

Handbook for → Engravers



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Tips & Tricks for working with the laser

→ Contents

- 3 Introduction
- 3 What can a laser do?
- 4 Laser sources and available options
 - 4 CO₂ and fiber lasers
 - 4 flexx function
- 5 From concept to finished workpiece
- 6 How does the laser work?
 - 6 Process: Vector interface
 - 6 Process: Raster engraving
- 8 How to create a file for the laser
 - 8 Import Trotec color palette
- 9 Materials**
- 10 Overview of materials for laser processing
- 12 Acrylic and plexiglass®
- 12 Delrin
- 13 Delrin
- 14 Natural rubber
- 16 Wood
- 17 Plastics
- 18 Laminates
- 19 Leather
- 20 Metal
- 21 Paper & cardboard
- 23 Stone
- 24 Textiles

- 26 Other tips and tricks
- 26 Computer hardware
 - 26 Select the correct focus lens
 - 28 Exhaust system
 - 29 The correct throttle setting for your application
 - 30 The Trotec table concept - the right table for every application
- 32 JobControl®
 - 32 Material database
 - 32 Exporting a parameter file
 - 34 Importing a parameter file
 - 36 Password protected materials
 - 36 JobControl® functions, which make laser processing even easier
- 37 How do I find the perfect laser parameters?
 - 37 Engraving
 - 38 Cutting
- 39 Shortcuts – key combinations
- 39 JobControl®
- 40 CorelDraw®
 - 40 Align and arrange objects
 - 40 Text
 - 40 F-keys
- 41 Finishing**
- 41 Lens cleaning
- 42 General cleaning

