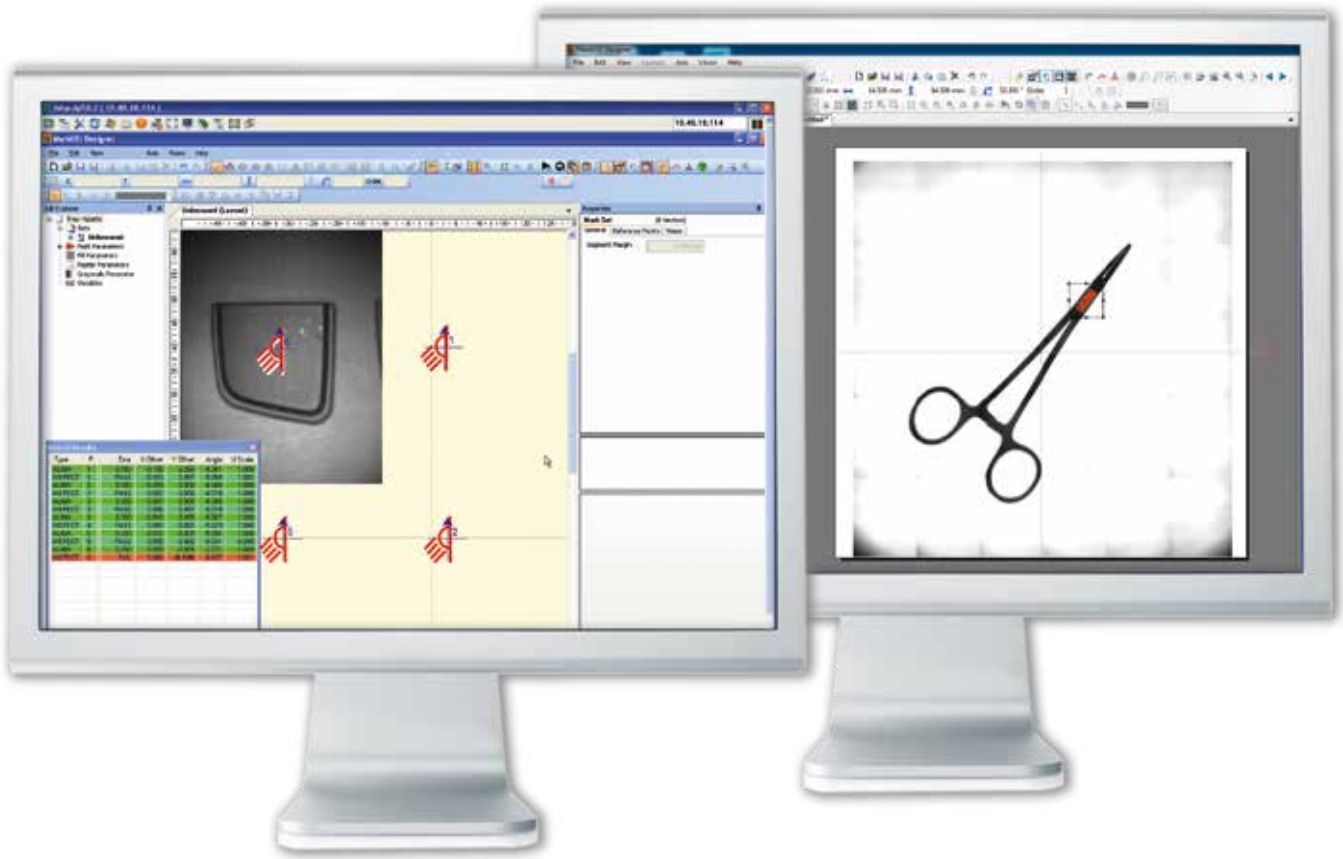
Laser Marking +
Engraving Solutions

FOBA®
Laser at your service

Software, Vision and Workflow Overview

High Performance Laser Marking Software with
Laser Integrated Vision Alignment and Inspection Tools
for the Simplest, Most Complete Laser Marking Process Solution

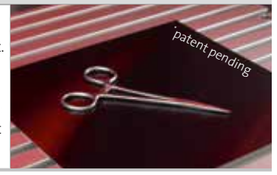


Taking laser marking to the next level –
Offering the market's simplest, most complete workflow solution

Our intuitive high-performance laser marking software FOBA MarkUS takes laser marking to the next level of innovation by incorporating MOSAIC™, the latest patent pending mark alignment technology, into HELP (Holistic Enhanced Laser Process), the simplest, most intuitive and complete laser marking process solution available to the industry.

