Digiverstas
Laser cutter
GCC LaserPro C180II

With a laser cutter, you can engrave and cut various patterns or objects from plywood. Only the library's own plywood materials may be used in the device.

The laser cutter works with the **CorelDRAW** program which can be used to prepare the image files to be engraved for processing. CorelDRAW can read most image file formats created by different programs.

The device may only be used under the supervision of staff.

Material fee: €2/board (maximum 2 pcs/customer).

OULU KAUPUNGINKIRJASTO

Table of contents

ATTENTION!

The library's laser cutter is intended to do only jobs that require light work. This means, for example, cutting the plywood into shapes, or carving the surface of the plywood to produce images and patterns. Examples of work can be seen at Digiverstas.

The laser cutter is not meant to, for example, grind plywood, or do other work that produces significant smoke. The library's laser cutter is not intended for so-called woodworking-like use.

Contact digitalkkari if you think the work justifiably requires the momentary use of powerful settings. More about the settings on page 21.

OULU KAUPUNGINKIRJASTO

Loading the material into the machine

The plywood sheet is placed on the surface inside the laser cutter in the upper left corner. The starting point of the device is in the upper left corner. The device engraves/cuts exactly where the images are placed in the CorelDRAW file. Take this into account especially when you want to use a plywood board that is has already been cut. Also note that the board cannot be reused at a later date.

The dimensions of the base are 458 mm x 305 mm, but the dimensions of the plywood board to be cut are 405 mm x 305 mm. It is also recommended to use a margin of 0.5 cm when placing images in CorelDRAW.
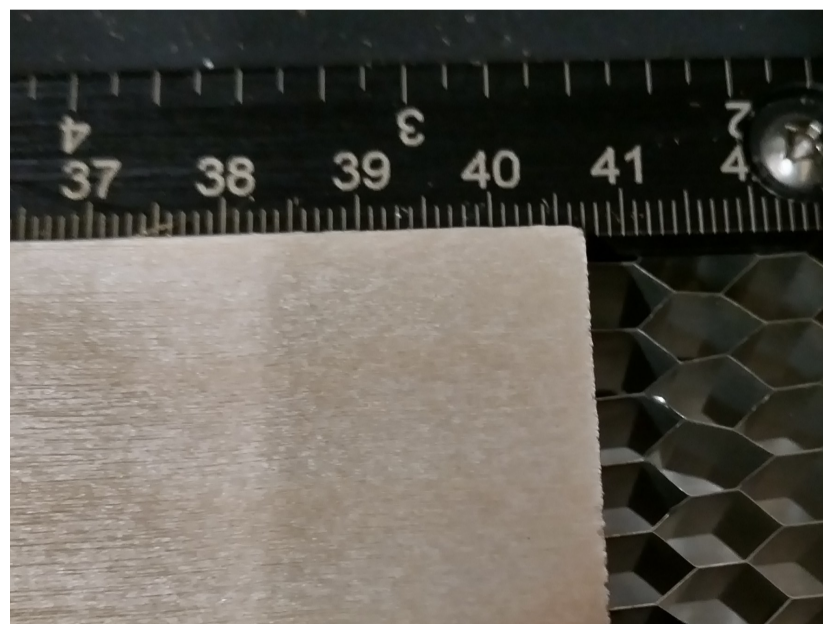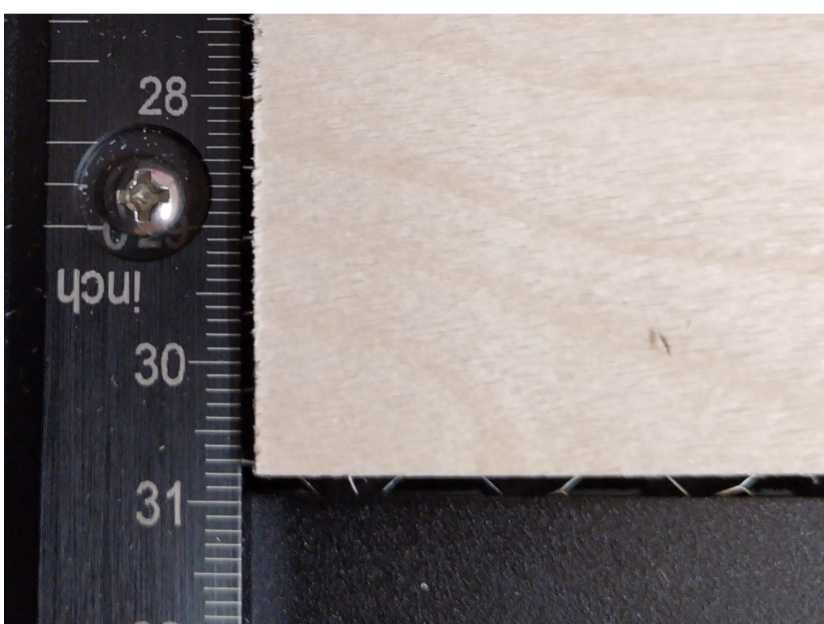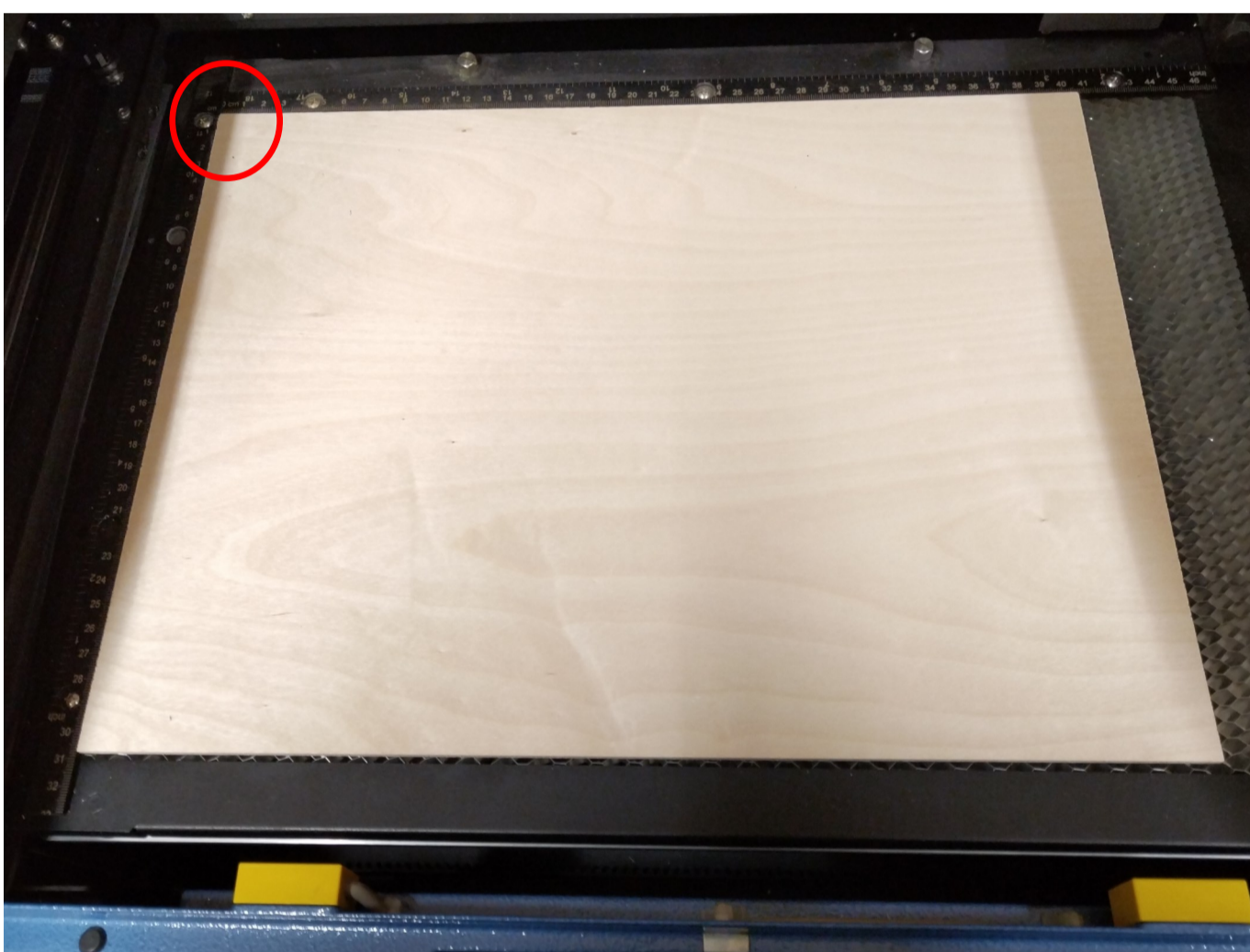
Image preparation

The **CorelDRAW** program can be found on the **desktop** of the computer connected to the laser cutter.

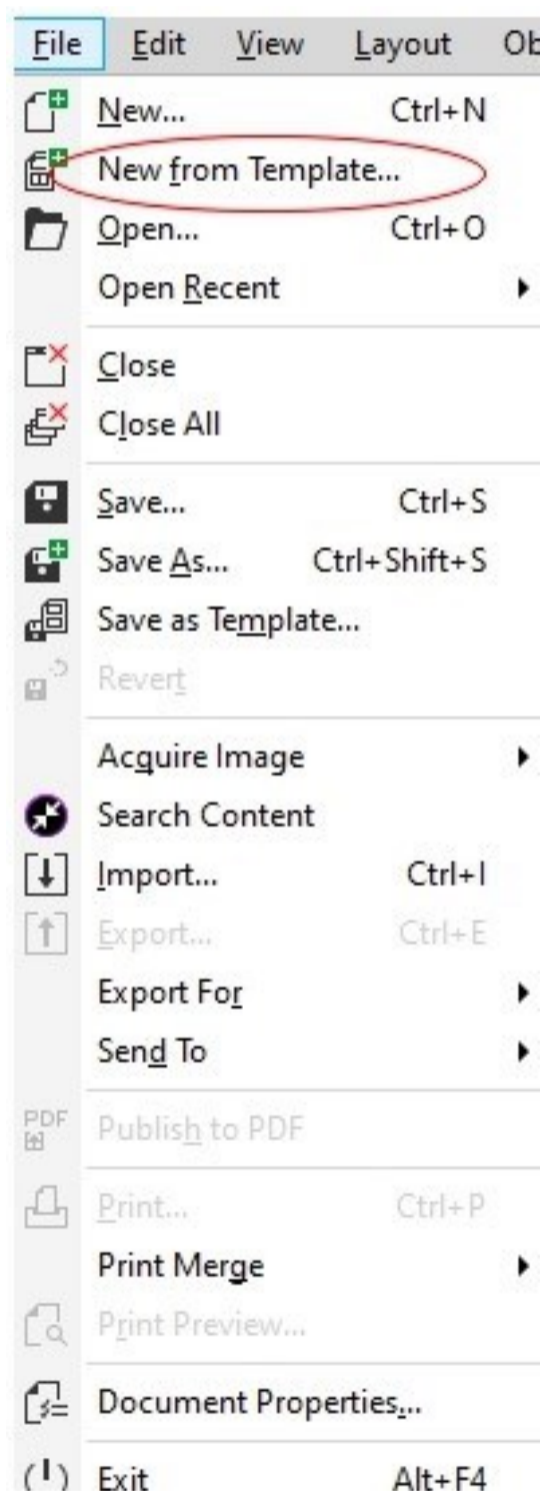Create a new file in the upper left corner by selecting