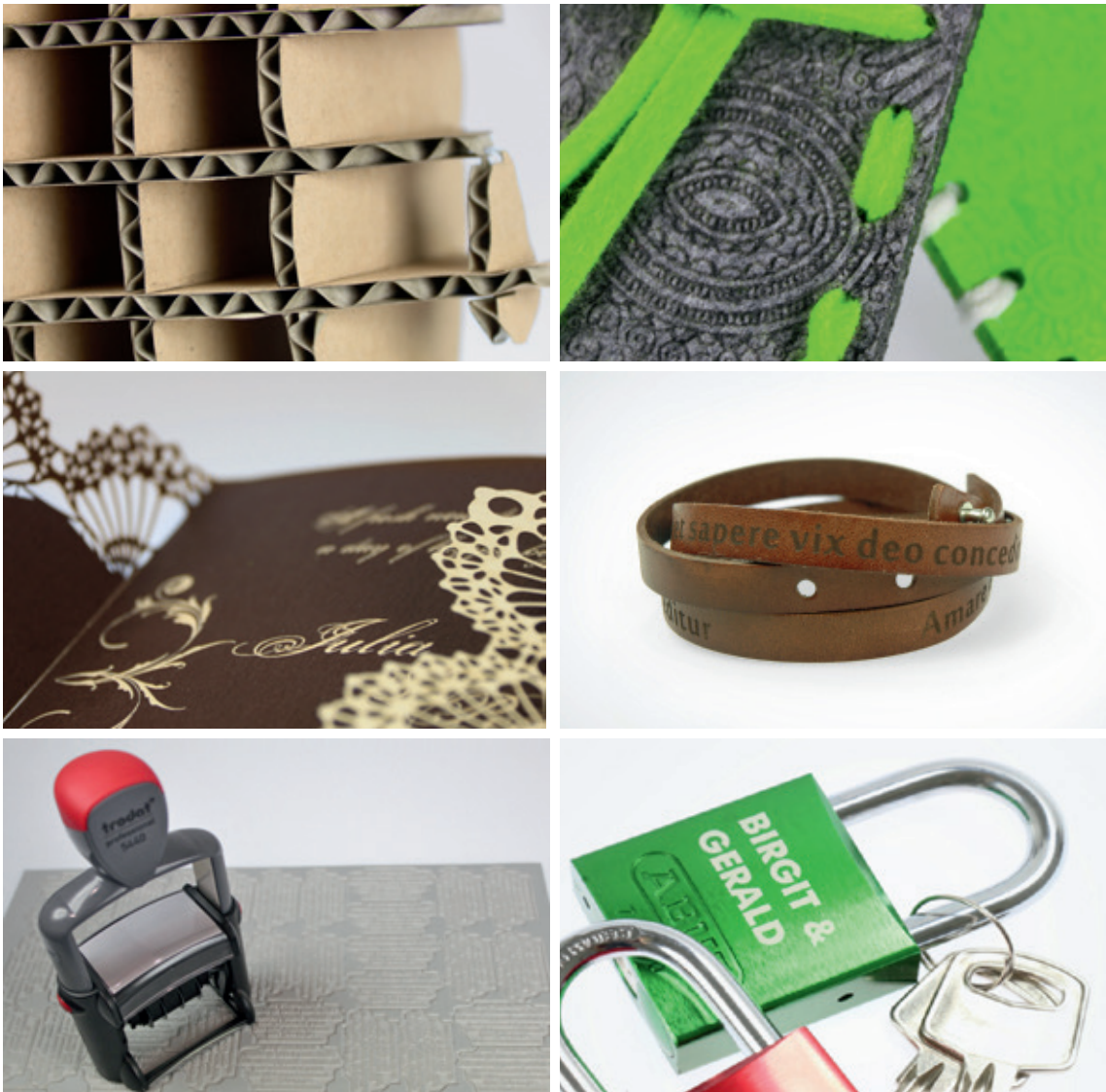
→ Introduction

→ What can a laser do?

With an advanced laser engraver, you can process a variety of different materials. Wood, glass, leather, acrylic, natural rubber or stone are just a few of the wide range of materials

used in applications, such as signs, stamps, promotional items and many more. With the wide range of laser engraving and marking systems offered by Trotec you are ideally equipped for the future of your business!

Here are a few examples of our favorite applications:



A range of different laser applications

→ Laser sources and your options

CO₂ and fiber lasers

The devices from the Speedy flexx series are equipped with a CO₂ and a fiber laser. Select a CO₂ laser with a power level between 25 to 120 Watt and combine it as desired with a 10, 20, 30 or 50 Watt fiber laser (For details on configurations see page 3). Use both laser sources in a single job without having to manually change the laser source, lenses or focus. The patented JobControl[®] laser software makes it possible: simply assign the desired laser source to each color of the graphic.

flexx function

Thanks to the flexx function developed by Trotec both laser sources can even work together on a single job. In other words only a single process has to be initiated to process two materials. The CO₂ laser for example can be used to engrave leather goods, while the fiber laser can mark metal parts. Likewise you can control both laser sources independently of each other. This feature is patented.

In general it can be said that all organic materials or non-metals can be processed with the CO₂ laser and all metals (even precious metals like gold and silver) can be processed with the fiber laser. Plastics are an exception, they can be processed both with the CO₂ as well as the fiber laser.

On page 10 of the Materials chapter you will find a summary table which shows in detail which substances can be processed with which laser source.

→ From an idea to the finished workpiece

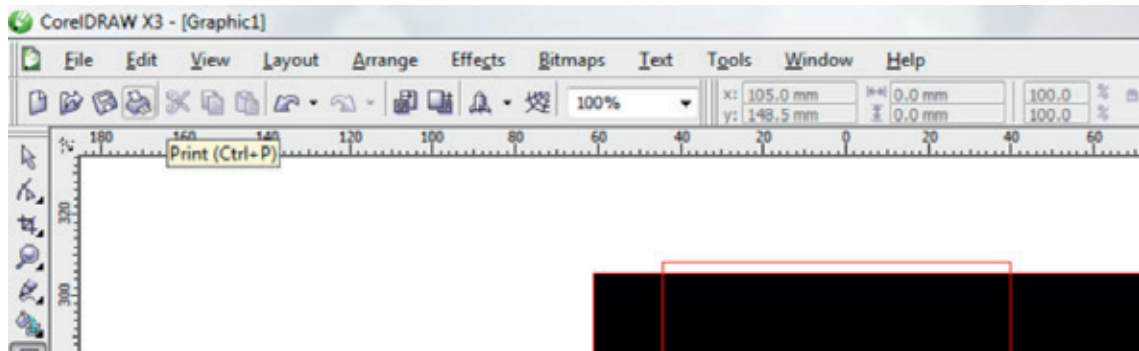


Work process from an idea to the finished product

→ Step 1: What do I want to laser process?

Depending on the material that you want to process, different factors must be considered. First of all ask yourself which laser source can be used to process the material. On page 10 you will find a table that maps the different materials to the laser sources. Furthermore, it may be necessary to use accessories, such as a rotary attachment or a special overlay, in order to cut acrylic.

