Cenon

User's Guide

Cenon

www.cenon.info

The Cenon User's Guide
Version 4.1

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Contents

Chapter 1

General Information

1.1 About this Book

This documentation serves as a reference of the Cenon functions. One chapter describes in short how to work with Cenon by example. This alone makes the book thick enough. Additional dokumentation for the modules and special tutorials for the different applications of Cenon are planned.

This book describes the Astrology module for Cenon. It is meant as a reference as well as a working book. A description of Cenon in general can be found in the Cenon User's Guide.

Depending on your computer system (Linux, Apple) or the applied Theme (skin), there are differences in the look of the user interface. The panels depicted in this book may differ in their look from the interface you are using, although the placement of the controls remain identical.

The various computer systems (Apple, Linux, OpenStep) also show some differences in the directory structure. This information is always given for all systems.

This book has been written using LYX. The title page and the slip case were designed with Cenon.

All trade marks like PostScript, Adobe Illustrator, HPGL, DXF, Gerber, Excellon, Sieb&Meyer etc. belong to the respective owners.

1.2   The history of Cenon

Cenon has been started in late 1992 / early 1993 as a production software under NextStep/OpenStep. Since then, Cenon has made lots of friends all over the world and is still making more.

Besides the usual improvements of a software project, the features of OpenEnd (Vector graphics conversion), and CenonPCB (prototyping of printed circuit boards) were merged into Cenon. Additionally basic font editor functions were added from a started project.

In the year 2002, Cenon was completely redesigned with a modular concept. This makes Cenon expandable by modules for extremely different graphical applications. The first modules available are a CAM module and an Astrology module. Two applications from opposite sides of the spectrum.

From 2000 on, Cenon was ported to GNUstep (Linux & Co) as well as the new Apple operating system (Mac-OS X). In addition, most other Unix systems are supported.

During the conversion of Cenon into a modular software, we also included the Astro program, which has been started in 1998 for research into Astro-Resonance, and turned it into a beautiful Cenon module.

The whole basis of Cenon with its vast set of features, including vector graphics conversion, vector design, publishing etc. is available as Free Software since 2003. The manufacturing software Cenon CAM is available as a commercial application.

In 2012 Cenon reached version number 4.0 with many improvements like SVG import.

1.3   What can you do with Cenon ?

Cenon is a modular graphical software. In it's basic version Cenon is most at home in the area of Vector-Graphics Design and Desktop Publishing (DTP). The idea of Cenon is a merger of vector design and publishing, an easy and straight forward tool.

With the powerful import functions of Cenon, you can import and edit almost all graphics formats (PostScript, HPGL, DXF, SVG, ...). The design functions fulfill all common Publishing demands. The output possibilities mirror the import capabilities and aim to give productivity to the user with as much flexibility as possible.

Moduls for Cenon can provide additional functionality. The first module for Cenon was the CAM module. This module turns Cenon into what it was from the beginning - a production software for manufacturing on CNC-machines like engraving machines, milling machines, routers, tool-plotters, cutting-plotters, and pen-plotters. Cenon CAM is a universal production software and has its application in the industrial area as well as in sign-making, or model-making.

This user guide for Cenon describes the Cenon Core. For a description of the modules and special Cenon-Packages, please refer to the corresponding document.

1.3.1   Cenon

Key Features

- Import of SVG, PostScript, PDF, Adobe Illustrator (AI3), DXF, HPGL, Gerber, Excellon, Sieb&Meyer, Type 1 fonts, ...

- Import of scanned images (TIFF, PNG, GIF, JPG ...)

- complete set of editing functions for lines, curves, arcs, complex paths, poly-lines, text, threads, countersinks, etc.

- comfortable management of layers and pages

- DTP functions like clipping of images and color separation

- Text along paths

- Color shading (graduate, radial and axial)

- Color-Separation, Crop-Marks (Pre-Printing)

- vectorisation of raster images

- Rich Text (vector fonts (Type 1, TTF), tabulators, rotation, ...)

- Easy and intuitive operating for fast and accurate working

- Batch processing

- Export of PostScript (PS, EPS), HPGL, DIN, Gerber (RS274X) and more

- Font editing of Type-1 fonts (not very comfortable yet)

- Extensible via additional modules (Plug-Ins)

Examples of applications

- Desktop Publishing (DTP) - Creation of Book-Cases, Stationary, Logos, Advertisings, Banners, ...

- Multi Page Documents like Brochures, Flyers, Booklets, ...

- Mousepads, Business-cards, Bookmarks, CD-labels, ...

- Letters and Forms of all kinds with predefined text masks

- Vector Graphic Conversion, including postprocessing of all import and export formats in every direction.

- many many more

1.4   The world around Cenon

This chapter displays a few services and products around Cenon. You will find more on the Cenon web pages.

1.4.1   Folder and printed book

You can order the Cenon Slip-Case including Manual and CD in our Online-Store:
http://www.cenon.info

1.4.2   Modules for Cenon

Cenon ist a modular graphics application. With the aid of modules Cenon can be
extended in functionality, or transformed into a very special application. Usually
modules are bundled with Cenon as complete Application-Packages. Examples for
specialized Application-Packages are

Cenon CAM (http://www.cenon.biz)
Cenon Astro (http://www.cenon.info/astro).

1.5 Installation

The installation process for Apple and Linux differ slightly. Please read the section of your System.

Here we describe the installation of the executable packages only. If you want (or need) to compile Cenon yourself, take a look at the file INSTALL inside the source tree.

1.5.1 Installation on Apple (Mac OS X)

1. Insert the Cenon-CD and wait until the CD-Symbol appears in the Finder. Then click on the CD-Symbol and select the path of Cenon for Apple (Apple ▷ Packages). If you downloaded Cenon, you have to unarchive the downloaded file instead (double click).

2. You will find a package with the name Cenon-x.x.x.pkg, where x stands for the version number. Double click the package to start the installation.

3. The installer appears, where you have to authorize yourself as administrator.

4. Next you can start the installation process by confirming the different stages (Introduction, Read Me etc.). The files are now extracted from the package and copied to your hard disk. This takes a few moments.

5. If you have a previous version of Cenon already installed, the installation program will tell you. Just continue the installation.

6. After the package is installed, you can start Cenon. To do this, go to the directory '/Applications' and start Cenon with a double click.

If you are installing the CAM version of Cenon, please refer to the CAM manual for further installation.

7. To be able to import PostScript or PDF files, you have to install GhostScript. You can get a version of GhostScript from the same place where you got Cenon, but any other version of GhostScript will do the job. Double click on the GhostScript package to start the installation.

1.5.2   Installation on Linux

1. log in as user root

2. Insert the Cenon-CD and mount the CD. Then change to the directory of Cenon for Linux (Linux ▷ Packages). If you downloaded Cenon, you can skip this step.

3. You will find a RPM package. Install it with the installation tool of your Linux distribution, or enter the following command in a terminal shell:

```
rpm -Uhv Cenon*.rpm
```

4. To start Cenon go to the folder /usr/GNUstep/Local/Applications and start Cenon with a double click. If you don't habe GWorkspace running you can start Cenon by typing 'openapp Cenon' from a shell.

   If you are using the CAM version of Cenon and it is your first installation, Cenon will ask you for a license key.

1.5.3   Installation on OpenStep (Deprecated)

1. Log in as user root

2. Insert the Cenon-CD and wait until the CD-Symbol appears in the File Viewer. Then click on the CD-Symbol and select the path of Cenon for OpenStep

(OpenStep ▷ Packages). If you downloaded Cenon, you have to unarchive the downloaded file instead (usually a double click should work).

3. You will find two packages, which you have to double click one after the other. The names are:

    (a) Cenon.pkg
    (b) CenonLibrary.pkg

4. For each package a window will appear, where you have to click on Install.

5. Then another window appears. Just click on Install or press Enter. The files are now extracted from the file and copied to the hard disk. This takes a few moments.

    If you have an old version of Cenon already installed the install programm will notify you. Just continue the installation.

6. Wait until the first package has been finished before installing the next one.

7. After all packages are installed start Cenon as user root. To do this, go to the directory '/LocalApps' and start Cenon.app with a double click.

    If you have installed the CAM version of Cenon for the first time, the license panel appears. Here you can license the program (See the next section) or decide to run it in demo mode.

1.6   Initial Operation

You will find Cenon in the application folder. Double click on the Cenon.app to start Cenon.

To get the Cenon-Icon into the dock, you can simply drag the Icon from the application folder and drop it on the dock.

Now, you can start Cenon, by clicking the Cenon-dragon in the dock.

In the library folder of Cenon you will find some examples: The folder *'Projects'* contains some example Cenon projects. The folder *'Jobs'* provides CAM examples, and the folder *'Examples'* provides examples of import formats.

The library of Cenon resides in slightly different places, depending on your system:

Apple: /Library/Application Support/Cenon

Linux/GNUstep: /usr/GNUstep/Local/Library/Cenon

OpenStep: /LocalLibrary/Cenon

1.7   Updates

Cenon can inform you automatically about available Updates. About once a week when Cenon is started, Cenon will check with the Server, if a new release is available.

You can manually check for updates via the menu Help ▷ Updates.

If a new release of Cenon is available, the Update-Panel appears.
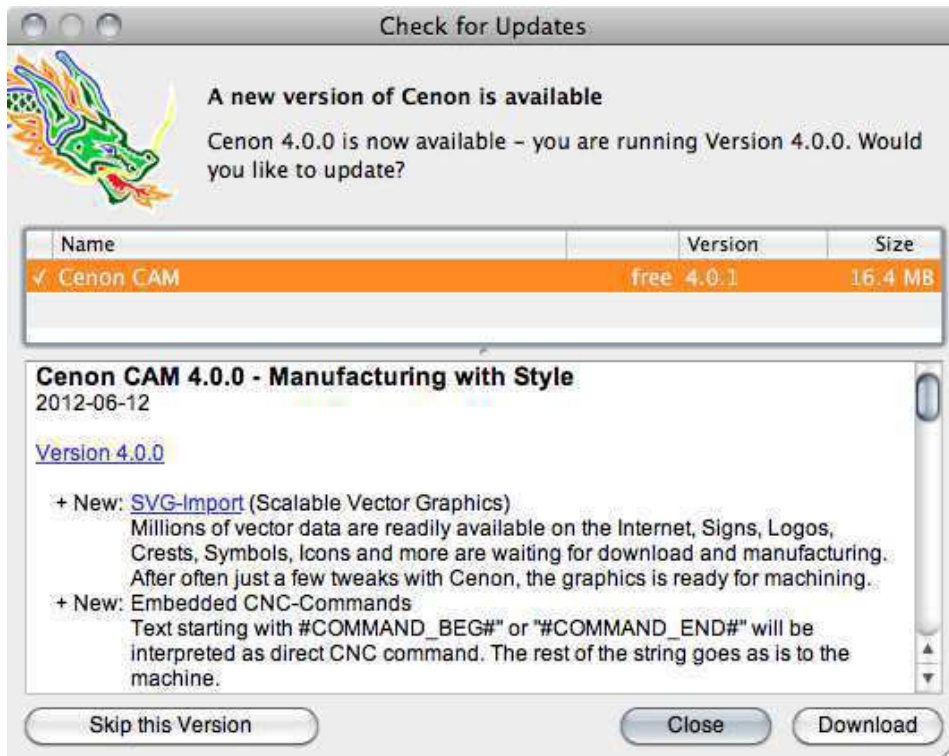
Cenon will check for Updates of your Cenon-Flavour and installed modules. Cenon will display the corresponding Packages in a list, including Package Name, Version, and File Size.

If you click on an entry in the list, the description of improvements of this package will be displayed.

Skip this Release	once clicked, you will not be informed about this specific version automatically. You can still use the Menu Help ▷ Updates to manually check for this version.
Close	the Update-Panel will be closed without action.
Download	all packages, which are checked, will be downloaded to your Download folder. Cenon will open the installer for

you, however (for now) will not install the packages au-
tomatically.

Automatic update checks can be disabled. To do so, you have to go to the Cenon
Preferences (see section 3.1) and activate the switch "Disable automatic check for
Updates". You can still check for updates manually via the menu Help ▷ Check for
Updates or via the Cenon Web-Site.

1.8   Support

User Guide   We try to keep the user guide practical and full of information. The user
             guide should answer most of your question.

WWW   You can find information about new versions and an up-to-date FAQ
             (frequently asked questions) on our Website:
             http://www.Cenon.info.

Mailing list In the mailing list of Cenon, you can ask questions and exchange your-
              self with other users of Cenon. To subscribe to the mailing list you can
              go to the Support page of the Cenon internet site.

eMail   Direct support for the free software is only offered via e-mail.
             Since Cenon is free software we can not gurantee for answers. Please
             try to check out other possibilities (User guide, FAQ, mailing list) be-
             fore asking for e-mail support.

Bugs   If you find a bug, we are thankful to receive your bug-report or even
             better a patch. We will try to fix serious bugs for the next release.

1.9 The file-extension and icons

Icon for the Cenon-project. The file extension is: **.cenon, (.cen)**

Extension and icons of import-formats

Icon for HPGL-files. The recognized extensions are: **.hgl, .hpgl, .plt**

Icon for DXF-files. The extension is: **. dxf**

Icon for Adobe Illustrator files. The extension is: **.ai**
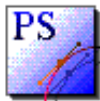
This is the icon for PostScript files. The look of the icon might differ somewhat from system to system. The possible extensions are: **.eps, .ps**

This is the icon for PDF-files. The look of the icon might differ somewhat from system to system. The extension is: **.pdf**

This is the icon for Gerber-files. The possible extensions are: **.gerber, .ger**

This is the icon for Scalable Vector Graphics (SVG)-files. The possible extensions are: **.svg**

The icon for DIN-files like Excellon or Sieb&Meyer. The possible extensions are: **.din, .drl**

Chapter 2

Publishing with Cenon

In this chapter we use the example of a cover page to describe all the steps necessary to create a Cenon document. Although we use a publishing example here, everything applies equally to other applications of Cenon. The other chapters of this book serve as reference of the Cenon functions. For further special description and examples of how to use Cenon, we refer to the other Cenon documents.

The general proceedings when creating a Cenon document is as follows.

1. Creating a new document; Import of a Graphic; Loading an existing project mask

2. Creating of new layers for the separate working steps

3. Editing of the project (document)

4. Export and Output

To get a mental picture of our work before starting - as every artist has, we now take a short look at the final result. That's how our document will look like, when we are through this tutorial:
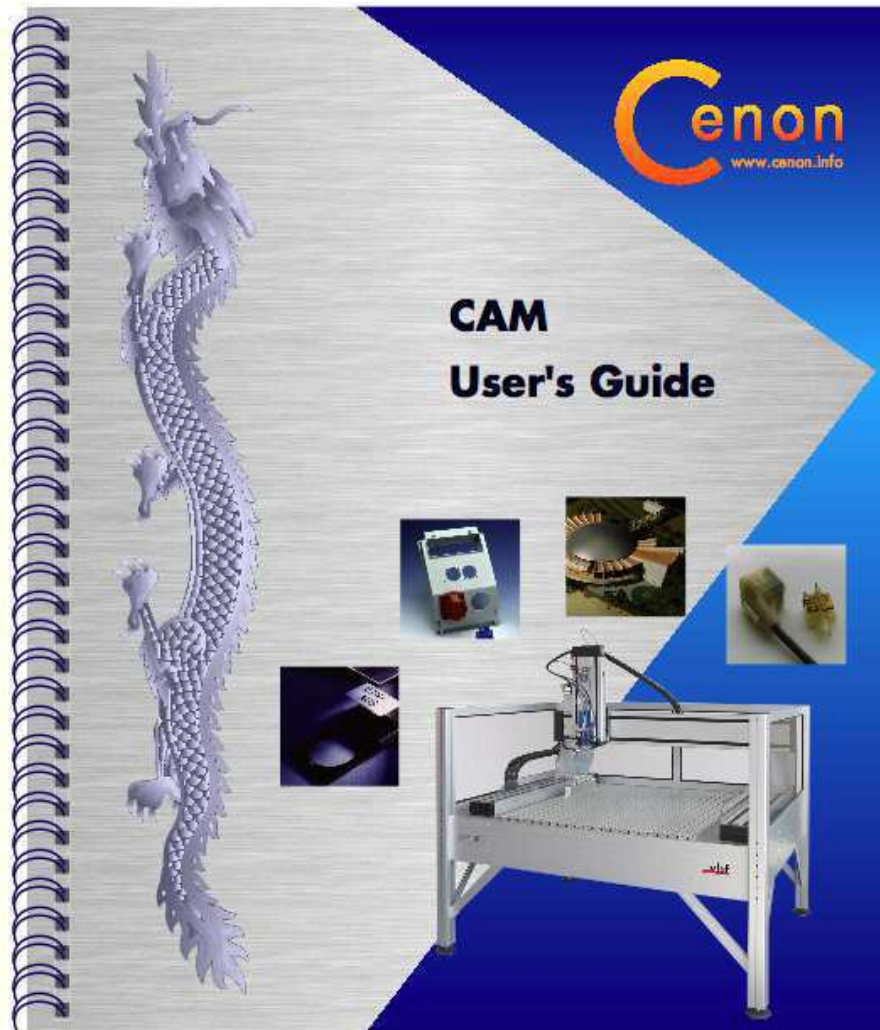
2.1 Create a new Document

2.1.1 Preparations

Before we start, we can set some preferences.
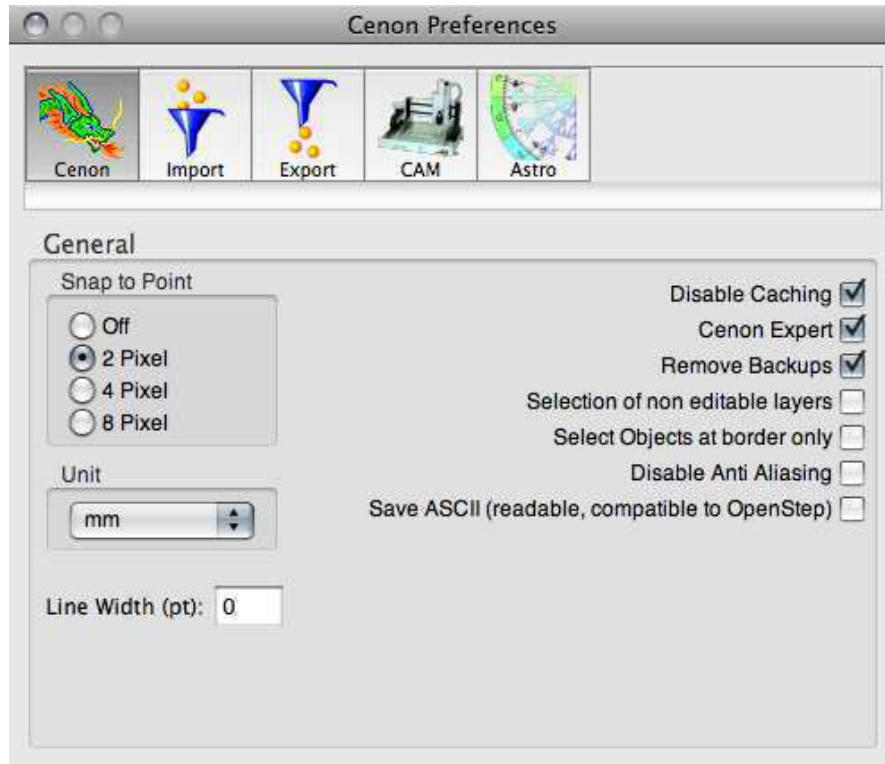
You can reach the Preferences Panel by the menu *Info ▷ Preferences*.

Here you can choose the unit of measurement (mm, Zoll, Point). We select mm for our example.

Additionally it seems useful for DTP applications to disable the selection of non editable layers.

Important for our work is to set the snap-to-point distance. 2 pixel should be well.

Further information on the preferences can be find in section 3.1.

2.1.2   New Document

In the menu *Document* with the menu entry *New* (Cmd-n), you can create a new Cenon document. What we get is an empty document window with the title "Untitled".
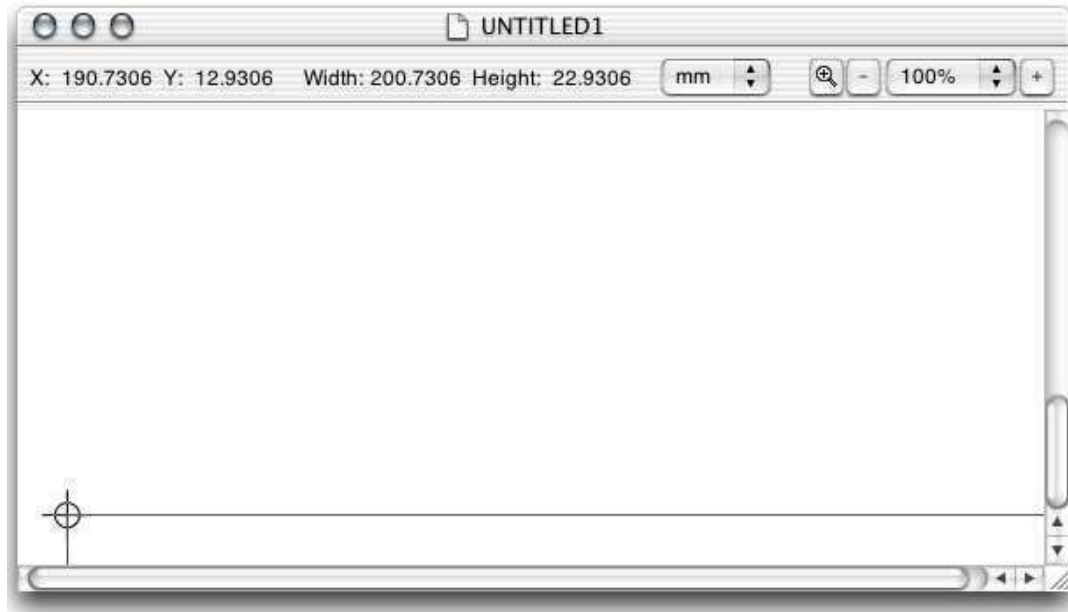
The crosshairs don't have use for us at this place. We simply move them to the lower left corner of the window, so that we get the coordinates 0/0 displayed for them inside the Inspector Panel.
The crosshairs are the origin of our coordinates. They can be moved to any desired position from where the coordinates should be measured or the grid should start.

2.1.3   Set working area

As we want to print our cover page on a DIN-A4 paper, we set the working area of the document window to this format. To do this, we open the Working Area Panel via the menu *Format ▷ Working Area* or by using the keyboard shortcut Cmd-A.
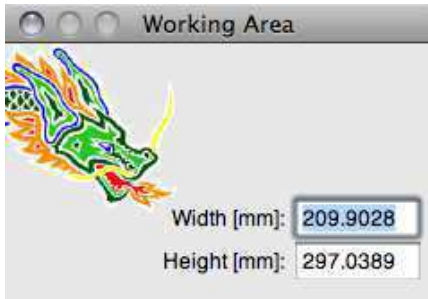
The format A4 has a width of 209 mm and a height of 296.86 mm. We simply enter these values into the text fields and press Enter on our keyboard.

2.1.4   Save Document

To have the document created permanently, we save it to a file and give the file the desired name. Cenon documents on disk get the extension '.cenon'. That's how they are identified.