Software for laser marking and engraving with vision
Programs and tools for a fully-automated and smooth production process

Software for Laser Marking and Engraving	Special Features and Options
FOBA MarkUS: Creation and production of marking contents. MarkUS includes the axis control.	**Vision:** For part detection, mark alignment, mark verification and code validation, MarkUS can be interfaced to the camera systems IMP and Point & Shoot. **MOSAIC™:** Enables fixtureless part marking through full-field imaging.* Operators can place the part anywhere under the laser in any orientation. The Mosaic™ image of the part, created within a second, is used to validate the part presence, its identity and align the mark content to match the part position. Available with IMP (Intelligent Mark Positioning) only.



Ultimate usability: FOBA MarkUS

Our intuitive graphic design and high-performance laser control software MarkUS is perfect for the creation of high-quality, high-precision laser markings. Its visual user guidance (color codings, flexible and floating toolbars, common icons) makes it intuitive and easy-to-use, and a range of value-adding features provides additional benefits.

- → **Intuitive graphic design tools and excellent layout functionalities** for lean and efficient workflows
- → **Various marking formats & contents** for ultimate flexibility
- → **Closed-loop marking process** for utmost process reliability (pre- and post-mark verification with part validation, pre-mark verification, mark alignment, mark verification, optical character verification, 2D code validation incl. UDI-Unique Device Identifier)
- → **Innovative vision alignment tools** for precision and repeatability: IMP, Point & Shoot, Mosaic™
- → **Remote control** options for increased automation and productivity (TCP/IP, Profinet, Profibus, I/O interface, EtherCat)
- → **Support and control of up to 5 axes** including two rotary axes

MarkUS at a glance
- → ***Designer:*** *Easy-to-use GUI for the creation and editing of laser markings*
- → ***Runtime:*** *Intuitive UI and high-performance laser control suite for the production of laser markings*
- → ***Administrator:*** *Setup and configuration*
- → ***Freely configurable user levels:*** *Operator (Runtime), Job Designer (Designer), Administrator*

Software options for mark-on-the-fly and custom applications
Programs and tools for high uptime

Software Options	Description
FOBA Draw (Smart Graph): Creation and production of marking jobs.	Especially suited for mark-on-the-fly applications and general marking applications (serial numbers, barcodes, 2D codes).
FOBA Advanced Operator PlugIn: Minimalistic graphical user interface for the fast, safe and reliable laser marking of all sorts of products, parts and devices.	A variety of **remote options** is available to log in, to diagnose, configure and program the laser marking system – depending on the customer's infrastructure and access. → **FOBA Remote Service** (FRS) is a dedicated, remote alert and diagnostics system that is customized for FOBA laser marking systems (V- and Y-Series lasers, M-Series machines). This remote system allows for real-time notification of laser status changes, warnings, and/or fault conditions via email and email to text. FRS also provides the ability for designated in-house maintenance staff and/or FOBA Technical Support to remotely access the laser for the purpose of running diagnostics, troubleshoot-ing, providing settings adjustments and helping plant personnel address laser issues.
	Customer-specific software for laser marking and laser engraving applications

MarkUS Designer: The designer interface

The Designer Suite is used to create and edit templates and jobs for astonishing laser markings; and for job setup – such as the laser parameter setup.

MarkUS Designer intuitively and visually guides the user thanks to color codings, floating toolbars and the use of common icons. Excellent layout and import functionalities include a wide range of marking formats, advanced text editing, several graphic import filters, easy mark multiplication, virtual marking fields and many more design features.

- → **Main Areas:** Dropdown menus and floating toolbars, preview and design area, properties, job explorer, axis control, status and hardware control

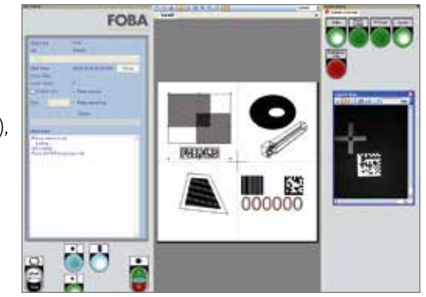


MarkUS Designer suite with examples of marking contents

MarkUS Runtime: The operator interface

Runtime is MarkUS' intuitive operator interface and high-performance laser control software. Runtime is used to run production jobs and provides all important status information on both machine and marking jobs.

- → **Functionalities:** Load, start/stop jobs (job control panel and job preview area), control the laser system (system status panel)



Standard MarkUS Runtime interface

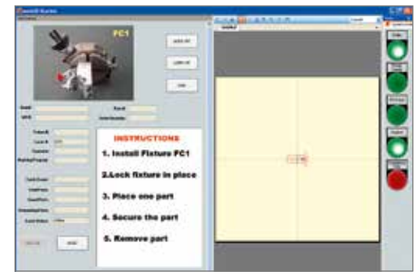
Standard and custom operator interface

Customers have the option of using the standard Runtime interface or – in case they require specific operating processes and custom graphical user interfaces – to use FOBA's **plugin** to develop their proprietary user interface.

