CONFIDENTIAL

VULQ1-S from QiOVA

The fastest laser marking solutions in the market

QiOVA presentation - Agenda

- QiOVA® at a glance
- Multibeam laser processing
- VULQ1® offering
- Industrial applications

Qiova at a glance

Pioneers of multibeam laser processing for industry

2011

Founded, pionneering multibeam laser technology application to material processing

2015

Releasing VULQ1 Module Gen1

First OEM beam shaping module in the market

2021

Raised 1,3M€ to boost deployment of multibeam solutions into the market

2022

Releasing VULQ1 Module Gen2

2022

Award Winner – Laser system for industrial production engineering

2022

Horizon Europe project « OPeraTIC » (500k€)

To develop high throughput laser surface texturation

2022

Eurostars project laureate « BrandGuard » (500k€)

To market novel high security marking system

2023

VULQ1 Multibeam laser

Standard offering

2023

France 2030 laureate

Individual project (800k€]

Smart laser tools for the industry of the future

2023

Strategic partnership with Neyret Group – focus on multibeam solutions for Luxe segment

2024

Serie A 2,25M€

Industrial group leading round

Latest news 2024

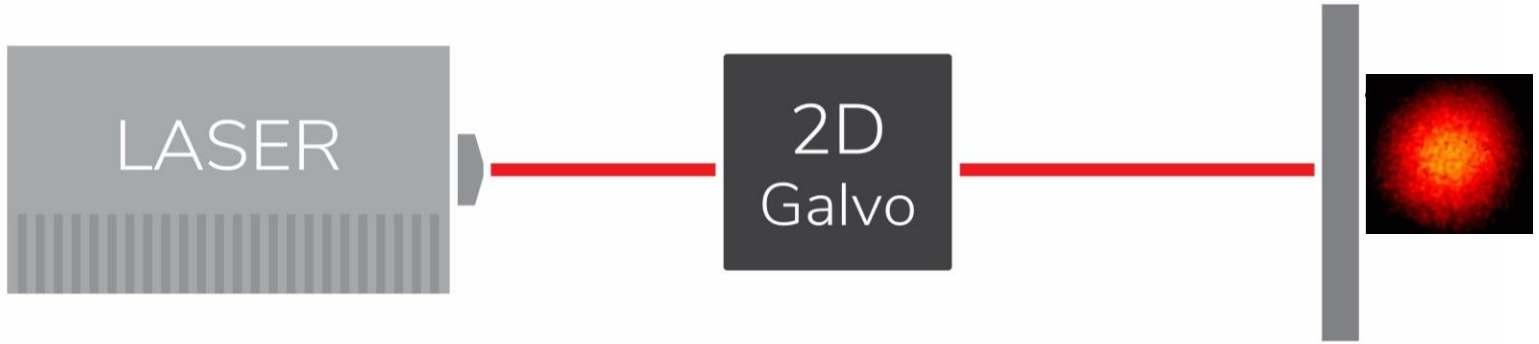
- Serie A funding – 2M€+ to accelerate market penetration
  - Led by top french Luxe industrial group

- >1 M€ booking by May
  - Pharmaceutics and luxe sectors leading, marking systems driven
  - Electronics and industrial goods to follow

- x3 revenue in FY2024 vs FY2023

- Consolidating team with 8 new hires

Current bottlenecks in laser processing

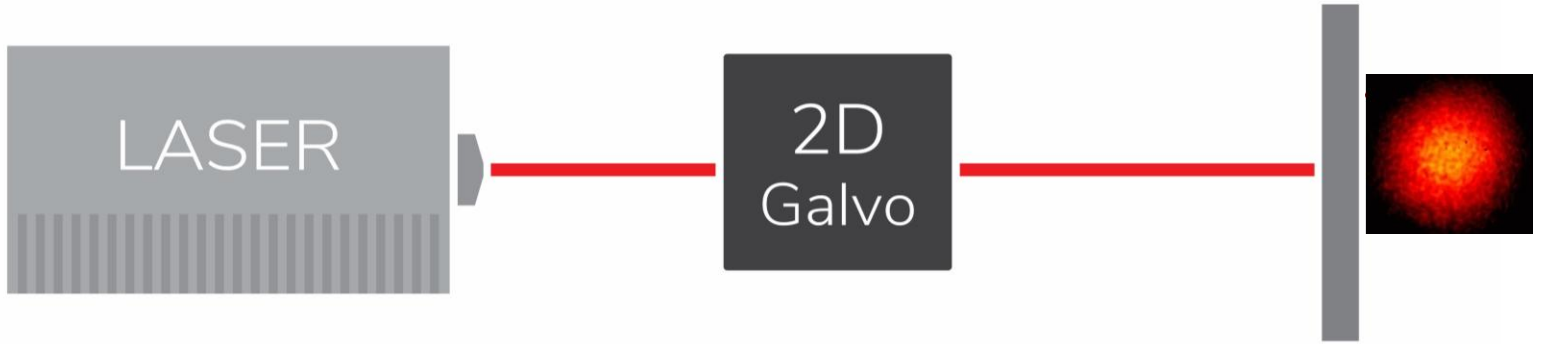


Standard laser processing
Sequential, like a pen on a sheet of paper

Using <u>only scanning</u> for laser beam delivery creates limitations in:

1. Throughput
2. Efficiency, especially for USP processing
3. Flexibility

Our solution: dynamically programmable multibeam laser processing

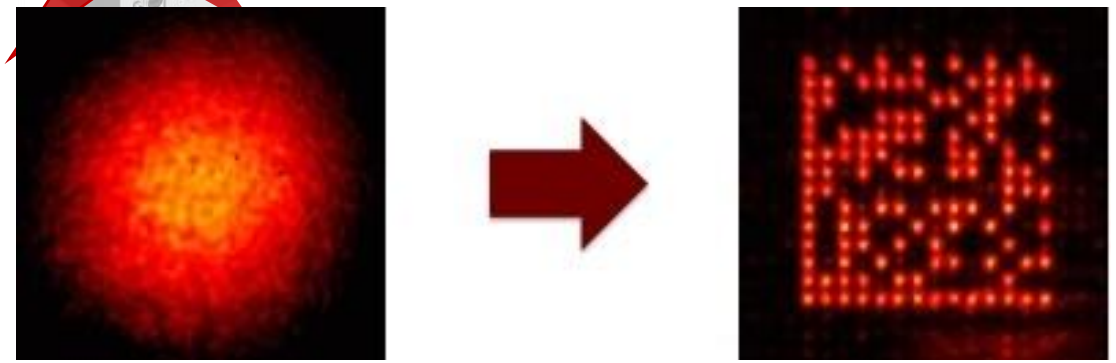


Standard laser processing
Sequential, like a pen on a sheet of paper

Programmable multibeam laser processing
Dynamically parallelized, like a digital mask approach

Faster
More efficient
More flexible

The programmable multibeam technology



VULQ1 programmable multibeam technology

shapes light from the laser beam

on-demand and in real time

to maximize process performance at each step

VULQ1 generates up to hundreds laser beamlets on-demand, from one single laser beam.

The beamlets characteristics are individually and dynamically controlled by software - in position, profile and energy - to create the "*multibeam pattern*" fitted to the process needs.

The many beamlets composing the "*multibeam pattern*" are applied simultaneously to the material, scaling up throughput with no compromise on quality.

Multifold process throughput & efficiency increase

Spatial resolution < 50µm

Our purpose: Better laser solutions for a better manufacturing

Since 2011, QiOVA pioneers multibeam laser solutions to **enable cost-effective and ecofriendly late-stage personalization** of industrial goods

Surface treatment

Sustainable decoration, functionalisation

Sectors :

Luxe, beverages, cosmetics, automotive

Internal product traceability(B2B)

Track&Trace, anticounterfeiting

Sectors:

Medical, luxe, electronics, beverages

External product traceability (B2C)

Digital marketing, Digital Product Passport

Sectors:

Durable consumer goods, luxury goods, electronics

Industrial applications

POCHET DU COURVAL

NEYRET

TISSEUR D'INNOVATION

Sustainable glass decoration

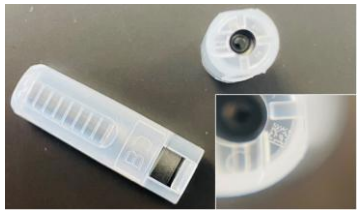
New design possibilities, permanent, no addings

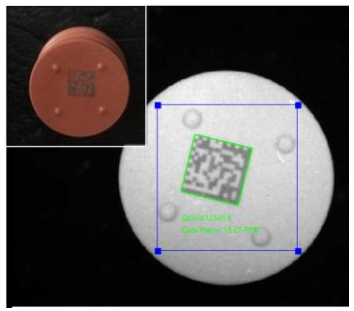
5x faster than standard laser

SCHOTT glass made of ideas

Lilly

BD





Serialization of medical devices

Permanent, seamless integration in-line

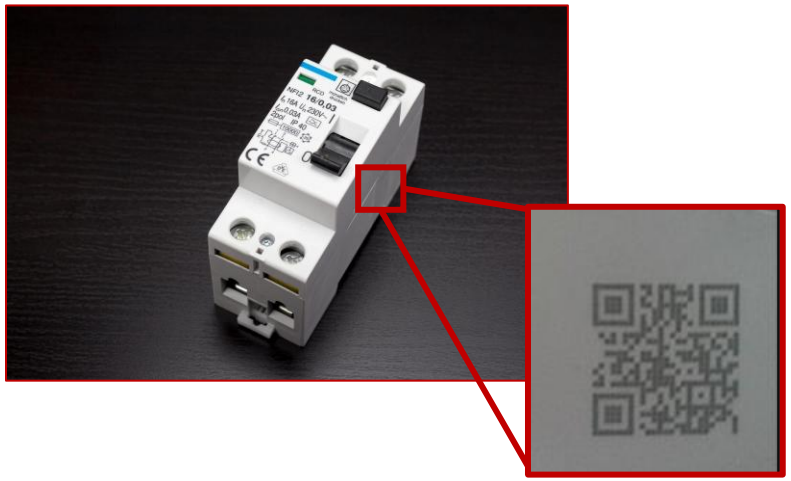
72 000 parts / hour

BIOMÉRIEUX

Sidel

Macsa id

a code you can trust



Serialization of electrical goods

4x faster than current UV laser marking

14 400 parts/hour

An unique offer of products and expertise to deliver superior throughput for industrial applications

