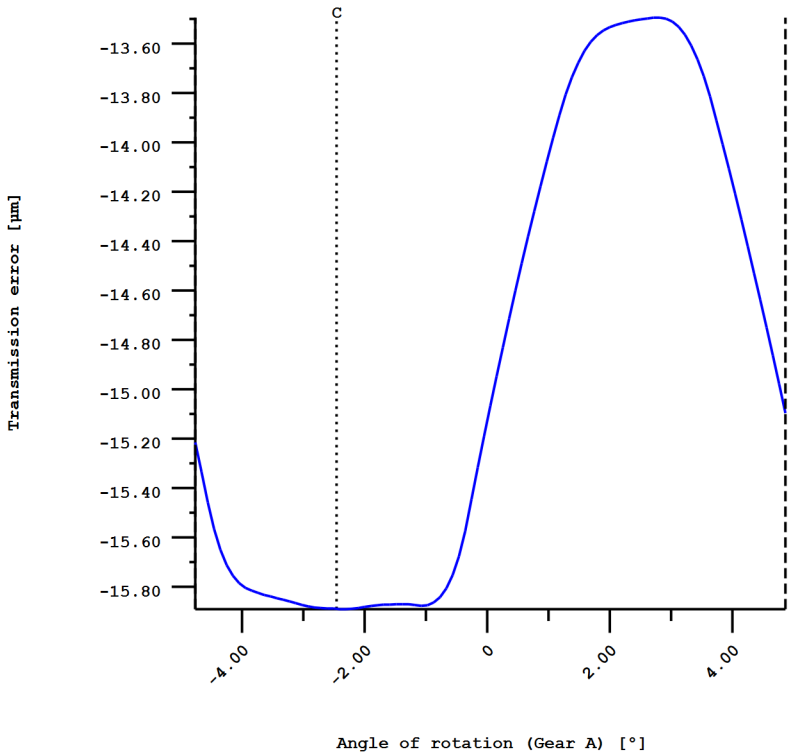
Harmonics	Amplitude (μm)
1	1.324
2	0.237
3	0.145
4	0.031
5	0.027

6	0.029
7	0.018
8	0.013
9	0.006
10	0.007



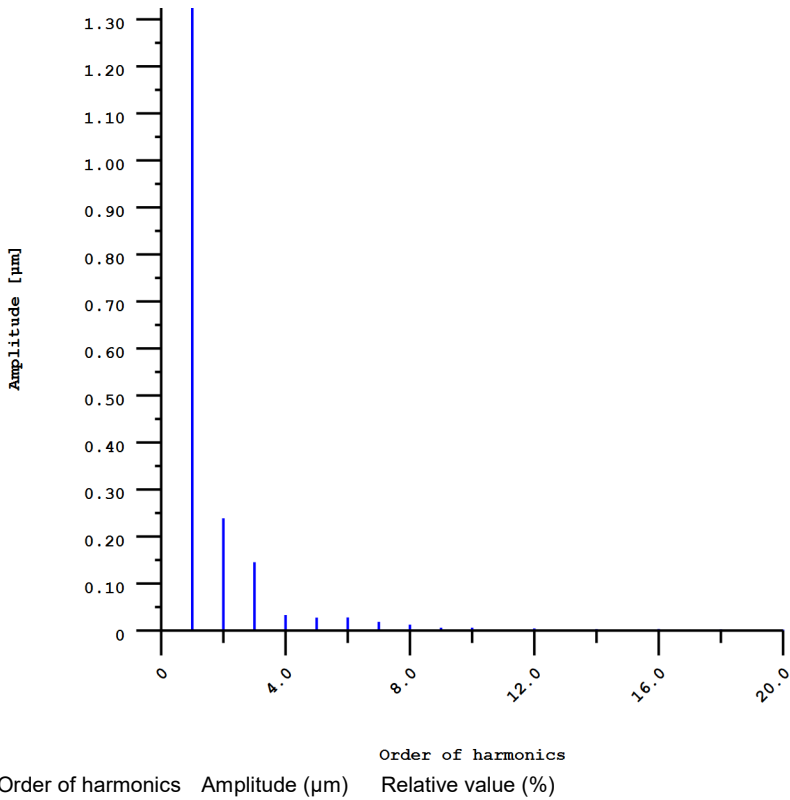
da1 = 182.0637 mm, df1 = 161.5230 mm, As1 = -0.1200 mm
da2 = 335.8689 mm, df2 = 315.2238 mm, As2 = -0.1600 mm