Custom Runtime interfaces are typically designed based on customer's requirements. These interfaces deliver the necessary functionality operators need to accomplish their production tasks while providing information on the machine status.

Some of the key elements of a custom interface:
- → **A display window** with step-by-step instructions
- → **A graphical display** on the hardware and fixtures to use for a specific job
- → **A direct machine interface** of production jobs to a global production database

Some of the key benefits of a custom interface include:
- → An improved and streamlined production process
- → A reduction of operator tasks
- → A higher yield and more predictable system performance



Custom MarkUS Runtime interface

Laser-integrated unique imaging tools:
When vision becomes reality

The camera systems IMP and Point & Shoot use vision through the lens and the galvo mirrors to ensure ultimate precision, flexibility, simplicity and repeatability. With our full-field-imaging feature MOSAIC™, cost of production are drastically reduced.

Vision and Workflow
Laser-integrated unique vision tools for precision, flexibility, simplicity and repeatability

Our vision tools increase precision, economy, manufacturing efficiency and overall processing quality during laser marking and engraving. Additionally, production processes are improved as small and large parts can be marked on the same equipment, and cost of operation are lowered as simpler fixtures or even no fixtures* (with MOSAIC™) are required for part marking. Simultaneously, our vision solutions help to drastically reduce scrap, and ensure close to zero defect marking.

FOBA's laser integrated vision system IMP (Intelligent Mark Positioning) is the heart of the market's simplest and most complete laser marking process solution called HELP, Holistic Enhanced Laser Process. With the concept of integrating the vision system directly into the marking system, we offer our customers a unique, simple and broad part marking workflow solution that ensures the highest production performance. With MOSAIC™, our latest innovation, cost of production are drastically reduced. The addition of MOSAIC™ to our workflow solution is key in continuously helping our customers reduce their manufacturing cost and ensure close to zero defect marking.

Our unparalleled, fully laser marker integrated imaging solutions result in superior marking quality that offers a quick ROI through reduced:
→ setup costs
→ scrap costs
→ process integration costs
→ tooling costs

**Fixture-free marking with MOSAIC™ is best adapted to large devices like tools or large automotive parts like mirrors, etc.*

FOBA's marking workflow solution features ...

... IN GENERAL

→ Fixtureless marking with MOSAIC™ (patent pending) to save production cost
→ Job setup with our patented Autofocus tool
→ Full integration in the Advanced Operator Plugin (AOP) with process traceability
→ The combination of vision and axis motion for high-accuracy marking on large parts (patented Multi Model Registration)

... PRIOR TO MARKING

→ Check if a part is not already marked (pre-mark verification)
→ Check if the to-be-processed part is the correct one
→ Alignment of the to-be-marked content to the part orientation – either automatically (by use of FOBA's IMP Intelligent Mark Positioning vision system) or manually (with FOBA's Point & Shoot vision system)
→ Instantly get the right mark using the Laser Parameter Expert

... DIRECTLY AFTER MARKING

→ Check that the mark is aligned to the part and positioned according to tolerance requirements
→ Read back mark contents: Verification that the right content has been marked by verifying every marked character (Optical Character Verification)
→ 2D code quality check: (1D/2D code validation) 1) Verify that the code content is correct 2) Verify that the code quality is consistent from part to part
→ Logging of images and inspection results to enable the monitoring of manufacturing processes

Vision Systems, MOSAIC™ and HELP (Holistic Enhanced Laser Process)
Focused on precision, economy, and marking and engraving quality without compromise

With Point & Shoot marking contents are placed manually directly on a screen image of the to-be-marked product, whereas the patented camera system IMP automatically detects parts and their positioning, and adjusts the marking accordingly. **With the patent pending MOSAIC™** feature, users can place their parts anywhere within the marking field and get a repeatable mark. Costly fixtures are no longer required.

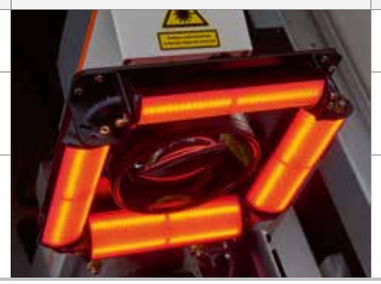
Intelligent Mark Positioning IMP (automatic)	Point & Shoot (manual mark positioning)
→ Automatic visual part detection and mark alignment. → Perfect for automation/batch production. → Patented vision system that automatically detects the position of the work piece and aligns the marking, engraving or frosting content precisely as required. → Quality control: Advanced optical validation of the final laser marking content (character, graphic or 2D code) and its position.	→ Visual alignment system for marking and engraving contents. → Ideal for high-quality work pieces and individual part production. → Visual positioning system for the marking content. With the camera focused on the product, the user creates the marking content and places it manually (via drag & drop) precisely where it should be applied. → Speeds up operations by reducing setup times and time-consuming trial-and-error processes.

