

User manual programs:

- GEAR-1 (Cylindrical gear pair)
 - GEAR-1 INTERNI (Cylindrical gear pair 1 internal)
- GEAR-1 SINGOLO (Arbitrary single gear)

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Presentation

The program calculates the geometric data of a pair of cylindrical gears with parallel axes

with toothed spur or helical.

The program "Gear-1" is designed for gear manufacturers and technical design offices.

It can then submit the calculation menu that does not affect the manufacturer of gears and vice versa.

The data recorded by "Gear-1" can be read by the "Differential" program (done for gear manufacturers) that takes care of calculating a set of four gears for the differential hobbing or grinding etc.

The peculiar characteristic of the program is to be simple to use, but to give all the results that are needed.

Another important feature is to trace in UNEQUIVOCALLY the tooth profile that is generated by the generating rack.

Consequently, it is like saying that simulates exactly the dentition process, eliminating the doubts of the manufacturer when it is in hand an unclear or poorly dimensioned drawing.

Before build a gear and risk of having to redo, the pro-gramme will make you see the real profile that will be executed on the hobbing machine.

Program capacity:

Normal	module:	0.1	to	100

Number of Teeth: 2 to 4000

Pressure angle: 10 ° to 45 °

Helix angle: 0 to 60 °

Corrections on the radius Xm:

max: + (2 XMN)

min: you have to set it is checked by the program.

If the value is so low as not to obtain a pressure angle of acceptable operation, it is signaled and is not accepted.

Possibilities of the program

- The program calculates:
- The geometric data
- Wildhaber measure
- Pins measure
- Circular tooth thickness, chordal of any diameter
- Pins measure of rack
- Helix Pitch
- Base diameter, evolving helpful start, active profile, etc.

The program displays:

- The rack profile generator
- The profile of the teeth
- The profile of the teeth of the pinion meshed with the rack-generating or normal
- The profile of the teeth of the wheel meshing with the rack or generating normal
- The profile of the pinion teeth engaged with those of the wheel
- A coordinate table (with 45 points) of the tooth or of the tooth space

The program performs the animation and zooming:

- The profile of the teeth of the sprocket
- The profile of the gear teeth
- The profile of the teeth of the pinion meshed with the rack-generating or normal
- The profile of the teeth of the wheel meshing with the rack or generating normal
- The profile of the pinion teeth engaged with those of the wheel

The program prints with scale on demand:

- The rack profile generator
- The profile of the teeth of the sprocket
- The profile of the gear teeth
- The profile of the teeth of the pinion meshed with the rack-generating or normal
- The profile of the teeth of the wheel meshing with the rack or generating normal
- The profile of the pinion teeth engaged with one of the wheel
- A table of coordinates (with about 45 points) of the tooth or of the compartment profile
- Export a DXF file of the tooth profile for the use of CAD systems
- All calculated geometric data

The program save:

- The main data and when recalculates read them from start
- For each type of calculation: A file with all the data in text format

Menu File



Menu Calculation



Menu Draw Form



Menu Dynamics

(% Ge	ear Calculation	2	
	File	Calculations	Draw Form	Dynamics View Setup Help
				Editor dynamic calculation

Menu View

Sear Calculation 2				
File Calculations Draw Form Dynamics 🛛	/iew Setup Help			
	Results			
	Tooth thicknesses			
	Specific strip plot			
	Factor of form YF			
	Clearances			
	Coordinates			
	Coordinates tool shape or moulding			
	Dynamic results			

Menu setup

% Gear Calculation 2							
File	Calculations	Draw Form	Dynamics	View	Setup Help		
					General Print		

Menu Help

% Gear Calculation 2							
File	Calculations	Draw Form	Dynamics	View	Setup	Help	
						Manual	
						Information	

Menu Calculations: Data editor Main data input screen (fig.1)



Insert the normal value of the module and press the "tab" key.

On the upper fields will appear the following default values:

Pressure angle.	.20 °	addendum	tool	1.25xMn	dedendum	tool 1.2	25xMn
radius 0.25xMn							

🐁 Input Data Editor	x
Rack Tool Dedendum tool Addendum tool	
Editor Tool Normal module Addendum tool 1 1.25 Normal pressure angle Dedendum tool 20 HMS Radius .25 Full radius	
Clearance Helix angle 0 0 N. teeth Xm Correction on pitch r. PINION 0 CROWN 0	

Fig.1

You can change the contact angle, the addendum tool, the tool dedendum, the fillet radius. (Fig.2)

Each time you press the "tab" on the rack generating drawing is updated.

With this method you can design your gears to "High addendum" or as better believe is an optimal profile.

With the "full radius" button profile with full beam is drawn.

With the "DIN 3960" button the entire profile is reset according to DIN to the default value, assuming all the values depending on the module.

By selecting the "G" button you can enter the angle of pressure values to degrees decimal.

Selecting the "GPS" button you can enter the angle of the Angle pressure side in degrees, minutes, seconds.

The same thing applies to the underlying field direction of the helix.

It is advisable to place the data in degrees decimal because the calculation is more accurate.

(With degrees, minutes, seconds, they are obliged to do a rounding to seconds)

And 'possible to insert a value of clearance.

