

VULQ1-M

OPTICAL MODULES



Boost your laser micromachining throughput x10 with dynamic parallelization

VULQ1™ product offer overview

BETTER LASER SOLUTIONS FOR A BETTER MANUFACTURING

Laser is the production tool of the future. But the way laser solutions are designed today limits their performance.

Conventional laser processing reaches 3 limits:

- **Throughput limit:** with high power laser available, throughput is limited by the speed of the laser beam onto the sample. This is particularly true for high resolution applications.
- **Economical limit:** adding to the processing time induced by throughput limit, it is frequent to use only part of the available laser power.
- **Environmental limit:** laser processing is intrinsically a green production tool, it will be even greener running at 100% of its capacity.

Multibeam laser processing with VULQ1 unlocks these three bottlenecks.

Multibeam processing is the combination of dynamic laser beam shaping with VULQ1 and traditional laser beam delivery systems.

Powered by our patented programmable multibeam technology, VULQ1 accelerates laser processing manifold compared to conventional laser marking.



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



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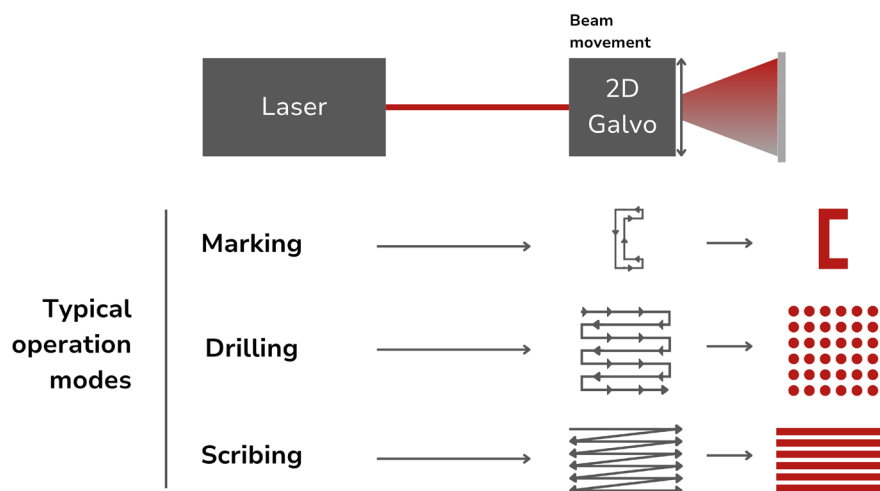


Process acceleration with multibeam processing

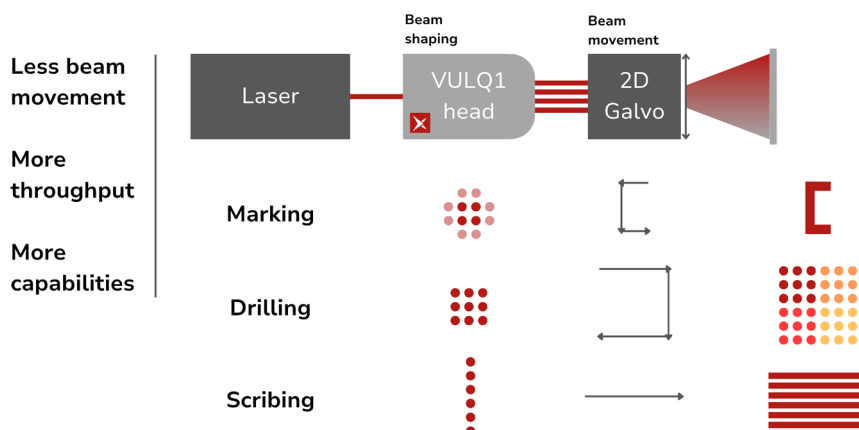
VULQ1-M accelerates laser marking and microprocessing applications throughput with dynamic process parallelization

Laser process	Multibeam acceleration vs standard laser processing
Marking alphanumerics	x3 - x5
Marking logos	x5 - x10
Microdrilling	x4 - x9
Grooving/ablating	x3 - x5

Standard laser processing = sequential processing



Multibeam processing: dynamic parallelization with programmable beam shaping eliminates useless scanner movements



What is VULQ1-M module ?