To save the document we open the save panel via the menu *Document ▷ Save* (keyboard shortcut: Cmd-s)
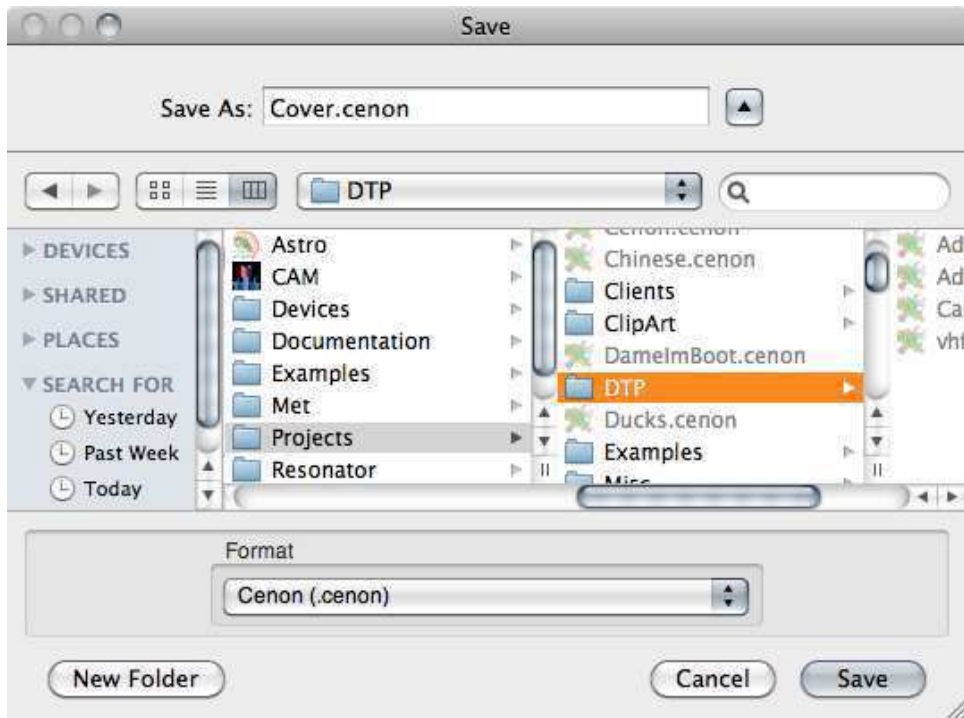
Here we can go to the desired folder and provide the filename inside the text field
called *Name*. We call our document CoverCAM.cenon. By pressing OK, the docu-
ment will be saved.

2.1.5   Grid

To make the positioning of our graphic objects easier, we can activate a background
grid. All graphic objects will then snap to this grid.
To create the grid, we have to open the Grid Panel via the menu *Format ▷ Grid* or the
keyboard shortcut Cmd-*.
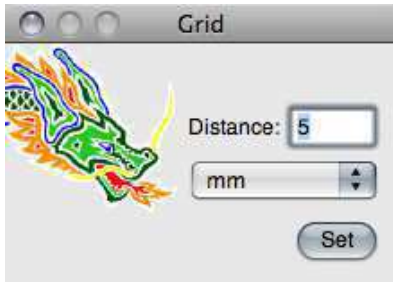
First, we better choose the same measurement unit like our coordinates - mm. This avoids confusion. Then we enter the grid distance into the text field. In the example we use a grid distance of 5 mm. By pressing the Set button, the grid will be created and displayed with gray lines.

To activate and deactivate the grid during work, we can now simply use the key Cmd-+ or the menu *Format ▷ Grid*.

2.2 Create Layers

To have a better overview and more flexibility we can organize our graphic elements on several layers. For example, we can place large background objects of our document on their own layer. To focus on other objects we can now simply disable this layer.
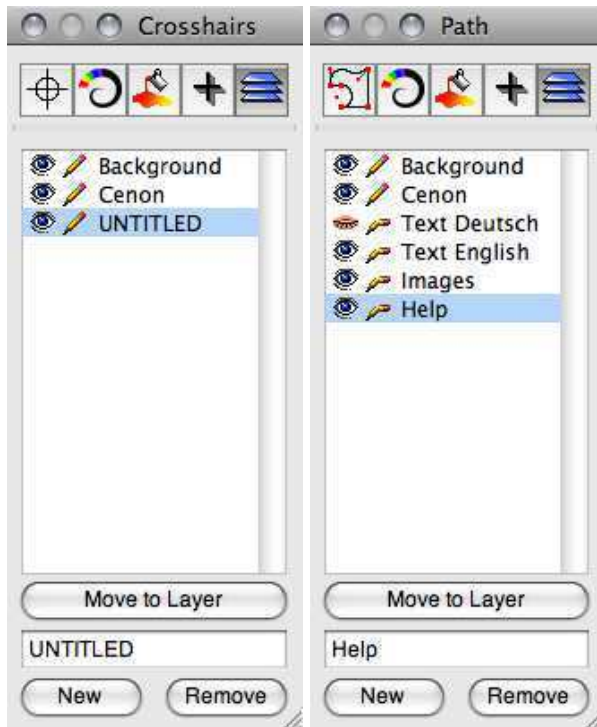
To create a new layer, we need the layer inspector. We get it from the menu *Tools* using the menu entry *Inspector*, and then inside the Inspector, clicking on the right-most icon in the top icon bar. Alternatively, we can simply use the keyboard shortcut Cmd-5. To have this work, our graphic window has to be in the foreground!

A new layer will be created with the button *New*. The layer appears with the name *UNTITLED* and has to be renamed to the desired name. The layer will be placed to the lowest position in the layer list. You can move it to any position inside the list with the mouse (while pressing the Control-Key on your keyboard).

We create the following layers for our document:

Background   A layer for the background elements. A layer like this makes sense, so we can't accidentally select the background while editing in a high zoom, probably without even realizing. We now simply turn the layer not editable to avoid this problem.

Cenon   Here we place the main elements of our cover page. Those which are not language dependant.

Text Deutsch This is our layer for German Text.

Text English Here we place the English version of our text. This way we can manage all desired languages without efforts in one single document.

Images   This is the layer for our images. An extra layer for images allows editing without bothering about other graphic objects.

Help   Help lines and guides are placed here. This layer will be disabled for printing as it only serves to simplify our work.

Further information about the layer inspector can be found in section 3.6.19.

2.3   Get to business - the Design

2.3.1   Help layer

On the help layer we place supporting details, which we don't need afterwards on our print. Beside help lines (guides), these could be things which show our cover page as it would appear as complete handbook. As the background of the book will be filled over size, we also draw a frame which shows the real end size of the cover page.

First, we turn on the help layer, and turn off all other layers. This can be achieved simply by clicking on the eyes inside the layer inspector. An open eye displays the layer. To be able to edit objects on the layer, the pencil has to be intact.
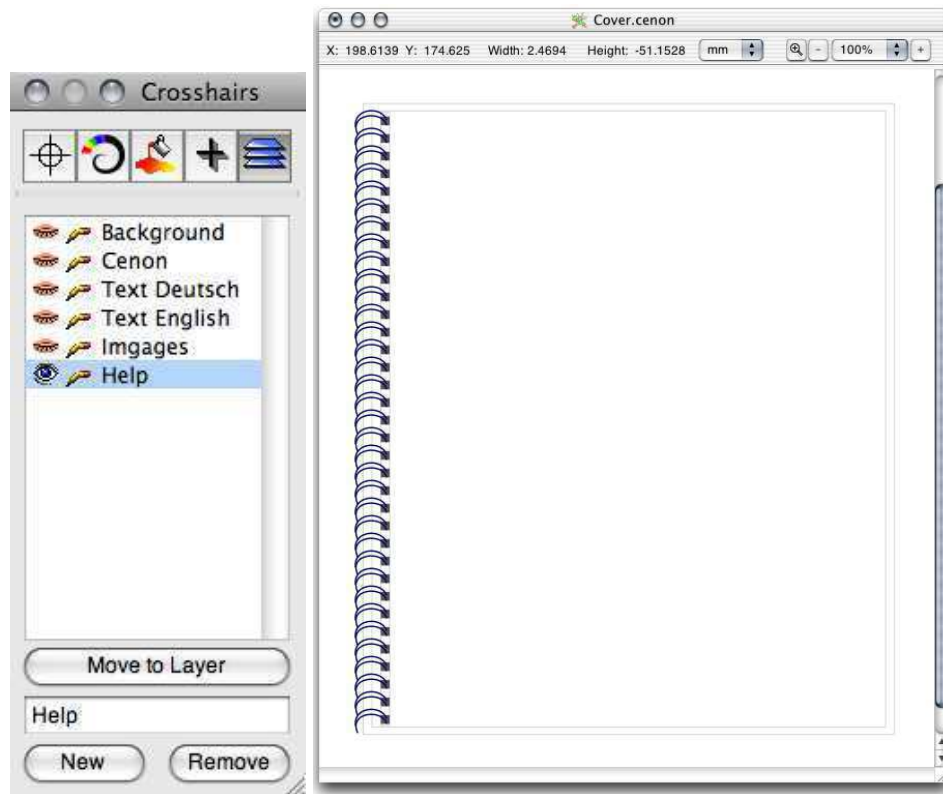
Now we create the frame of the cover page in the desired size. We select a discreet color for the rectangle, for example gray. The origin of the frame should be placed to even coordinate without decimals, this makes things easier.

We lock the position of the frame, so we can't move it accidentally. This is done in the ractangle inspector (Cmd-1) with the switch *Lock*.

The edges of the frame will be used, in the following design process to snap our objects. So, they are guides too.

To give our cover page the look of a real book on screen, we draw wire rings and punch holes. This helps visualizing the final results.

Tip: If you happened to draw on a wrong layer and now want to move the
                 object to the right layer, you can do the following:

- select the object (both layers have to be visible and editable)

- choose the destination layer from the layer inspector

- click on "Move to layer" to finally move the object

2.3.2 Background

Now we start with the background. We turn on the background layer and turn off the other layers (not visible or at least not editable). The help layer should remain visible to allow snapping to the grid.

On this layer we place the cutting marks and other markings, which need to be printed. If we have many markings, we could use a layer of it's own for the markings, of course.

Last but not least, we place our background image here. In our case a polished aluminum surface. The image should have a sufficient height resolution. About 600 dpi should be enough. The image can be provided in almost any format.
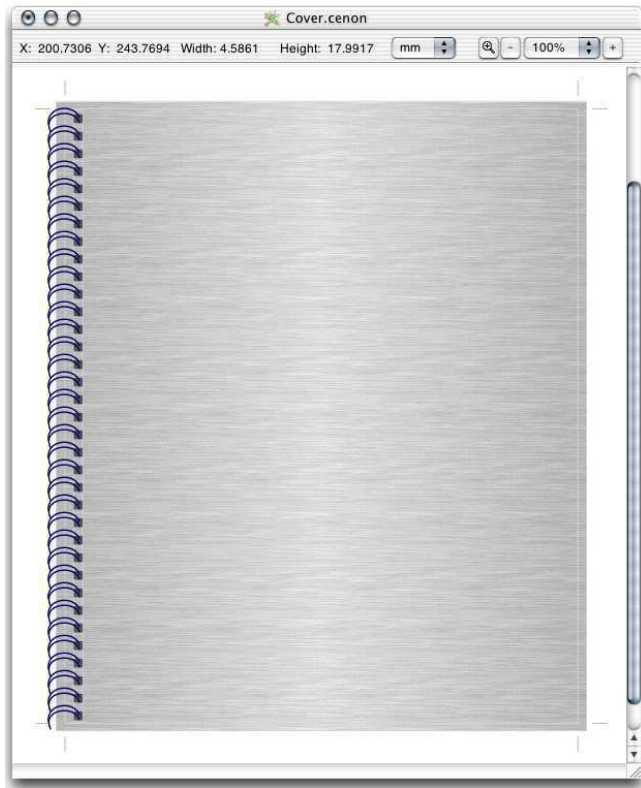
To get the image into our document, we have several choices. We can drag it directly from the Workspace (or the Finder on Apple) into our document. We can import the image via the menu *Document ▷ Import*, as well.

We now scale the image to the desired size. If it is much larger than the window, we use the Transform Panel to bring it down to a reasonable size first. We find the panel in the menu *Tools ▷ Transform Panel* (shortcut: Cmd-F).
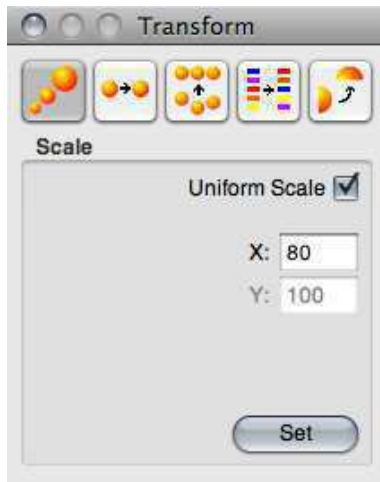
In the pop up menu on top of the panel we select *Scale*. Now, we scale by keeping the aspect ratio of the image (Uniform scale) to say 80% of the original size. If we have the image completely inside our working area, we can do the rest using the mouse:

First, we grab the lower/left corner of the (deselected!) image and drag it to the outer edge of our help frame. There the position will snap in.

In the second step, we grab the upper/right corner. This time while keeping the Control key (Ctrl) on the keyboard pressed. Resizing the image this way, will keep its natural aspect ratio. We snap to the corresponding edge of our frame.

If we have mastered the background, we turn the layer to non editable (broken pencil).

Tip: We should save our work from time to time. Whenever a working step is finished we could even save under a different name, this way keeping several versions of our work.

More information on the Transform Panel can be found in section 3.8.

2.3.3   Cenon

Now, after all the preparation, we can start the actual design of the title image. First, we turn on the corresponding layer (we have called *Cenon*), so that the layer is visible and editable.

Triangles

We start with the two blue triangles (to be exact, our triangles have four edges). The triangles are paths, which are composited from lines. The lines are then joined and filled.
First, the upper triangle...
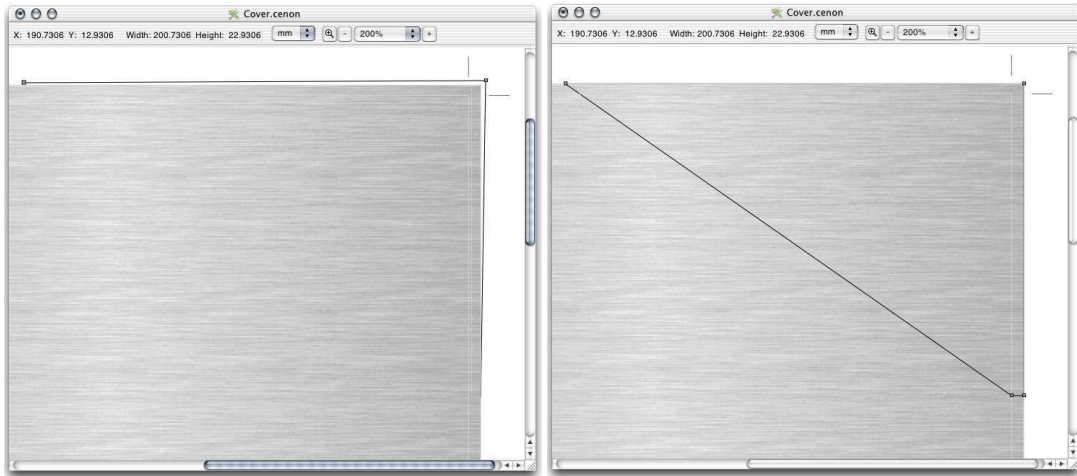
We need the Line tool to draw the lines. We find it in the Tool Bar (menu *Tools ▷ Tools...*), and activate it with a click by the mouse.

We draw the lines with the mouse. We first click at the start position of the line and then at the end position of the line. If we don't snap to another object, the next line segment is started automatically. We draw the complete train of lines and end it exactly where we started.

Tip: To avoid starting a new line every time we have ended a line, we can

draw the train of lines roughly to the side of the help lines. If we have completed the train of lines, we can easily drag the line ends with the mouse to their exact position on the help lines.

If the lines are drawn, we leave the line mode and go back to the arrow.

To create a path from the lines, we have to select all the lines, which are part of the deal. As we don't have any other lines on the layer, we have easy play: We simply select one single line and go to the menu and select *Edit ▷ Select equal* (shortcut: Cmd-e). Now, all lines are selected. To join them, we select Edit ▷ Join from the menu (shortcut: Cmd-j). Now, if we don't have selected too much, we get a closed path.

Now, even inside the path we can move the edge points of our path easily to the desired position.

Now, we make a copy of the first path to create the second triangle. After selecting the path, we use the keyboard and press Cmd-c followed by Cmd-v. Now we have two triangles. If you don't like your keyboard, you can also use the menu to copy the path. Use *Edit ▷ Copy* (Cmd-c) and *Edit ▷ Paste* (Cmd-v) to do this.

We mirror the new triangle with Edit ▷ Mirror (Cmd-m) and are almost done. We move the whole thing with the mouse to the lower right corner of our guides. Be aware, that before you grab the corner of the triangle, the triangle has to be deselected (without knobs)! Then, we move the triangle to the help frame that the two corners snap together.

Finally, we drag the upper two edges of the "triangle" to the tips of the upper "triangle" - ready!

Now we make color: To do so, we select the two triangles and select the fill button in the Inspector (shortcut: Cmd-3). In the pop up menu we select *Graduated*. Now the triangles are black, but we will manage to give them a nicer color.
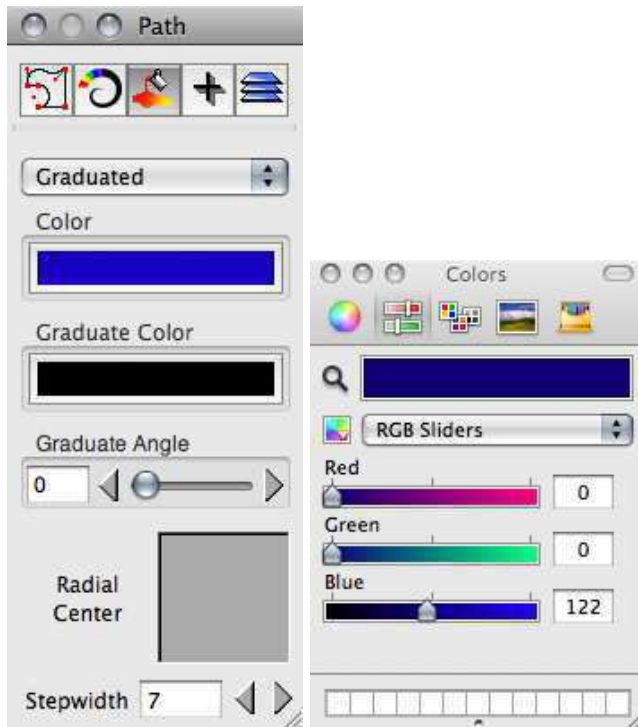
To select a color, we click on the border of the upper Color Well in the Inspector panel. The Color Panel will open up.

We want a beautiful dark blue. Then we do the same with the lower color well and give it a bright blue with much green, so that we get the color of a blue sky.
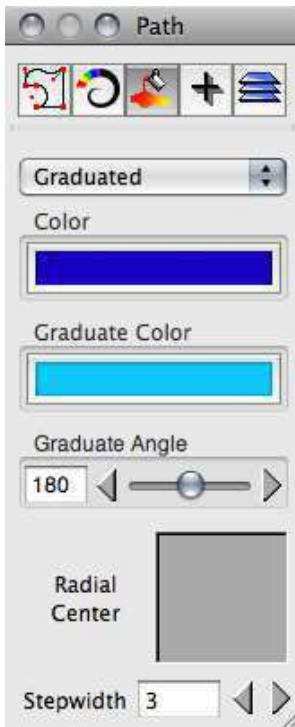
To make the graduation smoother on our print out, we set the step width to a finer level. Three pixel should do well.

Now we want to rotate the color graduation of the lower triangle. To do this, we select the upper triangle with the mouse, while keeping the Shift-Key pressed. This deselects the upper triangle! Then we set the Graduate Angle to 180 degree.

More information on the Fill Inspector can be found in section 3.6.17.

Dragon
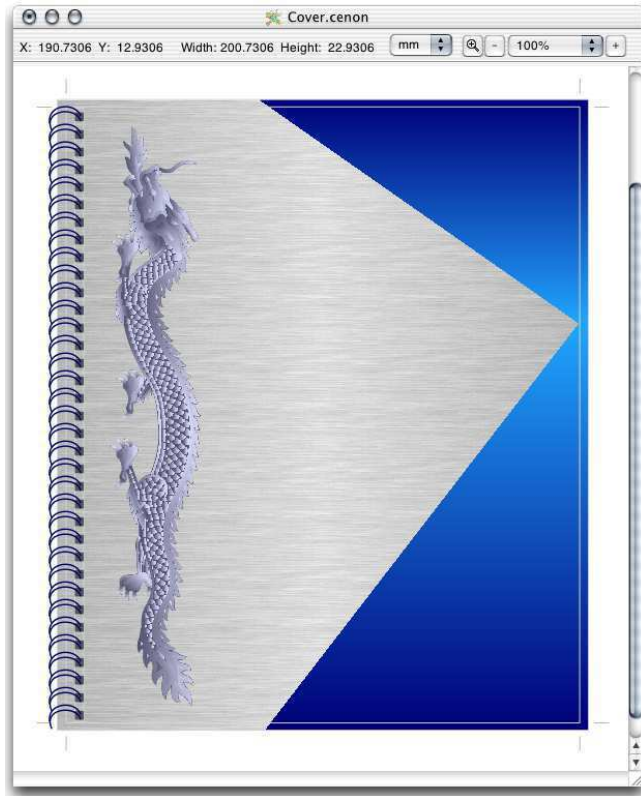
To use a graphic of the complexity of the dragon, we should have a separate document to create it in all silence. When we are ready with the design and have set all the color shades as needed, then we grab it into our document. If not a separate document, a separate layer would be sufficient too. But we have the dragon ready for ages now and simply copy or import it to the place where it is needed.

We already covered the import of graphics, so now we open the dragon in a second document, select what we need, and copy it with Cmd-c / Cmd-v into our document. Here it is! The first time it needs some time to render the many color shadings in the background, but from then on the rendering goes fast. What follows is a well known procedure, scaling (Transform Panel), 90 degree rotation (Cmd-r), moving

(for example with the mouse), mirror (Cmd-m) - and Voila.

Logo

The same thing with the Cenon logo - we copy it into our document. The internet address (www.cenon.info) is standing in small letters below the logo. We will do this little text by hand, now.

We start by activating the text tool. With a click by the mouse at the desired position on our document, a text box pops up at this position and wait for our input. On top of the document window a text ruler will be displayed, which gives us powerful functions for alignment, tabulators etc. We set the text of the internet address to right alignment.
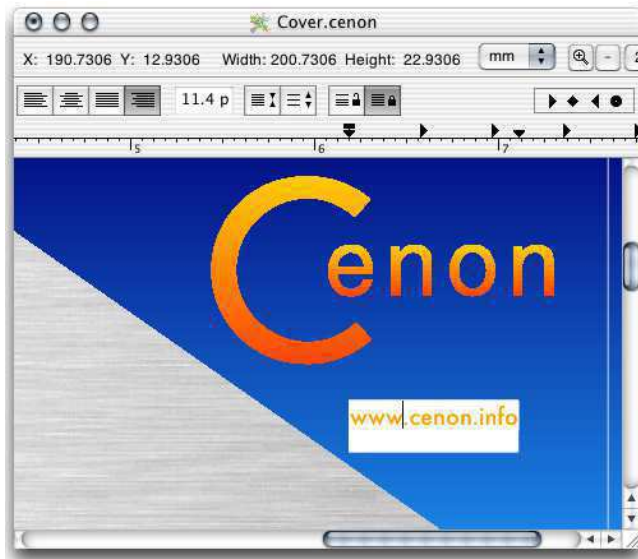
Now we select the entire written text and open the Font Panel to set the font size. We get the panel via the menu *Format ▷ Font ▷ Font Panel* (Cmd-t). Here we set the desired font and size and press the *Set* button.
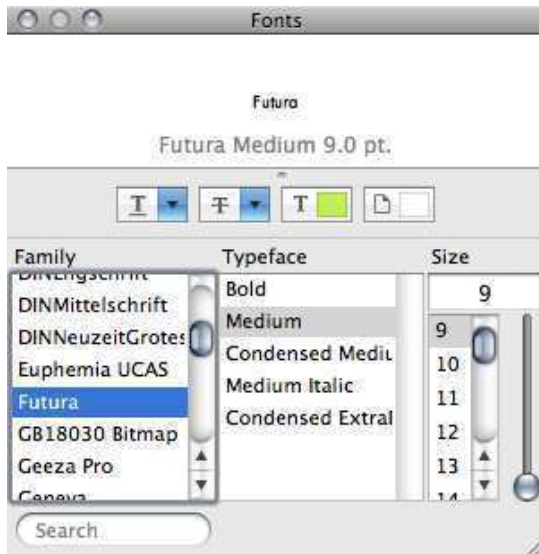
We leave the text mode and go back to the arrow. Then we select the newly created text box with a single mouse click.