Figure: Meshing Gear 1 - Gear 2



wt' = 125 %,
 a = 250.000 mm,
 fpt = 0.000 µm,
 μ = 0
 Working flank: Left flank

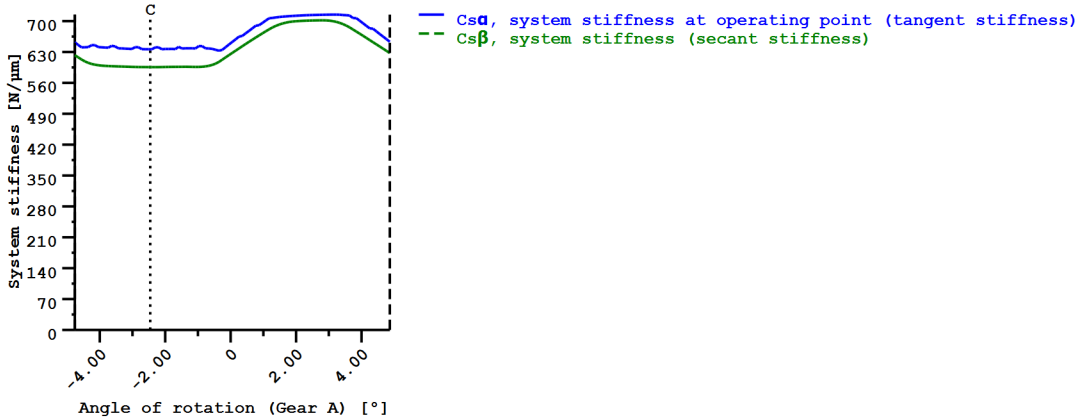
Figure: Transmission error



1	1.3241	100.00
2	0.2388	18.03
3	0.1454	10.98
4	0.0330	2.49
5	0.0275	2.08
6	0.0279	2.11
7	0.0185	1.40
8	0.0126	0.95
9	0.0060	0.45
10	0.0060	0.46
11	0.0017	0.13
12	0.0045	0.34
13	0.0012	0.09
14	0.0032	0.24
15	0.0014	0.11
16	0.0034	0.25
17	0.0018	0.13
18	0.0025	0.19
19	0.0015	0.11
20	0.0020	0.15

wt' = 125 %,
a = 250.000 mm,
fpt = 0.000 μm,
μ = 0
Working flank: Left flank

Figure: Amplitude spectrum of transmission error



wt' = 125 %,
a = 250.000 mm,
fpt = 0.000 μm,
μ = 0

Working flank: Left flank

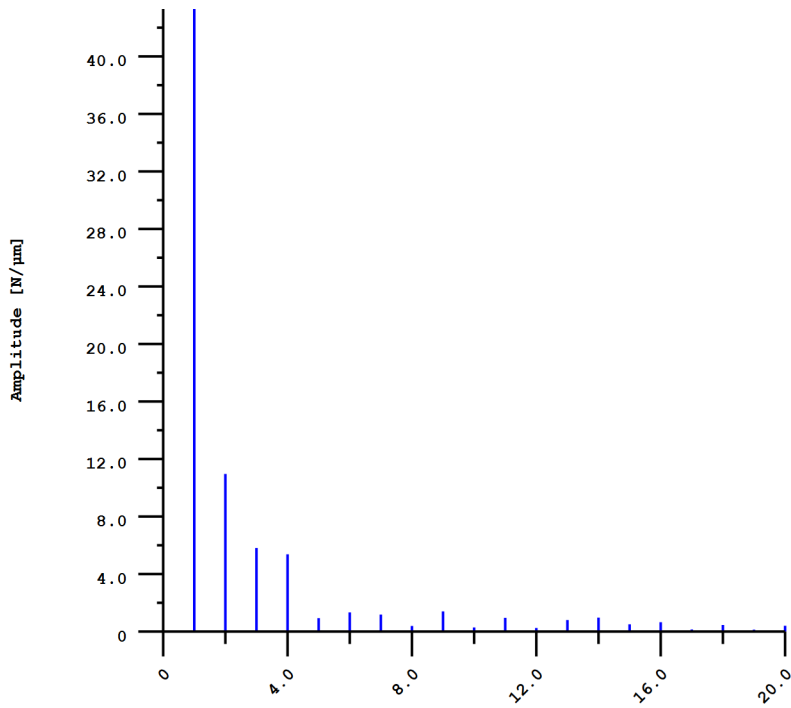
$C_{s\alpha_mean} = 668.7458529 \text{ N}/\mu\text{m}$

