Application Case Studies

Identify black PA66 car devices

Customer Request…

Marking black PA66GF30 car devices is a quite common request.

In this case the request was to grant a quite high production rate with a marking time within 0,4s to compete against **Keyence 30W fiber laser** (MD-F3000W).

…DLA's Solution

Thanks to the excellent beam quality provided by all the V-LASE laser models expressively tied to the marking applications a **V-LASE 20W** equipped with a quite long F=420mm f-theta lens perfectly matched the requested marking time providing a bright white contrast.

V-LASE 20W @ 1064nm
F-theta = 420mm

Marking time = 0,4s

Traceability marking on aluminum car pistons

Customer Request…

The request was to mark a single 5x5mm (16x16 modules) datamatrix code for WIP traceability on piston side, then to mark a 10x10mm (18x18 modules) datamatrix code on piston head together with a logo, human readable coed and the company logo within 3,5 seconds.

…DLA's Solution

Despite to the challenging request of marking a so huge amount of information in a so short time, the request was perfectly matched by a 20W fiber laser **Arex 2000** equipped with a **254mm** f-theta lens.

Arex 20W @ 1070nm
F-theta = 254mm

Marking time = 3,5S

Traceability on automotive steel components

Customer Request…

Direct laser marking on steel for car industry metal parts, surface marking should be performed within 10sec:

-2DCode: 31 characters, 10x10mm

-alphanumeric test: 10 characters, 2.5mm high

The marking should then resists to a wet polishing process removing the oily protection film.

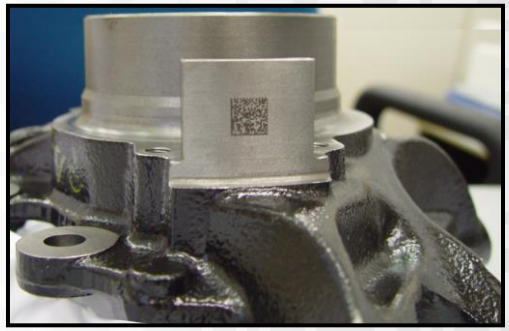
…DLA's Solution

The customer request was exactly meet with a configuration composed by a **Arex 2000** and an f-theta of **160mm**, achieving a dark contrast very well readable by a matrix 400 reader.

Arex 2000 (20W) @ 1070nm

F-theta = 160mm

Marking time = 10S



Engraving on black rubber automotive valves

Customer Request…

The request was to engrave the product code, a bacth code and the company logo on the black rubber valve used in the automotive industry.

The huge production rate requested resulted in a very short marking time of 0,2-0,3 seconds.

…DLA's Solution

Thanks to the "wobble" function able to mark thick paths in a single passage a a **V-LASE 20W** equipped with a standard F=160mm lens perfectly matched the customer requirements.

V-LASE 20W @ 1064nm
F-theta = 160mm
Wobble = 0.15mm @ 2000 mm/s

Marking time = 0,2s

Fast marking on plastic automotive components

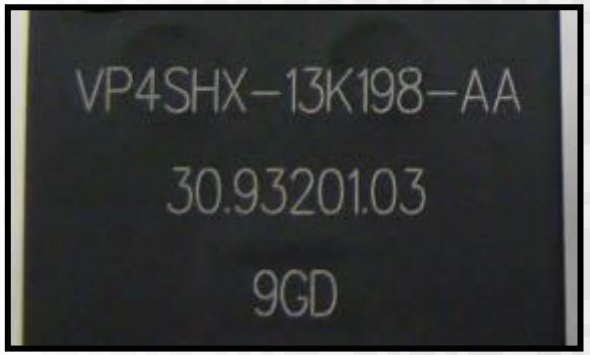
Customer Request…

The customer needed a very fast marking solution on the plastic shell of mechanical actuators for the **automotive** industry. **Simultaneous marking of several pieces** arranged in a planar layout was required. The marking consisted of alphanumeric strings for **traceability** purpose.

…DLA's Solution

DLA's **V-Lase 20 W** laser marker can provide excellent contrast by changing the color of the black surface of the samples. F-theta lens with 420 mm focal length provides a marking area whose size complies with the customer requirements. The marking time per piece is **less than 0.4 seconds**.