Within the Fill Inspector (Cmd-3) we give the text the correct color. Then we move the text to its position under the logo.

To get the text box aligned exactly to the right of the logo, we now use the Transform Panel. So we do the finger trick Cmd-F (or Tools ▷ *Transform Panel*). In the menu at the top of the panel we select *Align*.
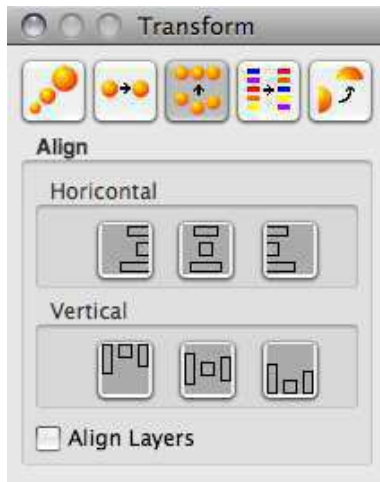
The graphic objects which we want to align must be selected. As the logo already sits at its place, we only want to align the text in relation to the logo. So we first select the logo! Then we select the text while keeping the Shift-Key pressed. Doing this we ensure that the logo will not be moved, only the text. The first selected object serves as the reference for the align function.

If we now press the right button inside the panel, the text will be aligned to fit under the logo on the right side. Try it!

If everything fits perfectly, we group logo and text together, so they can't escape any more. We simply select both objects and choose *Edit ▷ Group* from the menu. We can also use the shortcut Cmd-g from the keyboard.
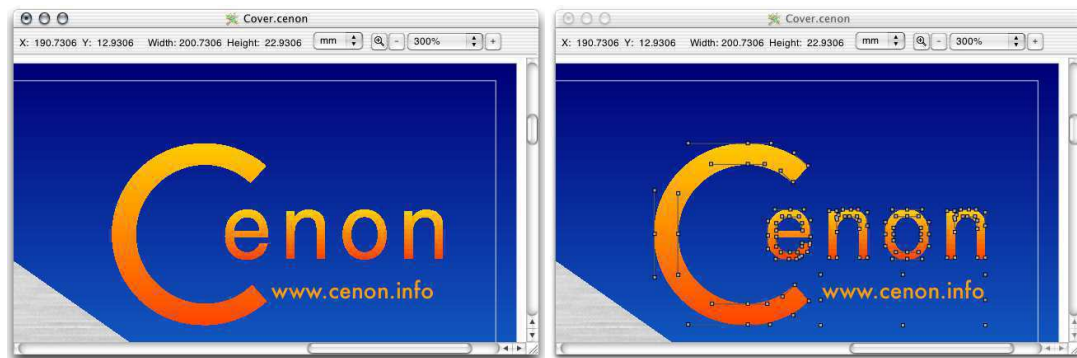
2.3.4   Text

Now off to the text layers. If you remember, we have created a text layer for each language. This way we only need one document for all languages.
We fill one text layer after the other with text. First we turn on the text layer we want to edit (visible and editable). All the other layers should be at least not editable.
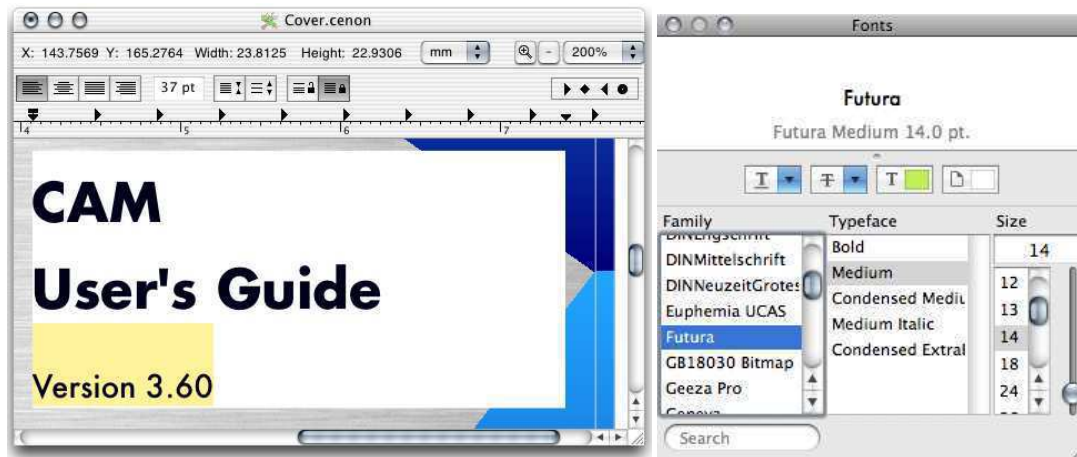
We already know how to place text. So, select the text tool from the Tool Bar, create a text box, write the text, set the font and the font size.

This time we don't set the font size for the entire text box. Instead we set the font for the selected region of the text, only. The text region can be selected with the mouse. A whole word is selected by a double click, and a whole paragraph can be selected with a triple click. We select the region "Version 3.60", because this text needs to be a little smaller. We select the size for this region as usual from the Font Panel. The line height can be adjusted using the ruler on top of the document window.

If size and line height are correct, we move the text to its position, do corrections if needed, and we are ready with our text.

The same play follows for all the other languages we know. But, here we take the easy way and simply copy and change the text box to the other layers. That's a known procedure with Cmd-c and Cmd-v. It is important here, that the destination

layer is editable before you paste with Cmd-v and that none other layer has priority and steals your text away.

2.3.5 Images

Now the best of all, exposing images from the background. First we turn off all other layers - just the image layer and us. Now we can peel our machine from the background without disturbance. Before we start, we have to drag the image into our document and scale it to reasonable size to fit in the window.
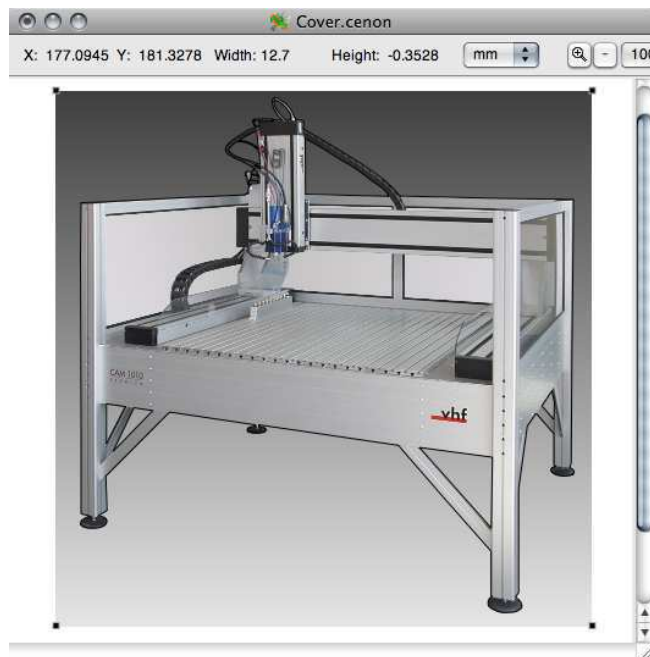
We have the image in the document? Well, lets give it a nice name using the Inspector. We also select a format to compress the image on disk. The correct scaling of the image doesn't matter for now. First we have to get rid of the background.

We start by buckling up the image, so it has no chance to slip away. This can be done in the Inspector by activating the *Lock* switch. We already know this button.

Now we start placing a path exactly around our image, which resembles the contour of our freed object.

Tip: To jump from the tools of the Tool Bar into the arrow mode without large mouse movements, we can simply press the Alt key. As long as the key is pressed we are in the arrow mode, able to move Objects instead of creating them.

We start with the straight segments of the path, which we can simply bridge using lines. We select the line tool and on we go. If our track makes a smooth turn, we end the line with a double click on the mouse. Then we start a new line where further lines are needed. It is easier to draw all the lines first, and later add curves in between. This way we don't have to change the editing modes.

Now the second run around with the curve tool. The bezier curves are created by four clicks with the mouse. The first click sets the starting point of the curve. We start our curves exactly at the end points of the lines, where they will snap in (to make this work we have activated the snap to point distance in the preferences). We set the endpoint of the curve with the second click to the starting point of the next line - or somewhere in between. A bezier curve shouldn't be too complicated. More than 90 degree turns are not recommended. The remaining two clicks set the control points of the curve.

Don't forget the open areas inside the image.

If all lines and curves are placed all together present a closed picture without gaps, where everything is nicely snapped together, then we can gather all parts and create a path. We already know how to do this from the triangles.

So, we select all lines and curves, which will be used to free the image. We then select from the menu *Edit ▷ Join* (or press Cmd-j). To select all the parts it is again enough to select one line and one curve. With Cmd-e all the other lines and curves will be selected, too.
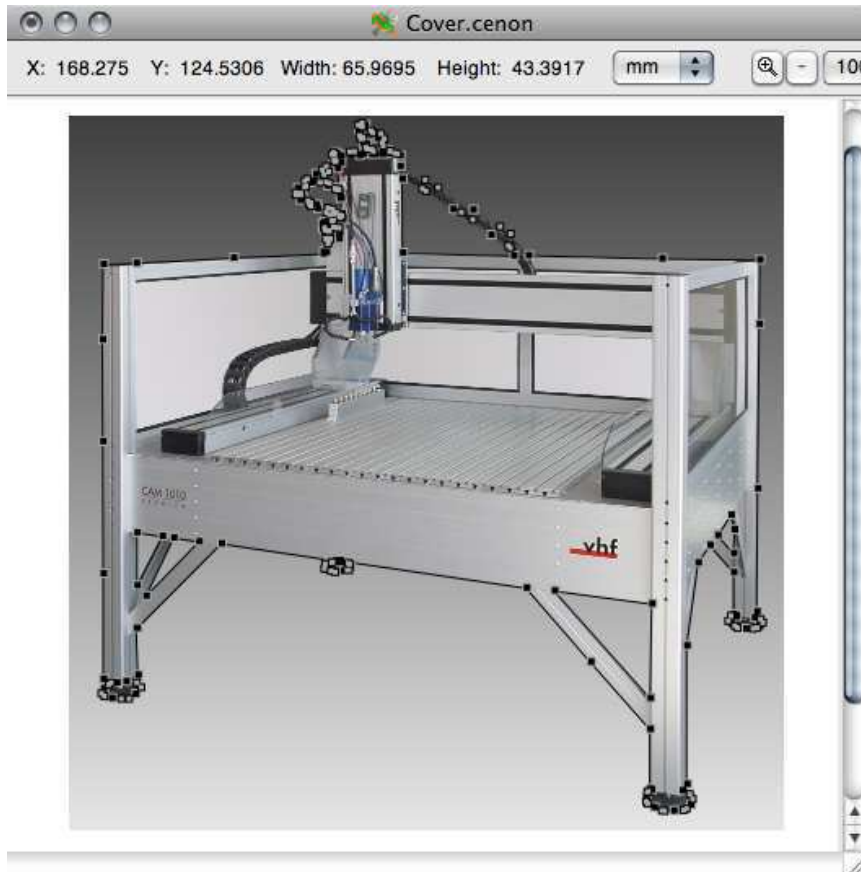
Don't forget to save from time to time. That was a good piece of work.

Now, we fill the path to see if everything fits. To do this we go to the Fill Inspector (Cmd-3) and set the pop up to *Filled*. Now we see, if we have closed accurately all

the subpaths. Are there lines intersecting all of the path, then there was a gap, and Cenon wasn't able to close it. In this case we have to split the path with Cmd-J and correct the related segment connections. Then try again.

Now we do the fine tuning of the path, because we want it perfect. Our path should go exactly along the edge of the object. So we zoom in as deep as it makes sense and correct the line and curve points until we are satisfied.
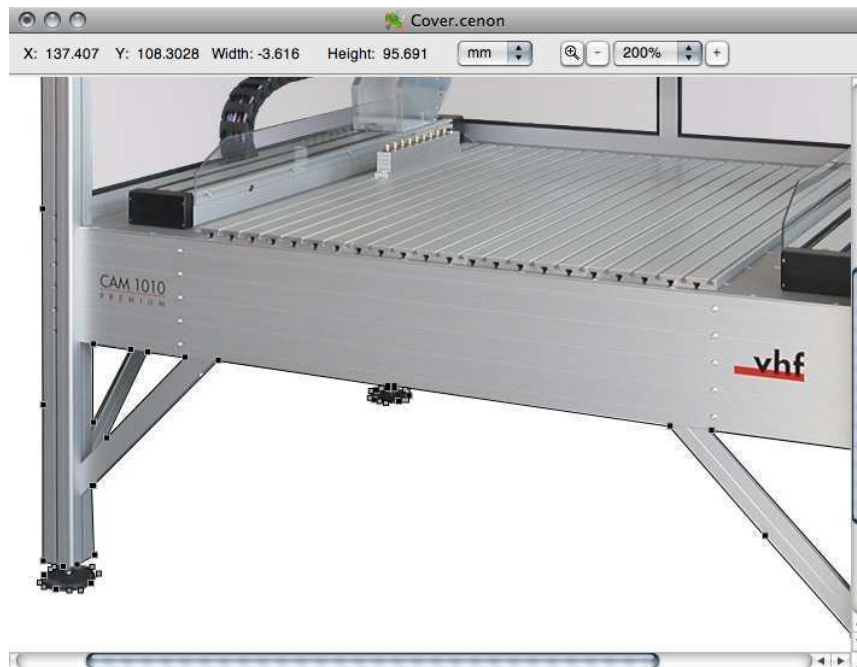
To move the vortices of the path, the path has to be selected. Then you can grab a vortex and move it.

Tip: If you happen to click beside the path or the vortex, the image will be selected. However, if you select the image once again while keeping the Shift key pressed, you can easily deselect it again.

If a line is missing you can cut the path into two, using the cutting tool. Now you can add the missing elements and join the parts to one (Cmd-j).

Finally, if the path is perfect and ready, we can join it with the image. Select the path and the image and once again use *Edit ▷ Join* (or Cmd-j). The background is gone!

Now we make all the other layers visible again, move the image to its place, and scale it down to the final size. To move the image, we have to unlock it, of course.
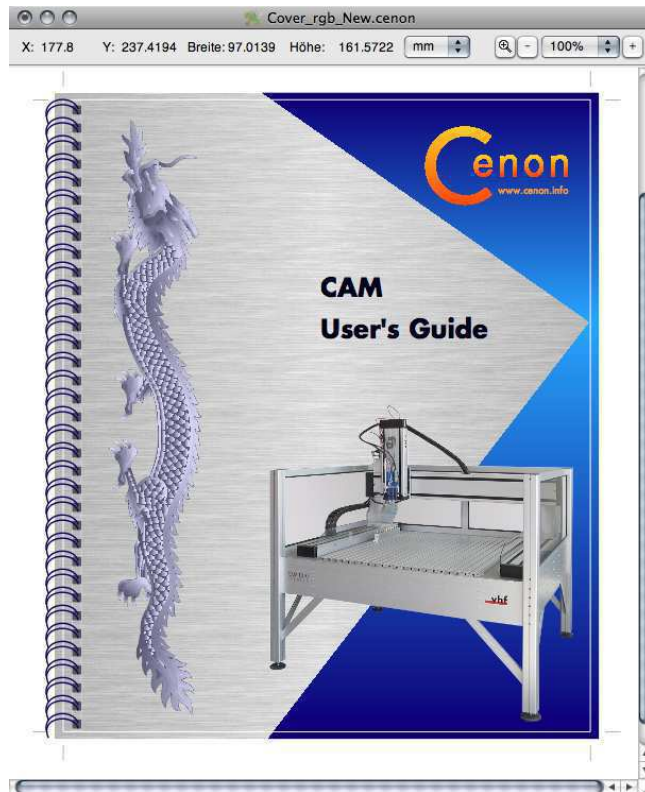
4 little images

Now, only the four little images are missing, then we are through. So, lets start
by placing four rectangles, which will be used later to clip the images from their
background. Just the rectangles without the images for now.
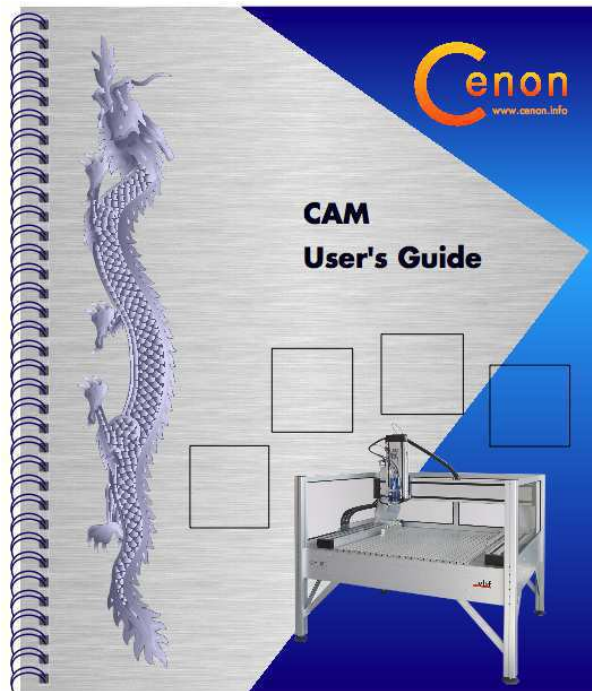
To place the rectangles we select the rectangle tool from the Tool Bar. The rectangle is placed with the first click. The second click sets the size. The size can be changed later using the inspector or the mouse, of couse.

We copy the first rectangle three times - or do we need four? This way we can play and look without producing too much work. Does a rectangle or a square look better? You can change the size of all rectangles together in the Inspector. Just select all rectangles and set the size and height. Be careful with setting the origin this way, or all your rectangles will be dumped to a pile. Not a big problem, however. Press Undo (Cmd-z) to revert the little accident.

Now the images for the rectangles. They shouldn't be larger as needed for the print. Also, not needed parts of the images should be removed in a image processing tool (for example Gimp).

We now move the first image into our Cenon document, give it a nice name and set the compression format.

We place the image at its position and direct it behind the rectangle, so that the rectangle is in the foreground and not invisible behind the image. We achieve this with the menu *Format ▷ Move to back* (Cmd-9), while the image is selected. Now we scale the image down using the mouse while keeping the control key (Ctrl) pressed, until it sits correctly inside the rectangle. To accomplish this we grab the image at one edge and drag this edge to the center of the image until the desired size is achieved.

Finally, if the image is in position, we select image and rectangle and join both by pressing Cmd-j (or using the corresponding menu entry).

With the other images, we do the same - Ready!
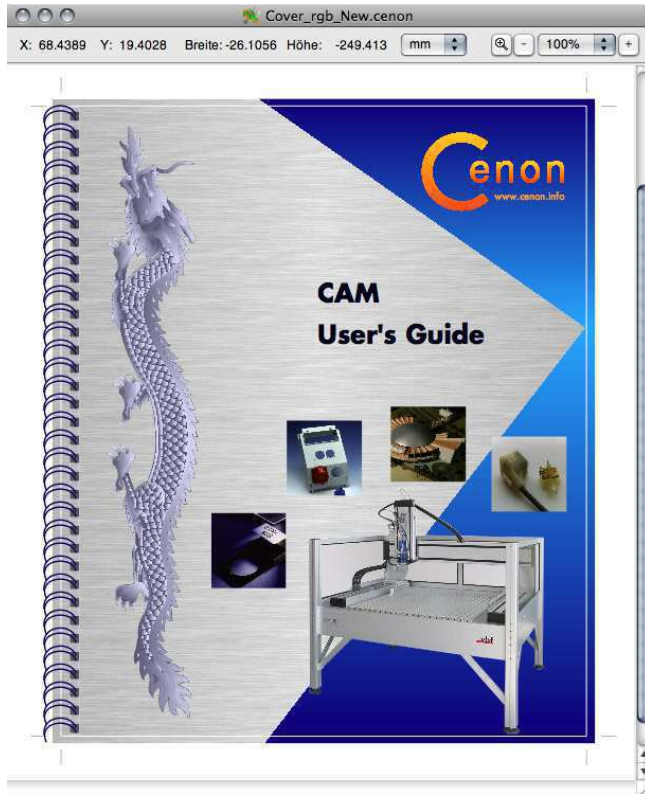
2.4   Printing / Color separation

Before we start printing, we have to set the paper format for printing. So far we only set the size of the working area. The format for printing could be different.

Use the menu *Format ▷ Page Layout* (or Cmd-P) to open the Page Layout Panel. We set the format to the same format as the working area - DIN A4. We press OK to affirm our change. The resolution of our document, should be 100% for printing.

To finally get it printing or separate colors, we select *Print* from the menu (shortcut Cmd-p). The Print Panel appears.

Here we can select the printer (if we have more then one), set the number of pages to print, set the scaling etc.

2.4.1 Printing

To print, we don't have to do more than press OK.
If we want to print to file we press *Save*, instead. A Save Panel appears, which let us set the directory and file name. By confirming with OK, a PostScript file with the extension 'ps' or a PDF file (if your systems allows this) will be written.

2.4.2 Color Separation

To separate colors, we have to set the kind of output to color separation. The color separation can be printed or saved to file. This will create four distinct files representing the separate colors (Cyan, Magenta, Yellow, Black). The four files will get the endings '_c', '_m', '_y', und '_k'.

For further information on color separation take a look at section 3.15.

Chapter 3

Reference part - the functions of Cenon

3.1 Preferences settings

You can enter elementary preference settings for Cenon in this dialogue box. You get there over the menu information, entry basic setting. The preferences are ordered on several cards, which can be reached by the icons on top of the panel. The available icons depend on the modules plugged in.

3.1.1   General Preferences
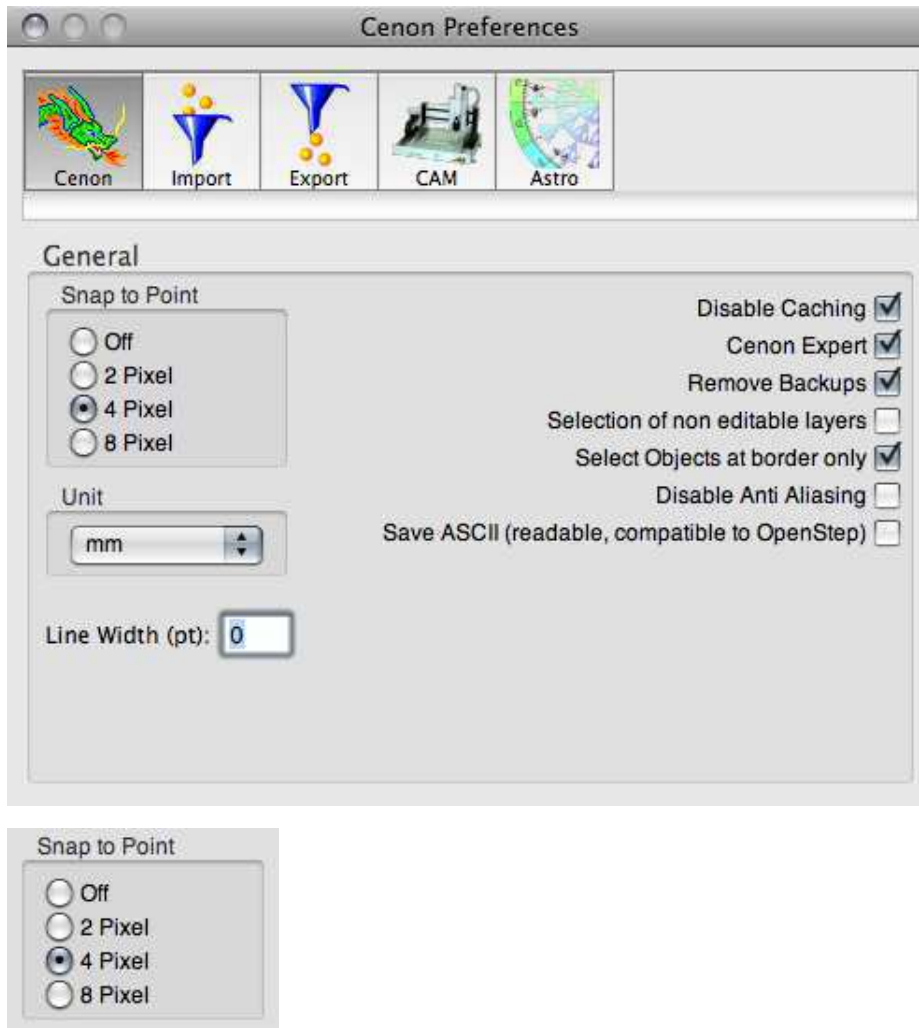
Here you can choose whether the mouse is caught by existing points or not and how big the distance should be during the editing.