Input Data Editor		×
Dedendum too	Rack Tool	4
Editor Tool Normal me 1	odule Addendum tool 1.5 Dodendum tool Profile DIN3960	
20 Radius .25	O DEG O HM S Full radius	
	Clearance 0.05 Helix angle © DEG © HMS	
PINION	N. teeth Xm Correction on pitch r. Helix sense 15 1 Right	
CROWN	40 -1 Left ▼ Cancel	

Fig. 2

Fill in the fields below: (Figure 3) helix angle (if it exists).

N ° of teeth on the pinion of the gear teeth.

By pressing the arrow for the field "propeller Sense" to choose whether the right or left stranded.

For the first wheel, the field of the second will be filled automatically.

"Calculate" push the button.

It is plotted the tooth profile, the wheel 1 and wheel 2, for generation.



Fig.3



The results screen (Fig. 6)

🗞 Results			• X
Quality Print DIN3962			
	7 8	9 🔲 10 🔲 11	🗖 12
Print Allowa	nce Chordal Dim	ension DIN 3967	
Notes a	b c d	e f g	h
<u>Final Data :</u>			
Normal module	2		
Rase pormal module	2		
Circonferential module	2,0309		
Base circonferential module	1,9049		
Running circonferential module	2,0309		-
Running normal module	2		=
Tool pressure angle	20	(20°0'0")	
Running pressure angle	20,2836	(20°17'1")	
Circonferential pressure angle	20,2836	(20°17'1")	
Helix angle on primitive diameter	10	(10°0'0")	
Helix angle on functioning diameter	9,3913	(1000'0")	
Conduct ratio	1.4559	(10 00)	
Distance between axis of running and mounting	55,8485		
Sum of corrections	0		
Inserted clearance	0		
	PINION	CROWN	
Helix direction	Right	Left	
N. Teeth	15	40	
N. Imaginary teeth	15,705	41,8799	
Correction on primitive radius Xm	1	-1	
Theoretical external diameter with pointed teeth	37,4593	86,7362	
External diameter	36,4628	83,2341	
Functioning pitch diameter	30,4628	81,2341	
Right pitch diameter	32,4628	/9,2341	
	30,4628	81,2341	T
•			4

Fig. 6

Press the "PRINT" to print the data, or "Export Results" button for to get a text file. (Figure 7)

Results		
Quality Print DIN3962		
Print 1 2 3 4 5 6	7 8 9	□ 10 □ 11 □ 12
Evport Booulto	ance Chordal Dimens	sion DIN 3967
Notes	b 🗌 c 🗌 d 🗌	e 🛛 f 🗋 g 🗌 h
Base glameter	28,5/38	10,1201
Internal diameter	27,4628	74,2341
Useful diameter of contact	29,0476	77,8729
Useful diameter of start involute	28,8259	76,8329
Helix angle on external diameter	11,9177	10,2411
Helix step	542,7513	1447,3369
Measuring data :		
<u>Incasaring data i</u>		
Frontal circular thickness tooth on base diameter	4,1305	3,4853
Normal circular thickness tooth on base diameter	4,0751	3,4386
Frontal circular thickness tooth on external diameter	0	1,6907
Normal circular thickness tooth on external diameter	0	1,6638
Chordal thickness on external diameter	0	1,6636
Chordal thickness on primitive diameter	3,8588	2,4133
Height (H)	3,1265	1,0185
Addendum	3	1
Dedendum	1,5	3,5
N. teeth in measurement	3	5
Wildhaber Measure	15,8836	27,0556
Diameter of contact pacs	32,5888	80,7369
Rollers quote	36,7704	84,1254
Roller diameter	3,55	3,45
Acces sliding	0.3424	1,7587
Recess sliding	-1,7587	-0,3424
Total sliding	2,1011	2,1011
Specific sliding at points A1 E2	-1.4038	0.584
Specific sliding at points E1 A2	0,7339	-2,7587
< III		4

Fig. 7

Calculations menu: Editor data sliding balancing input

If you want to optimize the creep, in this case, the program acts on Xm correction on the pitch radius, select the "Calculations" menu and select "Editor data editor: strip balancing". The program proposes the data previously entered. (fig.8)



Fig. 8

Calculations menu: sliding balancing Results Below (Figure 9) the results after the execution of sliding balancing

Results		• X
Quality Print DIN3962		
Print 1 2 3 4 5	6 7 8 9 10 11	12
Prin	t Allowance Chordal Dimension DIN 3967 —	
Export Results Notes	a b c d e f g	h
Base diameter	28,5/38 /0,190/	
Internal diameter	26,8948 74,8021	
Useful diameter of contact	28,8304 78,0693	
Useful diameter of start involute	28,6557 77,0604	
Helix angle on external diameter	11,7373 10,3094	
Helix step	542,7513 1447,3369	,
Measuring data : Frontal circular thickness tooth on base diameter Normal circular thickness tooth on external diameter Frontal circular thickness tooth on external diameter Chordal thickness on external diameter Chordal thickness on primitive diameter Height (H) Addendum Dedendum N. teeth in measurement Wildhaber Measure Diameter of contact pacs Rollers quote Roller diameter Acces sliding Recess sliding Specific sliding at points A1 E2 Specific sliding at points E1 A2	3,9336 $3,6822$ $3,8808$ $3,6329$ eter $0,9842$ $1,663$ $0,9636$ $1,6362$ $0,9635$ $1,6361$ $3,6537$ $2,6199$ $2,8294$ $1,3058$ $2,716$ $1,284$ $1,784$ $3,216$ 3 5 $15,6894$ $27,2499$ $32,4971$ $80,8005$ $36,3861$ $84,7078$ $3,55$ $3,45$ $0,5437$ $1,4996$ $-1,4996$ $-0,5437$ $2,0432$ $2,0432$ $-2,4084$ $0,7066$ $0,7066$ $-2,4085$	
<		