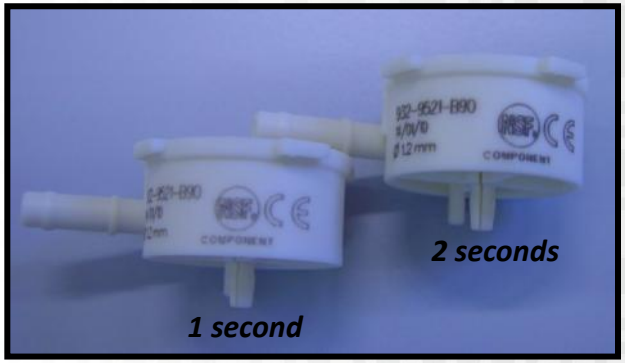
V-Lase 20W @ 1064 nm
F-theta: 420 mm
Marking time < 0.4 s



Marking on cylindrical flow sensors

Customer Request…

The request was to mark alphanumeric strings and small logos on the outer surface of cylindrical plastic (**PBT/GF35**) **flow sensors**.



…DLA's Solution

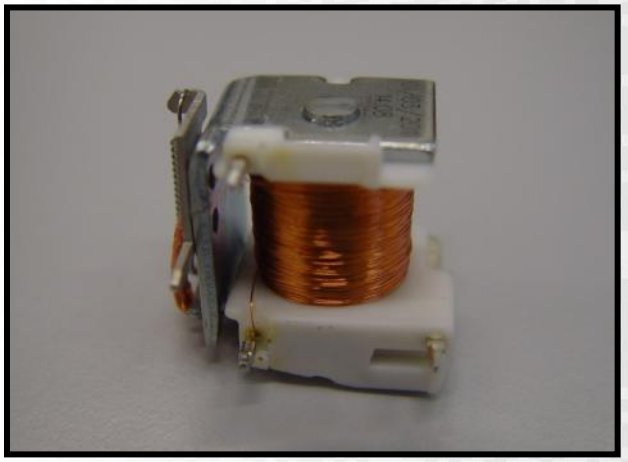
EOX @ 10.6 μm CO_2 laser marker, equipped with a standard f=100 mm lens, proves to be very effective in marking the specimens with a **visible dark contrast**. An amount of time of **1 s** is enough to obtain a clearly readable pattern.

EOX @ 10.6 μm
F-theta = 100 mm
Marking time = 1 - 2 s

Marking of date and time on relays

Customer's Request…

The customer wanted to mark two text lines onto the flat metallic part of an **electromechanical relay**. The main requirement was good readability, while the maximum cycle time was 2.2 s.



…DLA's Solution

Clear black figures can be marked by our compact infrared source **ZEUX 6W @ 1064 nm**. We chose a double-line font to draw thick lines while maintaining a high marking speed. The marking time is **1,8 s**.

ZEUX 6W @ 1064 nm
f-theta = 160 mm
marking time: 1.8 s

Coding of Heating Elements for Major Domestic Appliances

Customer Request…

A leading company in Major Domestic Appliances and Industrial Applications requested to mark on a metal frame of the heating element a readable code together with several functional information.A key request was the longevity of the marks – meaning that the marking must resist for a long time to the corrosion and still be readable.

Marking time for all the task should be less then 4 seconds each piece in order to grant the expected productivity.

…DLA's Solution

The expected results are achieved by using a V-Lase 20W completed by the standard focal lens of 160mm length.

The brown contrast text strings are clearly visible while marked in less then 3.6 seconds.

The markings resisted to corrosion tests performed by the customer simulate the complete life cycle of the product.

V-Lase 20 @ 1064nm

F-theta = 160(S) mm

Marking time < 3.6 s

Marking of small copper component parts

Customer's Request…

The request of the customer was a laser-based solution to **replace tampographic printing** on **copper** component parts, ensuring good readability. The solution should offer the possibility of marking both text strings and small logos.

…DLA's Solution

DLA's **V-Lase 10 W @ 1064 nm** IR laser can easily mark on the surface of the specimens, displaying a clear **dark brown** contrast. The marking time for the entire layout is about **1.3 s** per piece.

V-Lase 10 W @ 1064 nm
f-theta = 160 mm
marking time: 1.3 s

Identification of stainless steel machinery tools

Customer Request…

The request of the customer was marking the **company logo and a set of symbols and text strings** onto **cylindrical steel tools**. The samples had to be mounted on a rotating device in order to write quickly on a large portion of the surface. The marking time (40 seconds maximum) was of great interest for this application.

…DLA's Solution

Arex 20W @ 1070 nm laser marker, equipped with an f=254 mm lens, meets the customer requirements. The amount of time needed to mark the whole pattern is 35 seconds for the steel samples and 3 seconds for the black-colored nickel-plated tools.