$C_{s\beta_mean} = 638.7930449 \text{ N}/\mu\text{m}$

$C_{s\alpha} = C_{y\alpha} * b$

$C_{s\beta} = C_{y\beta} * b$

Figure: Stiffness curve



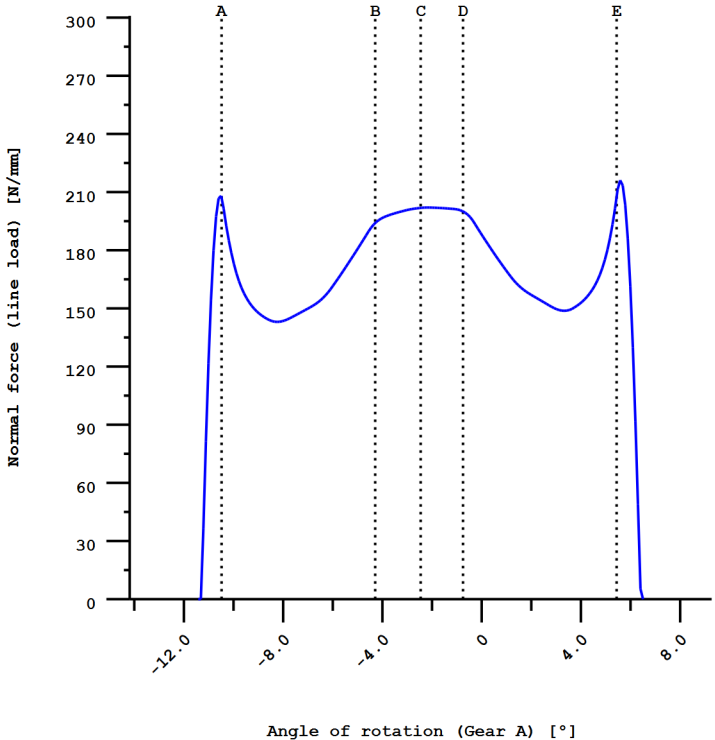
Order of harmonics	Amplitude (N/μm)	Relative value (%)
1	43.2974	100.00
2	10.9606	25.31
3	5.8119	13.42
4	5.3731	12.41
5	0.9327	2.15
6	1.3325	3.08
7	1.1808	2.73
8	0.3882	0.90
9	1.4021	3.24
10	0.2839	0.66
11	0.9540	2.20
12	0.2479	0.57
13	0.8016	1.85
14	0.9683	2.24
15	0.5046	1.17
16	0.6505	1.50
17	0.1440	0.33
18	0.4558	1.05
19	0.1311	0.30
20	0.4013	0.93