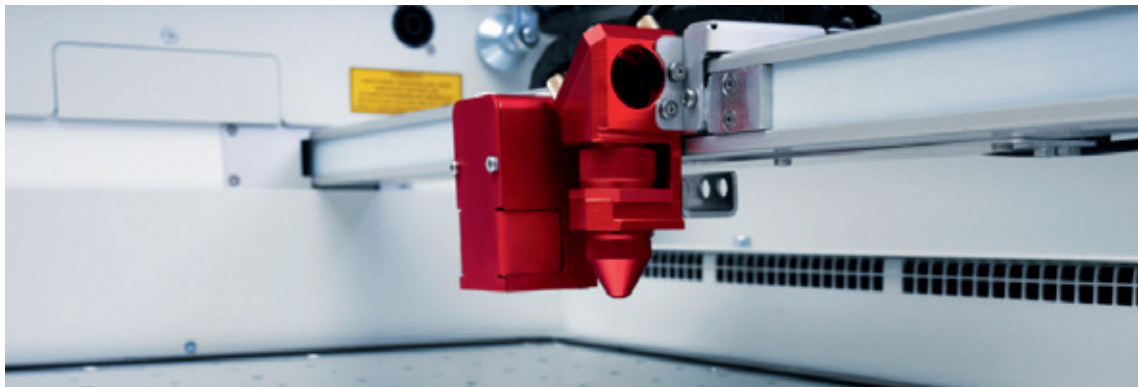
All of these points are described in detail in the Hardware chapter starting on page 26. In addition, material-specific hardware recommendations are described directly at the relevant point in the Materials chapter.



Laser processing is as simple as printing

→ Step 2: Graphics preparation

The desired graphics can be created in any graphics program. It is important that cutting lines are always vectors, everything else can be freely designed to your liking. On page 7 you will find a description of how to prepare graphics for laser processing, so that optimum results are achieved. Sending the job to the laser is as simple as printing because our lasers communicate with the graphics program via a printer driver.

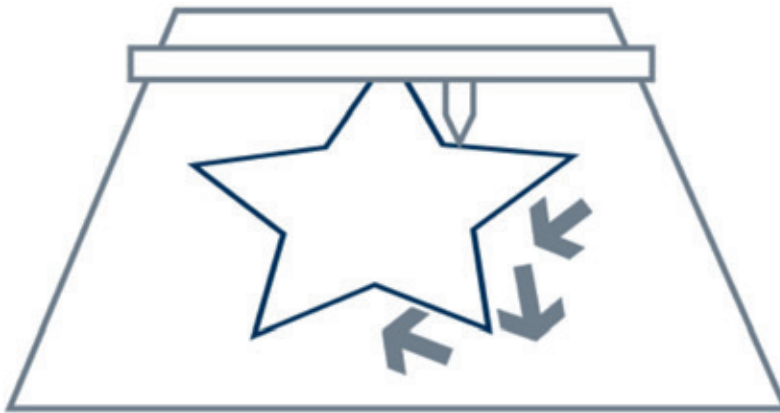


Speedy laser head

→ Step 3: Laser settings

In JobControl[®] select the appropriate settings from an abundance of laser parameters. Position the graphic where you want it and you are ready to start the laser process.

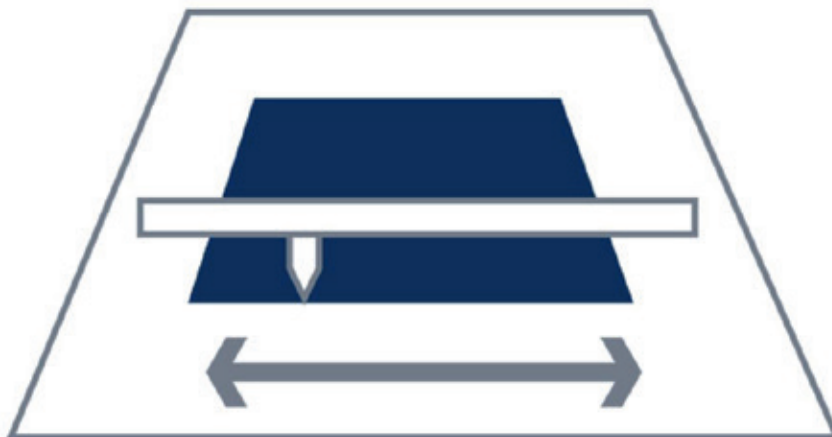
→ How does the laser work?