Image tiling process MOSAIC™

→ Image tiling of the marking field and alignment to parts as large as the field.
→ For marking large, bulky parts (i.e. tools, fixtures, instruments, housings).
→ Patent pending feature that simulates an inline camera system without perspective effects.
→ Allows operation with very basic fixtures or no fixtures at all.

HELP: A 360° laser marking process

Apart from the marking, FOBA offers with HELP the broadest part marking workflow solution on the market. HELP combines the use of FOBAs vision systems (IMP and Point & Shoot) and MOSAIC™ in a unique fixtureless workflow that includes part and mark validation prior to and right after marking. This process helps avoid systematic and human caused errors and is capable of validating laser contents right after marking directly in the laser station. This is not only important for users with strict quality and code integrity requirements, but also for everyone who values scrap and production time reduction.

HELP (Holistic Enhanced Laser Process)		
1: Pre-mark verification	**2: Laser marking (product identification)**	**3: Post-mark verification**
Part validation: Validates correct part and prevents marking of wrong or defective parts.		**Mark verification:** Validates that marks have been placed correctly (positioning, alignment, size).
Pre-mark verification: Confirms that only unmarked parts are being processed.		**Optical Character Verification (OCV):** Validates that every character marked by the laser matches the expected content.
Mark alignment: Aligns the mark relative to the position of the part.		**2D code validation and code reading:** Reads the contents of 1D and 2D codes (Datamatrix, e.g. ECC 200, GS1; QR) and compares the results to the expected content. A grading of the code into quality classes is included.

FEATURES IN DETAIL

For precision and repeatability:
Innovative vision alignment tools

The vision systems IMP (Intelligent Mark Positioning) and Point & Shoot ensure ultimate precision and repeatability. With Point & Shoot marking contents are placed manually directly on a screen image of the product to be marked. This system is perfect for the processing of high-quality work pieces and individual parts. The patented camera system IMP automatically detects work pieces and their positioning, and adjusts the marking/ engraving accordingly. That is why IMP is ideal for automated batch production.

It all starts with the right illumination

Proper illumination is the cornerstone of vision inspection. That is why FOBA offers a fully software controllable lighting that improves vision inspection and validation processes. FOBA's lighting allows users to reduce unwanted hot spot reflections while improving the OCV and code validation performance.

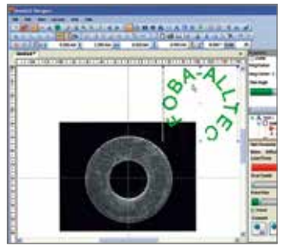
Flat field illumination	Front/back illumination	Flat field illumination	Left/right illumination
			
Hot spots on a cylindrical part	Text fully readable	Hot spot on a curved part	Text fully readable

Illumination of curved surfaces with and without programmable banks.

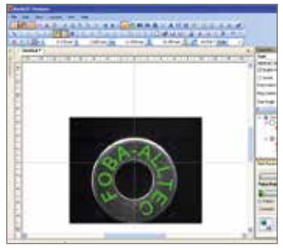
Visual alignment with Point & Shoot (P&S)

Point & Shoot is a powerful vision feature for manual mark positioning. Point & Shoot is fully integrated within the Designer tool, it eliminates the lengthy phases of trial-and-error. This exceptional visual tool also allows users to create marking jobs from existing pre-marked parts, eliminating the need for part drawings and completing the job within minutes.

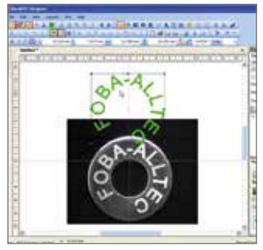
Point & Shoot is a WYSIWYG tool that helps reduce fixtures and fixture related costs, significantly curtails time consuming trial-and-error processes, and ensures upfront verification of what the mark will look like and where it will be applied.



