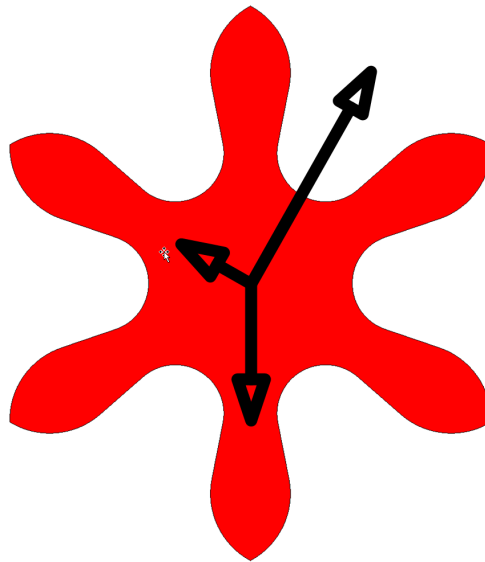


User's Manual



ClockGears

V. 3.1

Irnich Informatik GmbH
Ipsachstrasse 10
CH-2560 Nidau

Tel.: +41 (0)32 333 27 67
Fax: +41 (0)32 333 27 68
E-Mail: mail@irnich.ch

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1. Introduction

The application *ClockGears* has been developed to design circular gears in horology.

ClockGears helps you to avoid tedious and error-prone manual calculations.

The generated geometry is immediately available and can be transferred to other programs (e. g. CAD Systems or postprocessor systems) via DXF.

The user's manual describes how to install the application and how to work with it.

2. Installation

ClockGears setup requires four steps:

1. Checking system requirements
2. Installation of software protection key driver
3. Installation of Microsoft .NET Framework
4. Setup *ClockGears*

If only the Software *ClockGears* is updated, the first three steps can usually be omitted.

If the computer is automatically updated with Windows Update, the first three steps are limited to connecting the dongle to a USB interface. The driver is then installed automatically.

The following description assumes that your computer uses the drive letter D: for the CD drive. If your computer uses a different drive letter, the path names must be changed accordingly.

The setup does **not** start automatically after inserting the CD because different steps have to be carried out depending on the configuration of your computer.

2.1 System Requirements

ClockGears requires the following system specifications:

Clock rate	1000 MHZ	
RAM	1 GB	
Disk space	100 MB	
Operating system	Windows 7 to 11 (32 or 64 bit)	
Permissions	Installing <i>ClockGears</i> :	Administrator permissions
	Using <i>ClockGears</i> :	User permissions

2.2 Software Protection Key

The software protection key (sometimes called *Dongle*; manufacturer: www.thalesgroup.com, Type: Sentinel HASP HL) needs a driver to be installed on the computer.

- Advices:**
- On most systems, the installation is accomplished automatically. Just log in as administrator, plug the protection key to a local USB port and wait until the installation is finished.
 - If for whatever reason the installation isn't performed automatically, a manual installation can be performed using the file *D:\Third Party Software\Dongle\Sentinel HASP\Client\HASPUserSetup.exe*.
 - If necessary, the protection key can be checked with *D:\Third Party Software\Dongle\Sentinel HASP\Diagnose\Admin Control Center.url*. If the dongle has been installed correctly, the Sentinel Admin Control Center page will open in your internet browser. Clicking on Sentinel Keys lists all available dongles.
 - The dongle software is continuously updated by the manufacturer and adapted to new operating systems. The current versions can be found at https://supportportal.thalesgroup.com/csm?id=kb_article_view&sys_kb_id=61fb0ee1dbd2e78cfe0aff3dbf9619ab&sysparm_article=KB0018320
 - *Network dongle for floating licenses:* : Install the dongle on the dongle server and on all workstations either automatically or manually as described in points 1 and 2. The dongle server can be a network server or a normal workstation. The success of each installation can be checked as described in point 3.