Laser cutting process

Process: Vector cutting

- How to use the milling head
- The processing head moves along a specific path (vector)
- Cutting paths are vector lines and arcs
- Vectors are processed one after the other
- Control via Hz (frequency)
- „Slow“ X-axis and Y-axis movement



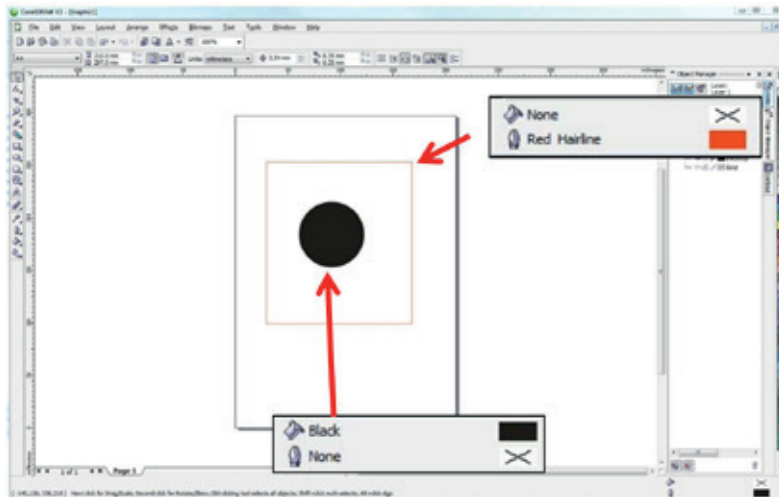
Laser engraving process

Process: Raster engraving

- Similar to a printer
- The processing head moves along on the X-axis from left to right
- Graphics are traversed row by row
- Graphics are rasterized bitmaps
- Control via DPI (dots per inch) and PPI (pulses per inch)
- Very fast X-axis, slow Y-axis motion

→ How to create a file for the laser

In order for the laser to know which lines of the graphics need to be cut and which must be engraved, they must be set in the graphics as follows.



Cutting lines must always be red, engraving elements black

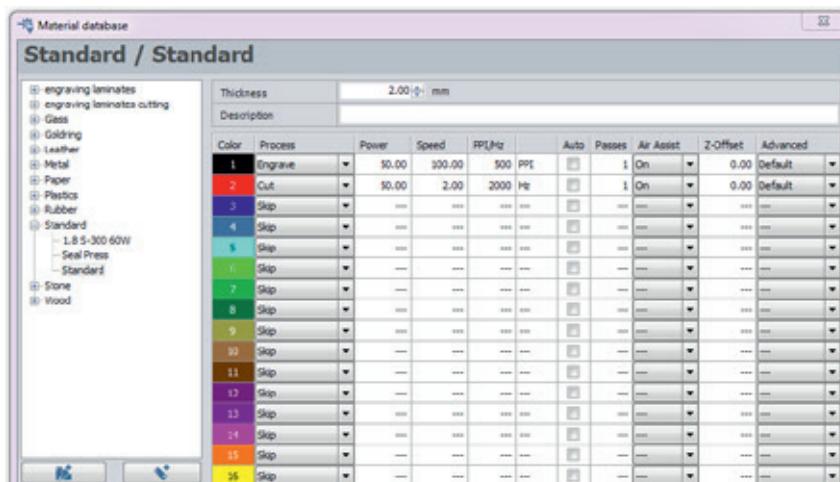
→ Cutting lines:

- must always be vectors
 - Line width = hairline
 - Line color = red
- (RGB from the Trotec color palette)

→ Engraving area:

- Vectors and pixel graphics
- Filling = black 100%

Would you like to work with different laser parameters in a single processing step, for example to produce different engraving depths or effects? JobControl[®] can fill different laser parameters with up to 16 colors. Simply use the Trotec color palette to mark the areas in CorelDraw[®].



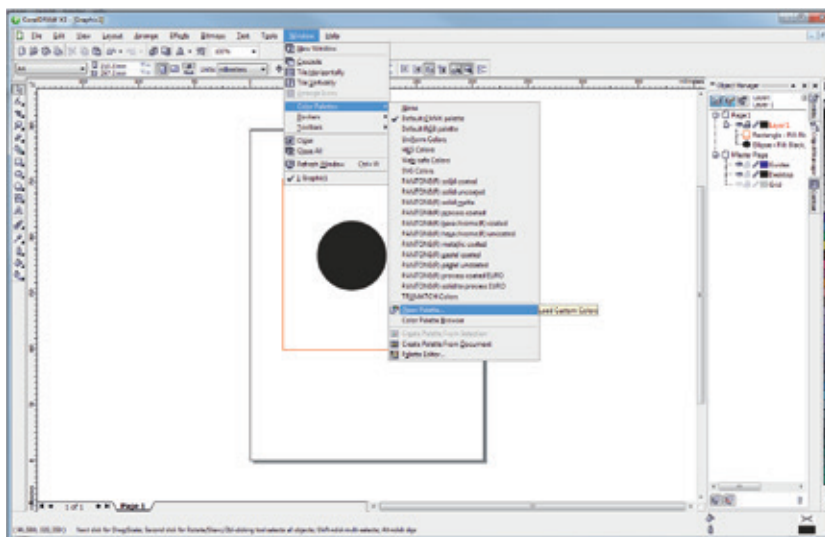
Overview of materials in JobControl[®]