Part in place



Mark content aligned manually



Part marked accordingly

The P&S camera focuses (through the lens) on the marking field, creates an image of the part, and displays it on the screen. The user creates the marking and places it (via drag & drop) where it should be applied on the product.*

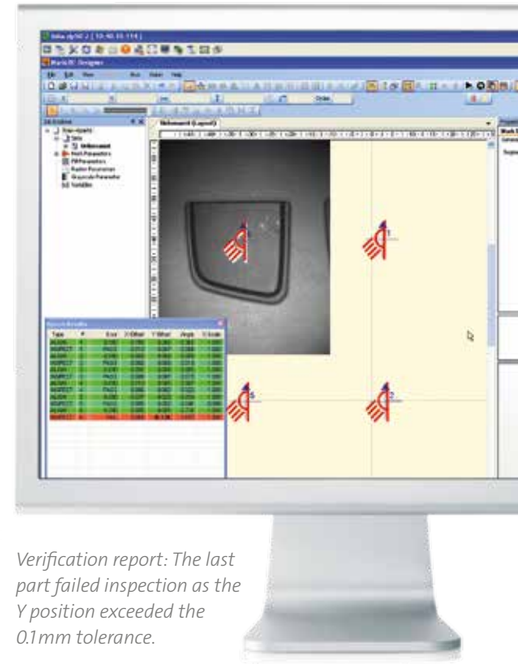
* The visual field of the camera depends on the configuration of the laser optics used.

Patented and proven: Vision alignment with IMP

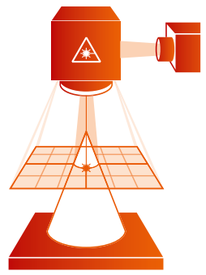
Upgrade from Point & Shoot to IMP to ensure ultimate precision and repeatability for automated batch production. The patented camera system automatically detects work pieces and their positioning, and adjusts the marking/ engraving accordingly which makes it ideal for automated batch production.

→ **Automatic mark alignment:** Many users have to strictly comply to defined processes, particularly if the mark position accuracy has a significant added value. IMP validates the part integrity, measures its position and automatically aligns the marking relative to the part.

→ **Automatic mark verification:** IMP provides the capability to achieve pre-mark and/or post-mark verifications. Pre-mark verification prevents users from marking already marked parts. The post-mark verification validates that the mark placement is accurate. This feature also helps check for poor contrast marks that can be caused by an early degradation of the laser performance or a change in material characteristics.

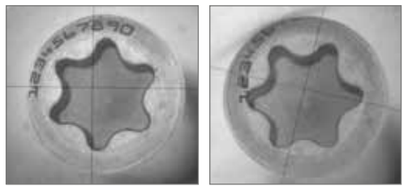


Verification report: The last part failed inspection as the Y position exceeded the 0.1mm tolerance.



The patented IMP mark alignment system is proven and tested in hundreds of installations. Added value:

→ Ideal for automated serial processing
→ Consistently highest processing quality
→ Faster finishing operator training
→ Improved accuracy
→ Increased efficiency
→ Increased productivity
→ Reduced scrap

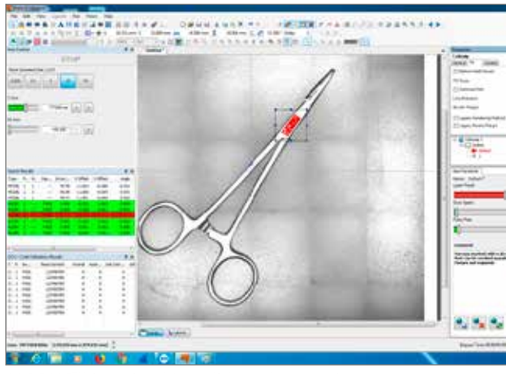


Left: mark was aligned with IMP. Right: shows a misaligned mark, a common problem when not using a vision system like IMP.

For fixtureless operation: MOSAIC™

The patent pending MOSAIC™ feature addresses the key challenges of accurately aligning marks on large parts regardless of the part position and orientation. MOSAIC™ uses the internal camera of the laser to create an image of the marking field simulating a straight down camera view. The straight down view eliminates the side view distortion typically created when using an external camera, and enables the system to accurately mark parts regardless of their placement.

Some of the key benefits include:
→ Fixtureless operation
→ Easier and faster marking process
→ Limited operator training
→ High ROI
→ Significant cost saving
→ Suitability for both manual and automated operations



MOSAIC™ is trained to validate the part (green results) and align a laser mark on a pair of forceps. Although the part is randomly placed under the laser, the system is capable of aligning the mark to the part.

Best aid for all laser marking applications

Software and vision features with added value

System Health Monitor

FOBA's M-Series laser workstations and Y-Series marking lasers offer an optional **laser power measurement tool.** The laser power meter (sensor) is fully integrated and can measure the marking system's output power that is available for the marking process. Laser power is measured past all laser optics to provide a true laser power level.

Some of the features of the system health monitor include:

- → Tracking the laser power output over time > process reliability.
- → The ability to use the tool during production cycles.
- → A Pass/Fail parameter configuration.
- → A modifiable help window (custom instructions with strict performance qualification (PQ) requirements).
- → A logging history on the laser source performance.