File > New from Template

Image preparation

New From Template – in the menu select **My Templates**

After that, select and open the file **Laserleikkuri.cdt**. The length of the plywood on the x-axis is marked on the opening base with a guide line.
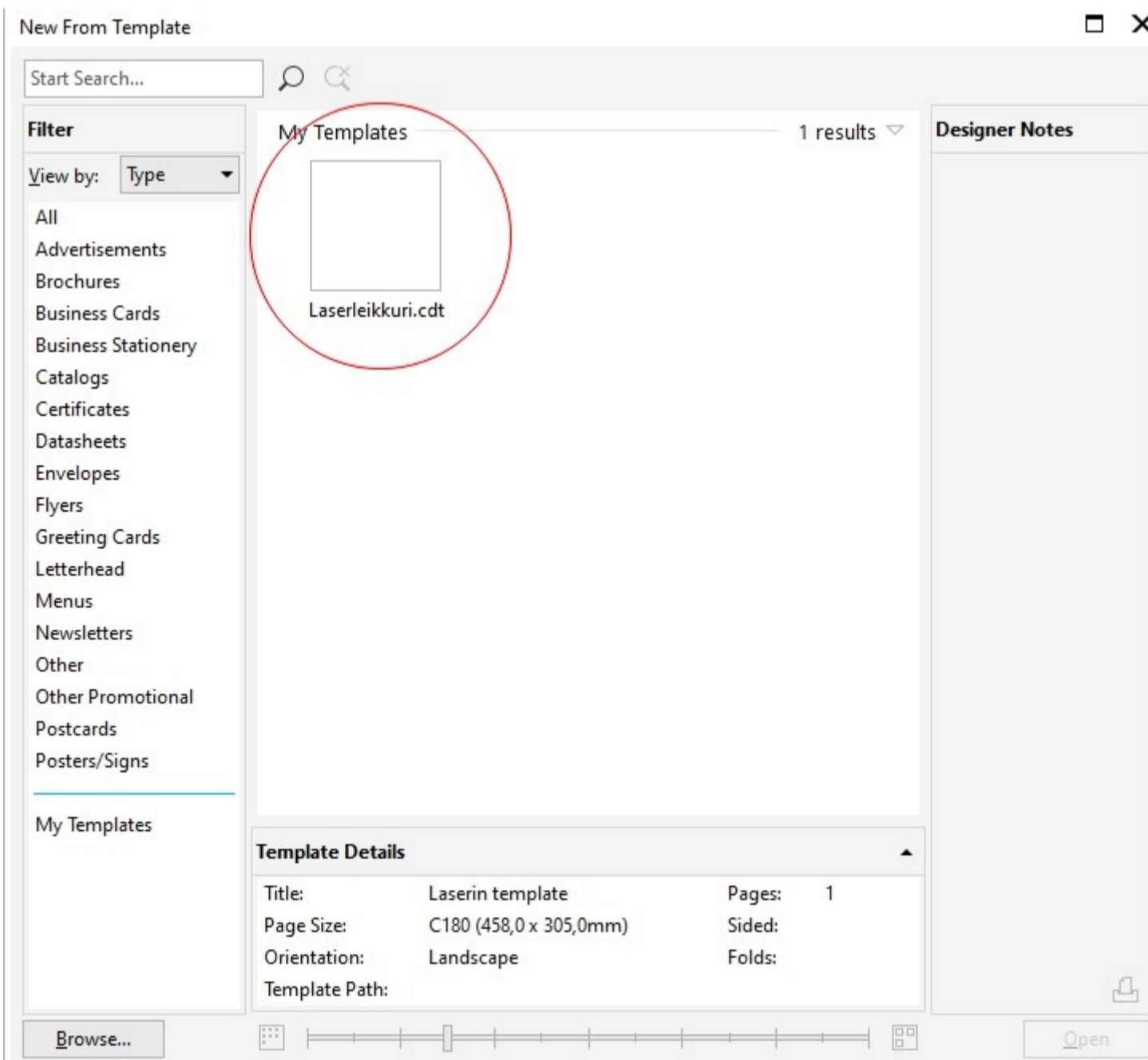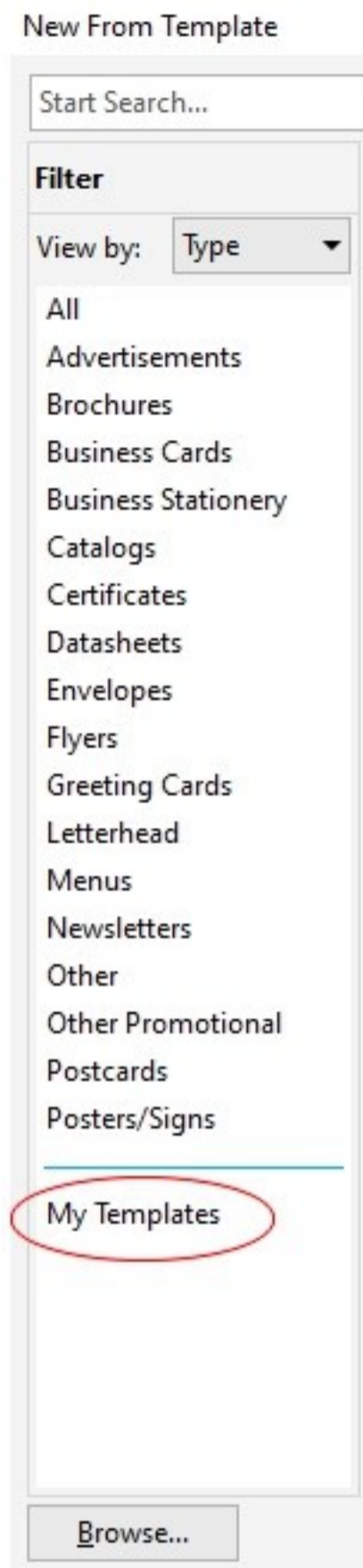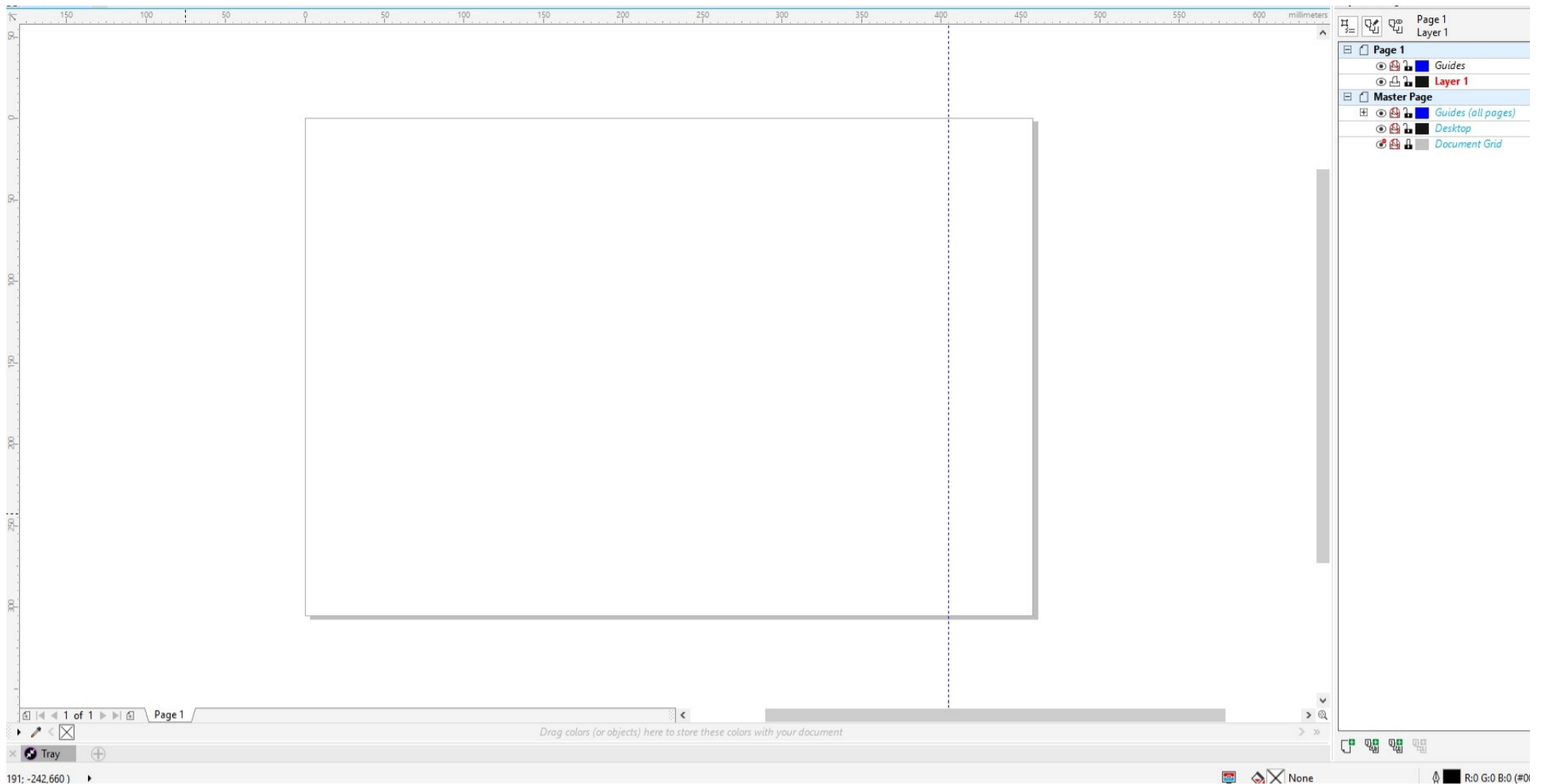
Image preparation

When the new file has opened, import the image file to be processed into the program. This is done by choosing **File > Import**. Get the file from your computer and click on the drawing area where you want to place the image.

The image size is displayed in the upper left corner of **CorelDRAW** and you can change it if necessary. However, you should only edit the size of the image after possible vectoring.
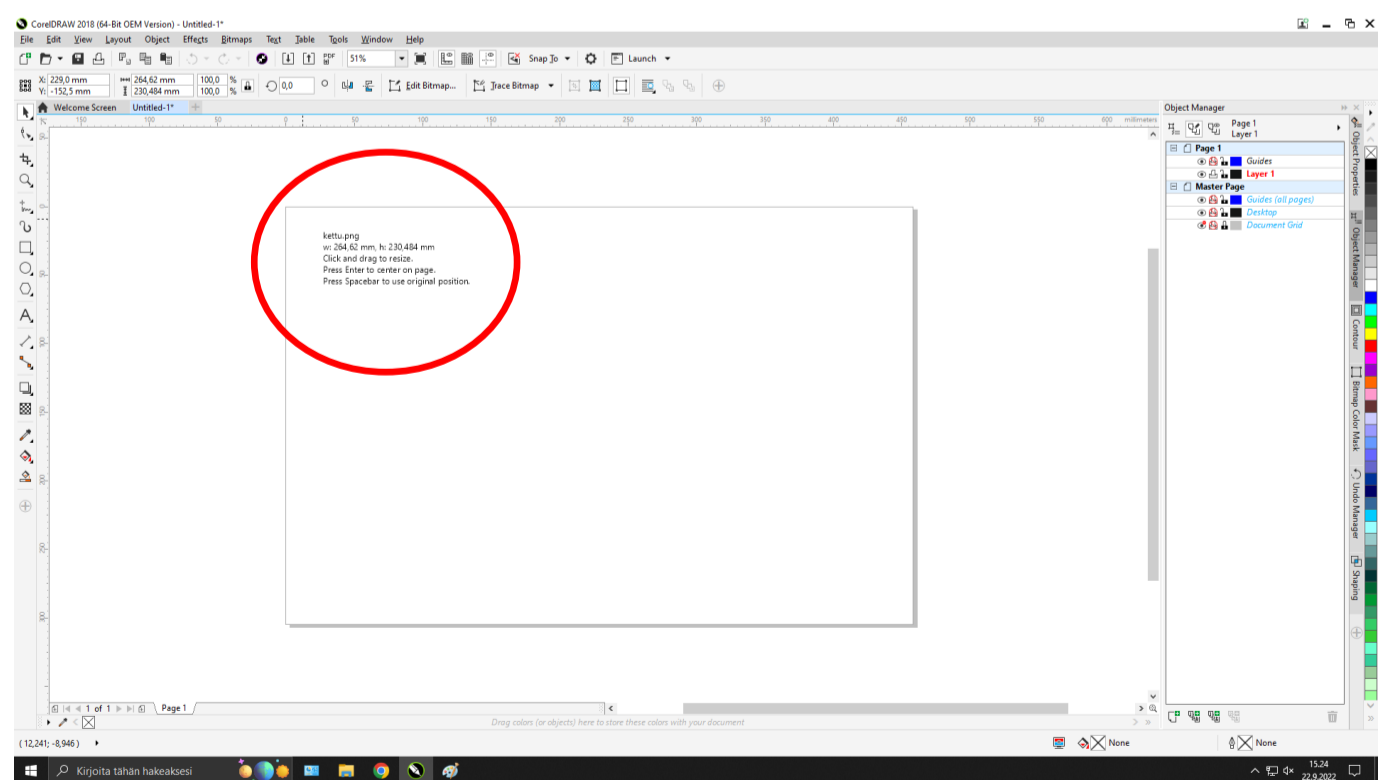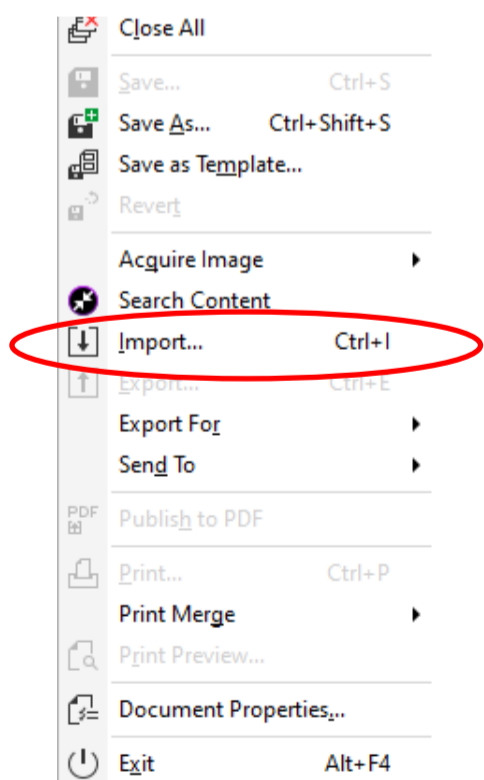
Image preparation

Graphics typically need to be converted to vector format in order to work with a laser cutter.

If the image is not vectorized, the quality of the engraving will suffer and the end result may be poor or unsuccessful.