Fig. 9

Calculations menu: Calculation pins measurement

If you want to calculate the roll rate, select the "Calculations" menu and select "calculates pins measurement ."

This dialog box appears: (Figure 10)

The program calculates the roller portion and performs the calculation by choosing a nearest pin diameter as possible to the theoretical one.

Changing the diameter of the pin according to your needs and press the "Calculate" button.

The program recalculates the data with the new pin.

🗞 Calculation Roller Dimension			
	PINION	CROWN	
Z	15	40	
Min	1.9707	2.2221	
Theoretic	3.5514	3.4528	
Мах	6.5336	4.9188	
Roller diameter	3.55	3.45	
	Calc	ulate	

Fig. 10



Calculations menu: Modify the number of teeth on span measurement (fig.11) If you want to change the number of teeth on the span measure,(Wildhaber):

Select the "Calculate" "Modify the number of teeth on measurement" menu, the show window: (Figure 12))

% Results		-
Quality Print DIN3962		5
Print 1 2 3 4 5	6 7 8 9 10 11 12	
Evport Pagulta	t Allowance Chordal Dimension DIN 3967	h
Notes	a 🗋 b 🗋 c 🗋 d 🗋 e 🗌 f 🗌 g 🗌 h	
Base diameter	(8.5/18 /D.19D/	51
Internal diameter	26.8948 74.8021	^
Useful diameter of contact	28.8304 78.0693	
Useful diameter of start involute	28.6557 77.0604	
Helix angle on external diameter	11,7373 10,3094	
Helix step	542.7513 1447.3369	
	012,7010 1117,0000	
Measuring data :		
_		
Frontal circular thickness tooth on base diameter	3,9336 3,6822	
Normal circular thickness tooth on base diameter	3,8808 3,6329	
Frontal circular thickness tooth on external diam	eter 0.9842 1.663	
Normal circular thickness tooth on external diame	ter 0.9636 1.6362	
Chordal thickness on external diameter	0.9635 1.6361	
Chordal thickness on primitive diameter	3,6537 2,6199	
Height (H)	2 8294 1 3058	
	2 716 1 284	
Dedendum	1 784 3 216	
N teeth in measurement	3 5	
Wildhaber Measure	15,6894 27,2499	
Diameter of contact pacs	32,4971 80,8005	
Rollers quote	36,3861 84,7078	-
Roller diameter	3 55 3 45	
	0 5437 1 4996	
Recess sliding	-1 4996 -0 5437	
Total sliding	2 0432 2 0432	
Specific sliding at points A1 E2	-2 4084 0 7066	
Specific sliding at points F1 A2	0 7066 -2 4085	
	0,7000 2,4005	
		Ŧ
<pre></pre>		

Fig.11



Fig. 12

Calculations menu: wheel chordal thickness of D =

If you want to know the chordal thickness and height measuring the caliber double vernier of any diameter:

Select the "Calculations" menu and select "Chordal thickness on diameter".

This shows this window: (Figure 13)

Chordal Thickness		— X
PINION		
Insert diameter to examine thick Min 26.895	ness Max 35.895	
Normal chordal thickness	0	Calculate
Height of measure	0	
CROWN		
Insert diameter to examine thick	ness	0
Min 74.802	Max 83.802	
Normal chordal thickness	0	Calculate
Height of measure	0	
·		

Fig. 13

It is calculated by the Chordal thickness and the Chordal height measurement: (Fig.14)

Chordal Thickness		
PINION		
Insert diameter to examine thickn Min 26.895	ness Max 35.895	34
Normal chordal thickness	0	Calculate
Height of measure	0	
CROWN		
Insert diameter to examine thick	ness	80
Min 74.802	Max 83.802	
Normal chordal thickness	2.9976	Calculate
Height of measure	1.93	

Fig. 14

Menu Calculations: Rack dimension of the ruller (Pins measurement)

The program also calculates the pins measurement, this window opens: (fig.15)







Pressing the "CALCULATE" button on the same window the results appear: (fig.16)

Fig.16

Menu Calculations: Calculation cutting time with hob

The program calculates the cutting time with the hob, this window opens: (fig.17)

% Calculation Cutting Time With Hob		
Hob diameter 150 mm Progress / Turn table 0.5 mm N. Hob revolutions 95.5 RPM Helix angle 10 Pinion	Band to tooth 10 mm N. Hob thread 2 Depth pass 4.5 mm Normal module 2	Calculate Print Export Results
26.8948 External gear diameter 35.8948 Teeth Numbers 15 Crown Internal gear diameter 74.80213 External gear diameter 83.80213 Teeth Numbers		