The power monitor

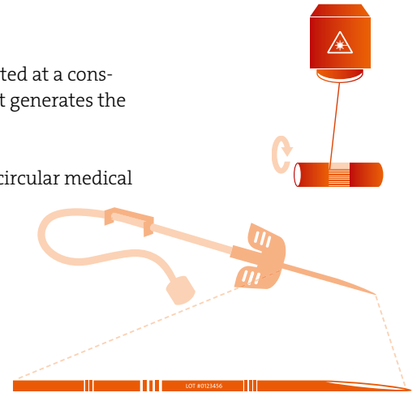
Rotary banding*

The banding process consists in laser marking a cylindrical part while it is rotated at a constant speed. The laser moves along the length of the part while the rotating part generates the equivalent of the cross motion.

Depth marks: Banding is often used to create line marks as depth markers on circular medical devices. These depth indicators show surgeons how far devices are inserted into the patient's body.

Benefits

- → High speed laser marking of bands on circular parts.
- → Marking of bands and alphanumeric contents in one marking step.
- → Vision system IMP ensures accurate mark placement.
- → Rotary banding can be performed on parts longer than the marking field.



Cannula with bands and alphanumeric content

* Only available on FOBA's M2000/3000-B/P workstations

Optical Character Verification (OCV)

FOBA's OCV feature, bundled with FOBA's vision alignment system IMP, enables users to validate that any laser marked text or glyph matches the expected content. OCV catches marking errors before the parts leave the workstation and flags marking flaws such as power degradation as they happen.

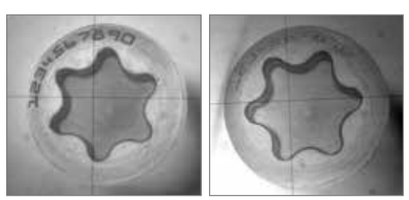
OCV validates that every marked character ...

- → is present at all
- → matches the expected content
- → is placed and oriented where it is supposed to
- → is readable (has proper contrast)

- → Dynamic mark contents are validated on the fly.
- → OCV is easy to use (no programming language to learn).
- → OCV is ideal for products that rely on legible mark contents used for traceability purposes.

Benefits from a manufacturing process perspective:

- → Continuous process validation
- → Early detection of mark defects > early correction > reduced waste
- → Flags non-compliant markings
- → Reduces human visual inspection
- → Decreases time and efforts at final inspection
- → Improves product quality and yields
- → Cost saving related to the marking process



Without OCV, mismarked parts could end up at the end customer – in the case of the right bone screw (both screws with OCR-A font) in the hands of a surgeon.

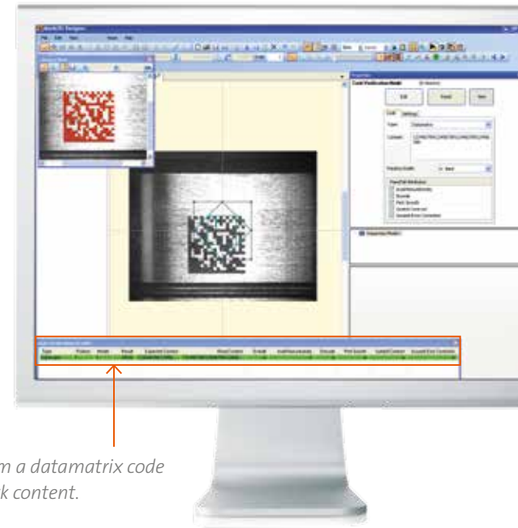
Datamatrix code validation

MarkUS provides the ability to **read barcodes**. Serial barcodes, as well as 2D codes such as the QR, DataMatrix, GS1 and UDI (Unique Device Identifier) codes, can be **read and validated** in a fraction of a second after being marked.

With the barcode reading feature, **code contents are read and compared to their expected contents.** The system will also check marked codes based on features like contrast, uniformity, error correction etc.

The code validation feature offers the ability to **run multiple products on the same production line** without the need to physically reposition the camera. The scan head galvos overcome the limitation of a rigidly mounted external camera. This represents significant time and cost savings when running mixed model production lines.

BC128 ECC200



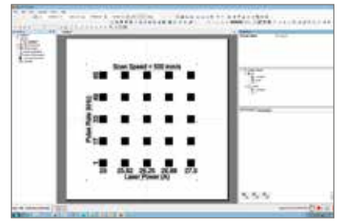
The code verification results from a datamatrix code read-out that validates the mark content.