wt' = 125 %,

a = 250.000 mm,

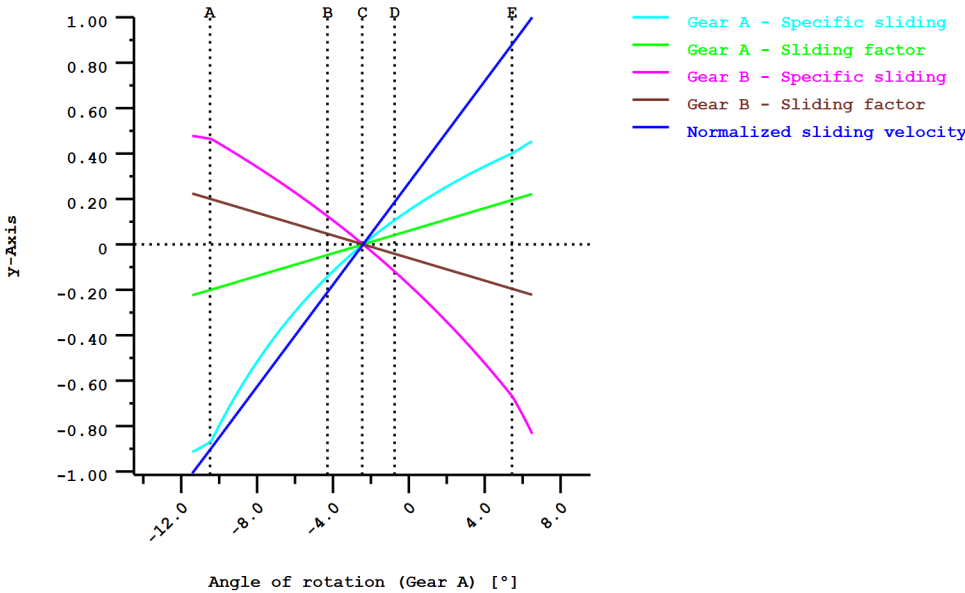
fpt = 0.000 μm ,
 $\mu = 0$
 Working flank: Left flank

Figure: Amplitude spectrum of contact stiffness



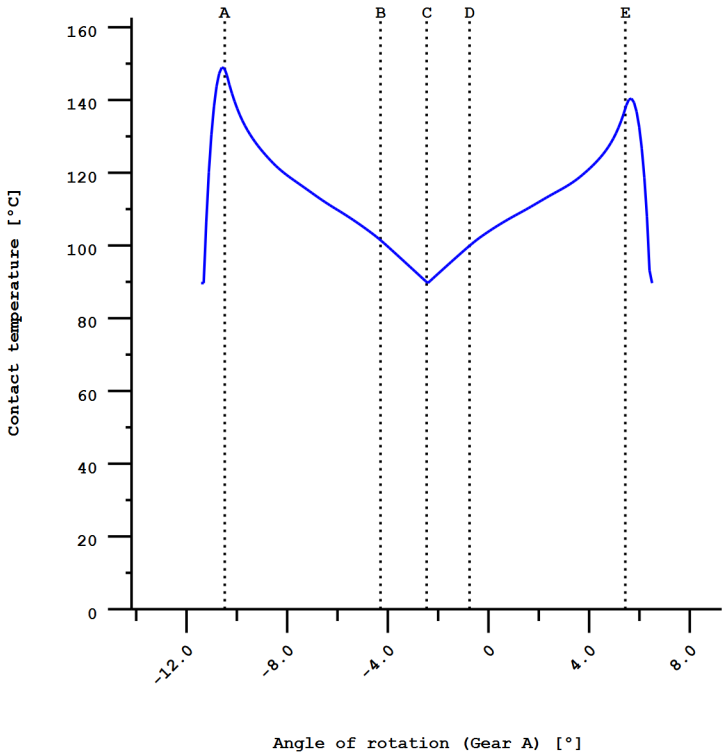
wt' = 125 %,
 a = 250.000 mm,
 fpt = 0.000 μm ,
 $\mu = 0$
 Working flank: Left flank

Figure: Normal force curve (Line load)