Arex 2000
F-theta = 254 mm
Marking time 3 – 35 s

Permanent marking on metal carbide tool inserts

Customer Request…

The customer needed to mark short text strings on **small carbide tool machine inserts**. The marking had to be **permanent and easy to read**, and the required cycle time was 0.5 s or less.

…DLA's Solution

Both **V-Lase 20W** and **Arex 2000 (20W)** infrared laser markers are suitable for this kind of application. The higher laser power delivered to the sample by Arex allows faster marking. The cycle time needed to mark on the side of each sample is **400 ms** for V-Lase 20W and **150 ms** for Arex 2000, respectively.

V-Lase 20W
F-theta = 160 mm
Marking time = 400 ms

Arex 2000 (20W)
F-theta = 160 mm
Marking time = 150 ms

Marking of expiration date on cardboard package

Customer Request…

The customer wanted to mark the **expiration date** and the **batch code** onto cardboard used in **food packaging**. The date string had to be 5 mm high, while the code 2.5 mm high. Additionally, the customer requested that the marking be performed at a linear speed between 40 m/min and 80 m/min, which gives a maximum **marking time between 185 ms and 100 ms**, respectively.

…DLA's Solution

EOX 30 W @ 10.6 μm CO_2 laser marker, equipped with an f=100mm lens, is capable of marking the desired information in single-line font, resulting in excellent readability on differently colored cardboard. The amount of time to mark the whole text is **100 ms**, thus allowing a line speed of about 80 m/min.

EOX 30 W @ 10.6 μm
F-theta = 100 mm
Marking time: < 100 ms

Marking on fly on cardboard boxes for chocolate

Customer's Request…

The customer wants to replace inkjet method to mark expiration date and batch code on cardboard boxes for **chocolate bars**. The line moves at **45 m/min** and the production rate is 4 pieces per second.

…DLA's Solution

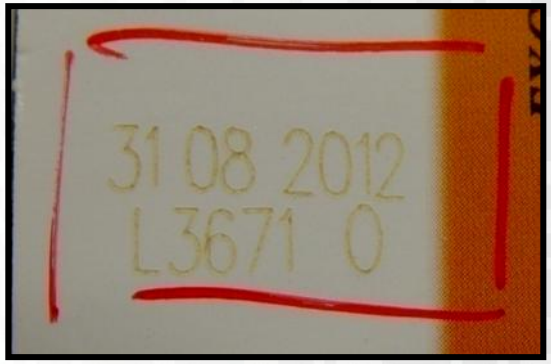
DLA's **EOX 30 W @ 10.6 μm** CO_2 laser is the ideal solution to mark cardboard. Single-line fonts help saving time when marking at high speed is required. The net marking time is less than 100 ms.

EOX 30 W @ 10.6 μm

f-theta = 100 mm

Single-line font, size 3 mm

Marking time 90 ms



Traceability of wood blocks using four-dot technique

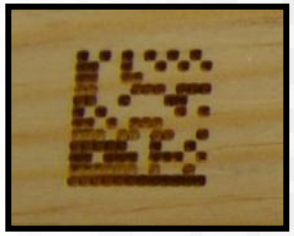
Customer's Request…

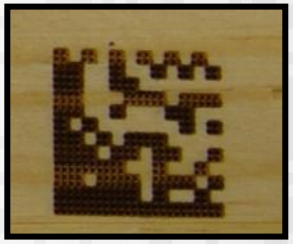
The standard method of marking **2D codes** is based on a matrix of square modules. When the surface of **wood** displays **grains having different color and hardness**, the code may not appear uniform. As a consequence, decoding through vision systems can be unsuccessful.

…DLA's Solution

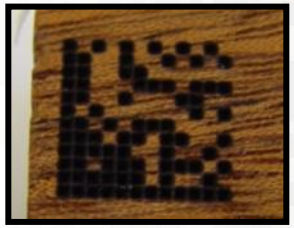
DLA's **EOX 30 W @ 10.6 μm** CO_2 laser is the ideal solution to mark wood. We developed a **four-dot technique** to replace each module with four adjacent dots, thus focusing the energy of the beam in a smaller region. This technique provides uniform dark contrast even when the wood has surface grains.