Pre-sales service

Defining custom solution

- *Feasability studies*
- *Application development*
- *Pre-series*

VULQ1 Multibeam OEM offer

Delivering higher performance

- *Manufactured in our factory*
- *Standard and custom OEM systems*
- *Retrofit/integration in environment*

VULQ1-M
Optical module

VULQ1-S
Laser marking systems

After-sales service

Maximizing uptime

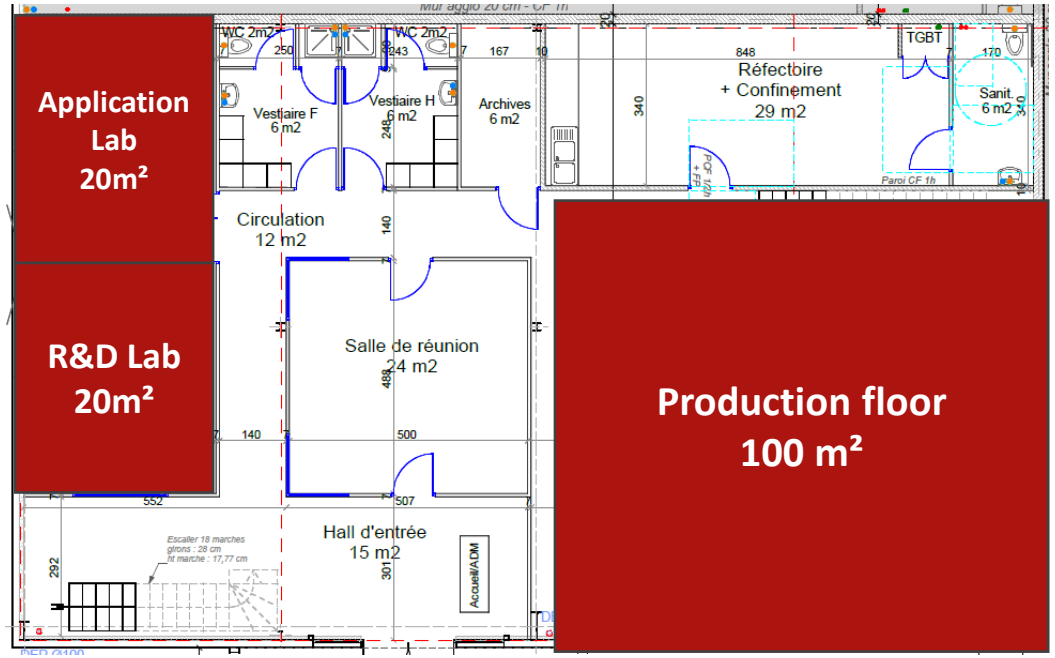
- *Maintenance*
- *Warranty extension*
- *Contracted services*

Custom Laser marking systems

QiOVA – Our factory

- **Factory located in the region of Saint-Etienne**
- Brand new industrial activity park
- 5min from highway, 1h from Lyon airport

- **Laser R&D laboratory**
  - Lasers: NIR & visible, up to 30mJ, 25W, nanosecond to femtosecond
  - Equipment: 3D printer, charaterization
- **Application laboratory**
  - VULQ1 STAMP marking systems
- **Production**
  - 50-100 VULQ1 modules / year
  - 20 VULQ1 systems / year



IP Qiova – A growing international patent portfolio

Patent family n°1
FLASH marking

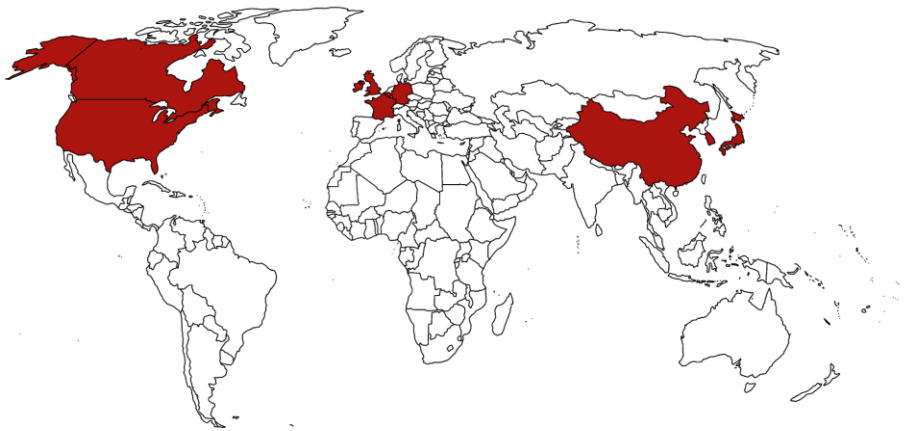
FR3023206B1 (process + system)
FR3023207B1 (principle of use)

WO2016001335A1
(PCT extension)

EP3164828B1 (GB, FR, DE, BE)
CA2953439C
CN106573336B
JP6720156B2
KR101904680B1
US10350705B2

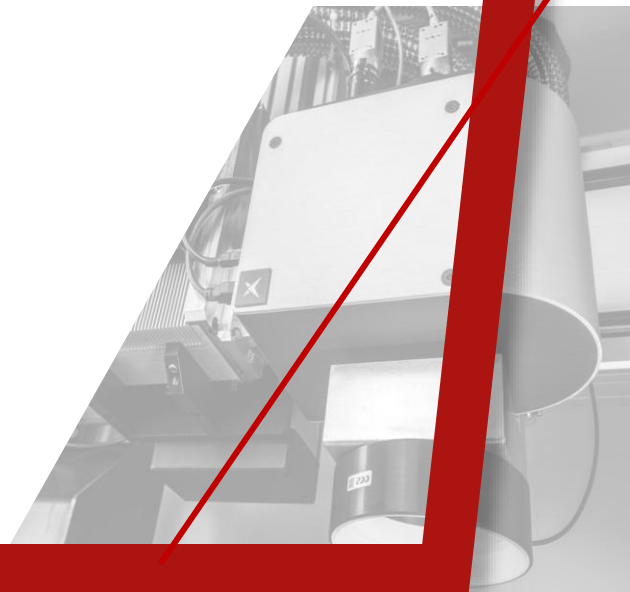
Patent family n°2
High-speed printing

France - FR 3121060
International Extension – WO/2022/208020



Additional IP pending for the micromachining sector

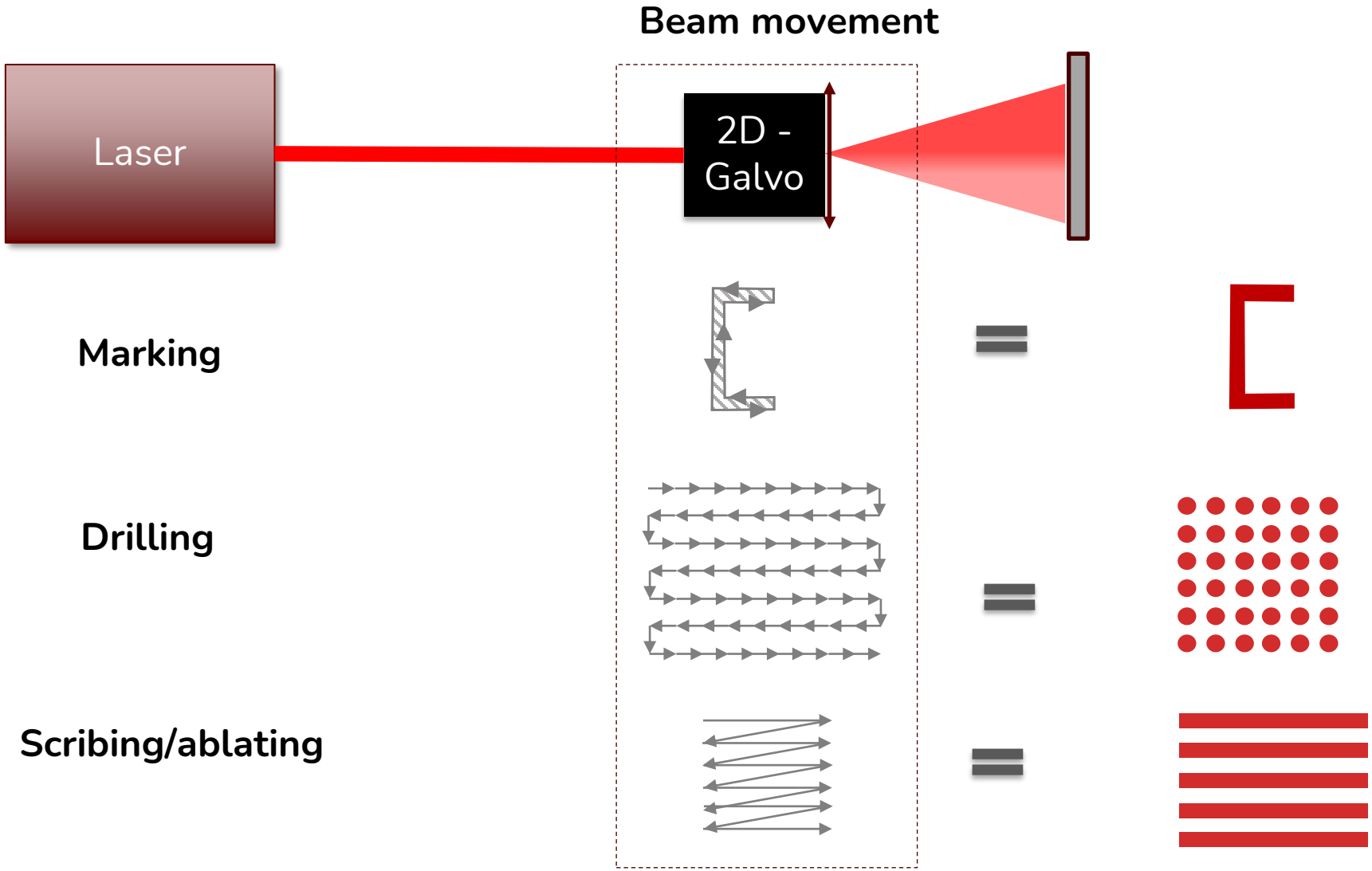
From standard laser processing to multibeam laser processing