The image must be changed to grayscale. Change the image to grayscale by first selecting the image as active and then
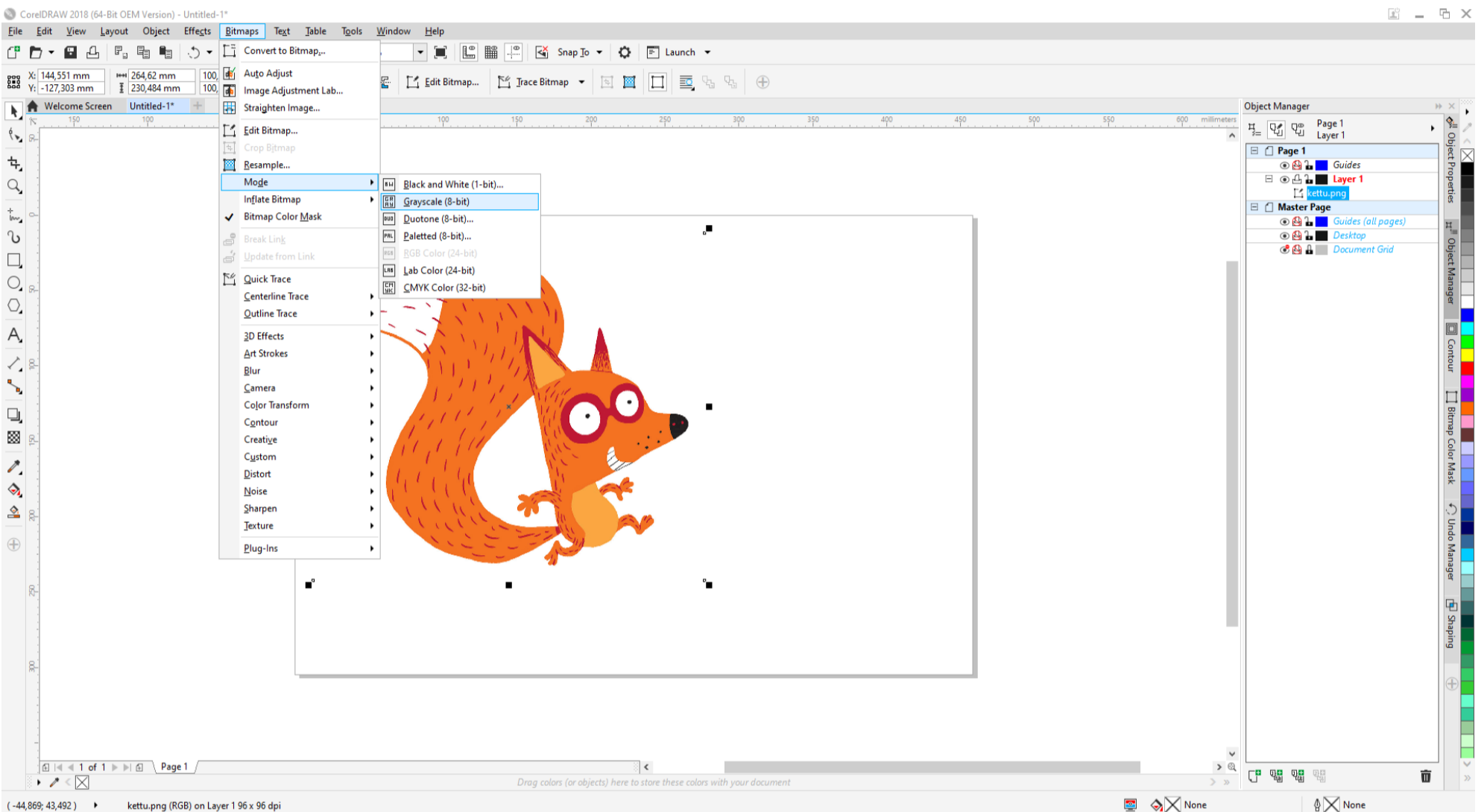**Bitmaps > Mode > Grayscale**.
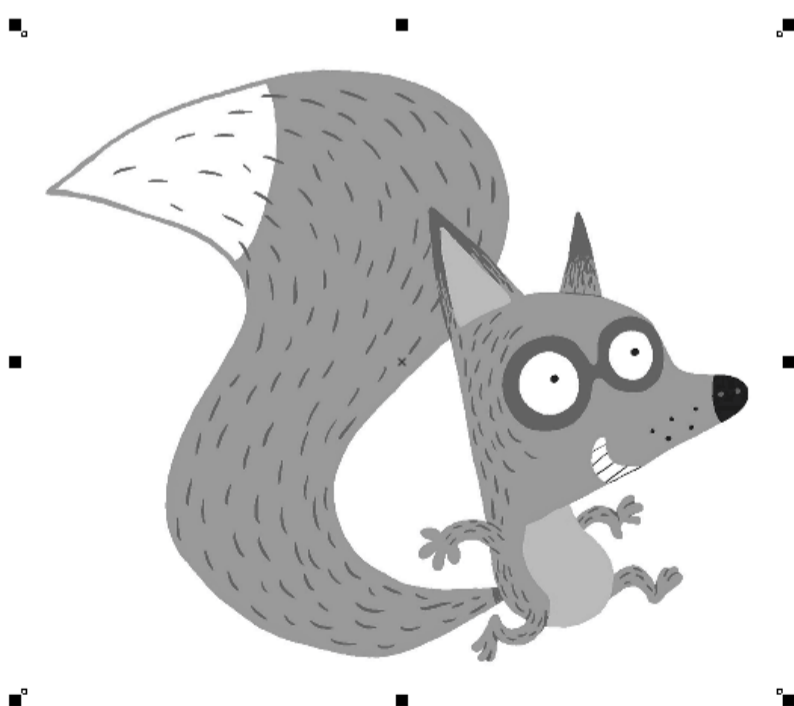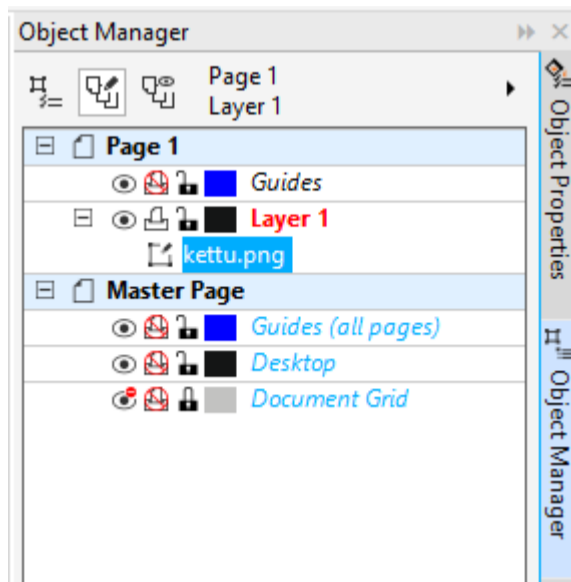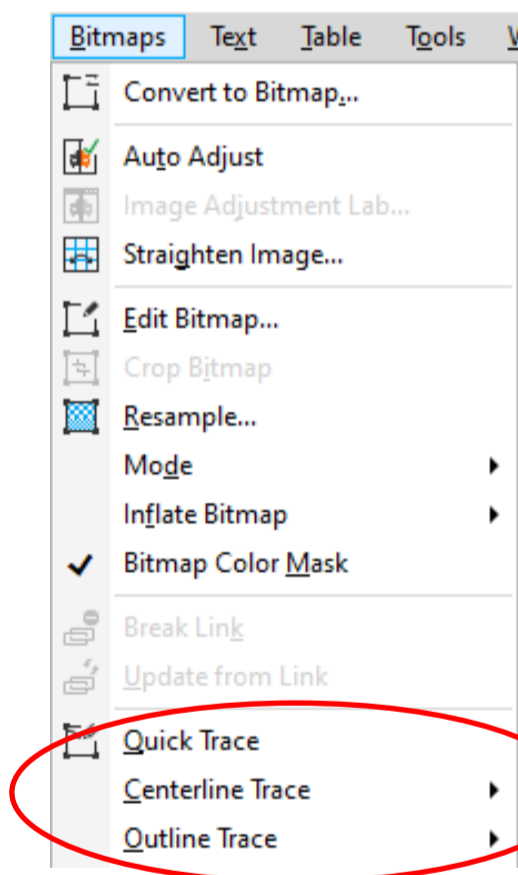

Image in Greyscale mode

Image preparation

After this, the image can be vectorized. Select the image as active either from the drawing area or from the **Object Manager** section on the right.


After that, select the **Bitmaps drop-down menu** and select the appropriate **Trace option** for your purpose.

There are many options and their use depends on the type of image. For example, **Outline Trace > Logo** is suitable for vectorizing logos.

Image preparation

Choose **Centerline Trace** or **Outline Trace** from the menu and CorelDRAW will open the **Powertrace window**. In the **Powertrace window**, you can change the image settings to suit. For example, the background of the image can be removed with **Remove background**
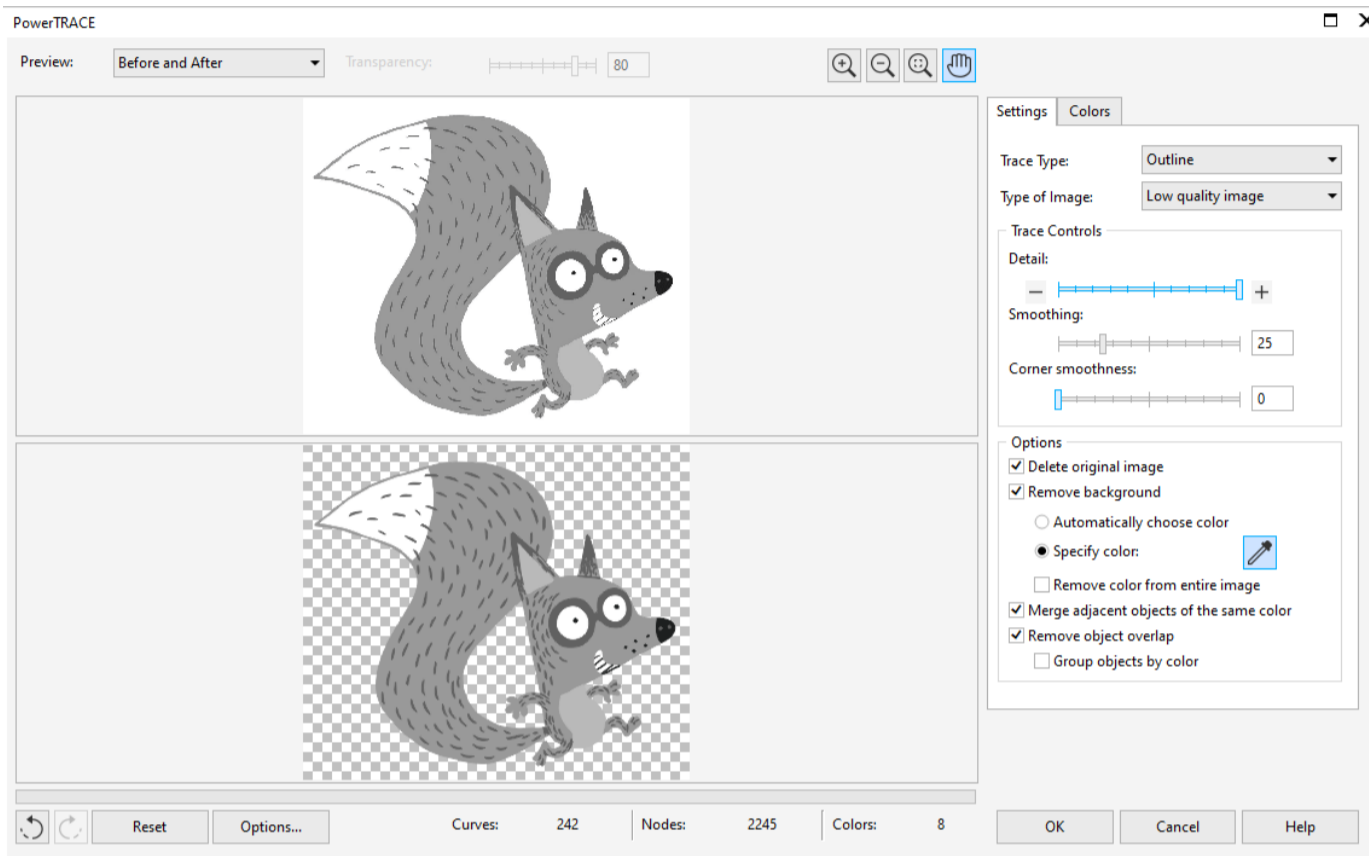
On the **Colors** tab of the **Powertrace** window, you can change the color tones and to combine them.
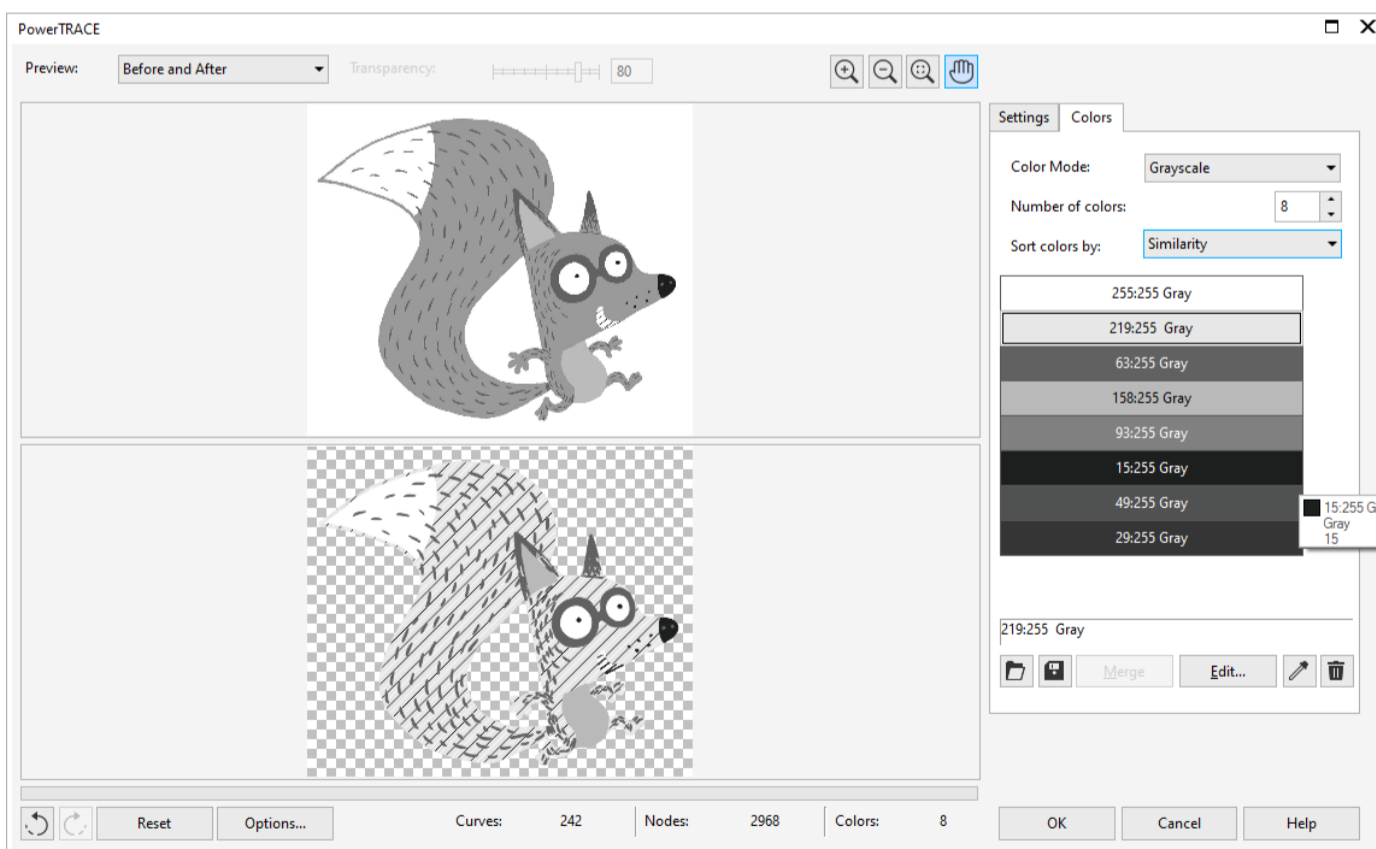
Image cropping: Rectangle tool

The operating principle of the laser cutter is that **all gray shades in the image are engraved and the red color is cut.** The boundaries of the image to be cut must therefore be defined and their color changed to red.

The image to be cut can be cropped in many different ways. This instruction goes through a simple shape drawn with the **Rectangle** tool and the **Boundary** tool that makes the outer boundaries of the vector shape. First select the right drawing plane before making the rectangle.

The selected level is show in red

The **rectangle tool** icon can be found on the left side of the toolbar or by pressing **F6**.