**Note for network administrators:
(Network dongle only)**

If the dongle server is located in a different network branch (e.g. 192.168.10.n) to the workstation (e.g. 192.168.77.m), then port 1947 must be enabled on the connecting router. In addition, you need to make sure that the workstation recognizes the dongle server's IP address. This is done via the *Sentinel Admin Control Center* (see above), *Configuration*, *Access to remote license manager*. The necessary settings can be found on the right:

Basic Settings	Users	Access to Remote License Managers
Allow Access to Remote Licenses		<input checked="" type="checkbox"/> You may experience changes will take
Broadcast Search for Remote Licenses		<input type="checkbox"/>
Aggressive Search for Remote Licenses		<input checked="" type="checkbox"/>
Specify Search Parameters		192.168.10.1

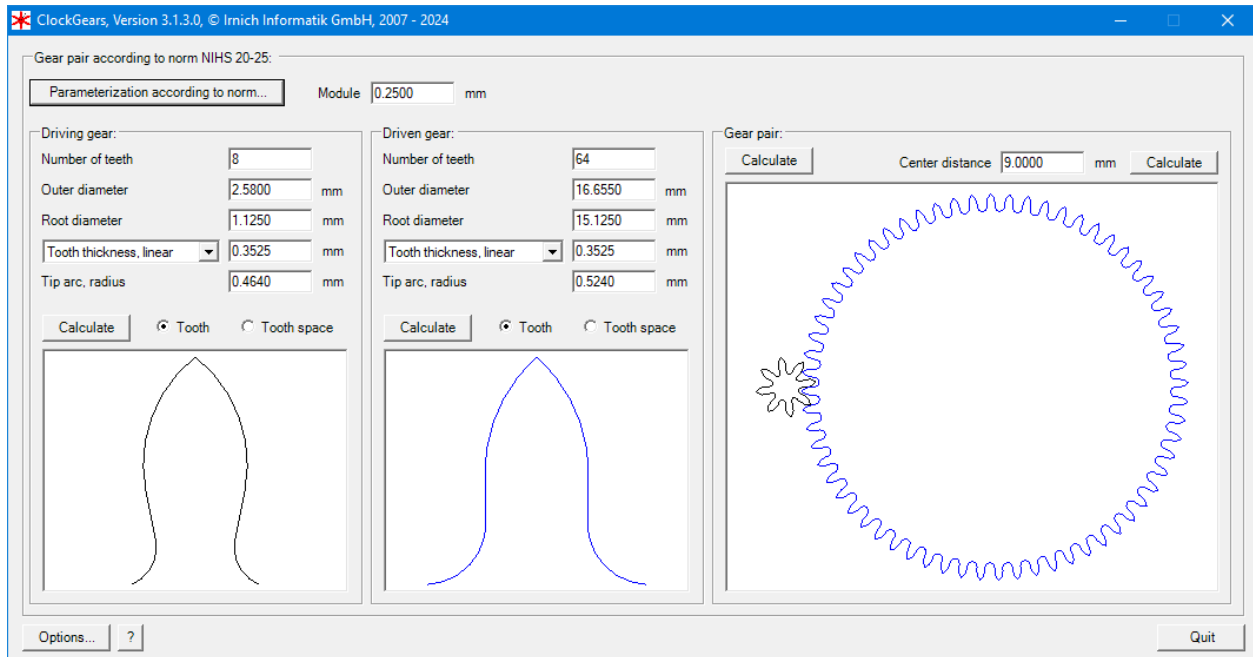
Image: Configuration Network Dongle

2.3 Microsoft .NET Framework

ClockGears needs Microsoft *.NET-Frameworks, Version 4.0, Client-Profile* to be installed.

- Advices:**
- Today, on most systems the framework is installed automatically by Windows Update.
 - If for whatever reason the installation isn't performed automatically, a manual installation can be performed using the file *D:\Third Party Software\DotNetFramework\4.0\dotNetFx40_Client_x86_x64.exe*.
 - *dotNetFx40_Client_x86_x64.exe* contains the English version of the framework. If needed, language packs can be found on CD e. g. *D:\Third Party Software\DotNetFramework\4.0\dotNetFx40LP_Client_x86_x64de.exe* for the German language pack.