VULQ1-M module is a sub-system in the laser machine design, where it brings programmable beam shaping capabilities. It needs to be operated with an external laser source.

Job shops and laser machine builders can immediately enjoy multifold process acceleration with multibeam processing, dramatically reducing marking time and cost per part for their customers.

VULQ1-M programmable beam shaping technology **dynamically controls Z-focus and compensates laser aberrations**, also when using one single beam.

VULQ1-M comes with **access to QiOVA patented STAMP marking methods**, delivering market-leading processing speed.



FEATURES

- **Specified for NIR and visible wavelength**, up to 100W in femtosecond regime
- **Market leading software**, with unique graphical interface and powerful built-in functions
- **Full dynamic control of laser beam**: multibeam operation, roundness, working distance
- **Industrial grade design**, ready for integration

BEAMFORGE Software

Our proprietary software BeamForge puts the power of programmable multibeam processing within everyone's reach.

BeamForge is available as:

- **Stand-alone version** for application development, featuring an ergonomic graphical HMI to create custom multibeam patterns
- **An API** for production, designed for seamless integration into machine software environment



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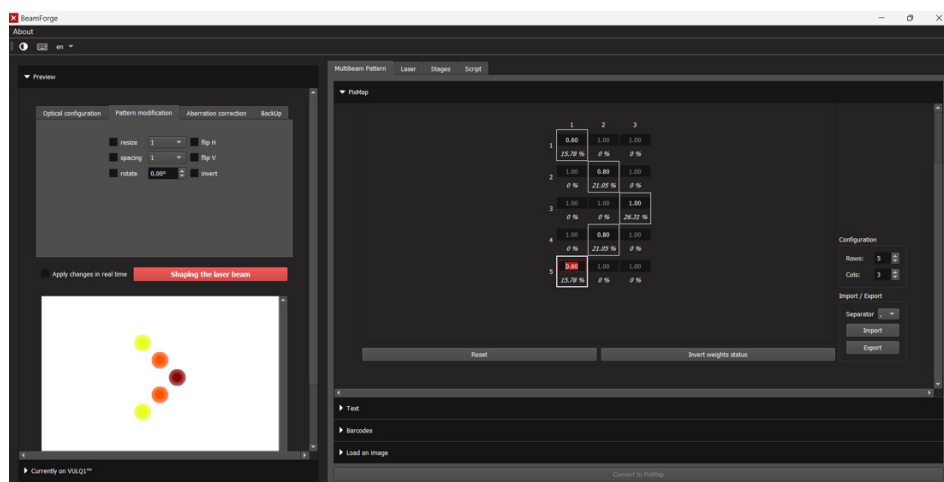
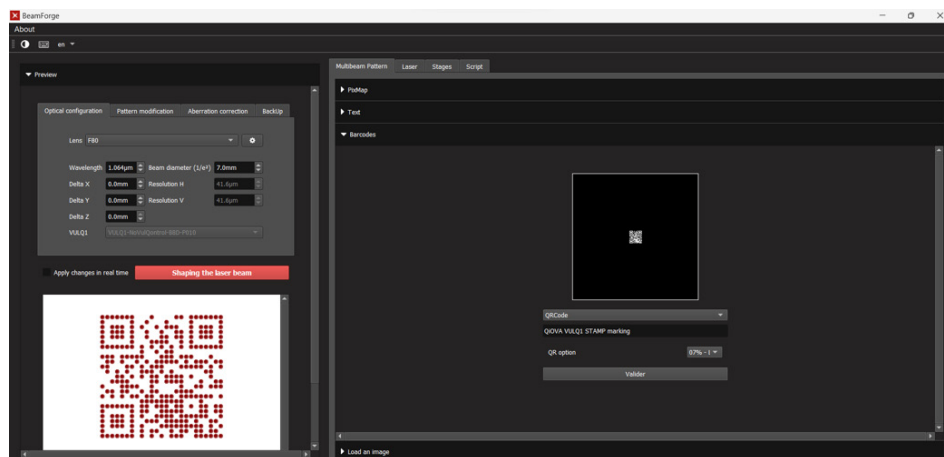


Product description

BeamForge for VULQ1-M Modules is dedicated to simplify the creation, optimization and use of multibeam patterns.

