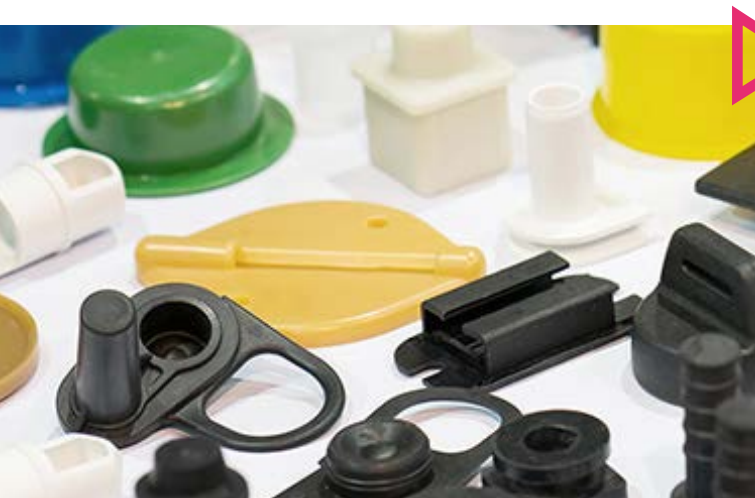


Laser marking on plastic



Laser marking on plastic



Speaking about plastics means referring to derivatives from very different chemical compositions, which influence the performance of the processes applied to them, including laser marking.

This is why we want to clarify what are the most common types of plastic to mark and which are the optimal parameters for achieving the desired results.

First and foremost, we should say that [laser marking and engraving](#) is possible on almost any type of plastic, although the reactions due to color pigments and other additives are very different.

The most common applications of laser marking on plastic



Containers



Electrical and electronic components



Printed circuit boards



Plastic film



Buttons and switches



Identification plates



Packaging and films

Plastic materials of which the most common marking applications are composed



Polyamide (PA)



Polycarbonate (PC)



PCB



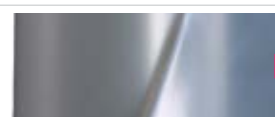
Mylar



Polyethylene



Laminated plastic



Polyethylene (PE)

The kind of laser sources that allow to achieve the best results on plastics are the UV and the green laser.

► FlyUV

FlyUV therefore guarantees optimal results for various applications, such as transparent or colored hoses, medical plastics for invasive applications and fire-fighting plastics for housings of electronic or glass components.

With a typical pulse duration of 20 ns and a radius diameter of 10 μm , the **FlyUV treats surfaces without damaging them**. Ideal for laser marking for medical technology (in this way catheters and insulin pumps can be given durable marking, resistant to sterilisation), glass can be reticulated and given glossy marking.

With its wavelength of 350nm, it **guarantees a very high contrast and marking quality**, hygiene and total integrity for delicate materials.



► FlyPeak

On the other hand, **the green light laser** has different features compared to the **UV laser** and is an absolutely **innovative technology which combines quality with reduced costs**.

This DPSS system (Diode Pumped Solid State) combines high peak power with a much shorter pulse duration than solid-state lasers on the market, while maintaining average power: there is currently no laser source on the market with the same performance.

FlyPeak operates in a single shot to 100kHz range with a pulse-width between 2 and 10 ns. Controlling the heat input is a determining factor in **obtaining quality marking on plastics**: too much heat can create burns at the edges of the marking, compromising the quality and therefore the contrast: instead of the white color, we will obtain a brown-yellow color.

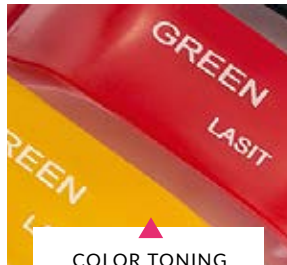
The FlyPeak laser pulse is always below 10ns throughout the range (at 20kHz = 3.5ns), which lets us **cool down the marking compared to traditional nanosecond lasers**, including fiber lasers, and consequently increase the quality of the process and result.



The most common processes for marking on plastics are carbonization, color toning, foaming and engraving.



CARBONIZATION



COLOR TONING



FOAMING



ENGRAVING

The absorption rate of plastics increases as the wavelength of the laser decreases, i.e. Polyamide has an absorption rate of 10% with an Infrared laser, 70% with a green light laser and 90% with a UV laser.

Another factor to keep in mind is the duration of the pulse: marking on plastic materials has a higher contrast when the pulse duration is shorter, for the same wavelength.



As a first approach for verifying the effect of marking on a new plastic material, it is advisable to use:

- High speed (900-1200mm/sec)
- Low frequency (10-20kHz)
- Low average power (30-60%)



REPETITION 1



REPETITION 2



REPETITION 3

In most cases pressing too much when marking can be counterproductive and can decrease the final contrast, so it is better to start with 1 repetition and gradually increase them.

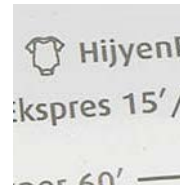
Below we have identified the most common plastic materials, describing their characteristics and the best parameters for marking them:



► White ABS

this material, if not additivated, can be marked fairly well with an Infrared FiberFly laser, well with a FlyAIR Green Wave green light laser and perfectly with a UV FlyUV laser.

