

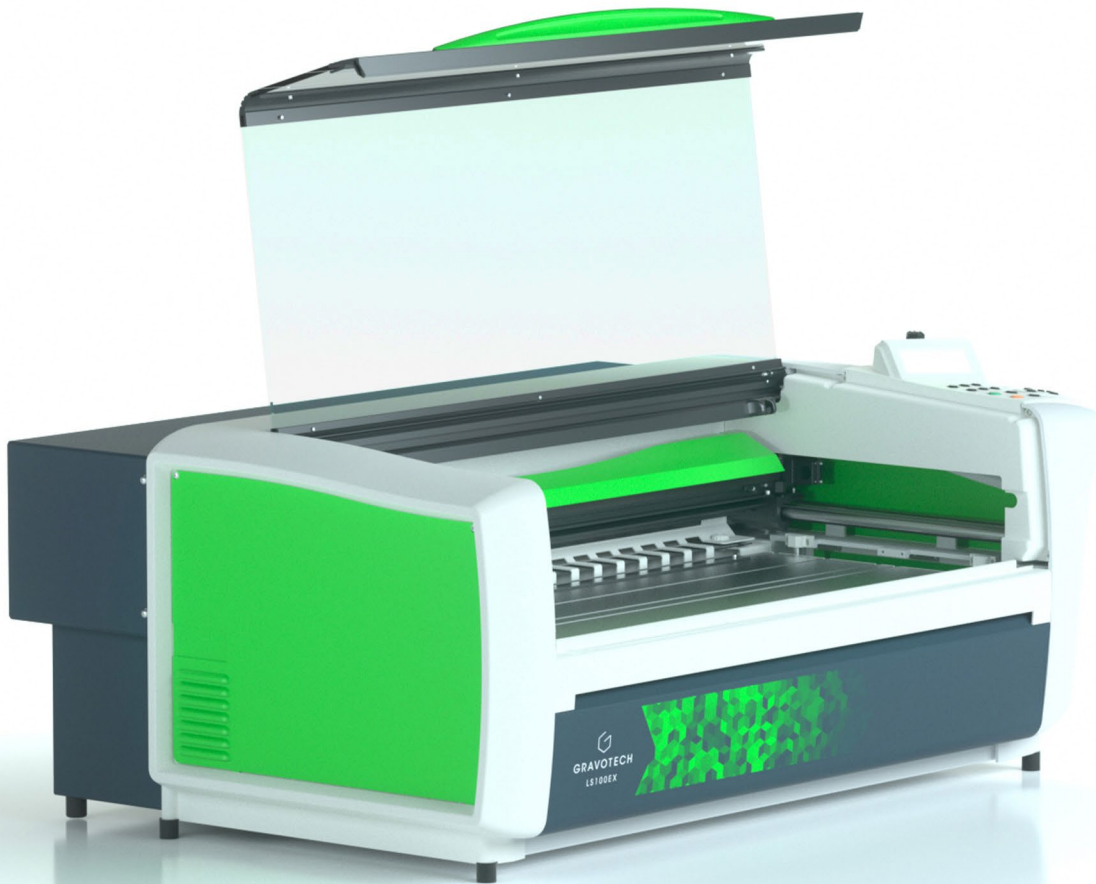


GRAVOTECH

by  BRADY.

EBOOK

All you need to know about laser tables





Learn everything about laser tables

A good understanding of laser technology is essential if you want to acquire your first laser table, diversify your production base, or develop in-house know-how for engraving and cutting.

In this guide, you'll find everything you need to know about laser tables: how they work, the different laser sources, and the points to consider before getting started.

The Gravotech expert



Product manager at Gravotech, Arthur first worked on the mechanical/rotary engravers range before specializing in the laser table range.

His role is to ensure the link between the sales teams and the research and development teams. To do this, he collects and synthesizes customer needs to define future products. He also brings his expertise on current products to salespeople to help them respond effectively to customer issues.

Arthur NAULIN, Laser Gantry Product Manager

Summary

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The fundamentals of laser technology ☑

The **laser** is a **concentrated ray of light**. Note that the word itself is an acronym for *Light Amplification by Stimulated Emission of Radiation*.

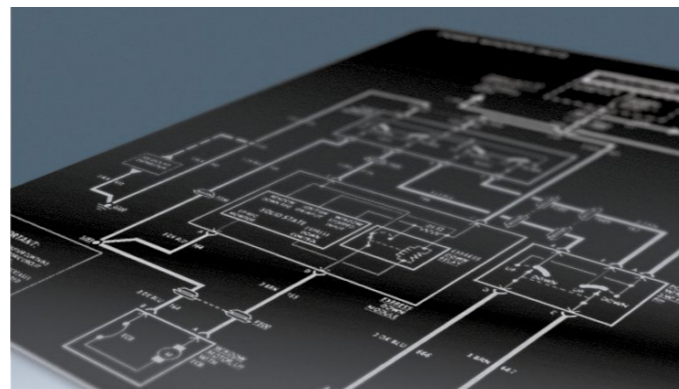
Under certain conditions and depending on the configuration of the laser, applying this beam of light to material can allow it to be engraved, cut or marked.