3. Operation



The construction of a *Gear pair* can be performed *automatically* or *semi-automatically*.

Automatically means:

All of the parameters are calculated automatically according to the chosen *norm*, the *module* and the *number of teeth*. The drawings are also automatically updated.

Semi-automatically means:

The two gear's parameters are defined by you. After defining all of a gear's parameters, clicking *calculate* updates the associated drawing.

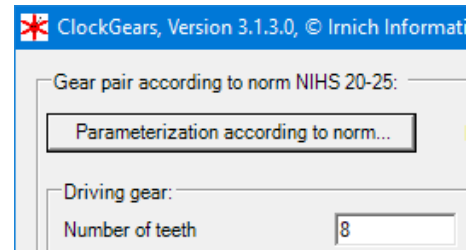
The two different construction modes provide a maximum of flexibility to define the geometries of the gears just as you need them.

3.1 Automated Construction

Automated Construction is based on *norm*, *module* and *number of teeth*. Please execute the following Steps:

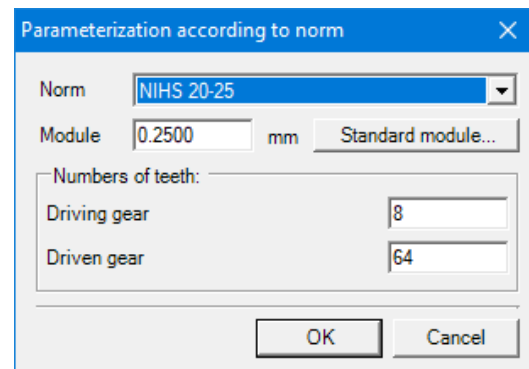
In main window:

Click *Parameterization according to norm*.



In window *Parameterization according to norm*:

- Choose a norm, e. g. *NIHS 20-25*
- Introduce a *Module* or choose a *Standard module*.
- Determine the two *numbers of teeth*. Please pay attention to the admissible number of teeth, which differs from norm to norm (see below).



3.1.1 Admissible Number of Teeth

Norm	Driving gear	Driven gear	Comment
NIHS 20-02	> 40	6 - 20	For multiplications only
NIHS 20-25	8 - 1000		For multiplications and reductions
NHS 56702 NHS 56703A	Pinion: 6 - 16; multiplication: 3 - 12		For multiplications only
NHS 56702 NHS 56703B	Pinion: 6 - 16; multiplication: 3 - 12		For multiplications only
NHS 56702 NHS 56703C	Pinion: 6 - 16; multiplication: 3 - 12		For multiplications and reductions
NHS 56704	8 - 1000		For multiplications and reductions

3.2 Semi Automated Construction

Semi Automated Construction allows the definition of teeth without relation to a norm. Please execute the following steps:

Driving gear:

- Please enter the parameters of the driving gear and click *Calculate*.

- Have *ClockGears* display the geometry as a *tooth* or a *tooth space*.

Driven gear:

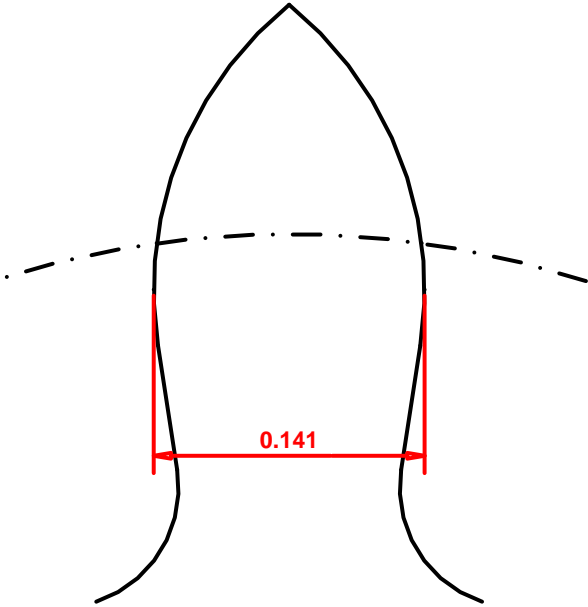
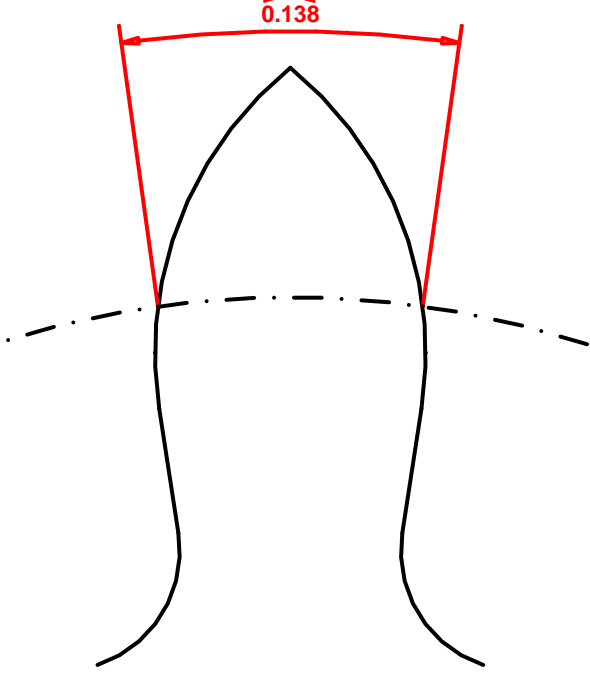
- Do the same for the *driven gear*.

Gear pair:

- If known, enter the *center distance*.
 - Have *ClockGears* calculate the gear pair.
- or:**
- Have *ClockGears* calculate the *center distance*. To perform the calculation, *ClockGears* needs the *module*, which should always be introduced as the first parameter (if not, other parameters would be deleted automatically now to ensure data consistency).
 - Have *ClockGears* calculate the gear pair.

3.3 Tooth Thickness

Regarding circarc gears, *tooth thickness* can be interpreted according to two different approaches:

Tooth thickness <i>linear</i> :	Tooth thickness <i>circular</i> :
	
<p>In this case <i>tooth thickness</i> means the maximum thickness. In reality it could be measured using a micrometer caliper.</p>	<p>In this case <i>tooth thickness</i> means the arc's length inside the tooth measured at primitive diameter. In reality it is not possible to measure it by simple means.</p>

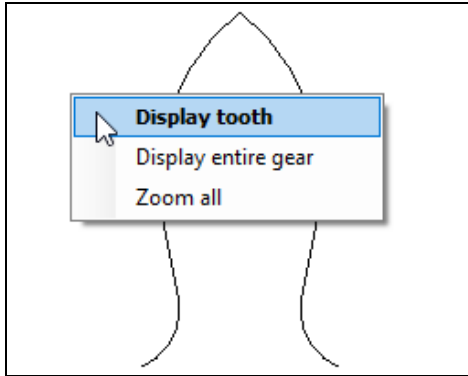
When using *Automatic Construction*, *ClockGears* chooses the proper approach for *tooth thickness* due to the norm.

When performing *Semi Automatic Construction*, it's up to you to determine which approach is to be used.

3.4 Display of Geometry

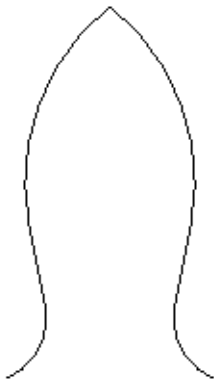
All displays are sensitive to the *mouse wheel*. Turning it, will result in a dynamic zoom of the displayed geometry.

All displays provide context menus to be opened with the right mouse button. Use these menus to get additional functions, e. g. starting a *viewer*:



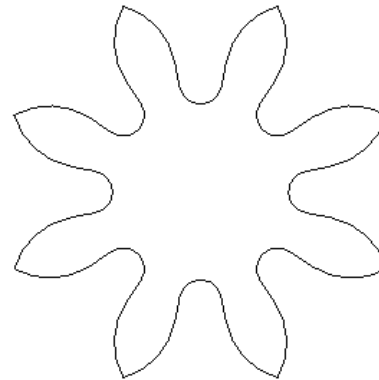
Viewer displays a tooth:

(To be achieved also with *double click*.)