Standard laser processing

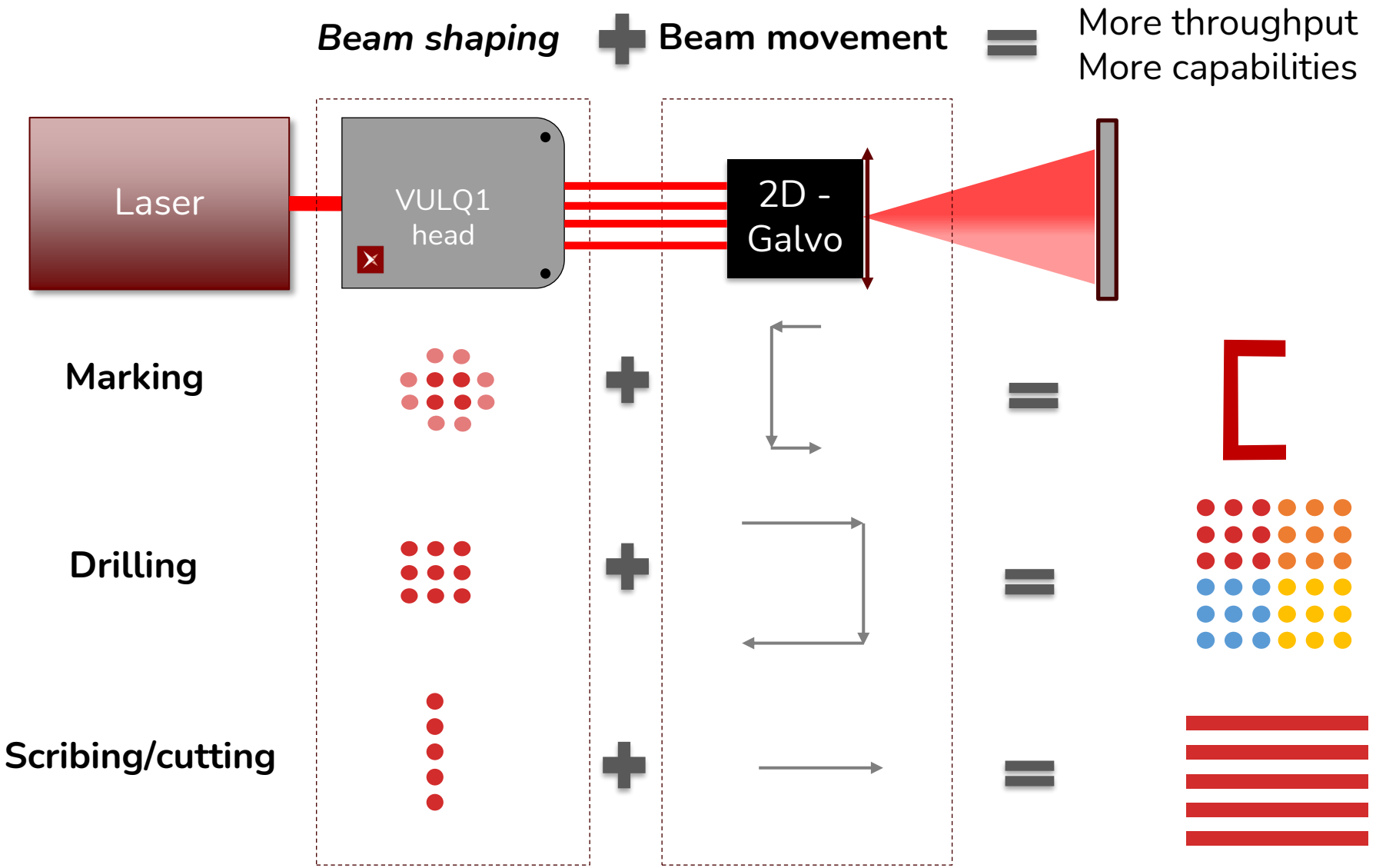
Typical operation modes:

1. Marking
2. Drilling
3. Scribing/ablating



Multibeam laser processing eliminates useless movements

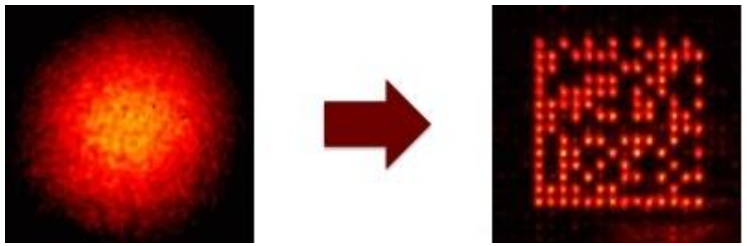
Less beam movement = More throughput



VULQ1 unique marking methods = laser stamping

PATENT#1
FULL-STAMP marking method

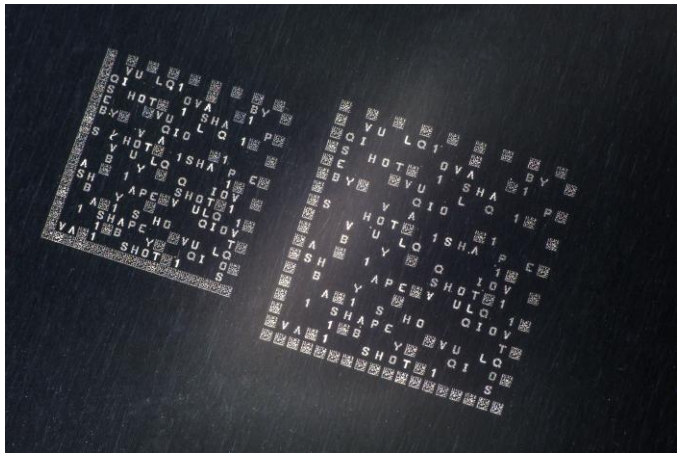
ONE LASER PULSE = ONE MARKING



Link to youtube video

PATENT#2
PIXEL-STAMP marking method

HIGH SPEED LASER STAMPING



Programmable multibeam processing is operated like standard laser processing

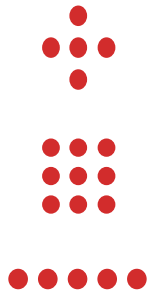
Standard

Laser marking sequence

1. Configure scanner software
   a) Load laser settings:
      - Power
      - Repetition rate
   b) Load scanner settings
      - Trajectories
      - Scanning speed
2. Start laser marking job

Multibeam

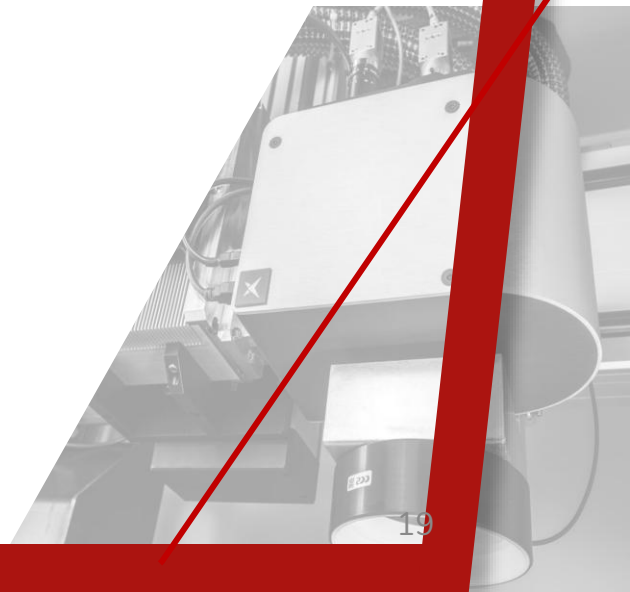
Laser marking sequence



1. **Configure BeamForge API**
   a) **Choose pre-loaded laser beam shape**
   b) **Define custom laser beam shape**
2. Configure scanner software
   a) Load laser settings:
      - Power
      - Repetition rate
   b) Load scanner settings
      - Trajectories
      - Scanning speed
3. Start multibeam laser marking job

- Same method to define laser marking jobs, also similar HMI
- Gaussian laser physics is the same in multibeam processing: no change defining focusing lens, spot sizes, etc..