The main principles of laser engraving, marking and cutting



Engraving

During this process, the laser heats the surface of the material until it removes a thin layer. It **penetrates into the material**.



Marking

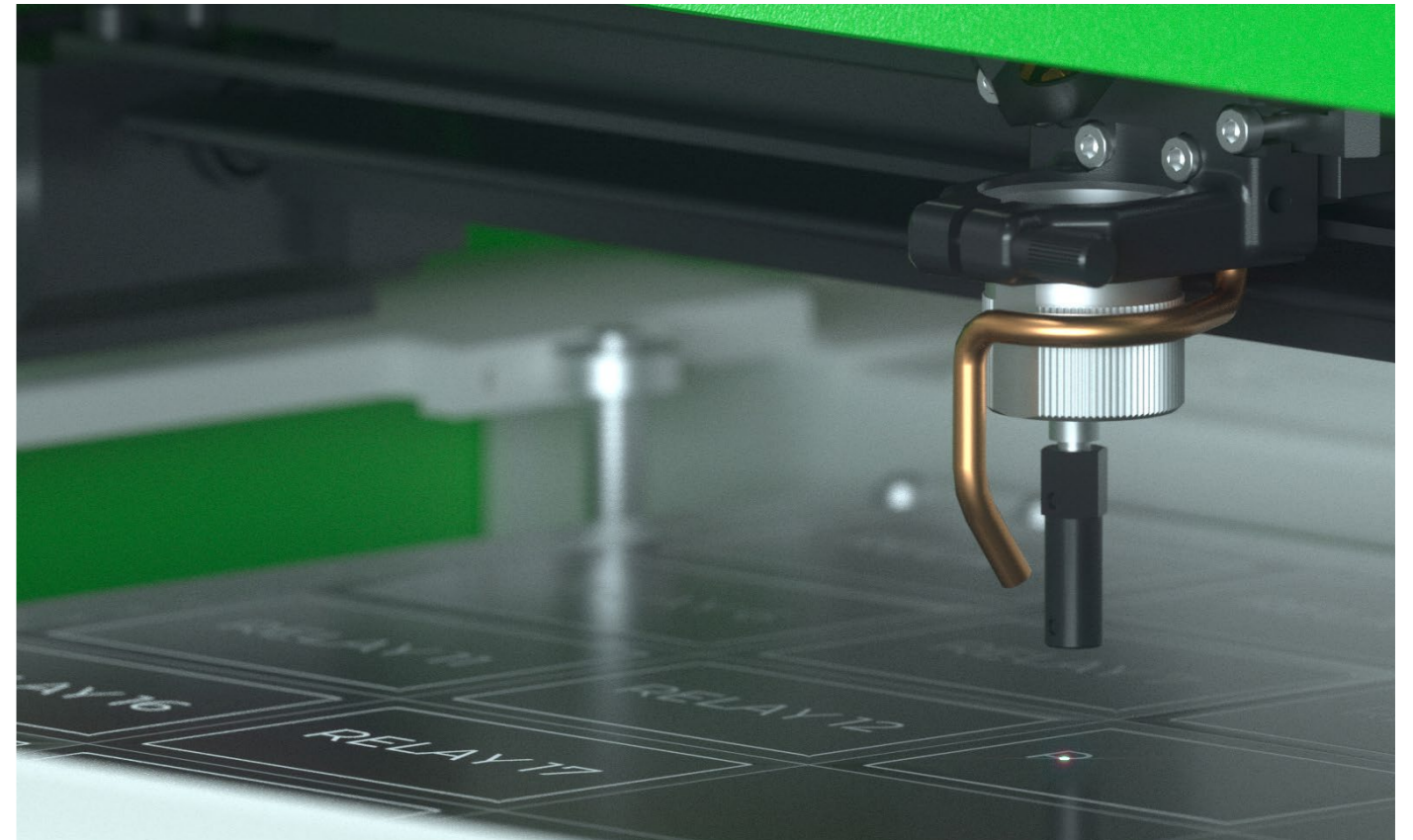
Here, the laser does not remove material. The surface of the latter reacts to the beam, and **changes color or appearance**.



Cutting

Cutting is similar to material engraving. It's the **exposure time** and/or **exposure** of the laser. Using a more powerful beam, or exposing the material for a longer period of time **to penetrate the material**.

The laser can cut wood, paper, plastic (e.g. acrylic), rubber and more into precise shapes!



The advantages of laser technology

Laser technology enables contactless processes. The beam and the material interact, but they do not touch each other. This has 3 major advantages.



More productive operations. There's no risk of the part being moved. There's no need to clamp the part when installing it in the machine via a dedicated mechanism - a real time-saver compared to traditional mechanical engraving.



Durable machines. No part of the laser machines wears out mechanically due to impact or friction against the part, there are no wearing parts to replace regularly.



More versatile work. Laser technology makes it possible to combine engraving, marking and cutting in the same operation. You can engrave text, logos or photos very easily.

Laser tables and laser stations: what's the difference?

These two types of laser machines are distinguished by their **operation**, their **applications**, and their **uses**.



