

Am Anfang war es eine Idee:

Planetenradsätze einfach und schnell finden.

Es ist viel mehr daraus geworden:

Ein sehr nutzbringendes Tool, welches das Finden von Radsätzen extrem erleichtert sowie die Berechnung und Optimierung mit STplus ermöglicht.

Und das möchten wir nicht für uns behalten:
wir bieten Ihnen an, dieses Tool für genau Ihre Aufgaben anzupassen.

In the beginning it was an idea:

To find easy and fast planetary gear sets.

Much more has become of it:

A very useful tool, which makes the finding of gear sets extremely easy and made the calculation and optimisation possible with STplus.

And we don't want to keep this to ourselves:
we offer you to customise this tool for exactly your tasks.

Mit Vorgabe der Übersetzung werden
alle Planetenradsätze gefunden,
die dafür möglich sind.

With the specification of the ratio
the software find all planetary gear sets
that are possible for this.

Suchemethoden sind zurzeit

- K^* nach Niemann/Winter
- Achsabstand
- was brauchen Sie?

Methods of searching are currently

- K^* acc. Niemann / Winter
- given center distance
- what do you need?

Für die Suchläufe werden
Vorgaben gemacht zu

- min. und max. Zähnezahl der Sonne
- min. und max. Zähnezahl der Planeten
- Anzahl der Planeten
- Drehmoment an der Sonne
- Drehzahl der Sonne
- Breiten-Durchmesser Verhältnis

For the operations of searching
requirements are

- min and max teeth number for sun
- min number of teeth for the planets
- number of planets
- torque of sun
- speed of sun
- b/d factor acc Niemann / Winter

Für gefundene Radsätze können zurzeit

- Zähnezahl der Planeten
- Zahnbreiten
- Eingriffswinkel
- Schrägungswinkel
- Normalmodul

geändert werden.

Außerdem kann derzeit jeder Radsatz mit

- Normalmodul
- Profilverschiebungsfaktor
- Eingriffswinkel

als Variablen optimiert werden.

For the found planetary gear sets are

- Teeth number of the planets
- Tooth widths
- Pressure angle
- Helix Angle
- Normal module

currently changeable.

In addition, each wheel set with

- normal module
- profile shift factor
- pressure angle

as variables optimisable.

Planetenradsätze finden: Eingabe der Rahmendaten

Find a planetary gearset: input of frame values.

Searching planetary gearsets

File Methods Results Extras

sun to carrier sun to ring ring to carrier
ratios:

carrier to sun ring to sun carrier to ring
ratios:

tolerance ±:

min. ratio:	3.808180	1.356103	-2.808180
max. ratio:	3.828180	1.353584	-2.828180
min. ratio:	992,123456	992,123456	992,123456
max. ratio:	992,123456	992,123456	992,123456

teeth number sun min.:

teeth number sun max.:

teeth number planets min.:

number of planets: even distribution

helix angle [°]:

torque of sun [Nm]:

speed of sun [rpm]:

b / d - factor:

K* [N/mm²]:

a [mm]:

Ein Mausklick auf “search” zeigt alle passenden Lösungen.

A mouseclick on “search” shows all suitable solutions.

The screenshot shows a software window titled "Searching planetary gearsets" with a menu bar (File, Methods, Results, Extras). The left panel contains search parameters:

- sun to carrier: 3.818180
- sun to ring: -2.818180
- ring to carrier: 1.354839
- carrier to sun: 0.261905
- ring to sun: -0.354839
- carrier to ring: 0.738095
- tolerance ±: 0.01
- teeth number sun min.: 15
- teeth number sun max.: 51
- teeth number planets min.: 15
- number of planets: 3 (checked: even distribution)
- helix angle [°]: 20
- torque of sun [Nm]: 700
- speed of sun [rpm]: 1000
- b / d - factor: 0.8
- K* [N/mm²]: 8.00
- a [mm]: 60

The right panel displays a table of 8 search results. The 4th result is highlighted in blue:

1	z_Z: 22	z_P: 20	z_H: -62	p: 3	i_ZS: 3.8182	i_HS: 1.3548	i_0: -2.8182
2	z_Z: 29	z_P: 26	z_H: -82	p: 3	i_ZS: 3.8276	i_HS: 1.3537	i_0: -2.8276
3	z_Z: 33	z_P: 30	z_H: -93	p: 3	i_ZS: 3.8182	i_HS: 1.3548	i_0: -2.8182
4	z_Z: 37	z_P: 34	z_H: -104	p: 3	i_ZS: 3.8108	i_HS: 1.3558	i_0: -2.8108
5	z_Z: 40	z_P: 36	z_H: -113	p: 3	i_ZS: 3.8250	i_HS: 1.3540	i_0: -2.8250
6	z_Z: 44	z_P: 40	z_H: -124	p: 3	i_ZS: 3.8182	i_HS: 1.3548	i_0: -2.8182
7	z_Z: 48	z_P: 44	z_H: -135	p: 3	i_ZS: 3.8125	i_HS: 1.3556	i_0: -2.8125
8	z_Z: 51	z_P: 46	z_H: -144	p: 3	i_ZS: 3.8235	i_HS: 1.3542	i_0: -2.8235

A "search" button is located at the bottom of the left panel.

