

KISSsoft evaluation

File

Name : Unnamed
 Changed by: jirri on: 26.07.2019 at: 16:14:58

Contact Analysis

Meshing gear 1 - gear 2

Accuracy of calculation Medium

Partial load for calculation $[w_t']$ 125.0000 (%)

Working flank	Right tooth flank		
Center distance	[a]	250.0000	(mm)
Single pitch deviation	[f _{pt}]	0.0000	(μm)
Coefficient. of friction	[μ]	0.0500	
Proportional axis deviation error	[f _{Σβ-p}]	0.0000	(μm)
Proportional axis inclination error	[f _{Σδ-p}]	0.0000	(μm)
Torque	[T ₁]	290.9799	(Nm)
Speed	[n ₁]	31023.0000	(1/min)

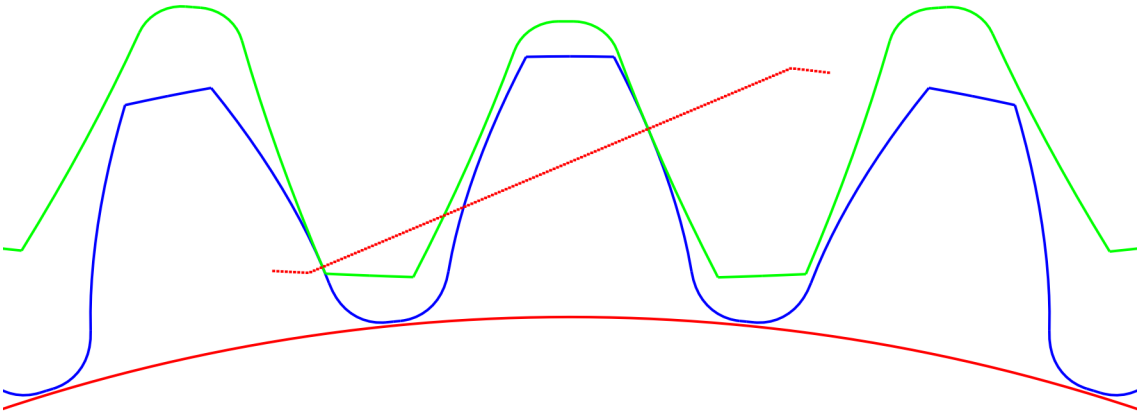
Torsion (0: -, 1: <I, 2: <II, 3: <from shaft calculation) gear A:
 0, Rad B: 0

		min	max	Δ	μ	σ
Transmission error	(μm)	-11.1819	-8.8210	2.3609	-10.1530	0.8398
Excitation force	(N)	4105.9110	5347.5840	1241.6730	4614.1327	431.3648
Tangents Stiffness curve	(N/μm)	426.7201	536.4850	109.7649	467.3549	35.5413
Secants stiffness curve	(N/μm)	408.3439	515.8335	107.4895	452.0760	37.6984
Line load	(N/mm)	0.0000	244.2774	244.2774	124.9281	29.1670
Torque Gear 1	(Nm)	290.9548	291.0045	0.0498	290.9788	0.0088
Torque Gear 2	(Nm)	758.4034	761.3347	2.9313	759.9299	0.9437
Power loss	(W)	4587.5071	6464.0972	1876.5901	5459.0188	661.1750
Contact temperature	(°C)	88.9589	157.1990	68.2401	108.8035	12.6715
Thickness of lubrication film	(μm)	0.9516	5.3931	4.4415	1.5554	0.5407
Hertzian pressure	(N/mm ²)		728.8880		403.1493	
Tooth root stress gear 1	(N/mm ²)		98.8689		58.3682	
Tooth root stress gear 2	(N/mm ²)		114.8393		66.5529	
Safety against scuffing			8.0953			
Transverse contact ratio under load	[ε _α]		1.6632			
		min	1.6421			
		μ	1.6552			
		max	1.6632			
Overlap ratio under load	[ε _β]		0.6166			
Total contact ratio under load (max)	[ε _γ]		2.2798			
Efficiency	[η]		99.4200			
Sound pressure level (according to Masuda)	[dB(A)]		96.1			