Laser tables



How it works

Also called **Gantry laser**, the laser table engraves the material **like a printer**, line by line. The plate can move up or down vertically to adapt to the height of the object to be engraved.



Work that can be done

Laser tables are ideal for **engraving large parts**. They also allow for **engraving and die cutting, serial marking or cutting** of parts.

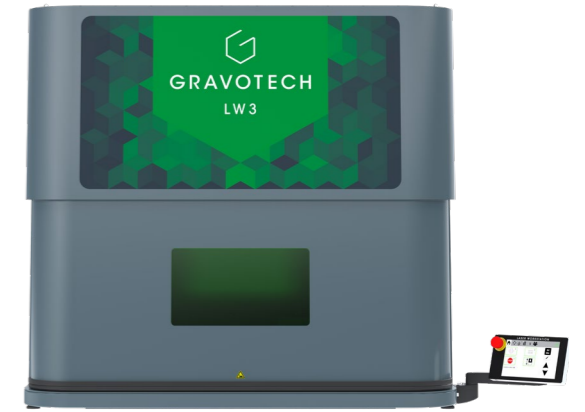
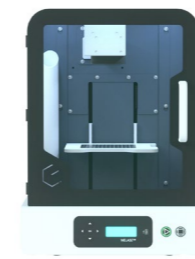


Its uses

The laser table is the right solution for almost **all engraving and cutting jobs**. It is also used in the fields of **signage** and **personalization** as well as in **creative fields**. It adapts to all types of environments, from professional engraver workshops and industrial workshops to FabLabs (places where machines are made available to individuals) and shops.

Laser stations sound like the right solution for you?

[Learn more](#)



Laser stations



How it works

Also called **galvanometric laser**, the laser station is equipped with a **laser head** in height and adjustable. The beam moves to mark or engrave the part. Its advantage is its **speed**, enabled by a set of mirrors reflecting the laser beam at high speed. This makes it possible to obtain a permanent marking **in a few seconds**.



Work that can be done

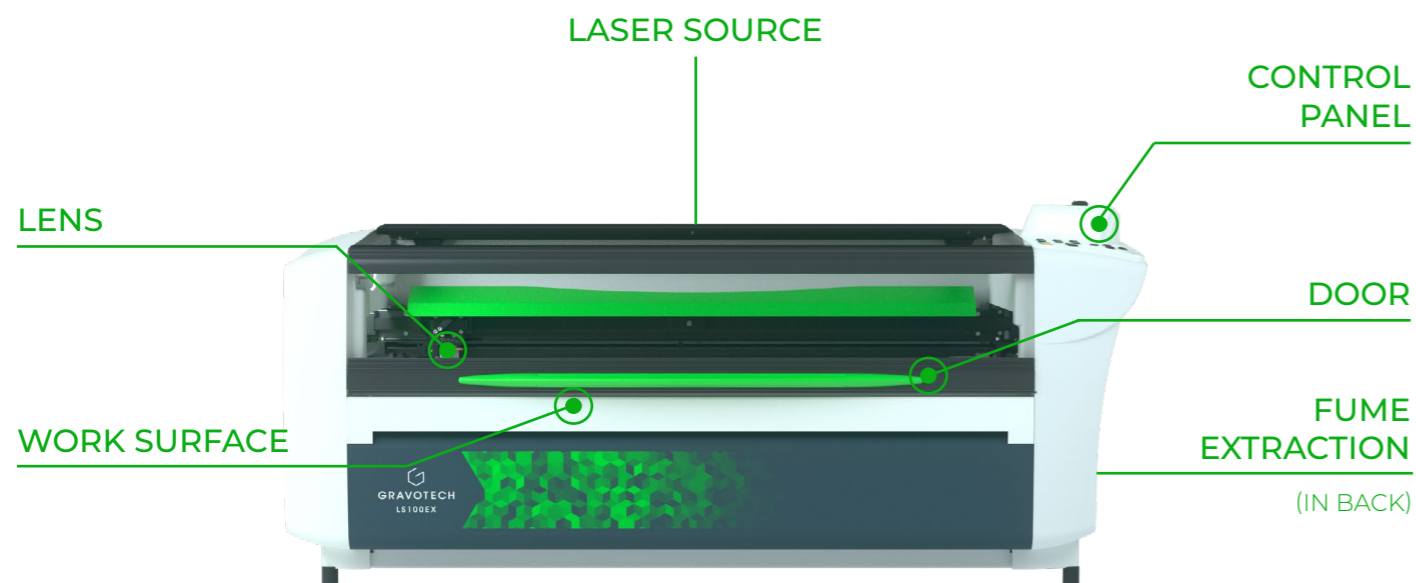
Laser stations allow marking and engraving of parts, and **thin cutting** (<1mm). Furthermore, it is possible to engrave large pieces but the **engraving area is limited**. For example, with the Gravotech LW3 laser station, the marking area is maximum **300 x 300 mm** with a **focal lens 420**.



Its uses

These machines are preferred for **rapid engraving work**, particularly in the field of **industrial traceability** or in the **personalization** of objects in stores.