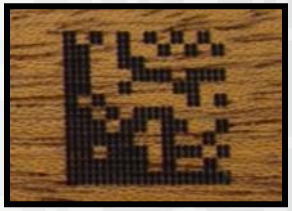
EOX 30 W @ 10.6 μm
f-theta = 100 mm
2D code: 12x12 mm - 12x12 modules
standard technique : ~ 2 s
four-dot technique : ~ 1.5 s





standard technique *four-dot technique*





Surgical tools surface marking for traceability

Customer Request…

Hospitals and medical environments in general, in addition to demanding accuracy in non-disposable tools cleaning, look for traceability methods to manage huge amounts of tools. **Datamatrix codes** can solve this issue, but marking must not involve any modifications of the metal surface. Also, the marking system must fit strict space requirements, looking for **small footprint** in hospital technical departments.

…DLA's Solution

DLA's **Ulyxe 6W** infrared laser marker can easily fit into **small marking equipment**, and its 1064 nm wavelength achieves **high-contrast** 2D marking on tools surface, making them easily readable despite metal reflection. The tools have subsequently passed through over **1000 sterilization cycles** without any significant fading or signs of rusting.

Ulyxe 6W @ 1064 nm
F-theta = 160 mm
2D resolution: 12 mils, 7 mils, 4 mils

Traceability marking on “hard to mark” medical plastic

Customer Request…

UHMWPE (ultra-high molecular weight polyethylene) is a very important material in **medical applications**, like joint replacement. **Serial and lot numbers** are required in production: infrared lasers aren’t effective because the surface of the material reacts irregularly. The marking has to be **readable, permanent and non-dangerous for the human health**.

…DLA’s Solution

DLA’s **Green-Lase 10W @ 532 nm** laser can effectively mark UHMWPE in **human readable** applications. Small bursts are produced by the laser spot, resulting in a nice visual effect. It is demonstrated that the marking process doesn’t affect the mechanical properties (namely, the resistance to tensile stress) of the samples.
A 160 mm f-theta lens covers up to 100 x 100 mm marking area.

GreenLase 10W @ 532 nm

F-theta = 160 mm

Marking time: n. a.

Logo and text marking on metal medical implants

Customer Request…

CoCrMo and AISI 630 alloies are largely used in medical **implants**. When customization or traceabilty marking is needed, after the laser process, the part must undergo special treatments and the surface must be not engraved. Nevertheless, the marking must **remain visible.**

…DLA's Solution

DLA's ***VLase 10W*** laser marker, ***1064 nm*** wavelength, can achieve **readable** and treatment resistant marking, without exposing the surface to oxydization. Here's a knee part implant case and a generical part case.
160 mm F-theta lens cover up to 100 mm marking area.

Setup:

VLase 10W @ 1064 nm
f-Theta 160 mm

Barcode marking on PV panels aluminium frame

Customer Request…

Solar panels are manufactured on a fully automatic line. Data have been laser-marked on the aluminum frame profile, black and silver aluminum alloy anodized. After lasering the laser marking have been verified by a barcode reader in order to check the result.

…DLA's solution

DLA's ***Zeux*** laser marker, ***1064 nm*** wavelength, achieves both speed and quality. 160 mm F-theta lens cover up to 100 mm marking area.

Setup:

Zeux @ 1064 nm
Ftheta 160 mm

Laser customization of tap handles

Customer's Request…

The request of the customer was marking a small logo on the **handle of a tap**. According to the customer's expectations, a **golden color** should be achieved. The maximum marking time is 3 s.

…DLA's Solution

DLA's **V-Lase 10 W @ 1064 nm** marker meets the customer's requirements. The desired color is obtained in about **2.8 s**.

V-Lase 10 W @ 1064 nm
f-theta = 160 mm
marking time: 2.8 s

Direct laser marking on plastic animal tags

Customer Request…

The request was to provide a compact laser marking solution for animal tag marking in order to serve decentralized service providers for local laser re-tagging of animals.

Marking time was a challenging constraints to be kept below 10 seconds for the overall animal tag pair (the tag plus the round button) .

…DLA's Solution

Selecting the appropriate laser and filling parameters enables the Ulyxe laser equipped with a f-theta lens of 254mm to perform a fast marking with dark gray contrast on both yellow and orange colored tags.

Ulyxe 6W @ 1064nm
F-theta = 254(S)mm

Marking time less then 10s

Color change on plastic immersion pump body

Customer Request…

The customer manufacturing immersion pump was requesting to mark the information plate directly on the pump plastic body.