The latter provides a Photochemical reaction of the material, achieving a high, constant and absolutely indelible contrast, leaving the surface smooth to the touch.



Laser	FlyUV 8W FFL330
Speed	900mm/sec
Frequency	40kHz
Power	80%
Repetitions	1
Defocus	10mm
Filling	0.1mm

► White PET

Good contrast can be achieved with the Infrared FiberFly laser. The MOPA version is recommended to increase contrast.



Laser	FiberFly 30W MOPA FFL160
Speed	800mm/sec
Frequency	10kHz
Power	90%
Repetitions	2
Defocus	NA
Filling	0.09mm
Pulse Duration	50ns

► Black PET

Fairly good contrast can be achieved with the Infrared FiberFly laser. The MOPA version is recommended to increase contrast.



Laser	FiberFly 30W MOPA FFL160
Speed	600mm/sec
Frequency	10kHz
Power	90%
Repetitions	1
Defocus	NA
Filling	0.08mm
Pulse Duration	8ns

► Black POM C

Good contrast can be achieved with the Infrared FiberFly laser. The MOPA version is recommended to increase contrast.



Laser FiberFly 30W MOPA FFL160

Speed	600mm/sec
Frequency	10kHz
Power	90%
Repetitions	1
Defocus	NA
Filling	0.08mm
Pulse Duration	8ns

► Grey ABS

Good contrast can be achieved with the Infrared FiberFly laser.



Laser FiberFly 30W MOPA FFL160

Speed	1000mm/sec
Frequency	20kHz
Power	90%
Repetitions	1
Defocus	NA
Filling	0.07mm

► PA66+MOS

Good contrast can be achieved with the INFRA-RED FiberFly laser.

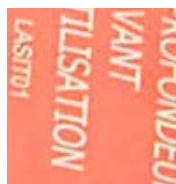


Laser FiberFly 20W FFL160

Speed	700mm/sec
Frequency	10kHz
Power	90%
Repetitions	2
Defocus	NA
Filling	0.08mm

► Red PE

Marking visible but with little contrast with Infra-red laser, optimal contrast with Green Laser.



Laser FlyAIR Green Wave FFL160

Speed	500mm/sec
Frequency	10kHz
Power	90%
Repetitions	1
Defocus	NA
Filling	0.08mm

► Black PE 1000

Marking visible but with little contrast with Infra-red laser, optimal contrast with FlyPeak Laser.



Laser	FlyAIR Green Wave FFL160
Speed	800mm/sec
Frequency	10kHz
Power	85%
Repetitions	1
Defocus	NA
Filling	0.06mm

► Blue PE

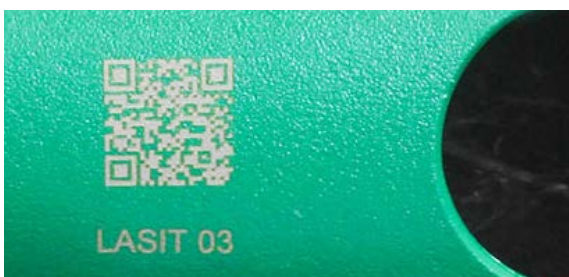
Marking visible but with low contrast with Infrared laser, optimal contrast with Green Laser.



Laser	FlyAIR Green Wave FFL160
Speed	600mm/sec
Frequency	10kHz
Power	90%
Repetitions	1
Defocus	NA
Filling	0.06mm

► Green PE

Marking visible but with little contrast with Infra-red laser, optimal contrast with Green Laser.



Laser	FlyAIR Green Wave FFL160
Speed	400mm/sec
Frequency	10kHz
Power	90%
Repetitions	1
Defocus	NA
Filling	0.06mm

► Black PA66 GF 30

Good contrast can be achieved with the Infrared Fiber-Fly laser. The MOPA version is recommended to increase contrast.



Laser	FiberFly 20W MOPA FFL160
Speed	1000mm/sec
Frequency	20kHz
Power	25%
Repetitions	1
Defocus	NA
Filling	0.08mm



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We've been designing and manufacturing standard and customised laser marking machines for thirty years, always ensuring continuous support to our clients.

Over the years, we've been standing out for our high-tech products of our research and development departments which include mechanics, automation, hardware and software.

- ▶ Over 30 years of experience in this industry. We have seized all the challenges of the marking industry – from manufacturing laser marking heads to whole turnkey systems – providing standard and customised solutions.
- ▶ We take care of the entire project, developing the marking machine, as well as its design and manufacture, without relying on intermediaries.
- ▶ Our laser marking machines can be integrated into MES–ERP systems or simple management programs, communication software and hardware.
- ▶ Our laser systems can interface with communication protocols, such as PROFIBUS, PROFINET, and In case of integrations, the laser marking unit interfaces with an existing PLC system or a PLC system specifically programmed for this purpose.



HEADQUARTER

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