Amplitude spectrum of the transmission error

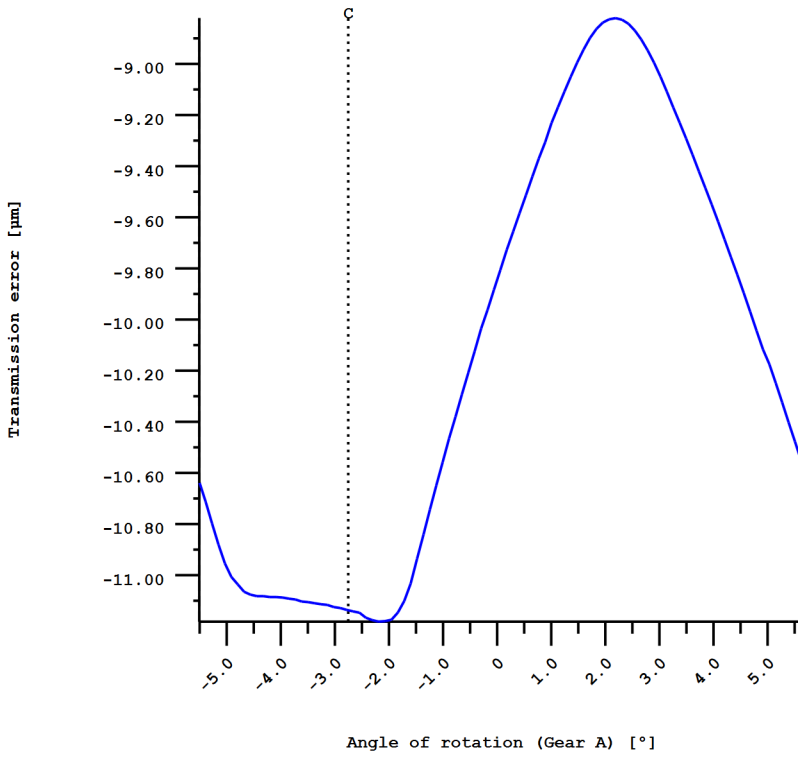
Harmonics	Amplitude (μm)
1	1.182
2	0.125
3	0.044
4	0.075
5	0.008

6	0.010
7	0.019
8	0.008
9	0.003
10	0.006



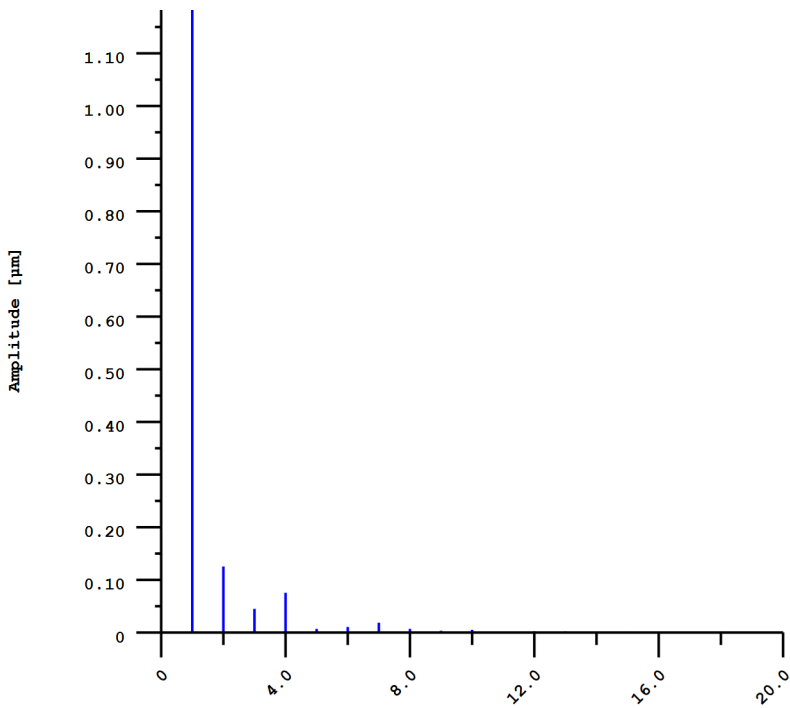
da1 = 145.3633 mm, df1 = 127.3056 mm, As1 = -0.1200 mm
da2 = 370.3355 mm, df2 = 352.1764 mm, As2 = -0.1600 mm