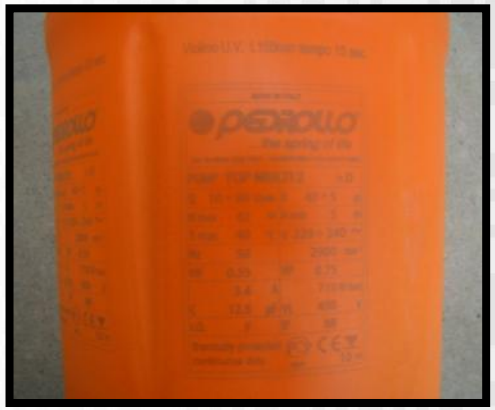
The expected production rate required a marking time within approximately 30 seconds.

…DLA's Solution

The orange colored PA66GF30 immediately appeared to be very "hard to mark" by using standard infra red laser sources while **UV-LASE** running @ 355nm easily performed better then expected marking whit a suitable contrast.

UV-LASE 3W @ 355nm
F-theta = 160mm

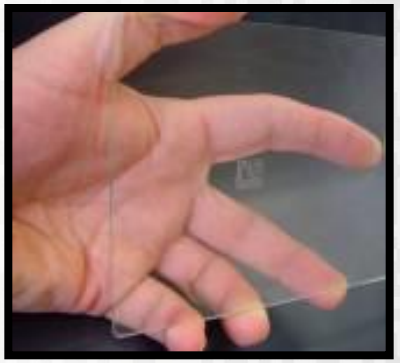
Marking time less then 15s



Glass Substrate Traceability on Solar Cells

Customer Request…

Traceability through Datamatrix code, alphanumerical code, or both, is highly recommended in ***solar cells glass substrate*** production. But laser marking on one side of the panel might affect also its opposite side, where a very thin TIN coating is applied. So ***accurate and selective laser marking is required.***



…DLA's Solution

When DLA's **UV –LASE** laser marker is adjusted to focus on the uncoated side, there's no effect on the opposite side of the thin glass substrate.
Since traceability marking requires small sizes, marking speed from 50 mm/s to 150 mm/s, provides high ***throughput***, depending on fonts and graphics.
Setup:

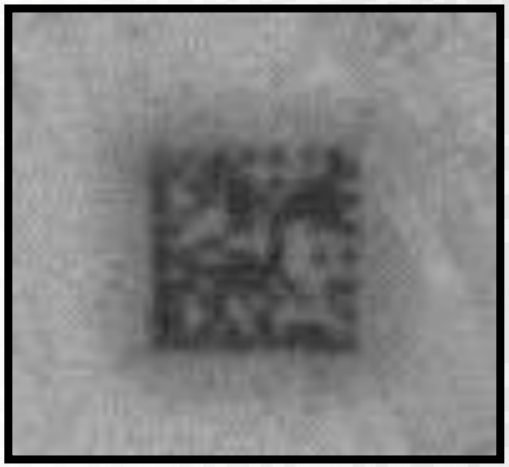
UV-LASE *@ 355 nm Wavelength*
f-Theta 100 mm

2D resolution: 12 mils, 7 mils, 4 mils

Datamatrix marking on silicon wafer for PV industry

Customer Request…

Solar cells manufacturers deal with Polycristalline Silicon which is highly sensitive to mechanical stress. Traceability data must be hidden in corners and involve as small as possible surface. ***Laser Direct marking*** is the solution to increase productivity and throughput. It's possible to mark ***1mm 14x14 2D*** codes.



…DLA's Solution

DLA's ***GreenLase 10W*** laser marker, ***532 nm*** wavelength, achieves both speed and quality. 160 mm F-theta lens cover up to 100 mm marking area.

Setup:

GreenLase 10W @ 532 nm

Ftheta 160 mm

References

Automotive	Electronics	Machinery	Other
Magneti Marelli	Siemens	Sandvik	Schaeffler/INA
Valeo	Rockwell Automation	Seco Tools	Rockwell Collins
Thales	SAE Magnetics	Schneeberger	Dexter Russell
Delphi	Magnecomp	Giuliani IGMI	General Electric
Mahle	Foxconn	CML	E.G.O. Products
TRW	Samsung		Saint-Gobin
Schaeffler/FAG	Apple		Pilkington
Shrader	Sony		Caterpillar
Daimler Chrysler	Nokia		Rolex
Volkswagen			Stryker Trauma
Audi			Trisa
BMW			
Fiat			
Porsche			

Thank you!

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