Laser Parameter Expert

Finding the ideal laser parameters for a specific mark quality on most popular materials like Titanium, Stainless Steel or plastics can be a huge challenge. Users need to master the interaction of speed, frequency and power on different materials. To eliminate the lengthy trial and error process, the Laser Parameter Expert comes with a mode that helps users achieve the right mark within seconds. (Parameters available for most common configurations.)

It just needs three simple steps and the tool will provide the marking parameters that match the optics and the type of laser in use. A significant time saving that turns novices into expert:

1 Material selection
2 Selection of marking method
3 Confirmation



Autofocus

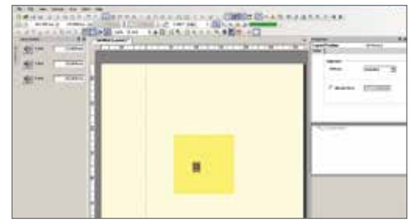
FOBA's Autofocus finds the best focus by measuring the image texture instead of the common triangulation process. The patented approach allows users to find focus on almost any surface, polished or dull, any color, any size, the bottom of a cavity or the top of dome.

Focusing the laser is much easier with the Autofocus – particularly on curved surfaces or deep cavities. The stable and maintenance-free function is fully integrated into FOBA's vision system.

Virtual marking field

The virtual marking field displays the maximum available marking field. By using a view of the virtual marking field – the result of the combination of axis movement and the physical marking field –, users can easily create complex marking jobs in a matter of minutes.

The laser (yellow square) and virtual (beige rectangular) marking fields →



Radial segmentation

Whether it is text or logo, the segmentation feature built-in MarkUS allows users to easily and quickly mark cylindrical components. MarkUS will accommodate marking on the inner diameter (ID) or outer diameter (OD) of a cylinder. The technical approach of radial segmentation overcomes the limited depth of focus of lasers as well as the inherent distortion associated with marking on radial surfaces. With this innovative approach to segmentation the mark is just perfect.



Available vision packages

All features and options at a glance

P&S = Point and Shoot
IMP = Intelligent Mark Positioning
CV = Code Validation

Vision Features	Description	P&S	P&S + CV	IMP	IMP + CV
Programmable lighting	Camera lighting with programmable banks that provide lighting adapted to cylindrical and curved surfaces.	✓	✓	✓	✓
High or low resolution images	Camera resolutions: 1280x1024 → for high mark accuracy 640x512 → for faster performance	✓	✓	✓	✓
Autofocus	Automatically focuses laser to the part anywhere within the marking field. Available when training jobs only. Available with M-Series only.	✓	✓	✓	✓
Image tiling	Tiles multiple images over the marking field to provide a large image of the marking area.	✓	✓	✓	✓
Image tiling with registration	Aligns laser mark to large parts regardless of their position and orientation.	–	–	✓	✓
Pre-mark verification	Verifies that parts are not already marked which prevents parts from being double marked.	–	–	✓	✓
Part validation & mark alignment	Validates that the correct part is in place and aligns the mark to the part orientation. Guarantees that the laser mark is always properly aligned to the part. The laser will not mark the part if incorrect or missing.	–	–	✓	✓
MOSAIC™	A patent pending feature that combines image tiling and mark alignment and allows most laser applications to run fixtureless.	–	–	option	option
Post-mark verification	Verifies that marks are placed where they are expected. Positioning tolerance is used to pass/fail the verification. Check for the positioning, the alignment and the size of the marked content.	–	–	✓	✓
Multiple Model Registration (MMR)	Uses multiple features on the part for an accurate validation and a higher mark alignment accuracy. This feature is ideal for large parts.	–	–	✓	✓
Optical Character Verification (OCV)	Verifies that every character marked by the laser matches the expected content. This feature is usable with text and graphics. Works with both linear and curved text or graphics.	–	–	✓	✓
1D/2D code validation	Validates content of 1D and 2D codes by reading content and grading (A thru F) code quality. Grade validation is ideal for process monitoring 2D codes in a production environment. Supports variable contents.	–	✓	–	✓
Data and image logging	Images, time stamps, inspection results, 1D & 2D code validation results, etc. are logged to monitor and debug manufacturing processes.	✓	✓	✓	✓

Scan head specifications

	SS10 scan head			CP10 scan head			CFS and CFT scan heads (Titus™)		
Lens*	Field square*	Field w/25pt correction*	Working Distance*	Field square*	Field w/25pt correction*	Working Distance*	Model	Working Distance*	Field rectangle*
F100-IR	73x73	70x70	151	66x66 or 60x76	60x60	129	CFS-S CFT-S	72 89	64x34
F163-IR	120x120	110x110	228	124x124 or 120x129	110x110	219	CFS-M CFT-M	112.5 129.5	89x40
F254-IR	185x185	170x170	357	174x174 or 162x189	170x170	350	CFS-L CFT-L	171 188	126x51
F420-IR	290x290	230x230	561	338x338 or 314x368	230x230	543			
UV	Vision tools are also available for UV sources with similar performance. Contact us for more information.						Supported by MarkUS software but vision tools are currently not an option		