Fig. 17

Press the "CALCULATE" button, here are the results: (fig.18)

Scalculation Cutting Time With Hob		×
Hob diameter 150 mm Progress / Turn table 0.5 mm N. Hob revolutions 95.5 RPM Helix angle 10	Band to tooth 10 mm N. Hob thread 2 Depth pass 4.5 mm Normal module 2	Calculate Print Export Results
Pinion	Stroke of entrance	28,4
Internal gear diameter	Stroke of exit hob	1,3
26.8948	Total stroke	39,7
External gear diameter	Time of hob entrance	00:04:27
35.8948	Time toothing band	00:01:34
Teeth Numbers	Time of hob exit	00:00:12
15	Total time	00:06:14
Crown	Stroke of entrance	28,6
Internal gear diameter	Stroke of exit hob	1,3
74.80213	Total stroke	39,9
External gear diameter	Time of hob entrance	00:11:57
83.80213	Time toothing band	00:04:11
Teeth Numbers	Time of hob exit	00:00:33
40	Total time	00:16:42

Fig. 18

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Menu Calculations: Calculation cutting time with pinion cutter

The program calculates the time with pinion cutting, this window opens: (fig.19)

% Calculation Cutting Time With Cutte	r	×
Rotation Progress 0.5 mm/blow	Entrance Progress 0.05 mm/blow	y .
N. knife blows per minute 75	N.Successive passes 4	
Pinion	Pitch diameter of wheel	
Depth pass 4.5 mm	30.4628 mm Base time H:M:S	Calculate
Crown	Pitch diameter of wheel	Print Export Results
4.5 mm	81.2341 mm Base time H:M:S	

Fig. 19

Press the "CALCULATE" button, here are the results. (fig.20)

% Calculation Cutting	Time With Cutter	
Rotation Progres	ss mm/blow	Entrance Progress 0.05 mm/blow
N. knife blows pe 75	er minute	N.Successive passes
Pinion		Pitch diameter of wheel
4.5	тт	Base time Calculate Calculate
Crown Depth pass 4.5	mm	Print Pitch diameter of wheel 81.2341 mm Base time 00:28:25 H:M:S

FIG.20

Menu Calculations: Case A: Fixed center distance, calculate helix angle without corrections Knowing the center distance, the program calculates the helix angle that is necessary to achieve this center distance without any correction Xm. (fig.21

% Input Data Editor
Rack Tool Dedendum tool Addendum tool
Editor Tool Normal module Addendum tool 2 2.5 Normal pressure angle Dedendum tool 20 • DEG 20 • HMS Radius - 5 5 Full radius
Case (A) Fixed distance: Calculate helix without corrections Distance between axis 0 55.8485 N. teeth Calculate PINION 15 CROWN 40

FIG. 21

23

GEAR -1

24

Menu Calculations: Case B: Fixed center distance, Xm Data of one of the wheel Knowing the center distance and Xm correction on a two-wheeler, the program calculates the correction Xm of the other wheel. (fig.22)

a Input Data Editor			
		Rack Tool	
Dedondum tool			
Addendum tool			
	\square		
Editor Tool			
Normal module	9	Addendum tool	
2		2.5	
Normal pressu	ire angle	Dedendum tool	Profile DIN3960
20	© HMS	2.5	
Radius		_	
.5	Full radius		
]
Case (B) Fixed d	istance: Data Xm of	one of the wheel	
Clearance	Dista	nce between axis Helix	angle
0	55.8	10	⊖ HMS
	N. teeth	Xm Correction	
PINION	15	.716	Calculate
	40		
CROWN	40		Cancel

Fig. 22

Menu Calculations: Case C: Fixed center distance, sliding balancing input

Knowing the distance, the program calculates the Xm1 corrections and Xm2 to balance sliding. (fig.23

% Input Data Editor
Rack Tool Dedendum tool Addendum tool
Editor Tool Normal module Addendum tool 2 2.5 Normal pressure angle Dedendum tool 20 • HMS Radius Full radius
Clearance Distance between axis Helix angle 0 Distance between axis Helix angle O DEG 0 55.8485 10 HMS M. teeth Calculate Calculate PINION 15 Cancel CROWN 40 Cancel

Fig. 23



Menu Draw form

The "Draw form" menu you can choose to draw:

- 1) The profile of the teeth of the gear1 and gear2
- 2) The profile of the gear teeth
- 3) The profile of the teeth of the pinion meshed with the tool rack or normal rack
- 4) The tooth profile of the wheel meshed with the tool rack or normal rack
- 5) The profile of the teeth of the pinion meshed with one of the wheel

In this case (fig.24) you choose: "sector meshing"



Fig. 24

Press the "Change Scale" button to change the viewing scale: (fig.25 - 26)









Fig.26

Menu Draw form: Animation window (fig.27) "Rotation Step" defines the rotation step larger or smaller.

"Show points" shows the points of contact involved in the length of action.

"Rotation Direction" Defines the left or right rotation.

"Print" Print window.

"Change scale" zooms in the scale you want.