Figure: Meshing Gear 1 - Gear 2



wt' = 125 %,
a = 250.000 mm,
fpt = 0.000 µm,
μ = 0.05
Working flank: Right flank

Figure: Transmission error

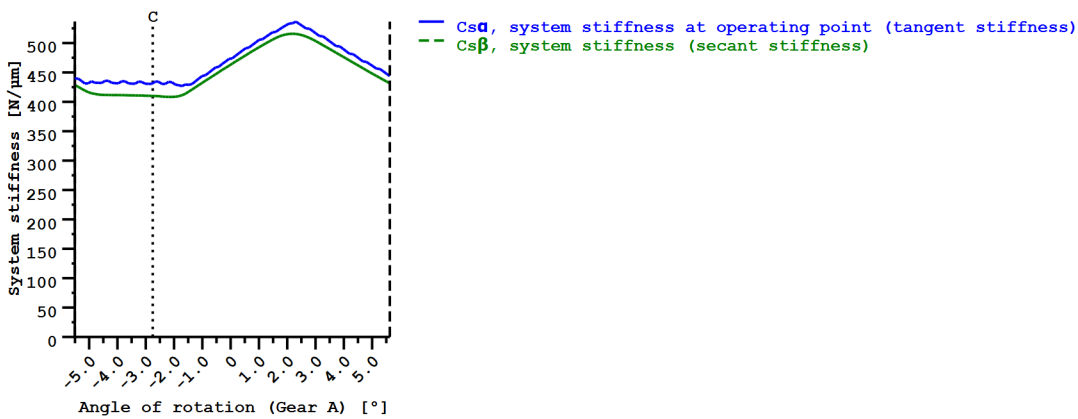


Order of harmonics	Amplitude (µm)	Relative value (%)
1	1.10	100.0
2	0.15	13.6
3	0.08	7.3
4	0.05	4.5
5	0.02	1.8
6	0.01	0.9
7	0.01	0.9
8	0.01	0.9
9	0.01	0.9
10	0.01	0.9
11	0.01	0.9
12	0.01	0.9
13	0.01	0.9
14	0.01	0.9
15	0.01	0.9
16	0.01	0.9
17	0.01	0.9
18	0.01	0.9
19	0.01	0.9
20	0.01	0.9

1	1.1823	100.00
2	0.1255	10.61
3	0.0450	3.80
4	0.0755	6.39
5	0.0069	0.58
6	0.0106	0.90
7	0.0187	1.58
8	0.0069	0.59
9	0.0034	0.29
10	0.0052	0.44
11	0.0007	0.06
12	0.0024	0.20
13	0.0020	0.17
14	0.0011	0.09
15	0.0016	0.14
16	0.0006	0.05
17	0.0009	0.07
18	0.0016	0.14
19	0.0006	0.05
20	0.0006	0.05

wt' = 125 %,
a = 250.000 mm,
fpt = 0.000 μm ,
 μ = 0.05
Working flank: Right flank