The composition of a laser table ☑



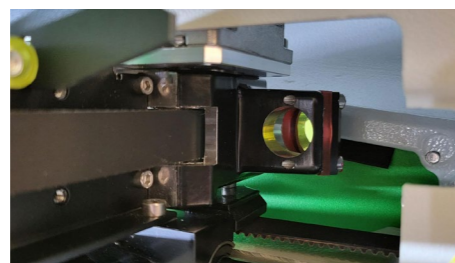
The different laser sources

The **characteristics** of the laser and its **effect on the part** being processed depend in part on the laser source – some beams do not interact with certain materials. So be sure to **choose your laser source** based on **the material** to be transformed and the **result** you want.

Gravotech offers laser table models with a **CO2 source**, a **fiber source** or **both** in the same table (called Edge technology). Note: adjusting the wavelength of the laser allows you to modulate the impact between the beam and the material.



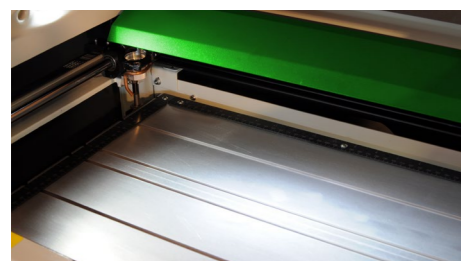
LASER SOURCE



MIRROR SYSTEM



LENS



WORK SURFACE



FUME EXTRACTION



DOOR

CO2 laser

CO2 laser tables are **the most widespread on the market**. The gas contained in this source and an electric current make it possible to excite a photon until a laser beam is generated.

The CO2 laser is suitable for marking or cutting parts made of **organic material** (wood, glass, stone, ceramic, leather, paper, etc.) or **plastic** (PMMA, acrylic, etc.), including coated **metals** such as anodized aluminum or varnished brass.



What quality of source should you choose?

In the case of a CO2 laser source, the gas is contained in a tube. There are **2 types of quality** on the market.

The glass tube is used for entry-level machines and therefore less expensive. This type of quality:

- has a water cooling system to absorb and dissipate heat;
- is less reactive (speed strongly limited in engraving, < 1 m/s);
- has a lifespan of up to 2 years only.

The metal source (sealed source) is a more expensive option which, unlike the glass tube:

- is used for engraving and cutting (at high speed);
- is cooled by the ambient air which circulates around the source;
- has a lifespan of up to 10 years;
- allows for more precise engraving.

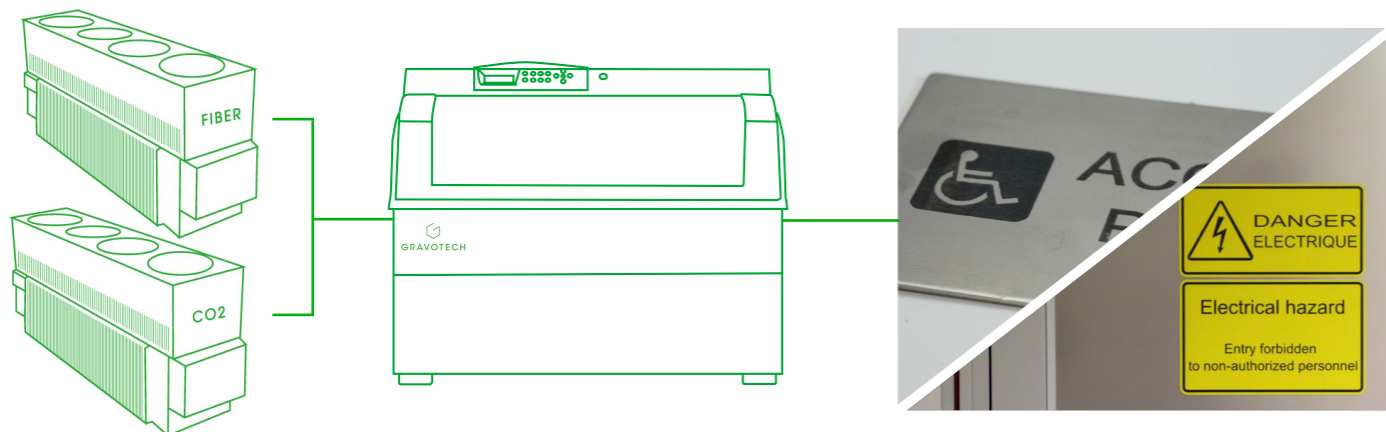
Fiber laser

Here, a **electric diode** emits a **radiation**, which is then captured by a **optical fiber**.

This laser source is effective for work on **metal parts** (aluminum, brass, steel, bronze, copper...). The fiber laser is therefore rather used for **industrial marking and personalization of metal parts**.