VULQ1 offering



VULQ1™ Product Offer:
From optical module to stand-alone laser marking system

VULQ1-S Systems FLASH series

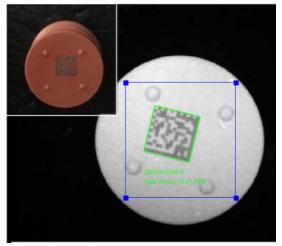
- Model NS NIR
- Model NS VIS

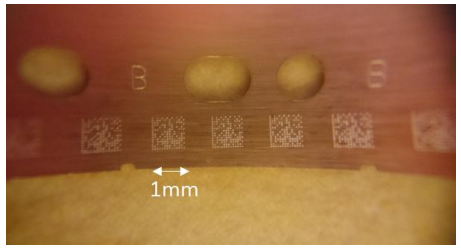
VULQ1-S Systems BEAMS series

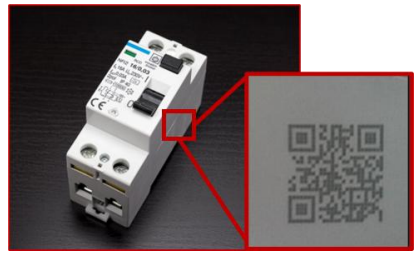
- Model NS NIR
- Model NS VIS
- Model FS NIR

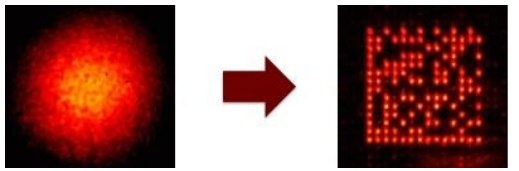
VULQ1-M Modules

- BBD-P010
- NIR-P050
- VIS-P050
- NIR-P100

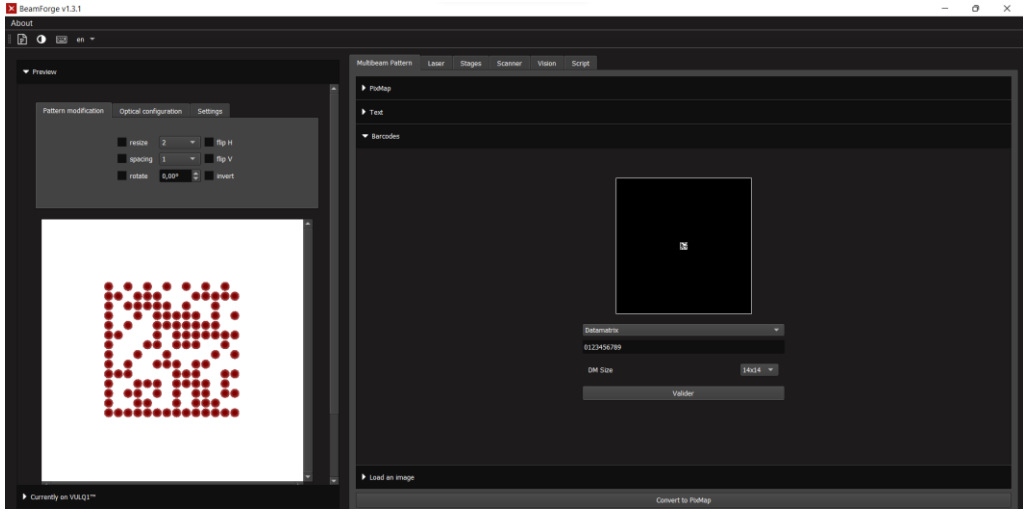




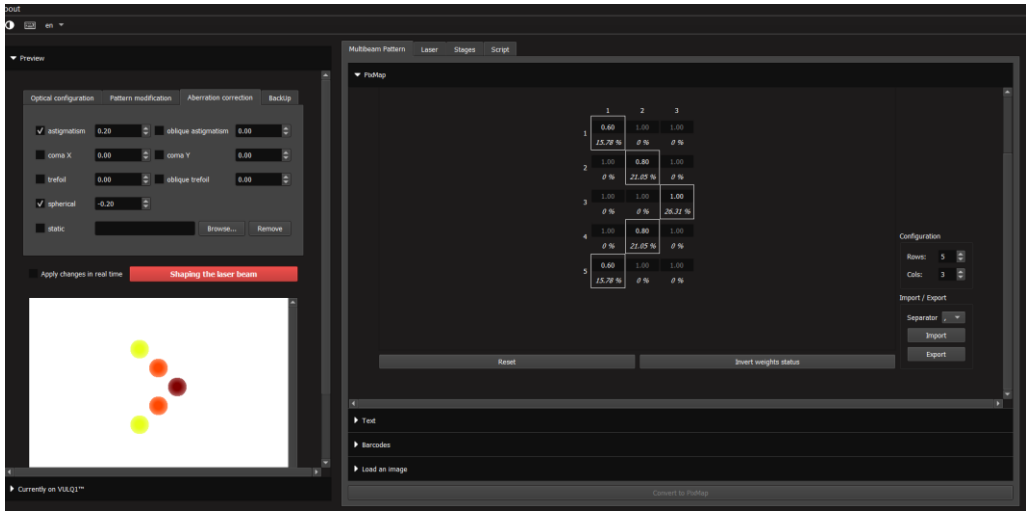




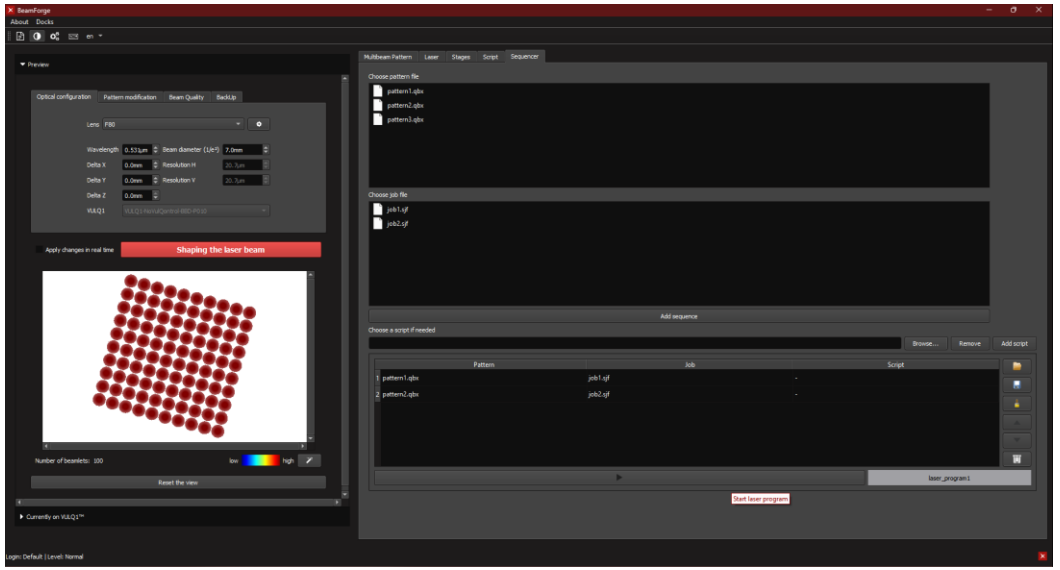
All powered by our proprietary software suite BeamForge



Generate 2D codes automatically from data

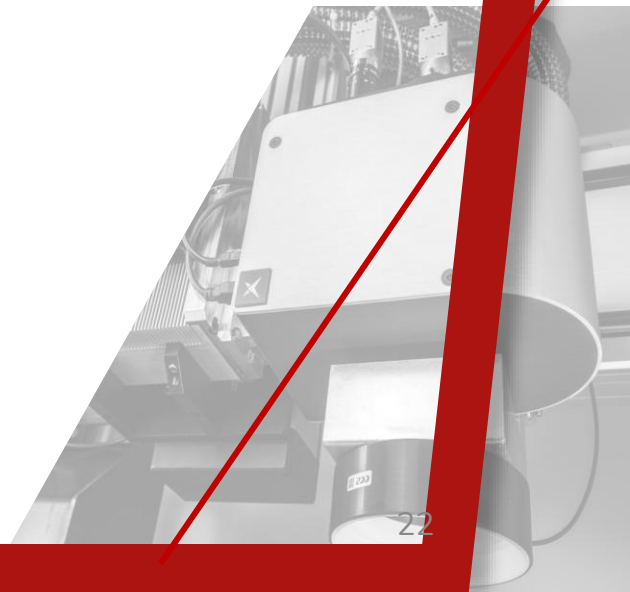


Create your own multibeam shapes interactively, save and reload on demand.