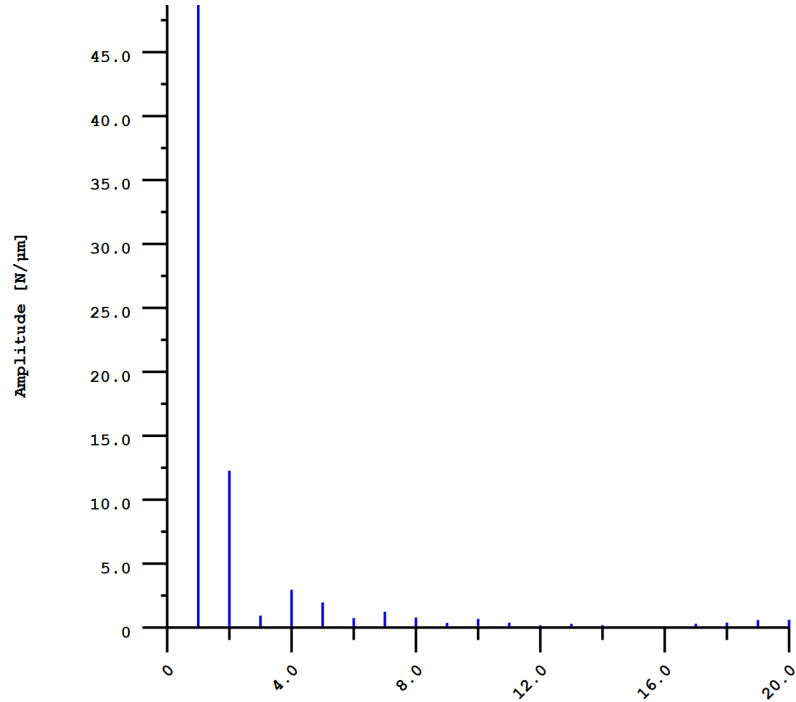
Figure: Amplitude spectrum of transmission error



wt' = 125 %,
a = 250.000 mm,
fpt = 0.000 μm ,
 μ = 0.05

Working flank: Right flank
 $C_{s\alpha_mean} = 467.6274836 \text{ N}/\mu\text{m}$
 $C_{s\beta_mean} = 452.3101772 \text{ N}/\mu\text{m}$
 $C_{s\alpha} = C_{y\alpha} * b$
 $C_{s\beta} = C_{y\beta} * b$

Figure: Stiffness curve

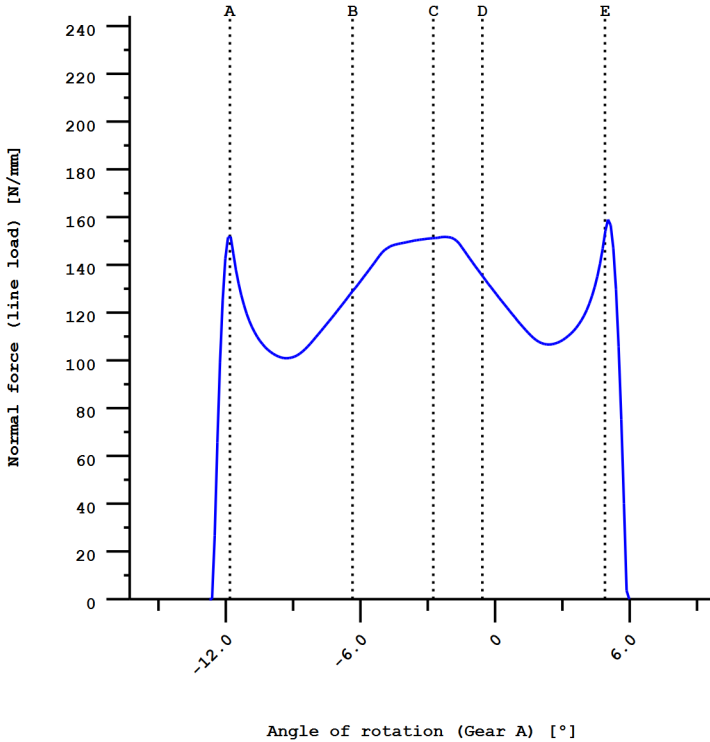


Order of harmonics	Amplitude (N/μm)	Relative value (%)
1	48.6881	100.00
2	12.2655	25.19
3	0.9340	1.92
4	2.9538	6.07
5	1.9660	4.04
6	0.7427	1.53
7	1.2381	2.54
8	0.7810	1.60
9	0.3601	0.74
10	0.6725	1.38
11	0.3874	0.80
12	0.1795	0.37
13	0.2927	0.60
14	0.1835	0.38
15	0.0490	0.10
16	0.0889	0.18
17	0.2931	0.60
18	0.3875	0.80
19	0.5907	1.21
20	0.6050	1.24