Vision performance

	Vision			IMP with Mosaic	
Lens*	Camera FOV (SS10)*	Camera FOV (CP10)*	Alignment repeatability*	Approx. image size (CP10)*	Alignment repeatability[1]
F100-IR	11x7	12x11	±0.04	62x53	±0.1
F163-IR	19x15	21x17	±0.05	118x107	±0.2
F254-IR	28x20	34x27	±0.07	157x166	±0.4
F420-IR	49x30	56x46	±0.1	308x278	±0.7
UV	IMP is available for UV sources with similar performance. Contact us for more information.			N/A	N/A

**All measures in mm. All specifications reflect ideal conditions. Performance will degrade with part texture, color, finish, shape and contour. Always validate performance with FOBA's application team. Specifications are based on marking content in the center of the marking field.*
[1] Performance valid over the center 50% of length and 50% of width of the scan field (ex 163 mm lens: valid area = 60 x 60 mm centered in the marking field). All specifications are subject to change without notice.

Choose the product that fits your production needs

	Point & Shoot	IMP	IMP with Mosaic™ (automatic)
Mark placement	manual	manual and automatic	manual and automated
Batches	single quantity	single, medium and large	single, medium and large
Mark alignment accuracy	low	high	medium
Mark inspection	none	automated	automated
Useable field of view	small	small and multiple models	full field
Tooling requirement	custom and precise	basic low accuracy	none [1]
Fixtureless operation	–	–	✓

[1] As long as the part can be marked flat

FOBA®
Laser at your service

FOBA MarkUS and Vision
Technical Data

Standard features

Interfaces	MarkUS Designer, MarkUS Runtime, MarkUS Administrator
Axis control*	Support and control of up to 5 axes
Radial segmentation*	Marking (texts, logos) on the circumference of cylindrical objects (rings, jewelry; arced, concave, convex). Allows the laser to maintain focus to the surface while marking and minimizing distortion caused by the surface curvature. Note: IMP is not available with this feature.
File support	Import functions for the most common file formats: HPGL, FOBA's proprietary MCL, AI (up to 10 except 9, CS1, CS2, CS3 [without text objects], compressed/binary/PDF not supported), DXF (up to AutoCAD 2016)
Supported lasers	IR, UV, CO_2
Laser Parameter Expert	Provides the optimum range parameters based on the material to be marked and the desired marking results. A matrix pattern is provided as a mark content to further tune the desired laser mark result.
Rotary banding*	Creation of line marks around the circumference of cylindrical tube shaped parts.
Training videos	Cover importing graphic files, using built-in tools, variables, layout, vision features, etc. Now installed on the PC.

Optional features

Power monitor*	The laser power meter (sensor) is fully integrated in the marking laser and measures the available marking system's output power. The laser power is measured past all laser optics to provide a true laser power level.
Point & Shoot	WYSIWYG camera system for visual direct mark alignment on a screen image of the part (hardware is included, one USB port is required).
Intelligent Mark Positioning (IMP)	WYSIWYG vision system for the precise position detection of parts/to-be-processed areas and automatic alignment of marking, engraving or finishing (hardware is included, two USB ports are required). Pre- and post-mark verification is included. Post-mark verification will pass fail on mark position, orientation and scale.
Programmable lighting*	Illumination controls and programmable light banks to reduce hot spots on curved or cylindrical surfaces.
Autofocus	Automatically focuses the laser on the part anywhere within the marking field. Available when training jobs only. Available with M-Series only.
MOSAIC™	A patent pending solution that combines multiple camera images and automatically aligns laser marks to large parts independently of their physical placement. IMP is required. Available with CP10 scan heads only.
OCV	Optical Character Verification, validates each marked character for content and readability.
Code reading/verification	Datamatrix (ECC200), QR-Code, PDF417, Codabar, BC128 A/B/C, BC39, GS1, UDI, EAN13, GS1-128, HIBC
Remote access	TCP/IP, Profibus, I/O interface, PROFINET, EtherCAT
Language support	Chinese (Simplified), Czech, Danish, Dutch, English, French, German, Hungarian, Italian, Japanese, Latvian, Polish, Portuguese, Romanian, Russian, Slovenian, Spanish, Swedish

** Additional and/or special hardware required*

Specifications are provided for informational purposes only, actual performance will vary from application to application. Performance will degrade with part texture, color, finish, shape, etc. Always validate performance with FOBA's application team. Specifications are based on marking content in the center of the marking field.

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Management System ISO 9001:2015