→ Import Trotec color palette

As already mentioned in the previous chapter, the laser needs accurate color information, in order to be able to process the data. To make creating these settings as quick and easy as possible, we have prepared a ready-made color palette, which you can import into your vector program in two easy steps, for example into Corel Draw[®]. You can find the color palette on the CD delivered with your laser.

→ Step 1

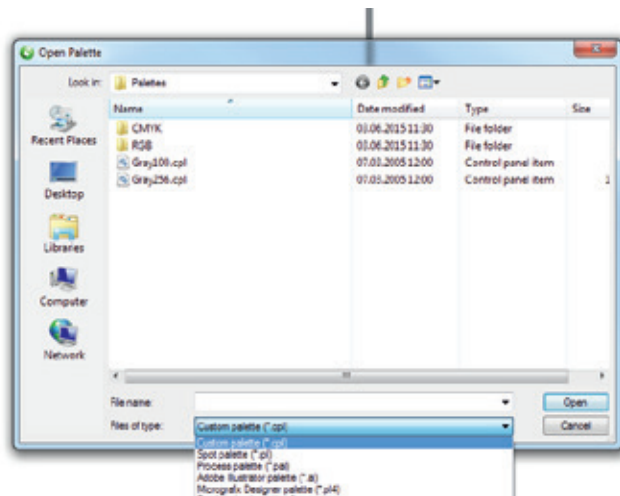
In the menu item “Window” under “Color palette” click on “Open color palette”. This will open a window where you can select the palette.



Overview of materials in JobControl[®]

→ Step 2

Change the file type to *.cpl in the dropdown menu at the bottom of the window and choose the Trotec color palette. The Trotec color palette enables clear communication between the vector program, e.g. CorelDraw[®] and the JobControl[®] laser software. In this way you can process your workpiece using 16 different laser parameters in a single processing step.



Importing a new color palette - Step 2

→ How to clean laminates after laser processing

If smoke residue occur on the workpiece during laser processing, we recommend that you clean them off using methylated spirits. Simply wipe off with a cloth moistened with methylated spirits, followed immediately by a wipe with a clean, dry cloth. Nano sponges (often referred to as dirt erasers) can also be very helpful when cleaning laminates.

Caution on glossy surfaces: Please first carry out a test on a sample piece, in order to ascertain whether the surface is affected by the methylated spirits, i.e. whether it turns matte for example.

→ Leather

→ Warning: PVC free leatherette

Please note that leatherette often contains PVC compounds and therefore cannot be laser processed. There is a danger that harmful gases may be released.



Engraving and cutting of leather causes no problems at all

→ Masking tape

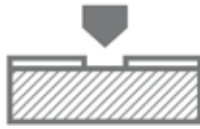
As already mentioned previously, masking tape can be very helpful when processing delicate materials. This is also the case with natural leather. When applying the masking tape it is important to:

- Cover the entire engraving or cutting area
- Apply the tape without air inclusions or wrinkles
- Use a squeegee to press down firmly on the material

You can apply the tape just before cutting or engrave through it straightaway, depending on the motif you choose. Particularly for very fine motifs, it is advisable to apply the tape only after the engraving process. In general, it can be said that relatively little power is required for engraving leather, in order to achieve first results.

→ Metal

In contrast to laser processing with a CO₂ laser it is important to distinguish between different processes when marking metal with a fiber laser:

		
Engraving	Annealing	Coating ablation
		
• Metal is partially vaporized during the process • This creates a depression • Very durable marking • High energy is required	• Stainless steel, titanium,... • Local temperature rises to just below the material's melting point • An oxide layer is created just below the material's surface • The surface is not damaged • High contrast marking of material	• Anodized aluminum, painted metal, foil • Top layer is removed • High contrast Marking of material • High speed during marking

→ Cleaning with a sponge and water

Smoke residues on the material surface are the result of rapid temperature rises during engraving and explosive vaporization. Consequently, engravings appear hazy.

The edges of the engraving look washed out and the quality of the engraving seems inferior.

		
Without cleaning	Cleaned with a sponge and then air-dried	Cleaned with a cloth
For perfect results, the engraved workpiece must be cleaned with water and a sponge and then air-dried.		