Nach einem Doppelklick auf eine Lösung werden für diese die wichtigsten Geometriedaten angezeigt.
 (Die Benutzeroberfläche ist individuell anpassbar.)

After double-clicking on one solution you see the most important geometry data.
 (The user interface is customizable.)

PGS View Optimising

	number of teeth [-]	face width [mm]	tip dia [mm]	root dia [mm]	addendum chamfer [mm]	tip form dia [mm]	root form dia [mm]	active tip dia [mm]	active root dia [mm]	Stegbreite [mm]	chamfer at tooth end [mm]
sun:	37	40.578	56.9913	50.2955	0.1000	56.7913	52.0727	56.7913	52.4839	40.58	0.3000
planet:	34	40.578	53.2623	46.5665	0.1000	53.0623	48.0733	53.0623	48.4325	40.58	0.1000
ring gear:	-104	40.978	-152.3556	-159.0514	0.1000	-152.5556	-158.2978	-152.5556	-157.5673	40.98	0.3000
no of planets	3	change tip / root dia									

	reserve [mm]	tip clearance factor [-]	h_aP*	h_fP*	rho_fP*
normal press angle [°]	0.2056	0.394	1.0000	1.4000	0.3939
helix angle sun [°]	0.1796	0.394	1.0000	1.4000	0.3939
normal module [mm]	0.1225	0.406	1.0000	1.4000	0.0000
zcd sun-planet [mm]	0.3653	0.406	ref profile 1 - 1,4		

	pitch dia:	base dia:	tooth thickness s_t:	transverse tooth tip thickness:	normal tooth tip thickness:
	54.9258	50.4724	2.0512	1.2048	1.1322
	51.2180	47.0652	2.3318	1.1397	1.0710
	-154.3860	-143.9642	2.0376	1.2703	1.1937

	contact ratio	profile	width	total
sun-planet	1.5036	3.1200	4.6236	
planet-ring gear	1.5604	3.1513	4.7117	
length of contact path:	6.538751	6.785938		

	Mindestzahnkopfdickenfaktor [-]	Rel. Kranzdicke [-]
	0.2000	18.0276357
	0.2000	16.6910221
	0.2000	5.0000000

	Breitenmitterversatz [mm]	Bohrungsdurchmesser [mm]	Kranzaußendurchmesser [mm]
	0.0000	0.000	173.001

pv shift factor sun: -0.259653

pv shift factor planet: 0.000000

pv shift factor ring gear: -0.272237

~ Geometry ~ ~ Material Quality Oil ~ ~ Tooling data ~ ~ Load data ~ ~ Load spectrum ~ ISO TR 13989 : STplus results : STplus input file Allgemeine Daten / D

Jetzt ist es möglich, die gefundene Lösung direkt mit STplus zu berechnen.

Das Programm

- erstellt eine STplus-Eingabedatei,
- speichert diese im STplus-Dateisystem,
- bereitet die STplus-Konfigdatei vor und
- startet STplus für die Berechnung.

STplus berechnet den Radsatz und schreibt die Ausgabedateien.

Das Programm

- liest die Ausgabedateien und
- zeigt die Ergebnisse unter „STplus Ergebnisse“.

Now it's possible to calculate the founded solution directly with Stplus.

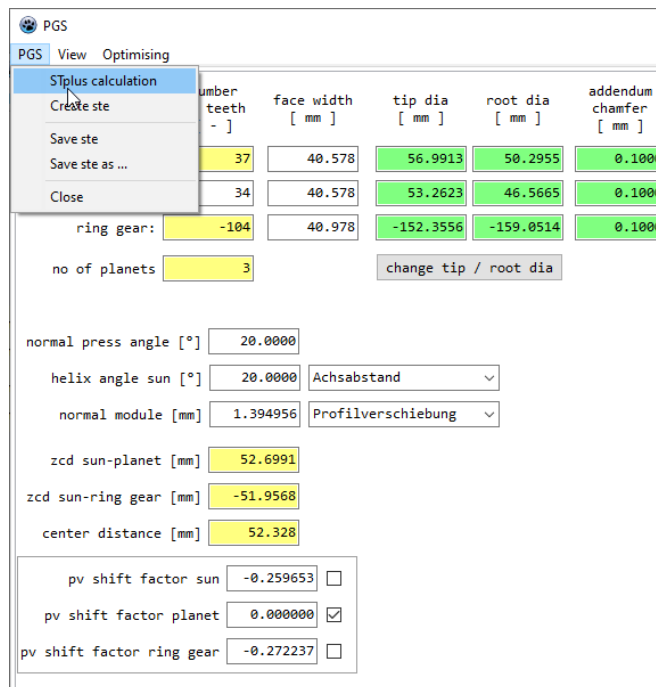
The program

- create a STplus input file,
- save it in the STplus file system,
- prepare the STplus config file and
- start STplus for the calculation.