The function helps a lot in precise construction work, as new or moved graphic objects snap to points of other graphic objects. You can also use this function to create

your custom help raster (e.g. in the form of a spiral), so that the edited graphic objects will be attracted by the nodes.

Here you can set the unit with which all the measures of the program that are not specially signed are displayed. Some windows, like the graphic window, have their own pop-up-menu to define/set the unit.

You can set the default line width for Cenon. This value is used whenever you create a new object. The line width or border will have this value.

Switches:

Disable Caching	When you don't want the graphic to be cached - that means that a copy of the entire document is stored in the background even when only a section is displayed - you can switch it off here. When you have little memory capacity it can be sensible to switch of the cache.
Cenon Expert	When the expert mode is switched on there are no warning panels before the program carries out the final/unchangeable function or a function that takes a lot of time.
Remove Backups	Here you can choose, whether backup files are removed after saving a file or is they should be kept. Backup files have the same file name with a tilde symbol added to them, for example: 'Filename.cenon~'

Selection of non editable layers   If you enable this option, you can select graphic objects, even if the layer is not editable. This can be useful in selective CAM production.

Select objects at border only   This option affects filled objects only. If active, filled objects can be selected at their edges but not in their area.

Cache Size

The maximum cache size determines the maximum size of the buffer used to cache the entire working area of your document. This cache allows scrolling of huge documents without interruption. Also see "Disable Caching".

3.1.2   Import Preferences
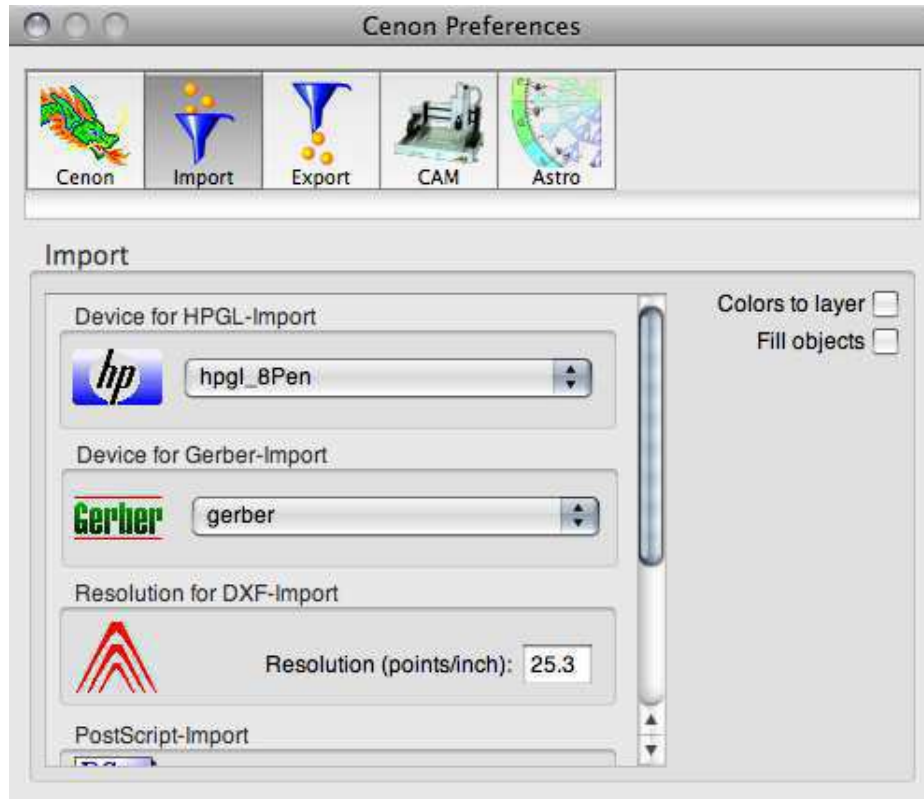
Now we introduce and explain the single parts of this window:
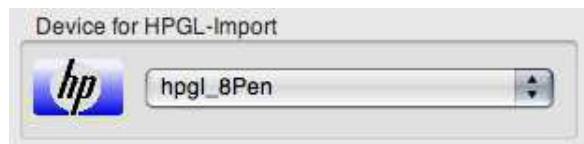
Here you can select a parameter file for the HPGL-import. The parameter-file contains information about the structure of the HPGL-derivative you want to load, so that Cenon is able to understand the code. For the creation of your own parameter-file or the adaptation of an existing files please see section 4.4.
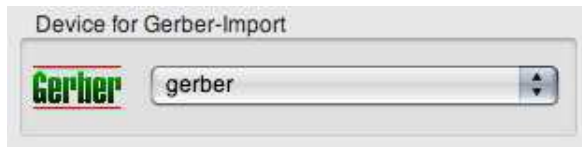
You can select a parameter file for the import of Gerber-files (it's the same as with HPGL-files). See also section 4.2.

Here you can set the resolution for the DXF-import. this value isn't given through the format, so that it's possible that different programs use different resolutions for the output. Please use the same value for the output of the file that your CAD-program uses. Common values are '25.4' or '1'. See also section 4.3.
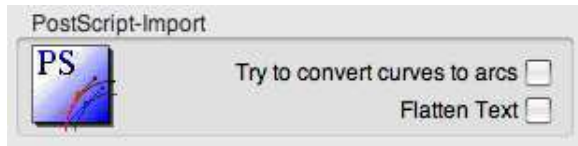
Here you can decide whether you want to transform the curves into arcs for the PostScript-import or not. The transformation will only be carried out when it is sensible. You can also enter whether the text should be divided into paths during the import or not (this is necessary for some Postscript-files to ensure that the display is not distorted/falsified). See also section 4.5.

Here you can set the device for the DIN Import. This is used to import drill data in different derivates of the DIN format (Excellon, Sieb&Meyer). If you select the Default entry, the import tries to detect the format of the file itself. This is the prefered setting for Excellon and Sieb&Meyer.

Colors to layer ☐

When you switch on this function Cenon will generate an extra layer for each color automatically when you import a graphic with more than one color. The colors are distributed correspondingly.

Fill objects ☐

Enabling this functions, all imported graphics is tried to be joined in a filled path. This usually only works if your data is prepared in a manner suitable for building a path.

3.1.3 Export Preferences

Flatten Text ☐

If you activate this option text is converted to vectors on export. This ensures that fonts look like expected and should be if you want to export the data for output on a device. However, if you want to import the graphic to another program, you probably want to have this option disabled. The option only applies to export formats which support text, like PostScript and DXF.

3.2   Import of graphic files

Cenon is able to import the following data formats:

- PostScript, PDF, Adobe Illustrator 3.0

- HPGL

- DXF

- Gerber

- Scalable Vector Graphics (SVG)

- DIN, Excellon, Sieb&Meyer 1000, Sieb&Meyer 3000

- Rasterimages (TIFF, PNG, GIF, JPG, ...)

- Type 1 Fonts im Font Package

When you click on the entry open in the menu document you get a file selection window. You can load a file that is available in one of the formats mentioned before. The following file formats are assigned to the following extensions (see also section 1.9):

PostScript	.eps, .ps, .ai
PDF	.pdf
DXF	.dxf
HPGL	.hpgl, .hgl, .plt
Gerber	.gerber, .ger
SVG	.svg
DIN	.din, .drl
Fonts	.font
Raster images	.tiff, .tif, .gif, ...
Cenon Projects	.cenon

After you have left the file selection window with a double-click on the wanted file or with a click on OK, Cenon loads the file.

Import to existing project

You can also import to a dedicated layer (resp. create new layers) of your current project by using the Document ▷ Import menu item.

With this pop up menu in the Open Panel, you can select how to import a graphics file.

Selected Layer   All elements of the imported graphic are added to the layer selected in the Layer-Inspector.

New Layer(s)   The objects from the imported file are placed on newly created layers. If the file contains layer information (like DXF), then layers are create with the names from the file. Otherwise, all graphic elements are placed on a single new layer.
You probably want to create new layers, when importing DXF files or drill data.

Existing Layer(s) Existing layers are reused as much as possible. The layers are emptied before new data is added.

If layer information is available from the imported file (like DXF), then layers with the same name are reused.

If the preferences option "Colors to Layers" is activated (see section 3.1.2), then the imported graphic objects are placed upon layers providing reference objects of the same color.

If layers are missing, there is the choice to create new layers or skip these elements.

Using this option, you can recycle existing settings of layers. This can be extremely useful in a series production to have everything ready to go.

For more information and known limitations of the Graphic Formats also see section 4.1.2.

3.3   The menus of Cenon

In this section we will describe the functions in the order of the entries in the menu. When you look for a special information about a special entry you can surely find it here.
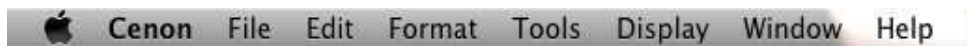
Cenon   Here you can retrieve some basic setting and information, preferences, etc.

File   With the document-menu you can open, save and create a document, projects and graphics. Additionally you can import text data for mass production. See section 3.3.2.

Edit   The edit-menu offers functions to work on the graphic. See section 3.3.3.

Format
: The format-menu offers functions that concern the layout of the page and the texts. See section 3.3.4.

Tools
: In this tool-menu you can find the tool-panels of Cenon. For example the inspector and the tool-bar. See also section 3.3.5.

Display
: The display-menu offers functions that concern the display of the graphic. See section 3.3.6.

Window
: The window-menu shows all the graphic windows.

Help
: Cenon documentation, Links to the web site, Update-Panel, ...

Print
: Printing. The printing panel appears, which is also used for separating colors and writing PostScript into file.

Hide
: Using this item, you can hide Cenon without having to quit the programm. With a double click on the application icon you can reopen Cenon.

Quit
: With this command you can quit the program.

3.3.1 The Cenon- or Info-Menu

About Cenon	The Info-Panel of Cenon
Preferences	The Preferences Panel of Cenon. Here you can configure general settings of Cenon. See section 3.1.
Project Settings	Document related information and settings. Here you can provide Copyright information to your document, and settings, which only apply to the document. See section 3.5.
License	commercial editions of Cenon like Cenon CAM, may ask for a valid license key.
Hide Cenon	Hide the Cenon application
Hide Others	Hide all other applications, except Cenon
Quit Cenon	Terminate the program

3.3.2   The File- or Document-Menu

New   This command creates a new document.

Open...   This command brings up the Open-Panel. Here you can
                                select the file you want to open. You also select a file
                                for import here. The extension of the file is used for
                                identification of the format.

Import...   Here you can import all import formats of Cenon to the
                                current project. The Open-Panel offers you the choice to
                                import to the selected layer (of the Layer-Inspector sec-
                                tion 3.6.19]) or create new layers for the imported files.
                                See Section 3.2

Import Text...   Here you can load a text file. This can be used to produce
                                different signs of the same geometry in mass production.

                                The strings which are extracted from this file are dis-
                                tributed on Text graphics. Before you start to import a
                                text file you have to place corresponding Text objects in
                                your project.
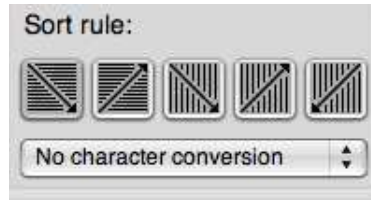
In the Open-Panel for the text import you can select how to sort the strings into your project's Text graphics:

- row by row from the upper/left to lower/right
- row by row from the lower/left to upper/right
- column by column from the upper/left to the lower/right
- column by column from the lower/left to the upper/right
- column by column from the upper/right to the lower/left

The file is a simple list of strings separated with a Space character, Newline, or Tabulator (TAB). If you have space in your strings you need to place the string inside double quotes or use TABs to separate your strings (Is a TAB in your text, TABs are used as the separating character):

text1 text2 text3

or

"text 1" "text 2" "text 3"

If you have to insert a Newline or TAB in your strings you can use '\n' respective '\t' in your text.

"Line 1\nLine 2" "Line 1\nLine 2"

Tip:

- If the text you want to import is in a different format, the search/replace function of a common text

editor can help you a lot to change the formatting.

Save	This command saves the document with the current name. If the document is new, the Save-Panel appears (see Save As).
Save As...	The Save-Panel appears. Here you can save your document with a new name. Additionally the Save-Panel offers the possibility to export your file in different formats:
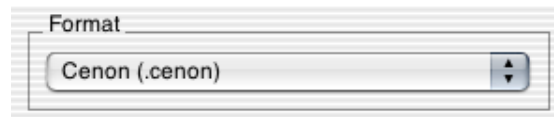
In this pop-up menu you can select the export format. Disabled items mean that this entry is not applicable or not implemented yet.

Cenon	Saves the file as Cenon document
PostScript	Exports the file as Encapsulated PostScript (EPS)
Gerber	Exports the file in the Extended Gerber format (used for Printed Circuit Boards)
DXF	Exports the file as DXF
HPGL	Exports the file as HPGL
Type1	Font Exports a previously loaded Type1 font

Revert to Saved	This command loads the last version of the document. The changes of the current document will be lost.
Print	Print the Document. You can also save as PDF here.

Save Output...   Cenon CAM: Here you can save the data in a file instead
                             of sending the output directly to a machine. The same
                             setting and starting positions are used (as when you send
                             it directly to an output-machine).

3.3.3   The Edit-Menu

Edit	Format	Tools	Display
Cut			⌘X
Copy			⌘C
Paste			⌘V
Delete			
Undo New Line			⌘Z
Redo			⇧⌘Z
Build Contour ...			
Join			⌘J
Split			⇧⌘J
Punch or Unite			⇧⌘U
Group			⌘G
Ungroup			⇧⌘G
Mirror			⌘M
Rotate 90˚			⌘R
Reverse Direction			⌘D
Set Start			⌘Y
Select Equal			⌘E
Select Color			
Select All			⌘A
Special Characters...			⌥⌘T

Cut

Copy

Paste   Cutting out, copying and inserting (paste) function in the
                             usual way.

Cut cuts the selected objects from the document and stores them in the background. Copy copies the selected objects to the buffer in the background. Paste inserts the stored objects into the current document.

Tip (Smart Paste): After the first paste of the buffer, you can move the position of the inserted objects. The next paste will be inserted at a distance to its predecessor using this offset, as will all consecutive pastes.

Delete   With this command the objects are deleted.

Undo, Redo   With Undo the last operation is undone. With Redo the undone operation is restored.

Build Contour...   The Contour-Panel appears. You can generate the contour of the object here. With this panel you can create the contour of an object. See section 3.13.

Join   This command unites single objects together in a path. When you unite the objects you can either select two ending points and unite them or you can combine many objects to a unit. When the first selected object is a path all other selected objects are added to this path.

If you select an image and a closed path object (Path, Circle, Rectangle, Polyline), then the image is clipped from the path object. You can use this to expose an image from its background.

Split   This command splits paths into single objects.

Punch/Unite   This command removes hidden (covered) areas of all selected and filled graphic objects.
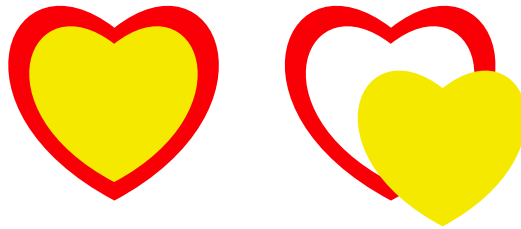
If the selected objects have different colors, the elements on top are punched out of the element below. If the overlapping objects have the same color they are united.

Group   Here you can group different objects so that you can handle them easier than single objects.

Ungroup   Here you can rollback the grouping. The objects remain in the twisted or mirrored status in which they were transformed while they were in the group.

Mirror   This command mirrors the selected object.

Rotate 90°   This command rotates the selected objects by 90 degrees around the center of all the selected objects.

Reverse Direction   For elements with direction (Arc, Rectangle, PolyLine, Path), this will reverse the winding direction of the object.

Set Start   Set the start point for Path objects. After selecting a vertex of a path, you can set the selected point as the starting point of the path.

Select Equal   This command selects all objects that are equal with the objects that have been selected already.

Select Color   This command selects all the objects that have got the same color like the objects that have been selected already. This entry in the menu is very practical when the colors of the imported files are meant to be distributed on different layers.

Select All   All the objects of the displayed layers are selected.

3.3.4   The Format-Menu

Font   With this menu you get to the common sub-menu to set
                        the font. Most entries are only active, if text is beeing
                        edited.

                        Here you can:

                        - call the Font-Panel (Keys: Cmd-t) and select a new
                          font, type or size.

- change the selected text region to bold and back to normal (Keys: Cmd-b)
- set the selected text region to italic and back to normal (Keys:Cmd-i)
- underline the selected text region and go back to normal
- change the kerning of the selected text region. The sub menu allows you to tighten or loosen the kerning, or go back to the default. The kerning determines the distance of the characters in the text.
- move the base line of the selected text within the sub menu. The selected text can be raised or lowered. *Superscript* and *subscript* offer values most commonly used. Using *raise* and *lower* you can change the base line in finer steps.
- copy and paste the font style of the selected text region (Tasten: Cmd-3 und Cmd-4).

Text

With this menu you reach the usual text menu to change the text parameters. The menu is only active, if you are editing text.

Align Left	⌘<
Center	⌘–
Align Right	⌘>
✓ Show Ruler	⇧⌘R
Copy Ruler	⌘1
Paste Ruler	⌘2
Convert To Path	
Bind To Path	

Here you can:

- align the selected text region. You can align text to the left (Cmd-<), center (Cmd–) or right (Cmd->).

- toggle the text ruler (Cmd-R)

- copy (Cmd-1) and paste (Cmd-2) the text ruler to other positions in your text.

- convert the selected text object into a path object. This is very useful, if you want to use operations on a text, which are only possible for path objects. For example, if you need text with a color shading.

- bind the selected text object on a path object (e.g. Line, Polyline, Arc, or Curve). See *Editing a Textpath* in section 3.12.9.

Grid

Here you can set the grid. A grid is used to attract the mouse pointer to fixed positions, which makes it much easier to construct precisely.

Have you set the grid, you can switch it off and on with the top most menu entry. *Set* opens the Grid-Panel:
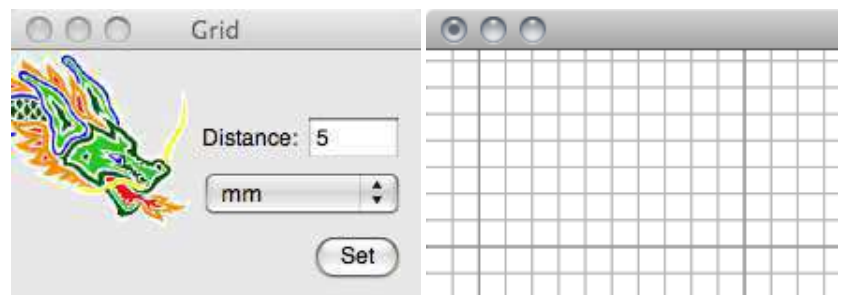
Here you can set the distance between the grid lines. You can choose the unit of measurement in the pop-up menu. Press *Set* to create a grid with the new distance.

Bring to Front

Send To Back   With this menu items you can move objects to the fore-
                                ground or background. So you can influence the order
                                of the elements when displayed. When an object cannot
                                be selected because it is hidden behind another object,
                                you can send the other object to the back using 'Send to
                                Back'.

                                The selected graphic object can be send all the way to
                                the back or front, or just a single graphic object further
                                to the back or front.

Working Area...   The Working-Area panel appears. Here you can enter
                                the size of the working area. The measuring unit of the
                                size is taken over from the Preferences-Panel.

                                The working area is displayed as white background in-
                                side the Graphic-Window.

Page Layout...   The Page-Layout panel appears. Here you can set the
                                page format for the printing.

3.3.5   The Tool-Menu

The tool menu gives access to the different tool-panels of Cenon. Some items appear
only if the respective module is installed.

Tools...   The tool-bar appears with which you can switch the editing
                         mode of Cenon. When you start the program the Tool-Bar is
                         opened automatically. See section 3.4.

Colors...   The Color-Panel appears. You need it to assign another color
                         to elements of your graphic.

Inspector...   The inspector appears. It shows the characteristics of the dif-
                         ferent graphic elements and it allows also changes/transformations.
                         See section 3.6.

Batch Production...   The Batch-Production Panel appears. Here you can distribute
                         the graphic on the working area. See section 3.10.

Transform-Panel...   The Transform-Panel appears. Here you can carry out several
                         transformations (scale, rotate, align, mix). See section 3.8 for
                         more information.

Project-Settings...   The Project-Settings Panel allows you to set settings and in-
                         formation (like Author and remarks) for your current project.
                         See section 3.5 for details.

Intersection-Panel...   The Intersection-Panel allows you to set different elements
                         on intersection points of your current graphic. This can be

	useful if you like to distribute large amounts of drill markers in a grid. See section 3.9 for further details.
Vectorize Images	Vectorizing of raster images. See section 3.14 for further details.
CAM-Panel...	Only available in Cenon CAM. The CAM-Panel of the optional CAM module appears. The CAM-Panel is opened automatically after you have started the program. It is used for the management of the layers and tools and to control the machine. See section **??**.
Teach-In Panel...	Only available in Cenon CAM. The Teach-In panel of the optional CAM module allows the collection of positions from a machine. You can position a plotter or machine over a template using the Control-Panel (section **??**). The positions then can be captured into the document as a mark via mouse click in the Teach-In Panel.
	The collected mark objects can be converted to 2-D or 3-D lines from within the Teach-In Panel.

More entries can appear with installation of Cenon modules. A description of these entries can be found in the corresponding documentation.

3.3.6   The Display-Menu

The items of this menu control features displayed in a document window.

Show Coordinates	Enables the coordinate display in the top area of the document window.
Show Directions	Here you can see the direction of the vectors displayed as little arrows on the border of the graphic objects.

More entries appear with installation of Cenon modules. A description of these entries can be found in the corresponding documentation.

3.3.7 The Windows-Menu
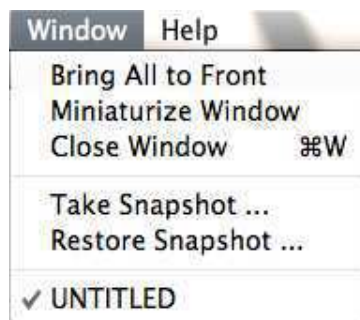
Take Snapshot	This menu entry lets you save the name, position, and size of all documents on the screen. When starting Cenon the next time, all documents will be automatically loaded and positioned. You can also give your snapshots a name to restore different working situation.
Restore Snapshot	You can pick a snapshot to be restored.