When the shape is drawn, its color must be changed to red. This can be done through the **Outline pen** window in the lower right corner.
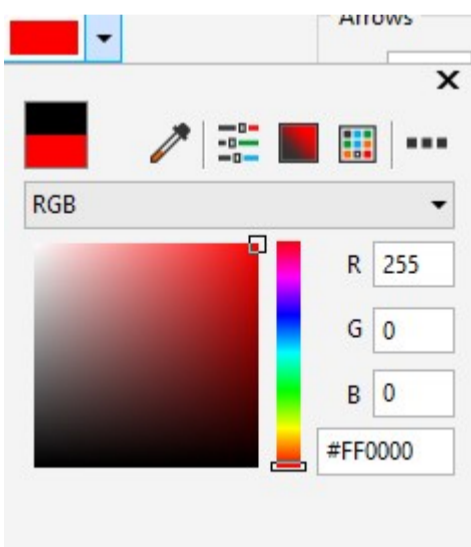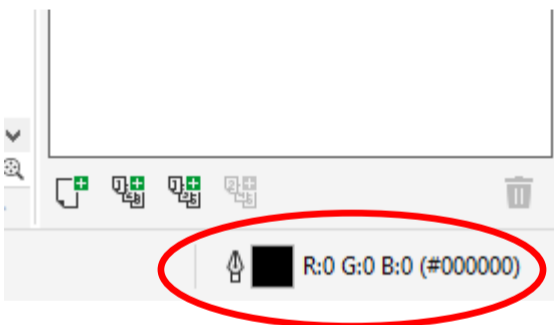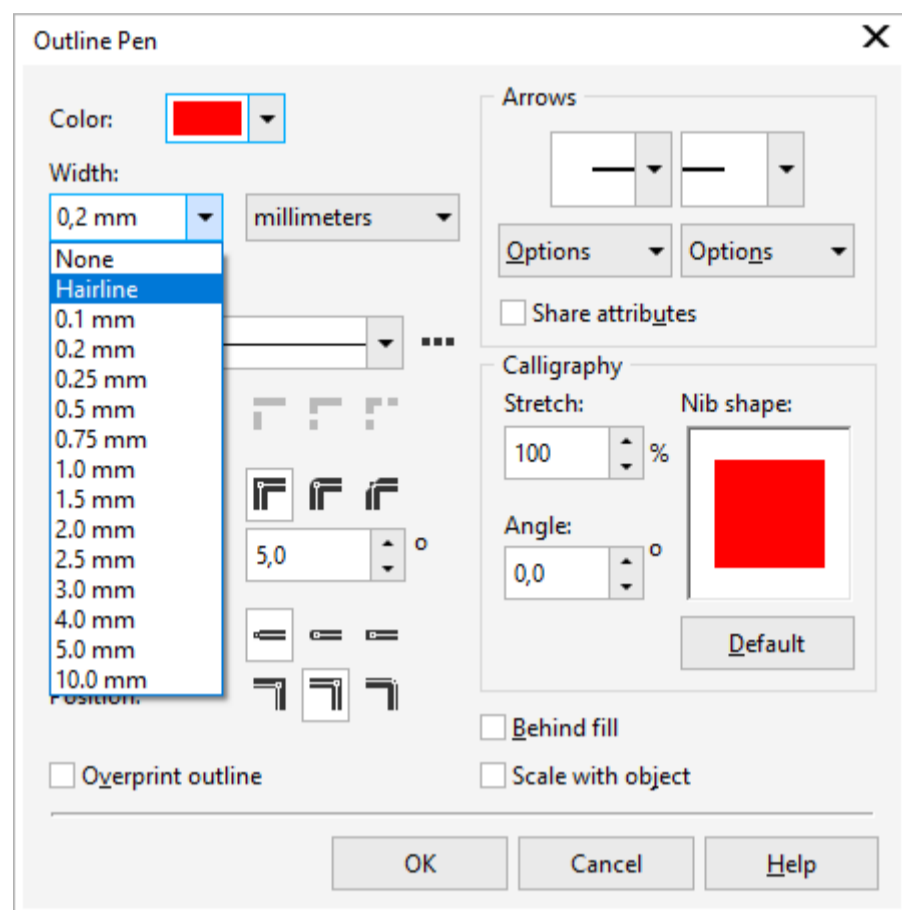
Image cropping: Rectangle tool

In the **Outline Pen** window, change the width of the line to the **Hairline** option.

A rectangle with a red color and a line width of **Hairline** is now visible around the image.
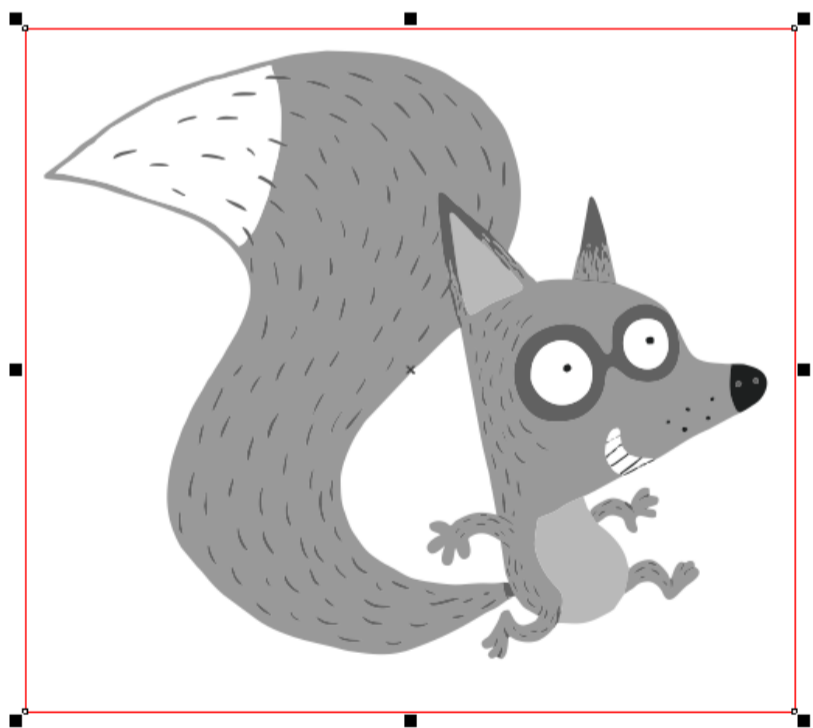
Image cropping: Boundary tool

The **Boundary tool** is used to define the contours of the image.

Select the correct layer and image as active and after
Object > Shaping > Boundary.
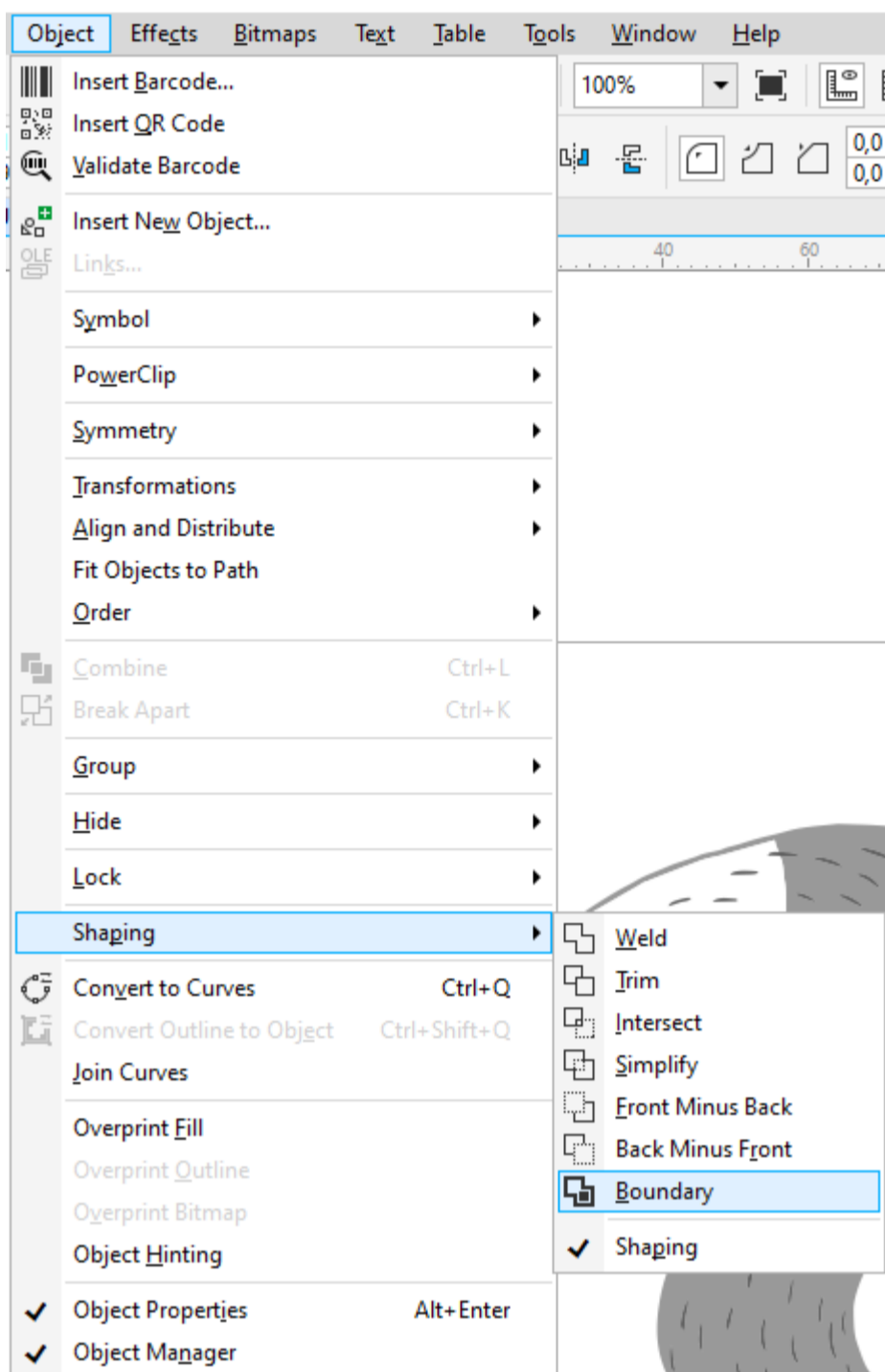
Next, change the color of the newly created outline to red and set the line width to

Hairline.

The outline can be found on the right in the **Object Manager**

section.

To change to colour and width of the border use the **Outline pen window**, which can be found in the lower right corner

Image cropping: Boundary tool

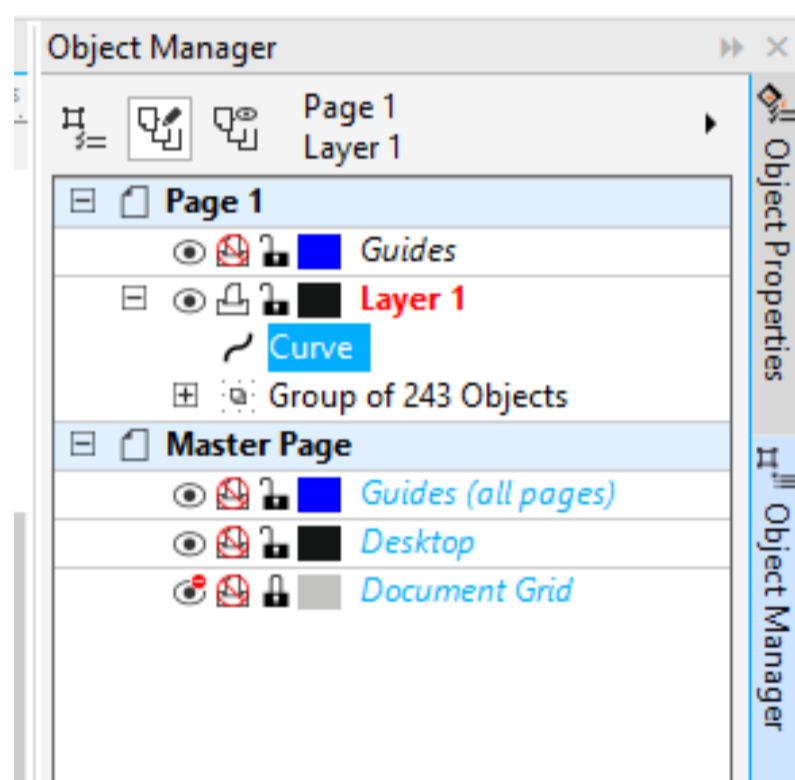Depending on the shape of the image, the outlines should now appear in red. The outlines can be further defined by selecting different sections of the image through the **Object Manager**.
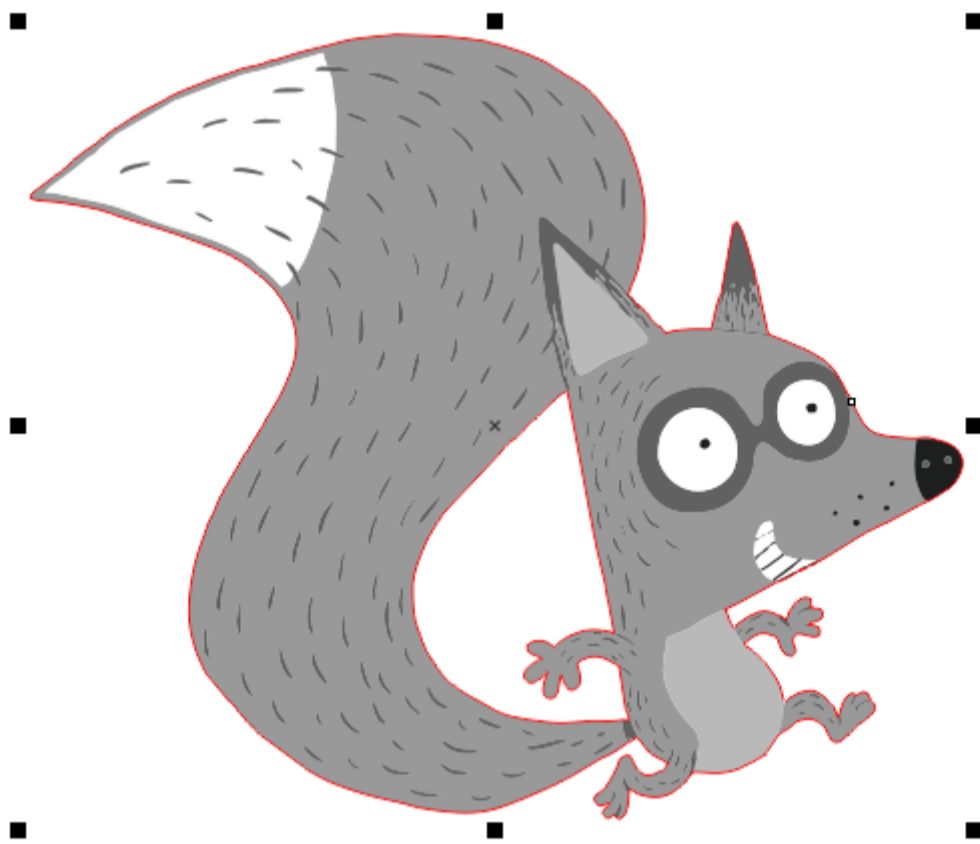
A vectorized image and its outlines can be moved, scaled or copied quickly by selecting all the sections that belong to it in the **Object Manager view**.