STplus calculate the gearset and write the output files.

The program

- read the output files and
- show the results under the „STplus results“.



Aus den Stplus-Ausgabedateien ausgelesene Ergebnisse.
(Die Benutzeroberfläche ist individuell anpassbar.)

The results read from the Stplus output files.
(The user interface is customizable.)

The screenshot shows the PGS software interface with a menu bar (PGS, View, Optimising) and a main window containing various input fields and output results. The parameters are organized into sections: geometric parameters, material selection, safety factors, and VDI 2737 standards.

Parameter	Value 1	Value 2	Value 3
Center distance [mm]:	61.203		
Normal module [mm]:	1.631600		
Pressure angle [°]:	0.3491		
Helix angle [°]:	0.3491	0.3491	0.3491
Teeth number [-]:	37	34	-104
Profile shift factor [-]:	-0.260830	0.000000	-0.270940
Tip diameter [mm]:	66.6574	62.2959	-178.1962
Root diameter [mm]:	58.8240	54.4662	-186.0294

Material: 20MNCr5-MQB, 20MNCr5-MQB, 31CRMOV9-MQ

Parameter	Value 1	Value 2	Value 3	Value 4
Root safety factor [-]:	2.953	2.602	2.260	2.348
Flank safety factor [-]:	1.242	1.281	2.177	1.651
Scuffing safety factor integral temperature [-]:	5.160	7.542		
Scuffing safety factor contact temperature [-]:	12.308	34.947		

VDI 2737 - safety against fatigue (dynamic): 1.840000
VDI 2737 - safety against start crack: 2.990000
VDI 2737 - safety against perm. deformation tooth: 9.090000
VDI 2737 - safety against perm. deformation rim in mesh: 4.810000
VDI 2737 - safety against perm. deformation rim out of mesh: 8.260000
VDI 2737 - safety against perm. deformation: 4.810000

~ Geometry ~ ~ Material Quality Oil ~ ~ Tooling data ~ ~ Load data ~ ~ Load spectrum ~ ISO TR 13989 : STplus results : STplus input file Allgemeine Daten / D

Optimierung: Zurzeit zum Finden von optimalen Werten für

- Normalmodul
- Profilverschiebungsfaktor
- Eingriffswinkel

Nach dem Optimierungslauf zeigt Ngs die Ergebnisse in CSV-Textform an.

Optimisation: Currently to find optimal values for

- normal module
- addendum modification factor
- pressure angle

After the optimization run, Ngs shows the results in CSV text form.

The screenshot displays the OptiForm software interface. The main window is titled "OptiForm" and contains several input fields for optimization parameters. The parameters are organized into three columns and four rows. The first row is labeled "(pv of planets)". The second row contains "max. module:", "max. x:", and "max. alpha_n:". The third row contains "step width:", "delta x:", and "delta alpha_n:". The fourth row contains "min. module:", "min. x:", and "min. alpha_n:". Below these are three yellow boxes, each containing the number "3", and a larger yellow box containing "27". At the bottom of the window are "Ok" and "Cancel" buttons.

Below the main window, a list of output files is shown in a scrollable area. Each line represents an output file with its path and a series of numerical values. The paths are all located in "C:\STplusNGS\work\Ausgabe\ngs-opt_24.03.2022 08-48-57 ~ 014.sta" through "C:\STplusNGS\work\Ausgabe\ngs-opt_24.03.2022 08-49-43 ~ 027.sta". The numerical values are separated by commas and represent various optimization results.

Leider ist zurzeit keine Ergebnisauswertung implementiert.

Unfortunately, currently no result evaluation is implemented.

Aber es ist möglich, die Ausgabeergebnisse sehr übersichtlich in einer Tabelle darzustellen.