Its ergonomic user interface offers many unique and powerful features like:

- PixMap : graphical and interactive multibeam pattern creation tool, notably allowing point-to-point energy control
- Automatic 2D code generation in various formats: Datamatrix, QR code and dotcode
- Automatic generation of multibeam patterns from alphanumeric characters or images
- Toolbox for multibeam pattern control and optimization: rotation, dilation, symmetry, ...
- User assistance tools for pattern creation: preview, distance measurement,...
- Beam Quality Control functions, for optimal quality throughout the life of the laser solution
- Export/import capabilities to create our own customized multibeam patterns libraries
- Scripting interface to create custom marking sequence with BeamForge API commands



Specifications

SPECIFICATIONS			NS-BBD-P010	NS-VIS-P050	NS-NIR-P050	FS-NIR-P100
Optical data						
Input laser beam requirements						
Spectral range	nm	500 – 1100	500-550	1000-1100	1000-1100	
Input laser beam	-	Gaussian (TEM00) Full divergence angle < 0.1 mrad				
Input beam diameter ¹	mm	5.0 – 7.5				6.0 – 10.0
Input polarisation ²		Linear , along optical plan +/-35mrad, PER>100/1				
Max. input average power	W	10	50		100	
Max. input pulse energy ³	mJ	10	30	30	0.6	
Min. pulse duration		1 ns	1 ns	1 ns	250 fs	
Input beam centering tolerance ⁴⁻⁵	mm	+/- 0.5				
Input beam pointing tolerance ⁵⁻⁶	mrad	+/- 2.5				
Output laser beam(s)						
Optical transmission	%	≥ 70 %	≥ 90%	≥ 90%	≥ 90%	
Output PER (Polarisation Extinction Ratio)	-	> 100 : 1				
Output beam centering tolerance ⁷	mm	+/- 0.5				
Output beam centering tolerance ⁸	mrad	+/- 5				
Maximum number of beamlets in the beam pattern		10 000				
Maximum field (without scanner)	mrad	35	17.5	35	35	
Maximum size of beam pattern (without scanner, F160)	mm	5.6	2.8	5.6	5.6	
Minimum angular resolution, beamlet to beamlet	mrad	0.25 @ 532nm	0.25	0.5	0.375	
Minimum distance beamlet to beamlet (F80)	µm	20 @ 532nm	20	40	30	
Dynamic control						
Dynamic setting of working distance	mm	+0 / -25% of focal length				
Beam shaping display latency ⁹	ms	60	65	115	100	
Beam shaping display rate	Hz		20	10		

¹ d80 according to ISO 11145

² Plan that includes the input optical axis (see drawings below) and optical output center

³ Within specified pulse duration and beam diameter ranges – contact us for more detailed capabilities

⁴ Referenced to center of input mechanical interface

⁵ To ensure <10% of fluence variation in the generated beamlets

⁶ Referenced to input optical axis

⁷ Referenced to nominal output, see drawings

⁸ Referenced to nominal output axis, see drawings

⁹ Pattern calculation excluded

Specifications

SPECIFICATIONS			NS-BBD-P010	NS-VIS-P050	NS-NIR-P050	FS-NIR-P100
Dimension and weight						
Optical head						
Optical head dimensions	mm	264 x 170 x 183				
Optical head weight	kg	< 4				
Controller						
Controller dimensions	mm	19 inch rack 2U, H90 x L411				
Controller weight	kg	< 4				
Cable length	m	5				
Utility						
Head						
Head Cooling		Passive air				Water (not included)
Controller						
Voltage	VAC	85 – 245				
Frequency	Hz	50-60				
Power	VA	6				
Environment						
Storage temperature	°C	5-50°C, non condensing				
Use temperature	°C	15-30°C, non condensing				
Humidity	%	< 80%, non condensing				