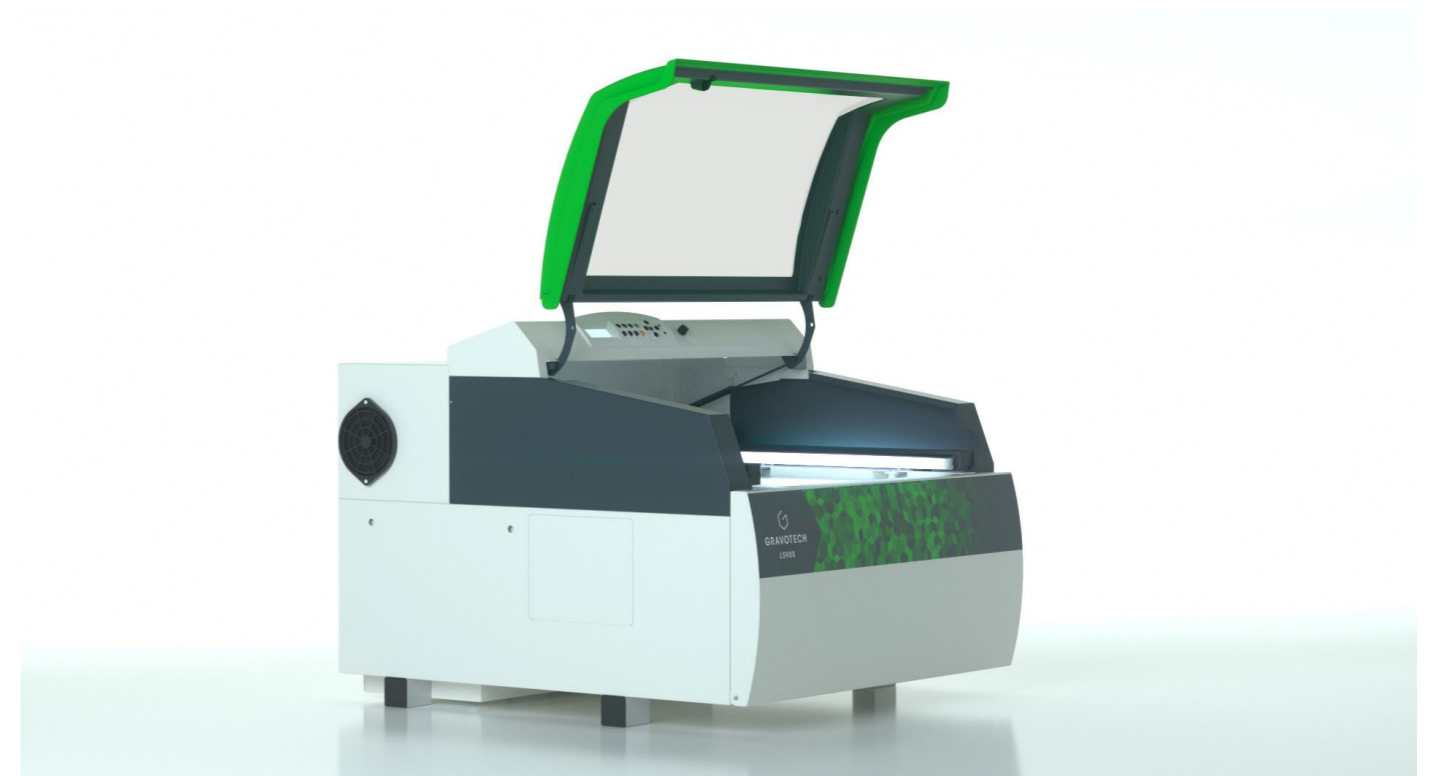
Combined laser sources

It is possible to **combine fiber and CO2 sources** within a single laser table. This is **Edge technology**. It allows you to **choose one source or the other** depending on the material to be engraved or cut!



The dimensions of a laser table

These vary depending on the model chosen.



The size of the marking area



This is the location where to place the object to be marked. Its dimensions depend on the size of the machine – from **45 x 30 cm for the smallest models** up to more than **100 x 60 cm for the largest**. Therefore choose your Gravotech machine according to the objects to be engraved or cut.

Machine size



The machines can be **between 40 cm long** – the equivalent of an office multifunction printer – **and 1.20 m**, but some walk-in models can be around 2 m long and 1 m deep.

The weight of the machine



You should count between **approximately 40 kg and 250 kg**, depending on the model. For each model, the ratio between the working area and the size of the machine is optimized to guarantee a beautiful working space while avoiding unnecessary loss of space.

Safe use of laser tables



The CDRH (*Center for Devices and Radiological Health*), an American public organization, offers **strict regulations** for the safe use of lasers.

This is all the more important as **all laser tables** on the market are equipped with a **class 4 source** (the most dangerous laser index).

However, manufacturers can add **additional protections** (boxes, doors, closed system, etc.) when integrating the laser source into the machine to protect future operators.

What do these classes correspond to, and what constraints do they imply?



Class 1 and 2 laser machines

When using class 1 machines, **no laser radiation escapes** from the machine. They can therefore be used safely.

The principle is similar for class 2 machines: **no laser radiation** from the **main source** can escape from the laser table.

For ergonomic purposes, positioning assistance or for previewing, some machines have a **laser pointer** red emitting radiation in the visible range. It is the latter which moves a laser machine from class 1 to 2, without compromising the level of safety. It indicates to operators the area **where the laser beam will act**.

No other protection is necessary to use these two types of machines.