Making assembling objects

If the image to be cut is, for example, a plywood object to be assembled, certain things must be taken into account in the preparation.
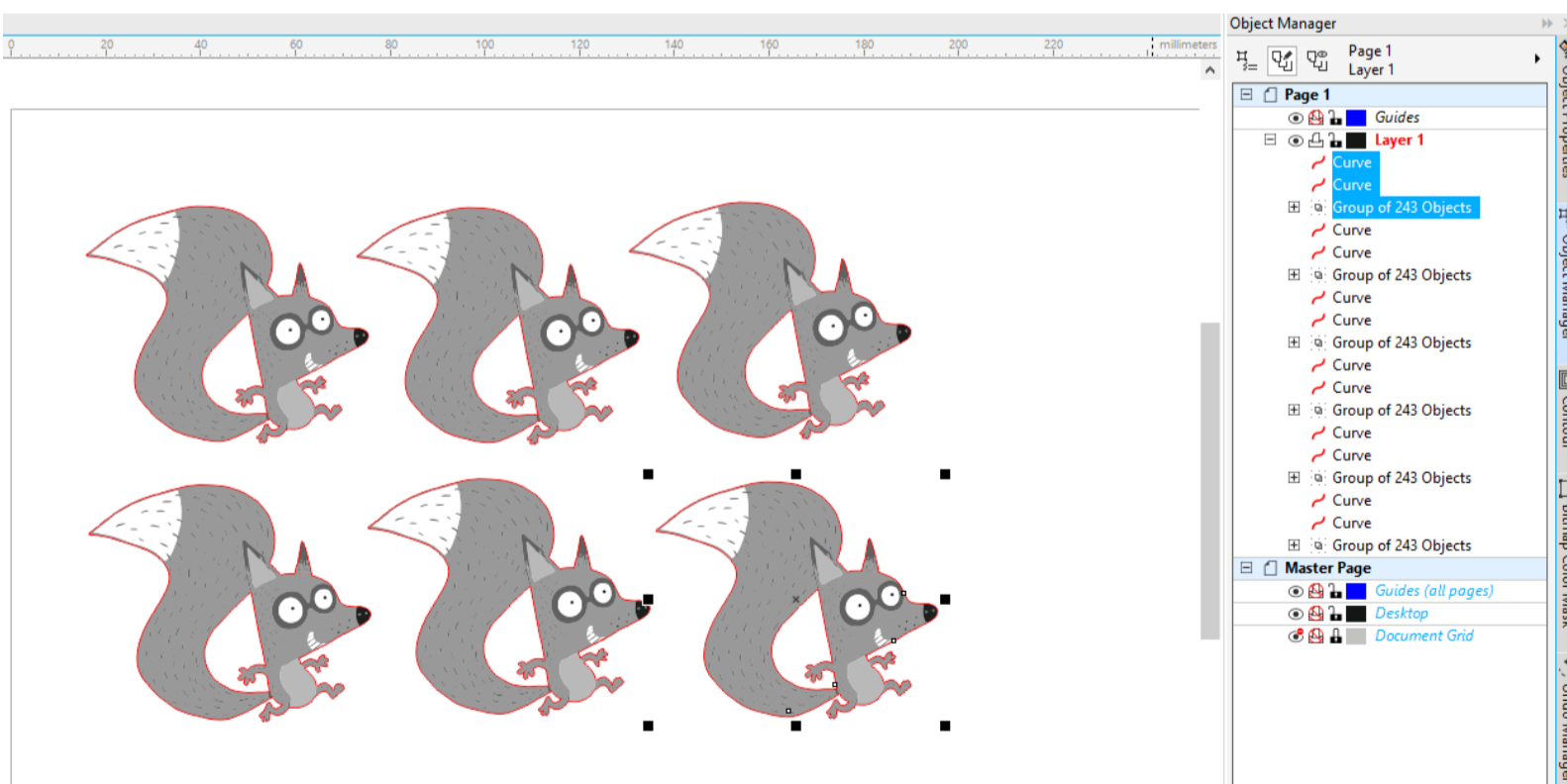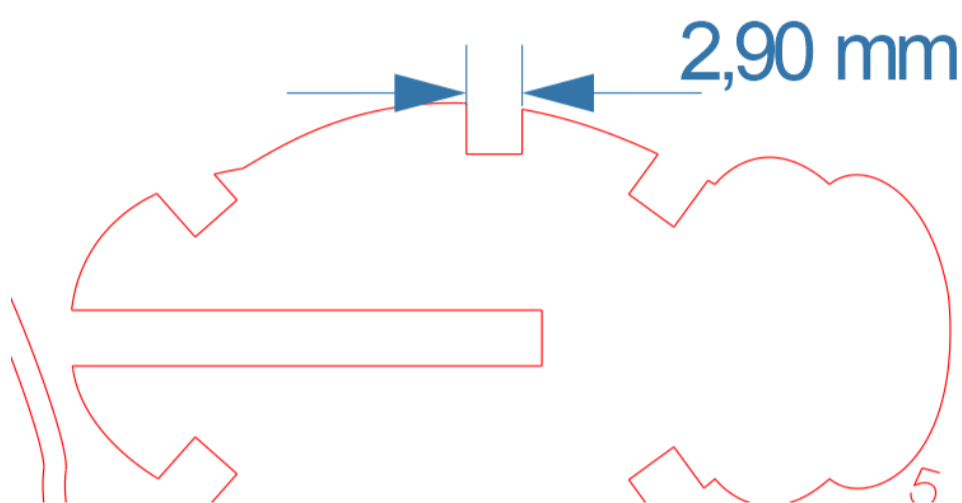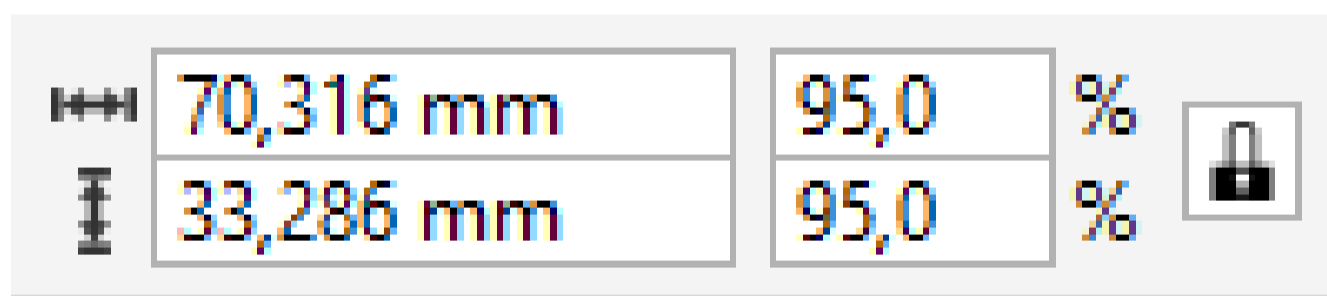
The model must be designed for 3 mm plywood. The piece must be modified or scaled so that the dimensions of the joints are less than 3 mm. With this, the joints are finished tight.

2,90 mm

The scaling function can be found in the upper left corner

70,316 mm   95,0 %
33,286 mm   95,0 %

The measurement tool can be found on the left side of the toolbar
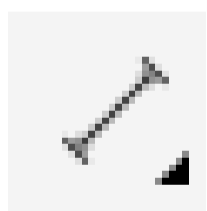
In addition, you must remember to change the points to be cut to red and the width of the line must be **Hairline**. If the object to be made is too big and does not fit on one plywood sheet, it must be divided into several CorelDRAW files.

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Engrave a raster image

Successfully engraving a raster image requires image processing and adjusting the engraving settings. In addition to this, it should be noted that the image itself with its elements aff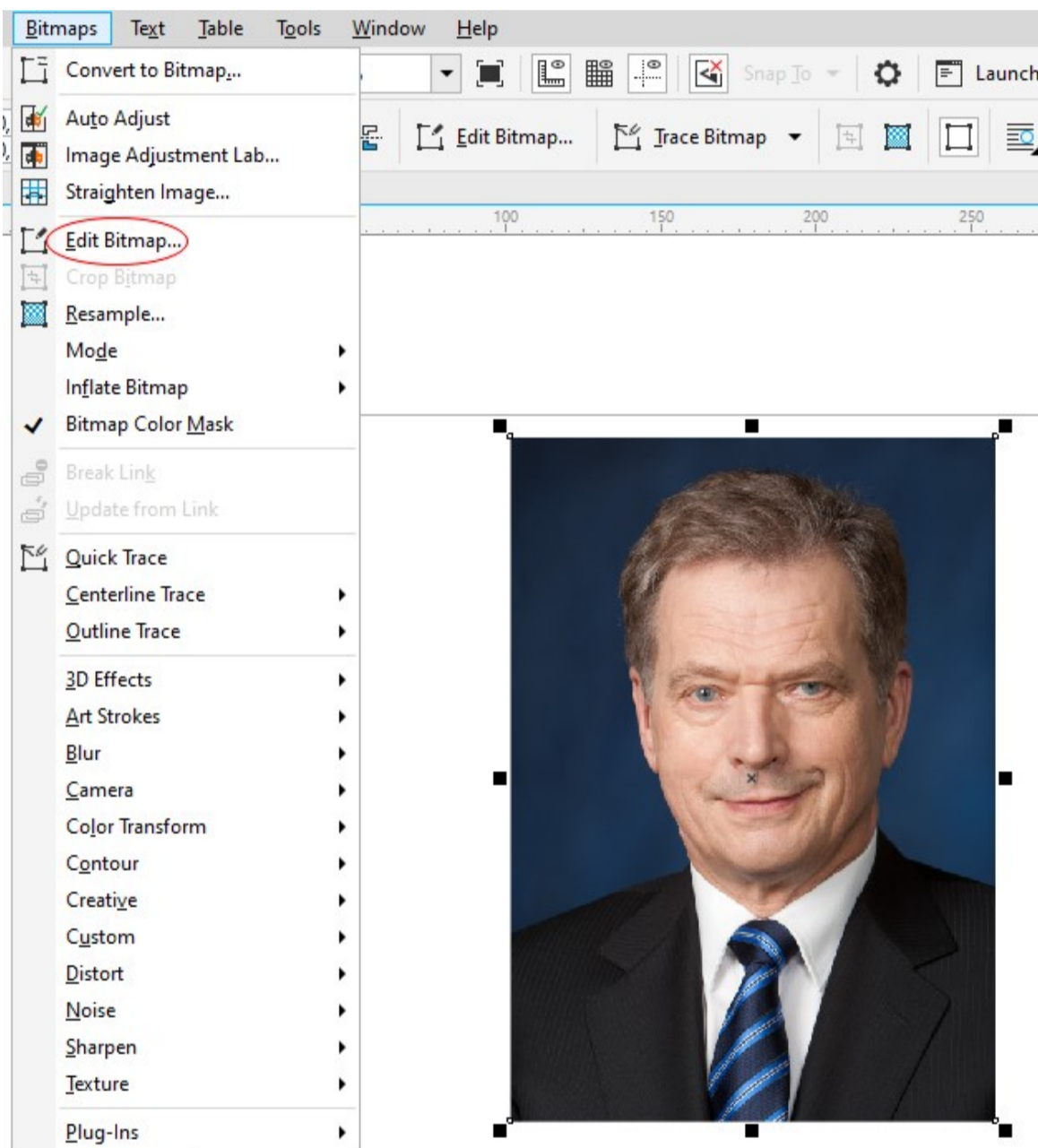ects the final result of the engraving. The chosen image should be of high resolution. A pixelated image can be engraved, but the pixels are also visible in the final result. The instructions provided here are only a general starting point. Each raster work requires its own trial process.
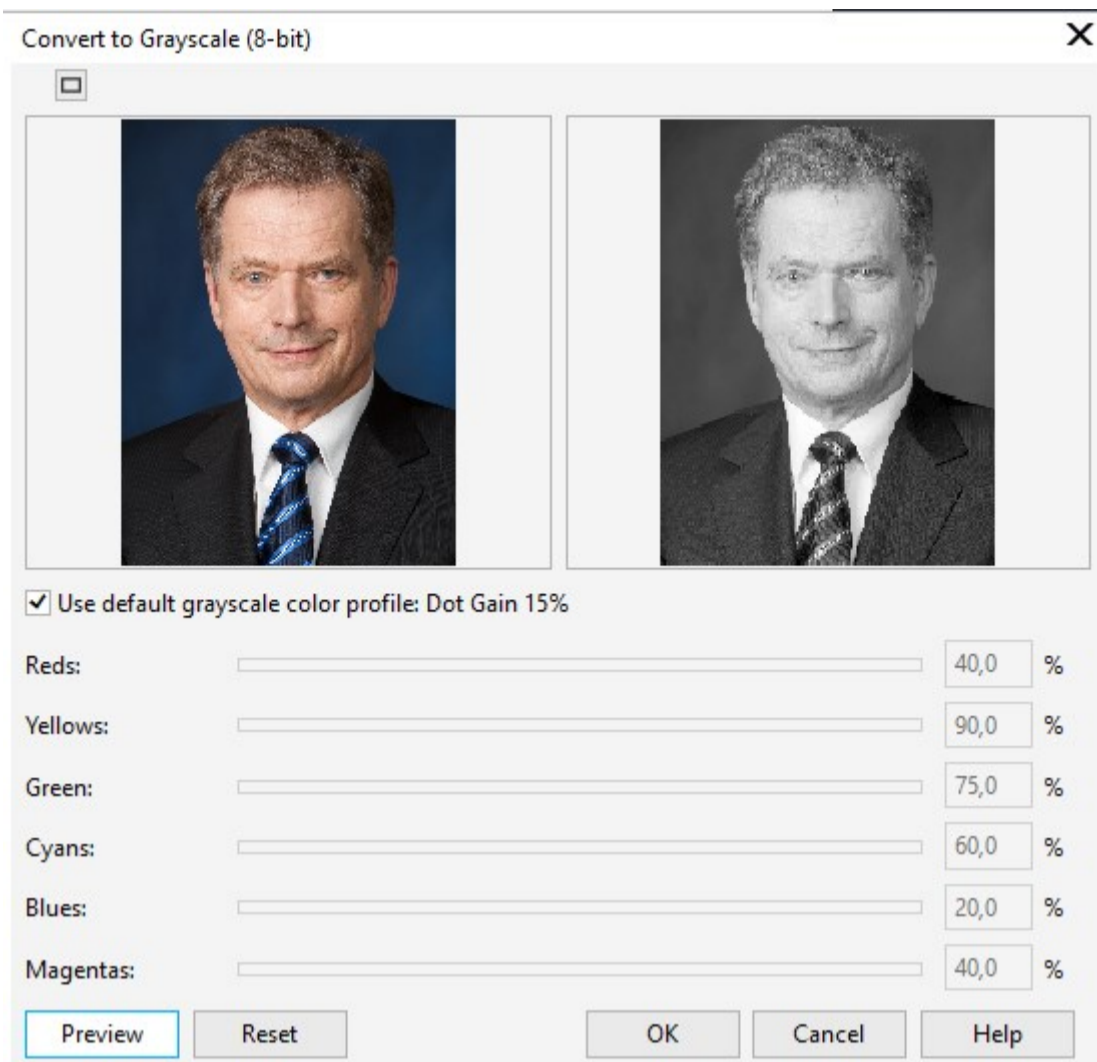

The image imported into the **CorelDRAW** environment can be processed in the **Corel PHOTO-PAINT** program by selecting

Bitmaps > Edit Bitmap from the menu.