wt' = 125 %,
a = 250.000 mm,

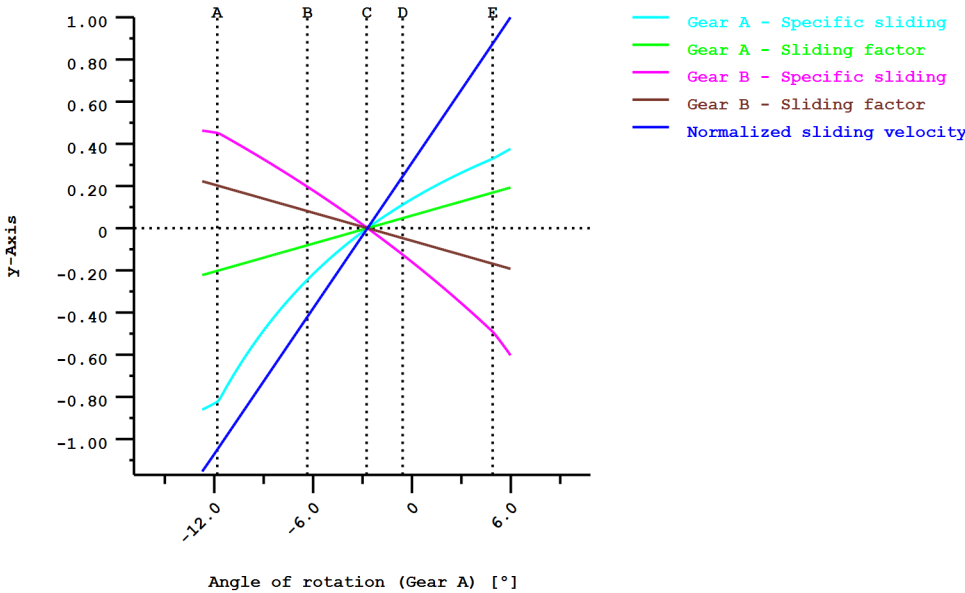
fpt = 0.000 μm ,
 μ = 0.05
 Working flank: Right flank

Figure: Amplitude spectrum of contact stiffness



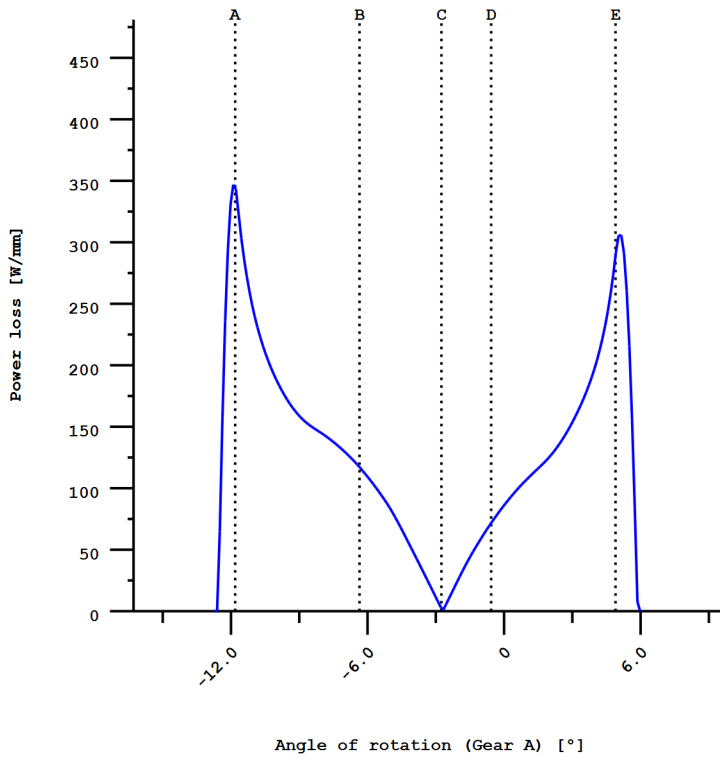
wt' = 125 %,
 a = 250.000 mm,
 fpt = 0.000 μm ,
 μ = 0.05
 Working flank: Right flank