Class 4 laser machines

As noted, Class 4 lasers are **dangerous**. Direct exposure or even reflection can damage **the skin** and especially **the eyes** of operators.

Please note that the safety of a laser machine used in an unsuitable environment cannot be guaranteed by the manufacturer. In these cases, the source presents dangers (start of fire, exposure to laser...) and your company will have to cover any possible accident.

Their use must therefore be:

- **in a dedicated and secure environment** – the machines cannot be used in a place open to the public;
- **with suitable protective glasses** depending on the laser source.



Attention

If the manufacturer does not mention the laser protection class of a machine, it is likely class 4.

Class 1 and 2 laser tables and stations can be used in workshops. But be careful, just because the laser is shrouded or has a protective glass does not mean it is class 1 or 2.

Integrable lasers, as their name suggests, are designed to be integrated into various production and safety systems. As a result, they are sold as class 4.

Laser table accessories



Laser tables can be equipped with several accessories to diversify the engraving or cutting possibilities, improve the quality of the work carried out, or protect the machine and the operators.

Fume extractors



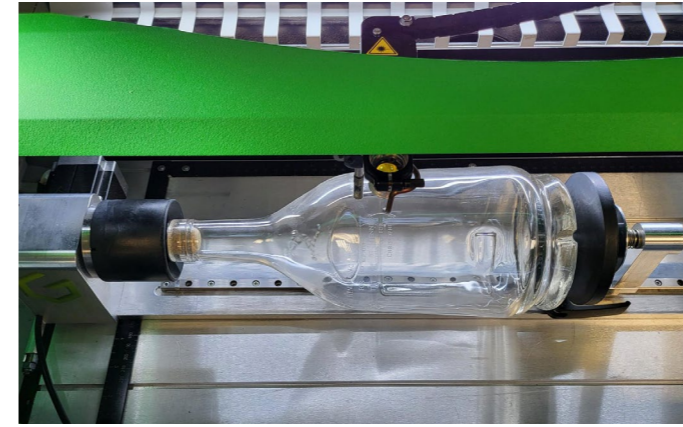
The interaction of the laser with the material releases smoke, particles, gases, odors... Fume extractors guarantee clean and safe work and working environments. They **suck up dust and gases** and **filter the chemical compounds** they contain to release clean air into the work space.

Fume extraction is essential for:

- user health;
- the quality of engraving and cutting;
- the proper functioning and optimal lifespan of the machine.

Their **3-stage extraction system** includes 2 particle filters to remove dust and fumes, as well as a carbon filter to **eliminate odors** – making it possible, for example, to place the machine in an office.

The smoke extractor can be installed below the machine. Then raised to human height, which facilitates its use, while saving space.



Cylinder turners

They allow you to **engrave the edge** of a cylindrical part – for example a bottle, a flask, a glass – by making it rotate on itself.

Cutting tables and supports



During cutting, these accessories (cutting table and honeycomb table) **protect the object and the bottom of the laser machine**, allowing better quality cutting and preserving your equipment. They also contribute to good **air circulation** because they **evacuate the vapors** produced by work.

On a CO2 machine, the cutting table also protects the laser table. It prevents dust and fumes from sticking to the table or even the table being marked.

These cutting tables **minimize contact points** between the material and the machine table. The laser beam thus passes freely through the material. **This limits reflections from the laser** on the bottom of the machine, **and the resulting return beam marks** on the opposite surface of the object. The pin tables also allow better air circulation, and therefore better smoke evacuation.

Please note: they are particularly used for cutting acrylic.



Lenses

It is the essential optical element of a laser table. Their **focal length** varies from one model to another. A short focal length is therefore more suitable for high-precision engraving work. A long focal length allows better penetration and therefore better cutting of thick materials.

You can **change the lens according to your applications and your needs** (sharpness, precision, engraving, cutting, etc.).



Focus on laser lenses

Discover in our guide the advantages of varying laser lenses and how to change them.