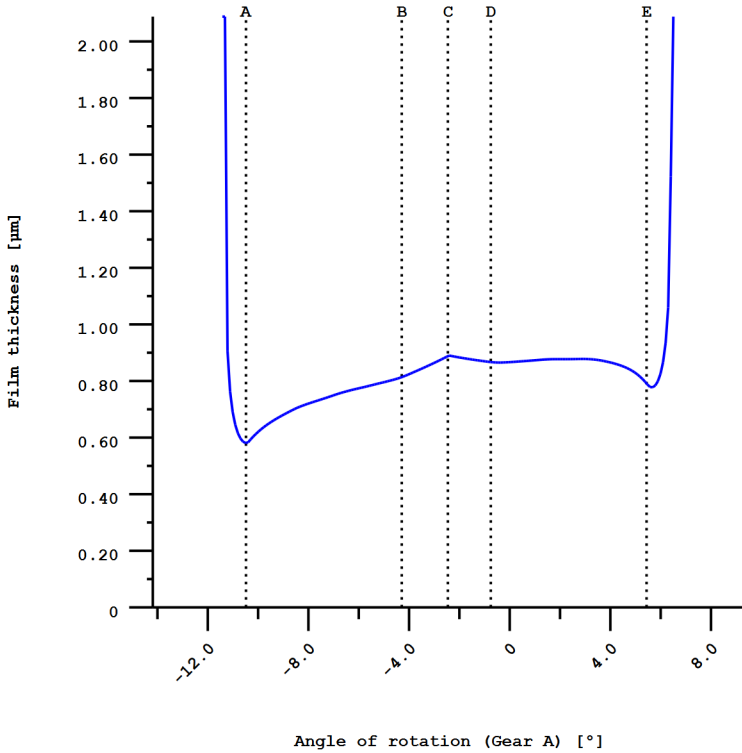
$w_t' = 125 \%$,
 $a = 250.000 \text{ mm}$,
 $f_{pt} = 0.000 \text{ }\mu\text{m}$,
 $\mu = 0$
 Working flank: Left flank
 Maximum sliding velocity: 1.000 m/s

Figure: Kinematics



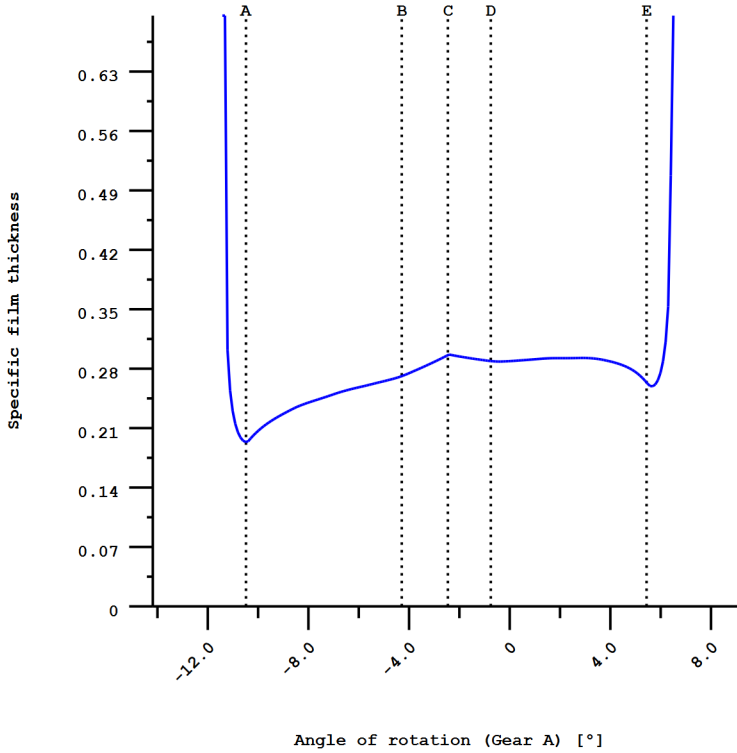
$w_t' = 125 \%$,
 $a = 250.000 \text{ mm}$,
 $f_{pt} = 0.000 \text{ }\mu\text{m}$,
 $\mu = 0.044$
 $\theta_{oil} = 70.0 \text{ }^\circ\text{C}$, $\theta_{M} = 89.7 \text{ }^\circ\text{C}$, $\eta_{M} = 5.86 \text{ mPa}\cdot\text{s}$
 Working flank: Left flank

Figure: Contact temperature



wt' = 125 %,
a = 250.000 mm,
fpt = 0.000 μm,
μ = 0.044
theOil = 70.0 °C, theM = 89.7 °C, etaM = 5.86 mPa*s
hMini(ISO) = 0.544 μm, Ra = 3.000 μm
Working flank: Left flank

Figure: Lubricating film (ISO TR 15144)



wt' = 125 %,
a = 250.000 mm,
fpt = 0.000 μm,
μ = 0.044
theOil = 70.0 °C, theM = 89.7 °C, etaM = 5.86 mPa*s
hMini(ISO) = 0.544 μm, Ra = 3.000 μm, lamGFmin = 0.181
Working flank: Left flank

Figure: Specific film thickness (ISO TR 15144)