Figure: Normal force curve (Line load)



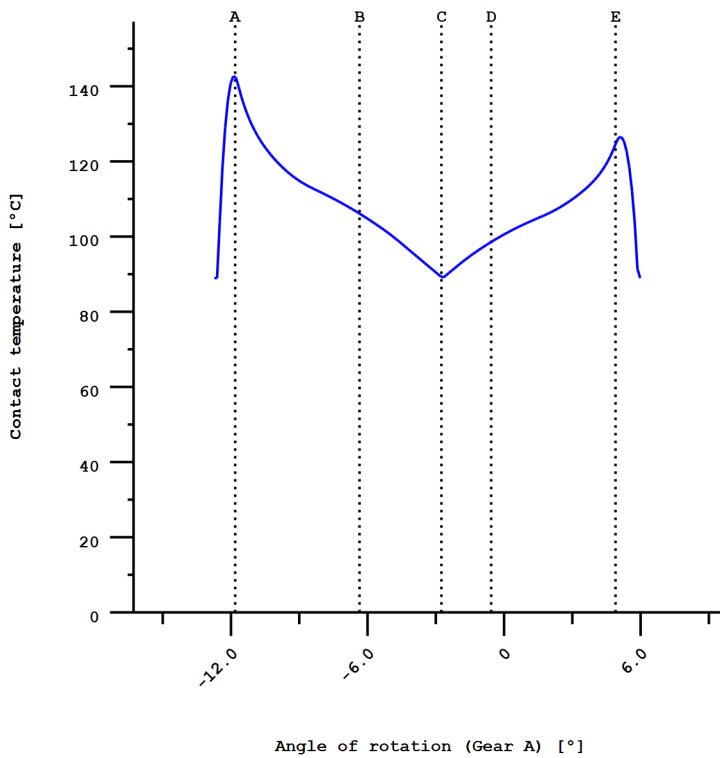
$w_t' = 125 \%$,
 $a = 250.000 \text{ mm}$,
 $f_{pt} = 0.000 \text{ }\mu\text{m}$,
 $\mu = 0.05$
 Working flank: Right flank
 Maximum sliding velocity: 1.000 m/s

Figure: Kinematics



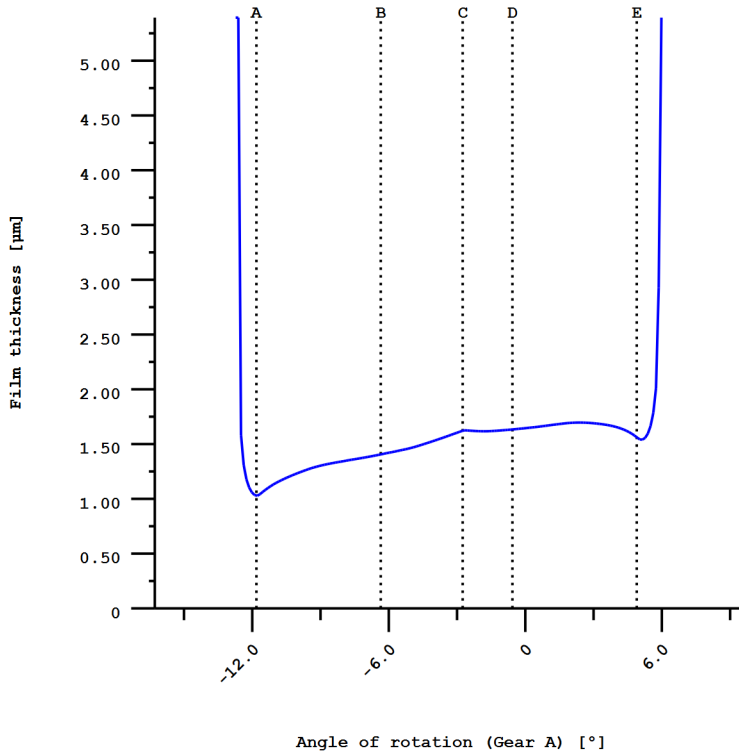
$w_t' = 125\%$,
 $a = 250.000\text{ mm}$,
 $f_{pt} = 0.000\text{ }\mu\text{m}$,
 $\mu = 0.05$
 Displaying power losses per mm facewidth
 Working flank: Right flank