3.3.8   The Help-Menu

The Help menu provides documentation, links to the web site, and the Update Panel.
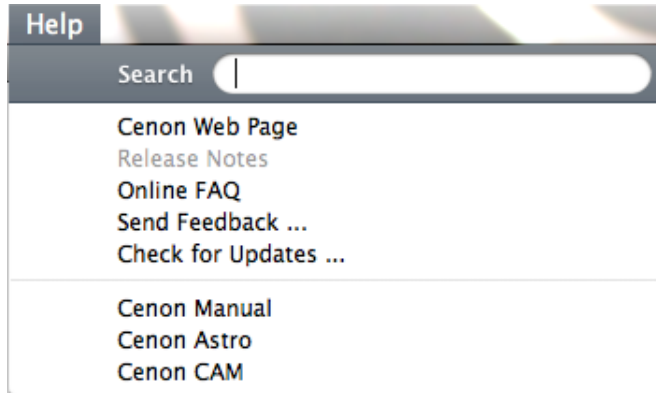
Cenon Web Page	This brings you to the web site of your flavour of Cenon.
Online FAQ	Frequently Asked Questions.
Send Feedback	Opens a new E-Mail.
Check for Updates	This will check with our server, if a new release of Cenon is available. If a new version of Cenon is available, the Update Panel will open and will give you information on what's available. The Update-Panel also allows you to download a new Cenon package.
Cenon Manual	The Cenon Manuals of Cenon and installed flavours.

3.4 The Tool-Bar

You can switch the different editing-modes of Cenon with the Tool-Bar.

Group-mode. You can move and select all the elements in this mode. You can get to this mode from any other mode when you press the Cmd-key.

Rotate. In this mode you can rotate elements with the mouse. Click at some place on a selected graphic and drag the mouse to rotate the object.

Cutter. In this mode you can split graphic objects at the position of your mouse click.

Add Vertex. This mode allows adding vertices into Paths and Polylines. A mouse click to a position on the selected path or polyline adds the new vertex.

Countersink. In this mode you can place countersinks at the position of the mouse. See the Inspector in section 3.6.11 for Details.

Threads. Here you can place threads. See the Thread-Inspector in section 3.6.3 for Details.

Marking. In this mode you can place marks. A marking is normally used to set a drilling.

Line. In this mode you can draw lines. With the first click you start a line and with every further click you set a further part of the line. With a double-click on

the left mouse-button or when you leave the mode the connection is interrupted. The connection is also ended when the line has got no extent/dimension.

Whenever you meet the end of the element you will hear a signal.

PolyLine. In this mode you can create poly lines. A PolyLine is like a path composed from lines. The first click starts the PolyLine. The next clicks add further line segments. You can end the PolyLine with a double click or by leaving the PolyLine mode.

Whenever you hit a edge point of another graphic, a signal is played.

Arc. The first click with the mouse sets the starting position (starting angle). The second click defines the center and the last click defines the endpoint (end angle).

Rectangle. The first mouse-click sets/defines the first edge, the second click the opposite edge. The rectangle is saved and worked with a polygon.

Curve. The first mouse-click sets the starting position, the second the endpoint. The next two mouse-clicks set the anchor points of the curve.

Text. Here you can create text. A complete text-frame is offered, that means you have the same editing-functions like in a rich text editor.

Tips: You can set the Font style with the Menu Format ▷ Font. You can move the color directly from the Color-Panel into selected text. You can copy and paste selected text to other applications. You can also copy text from other applications into your Cenon document.

Webs. Webs are used in CAM applications to keep the working piece at its

position during cutting. The webs are spared on cutting. Place the webs at good positions around the outline of your working piece. You can adjust the width of the webs in the Web-Inspector. For more info see section 3.6.14.

3.5 Project Settings

In this panel you can set parameter and information for your project. Using the pop-up menu you can switch between the project settings and the project info.

3.5.1 Project Info
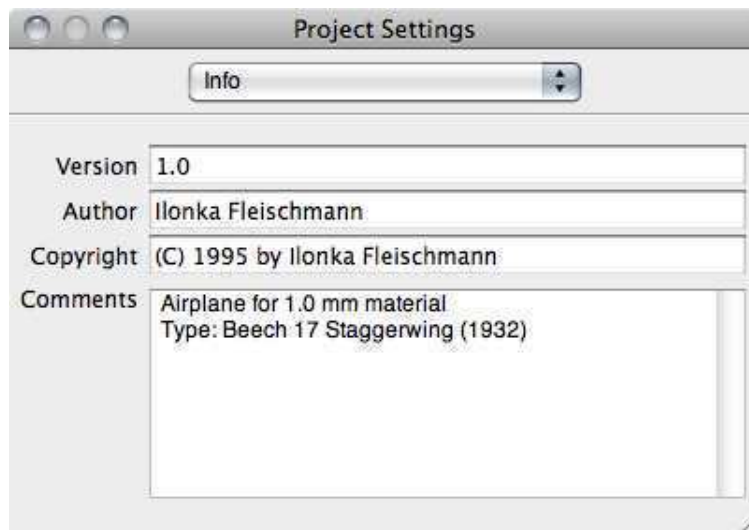
In the project info part you can place information regarding your project. The input will appear at the beginning of the Cenon file, so it is also visible in a text editor. Depending on the kind of project, the values you can enter may vary.

The following entries are the standard:

Version   A place for the version number of your project

Author   Who did it? Name, eMail-Address etc. of the author

Copyright   Who owns it?

Comments   Here is a place for a descriptive text of the project

3.5.2   Project Settings
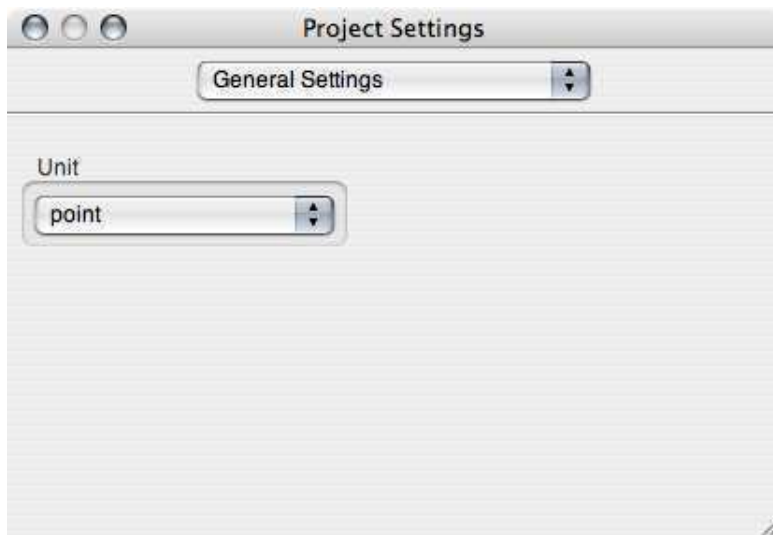
The General Project-Settings allow changing the unit of measurement. If you change
the Unit from the Default "Use Preferences" to a unit, then this unit will be used for
the document. If you leave the Default, the Preferences-Settings (see section 3.1.1)
will be used.

3.6   The Inspector-Panel

The inspector gives information about the selected graphic. The selected graphic can
also be changed here. You can open the inspector from the tool-menu. Depending
on the selected element the inspector changes its display appropriately.

In addition to the object parameters, the inspector is also used to manage the document layers too.

At the top of the inspector panel is an icon bar. Here you can select the kind of setting you want to modify. You can select between object coordinates, stroke width, filling and text. Additionally you can manage the layers of your project.

To the following inspector-types you can find further information in the following sections. The common inspector types for width, filling, text and layers are placed at the end of the list:

- Arc Inspector - Section 3.6.5

- Curve Inspector - Section 3.6.1

- Crosshairs Inspector - Section 3.6.2

- Group Inspector - Section 3.6.4

- Image Inspector - Section 3.6.15

- Line Inspector - Section 3.6.6

- Mark Inspector - Section 3.6.7

- Path Inspector - Section 3.6.8

- Rectangle Inspector - Section 3.6.10

- Countersink Inspector - Section 3.6.11

- Text Inspector - Section 3.6.12

- Textpath Inspector - Section 3.6.13

- Thread Inspector - Section 3.6.3

- Web Inspector - Section 3.6.14

- Width Inspector - Section 3.6.16

- Fill Inspector - Section 3.6.17

- Texttype Inspector - Section 3.6.18

- Layer Inspector - Section 3.6.19

Tips:

- When you select more than one element of the same type you can change them together. In this case, the inspector shows the parameters of the first selected object.

3.6.1 The Curve Inspector

The curve-inspector shows information about the selected curve. The selected curve (or more than one) can also be altered here.

Here you can see and set the start point and the endpoint of the curve.

Here the control points of the curve are displayed and can be changed.

Here you can lock the position of the curve to prevent moving it accidentally. You still can select the curve and change its parameters using the inspector.

3.6.2 The Crosshairs Inspector

You can see the crosshairs inspector on the display when no object is selected. It shows the position of the crosshairs that defines the zero point of all measurement as well as output.
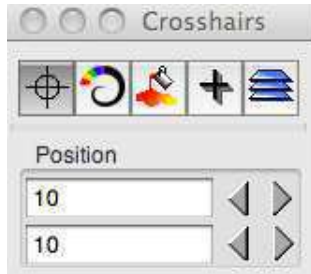
Here you can set the position of the crosshairs. For most applications this will simply be 0/0. The coordinates of the crosshairs are an exception, because they are displayed in absolute coordinates (relative to the lower left corner of the window).

3.6.3   The Thread Inspector

The Thread-Inspector shows information about the selected thread. The selected thread (or more than one) can be altered here, too.

The output of a thread performs a 360 degree spiral starting at the bottom of an existing hole, and lifting the tool by the value of the pitch of the assigned tool. Note: You have to assign a thread cutter to the layer, to get this work!

Here you can see and set the position of the thread. This is it's center point.
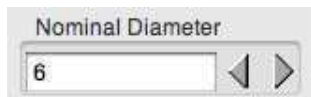
Here you can see and set the nominal diameter of the thread. This is the same as for the screw which should fit.
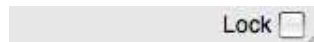
Here you can lock the position of the thread.
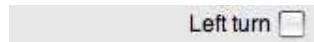
Activate this switch if you need left turned threads.

3.6.4 The Group-Inspector

In the group-inspector you can find information about the selected group. The selected group (or more than one) can be changed here.
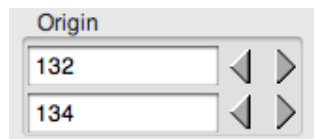
Here you can set the position of the group. The position is the lower left corner of a rectangle enclosing the group elements.
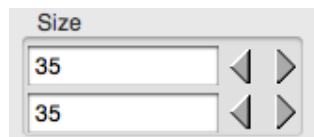
Here you can set the size of the group. All elements of the group will be scaled to the new size. This operation is not without problems if the group contains text or arcs:

- If your group contains text, scaling may render text invisible in some rare cases. If this happens, you have to ungroup the group and adjust the height of the text to be visible again.

- If you set the group size arcs will be converted to curves.
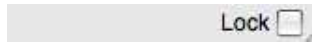
Use this switch to fix the position of the group. The group can still be selected and changed inside the inspector, but not handled with the mouse.

3.6.5   The Arc-Inspector

In the arc-inspector you can find information about the selected arc. The selected arc (or more than one) can be altered here.

In this field you can see and set the coordinates of the center of the arc.

Here you can see and change the radius of the arc.

Here you can see the starting angle. You can set/enter the starting angle from -360 to 360 degrees.

Here you can see and set the angle from -360 to 360 degrees. A positive angle means that the angle is drawn counterclockwise (positive direction mathematically).
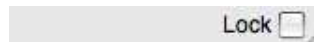
Use this switch to fix the position of the arc. The arc can still be selected and edited using the inspector, but not handled with the mouse.

Filling: You can fill an arc using the Fill-Inspector. If you fill an open arc (<360°), two lines will be added to close the arc segment (piece of cake).

3.6.6   The Line-Inspector

In the line-inspector you can see information about the selected line. The selected line (or more than one) can be changed.

Here you can see and set the startpoint of the line.

Here you can set the direction of the line. Starting at the startpoint the vector heads in the direction provided here.
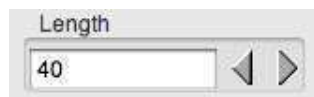
The length of the line.

The endpoint of the line.
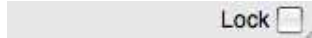
Lock ☐

Here you can lock the position of the line against accidentally changing with the mouse. You can still select the line and change values with the inspector.

3.6.7   The Mark-Inspector

The Marking-Inspector shows the position of the selected marking. You can use a marking for marking or for drilling.

Position

30	◀ ▷
40	◀ ▷
0	◁ ▷
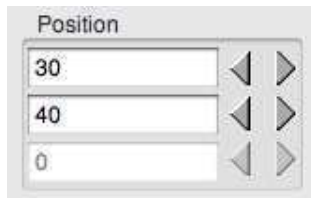
The coordinate of a marking. The coordinate can be three dimensional.

3-D Marker ☐

Here you can select, if the marking shall be three dimensional. If you check the switch the Z field of the coordinates is editable.
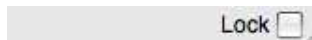
Lock ☐

Here you can lock the position of the mark against accidentally moving with the mouse. You can still select the mark and change values with the inspector.

3.6.8   The Path-Inspector

In the Path-Inspector you can find information about the selected path. You can change the selected path (or more than one) here.

Here you can set the position and the size of the path.
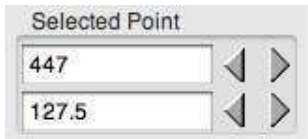
Here you can see and set the selected point of the path. The selected point is marked with a selecting point that is a bit bigger.

Use this switch to fix the position of the path. The path can still be selected and edited using the inspector, but not handled with the mouse.

Filling: You can fill a path using the Fill-Inspector. To fill a path it needs a closed contour. If you fill a open path, the path will be closed automatically with a line.

Tip:

- A path should not have overlapping sub-paths because otherwise the calculation of the contour can be wrong.

3.6.9 The Polyline-Inspector

In the Polyline-Inspector you can find coordinate information about the selected Polyline and you can modify it.
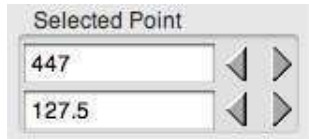
Here you can see and set the selected point of the polyline. The selected point is marked with a selecting point that is a bit bigger.
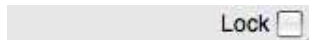
Use this switch to fix the position of the polyline. The polyline can still be selected and edited using the inspector, but not handled with the mouse.

3.6.10   The Rectangle-Inspector

The Rectangle-Inspector shows information about the selected rectangle. The selected rectangle (or more than one) can be changed here.
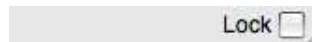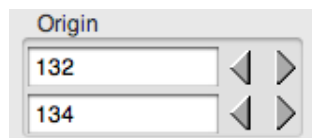
Here you can set the position and the size of the rectangle.

Here you can set the width and the rotation angle from 0 to 360 degrees.

Here you can set the edge-radius of the rectangle. The rectangle has got rounded edges when the edge-radius is not 0.

Use this switch to fix the position of the rectangle. The rectangle can still be selected and edited using the inspector, but not handled with the mouse.

3.6.11 The Countersink-Inspector

The Countersink-Inspector shows information about the selected countersink. The selected item (or more than one) can also be changed here.

Here you can set the position of the item. This is the position of the center.
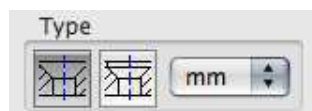
This part lets you choose the type of the countersink. The main difference between the two types is the rim. The pop up allows you to toggle between metric and inch type.
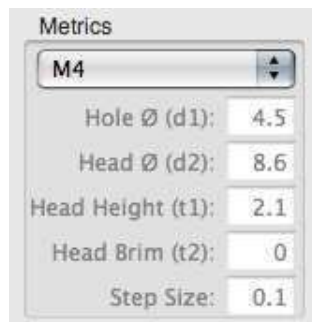
This area shows the metrics of the countersink. In the pop up menu you can select the desired metrics by name. The metrics are then displayed in the fields.

Hole Ø (d1)   The diameter of the hole for the screw

Head Ø (d2)   The diameter of the head of the screw

Head height (t1)   The height of the entire head of the screw including brim

Head brim (t2)   The height of the head brim of the screw (only second type)

Step size   This entry is used for cutting. It is the step size the cutter increments while stepping down the cone of the head part of the countersink.
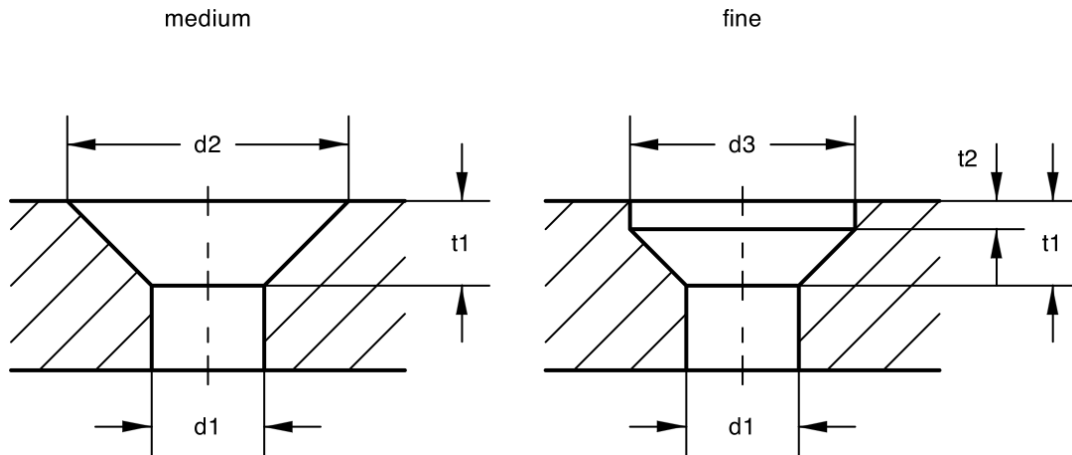
If you need to customize the settings choose *Custom* from the pop up menu. Then you can modify the values in the text fields.

You can modify the names (and relating parameters) listed inside the pop up menu by editing the file SinkingMetrics.plist. The file is located within the Cenon application bundle and has to be copied to the User Library for editing (example for Apple): Cenon.app/Contents/Resources/SinkingMetrics.plist ▷ USER/Library/Application Support/Cenon/
(see section 5.1).

3.6.12 The Text-Inspector

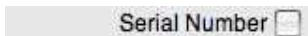In the text-inspector you can find information about the selected text.
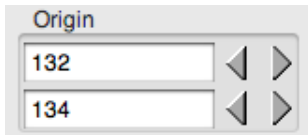
Here you can set the position of the text box. This is the lower left corner of the box.
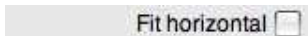
Here you can set the width and height of the textbox.

Here you can set the rotation angle of the text between 0 and 360 degrees.

With this button you can use the text as a serial number for batch production. The trailing numbers are counted automatically. Only a Text and a TextPath can be used as a serial number!

When you use this button Cenon will fit in the text into the text-box. The height of the text is preserved. Only the distance between the words and letters is reduced (the kerning is tightened).
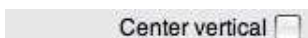
Centers the text vertically inside the text-box.

Lock ☐

Use this switch to fix the position of the text. The text can still be selected and edited, but not moved. This function is especially useful to create text masks. Once you have locked the position of a text you can still edit it, but not move. This way you can easily create forms.

Tips:

- The color of the text can be moved with the mouse from the color-field into the selected part of the text. so only a part of the text can be colored.

3.6.13   The Textpath-Inspector

In the Textpath-Inspector you can find information about the selected Textpath. A Textpath is a text placed on a line, polyline, arc, or curve. Depending on the object the text is bind to, the appearance of the inspector will change and display the appropriate kind of fields. Take a look at the line, polyline, arc or curve inspector for a description of these fields.

See section 3.12.9 how to create a text path.

Show Path ☑

Here you can decide whether the path, which the text is bound to, should be displayed or not.

Serial Number ☐

With this button you can use the text as a serial number for batch production. The trailing numbers are counted automatically. Only a Text and a TextPath can be used as a serial number!

Lock ☐

Use this switch to fix the position of the text. The text can still be selected and edited, but not moved.

3.6.14   The Web-Inspector

In the Web-Inspector you can set the positions of webs, which should survive the cutting of the contour of your working piece.
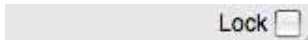
The working piece will not be completely separated from the material. The webs will still connect it with the material.
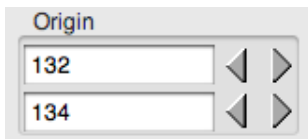
Here you can set the position of the web. This is the center of the object.

Here you can set the size of the web. The size determines the size of the gap in the calculated output of the paths this object sits on.

Use this switch to fix the position of the web. The web can still be selected, but not moved with the mouse.

Note:

• If you have disabled stepwise cutting in the Layer-Panel, the web remains in the entire thickness of the material. Select stepwise cutting and provide the thickness of the web with the final step.
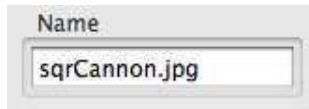
3.6.15   The Image-Inspector

The image inspector shows the parameters of the selected image. If more than one image is selected, the parameters of the first selected image are displayed. Parameters can be changed here, too.
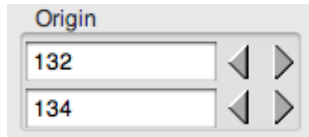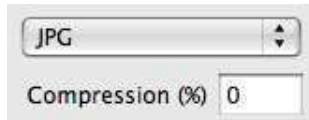
Here you can set the position of the image. This is the lower left corner of the image.

Here you can change the size of the image.

The name of the image.

Here you can choose how to compress the image. Cenon saves images in a common image format like TIFF to the project-file. As images especially in publishing may become quite large, Cenon allows several compressions.

Usually Cenon will save an image in the TIFF format. You can compress TIFF images as LZW without losing quality. Free software sometimes doesn't offer the LZW compression because of patent issues. The alternative is the JPEG format. For

the JPEG format you have to provide a compression factor to control how much the image will be compressed without losing too much quality. The less you compress JPEG images, the better the quality. A compression of 10% is usually without visible loss of quality.

Activating this switch will create a thumbnail image of a large image. A thumbnail is a low resolution copy (72 dpi) of an image. This small image doesn't need much memory compared to the repro version and saves a lot of memory and time when working. For printing and export, the repro version of the image will be used in any case.

Use this switch to fix the position of the image. The image can still be selected, but no longer moved with the mouse.
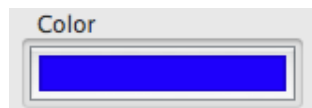
3.6.16   The Width Inspector

The width is only available for objects which allow a border width like Line, Arc, Curve or Path.

Here you can select, weather the object border is stroked.

Here you can set the color of stroked objects. With a click on the border of the color field the Color-Panel appears to change color. Cenon allows separate colors for stroking and filling of objects. Here you can set the color for stroking.

Here you can set the width used to stroke the object.
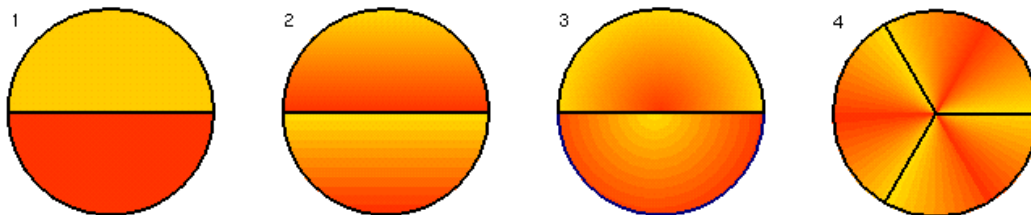
3.6.17   The Fill-Inspector

The filling is only available for objects which can be filled, like Text, Path, Polyline.

Here you can select the kind of filling you desire for the graphic object, if any at all. The following kinds of filling are supported:

1. Simple filling in one color. The lower Arc is filled with a different color.

2. Linear color shading: The shading starts with a start color towards an end color using the given step width. The lower Arc is filled with bigger steps.