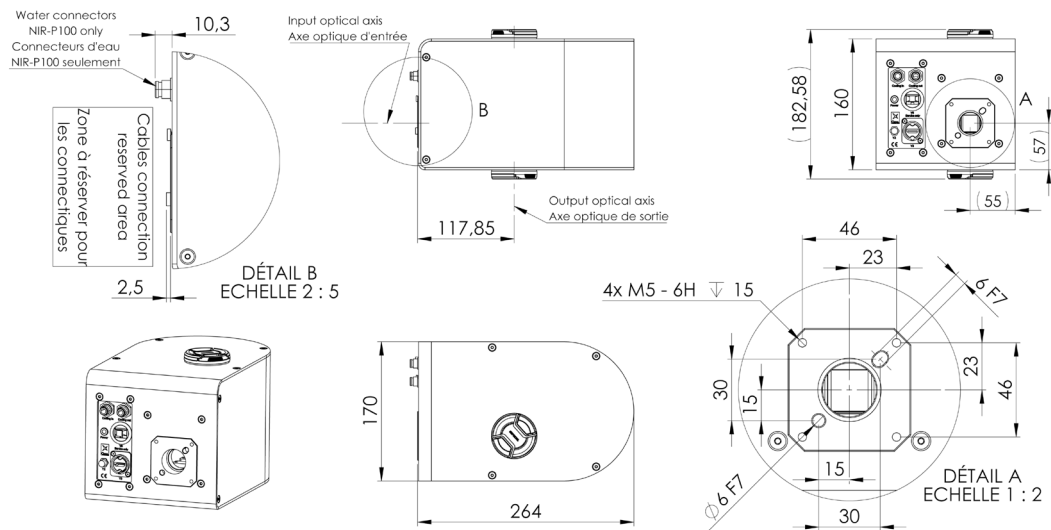


Figure 1: VULQhead optical head

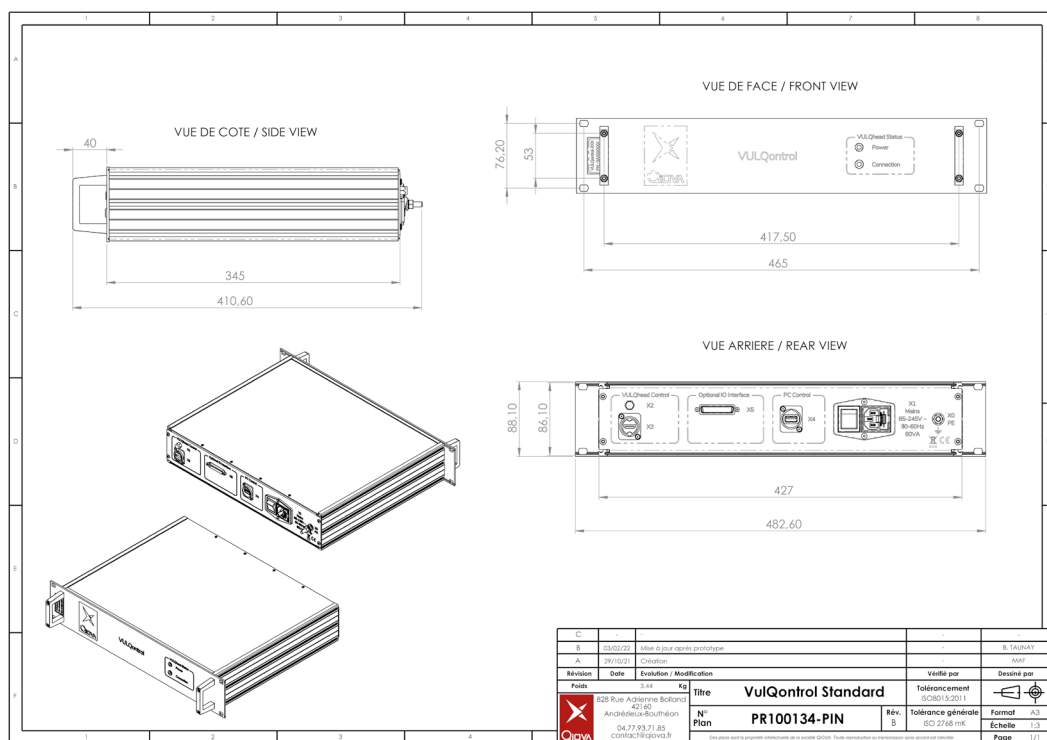


Figure 2: VULQ1 controller