After that, the selected image opens in **Corel PHOTO-PAINT**.

In Corel PHOTO-PAINT, the image is prepared by converting it to a grayscale image **Image > Convert to Grayscale (8-bit)**
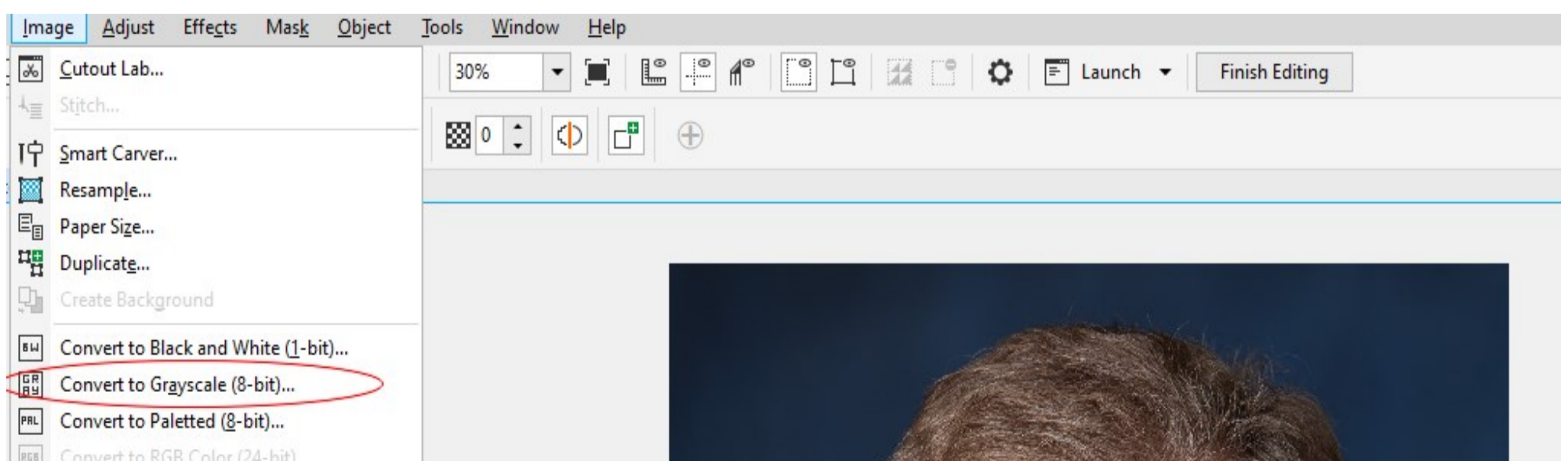
Engrave a raster image

In the conversion window, you can choose the default color conversion, or use the sliders to convert the grayscale value of individual colors.

The shade tells the engraver the intensity of the engraving. Black then corresponds to the strongest effect of the engraving settings, while a completely white tone remains unengraved. When planning the engraving, it is therefore good to think about which parts of the image will be engraved more strongly and which parts will be engraved more weakly. The final output is determined by the engraving settings of the laser cutter.

Corel PHOTO-PAINT's **Eyedropper tool**, i.e. the eyedropper tool, tells you the grayscale value of the individual pixels in the image when you move the tool over the image.

Engrave a raster image
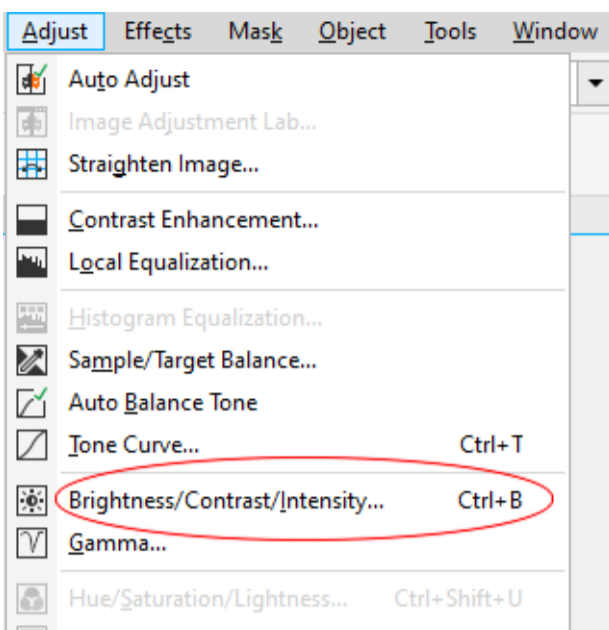
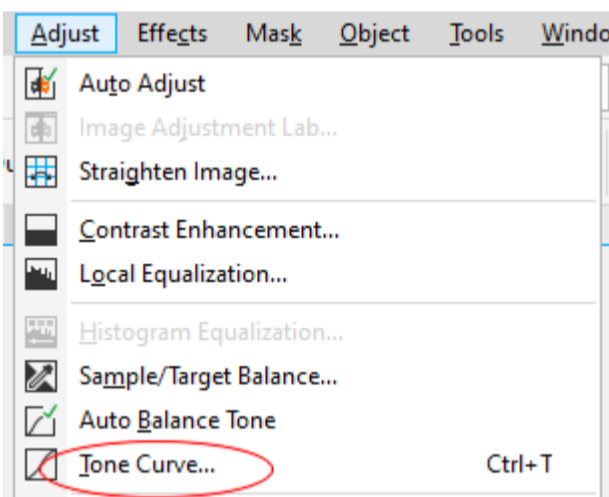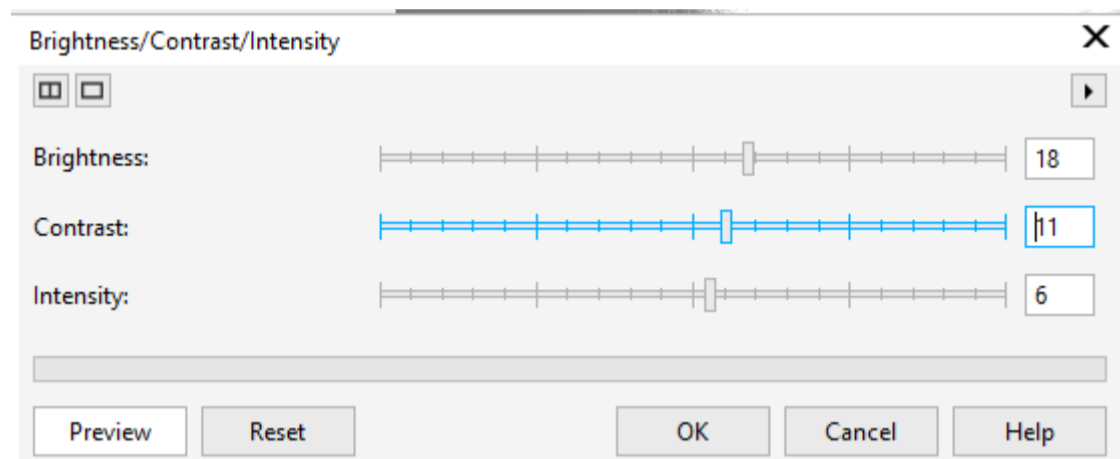You can roughly adjust the brightness and contrast of the image in the brightness window **Adjust > Brightness/Contrast/Intensity**. The intensity control increases or decreases the total amount of brightness and contrast

Shades of gray can be adjusted more subtly

From the **Adjust > Tone Curve** settings.

In the **Tone Curve** window, gray tones are adjusted by placing points in the coordinate grid that describes the tones, which can be used to change the tones of a certain gray tone range in a darker or lighter direction.

Tone Curve is useful, for example, if you want to change the light tones of the image to lighter ones, but at the same time you want to keep the dark tones darker in relation to the lighter ones.
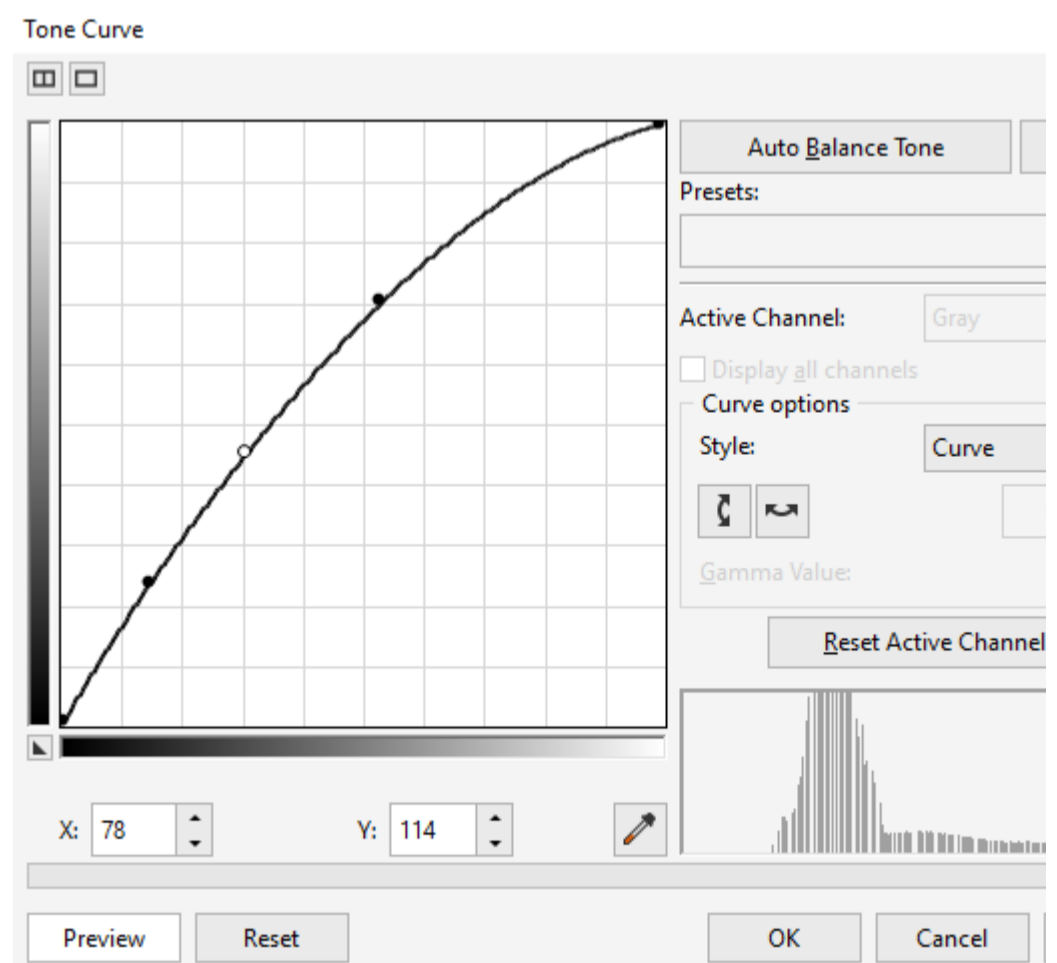
Engrave a raster image

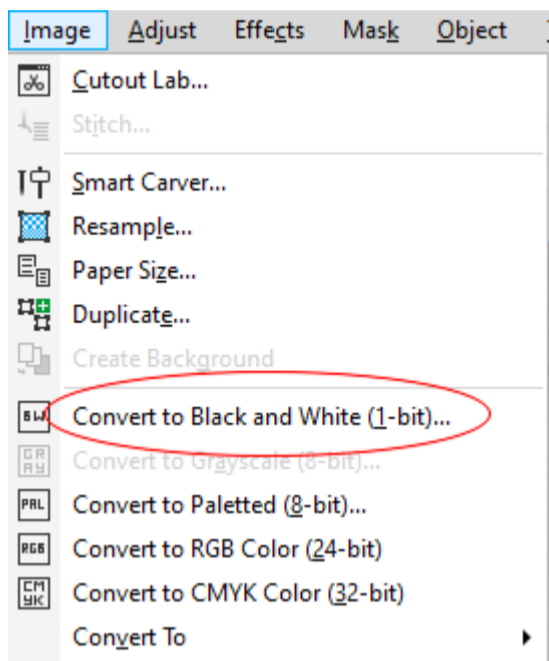The image can be engraved as an 8-bit grayscale image or as a 1-bit image containing only black and white pixels. One black pixel then corresponds to one engraved point on the plywood board. The choice of image bitrate is influenced by the desired end result, as well as the content and size of the image.

In PHOTO-PAINT, the conversion to a 1-bit image takes place from the menu

Image > Convert to Black and White (1-bit).

The conversion algorithm is selected from the conversion settings, which affects how the program interprets color tones as black and white pixels. The Jarvis algorithm in the example is suitable, for example, for converting photos. You can get more information about the algorithms via the **Help button**.
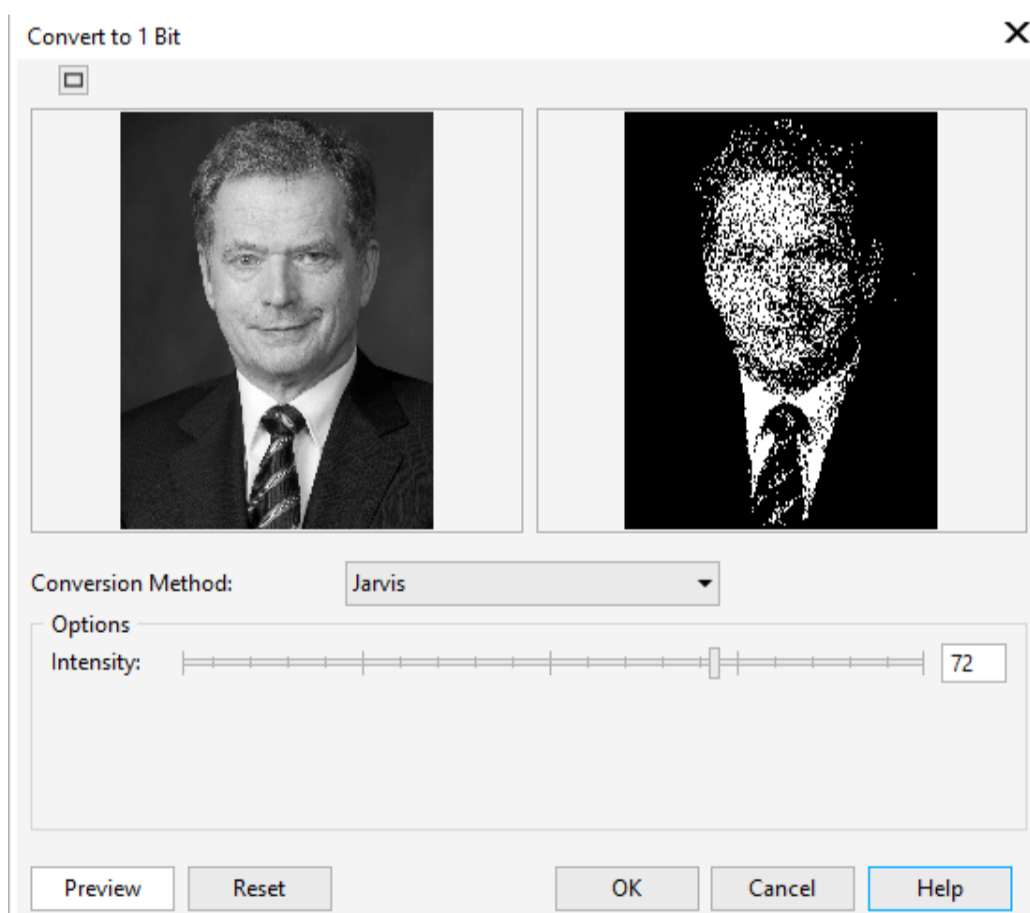
When the processing is complete, the image is saved, so it is updated in the CorelDraw program. When the image is ready to be engraved, let's return to the CorelDraw program.