But it's possible to present the output results very clearly in a spreadsheet.

	file name	S_FZ	S_FPZ	S_FPH	S_FH	S_HZ	S_HPZ	S_HPH	S_HH	S_BZP	S_BPH	S_SLZP	S_SLPH	S_F2737	S_FstA	S_FstVb	S_FstVIE	S_FstVaE	S_FstV	m_n	alpha_n	x_P
1	~001.sta	2.25	2.2	2.11	1.98	1.11	1.16	2.05	1.53	10.85	39.71	5.1	7.61	1.61	2.73	8.18	4.38	6.53	4.38	1.4100	22.5000	0.1000
2	~002.sta	2.33	2.19	2.11	2	1.11	1.16	2.06	1.53	10.85	39.71	5.1	7.61	1.61	2.73	8.18	4.38	6.53	4.38	1.4100	22.5000	0.0000
3	~003.sta	2.4	2.17	2.1	2	1.11	1.16	2.07	1.54	10.85	39.71	5.1	7.6	1.61	2.73	8.18	4.38	6.53	4.38	1.4100	22.5000	-0.1000
4	~004.sta	2.29	2.1	2.07	2.03	1.11	1.15	2.07	1.55	10.89	40.25	5.21	7.62	1.61	2.73	8.18	4.38	6.53	4.38	1.4000	22.5000	0.1000
5	~005.sta	2.35	2.09	2.05	2.04	1.11	1.15	2.07	1.56	10.89	40.25	5.21	7.62	1.61	2.73	8.18	4.38	6.53	4.38	1.4000	22.5000	0.0000
6	~006.sta	2.41	2.06	2.04	2.03	1.11	1.15	2.08	1.56	10.89	40.25	5.21	7.62	1.61	2.73	8.18	4.38	6.53	4.38	1.4000	22.5000	-0.1000
7	~007.sta	2.31	2.01	2.03	2.1	1.11	1.16	2.1	1.58	10.96	40.84	5.31	7.64	1.61	2.73	8.18	4.38	6.53	4.38	1.3900	22.5000	0.1000
8	~008.sta	2.35	1.98	2.01	2.08	1.11	1.16	2.1	1.58	10.96	40.84	5.31	7.64	1.61	2.73	8.18	4.38	6.53	4.38	1.3900	22.5000	0.0000
9	~009.sta	2.38	1.95	1.98	2.06	1.11	1.16	2.1	1.58	10.96	40.84	5.31	7.64	1.61	2.73	8.18	4.38	6.53	4.38	1.3900	22.5000	-0.1000
10	~010.sta	2.3	2.28	2.14	1.99	1.1	1.14	2.03	1.5	9.75	34.65	4.67	7.53	1.61	2.73	8.18	4.38	6.53	4.38	1.4100	20.0000	0.1000
11	~011.sta	2.37	2.27	2.14	2.02	1.1	1.14	2.04	1.51	9.75	33.36	4.67	7.52	1.61	2.73	8.18	4.38	6.53	4.38	1.4100	20.0000	0.0000
12	~012.sta	2.43	2.24	2.14	2.05	1.1	1.14	2.06	1.52	9.75	31.95	4.67	7.52	1.61	2.73	8.18	4.38	6.53	4.38	1.4100	20.0000	-0.1000
13	~013.sta	2.33	2.18	2.12	2.07	1.11	1.14	2.06	1.53	10.75	36.03	4.85	7.55	1.61	2.73	8.18	4.38	6.53	4.38	1.4000	20.0000	0.1000
14	~014.sta	2.39	2.16	2.1	2.09	1.11	1.14	2.07	1.54	10.75	35.45	4.85	7.55	1.61	2.73	8.18	4.38	6.53	4.38	1.4000	20.0000	0.0000
15	~015.sta	2.44	2.13	2.09	2.1	1.11	1.14	2.07	1.54	10.75	34.72	4.85	7.55	1.61	2.73	8.18	4.38	6.53	4.38	1.4000	20.0000	-0.1000
16	~016.sta	2.34	2.08	2.1	2.16	1.11	1.15	2.11	1.57	10.7	36.96	5	7.57	1.61	2.73	8.18	4.38	6.53	4.38	1.3900	20.0000	0.1000
17	~017.sta	2.38	2.05	2.08	2.16	1.11	1.15	2.11	1.57	10.7	36.91	5	7.57	1.61	2.73	8.18	4.38	6.53	4.38	1.3900	20.0000	0.0000
18	~018.sta	2.42	2.02	2.05	2.15	1.11	1.15	2.11	1.57	10.7	36.81	5	7.57	1.61	2.73	8.18	4.38	6.53	4.38	1.3900	20.0000	-0.1000
19	~019.sta	2.34	2.36	2.12	1.96	1.08	1.12	2	1.45	6.15	23.68	4.01	7.43	1.61	2.73	8.18	4.38	6.53	4.38	1.4100	17.5000	0.1000
20	~020.sta	2.4	2.34	2.14	2	1.08	1.12	2.02	1.47	6.15	21.82	4.01	7.42	1.61	2.73	8.18	4.38	6.53	4.38	1.4100	17.5000	0.0000
21	~021.sta	2.45	2.31	2.15	2.04	1.08	1.12	2.05	1.48	6.15	20.13	4.01	7.41	1.61	2.73	8.18	4.38	6.53	4.38	1.4100	17.5000	-0.1000
22	~022.sta	2.36	2.25	2.13	2.06	1.09	1.13	2.06	1.5	7.76	24.8	4.34	7.46	1.61	2.73	8.18	4.38	6.53	4.38	1.4000	17.5000	0.1000
23	~023.sta	2.41	2.23	2.13	2.1	1.09	1.13	2.07	1.51	7.76	23.76	4.34	7.45	1.61	2.73	8.18	4.38	6.53	4.38	1.4000	17.5000	0.0000
24	~024.sta	2.45	2.2	2.13	2.12	1.09	1.13	2.08	1.52	7.76	22.83	4.34	7.45	1.61	2.73	8.18	4.38	6.53	4.38	1.4000	17.5000	-0.1000
25	~025.sta	2.36	2.15	2.16	2.18	1.09	1.14	2.11	1.55	9.22	25.5	4.59	7.48	1.61	2.73	8.18	4.38	6.53	4.38	1.3900	17.5000	0.1000
26	~026.sta	2.41	2.12	2.14	2.2	1.09	1.14	2.11	1.56	9.22	25.18	4.59	7.47	1.61	2.73	8.18	4.38	6.53	4.38	1.3900	17.5000	0.0000
27	~027.sta	2.44	2.09	2.12	2.21	1.09	1.14	2.12	1.56	9.22	24.83	4.59	7.47	1.61	2.73	8.18	4.38	6.53	4.38	1.3900	17.5000	-0.1000