"Zoom" the right slider performs a dynamic zoom.

Pressing the mouse button to bring up the Windows cursor.

You may move the pattern represented in the window.

х View Teeth Form Rotation step Rotation direction × Animation Change Scale ◀∎▶ Show points Print Zoom Z2=40 2 'n. Έ Graphic Gear Circonf. Section MN = 2 Z = 15 / 40 Z1=15 Scale 10:1







Menu Draw form: Pinion

After you see the following window you press the "rack Tool" button. (fig.28)





Pressing the "Animation" button and doing zoom, this is the animation window. (fig.29)

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Fig.29

Menu View: Coordinates

You can choose "Coordinates" You can get a table of coordinates at will be the tooth of the tooth space 1 and 2 (fig.31)



Fig.31

X and Y are the Cartesian coordinates from the gear center

R and alpha are the polar coordinates of the center gear

You can get a tooth design at the desired scale. (fig.32)



Fig.32

Menu View: Coordinates tool shape

You can select the " Coordinates tool schape or moulding"

You can get a coordinate table with 45 points around the shape of the tooth or the shape of the tool, the pinion and wheel (fig.33)

🌯 Coordinates		
PINION	CROWN	
Tooth	Tooth	l
© Space	Space	
	Show	ļ

Fig.33

 \boldsymbol{X} and \boldsymbol{Y} are the Cartesian coordinates from the gear center

R and alpha are the polar coordinates of the center gear

You can get a tooth design at the desired scale. (fig.34)

% Coordin	nates Tool F	orm or Moulding				
	Cartes	sian	Polar			
N°	Х	Y	R	Alfa		Half of profile from gear center
Caard		aath ninian .				
Coora	inates t	ooth pinion :				
Mn = 2	Z = 15	Beta = 10 Xm	n = 0,716			
Botton	n land					
2	2 7050	10 1505	12 4474	12		
3	2,7959	13,1335	13,4336	10.9859		
4	2,42	13,2274	13,447	10,3678		
5	2,34	13,2674	13,4722	10,0025		
6	2,2938	13,2982	13,4946	9,7868		
7	2,22	13,3474	13,5308	9,4432		
8	2,18	13,3874	13,5637	9,2488		
10	2,1530	13,4220	13,5943	9,1152		
11	2,12	13,4074	13,6697	8,837		
12	2,08	13,5474	13,7061	8,7287		
13	2,06	13,5874	13,7427	8,621		Scale 10:1
14	2,04	13,6274	13,7792	8,5139		
15	2,02	13,6674	13,8159	8,4073		Print Draw Profile
16	2	13,7074	13,8525	8,3013		
1/	1,9906	13,745	13,8884	8,2404		Export Results
18	1,98	13,7874	13,9288	8,1723		Export Results
20	1,9706	13,865	14.0044	8.0891		
21	1,96	13,9074	14,0448	8,022		
22	1,96	13,9474	14,0844	7,9993		
23	1,9641	14,1926	14,3279	7,8792		
24	1,9635	14,4071	14,5403	7,7609		
25	1,9445	14,624	14,7527	7,574		
20	1,912	14,8425	14,9052	7,3403		
28	1,5921	15,148	15,2314	6	Primitive R.	
29	1,8134	15,2828	15,39	6,7668		
30	1,7492	15,5041	15,6025	6,4369		
31	1,6759	15,7259	15,8149	6,0829		
32	1,5938	15,9479	16,0273	5,707		
33	1,5033	16,17	16,2398	5,3113		
34	1,4045	16,3921	10,4522	4,89/4 4 4668		
36	1,1833	16,8355	16,8771	4,0206		
37	1,0612	17,0565	17,0895	3,56		
38	0,9314	17,2768	17,3019	3,086		
39	0,7943	17,4964	17,5144	2,5992		
40	0,6498	17,7149	17,7268	2,1006		
41	0,498	17,9323	17,9392	1,5908		
42	0,3391	18,3633	18,151/	0.5300		
44	0	18,5765	18,5765	0		
			,	-		
•			III		4	

Fig.34

Menu View: Tooth thicknesses

You can get a table with the tooth thickness: (fig.36)