3. Radial Shading: This shading starts from a center of the object.

4. Axial Shading: This shading starts on one side of the object and goes in axial direction. This kind of filling is a little tricky to adjust to achieve the desired results. The example was build using 6 Arcs with different centers and angles.
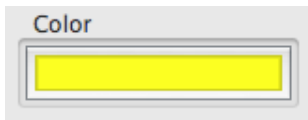
Here you set the color or start color of the selected graphic object. If you have selected more than one object, then the color of the first selected object is displayed. With a click on the border of the color well, the Color-Panel appears, where you can change the color.

If the border of the color well is white, then the color selected in the Color-Panel will be set directly. If the border is not selected, you can drag and drop a color from the Color-Panel into the color well.
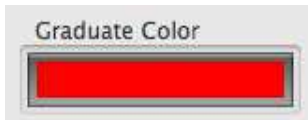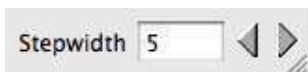
Here you can set the end color of the selected object. With a click on the border of the field you get the Color-Panel to change the color.

Here you can set the direction of the shading.

For radial shading, you can move the knob inside the square to determine the center of the filling. The square symbolizes the bounding box of the graphic object.

Here you can set the stepwidth of the color shading. The stepwidth is also used on export. If you create documents for printing a smaller step width might be better as the default.
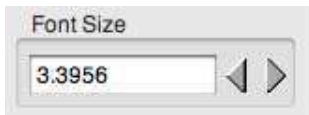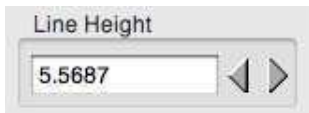
3.6.18   The Texttype-Inspector

In the Accessory-Inspector, select "Text" from the pop-up menu.

The Text part is only available for Text and TextPath objects.

Here you can set the font size for the entire textbox. If you want to change the text size for a selected range of characters only, you can use the Font-Panel (section 3.3.4) to do so.

Here you can set the line height for the entire text box. If you want to change the line height for a selected range of characters only, you can use the text ruler (section 3.3.4) to do so.

3.6.19   The Layer-Inspector

At this place inside the Inspector-Panel you find the layer management of Cenon. Here you can add, rename, reorder and remove document layers.

This part lists all the layers of your document. Here you can select and reorder layers.

 By clicking on the eyes you can switch on and off the display of a layer. A layer with closed eye will neither be displayed nor printed or exported. A layer which is not displayed can't be edited too.

 By clicking the pencil you can decide, if a layer is editable or not. A layer with broken pencil can't be edited. This can be used to protect your layer from accidental modifications.

The layers in the list can be reordered by dragging them to the new position in the list while the Control-Key on the keyboard is pressed.
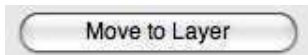
This button moves the selected objects of your document to the selected layer in the layer list. Therefor all participating layers must be visible and editable! None of the graphic objects should be locked.
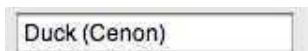
Here you can change the name of the selected layer in the list. Press Enter on your keyboard to set the new name.

With these buttons you can add and remove layers.

Here you can create a new layer or remove the selected layer.

3.7   Layer Details

The Layer Details allow more settings for each layer.
The panel is reached by a double click on a layer in the Layer Inspector.

The pop-up menu allows the change of the type of a layer. This determines the behaviour and use of a layer. The following possibilities are available:

Standard Layer   A layer of this kind is completely on it's own. When printing such a layer will be printed only, if the eye in the Inspector is open. This type is the default.

Page   A page is used for multi page documents. When printing each page is printed to a new page. All displayed standard layers are included on every page. The special template layers are included according to their purpose.
                   If you enable (open eye) a page in the Layer-Inspector, all other pages are disabled.

Template   A template usually contains wildcards, which are filled with life at a different place. Using a template you can define variable parameters.
                   The elements on this template now, are used on any page. Here

you can define a page numbering, which is displayed on even as well as odd pages, for example. See also Chapter .

Template Odd   This template provides elements used for odd pages only. For example a page number which should sit at the outside of pages.

Template Even   This template contains variable elements for even pages.

The switch "Use for Batch Production" allows to have layers that are not included when creating multiples. For example if you create multiples of a callcard, but want to spare the layer with the crop-marks.

3.8   Transform-Panel

With the Transform-Panel you can transform selected graphic objects. The Transform-Panel is called from the Menu Tools ▷ Transform-Panel.

With the pop-up menu you can select the different kinds of transform operations explained below. The transform operations usally work upon the selected objects.

3.8.1   Scaling
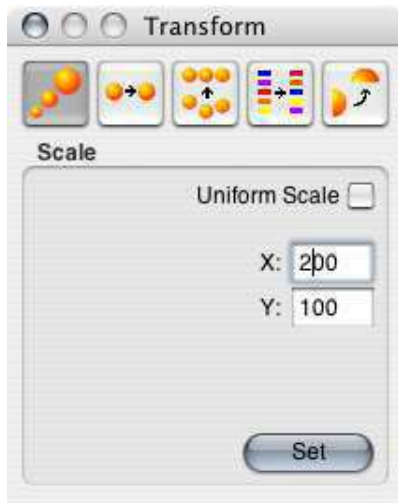
In this part of the Transform-Panel you can scale objects in x and y direction. Select the switch to keep the aspect ratio of the objects. That means that the scaling is carried out with the same value in x- and y-direction.

You enter the percentage of the scale into the fields. For example when you enter e.g. 110 the graphic is enlarged to 110 % of the original size (that means 10 % bigger).

As soon as you click on Set the scaling is carried out.

3.8.2 Moving
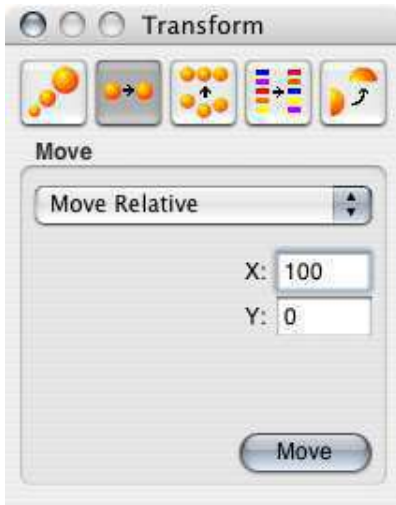
You can move the selected graphic objects relative or absolute.

| Move Relative	The entered coordinates are added to the position of the objects. Negative coordinates move in the negative direction of the co-ordinate system (e.g. x = -10 moves to the left, x = 10 moves to the right).
Move Absolute	The entered coordinates are set directly for all selected objects.

3.8.3   Rotation
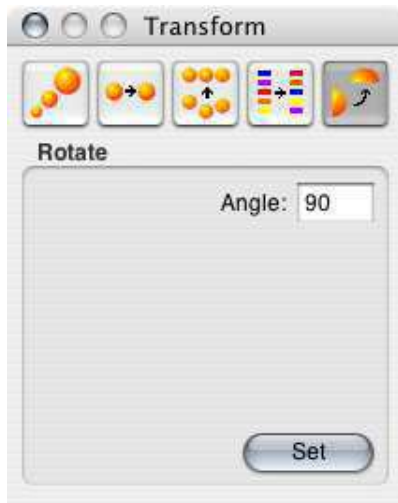
Here you can rotate the selected objects. The angle is given in degrees. Positive values rotate counter clock wise.

3.8.4 Align
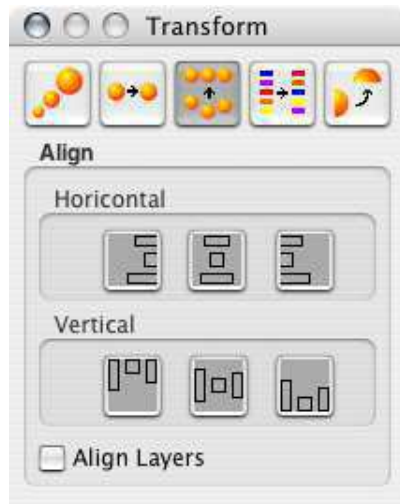
Using this part of the Transform-Panel allows you to align graphic objects in several ways. You have to select at least two objects to be able to align them. The icons show quite clear what will happen.

By activating the switch 'Align layers', you can align complete layers instead of single objects. This works as follows:

- Select at least one graphic object on each layer. These are the reference objects for aligning the layers.

  For each layer, the smallest rectangle enclosing the reference objects is used to align the layers. If you want to center layers you want to select all objects on the layers. However, if you want to align dedicated objects on the layers above each other, then you only want to select a single object on each layer.

- One layer will not be moved and plays the role of the reference layer. If you want to give this role to a layer, make sure the layer is not editable (see section 3.6.19). All other layers will be aligned to this one. If all layers are editable, the last one is used as reference layer.

3.8.5   Mix
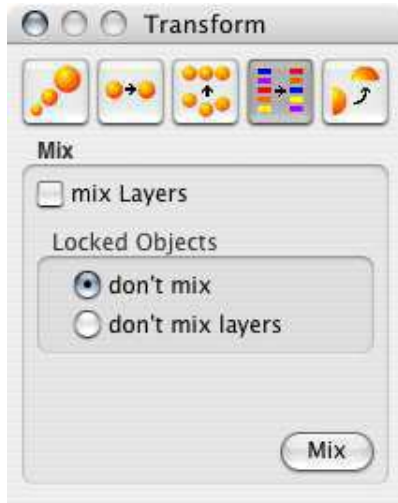
Here you can mix the positions of graphic objects in several ways. This can be used to produce unique samples of an art work e.g. a collection of engraved signatures. This way you can add additional value to a product without having much work.

If you select the switch you can mix objects across layers. Otherwise each layer is mixed on its own.

The radio buttons decide how to process fixed objects. You can keep them where they are or keep them on their layer.
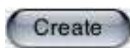
3.9 Intersection-Panel

The Intersection-Panel is used to distribute objects of differend kind upon intersection points. For example if you have to drill holes in a concentric pattern, you can easily construct the pattern using arcs and lines. Now you can use this panel to place drill markings on each intersection.

You can use Lines, Arcs, Curves, and Paths to create the intersections.

Here you can select the kind of object you want to create. The objects will be placed on each intersection using default values for all parameters. Use the appropriate Inspector-Panel (see section 3.6) to change these values to whatever you like.

Place objects of selected kind upon each intersection on editable layers.

3.10   Batch Production
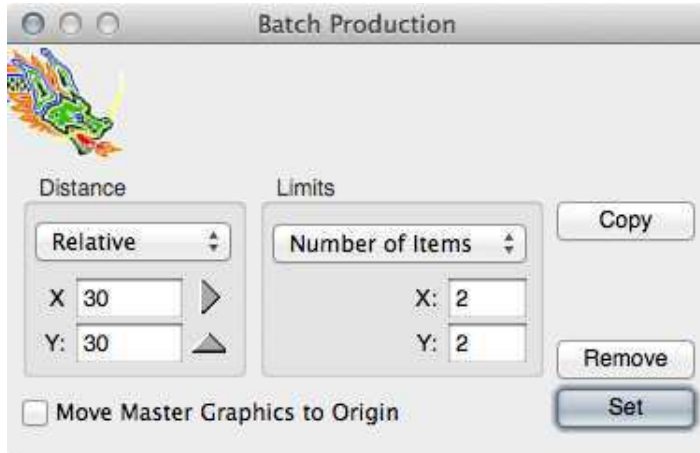
The panel for batch production (Tools ▷ Batch Production) is for the production of multiple duplicates. The working surface of the engraving machine is used optimally to distribute the available graphic as often as possible on the surface. So you can create the same object several times without making a copy of the objects or without having to justify the starting point of the machine again.
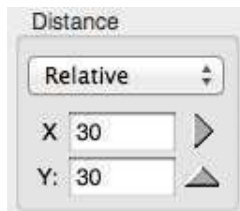
Here you can set the distance between the individual parts of the duplicates. If you choose 'Relative' the distance describes the gap between the parts. You can also set the absolute distance from part to part.
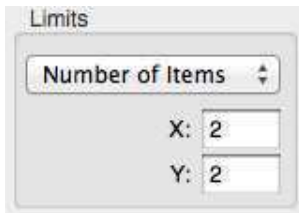
In this part of the panel you can set how the duplicates are distributed. In the pop up you can select between distribution based on the "Number of Items" or the "Size of Material". In the two fields you can specify your choice.

Here you can decide, whether to move the master parts to the origin, before the duplicates are distributed.

After a click on "Set" the duplicate is generated. The duplicates are generated for all layers which are enabled for batch production (see Layer-Details in section 3.7). In our example you can see four duplicates. On the lower left side you can see the original graphic. The display shows only the frame of the three duplicates. It's possible to give every part in batch production its own serial number. Therefore choose the appropriate entry in the Text-Inspector (see section 3.6.13). On every part the serial number is increased by one automatically.

When you use *Copy*, Cenon creates real copies of your graphic. This needs more memory and you have to maintain all copies of the graphic! The copies are distributed like duplicates on the working area. Using copy you can edit the single copies of the graphic.

Click on remove to remove the duplicates for batch production that has been generated (This makes no sense and doesn't work for real copies!).
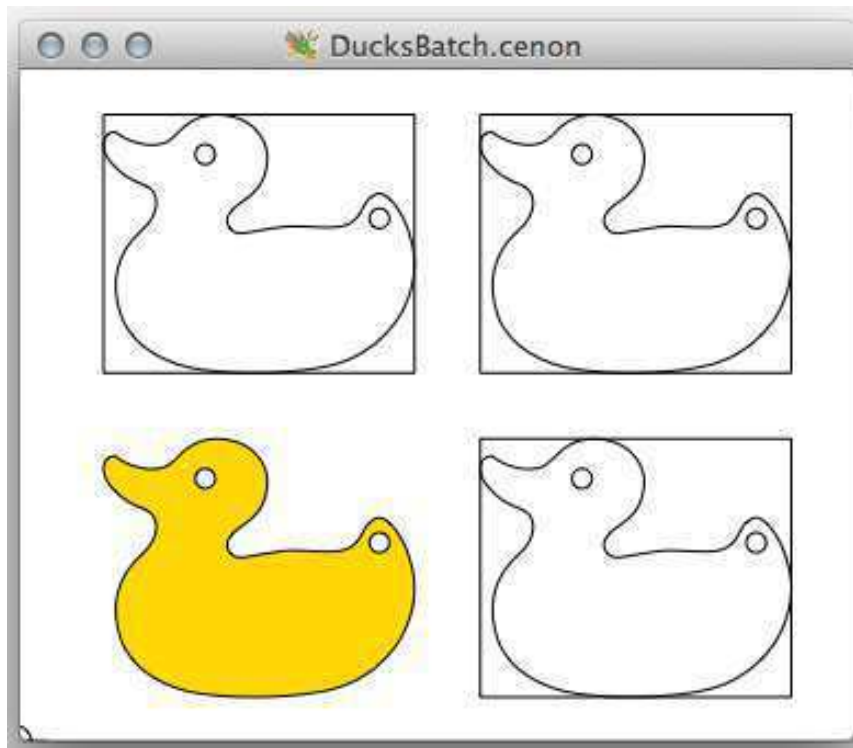
3.11   The Graphic Window

After you have loaded or created a new document it is displayed in the (following) graphic window.

The crosshairs mark the zero point of coordinates. If the grid is enabled, it is aligned to the crosshairs too.

For CAM applications, the grey frame represents the machine table. So you can easily see if the graphic is not too big for the working area.

Here you can see the display of the coordinates. On the left you can see the absolute position to zero; on the right you can see position relative to the last mouse-click. When you create a new object you can see its size on the right.
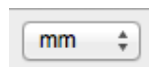
Here you can choose the measuring unit of the display of the coordinates.
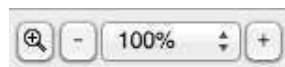
With these elements you can zoom the graphic. In the pop-up-menu you can choose a new zooming-factor. With the buttons + and - you can zoom into and out of the graphic. With the magnifying glass you can create a rectangle. Then the content of the rectangle is displayed on/over the whole screen.

Tips:

- When you press the Alt-key the operation is carried out in one direction only. So you can move the graphic only in x- or y-direction. The same goes for rotating.

- With the Shift-key you can select or deselect further graphic objects.

3.12   Editing

- Lines

- Rectangles

- Curves

- Arcs

- Images

- Paths

- Polylines

- Text

- Textpaths

- Groups

- Markings

- Threads

- Countersinks

- Webs

You can modify the graphic objects as follows:

Selecting

Click on the graphic object to select it. If you press the Shift-key during this operation, you can select or deselect additional objects.

If you keep the mouse-button pressed, you can drag up a rectangle around objects. All objects which are partly inside the rectangle become selected. If you press the right Alt key while dragging the rectangle, only those objects are selected which are completely inside the rectangle.

The edit-menu offers additional ways to select graphic objects:

- *Use Edit ▷ Select Color to select all objects which have the same color as the already selected objects.*

- *Use Edit ▷ Select Equal to select all object which are of the same kind as the already selected objects.*

- *Use Edit ▷ Select All to select all objects.*

Moving

Click on the graphic object. Keep the mouse-button pressed to move the object. It doesn't matter whether the graphic object is selected or not - as long as you don't hit a knob.

If you want to move an entire object but want to grap it at a vertex point (where the knobs are placed), pay attention that the object is not selected when starting the move. This way you can move the object by snapping the grabbed point to the grid or other object points. The distance where objects are catched, can be set in the general preferences (see section 3.1.1). This feature is very helpful whenever you have to attach graphics to each other.

Dragging points

To drag an end point or an anchor point (vertex) of an object you must select it first. Then you can move the vertex by keeping the mouse-button pressed (drag). When this point meets another point during the operation you can hear a signal, and the point is snapped to this point. You can set the distance to which points are snapped in the Preferences-Panel.

Copy/Cut/Paste

You can copy a selected object with the entry "copy" (menu) into the intern buffer. It's also possible to move it to the buffer by cutting it out. Objects that are in the buffer you can insert in the position of the mouse with the command "paste". When you want to insert more than one copy of an object, the copied objects appear staggered to each other. After you have inserted the second object you can move it. Every further object is inserted with the same distance like the distance between the original object and the first copy (smart paste).

Delete

You can delete a selected object with the delete entry in the menu (Edit->Delete) or with the backspace-key.

Tips:

- When you press the Alt-key the action is carried out in one direction only (either x- or y-direction).

- To be able to edit an object the Move-Mode must be active (see Tool-Bar section 3.4). You can get to the Move-Mode from any other mode while pressing the Cmd-key.

3.12.1 Editing Lines
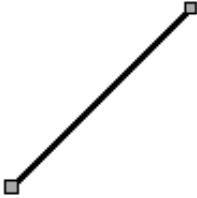
Create

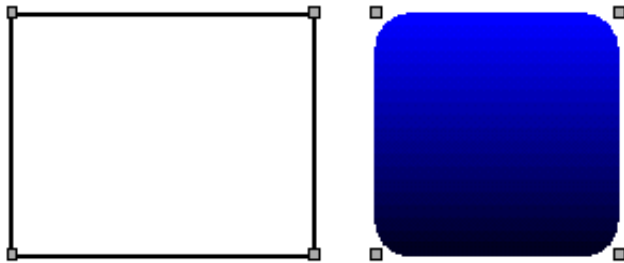 To create a Line you have to activate the line mode.

- The first mouse-click sets the starting point the second the end point.

- After a line has been finished the next line starts from the end point of the last.

- The creation of the lines can be stopped with a double-click on the end point of the line or by setting the endpoint on an existing point. You can also end a line by setting the endpoint at an illegal coordinate or by clicking outside of the window. In this case the line is not set. Also a right click with the mouse will end editing.

- When you press the Cmd-key only one line is drawn or it is stopped after the next segment.

Selecting

Click on the line to select it. The end points of the selected line are marked with knobs. The selected end point is displayed bigger than the other one.

Tips:

- When you press the Alt-key moving of the line or its end points is carried out in one direction only.

## 3.12.2   Editing Rectangles

Create

To create a Rectangle you must activate the rectangle mode.

- The first mouse-click sets a vertex, the second the opposite vertex.

- During the creation the mouse-position locks to the points near to it.

Selecting

Click on the border of the rectangle to select it. A selected rectangle is displayed with knobs on each edge point.

3.12.3 Editing Curves
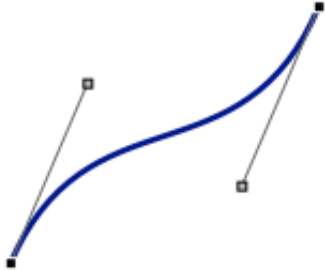
To edit curves mind the following:

Create

To create a curve you have to activate the curve-mode.

- The first mouse-click sets the starting point, the second sets the endpoint of the curve. The third and the fourth mouse-click set the anchor points.

- After you have finished the curve, the next curve starts at the endpoint of the previous curve.

- You can end the drawing of the curve with a double-click on the endpoint or when you set the endpoint on an existing point. You can also end a curve by setting an illegal coordinate or by clicking outside of the window. In this case the curve is not set.

- If you keep the Cmd-key pressed only one curve is drawn or is stopped after the next segment.

- During the generating the mouse-position locks to the points near to it.

Selecting

Click on a curve to select it. The end point and the anchor points are marked differently. The selected end point (on the left) is displayed bigger than the others.

Moving

If you move an endpoint the corresponding anchor point is moved with it.

Important Notes on Bezier Curves

To create nice bezier curves without surprises during output or calculations, you should keed a few general things in mind:

- the anchor points of the curve should be between the start and end points.

- the bezier curve should always continue in the direction of a connected graphics element. If two bezier curves are connected, their connecting handles should form a straight line.

- the two handles of a bezier curve should be abould 1/3 the length of the bezier curve and equidistant to each other.

- The follwoing image shows a bad connection of two bezier curves (top, red), and a perfect connection of curves (bottom).

- Curve Diagnosis (Version >= 4.1):
  For curves joined into a path, bad handles are displayed in red color.
  When moving a handle of a curve inside a path, the handle snaps along the
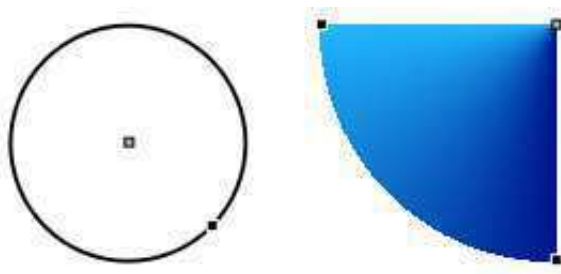
ideal tangent.
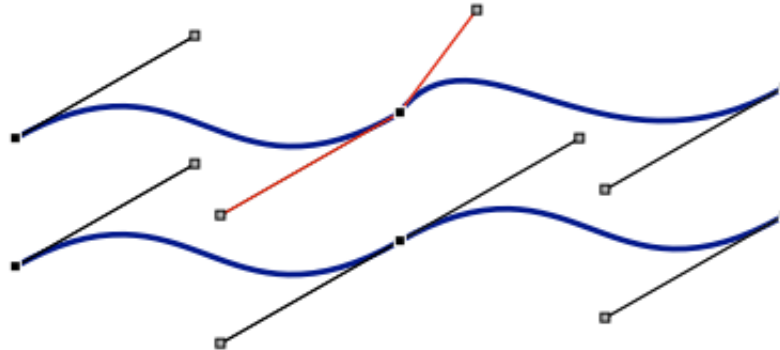
Hint:

- Keep the Alt-key pressed to move a curve or handle in one direction only (horicontal or vertical).

3.12.4 Editing Arcs

Create

To create an arc you have to switch to the arc-mode.

- The first mouse-click sets the starting point, the second sets the center and the third sets the endpoint.

- During the generating of the Arc the mouse position locks to the points near to it.

Selecting

Click on the arc to select it. You can see the starting point, the endpoint and the center. The selected endpoint is bigger than the others.

Moving

You can move the arc by clicking on the center or the frame and by keeping the mouse-button pressed.