S_FZ: root safety of sun

S_BZP: safety against scuffing (flash temperature) sun - planet

S_FPZ: root safety of planet sun-side

S_BZH: safety against scuffing (flash temperature) planet - ring gear

S_FPH: root safety of planet ring gear side

S_SLZP: safety against scuffing (integral temperature) sun - planet

S_FH: root safety of ring gear

S_SLZH: safety against scuffing (integral temperature) planet - ring gear

S_HZ: flank safety of sun

m_n: normal module

S_HPZ: flank safety of planet sun-side

Alpha_n: pressure angle at normal section

S_HPH: flank safety of planet ring gear side

x_P: profile shift factor of planet

S_HH: flank safety of ring gear

Stirnradsatz finden:

Eingabe der Daten für die Suche, klick auf "search", eine Lösung mit Doppelklick auswählen.

Find a spur gear set or helical gear set:

Input of data for searching, click on "search", double click to select one solution.

Search spur gearset / helical gearset

Datei Methods

required ratio:

permissible deviation \pm : abs

min. ratio:

max. ratio:

min. teeth of gear 1:

max. teeth no. gear 1:

helix angle [°]:

torque gear 1 [Nm]:

speed gear 1 [U/min]:

b / d - faktor [-]:

b_1 [mm]:

K* examples K* [N/mm²]:

a [mm]:

z = 20	72	i = 3.6000
z = 22	79	i = 3.5909
z = 23	83	i = 3.6087
z = 25	90	i = 3.6000
z = 27	97	i = 3.5926
z = 28	101	i = 3.6071
z = 30	108	i = 3.6000
z = 32	115	i = 3.5938
z = 33	119	i = 3.6061
z = 35	126	i = 3.6000
z = 37	133	i = 3.5946
z = 38	137	i = 3.6053
z = 40	144	i = 3.6000
z = 41	148	i = 3.6098
z = 42	151	i = 3.5952
z = 43	155	i = 3.6047
z = 44	158	i = 3.5909
z = 45	162	i = 3.6000
z = 46	166	i = 3.6087
z = 47	169	i = 3.5957
z = 48	173	i = 3.6042
z = 49	176	i = 3.5918
z = 50	180	i = 3.6000
z = 51	184	i = 3.6078

Der ausgewählte Stirnradsatz wird sofort einmal mit Stplus berechnet und die Daten werden angezeigt.

The selected cylindrical pair is calculated with STplus and the Stplus results displayed.

Sgs
Datei Extras Optimising

	number of teeth [-]	face width [mm]	tip dia [mm]	root dia [mm]	addendum chamfer [mm]	tip form dia [mm]	root form dia [mm]	active tip dia [mm]	active root dia [mm]	chamfer at tooth end [mm]
center distance	23	54.6780	73.9323	61.1741	0.1000	73.7323	64.1565	73.7323	64.6274	0.0000
	83	54.6780	252.2302	239.4032	0.1000	252.0302	240.8783	252.0302	242.4464	0.0000

change tip / root dia

normal press angle [°]: 20.0000
 helix angle [°]: 20.0000 module
 Normalmodul m_n [mm]: 2.7924 profile shift factors
 zero center dist. [mm]: 157.4965
 center distance [mm]: 157.4964 module

pv shift factor 1: 0.00000
 pv shift factor 2: -0.00002

own input
 acc. DIN 3992
 same specific tip sliding
 same specific root sliding
 same root stress
 same max. slide speed
 same flank pressing
 x₁ = x₂

root free cut [mm]	measured at dia [mm]	reserve [mm]	tip clearance factor [-]	tip clearance [mm]
0.0000	0.0000	0.2355	0.2967	0.8286
0.0000	0.0000	0.7840	0.2844	0.7943

root thickness transvers pitch [-]	root thickness normal pitch [-]	tip thickness normal [mm]	tip thickness chamfer normal [mm]
4.6678	4.3863	1.9654	1.8254
4.6678	4.3863	2.1574	2.0174