Summary of accessories

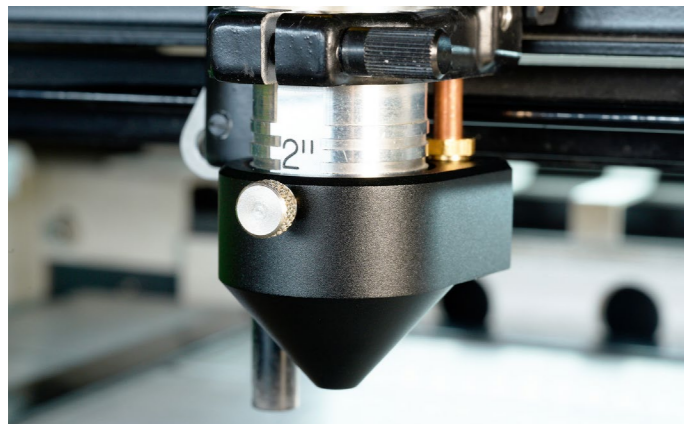


Nose blowing



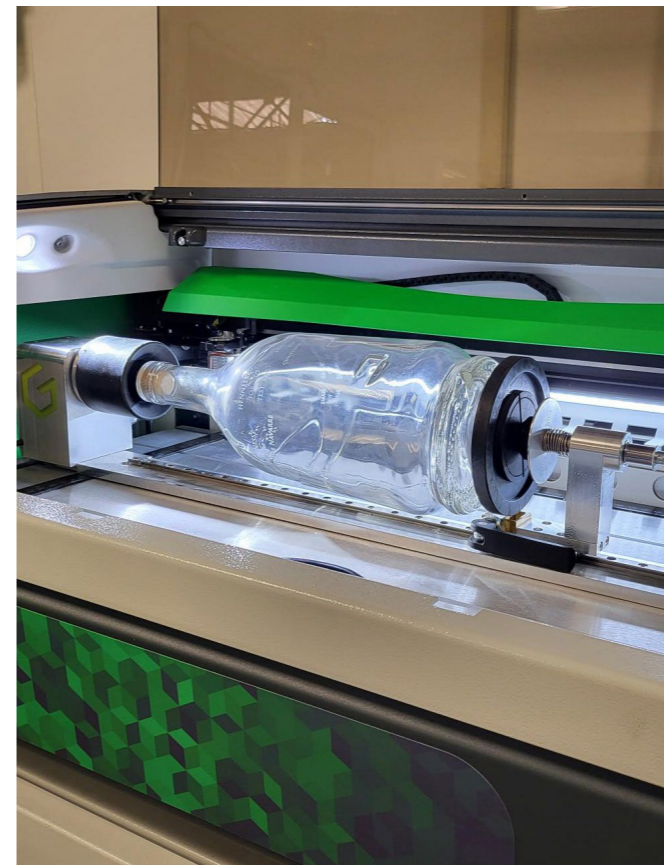
Lens

Blowing noses

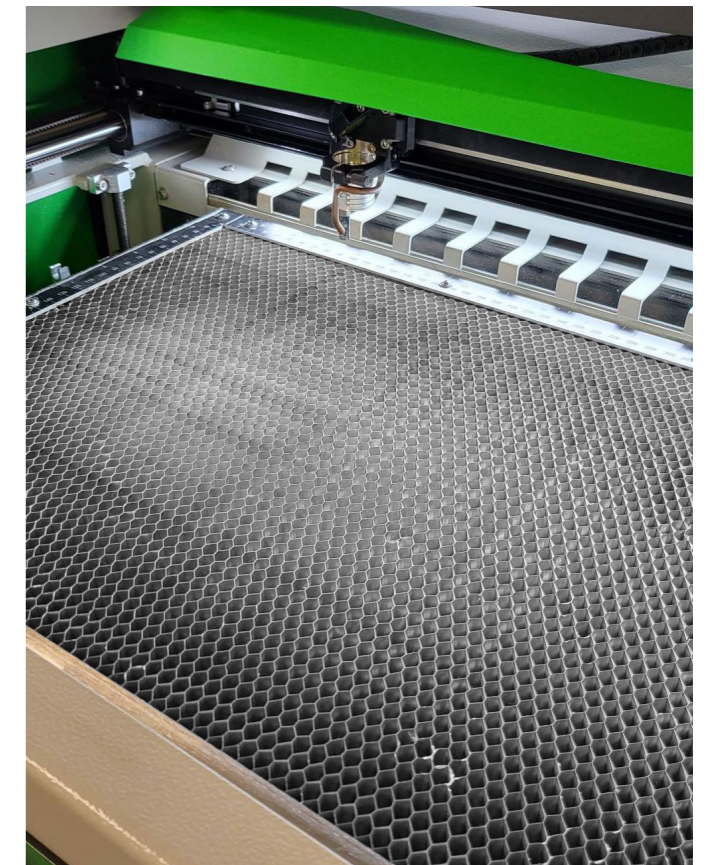


These accessories **blow air into the incision** produced by the laser during cutting work, thus releasing dust and material particles. They allow a **cleaner** result. This **also protects the lens** from dust deposits, reducing its cleaning requirements and extending its lifespan.

They are particularly used for cutting thick material or for intensive engraving, which tend to generate more fumes.



Cylinder turner



Honeycomb table

The prices of laser tables and considerations ✓

You have undoubtedly noticed significant price differences between laser tables from brands on the market. What explains these disparities?

Several factors come into play, such as:

- the **quality of the laser source** (glass tube or sealed source);
- the **choice of components** – which also impacts their lifespan as well as the quality of the work – and their manufacturing origin;
- the **class of the laser** – a class 2 machine, more secure, generally costs more.

The **power** of laser tables also affects their price. This varies depending on the model. For example, Gravotech offers tables from 25 to 150 W. What matters most when choosing your machine is its suitability for your projects. Its power must be **adapted to the work to be done and the material** to be engraved or cut.



In general, the **thicker** the material to be cut, the more **powerful** the laser must be. You won't be able to cut more than 10mm of acrylic with a 30W laser table. But an 80W laser will cut through 20mm of acrylic without difficulty.

The more powerful the laser, the faster it will be possible to engrave or cut. An 80 W laser will be able to cut approximately twice as fast as a 40 W laser, for example.