Print view

After the image has been processed, it must be transferred to the laser cutter. Open the Print View by pressing **Ctrl+P** or by going to **File > Print**
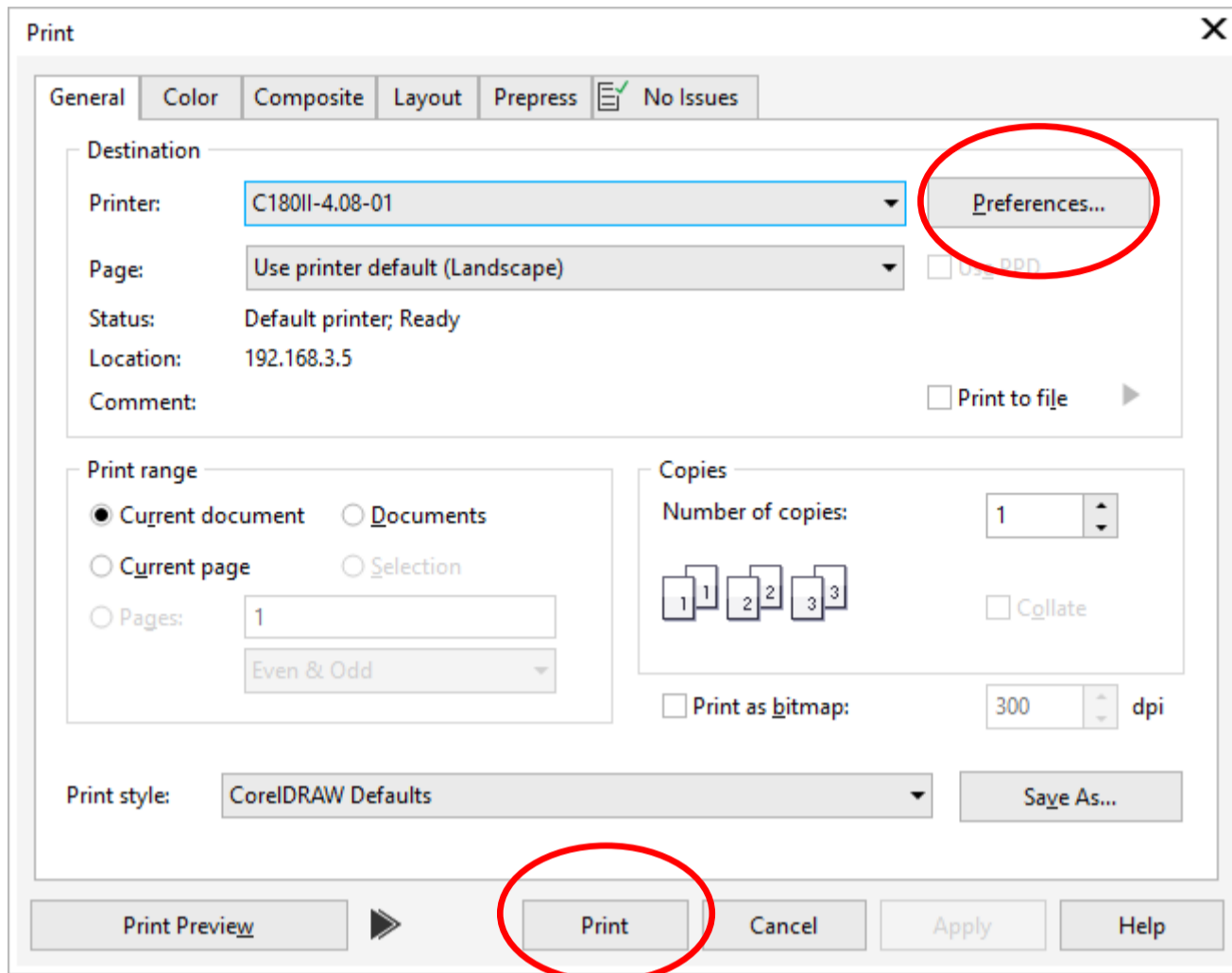
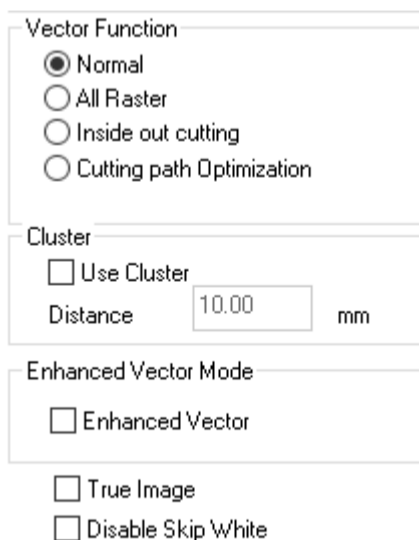In the print view, you can change various settings, such as color settings and cutting order. These settings can be accessed
Preferences > Ominaisuudet –ikkuna/Features window ◻ Advanced–tab

Inside out cutting change the cutting order starting from the middle if there are many areas to be cut in the job

Cutting path Optimization optimizes the time spent cutting, reducing nozzle jumping from section to section.

Once the settings are in order, the image to be worked on is transferred to the cutter. This is done by pressing **Print** in the **Print window.**

The laser cutter must be turned on in order to receive files.

OULU KAUPUNGINKIRJASTO

Print view

The operation of the laser is regulated from the **Pen tab** of the preferences.
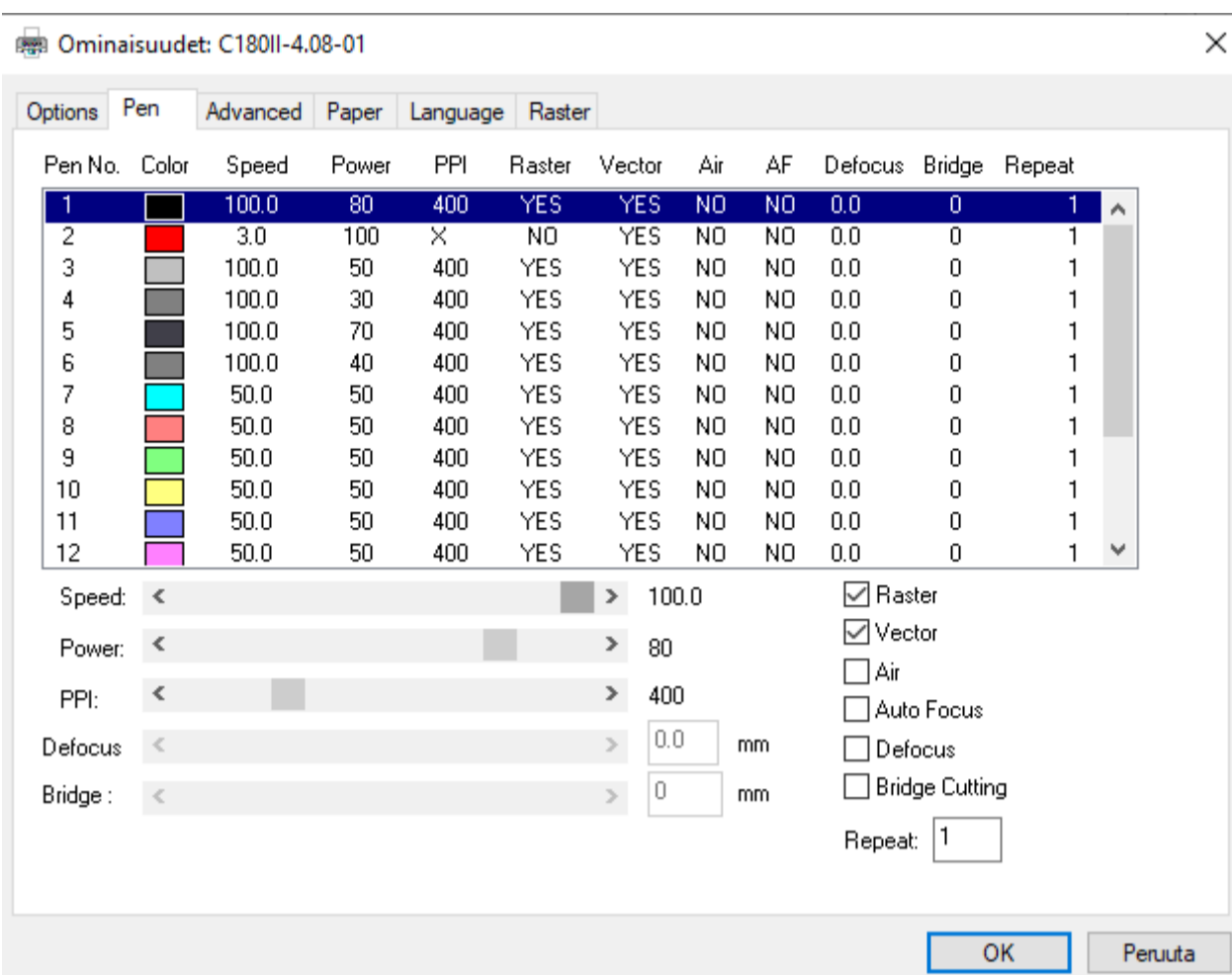
Speed-the controller sets the maximum allowed speed of the engraver's movement. The speed is also affected by, for example, the complexity of the engraved pattern. The laser cutter reaches 100% speed when cutting mostly straight lines.

**Power**-the control affects the strength of the engraving. The depth of the engraving is determined in the settings by the combined effect of strength and speed. A slower speed and higher power will produce a deeper engraving, while a higher speed and lower power will produce a shallower finish.

ATTENTION: The use of strongly smoking settings (speed 20 or less AND power 70 or more) is prohibited, unless specifically stated.

**Raster**-tab defines how the laser cutter rasterizes the image before engraving it.

Error Diffusion –the setting allows the user to choose from three different algorithms how the rasterization takes place.

Dithering-the setting allows the user to choose the size of the dot matrix and what kind of pattern the laser uses for engraving.
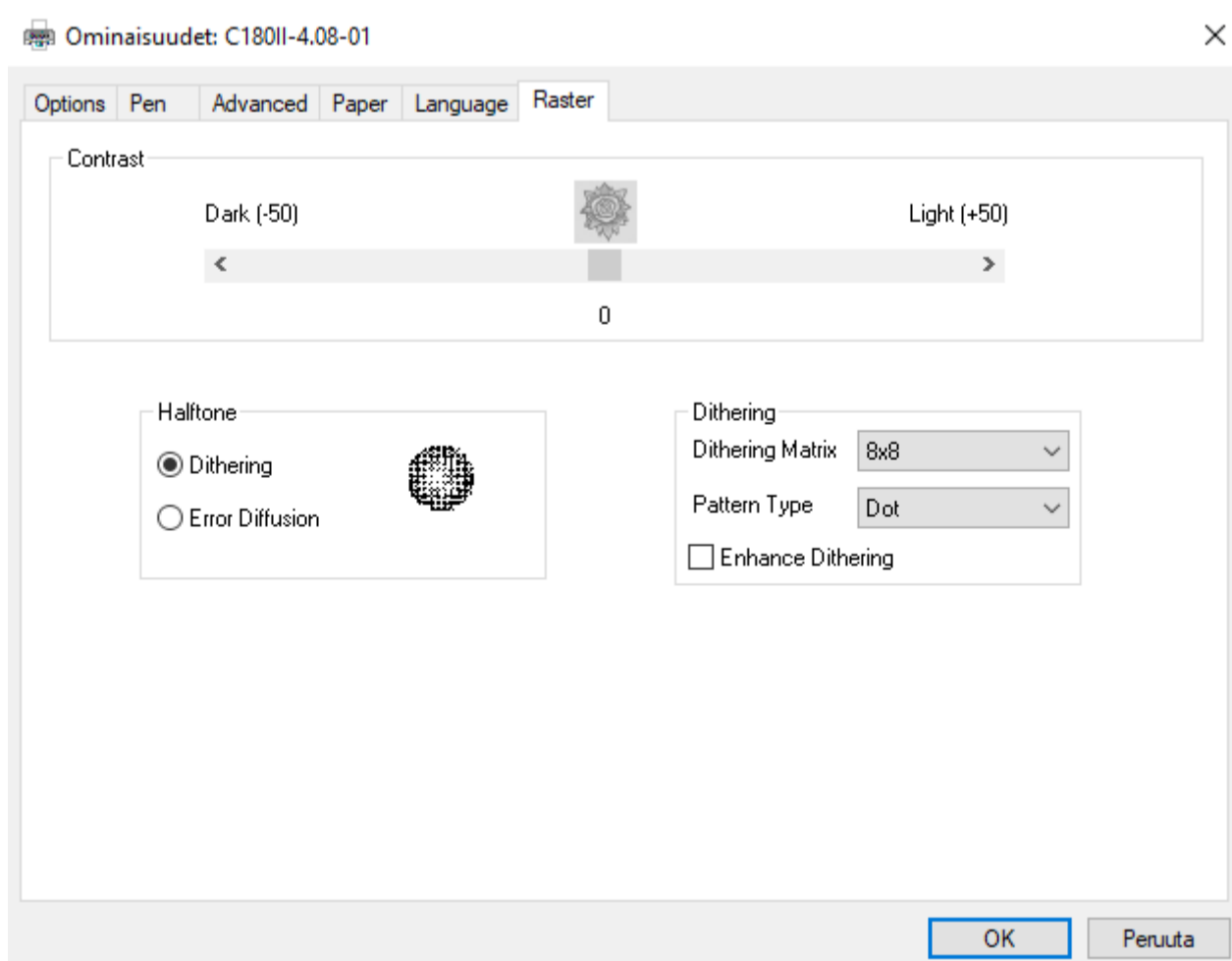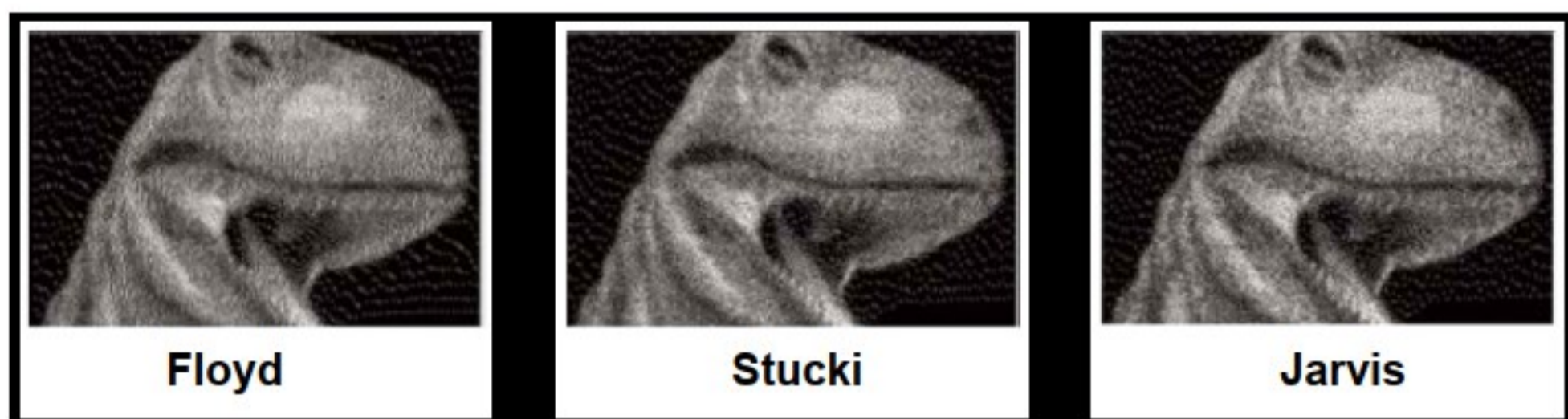
Print view