Dragging the starting point and endpoint

You can move the starting point and the endpoint (a)round the center. So you can transform the starting and the end angle. If you keep the Ctrl-key pressed you can also alter the radius.

Tips:

- By pressing the Alt-key the arc can only be moved in one direction. When you move the arc by clicking on the center the Alt-key has no function.

3.12.5 Editing Images

Create

Images can be imported to Cenon by Drag and Drop or via Copy and Paste. Additionally you can import images via the menu (File ▷ Import...). So, many possibilities.

Exposing

You can expose an image by clipping it from a Path, Polyline, Rectangle or Arc. To do this first create the path describing the desired contour of the image. Then select both image and path and join the two objects using the menu (Edit ▷ Join).
Details on how to expose an image, you can find in chapter 2 or in our tutorial: "HowToExposeImages.cenon".

Selecting

To select an image click on it. The selection is displayed by four knobs at the corners of the image. This is also true for exposed images.

Moving

You can move the image by dragging it with pressed mouse button.

Resize

You can drag the four corner points of the image to change the size of the image.

If you press the right Alt key while moving the corner point of an image, the image will keep its natural aspect ratio.

Hint:

- If you press the right Alt key while moving an image, the movement will be limited in one direction only. If you press the right Alt key while moving a corner point (resize), the image keeps its aspect ratio.

3.12.6   Editing Paths

A Path consists of Lines, Arcs and Curves. A filled path has always got a closed outline. An unfilled path can be open. A path can consist of several parts that don't have to be connected with each other (Sub Paths). After you have filled a Path all the independent parts are closed. A Path is filled Even-Odd or EOR (exclusively or) that means that areas outside of the outline are left blank.

Create/Join

You can create a Path by joining multiple graphic objects. You can generate a path out of Lines, Arcs, Curves and Paths that exist already. Use the Join item in the Edit menu to create a path (Edit ▷ Join).

Additionally you can create a path from other objects. For example you can build the contour of an object (see section 3.13), or by flattening a text (Kapitel 3.3.4).

Selecting

Click on the path to select it. All points of the selected path are marked with a knob. When a path is open and not filled the selected endpoint is displayed bigger than the others.

Splitting

You can split a path with the Split command from the Edit menu (Edit ▷ Split).

Punch

You can punch a filled path from another filled path with the Punch command from the Edit menu (Edit ▷ Punch/Unite). The paths you want to punch must have different colors. The paths on top are punched from the paths covered.
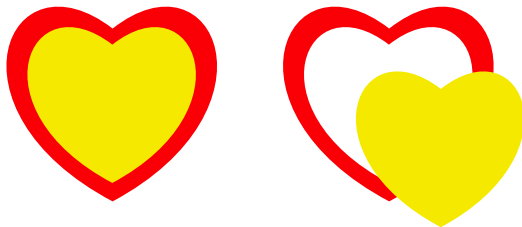
Unite

You can unite multiple filled paths with the Split command in the Edit menu (Edit ▷ Punch/Unite). The paths you want to unite must have equal fill color (the stroked border had been added after uniting the paths!).
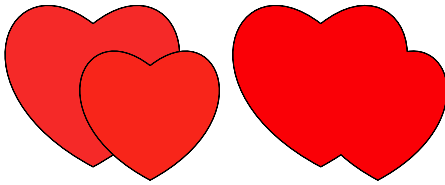
Moving

You can move the path by clicking on the border of the path and keeping the mouse-button pressed as you move. If you want to grab a corner point of the path to move it (for example to attach it to other objects or snap it to the grid), the path must not be selected before starting the move.
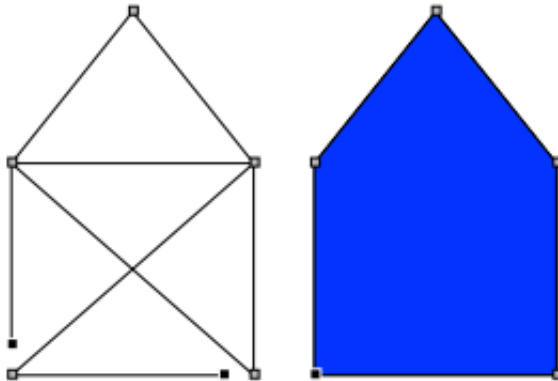
Moving points within the Path

The selected points of a Path can be moved with the mouse. Just press the mouse button on a knob of the Path and drag it to the new position.

Hint:

- When you keep the right Alt key pressed the path or a point is moved only in one direction.

3.12.7 Editing Polylines

A Polyline is very similar to a path with the difference that a polyline contains lines only. A Polyline can be open or closed.

The advantage of using a polyline is, that it is managed very efficiently which makes the Polyline faster and the size of your project much smaller.

Create

To create a polyline, you have to activate the Polyline mode in the Tool-Bar.

Selecting

A Polyline can be selected by clicking on it. The corner points of the Polyline will be marked by knobs.
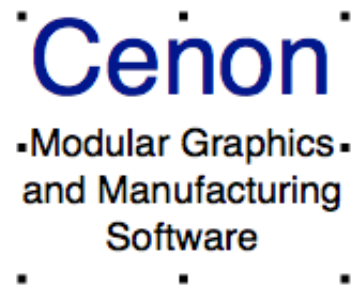
Moving

You can move the polyline by clicking on it and moving it while you keep the mouse button pressed. If you want to move the Polyline by grabbing it at a corner point be

sure that the Polyline is not selected. This way you can attach the Polyline to other objects or snap it to the grid with the grabbed point.

Moving corner points

The selected points of a Polyline can be moved with the mouse. Just press the mouse button on a knob of the Polyline and drag it to the new position.

3.12.8   Editing Text

Create

Text Select the text button from the Tool-Bar.

1. The first mouse click sets the position of the text.

2. Now you can start writing the text.

Selecting

Click on the text to select it. The text-frame of the selected text is marked by 8 knobs.

Moving

Click on the text-frame to move it. You can move it by keeping the mouse-button pressed (drag).

Resizing the text box

You can change the size of the text-box by dragging one of the eight buttons to a new position.

Editing

You can edit the text with a double-click within the text-frame in the usual way. When the text-mode is active you only have to click once to edit the text.
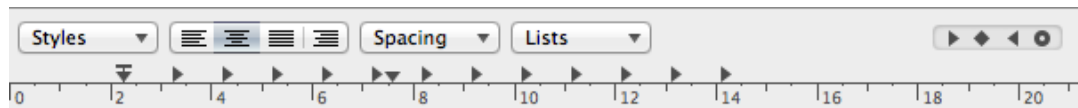
When you edit text a ruler appears on top of the Graphic-Window. In the ruler you can set the text attributes of the selected part of the text (Alignment, line distance, Tabulators).

You can change the font by using the Font-Panel. You can get it with the menu item Format ▷ Font ▷ Font-Panel.

You can change the color of selected parts of the text by using the Color-Panel. You can get it with the menu item Tools ▷ Colors.

Tips:

- When you keep the Alt-key pressed the moving of the text-box is only carried out in one direction.

3.12.9   Editing Text on Paths

Creating

1. Select a text and a path element (line, arc, curve)

2. Now select the menu item Format ▷ Text ▷ Bind To Path

Splitting

To split a Textpath into its components, select the menu entry Edit ▷ Split.

Selecting

Click on the path of the Textpath to select it. The path element of the selected Textpath is marked by knobs.

Moving

You move a textpath the same way as you would move the path it is bind to. See the description of the used path element (Line, Polyline, Arc, Curve) to read more about how to move the Textpath.

Editing

You can edit the text of the Textpath with a double-click on the path element. This brings the text in a unrotated position, so you can easily edit it. When you're done with editing the text, press on the Arrow in the Tool-Bar.

3.12.10   Editing Groups

A group consists of several objects grouped together in one object.

Creating

You can create a Group by grouping several selected objects. You can group almost everything. Use the Group item in the Edit menu to create a group (Edit ▷ Group).

Ungroup

You can split a group with the Ungroup command in the Edit menu (Edit ▷ Ungroup).

Selecting

Click on a group to select it. The buttons of all united graphic objects are displayed.

Hint:

- When you keep the Alt-key pressed the group can only be moved in one direction.

3.12.11   Editing Marks

In a CAM application a mark is usually used to mark drillings. But that's not the only way to use a mark. Basically a mark is a single point in your document.

Creating

To create a marking you have to switch in the marking-mode. You set a marking with a mouse-click.

Selecting

Click on the mark to select it. The center of the selected marking is marked with a knob and its position is displayed in the inspector.

Hints:

- When you keep the right Alt key pressed the moving is only carried out in one direction.

3.12.12   Editing Threads

Usually a thread is used to cut a thread in an already existing hole or cylinder. You can create inside and outside threads.

Creating

To create a thread you have to switch in the thread-mode. You set a thread with a mouse-click.

1. Decide whether you want to create an inside or outside thread. Create a hole for an inside thread, or a cylinder for an outside thread. The dimensions of the hole depend on the data of the thread cutter you use. See the data sheet of the tool.

2. In the Layer-Panel create a layer for the thread.

3. In the Layer-Panel set the tool-radius correction of the layer according to the kind of thread you need: Inside correction = inside thread, Outside correction = outside thread. (see section **??**)

4. In the Layer-Panel assign a thread cutter to the layer (see section **??**).

5. In the Tool-Bar change to the thread-mode (see section 3.4), then set the thread with a click to the desired position.

6. Set the nominal diameter of the thread in the Thread-Inspector (see section 3.6.3). The nominal diameter is the diameter the screw diameter got its name from. For example: M6 for a 6 mm screw and thread. You have to enter 6 (if the unit of Cenon is set to mm).
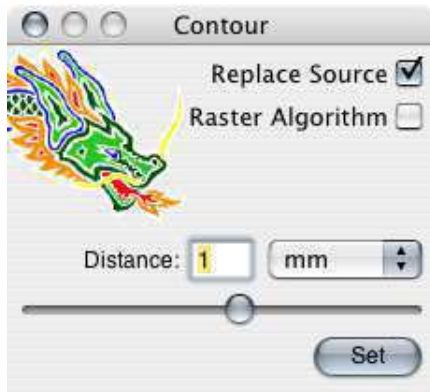
Selecting

Click on the thread to select it. The center of the selected thread is marked with a knob and its position is displayed in the inspector.

Hints:

- When you keep the right Alt key pressed the moving is only carried out in one direction.

3.13 Konturen erzeugen

With the menu Edit ▷ 'Build Contour', you can create the contour of a selected graphic object. In the Contour-Panel which appears, you can set the distance of the contour to the graphic object. The result will be a Path , which resembles the contour of the object.

In this panel you can enter the distance of the new contour to the previous object-contour. The distance can be negative. That means the new contour is inside the object contour. When you click on *Set* every selected object is transformed into a Path that is bigger or smaller than the original object (depending on the chosen distance). You can set the unit of measurement for the distance.

When the distance is too big this might create unwanted overlappings. You can remove them by hand.

Replace Original   If you check the switch, the original will stay, otherwise it will be replaced by it's contour.

Raster Algorithm   Instead of the (more precise) vector algorithm, the tolerant raster algorithm is used.

You also can build a contour of an image. This would be called a vectorization.

3.14   Vectorizing

Via the menu item Tools ▷ Vectorize, you can turn raster images into vector graphics.
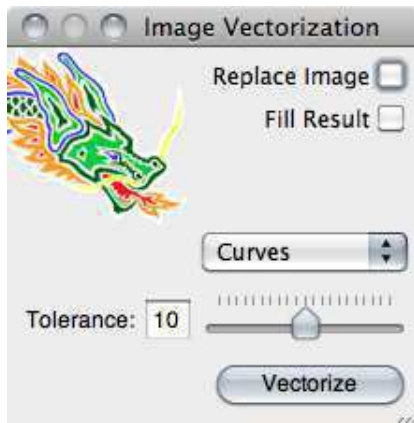
Replace Image   If this switch is active, the original image will be replaced.
                       Otherwise the original image with stay alive.

Fill Results   This switch will fill the generated vecotr path.
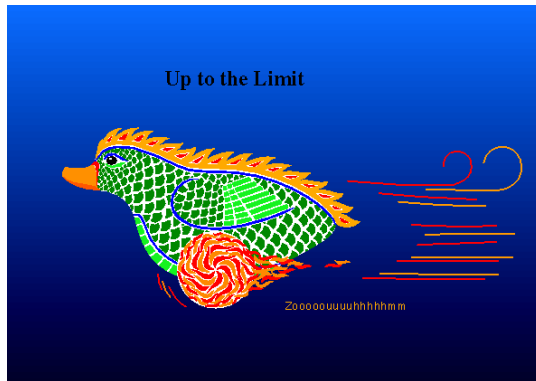
Curves   With this Pop-Up menu you can chose if you want to create
                       Curves or Lines.

Tolerance   Curves will be created with a certain tolerance that can be set
   here. The smaller the tolerance, the more curves you will get.

To achieve good results, the image should be monochrome and available in high
enough resolution.
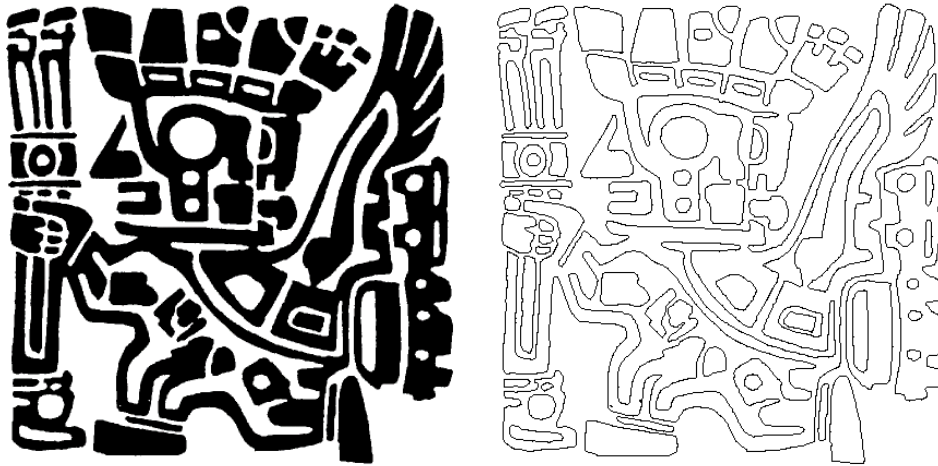
3.15   Color Separation

To prepare your document for exposition and pre-press, you have to separate the document into the four basic colors cyan, magenta, yellow, and black. Therefor four films respective files will be generated.
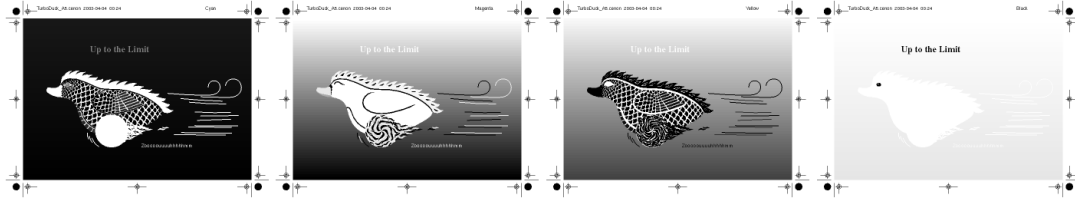
The selected paper size (here A5 landscape) will be surrounded by crop marks and descriptive text. These make it possible to identify the filmes and precisely stack together the four separate colors for printing.

The color separation of Cenon is integrated into the Print-Panel. Use the menu *Print...* to open the Panel.
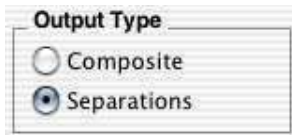
This buttons allow to activate the color separation process.

 To generate files click on the save button of the Print-Panel. A file selection panel will appear where you can set the destination and name of the files to write. The files will be written with the name extended by some characters specifying the color (_c=cyan, _m=magenta, _y=yellow, _k=black).

 Use the Print button to send the separated colors directly to a printer or type setter.

Note: To get the desired page layout on color separation, be sure to set your working area to the same size as the page layout (see section 3.3.4).

3.16 Multi Page Documents

Cenon allows the creation of multi page documents. All you have to do is tell Cenon to use a layer as page. This can be done with the Layer-Details Panel (Section 3.7).

The behaviour of pages is different to that of layers. Only one page can be visible at once, and the template layers holding the definition of page numbers, are displayed.

Printing automatically turns to multi page, if at least one layer of the type 'Page' is inside the document.

3.16.1   Procedure

1. Inside the Layer Inspector create a layer for each page. After this, change these layers to pages with the Layer-Details (double click).
    Layer-Datails: Section 3.7.

2. Create the Template layers according to your needs. Alternatively, you can load and "recycle" predefined documents.

3.16.2   Templates

On a template layer variable elements are stored, which are displayed on pages according to their purpose. You have the choice between three kinds of template layers:

Template	The elements on this template, are used on all pages. Here you can define a page numbering, which is displayed on even as well as odd pages, for example.
Template Odd	This template provides elements used on odd pages only. For example a page number which should sit at the outside of pages.
Template Even	This template contains variable elements for even pages.

The elements of templates:

The elements of templates are created as text objects (Section 3.12.8) with appropriate wildcards. Tehse wildcards will be replaced by the page numer etc.

#PAGENUM#	This label will be replaced by the page number. Example: "Page #PAGENUM#"
#PAGECNT#	This label will be replaced by the number of pages, ex. "Page 2 of 10". Example: "Page #PAGENUM# of #PAGECNT#"
#DATE_%Y-%m-%d %H:%M#	This wildcard will be replaced by the current date. The format of the date can be configured. The example will be displayed as 2012-06-12 13:55.

%Y	year (2012)
%m	month as number (06 = June)
%d	day as number (12)
%a	day shortcut (Tue)
%H	hour (13)
%M	minutes (55)
%S	seconds (00)
%Z	time zone description (Europe/Berlin)
%z	time zone in hours (+0100)

Chapter 4

Device Configuration

4.1 General Information

The configuration files of Cenon are ASCII files containing all the information needed for the definition of devices and import formats.

This section will describe how to configure Cenon for the different "dialects" of Gerber, HPGL as well as for your own XYZ-units and controller. Although Cenon comes with a number of predefines configuration files (*.dev), there is a chance that the commands of one or the other program is not understood properly or that there is no 100% matching configuration file available for your controller or device. Unfortunately, there are slight differences in the command set of the different programs and controllers.

4.1.1 Creating your own configuration files

In case you do not find a suitable configuration file for you purpose in one of the device directories (HPGL, DXF, xyz etc.), you can alter an existing file.

- Start a text editor.

- Load an already existing configuration file (extension: *.dev). Only load files from the appropriate directory and save them in the same directory after modification. This is very important, because Cenon uses the directory name for accessing the right file format. The setup directory names, for these reasons, should not be changed. Therefore, a Gerber configuration file should only be placed in the directory Gerber, etc.

- To avoid duplication of work you should load a configuration file which matches the command set of your computer the most. You can change the configuration file to your needs using the information provided in the output device manual.

- After changing all necessary entries you have to save the file (to the same directory under a new name) and quit the text editor.

- Load from within Cenon the newly created file (Menu: Info ▷ Preferences) and you are ready to start.

4.1.2   Important Notes

- The comments before the number sign (here: controller) are not important for the program (comment here: device name). These can be changed to your needs or even deleted. Cenon is recognizing only the characters from the number sign to the end of the line (here: "CNC750"). Example:

```
controller                    #CNC ''CNC750''
```

- The entries are not permitted to exceed more than one line.

- The order of the entries is not important, unless there are several entries with the same #-code. You also can delete an entry if it is not necessary.

- Within a command line you can add after a backslash () certain sequences to the code. You could for example, write in a new line each single command in the output file:

\n	Neue Zeile (Zeilenvorschub)
\e	Escape-Sequenz
\r	Carriage Return (Wagenrücklauf)
\"	Anführungszeichen

- If you have to leave space for variable parameters, which will be provided by Cenon. This is done with a percent sign (%) followed by a letter:

%f	will accept a floating value (with decimal values entries). The output format can be regulated with these entries. Examples:

```
%.0f   -> 1
%.2f   -> 1.00
%2.2f  -> 01.00
%2f    -> 01
```

%d	is describing decimal integers
%x	is describing hexadecimal values
%ld	is describing decimal long integers
%e	is describing numbers with exponents

- Transmitted commands are always in quoted and also contain the appropriate variable (e.g. pen selection for a HPGL-Plotter:

```
select pen                #PEN "SP%d;"
```

- Parameter providing information to Cenon (e.g. number of pens for HPGL-plotter or the size of the working area) are not quoted:

```
number of pens           #NPN 8
```

- If several values are passed on to the program in one command line, these values have to be separated by at least one space (e.g. maximum working area of a unit):

```
X Y Z-maximum range (mm) #SIZ 380 235 63
```

4.2   Gerber-Import / Export

4.2.1   General Information

For importing Gerber-files there is besides the differences in the command set also
the problem of choosing the appropriate aperture table for the output. This glitch is
solved in the new extended Gerber format. But first some general information about
Gerber-Photo-plotter.

The Gerber-file-format is well know and has been in use for a long time to create
high quality film layouts with photo-plotters. More and more this is done with laser
plotter which can interpret the PostScript format. But to better understand the Gerber
file format let us go back to the times, when the computer aided printed circuit board
development was in its early stages. Earlier plotters with very large casings were
used, which used a regular bulb for film exposure. To achieve different conductor
path widths and different shapes of soldering points, the plotters were equipped with
a shutter unit with different aperture sizes. Depending which aperture was placed in
front of the light bulb, different conductor path widths and soldering points could be
simulated.

A so called D-code was used to tell the photo plotter which aperture to use. Each D-
code is representing a particular aperture on the shutter unit. Because these shutter
units were restricted in size, only a limited number of apertures were available and
therefore, only a limited number of D-code possibilities were available. For modern
units, this problem does not exist, because mechanical apertures are replaced by
apertures simulated electronically.

Each time a printed circuit board is exported by your CAD-application through a
Gerber file, a file with all the circuit board data will be created. This file contains
the necessary D-code information. Therefore, for each path the appropriate aperture
indicates the width of the conductor path and the style of the soldering point. All
this information is stored in the aperture table. Because your PCB manufacturer
uses this table for setting up his photoplot unit for producing the board he needs this
information. While importing the file for engraving the insulating path to the Cenon
application, Cenon is actually using this file to simulate the photo plotter.

Some CAD applications have the drawback of using dotted lines for the representation of soldering point instead of using the appropriate flash command. This results in very large Gerber files which result in extremely long calculation times and unsatisfactory results. Try in these case a PostScript output or change the application.

Most of these problems are solved with the new extended Gerber format (RS274X).

4.2.2   Export of Gerber files

The export of Gerber files is not critical. Cenon always writes the extended Gerber format, so no paramaters have to be set.

4.2.3   Import of Gerber files

For importing Extended Gerber files just click on the file.

For importing standard Gerber files you need, besides the Gerber file an Aperture table file.

- Aperture-Tabelle (Extension *.tab)

The folder *Devices/gerber* contains a default aperture table with the name of the .dev file. While importing the Gerber file this table will automatically be loaded, unless there is a specific aperture table with the specific project name in the project folder. In this case, the appropriate project aperture table has priority and will be loaded.

Unfortunately, there is no standardization for creating an aperture table. Therefore, you have to prepare the table of your CAD-system usually with a text editor so that Cenon can use it.

To make the task of adjusting the aperture table or adopting your CAD application format easier, we will explain the single entries in the following sections, so that you can make the necessary changes.