Working speed, another guarantee of quality

The difference in quality of laser tables – and price – is also illustrated by their **marking speed**. This is generally:

- from 0.5 to 1 m/sec for an entry-level machine;
- from 2.5 to 4 m/sec for a high-end machine.

Better quality machines can therefore be up to 5 times faster.

Concretely, this means that a high-end laser travels 2 round trips along the length of its table in the time required for an entry-level laser to make only one one-way trip. This of course affects your **productivity**, and therefore your **profitability**.

Gravotech's special features



The machines offered by Gravotech are designed for efficient and secure professional use. Choosing Gravotech laser tables means choosing machines:

- **composed of metal sources** (sealed sources) which ensure the longevity and quality of the machines;
- **exclusively class 2**, therefore usable without additional protection, thanks to a box around the laser which secures sources initially class 4;
- **whose components are certified** according to current standards;
- **among the fastest on the market**, with an engraving speed of up to 4 m/s.

And because Gravotech manufactures its own machines, you benefit from the guarantee:

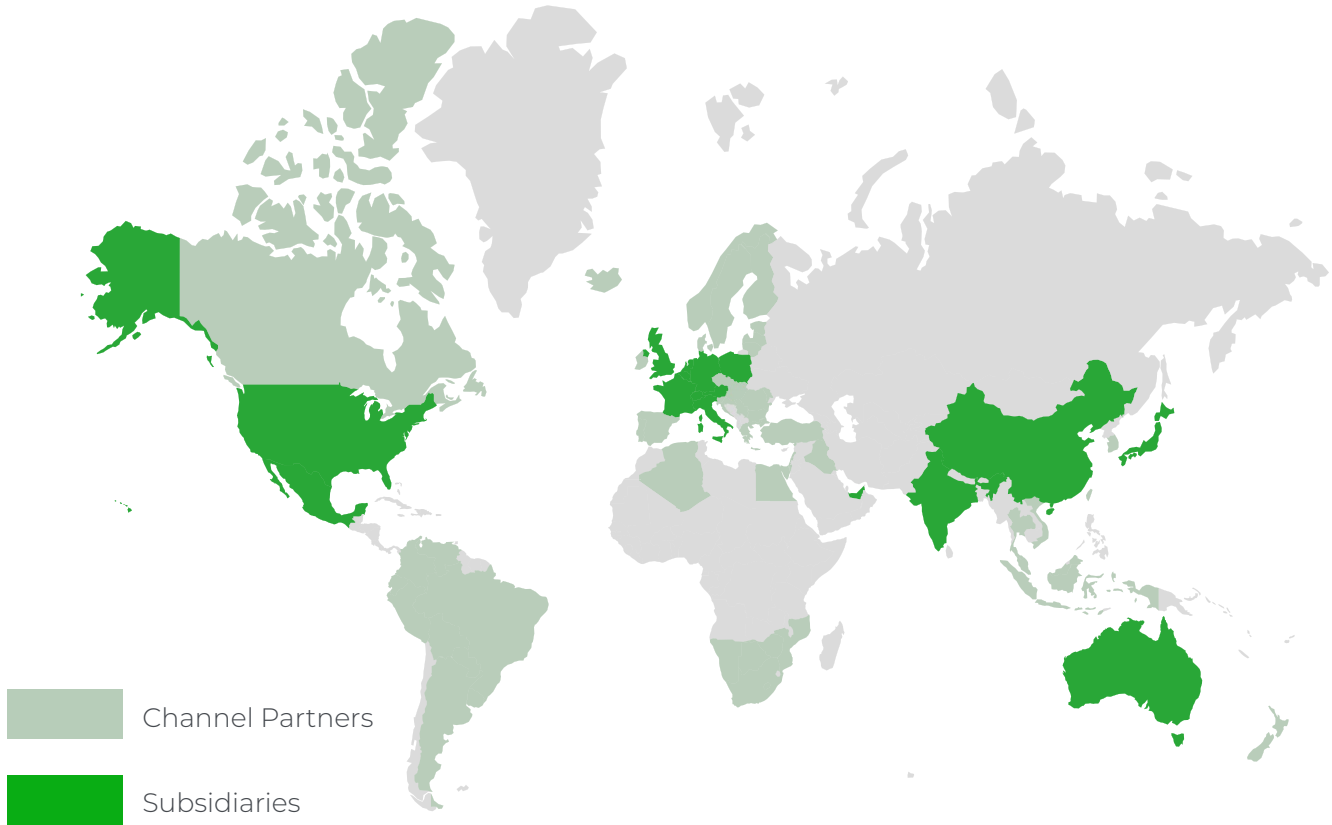
- appropriate training;
- a service offer;
- long-term availability of spare parts;
- real expertise in repairs.

You now have the knowledge necessary to understand how a laser table works, whether it is the differences between CO2 and fiber laser sources, their suitability for various applications, or whether the safety level of the laser is compliant with your security requirements.

[Discover Gravotech laser tables](#)



Gravotech, leader in permanent marking solutions



+85

years of expertise



+60 000

customers



+85 %

sales for export



77

countries



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