, TOOLIT MICKIN				-			
Print	Exp	ort Results					
X Diameter	Thicknesses Circular Frontal	Thicknesses Circular Normal	Thicknesses Chordal Frontal	Thicknesses Chordal Normal	Addendum Chordal		
PINION :							(
hicknesse	s on involute						
35,8948	0,9842	0,9636	0,9841	0,9635	0,0067	* External D.	
35,4948	1,271	1,245	1,2707	1,2447	0,2114		
35,0948	1,5451	1,5141	1,5446	1,5137	0,417		
34,6948	1,8062	1,7709	1,8054	1,7701	0,6235		
34,2948	2,0543	2.015	2.0531	2,0138	0,8308		
33,8948	2,2892	2,2464	2,2875	2,2447	1,0386		
33,4948	2,5107	2,4648	2,5083	2,4625	1.247		
33.0948	2,7185	2,6699	2,7154	2,6669	1,4558		
2 6048	2 0124	2,8616	2 9085	2,0000	1 6648		
27 2049	3 002	3 0303	3 0873	3 0347	1 874		
21 2040	3,052	3,0393	2 2512	3,0377	2 0921		
01,0940	3,237	3,2029	3,2513	3,1973	2,0031		
1,4940	3,4009	3,3510	3,4002	3,3451	2,292		
31,0948	3,5411	3,4851	3,5334	3,4770	2,5007		
30,6948	3,6589	3,6025	3,6502	3,5939	2,7089	* pit-t-p	
30,4628	3,/193	3,6628	3,/101	3,6537	2,8294	" Pitch D.	
30,2948	3,7593	3,7028	3,7496	3,6933	2,9165		
29,8948	3,8409	3,7846	3,8303	3,7742	3,1232		
29,4948	3,9017	3,8461	3,8903	3,8349	3,3288		
29,0948	3,9383	3,8836	3,9263	3,8718	3,5331		
28,6948	3,9428	3,8895	3,9304	3,8773	3,7352		
[hicknesse:	s under invol	ute					
28,1689	3,9328	3,8815	3,92	3,8689	4		
28,0897	3,9328	3,8819	3,92	3,8692	4,04		
28,0088	3,9543	3,9033	3,9412	3,8904	4,0824		
27,9369	3,9734	3,9224	3,96	3,9092	4,12		
27,8577	3,9735	3,9228	3,96	3,9095	4,16		
27,7769	3,9949	3,9443	3,9812	3,9307	4,2024		
27,7051	4,014	3,9634	4	3,9495	4,24		
27,6317	4,0545	4,0036	4,04	3,9893	4,28		
7.5585	4.0951	4.0439	4.08	4.0291	4.32		
7 4853	4 1356	4 0842	4 12	4 0688	4 36		
7 4123	4 1761	4 1245	4 16	4 1086	4 4		
7 3303	4 2167	4 1649	4.2	4 1484	4 44		
7 2665	4 2572	4 2052	4 24	4 1882	4 48		
7 1895	4 3254	4 2729	4 3072	4 2549	4 5249		
07 1075	4 270	4 226	4.36	4 2072	4 56		
27,12/3	4 4600	4,320	4.44	4 2065	4,50		
27,0015	4,4002	4,4004	4 5077	4,0000	4,6402		
20,9891	4,0101	4,5548	4,58//	4,532/	4,0492		
20,9443	4,7039	4,04//	4,08	4,0241	4,08		
20,8939	4,8005	4,8086	4,84	4,7824	4,72		
20,80/2	5,1515	5,0903	5,12	5,0592	4,70	* Tabana 1 D	
26,8948	5,6328	5,5658	5,5917	5,5252	4,7939	Internal D.	

Menu View: Results (fig.37)

Results	8		
Quality Print DIN3962			
Print 1 2 3 4 5 6	7 8	9 🔲 10 🔲 11	🗖 12
Export Results Notes a b	c Chordal Dime	nsion DIN 3967	h
<u>Final Data :</u>			
Normal module	2		
Base normal module	1,8794		
Circonferential module	2,0309		
Base circonferential module	1,9049		
Running circonferential module	2,0309		
Running normal module	2	(2000/0!!)	
Running pressure angle	20 2836	(20°00)	
Circonferential pressure angle	20,2836	(20°17'1")	
Helix angle on primitive diameter	10	(10°0'0")	
Helix angle on base diameter	9,3913	(9°23'29 [′] ″)	
Helix angle on functioning diameter	10	(10°0'0")	
Conduct ratio	1,4945		
Distance between axis of running and mounting	55,8485		
Sum of corrections	0		
	0		E
	PINION	CROWN	_
N. Teeth	15	40	
N. Imaginary teeth	15,705	41,8799	
Correction on primitive radius Xm	0,716	-0,716	
External diameter	37,1531	87,1451	
Functioning pitch diameter	30,4628	81,2341	
Right pitch diameter	31,8948	79,8021	
Pitch diameter	30,4628	81,2341	
Base diameter	28,5738	76,1967	
Internal diameter	26,8948	74,8021	
Useful diameter of contact	28,8304	78,0693	
userul diameter of start involute Helix angle on external diameter	28,055/	10 2004	
Helix step	542,7513	1447.3369	
· ·	3.27.010	2,0000	
			_
<u>Measuring data :</u>			
Frontal circular thickness tooth on base diameter	3,9336	3,6822	
Normal circular thickness tooth on base diameter	3,8808	3,6329	
Frontal circular thickness tooth on external diameter	0,9842	1,663	
Normal circular thickness tooth on external diameter	0,9636	1,6362	
Chordal thickness on primitive diameter	0,9035	1,0301	
Height (H)	2,8294	1,3058	
Adapdum	2 716	1 204	•





Fig.38







Menu View: Clearances

If in the input data a clearance was scheduled between the teeth, on the View menu you can see all the lights in your teeth derived from the data you have set. (JTT= clearance entered)



Menu Dynamics

It executes the dynamic calculation and sizing the effective face width as a function of the forces and of a pair of work cycle.

The calculation is performed as published by 'Ing. Georges Henriot (1921-2009), one of the leading world experts in gears.

The calculation is very reliable, as long as you know how to estimate the coefficients of the service factor, the quality of teeth and hours duration.