Minzahnkopfdickenfaktor [-]:
 Breiten-Durchmesser-Verhältnis bd1: 0.8000

Stegbreite [mm]	bezogene Stegbreite [mm]
54.6780	1.0000
54.6780	1.0000

tooth width together [mm]: 54.6780
 Breitenmittenversatz [mm]: 0.0000
 pitch dia: 68.3475 246.6454
 operating pitch dia: 68.3475 246.6453
 base dia: 63.7337 229.9957

Root safety: 2.633 2.660 Ratios: 1.5142 2.1317 3.6459
 Flank safety: 1.283 1.158
 Safety against scuffing integr. temperature: 7.803 Specific sliding tip: 0.4267 0.6250 tothing efficiency: 0.9942
 Safety against scuffing flash temperature: 4.731 Specific sliding root: -1.6664 -0.7444 tothing power loss: 1101.4679

reference profile
 tip height factor: 1.0000 1.0000
 root height factor: 1.2844 1.2967
 root radius factor: 0.3939 0.3939

geometry material; quality; oil tooling data load data load spectrum general data / print control

Auch für Stirnradpaare kann eine Optimierung erfolgen.

Even for cylindrical pairs is an optimisation possible.

Sgs

Datei Extras **Optimising**

with const dias

	number of teeth [-]	face width [mm]	tip dia [mm]
center distance	23	54.6780	73.932
	83	54.6780	252.230

change

normal press angle [°]: 20.0000

helix angle [°]: 20.0000

module

Normalmodul m_n [mm]: 2.7924

profile sh

SgsOptiForm

max. module:	2.8100	max. x:	0.1000	max. alpha_n:	22.0000
step width:	0.0200	delta x:	0.05	delta alpha_n:	2.0
min. module:	2.7700	min. x:	-0.1000	min. alpha_n:	18.0000
no of calculations:	3		5		3
total no of calculations:	45				

ok cancel

Optimierungsergebnisse übersichtlich in einer Tabelle.

(an einer Ausgabe im Programm wird demnächst gearbeitet)

Optimization results clearly in a table.

(an output in the program will be worked on soon)