Drag-and-drop beam shapes, scanning jobs and scripts **to create custom marking sequences**

VULQ1-S
Multibeam Laser Marking systems

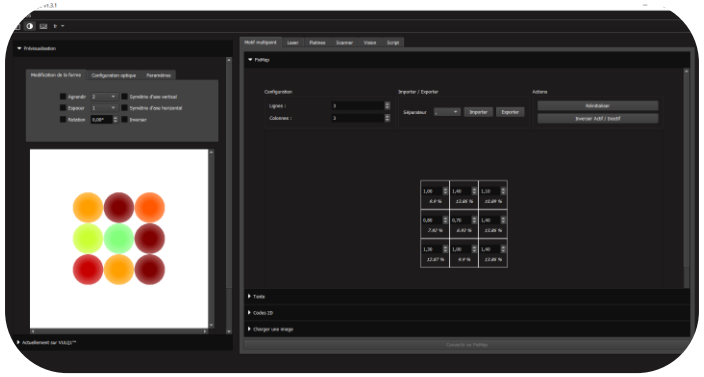


VULQ1-S Multibeam Laser marking system components

1. **Multibeam Laser head**
   - Wavelength: NIR or Visible
   - Up to 80W power
   - Up to 40mJ energy
   - Down to fs pulse duration range

2. **Control bay**
   - 19’’ rack bay
   - Includes water connection
   - Default 5m connection cable to the laser head

3. **BeamForge software**
   - Main software with interactive graphic tools
   - Embeddable API version for integration

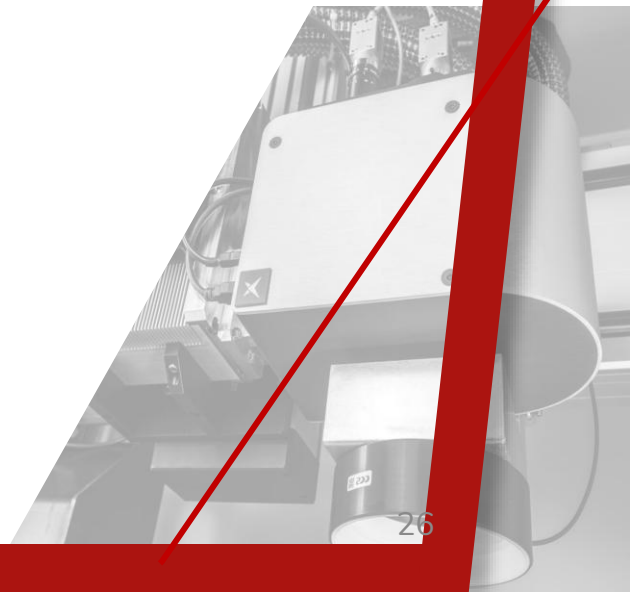


VULQ1-S: a modular system range to provide an industrial response to every mass customization need

Product line	Model	Max Energy	Max Power	Pulse duration	Wavelength	Materials	Marking time
VULQ1-S FLASH series	NIR	40mJ	4W	ns	1064 nm	Metals, coated materials, polymers, moulded compound	**<10ns**
	VIS	40mJ	4W	ns	532 nm	Polymers, films, multilayers, elastomers	**<10ns**
VULQ1-S BEAMS series	NS NIR	6,4mJ	64W	ns	1064 nm	Metals, coated materials, polymers, moulded compound	**3-10x shorter (*)**
	NS VIS	3,2mJ	32W	ns	532 nm	Polymers, films, multilayers, elastomers	**3-10x shorter (*)**
	FS NIR	800µJ	80W	ps-fs	1030-1064 nm	Ceramics, glass	**3-10x shorter (*)**
	(*) Marking time typically 3-10x shorter than conventional laser marking						

- High throughput laser marking systems based on programmable multibeam technology
  - Infrared and visible spectral range
  - Up to 80W power
  - Up to 40mJ energy per pulse

VULQ1 multibeam laser marking systems
Industrial applications



Technology differenciation regions

Shortest marking time <10ns

- Line-speed >100m/min
- Roll-to-roll
- Automated lines

Technical substrates

- Polymers
- Glass
- Ceramics
- Thin-layers

Fine marking Micromachining

- High resolution
- High selectivity: shallow marking
- Discrete: covert marking

Target sectors

***Shortest* marking time**

Technical substrates

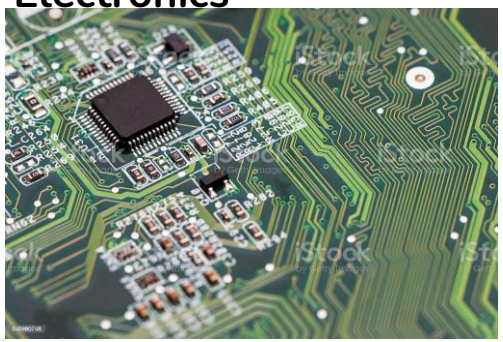
Fine marking Micromachining

Electrical products

Medical devices

Luxe

Electronics

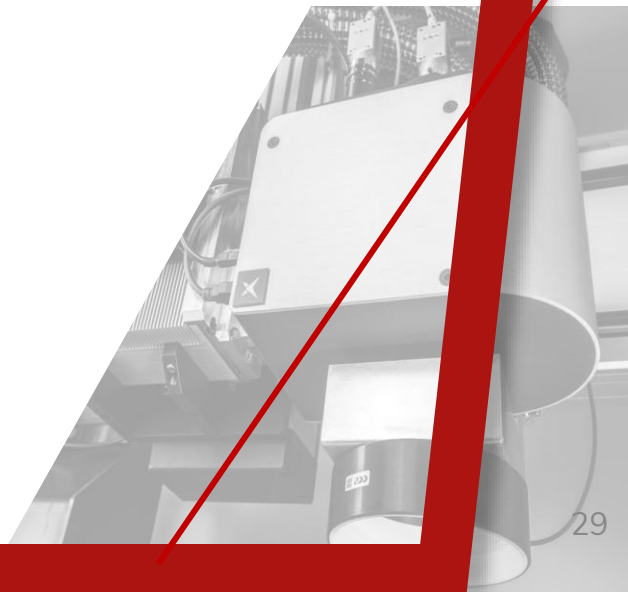


FMG packaging

Beverages

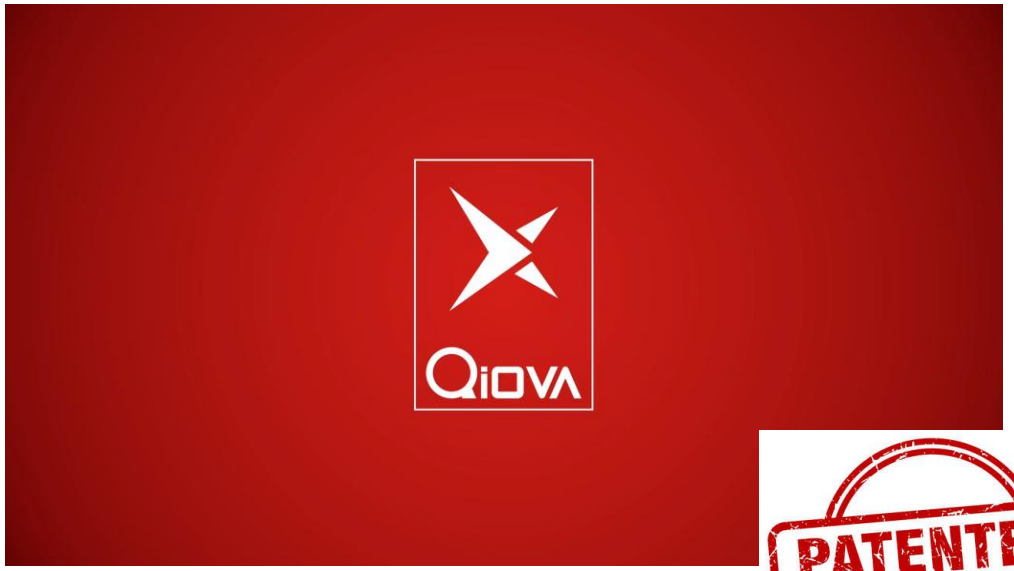
Applications examples with

VULQ1-S FLASH series



VULQ1-S FLASH series: The best permanent serialization solution for fast lines

Link to youtube video FLASH marking



Product features

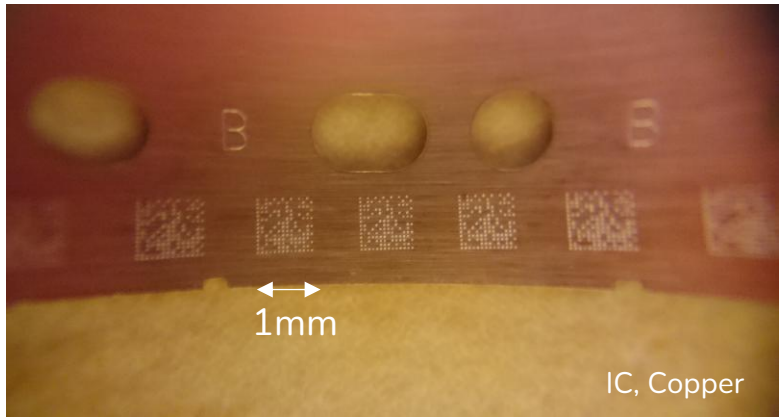
- **Shortest marking time of the market <10ns**
- Supports QiOVA's patented FULL-STAMP marking method
- 20Hz serialization rate
- 2kHz lot marking rate
- Down to 300µm code size

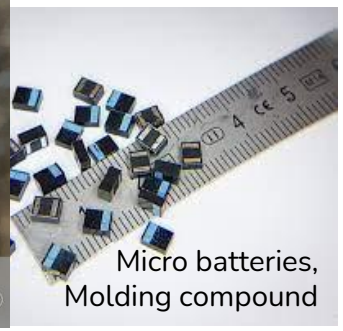
Applications:

- In-line serialization of small products
- In-line serialization of components
- Anticounterfeting