Calculating fatigue is not a precise calculation as the geometric calculation, but it depends on many variables and "analogic" factors, empirical, taken from practical experimentation.

Therefore, the firm "Crivellin Progettazioni" does not take any responsibility for the result, a result that is conditioned by technical knowledge, and from the user's estimated capacity.

Here you will not find the formulas used in the program, but will be fully set out in the Annex to this user manual.



- 1) Enter a planned duration in hours
- 2) Insert an expected duty cycle (pairs and turns the pinion)
- 3) Enter a service factor
- 4) Insert the accuracy class and the finish surface tooth
- 5) Choose the pinion building material (see fig.41)
- 6) Choose the wheel of the building material (see fig.41)

Q	Select Material			-	×
	Material Type				
	Steels for harder	ning and temperi	ng		
	Untreated steel	ing steels			
	Cast iron				
	Material	R	НВ	δb	Ω0
	16 Ni Cr Mo 12	125-155	250	45	1,5
	18 Ni Cr Mo 7	120-150	240	43	1,4
	18 Ni Cr Mo 5	125-155	240	42	1,3
	20 Ni Cr Mo 2	120-160	235	41	1,2
	16 Ni Cr Mo 2	95-130	230	40	1,1
	16 Ni Cr 11	115-145	235	39	1
	12 NI CF 3	85-100	200	33	1
	20 CF NI 4	125-160	250	38	1
	16 CF NI 4	110-145	220	37	1
	Cr 16	70-110	160	30	1
	Cr 10	20-90	130	30	1
					Select
1)

Fig. 41

Press the "Calculate" button and the results will be like those in fig.42

🗞 Dynamic Results	-				
Print	Export Results				
Final Data :					·
Geometric data	a				
Transversal con Contact ratio Total conduct ra Velocity ratio	duct ratio atio		1,4945 2,5512 4,0456 0,375		
Inserted data					
During (hours)			20000		
Time % N Revolutions	Z1 Load daN	Z2 Load daN	Z1 N.Revoluti	ons Z2	E
50 25 20 5	20 10 1 5	53,333 26,667 2,667 13,333	1500 1000 10 100	562,5 375 3,75 37,5	
Precision class (Extreme precis	ion V.P => 100 M	t/sec)	1		
"Service factor "	"KA"""		1		
N. Teeth Material of Cons	truction		PINION 15 16 Ni Cr M	CROWN 40 10 12 16 Ni Cr M	o 12
Dynamic data					
N. Revolutions / Couple DaN*Mt During equivalen During equivalen Minimum width b Minimum width b Ratio band / Pit	1' medium It at pression It at breaking Jand at pression Dand at breaking Itch diameter	(H) (H) (mm) (b/d1)	1007 20 10078 10004 92,3101 59,4546 3,0303	377,625 53,3333 81,2593 55,2717	
Reccomended	band	(mm)	93		
Coefficients (co	ommon data)				
Speed factor Toothing inclinat Contact factor Service factor Conduct factor Helix inclination Ratio factor	tion factor factor	Kv CB Km Ka Ye YB Cr	0,951 1,1711 0,72 1 0,7519 0,87 0,7273		Ŧ

Fig. 42

The program calculates the band 4 widths:

- 1) Breaking, (bending) of the pinion
- 2) Breaking, (bending) of the wheel
- 3) Compression (specific pressure of Hertz) of the pinion

4) Compression (specific pressure of Hertz) of the wheel

Obviously the highest value of these 4 is the width recommended by the program

He is for the user to decide what to do.

For example: a designer of transmissions for racing cars, normally considers a duration of a few hours (1 race), hence flies on the Hertz pressure and takes into account only the calculated flexural end (which is smaller, as shown by results).



Seneral Settings	
Italiano English	Spanish French
Introduction mod	e default angles
Tool fitting	● ◎ 0.25 0.16
Addendum tool rack Dedendum tool rack	1.25 1.16 1.25 1.16
~	Save

fig.43

You can set the default preferences so that they remain stored.

Set the preference degrees decimal or degrees, minutes, seconds for the introduction of the angles

(Pressure angle, helix angle etc.)

Set the radius tool rack

Set the addendum tool rack.

Set the dedendum tool rack.

Every time you start the program these values will be proposed by default, but you can always change the preference of locally entered data.

Menu setup: Print Settings

The program prints all the data necessary to the construction of the gears, select "Setup" you can still choose at any time the data that you want to print, the printed output so it is customizable to operator needs. (Fig.42)

% Print Settings	X
Print selected items	
Base normal module	
✓ Base circonferential module	
Running circonferential module	
Running normal module	
▼Running pressure angle	
✔ Circonferential pressure angle	=
Helix angle on base diameter	
Helix angle on functioning diameter	
Conduct ratio	
Theoretical external diameter with pointed teeth	
Right pitch diameter	
✔ Useful diameter of contact	
✔ Useful diameter of start involute	
Helix angle on external diameter	
Helix step	
Frontal circular thickness tooth on base diameter	
Normal circular thickness tooth on base diameter	
Frontal circular thickness tooth on external diameter	-
Sava	
Save	

Fig.44

Select or clear the data that is to appear in the press.