	file name	S_F1	S_F2	S_H1	S_H1	S_B	S_SL	eta_zP	P_VzP	eps_g	s_an1	s_an2	s_ak1	s_ak2	m_n	alpha_n	z_1	z_2	x_1
1	~ 001.sta	2.63	2.72	1.21	1.09	5.11	7.41	0.9945	1035.2399	3.5827	2.2737	1.6299	2.1337	1.4899	2.8100	22.0000	23.00000	83.00000	0.1000
2	~ 002.sta	2.62	2.75	1.21	1.09	5.11	7.41	0.9945	1035.2399	3.5827	2.1528	1.7450	2.0128	1.6050	2.8100	22.0000	23.00000	83.00000	0.0500
3	~ 003.sta	2.61	2.77	1.21	1.09	5.11	7.41	0.9945	1035.2399	3.5827	2.0318	1.8602	1.8918	1.7202	2.8100	22.0000	23.00000	83.00000	0.0000
4	~ 004.sta	2.59	2.78	1.21	1.09	5.11	7.41	0.9945	1035.2399	3.5827	1.9109	1.9753	1.7709	1.8353	2.8100	22.0000	23.00000	83.00000	-0.0500
5	~ 005.sta	2.57	2.8	1.21	1.09	5.11	7.41	0.9945	1035.2399	3.5827	1.7899	2.0905	1.6499	1.9505	2.8100	22.0000	23.00000	83.00000	-0.1000
6	~ 006.sta	2.54	2.63	1.22	1.1	5.75	7.69	0.9947	992.8280	3.5624	1.9686	1.7246	1.8286	1.5846	2.7900	22.0000	23.00000	83.00000	0.1000
7	~ 007.sta	2.53	2.64	1.22	1.1	5.75	7.69	0.9947	992.8280	3.5624	1.8477	1.8397	1.7077	1.6997	2.7900	22.0000	23.00000	83.00000	0.0500
8	~ 008.sta	2.52	2.64	1.22	1.1	5.75	7.69	0.9947	992.8280	3.5624	1.7269	1.9548	1.5869	1.8148	2.7900	22.0000	23.00000	83.00000	0.0000
9	~ 009.sta	2.5	2.64	1.22	1.1	5.75	7.69	0.9947	992.8280	3.5624	1.6061	2.0698	1.4661	1.9298	2.7900	22.0000	23.00000	83.00000	-0.0500
10	~ 010.sta	2.48	2.63	1.22	1.1	5.75	7.69	0.9947	992.8280	3.5624	1.4852	2.1849	1.3452	2.0449	2.7900	22.0000	23.00000	83.00000	-0.1000
11	~ 011.sta	2.46	2.5	1.22	1.1	5.92	7.94	0.9949	957.5380	3.5463	1.6539	1.8318	1.5139	1.6918	2.7700	22.0000	23.00000	83.00000	0.1000
12	~ 012.sta	2.44	2.49	1.22	1.1	5.92	7.94	0.9949	957.5380	3.5463	1.5332	1.9468	1.3932	1.8068	2.7700	22.0000	23.00000	83.00000	0.0500
13	~ 013.sta	2.43	2.47	1.22	1.1	5.92	7.94	0.9949	957.5380	3.5463	1.4125	2.0617	1.2725	1.9217	2.7700	22.0000	23.00000	83.00000	0.0000
14	~ 014.sta	2.41	2.44	1.22	1.1	5.92	7.94	0.9949	957.5380	3.5463	1.2917	2.1767	1.1518	2.0367	2.7700	22.0000	23.00000	83.00000	-0.0500
15	~ 015.sta	2.38	2.41	1.22	1.1	5.92	7.94	0.9949	957.5380	3.5463	1.1710	2.2917	1.0310	2.1517	2.7700	22.0000	23.00000	83.00000	-0.1000
16	~ 016.sta	2.68	2.77	1.21	1.09	3.6	6.67	0.9938	1160.7417	3.6746	2.4364	1.8915	2.2964	1.7515	2.8100	20.0000	23.00000	83.00000	0.1000
17	~ 017.sta	2.67	2.79	1.21	1.09	3.6	6.67	0.9938	1160.7417	3.6746	2.3274	1.9952	2.1874	1.8552	2.8100	20.0000	23.00000	83.00000	0.0500
18	~ 018.sta	2.65	2.81	1.21	1.09	3.6	6.67	0.9938	1160.7417	3.6746	2.2185	2.0990	2.0785	1.9590	2.8100	20.0000	23.00000	83.00000	0.0000
19	~ 019.sta	2.63	2.83	1.21	1.09	3.6	6.67	0.9938	1160.7417	3.6746	2.1095	2.2027	1.9695	2.0627	2.8100	20.0000	23.00000	83.00000	-0.0500
20	~ 020.sta	2.62	2.85	1.21	1.09	3.6	6.67	0.9938	1160.7417	3.6746	2.0005	2.3064	1.8605	2.1664	2.8100	20.0000	23.00000	83.00000	-0.1000
21	~ 021.sta	2.59	2.68	1.21	1.09	4.31	7.01	0.9942	1094.1881	3.6424	2.1477	1.9590	2.0077	1.8190	2.7900	20.0000	23.00000	83.00000	0.1000
22	~ 022.sta	2.58	2.7	1.21	1.09	4.31	7.01	0.9942	1094.1881	3.6424	2.0389	2.0626	1.8989	1.9226	2.7900	20.0000	23.00000	83.00000	0.0500
23	~ 023.sta	2.56	2.7	1.21	1.09	4.31	7.01	0.9942	1094.1881	3.6424	1.9300	2.1663	1.7900	2.0263	2.7900	20.0000	23.00000	83.00000	0.0000
24	~ 024.sta	2.54	2.71	1.21	1.09	4.31	7.01	0.9942	1094.1881	3.6424	1.8212	2.2699	1.6812	2.1299	2.7900	20.0000	23.00000	83.00000	-0.0500
25	~ 025.sta	2.52	2.71	1.21	1.09	4.31	7.01	0.9942	1094.1881	3.6424	1.7123	2.3736	1.5723	2.2336	2.7900	20.0000	23.00000	83.00000	-0.1000