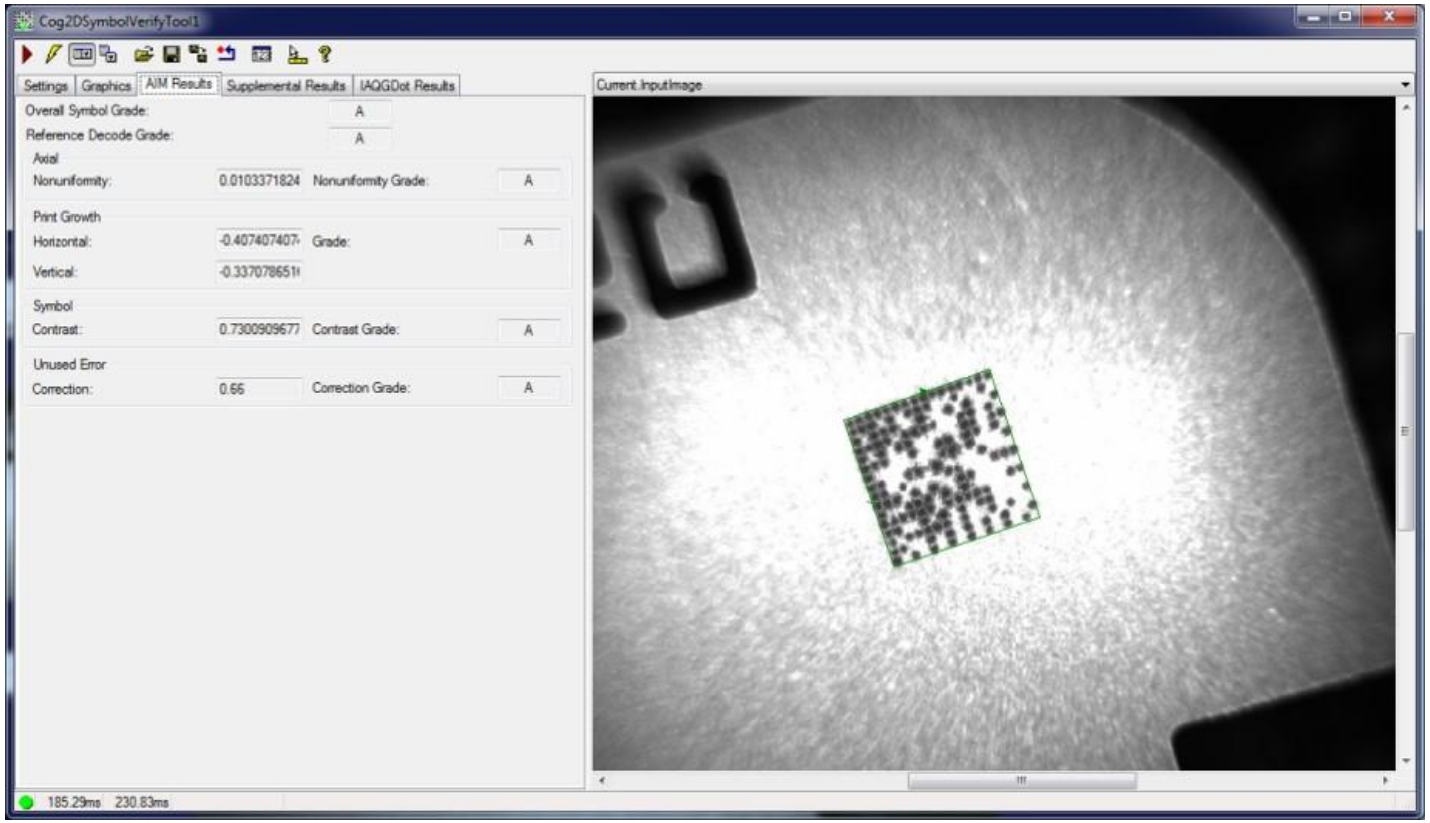
Sectors

- Medical
- Electronics & semiconductors





VULQ1-S FLASH series delivers speed & marking quality



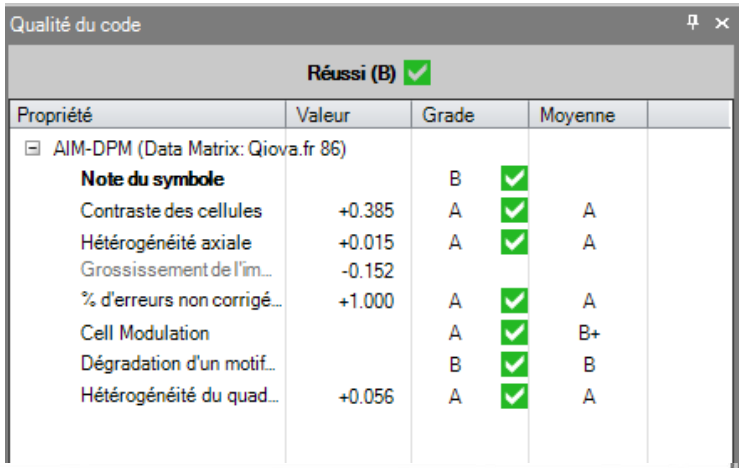
- Datamatrix 16x16 marking on IC chip, 1mm size code
- A Grade quality
- 10 unique 2D codes per second, on the fly marking

In-line serialization of insulin cartridge

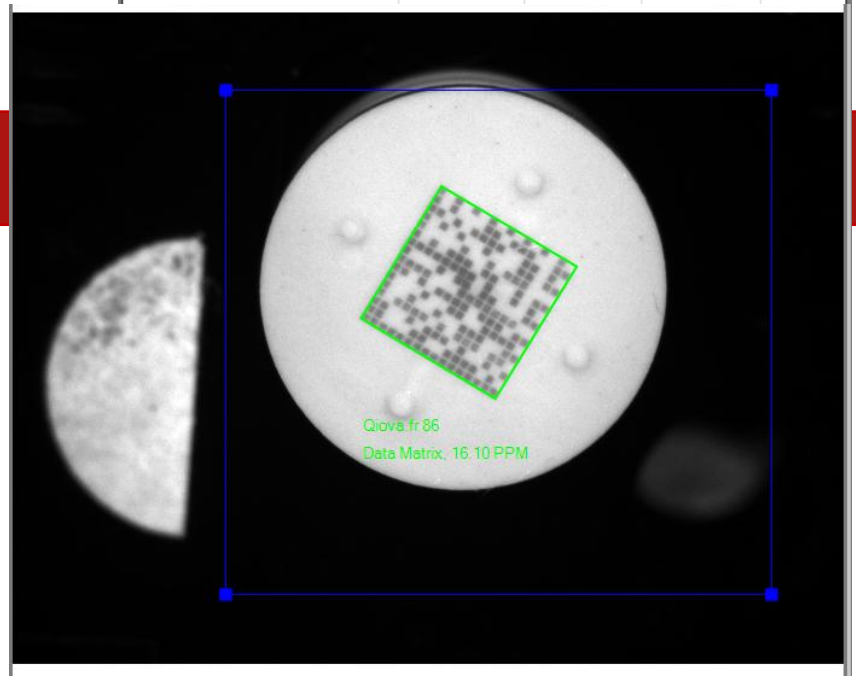
MATERIAL:
•Elastomer

DM14x14 GS1 code:
•2,5mm

Product & process:
- FLASH NS VIS
- FULL-STAMP



Market: **Medical, pharmaceutical packaging**



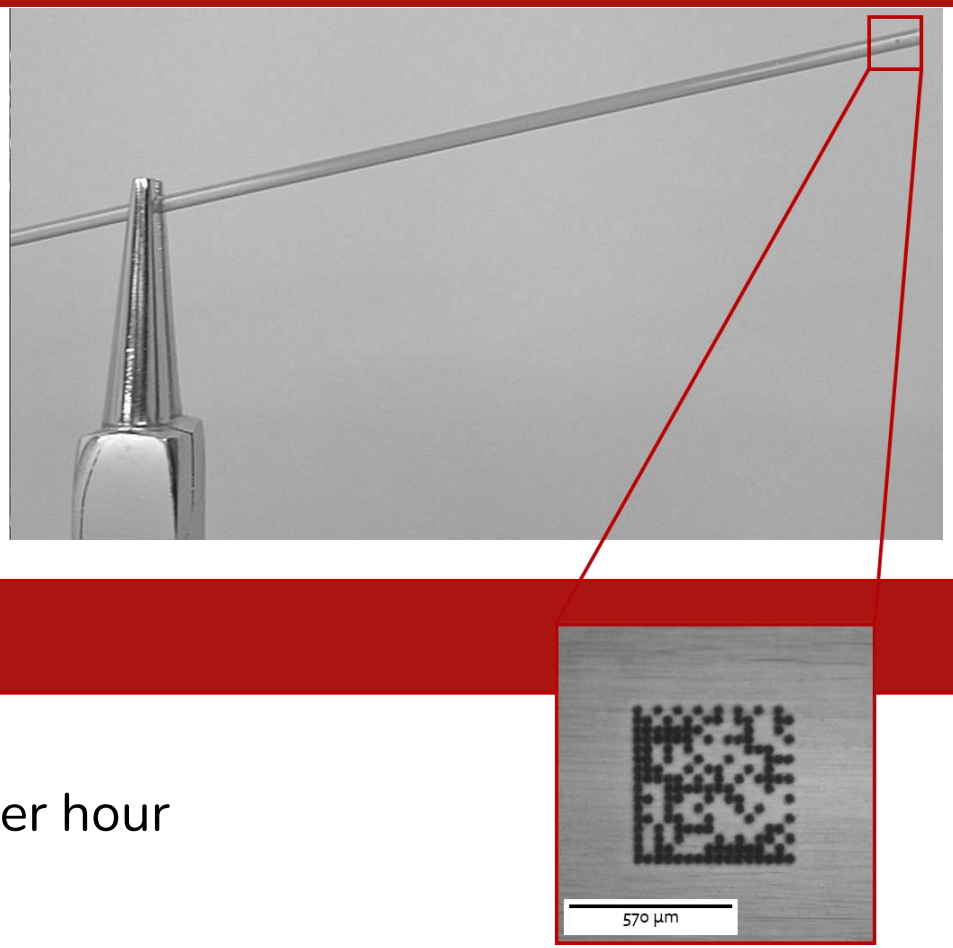
- In-line on-the-fly marking, 600u/min
- **Marking in one pulse with FULL-STAMP patent**
- Marking Quality: Grad A to C
- **Straightforward retrofit, with +/-4mm depth of focus**