The picture shows examples of the impression produced by different carving patterns.
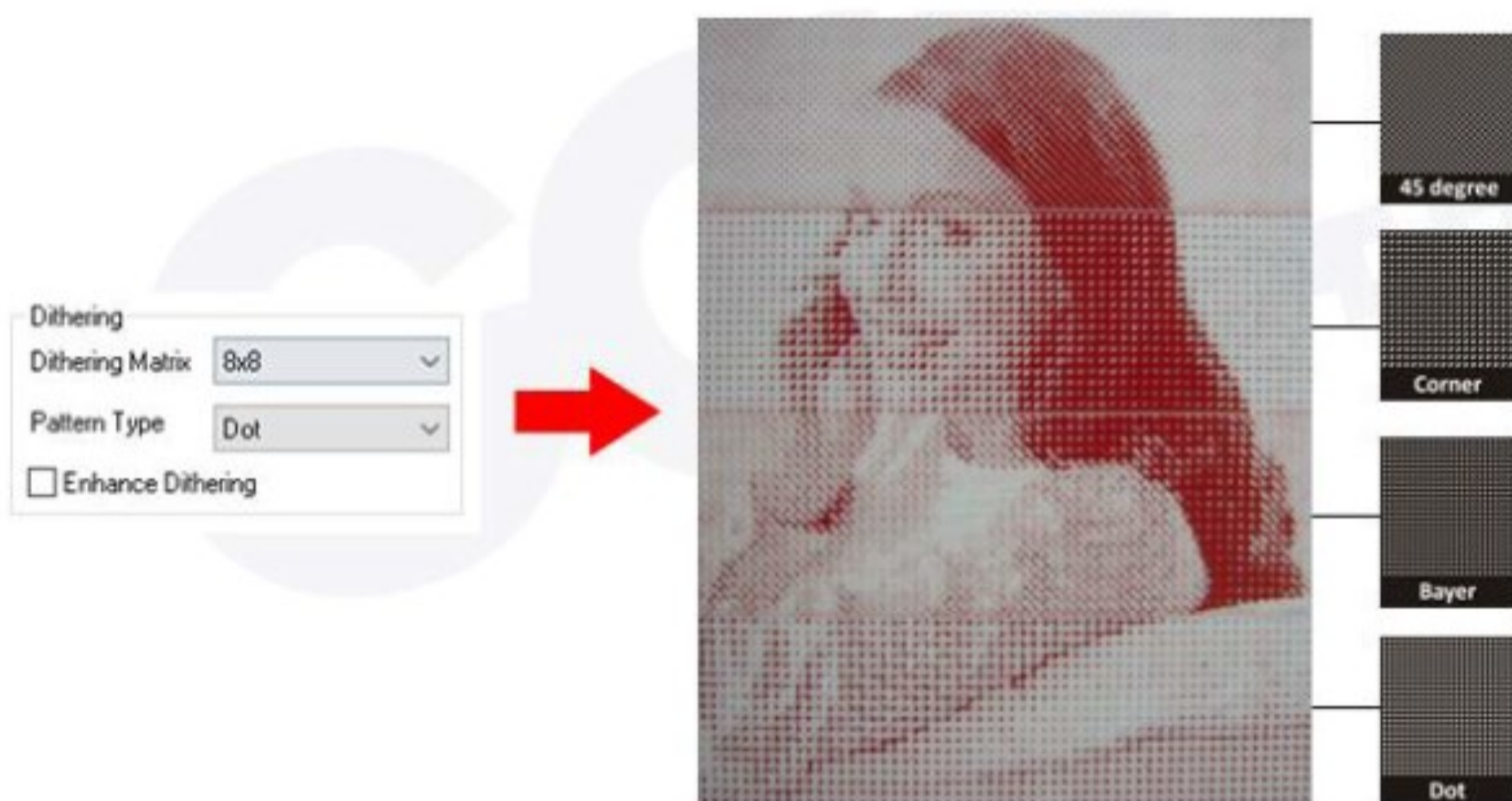
Below are examples of traces produced by different rasterization algorithms.

Print view

Examples of the effects of different engraving settings.

Settings for the left image: **speed 60, power 35, error diffusion, algorithm: stucki.**

Settings in the middle picture: **speed 55, power 30, error diffusion, algorithm: jarvis.**

The settings in the image on the right: **speed 75, power 60, error diffusion, algorithm: jarvis.**

The processing of grayscale also affects the work trace of the examples

In Corel PHOTO-PAINT.

OULU KAUPUNGINKIRJASTO

Laser cutter power switches

The laser cutter consists of three devices, all of which must be switched on: the compressed air compressor, the cutter and the flue gas extractor. Each device has its own power switch (see pictures below).
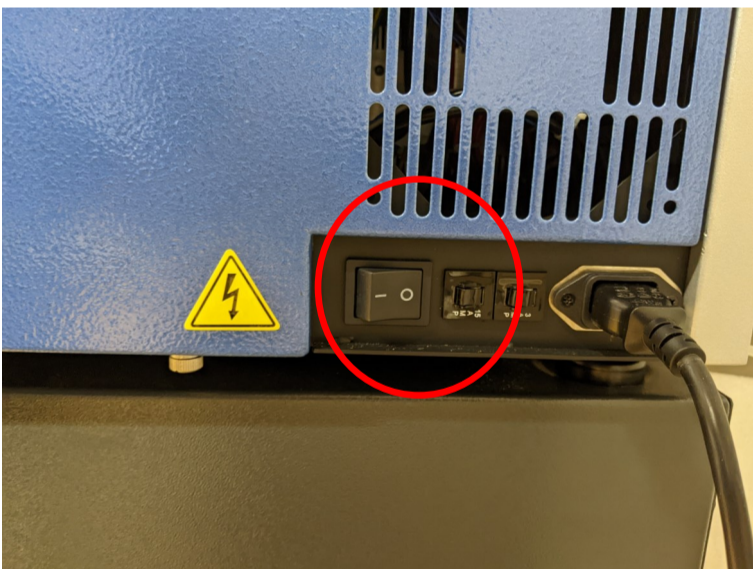
The compressed air compressor is located next to the device. The cutters power switch is located on the right side of the mower. The flue gas

extractor is located below the laser cutter

The device itself does nothing but engrave/cut the files designed on the computer and for this reason you should not start them until you are ready to start engraving/cutting. Most of the work is done on a computer. The device also emits noise that may disturb other customers.
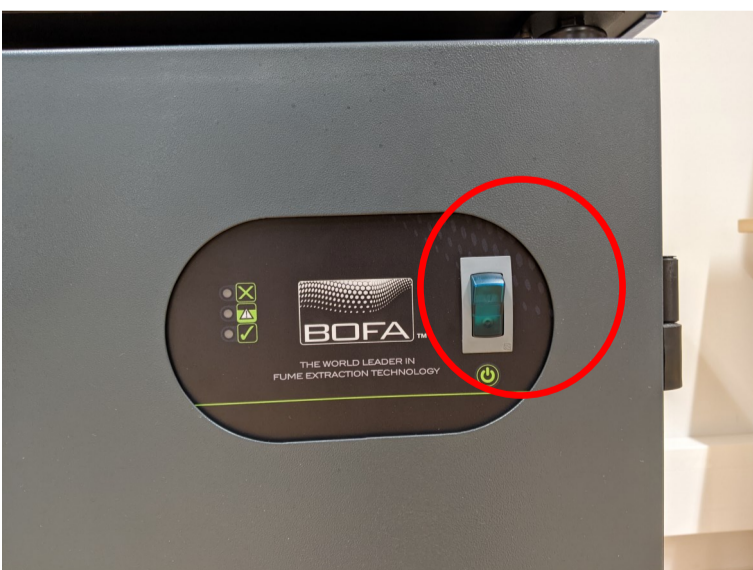

Boot / Operating order

1. Air compressor power switch
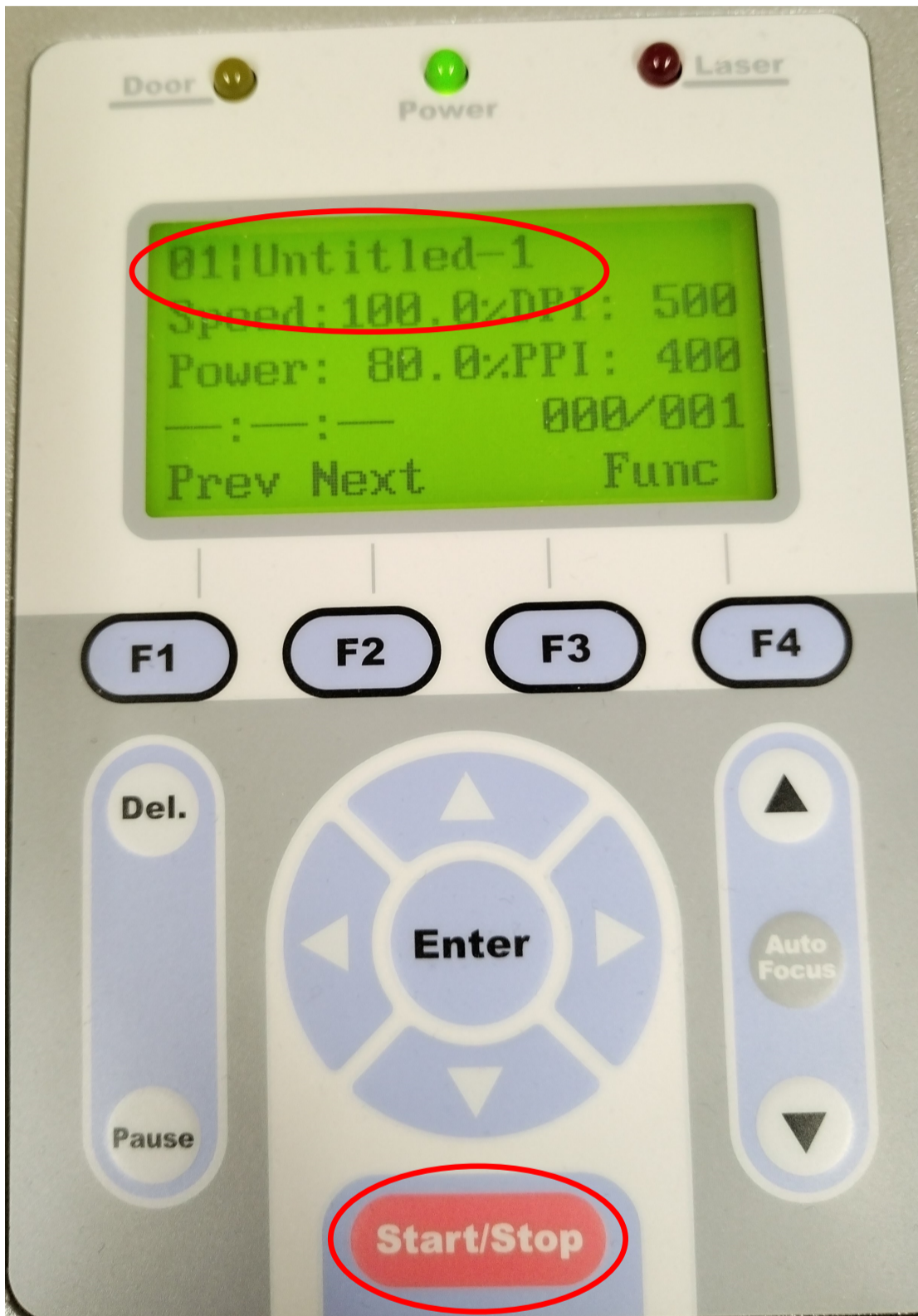

2. Laser cutter power switch

3. Flue gas vacuum switch

Starting the operation

Before starting, make sure that the compressed air compressor and flue gas vacuum are on!

The name of the transferred file is displayed on the cutter screen. The job is started by pressing the red **Start/Stop** button of the machine

NOTE! Do not leave the device unattended even for a moment! Also, avoid looking at the red laser beam.

When the job is done, the laser head of the device moves to the right rear corner and emits a beeping sound. Leave **the exhaust air device on for one more minute after working to make sure that the smoke inside the device has been removed.** After that, you can open the cover of the device and remove the tracks from the disc.