Figure: Specific Power Loss



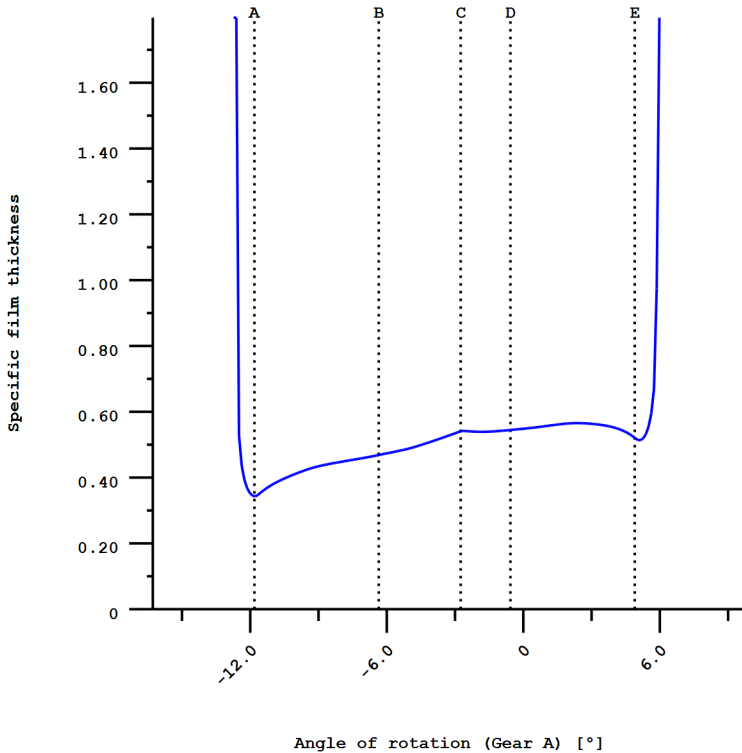
wt' = 125 %,
a = 250.000 mm,
fpt = 0.000 μm ,
 μ = 0.036
theOil = 70.0 $^{\circ}\text{C}$, theM = 89.0 $^{\circ}\text{C}$, etaM = 5.95 mPa*s
Working flank: Right flank

Figure: Contact temperature



wt' = 125 %,
a = 250.000 mm,
fpt = 0.000 μm ,
 μ = 0.036
theOil = 70.0 $^{\circ}\text{C}$, theM = 89.0 $^{\circ}\text{C}$, etaM = 5.95 mPa*s
hMini(ISO) = 0.952 μm , Ra = 3.000 μm
Working flank: Right flank

Figure: Lubricating film (ISO TR 15144)



wt' = 125 %,
 a = 250.000 mm,
 fpt = 0.000 μm,
 μ = 0.036
 theOil = 70.0 °C, theM = 89.0 °C, etaM = 5.95 mPa*s
 hMini(ISO) = 0.952 μm, Ra = 3.000 μm, lamGFmin = 0.317
 Working flank: Right flank

Figure: Specific film thickness (ISO TR 15144)