Batch product identification on small medical device

MATERIAL:
PVC polymer with additives

DM 16x16
570µm

Product & process:
- FLASH NS NIR
- FULL-STAMP

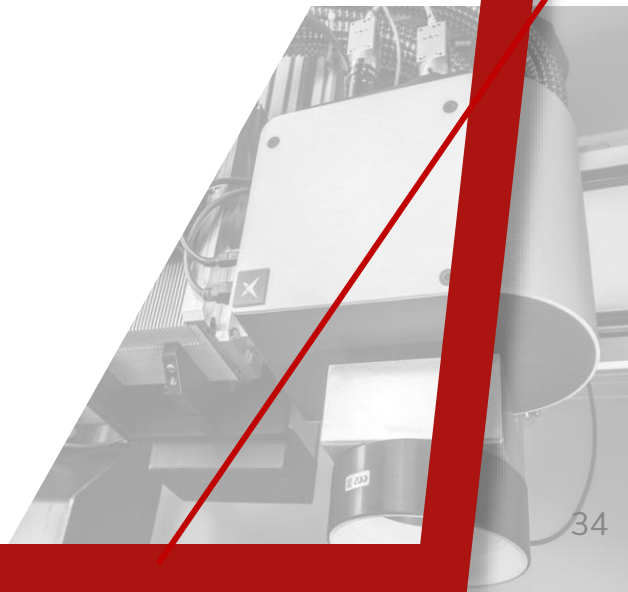


Market: **Medical**

- Throughput: 77 000 parts marked per hour
- Resolution: DM 16x16 in 570µm
- Readable on-site with smartphone to allow secure transaction WW and customer support

Applications examples with

VULQ1-S BEAMS series



VULQ1-S BEAMS series: laser processing now AUGMENTED

Features

- **Typical x3-x10 throughput increase vs conventional marking**
- Supports QiOVA's patented PIXEL-STAMP marking method
- Surface marking rate in cm^2/s with micron resolution
- Glass
  - High-end soft touch and appearance
  - No micro-cracking when cold marking

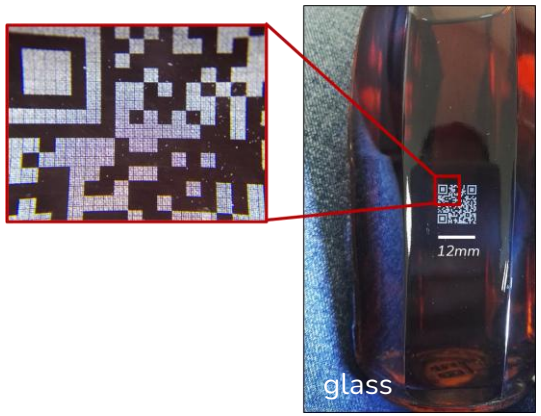
Applications:

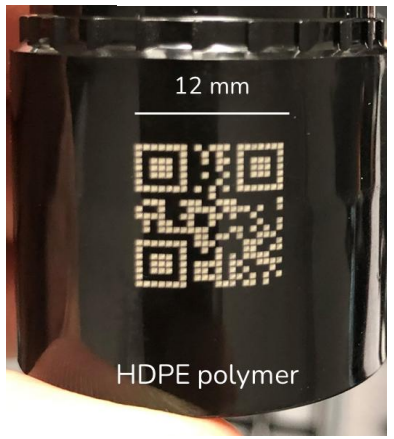
- **Unique QR codes marking**
- **Product personalization**
- **Security marking**

Sectors

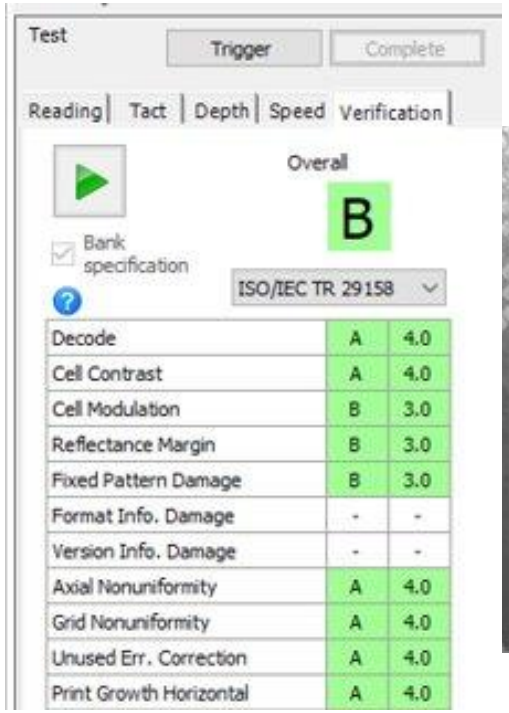
- Luxe
- Medical
- Beverages
- Electrical goods

Link to youtube video PIXEL-STAMP marking

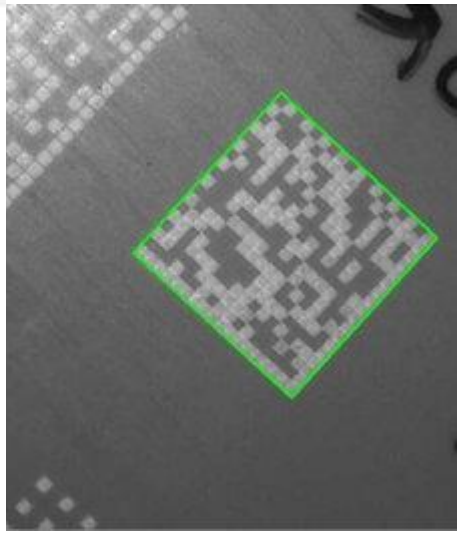




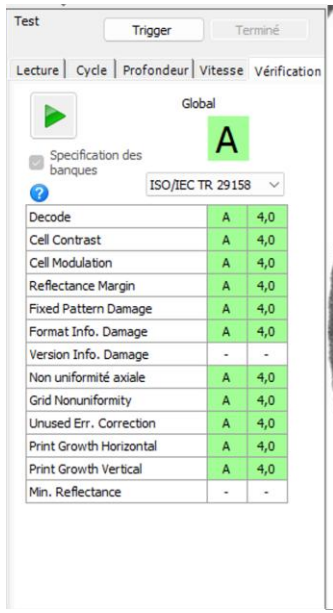
VULQ1-S BEAMS series delivers throughput and quality



Polypropylen



Glass



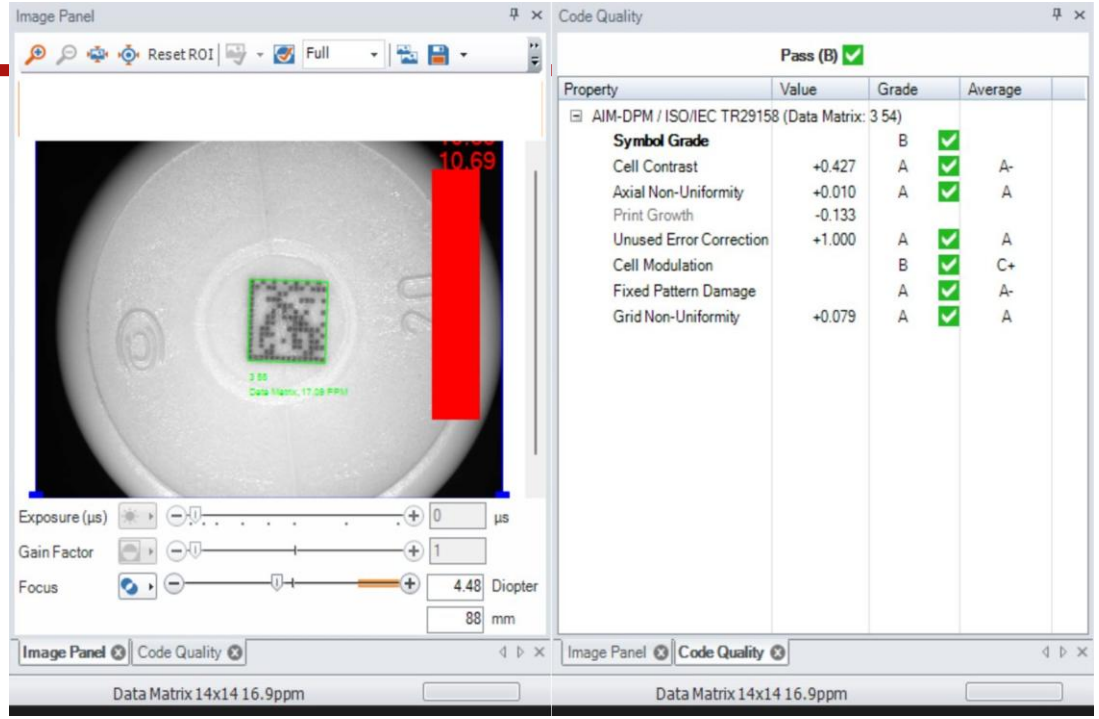
- Dot-peen like code marking approach **maximizes throughput**: DM14x14 in < 50ms
- Square cell shape **optimises code grading level**
- Cell characteristics are **fully software configurable to optimize quality**