4.2.4   Commands in the configuration file

```
device name                  #DEV "Gerber"
```

This describes the name of the unit. The name can be up to 20 characters long and the name selection is your choice. At appropriate places within Cenon this name will be used for display.

```
resolution in points/inch #RES 1000
```

Preset resolution for the output of the file in points per inch.

```
tool                         #IT0 "D"
tool                         #IT1 "DX"
```

These two code segments contain code to select the appropriate aperture. The second value is optional.

```
X                            #IXP "X"
Y                            #IYP "Y"
```

Code for a x- or y coordinate.

```
I                            #IIP "I"
J                            #IJP "J"
```

Code for the relative translation of a x- or y-coordinate.

```
draw                         #IDR "D1"
```

Code to switch on the light (comparable to the pendown command for plotter) with which the film in Gerber plotters can be exposed. In contrast to the flash command, the light stays on during the whole movement of the photo plotters and can be used for conductor paths.

```
    move                        #IMO "D2"
```

Movement to new position with the light switch off (comparable to pen-up).

```
    flash                       #IFS "D3"
```

Flash light for marking a soldering point.

```
    circle cw                   #ICI "G75*G02"
```

Command for drawing a circle clockwise.

```
    arc                         #IAR "G75"
```

Command for drawing an arc (-segment) clockwise.

```
    terminator                  #ITR "*"
```

Termination sign for ending the command sequence.

```
    absolute                    #ABS "G90"
    relative                    #REL "G91"
```

The coordinates can be forwarded either as absolute (in reference to a fixed origin) or relative (in reference to the last position) values.

4.2.5   The Aperture Table

This file is only need for standard Gerber. If you use the Extended Gerber format
(RS274X) you can skip this section.

```
tool, type (L=trace/line, P=flash/pad, A=both),
width, height (mill), form (C=circle, R=rectangle)
```

This is the decription at the beginning of the aperture table. It is important to follow
the order in which the entries are placed in each line:

- The D-code (aperture number) of a specific tool is placed directly after #DCD

- This is followed by a character, describing the tool type (aperture). As char-
  acters are possible: L for lines (trace/line), P for point (flash/pad) and A for
  both.

- Next entry is the tool width in mil (1/1000 inch).

- Thereafter, the entry for height, also in mill.

- Last, the shape has to be entered. As possibilities you have C for circle or R
  for rectangle.

The complete aperture table has to be build in this way, so that Cenon can use the
file. If your CAD application is able to create the aperture files in this way, you will
have it very easy. In this case you only have to name the file and assure that the file
has the extension *.tab. If this file will be used as standard aperture table, save it in
the Devices/Gerber folder with the name Gerber.tab. If it is used for a certain project,
save it in the appropriate folder with the filename and the extension *.tab.

After saving the file you can load it when needed. If for some reasons your CAD-
program is not able to produce such a matching file you are required to make changes
by hand. The following two lines give you an example of part of a manually altered
aperture file table:

```
line 0.1 mm  #DCD "D10*" L  4  4 C
pad 0.5      #DCD "D39*" P 20 20 C
```

4.3   DXF-Import / Export

4.3.1   General Information on DXF

DXF is an abbreviation for "Drawing Exchange Format" and became mostly known through the application AutoCAD. Not only AutoCAD, but other CAD applications use this file format mainly to exchange technical drawings. Because DXF-files can be imported from Cenon directly (in contrary to HPGL-files) we will not elaborate on this format and would rather guide you to the DXF specifications for download from http://www.autodesk.com.

4.3.2   Export of DXF-Data

For output of DXF you can decide whether to flatten text into lower graphic elements. Use the preferences panel for Export (see section 3.1.3) to toggle this option.

4.3.3   Import of DXF-Data

For the DXF import there isn't much to adjust. Important is the correct setting of the measurement unit for the file which you want to import. You can set this resolution in the Import part of the Preferences-Panel.

When writing a DXF file from a CAD application, be sure to set the drawing extends so that your entire drawing is inside.

4.3.4   List of supported DXF syntax

Interpreted Table Entries:

- BLOCK
- LAYER

Incomplete list of implemented Graphic Elements:

- ARC

- INSERT

- LINE

- LWPOLYLINE

- MTEXT

- POLYLINE

- SOLID

- SPLINE (>= 4.1)

- TEXT

- VERTEX

- 3DLINE, 3DFACE

4.4   HPGL-Import / Export

4.4.1   General Information

The HPGL- format is an established and well known language to control pen plotters of any kind. The quality and the speed of the import process is depending on the file created by your program. If for example, every line in file is created with one line thickness, a thick line has to be created from several thin lines during the converting process. We may experience the same problem drawing a circle. In this case a circle will be composed from many smaller line pieces, which is a very time consuming

process and will not provide best results. In general it is not advisable to use HPGL files for calculating insulation paths.

HPGL is not the best choice for the calculation of outlines or filled areas. Filled areas are represented in HPGL by many parallel lines. In these cases Cenon will have difficulties calculating the milling path. You should export HPGL-files therefore in the most simplest way (without filled areas, overlapping areas or thick lines etc.).

4.4.2 Export of HPGL files

The export generates a standard HPGL file, without the option to configure derivates.

4.4.3 Import of HPGL files

The import is using the entries provided by the configuration file.

4.4.4 Commands in the configuration file

```
device name                    #DEV "HP 7550"
```

This describes the name of the unit used and serves only information purposes.

```
resolution in points/inch      #RES 1021
```

This value indicates the plotter selected resolution of the output file in points per inch.

```
number of pens                 #NPN 8
```

Describes the number of pens, which will be used for the output file.

```
    1. pen width (unit: 1/1000 mm) #PWI 250
```

This describes the pen width in units of 1/1000. For a thickness of 0.25mm a value of #PWI 250 has to be entered. For each pen width there is a separate line. If for example the field number has an entry of 8 you have to have eight different entries for the different pens. This is true even when the width of all eight pens is the same. The first entry always stands for the first pen.

```
    1. pen color (0 - 1000, rgb)   #PCO 1000 0 0
```

Plotters are in most cases equipped with several pens of different colors. Because the color can not be entered directly with HPGL (in contrary to PostScript) the color information has to be determined indirectly by using different pen colors. For each pen the color intensity for red, green and blue can be entered separately. From this color information, color for each pen in the preview window of Cenon will be composed.

```
    special characters in command strings:
    \n linefeed
    \e escape
    \r carriage return
    \'' quotation marks
    parameters will be inserted at %f (%d, %x, %ld, %e)
```

Please refer for the different parameter values to general information in section 4.1.2.

```
    draw                              #DRW "PD"
```

Pen down command for drawing of lines etc.

```
    pen                               #IPN ""
```

Selection of the actual pen

```
move                          #MOV "PU"
```

This command is used for moving the pen to a certain position without drawing.

```
absolute                      #ABS "PA"
relative                      #REL "PR"
```

The coordinates can be forwarded to the output device either as absolute (in reference to a fixed origin) or relative (in reference to the last position) values.

```
circle (radius)               #ICI "CI"
```

Command for drawing a circle.

```
arc absolute (xm,ym,arc angle) #IAA "AA"
```

Command for drawing an arc in relation to the origin.

```
arc relative (xm,ym,arc angle) #IAR "AR"
```

Command for drawing an arc in relation to the last position of the pen.

```
terminating characters        #ITR ";\n\r"
```

All possible characters for termininating a command sequence.

4.5   PostScript-Import / Export

4.5.1   General Information to PostScript

PostScript is the industry standard of the publishing industry and the most popular graphic format. In contrary to bitmap graphics, where images are composed of single points, vector graphic images are composed from lines, circles, curves, rectangles, etc., where closed paths can be filled with a color. This information will be sent to a output device. There, the information will be converted to the printed image. Since printing is done, after all, point by point, an interpreter will convert the vector information to point information.

For Imagesetter, PostScript is the industry standard for a long time. All graphic information is contained in one single file. Further external files to handle any output are not necessary. If your application of choice is capable of creating PostScript output files we strongly recommend to use this option. In this case it is not necessary to enable special settings for importing PostScript files.

Depending on the system, PostScript is imported using varying interpreters. For OpenStep the Display-PostScript of the system is used. For Apple and Linux, the GhostScript interpreter has to be installed, which is usually the case on Linux systems, but not on Apple.

4.6   PDF-Import

The Portable Document Format is imported with the help of Ghostscript, provided that you have installed GhostScript.

4.7 DIN-Import

4.7.1 General Information

DIN files correspond to the DIN 66025 norm. Most of the drill data files can be imported using this device.

Currently device configurations for the Excellon (excellon.dev), and the Sieb&Meyer formats (sm1000.dev, sm3000.dev) are supplied. Additional configuration files can be created.

Usually you want to modify the resolution entries only. This can be necessary, because some programs on the market use non standard resolutions for exporting files.

4.7.2 Commands in the configuration file

```
device name                    #DEV "Excellon 2000"
```

This describes the name of the unit. The name can be up to 20 characters long and the name selection is your choice. At appropriate places within Cenon this name will be used for display.

```
resolution in points/inch      #RES 10000
```

Preset resolution for the output of the file in points per inch. Here 10000 points/inch. This is what you usually want to change.

```
resolution (mm) in points/inch #RMM 25400
```

Preset resolution if set to mm (usually using M71). Here 25400 points/inch. This information is used in the Excellon format only. The Sieb&Meyer format has a fixed resolution.

```
    start                                #IST "%%3000"
```

This specifies a string to recognize the file format. In the exampe the Sieb&Meyer 3000 format is introduced.

```
    parameter                            #IPA "$"
```

The supplied string introduces the parameter section of the Sieb&Meyer formats.

```
    select tool                          #ITL "T"
```

The commant to select a tool (usually "T").

```
    X                                    #IXP "X"
    Y                                    #IYP "Y"
```

The strings introducing the x-, and y-coordinate.

```
    terminator                           #ITM "\n"
```

The string specifying the end of a command. In the example this is a usual line feed (\n).

The device files contain additional commands which are not important or not ment for modification.

Chapter 5

Appendix

5.1 Files and directories

5.1.1 Cenon program

The program file of Cenon is located in the application directory of your computer system:

Apple: /Applications/Cenon.app

GNUstep: /usr/GNUstep/Local/Applications/Cenon.app

OpenStep: /LocalApps/Cenon.app

5.1.2 Library

In the Library path of Cenon you can find examples, projects and all the things which are intended to be customized (configurations, data files, etc.). Cenon has a global Library path shared between all users, which is not writable to a user and shouldn't be modified, and a User Library inside the home directory (here HOME) of the user. You can place modified versions of files inside the User-Library folder.

Apple: /Library/Application Support/Cenon

                 HOME/Library/Cenon

GNUstep: /usr/GNUstep/Local/Library/Cenon

                 HOME/GNUstep/Library/Cenon

OpenStep: /LocalLibrary/Cenon

                 HOME/Library/Cenon

Files can appear in both Library paths (the global library path and the home library path). In this case the file in the home library path has priority. This allows a user to modify a configuration file without changing the installation of Cenon.

In the following we describe the most important files and directories. All located in the HOME-Library of Cenon:

File / Folder	Description
Projects	Your Cenon projects and examples
Examples	Some examples of import formats
Devices/din/*.dev	Configuration files for the drill data import
Devices/gerber/*.dev	Configuration files for the Gerber import
Devices/hpgl/*.dev	Configuration files for the HPGL import
Devices/xyz/*.dev	The device configuration files
CAM	Folder for special configurations
CAM/Jobs	Your CAM projects and example projects
CAM/positions	ASCII file holding the position memory
CAM/magazine	ASCII file holding the tool magazine

Cenon provides two folders for projects (Projects and CAM-Jobs). There is no technical differences between the file format.

5.1.3   Cenon Modules

Cenon Moduls may be installed in various locations of the file system. The basic location is dependant of the computer platform:

Apple: /Library/Extensions/Cenon

HEIM/Library/Extensions/Cenon

HEIM/Library/Cenon

GNUstep: /usr/GNUstep/Local/Library/Bundles/Cenon

HEIM/GNUstep/Library/Bundles/Cenon

HEIM/GNUstep/Library/Cenon

OpenStep: /LocalLibrary/Bundles/Cenon

HEIM/Library/Bundles/Cenon

HEIM/Library/Cenon

5.2   Error and Warning Messages

- **Select two objects for joining!**

  You have to select two objects to be able to join them and create a path object.

- **Can't create backup file. File not saved!**

  Check if you have write permission to the directory and the Cenon file you tried to write.

- **Could not open file FILENAME.**

  Check the read permissions on the file FILENAME, and on the directory it is located in. You need read permissions on a file to open it. Another possibility is that the file is corrupted or of a format Cenon is not capable to read. Check for other messages in the Console.

- **Could not open file FILENAME. Using Default.**

  Here Cenon tells you that it can't read FILENAME, and uses default values instead.

- **You have unsaved documents!**

  If you quit Cenon and have unsaved documents, this message appears to give you a chance to save the files. You can review the unsaved files or quit anyway.

- **Can't write file.**

  Check the write permissions on the directory you try to save in. Also check if there already is a file which you are not allowed to overwrite.

- **FILENAME has changes. Save ?**

  This warning message appears if you try to close a window of a document which hasn't been saved yet. You have the choice to save the file or close it anyway.

- **Do you want to revert to: FILENAME ?**

  This is a safety message giving you a chance to cancel your request to reload a file and loose all your changes.

- **This Operation will force a recalculation of the graphic!**

  Cenon gives you a chance to cancel the operation or will start a recalculation.

- **This Operation can take a while!**

  You are warned that the following operation will take some time and you have to wait until has been finished. This message does not appear in expert mode.

- **The contour will be calculated know! You may want to stop this operation to calculate on a later time.**

  You are warned that the output tracks needs recalculation and you are given a chance to calculate them on a later time. This message does not appear in expert mode.

- **Layer LAYERNAME needs recalculation!**

  If you start the output and the output tracks of some layers are not calculated yet, Cenon gives you a chance to cancel and take a look at the tracks before you start output. Otherwise the output is calculated and executed directly.

- **No data to process!**

  You started the output without any data to process.

- **Couldn't locate tool name TOOLNAME in magazine! You may have removed the tool since your last session.**

  You have tools assigned to a layer of your job which is not in the active magazine. Check the magazines for the needed tool or select a new tool from the pop up menu.

- **Name 'NAME' allready in use!**

  If you add or rename a layer or position this message can appear. You should rename the existing layer or choose a different name for the new one if possible.

- **You need to install the Cenon Library!**

  Some Library files are missing. On OpenStep the Library of Cenon has an extra package. Most likely you haven't installed it.

- **Only one layer of this kind allowed!**

  Cenon allows only one layer of the kinds: Fitting-Layer, Clipping-Layer, or Levelling-Layer.

- **Only one position for parking allowed!**

  This shouldn't happen at all, but somhow you tried to add a second layer for the parking positiong. This is not possible.

- **Only a single rectangle allowed on leveling layer!**

  You created graphic objects on the leveling layer which are not allowed there. Delete everything but a single rectangle.

- **This Operation will remove the fill layer attached to the Pick Out!**

  The Pick-Out owns a second layer. If you leave the correction for a Pick-Out this layer is removed.

- **Automatic adjust! Be sure to have placed the surface sensor correctly, before pressing 'Start'.**

  If your machine allows automatic measuring of the tool offset, this message gives you a chance to place the switch under the tool before it starts the operation.

- **Do you really want to remove the current magazin?**

  A warning message telling you that you are about to remove an entire magazine.

- **Set Magazin: This operation will remove all tools from layers!**

  A warning message telling you that you have to assign a new tool to all your layers, if you select a new magazine. You have the chance to cancel your request.

- **Stop work?**

  A warning message. It appears when you click on Stop while the output is running. The Z axis is lifted and you have a chance to check things, before you continue or stop the output.

- **Graphic out of range!**

  Your graphic is located outside of the machine table. Be sure that the graphic you want to process is completely inside the gray lines, representing the machine table. You have a chance to continue, but this can lead to an incomplete output of your graphic.

- **Please log in as root!**

  Licensing only works as user root.

More messages can appear in the Console window (or system log file). Especially messages during calculation of the output path are listed there.

On Linux this file can be found in the menu of the Window Manager under *Info* ▷ *System* Console. On OpenStep it can be found in *Tools* ▷ *Console* of the Workspace Manager.

5.3 Keyboard Commands

Editing, Selecting

The keys Alt, Shift, and Ctrl can be used in combination with the mouse. The meaning of these combinations can be found in the description of each mouse action. See section 3.12.

Menu keys:

The Command key (Cmd) on a PC is usually the left Alt-Key. On Apple the Command Key is the Apple or command key.

Command	Key word	Description
Cmd-a	all	Select all
Cmd-A	Area	Show Working Area panel
Cmd-b	bold	Change selected text to bold
Cmd-B	Batch	Batch Production
Cmd-c	copy	Copy selected objects into buffer
Cmd-C	Color	Show Color-Panel
Cmd-d	direction	Revert direction
Cmd-D	Direction	Display directions of objects
Cmd-e	equal	Select equal objects
Cmd-F	Form	Show Transform-Panel
Cmd-g	group	Group selected objects
Cmd-G	unGroup	Ungroup selected groups
Cmd-h	hide	Hide program
Cmd-i	iItalic	Change selected text to italic
Cmd-I	Inspector	Show Inspector-Panel
Cmd-j	join	Join selected objects
Cmd-J	unJoin	Split joined objects (Path, Textpath, clipped Image)
Cmd-m	mirror	Mirror selected objects

Cmd-M	Moves	Show output tracks
Cmd-n	new	Create new document
Cmd-o	open	Open (Load) document
Cmd-O	Optimize	Optimize moves
Cmd-p	print	Print document
Cmd-P	Page	Show Page-Layout panel
Cmd-q	quit	Quit program
Cmd-r	rotate	Rotate selected objects by 90°
Cmd-R	Ruler	Toggle text ruler
Cmd-s	save	Save document
Cmd-S	Save as	Save document with new name
Cmd-t	text	Show Font-Panel
Cmd-T	Tool	Display tool diameter
Cmd-u	unsave	Revert to saved document
Cmd-U	pUnch	Punch selected objects
Cmd-v	view	Paste buffer into document
Cmd-w	window	Close window
Cmd-x		Cut selected objects into buffer
Cmd-z		Undo
Cmd-Z		Redo
Cmd-?	?	Help
Cmd-1		Graphic-Inspector, when editing text: Copy ruler
Cmd-2		Width-Inspector, when editing text: Paste ruler
Cmd-3		Fill-Inspector, when editing text: Copy font
Cmd-4		Texttype-Inspector, when editing text: Paste font
Cmd-5		Layer-Inspector
Cmd-8		Bring to front
Cmd-(		Bring one object further to the front
Cmd-9		Send to back
Cmd-)		Send one object further to the back
Cmd-+		Toggle grid
Cmd-Shift-+		Show Grid Panel

Cmd-<		align text to the left
Cmd–		center text
Cmd->		align text to the right

5.4 Frequently asked Questions

For an up-to-date version of the questions and answers visit the internet pages of Cenon www.Cenon.info.

5.4.1 Import

The imported DXF graphic is displayed in a wrong size

Go to the preferences of Cenon to change the unit of the DXF import. The DXF format has no defined unit, that's why you have to tell the importing program the unit of the file.

The size of imported fonts is not correct

You can tell the exporting program to flatten all text to a path.

If you are using HPGL or DXF, the cause is that no font information is inside the file, so Cenon will use the default font.

If you are using PostScript, it is possible that the desired font is not installed on your system. In the latter case you can install the font as Type 1 font. Ask the documentation of your computer system on how to do this or ask your system administrator for help.

Graphics which are generated using Freehand contain intersecting lines

In Freehand don't use the output option Split Complex Paths. Otherwise Freehand
splits large paths into several smaller paths to limit the complexity of generated
PostScript files.

I can't import HPGL files

The extension of HPGL files must be .hpgl, or .plt. The case (lower case) is important
on Unix systems!

5.4.2   Computer System

A double click on a file opens the file in the text editor and not in Cenon

Select the file in the File Viewer of the Workspace. Then go to the Tool Inspector
(Pop Up Menu Tools) of the Workspace (not Cenon), and move the Cenon symbol to
the left. Doing this you set Cenon as default application for the selected file type.

After a check for disks, no disk symbol appears in the shelf of the File Viewer

Disks are not displayed when their file name is missing or not appropriate. You can
find your Disk in the root directory (/).

Transport of Cenon files to DOS disks

Before you can copy a Cenon file to a DOS disk, you have to truncate the file ex-
tension (.cenon) to 3 characters (.cen). To use the file you have to change back the
extension to .cenon.

If possible, you should use Unix or Apple formatted disks to transport files.

The prefered way to transfer files is a LAN (Ethernet).

Killing a process

If it happens that you have a process hanging around as a zombi, you can kill this process.

On OpenStep go to the process list of the Workspace using the menus 'Tools - Processes'. If you have to kill Cenon, you must kill the output process (controller) too.

5.5 Glossary

"What does this mean?" is sometimes the question. This glossary should help you to better understand technical terms and also give you a short explanation to important terms from A (aperture table) to Z (Cenon). If more information is available in the manual we will refer to the appropriate section of the manual.

Aperture Table	An aperture table is necessary for importing Gerber files. This file contains all the necessary D-code information to assign the aperture of the photo-plotter (soldering point shape, sizes and conductor path thickness) to the different layout elements of your CAD-program. The aperture table used for export has to be used for importing as well. The extended Gerber format doesn't need an aperture table any more.
Blow Up	Special kind of isolation tracks for producing PCB prototypes. A blow up is used to increase the isolation paths for easier soldering.
CNC-Controller	The CNC controller is the link between your computer unit and the engraving unit. The controller converts the signals send by Cenon to signals of higher electrical current, so that they are able to power the different axes of the engraving unit.

Configuration file	In your configuration file (extension .dev) control commands and other parameter for the output device are defined or different commands of the different import formats are translated for Cenon.Default A default is an entry preset by an application.
Conical	Conical describes a shape which goes from wide to narrow.
Inlay	Inlays are a special case of cutting material, so that one poarts fits exactly into another.
Excellon Format	Excellon is a data format used by industrial drilling machines for drilling holes in circuit boards. Many of the CAD programs can export these data and enable you to import all the drilling information. The format is imported using the DIN import.
Extended Gerber	This is an improved Gerber format without the need of a separated Aperture file. The format also allows complex ground planes, which is very important for a clean import of the data.
Gerber-Format	Gerber is a data format for exporting layout data. In general, photo-plotter use this file format. Because this file format is very common, most of the CAD-programs are able to create files in this format.
HPGL	This abbreviation is an acronym for "Hewlett Packard Graphics Language" and is one of the well know and mostly used command set for accessing pen plotter.
Inner Contour	The inner contour is mainly used for calculating the engraving path of filled areas. The appropriate tool is labeled engraving tool.

Isolationsgravur	Spezielle Art der Werkzeugradiuskorrektur zum Erstellen von Leiterplatten-Prototypen. Die Isolationsgravur graviert die Isolationen um die Leiterbahnen.
Insulation engraving	Special kind of tool radius correction used to create prototypes of printed circuit boards (PCBs). The insulation is engraved around the tracks.
Outer Contour	The calculation of the outer contour of components is necessary, if the elements have to be cut-out totally and the cut out should comply exactly with the layout of the element. These cut-outs are normally done with a milling tool.
Outline-Algorithm	The outline-algorithm is responsible for creating a contour around graphic objects.
Pick-Out	The pick out is a special method of creating output for detailed engraving purposes. It is used with a conical tool.
PostScript	PostScript is a vector based page description, which is mainly used in the DTP area. This format is normally used to drive photo-type-setters to create inexpensive film layouts.
Project	A project in Cenon is your document file. It is saved with the extension '.cenon'. In CAM applications a Cenon project can also be called a job.
Rub-Out	Rub-Out area (especially PCB prototyping) indicates areas were analog to the chemical process the conduction copper material is completely removed (important for HF-applications). The actual tool diameter is used for calculation of the appropriate path to completely remove all the copper.

Sieb & Meyer   Sieb & Meyer ist a industrial drill data format. The
                        two Sieb & Meyer formats (1000 and 3000) can be
                        imported using the DIN import.

Spindle   Also called HF- or SF-spindle. Using high frequent
                        three-phase current, extremely high revolutions per minute
                        (RPM) can be generated, to achieve a precise output
                        and a high feeding speed.

Cenon   Universal graphics tool.

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