The "SAVE" button allows saving the selection.

Help menu

If you select "Manual" you open the PDF file with the instruction manual

The entry "Information" provides the formations of the program version. (Fig.43)



Fig.45

Program GEAR-1 INTERNI (Cylindrical gear pair, 1 internal)

The GEAR-1 NTERNI program varies little from Gear-1 It varies to some output windows which are the following: Display window meshing (fig. 46)



Fig. 46

Animation window, you can axially move the pinion to check graphically interference. (Fig. 47)





GEAR -1

Menu View: Specific strip plot. (fig. 48)



Fig. 48

Menu View: Factor of form (fig. 49)



GEAR -1

Program GEAR-1 SINGOLO (Arbitrary single gear)

The GEAR-1 SINGOLO program varies little from Gear-1 It varies for some menus and viewing windows.

General menu:



Menu Calculations

where it is possible a calculation to determine the diameter of the rolling of a gear



Menu DIN 5482, calculates the toothed profiles, male and female DIN 5482

🍈 DIN 5482			x
Туре			
Male		🔘 Fem	ale
© 15x12	© 35x31	© 58x53	© 80x74
© 17x14	© 38x34	© 60x55	© 82x76
© 18x15	Ø 40x36	© 62x57	© 85x79
© 20x17		© 65x60	© 88x82
© 22x19	0 45x41	© 68x62	© 90x84
© 25x22	Ø 48x44	70x64	© 92x86
© 28x25	© 50x45	72x66	© 95x89
© 30x27	© 52x47	75x69	© 98x92
© 32x28	© 55x50	© 78x72	© 100x94
			Calculate

Menu topping

🔹 Gear Singolo 2					
File Calculations	Topping DIN 5482	Draw Form	View	Setup	Help
	External wheel Internal wheel				

From this menu you can calculate arbitrary profiles generated by an arbitrary tool rack.

The inner diameter and the outer diameter of the wheel are created from the tool rack-generator.

The GEAR 2 Single program is extremely flexible and is very useful in reconstructing a gear sample that you do not have the main data.

In the input box, you can impose:

The addendum, the dedendum, the circular thickness.

The tool rack-generator generates the profile, provided it is consistent and feasible.

Some examples:

The input window accepts values that concern the tool generator and the wheel.

Until you press "Confirm" button the tool generator is displayed.

The program calculates the tool feasibility.

🐫 Input Data Editor			×
Normal module 3 Normal pressure angle 20 Normal circular thickness s 4.712389	● DEG ○ HMS pace	External diameter 92 Internal diameter 88 Radius 0	
EXTERNAL N. teeth TEETH 30	Helix angle 0 Xm Correction on p 0	● DEG ← HMS bitch r. Helix sense ✓	Confirm Calculate Cancel

By pressing the "Confirm" appears the tool shape generator (if feasible)

🌞 Input Data Editor			×
Dedendum tool Addendum tool	Rack Too	я 	<u></u>
Editor Topping Normal module 3 Normal pressure angle 20 Normal circular thickness sp 4.712389	● DEG ● HMS ace	External diameter 92 Internal diameter 88 Radius 0	
EXTERNAL N. teeth TEETH 30	Helix angle O Xm Correction on pir O	DEG HMS Helix sense T	Confirm Calculate Cancel

Press the "Calculate" button and the result is this:

🔅 View Teeth Form				
Rack tool	Complete wheel	Animation Print	Change Scale	
				Zoom
		_		ŧ Ļ
				- <u>-</u>
			× J	
			A A	
Graphic Sector				
Scale 2:1	30		\	

Other examples:

🔅 Input Data Editor	x
Rack Tool Dedendum tool Addendum tool	
Editor Tool Normal module Addendum tool 3 8 Normal pressure angle Dedendum tool 12 HMS Normal circular thickness space Radius 6 0 Full radius	
Helix angle 0 DEG 0 HMS EXTERNAL TEETH 30 0 Calculate Calculate Cancel	

🐫 View Teeth Form			
Rack tool	Roller Complete wheel	Animation Print Change Scale	
Graphic Sector Circonf. Section MN = 3 Z = 30 Scale 1.8 :1			Zoom



Menu Calculations: Calculation burnishing

Calculate the diameter of the preparation for a gear that must be built for any rolling.

The program calculates EXACTLY the compartment area and the tooth (obtained for generation and not by approximation), then calculates the diameter in which the volume of the upper part of the full tooth corresponds to the void volume in the lower part of the tooth space.

Burnishing calculation	- • ×				
Export Results Print					
Rolling data :					
Total area of the tooth Total area of the tooth space	31,6967 31,3904				
Pre-rolling diameter Top area tooth mm ^ 2 Lower tooth space area mm ^ 2	89,488 11,9152 11,683				
Data referred to the diameter of the pre-rolling					
Rolling pitch diameter (= Pre-rolling diameter) External diameter Internal diameter Module Circular pitch Circular tooth thickness = thickness space roller burnishing Addendum roller burnishing Dedendum burnishing Corner radius roller burnishing Angle of pressure	89,488 96 82,5 2,9829 9,3712 4,8668 3,494 3,256 0,75 20 (20°0'0")				