Serialization of polymer cans

MATERIAL:
•Polymer: PFMD

DM14x14 GS1 code:
•5mm

Product & process:
- BEAMS NS VIS
- PIXEL-STAMP



Market: **Medical, pharmaceutical packaging**

- **Marking time < 150ms** to support 400u/min productivity
- Optimal marking **quality, Grade B**
- Industrial nanosecond pulsed laser source for optimal ROI

[Pharma] Individual traceability of medical glass packages

MATERIAL:
- Borosilicate glass

2D CODE TYPE:
- GS1: 10 digits, DM14x14

Product & process :
- BEAMS FS NIR laser
- PIXEL-STAMP

Market: **Medical, pharmaceutical packaging**

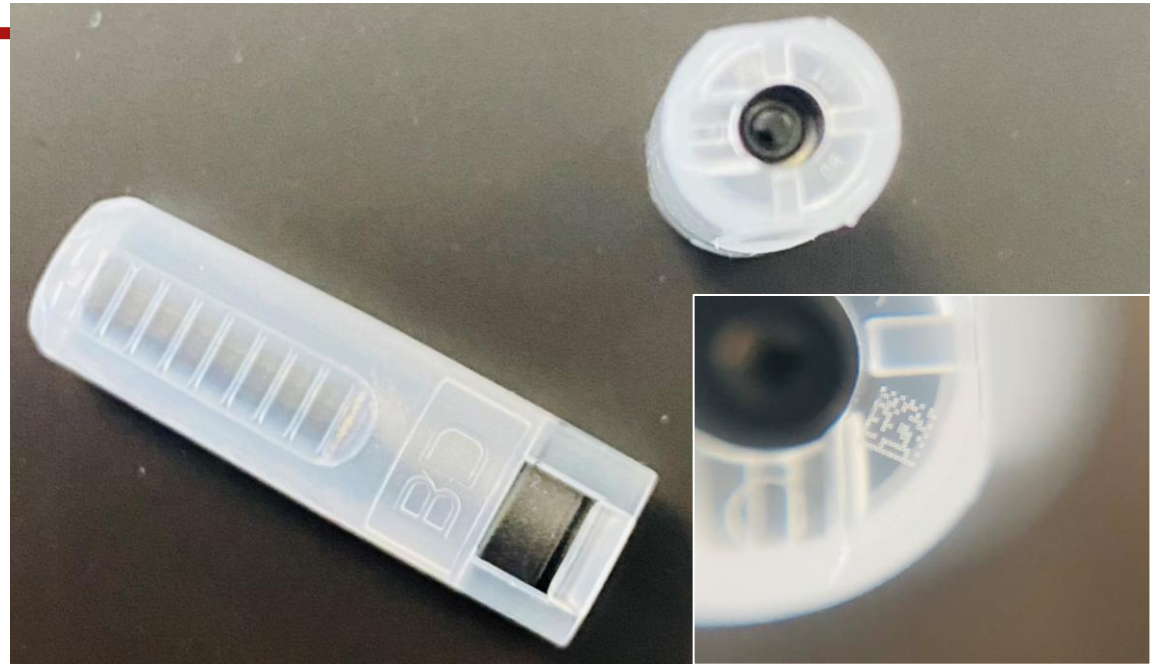
- **20 unique codes per second** for serialization
- Semi-invisible marking: no perturbation to in-line screening
- Direct cold marking, no micro-cracking, **2,5mm depth of focus**

[Pharma] Serialization of syringes with RNS end marking

MATERIAL:
•Polypropylene

DM14x14 GS1 code:
•1mm

Product & process :
- BEAMS FS NIR laser
- PIXEL-STAMP



Market: **Medical, pharmaceutical packaging**

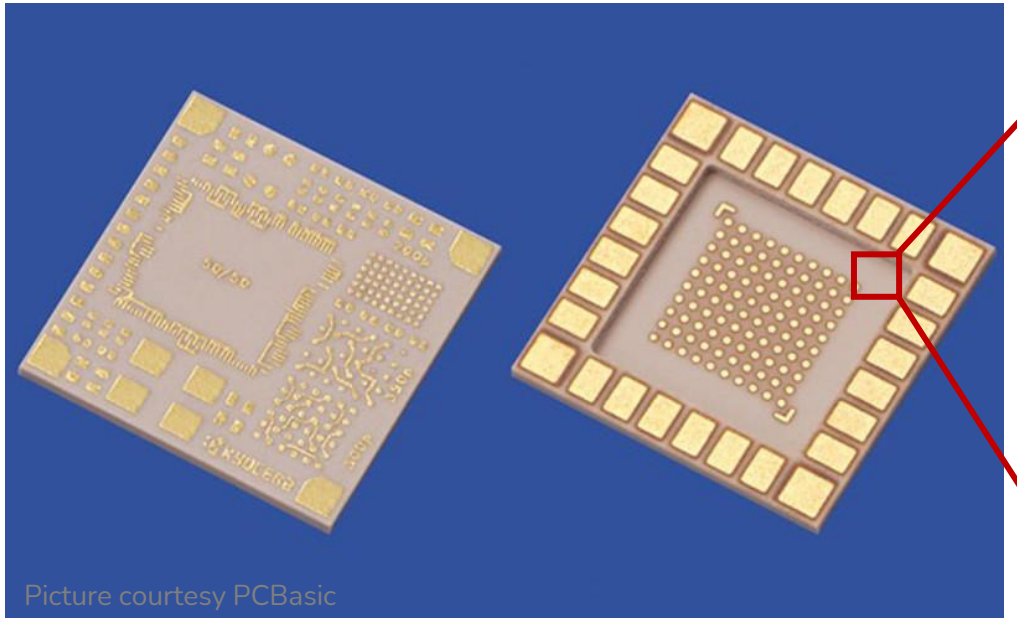
- **Marking in <50ms**, robustly readable with industrial vision
- In-line integration possible with **depth of focus 4mm**
- Femtosecond laser favored to ensure homogeneous marking characteristics vs supplier/batch material composition difference

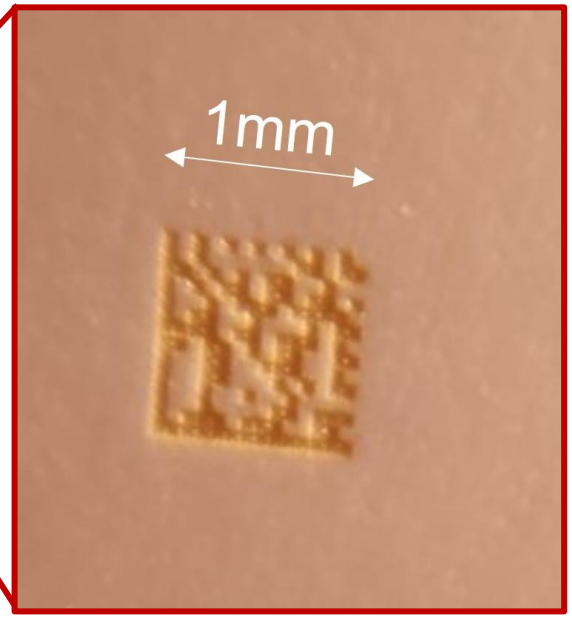
Individual identification of ceramics packages

MATERIAL:
- Zirconium ceramics

DM 14x14 code:
- 1mm

Product & process :
- BEAMS FS NIR laser
- PIXEL-STAMP





Market: **Electronics**

- Discrete unique identification of ceramics-based power electronics products
- **Marking time < 100ms**
- Reading with standard vision tools

Sustainable labelling of PET bottles

Material:
- Additived PET

Marking:
- Drawings
- Alphanumerics

Product & process :
- BEAMS NS NIR laser
- Multibeam marking

Market: **Beverages**

- Market driver: replace plastics labels by direct marking to reduce production costs and environmental footprint
- **Multibeam marking accelerates marking process manyfold:**
  - **x5 for drawings**
  - **x3 for alphanumerics**

[Consumer goods]: serialization of polymer electrical goods

Application
- Serialization of circuit breakers using a QR code
- The QR code will be linked to the product page to develop consumer services

Current solution
- On-line UV laser marking: cycle time = 1 to 2s/piece

QiOVA advantages vs. current solutions
- QiOVA marking speed = 3 to 6 x higher
- “Visible" laser technology less dangerous and less costly to maintain

Costs vs.QiOVA
- Marking cost per part 3 to 6 x lower
- No loss of line speed with a single integrated

Fire resistant
PolyAmide
PA6/PA66

PolyCarbonate

[Luxe] Use case: sustainable decoration of luxury bottles

In collaboration with:

NEYRET
TISSEUR D'INNOVATION

POCHET DU COURVAL

Current industrial solution for decoration:
screen-printing, pad printing, spray gun

No industrial solution for direct marking on glass

VULQ1 enables new possibility for decoration, combining high resolution and throughput

VULQ1 solution = PIXEL-STAMP marking with short-pulse lasers

- Unprecedent design possibilities
- Much reduced impact on environment
- Flexible with much reduced OPEX

Thank you for your trust !

If you have any questions, we will be happy to answer them.

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