26	~ 026.sta	2.5	2.58	1.21	1.1	5	7.31	0.9945	1040.6866	3.6165	1.8494	2.0403	1.7094	1.9003	2.7700	20.0000	23.00000	83.00000	0.1000
27	~ 027.sta	2.49	2.57	1.21	1.1	5	7.31	0.9945	1040.6866	3.6165	1.7407	2.1439	1.6007	2.0039	2.7700	20.0000	23.00000	83.00000	0.0500
28	~ 028.sta	2.47	2.57	1.21	1.1	5	7.31	0.9945	1040.6866	3.6165	1.6319	2.2474	1.4919	2.1074	2.7700	20.0000	23.00000	83.00000	0.0000
29	~ 029.sta	2.45	2.55	1.21	1.1	5	7.31	0.9945	1040.6866	3.6165	1.5232	2.3510	1.3832	2.2110	2.7700	20.0000	23.00000	83.00000	-0.0500
30	~ 030.sta	2.43	2.54	1.21	1.1	5	7.31	0.9945	1040.6866	3.6165	1.4144	2.4546	1.2744	2.3146	2.7700	20.0000	23.00000	83.00000	-0.1000
31	~ 031.sta	2.71	2.8	1.2	1.09	2.15	5.88	0.9929	1344.2860	3.7868	2.5894	2.1454	2.4494	2.0054	2.8100	18.0000	23.00000	83.00000	0.1000
32	~ 032.sta	2.7	2.83	1.2	1.09	2.15	5.88	0.9929	1344.2860	3.7868	2.4922	2.2380	2.3522	2.0980	2.8100	18.0000	23.00000	83.00000	0.0500
33	~ 033.sta	2.68	2.85	1.2	1.09	2.15	5.88	0.9929	1344.2860	3.7868	2.3949	2.3306	2.2549	2.1906	2.8100	18.0000	23.00000	83.00000	0.0000
34	~ 034.sta	2.66	2.87	1.2	1.09	2.15	5.88	0.9929	1344.2860	3.7868	2.2976	2.4232	2.1576	2.2832	2.8100	18.0000	23.00000	83.00000	-0.0500
35	~ 035.sta	2.65	2.89	1.2	1.09	2.15	5.88	0.9929	1344.2860	3.7868	2.2004	2.5158	2.0604	2.3758	2.8100	18.0000	23.00000	83.00000	-0.1000
36	~ 036.sta	2.62	2.73	1.21	1.09	2.92	6.29	0.9934	1236.1249	3.7379	2.3160	2.1845	2.1760	2.0445	2.7900	18.0000	23.00000	83.00000	0.1000
37	~ 037.sta	2.61	2.74	1.21	1.09	2.92	6.29	0.9934	1236.1249	3.7379	2.2188	2.2770	2.0788	2.1370	2.7900	18.0000	23.00000	83.00000	0.0500
38	~ 038.sta	2.59	2.75	1.21	1.09	2.92	6.29	0.9934	1236.1249	3.7379	2.1217	2.3695	1.9817	2.2295	2.7900	18.0000	23.00000	83.00000	0.0000
39	~ 039.sta	2.58	2.76	1.21	1.09	2.92	6.29	0.9934	1236.1249	3.7379	2.0245	2.4620	1.8845	2.3220	2.7900	18.0000	23.00000	83.00000	-0.0500
40	~ 040.sta	2.56	2.77	1.21	1.09	2.92	6.29	0.9934	1236.1249	3.7379	1.9273	2.5546	1.7873	2.4146	2.7900	18.0000	23.00000	83.00000	-0.1000
41	~ 041.sta	2.54	2.64	1.21	1.09	3.66	6.65	0.9939	1152.9521	3.6987	2.0328	2.2394	1.8928	2.0994	2.7700	18.0000	23.00000	83.00000	0.1000
42	~ 042.sta	2.52	2.64	1.21	1.09	3.66	6.65	0.9939	1152.9521	3.6987	1.9357	2.3319	1.7957	2.1919	2.7700	18.0000	23.00000	83.00000	0.0500
43	~ 043.sta	2.5	2.64	1.21	1.09	3.66	6.65	0.9939	1152.9521	3.6987	1.8387	2.4243	1.6987	2.2843	2.7700	18.0000	23.00000	83.00000	0.0000
44	~ 044.sta	2.48	2.63	1.21	1.09	3.66	6.65	0.9939	1152.9521	3.6987	1.7416	2.5167	1.6016	2.3767	2.7700	18.0000	23.00000	83.00000	-0.0500
45	~ 045.sta	2.46	2.63	1.21	1.09	3.66	6.65	0.9939	1152.9521	3.6987	1.6445	2.6092	1.5045	2.4692	2.7700	18.0000	23.00000	83.00000	-0.1000

Zusammenfassung

- Angeboten wird die Entwicklung Ihrer eigenen Software
- Optimiert auf Ihre Anforderungen
- Mit Stplus als zertifizierte Standardberechnung
- Radsätze suchen und finden
- Radsätze optimieren
- Ihre weiteren Anforderungen

Sie erhalten

- den bisherigen Stand der Software gratis
- die Quelltexte
- Auf Wunsch können Mitarbeitende Ihres Unternehmens so geschult werden, dass sie selbst die Software erweitern.

Summary

- The development of your own software is offered
- Optimized for your requirements
- With Stplus as a certified standard calculation
- Search and find wheelsets
- Optimize wheelsets
- your further requirements

You receive

- the currently status of the software free
- the source texts
- If desired, employees of your company can be trained in such a way that they extend the software themselves.

Danke für Ihre Aufmerksamkeit.

Thank you for your attention.