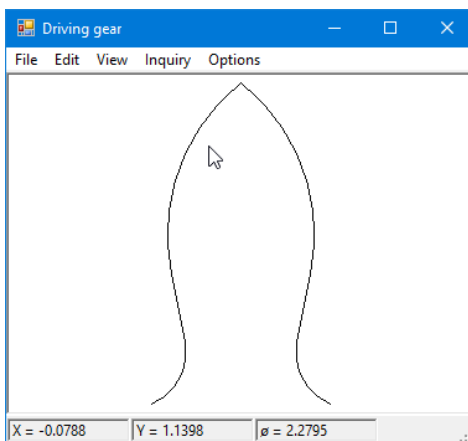


Viewer displays an entire gear:

(To be achieved also with *SHIFT-double click*.)



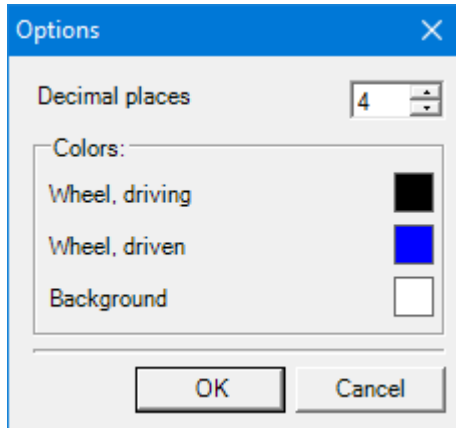
The following options and information are available in the details window that now opens:



- Save drawing as *DXF file* (*File, Save as*).
- Check *coordinates* in the status line
- Display *element data* (*Inquiry, element data*)

3.5 Options

The *Options* button (at the bottom left of the main window) can be used to open a dialog window to set various options:



Decimal places

Specifies how many decimal places the program should use.

Note: The number of decimal places affects the geometry of the calculated gears. This ensures that the parameters and geometry always match exactly.

Recommendation: 4 decimal places.


Colors

Colors can be set in a dialog box by double-clicking on the respective color field.

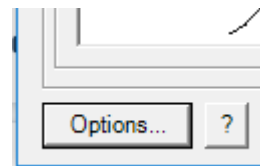
3.6 Language Settings


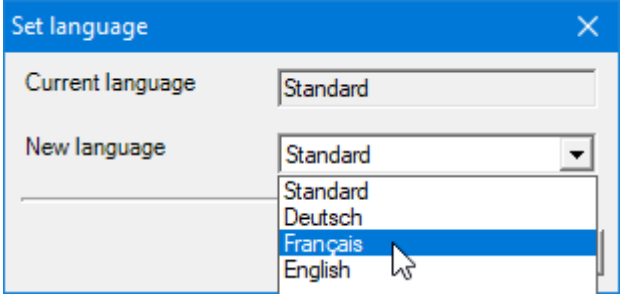
ClockGears is designed as a multilingual program. When first started, it perceives the operating system's language setting and tries to follow it. If the desired language is not available in *ClockGear's* resources, it will be switched to German by default.

If the automatism doesn't show the proper language for *ClockGear's* user interface, it is possible to set it manually:

Click the *Help Button*  to the lower left.

An *About Window* will appear.



<p>Double Click the icon of the <i>About Window</i>.</p> <p>A window to set the language will appear.</p>	 <p>ClockGears Version 3.1.3.0 The program generates profiles of clock gears</p>
<p>Click the <i>New language</i> box. All available languages will be shown. Choose the appropriate language.</p>	
<p>Please note that <i>ClockGears</i> has to be restarted to show up the new language setting. The setting will then remain until the next manual change.</p>	

4. Hints

Drag & Drop: All drawings in *ClockGear* can be *drag-and-dropped* to other applications of Irnich Informatik GmbH. This makes it very convenient to transmit the two gear's profiles e. g. to the application *VisualGear* to watch them rotate.

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