



FOBA MarkUS

The intuitive software for laser marking

FOBA MarkUS is an intuitive graphic design and high-performance laser control software for the creation of high-quality and highly precise laser markings. Thanks to the visual user guidance (color codings, flexible and floating toolbars, common icons) MarkUS is an intuitive and easy-to-use software interface.

With MarkUS users not only create great marks, they especially benefit from a range of advantageous, value-adding features:

Your product benefits

- **Intuitive graphic design tools and excellent layout functionalities** for lean and efficient workflows
- **Various marking formats & contents** for ultimate flexibility
- **Closed-loop mark process** supporting customers' process reliability (pre- & post-mark validation with part validation, pre-mark verification, mark alignment, mark verification, optical character verification and 2D code validation)
- **Built-in grayscale image support** for the convenient creation of astonishing grayscale markings
- **Innovative vision alignment systems** for precision and repeatability: IMP and Point & Shoot
- **Remote control options** for increased automation and productivity (TCP/IP, Profibus, serial communication)
- **Five in one sweep:** support and control of up to 5 axes including a swivel and a rotary axis

At a glance

- **MarkUS Designer:** Easy-to-use GUI for the creation and editing of laser markings, engravings or finishings
- **MarkUS Runtime:** Intuitive user interface and high-performance laser control software for the production of laser markings, engravings or finishings
- **MarkUS Administrator:** System setup and configuration
- **Freely configurable user levels:** Operator for running production jobs (Runtime), Job designer for job creation and job setup (Designer), Administrator for system configuration

*MarkUS Designer (left) and
Runtime (right) user interfaces*





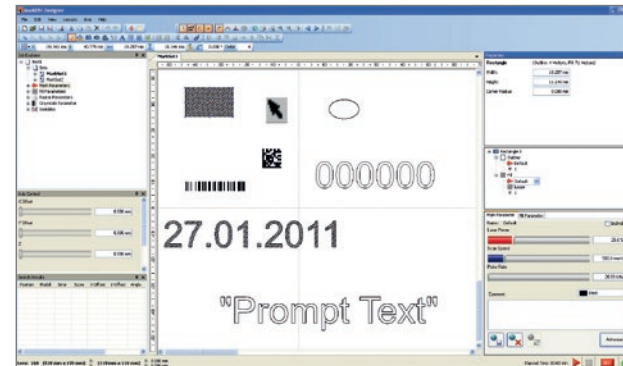
Ultimate usability: MarkUS user interfaces

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

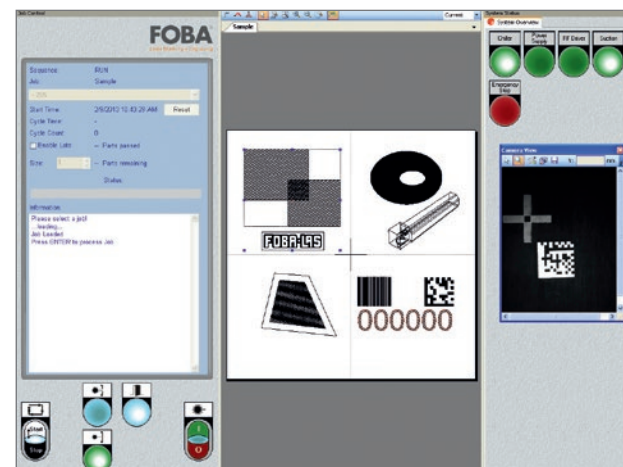


MarkUS Designer suite with examples of marking contents

MarkUS Runtime: The operator interface

Runtime is MarkUS' intuitive operator interface and high-performance laser control software. Runtime used to run production jobs and provides all important status information on both machine and marking jobs. The suite is especially easy-to-use as it comes with the same controls as the laser marking system or machine.

→ **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.

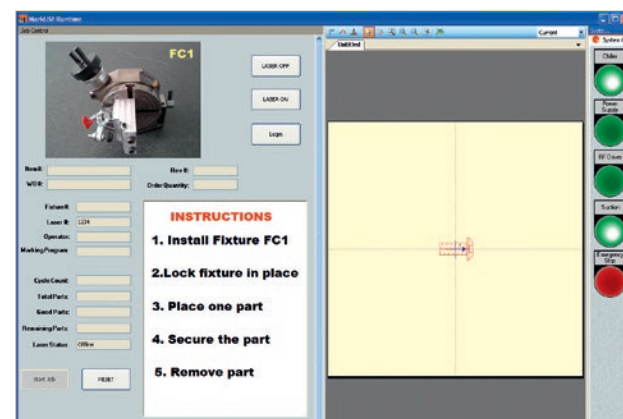
Custom Runtime interfaces are typically designed based on customer's requirements. These interfaces deliver the necessary functionality operators need to accomplish their production tasks while providing information on the machine status.

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



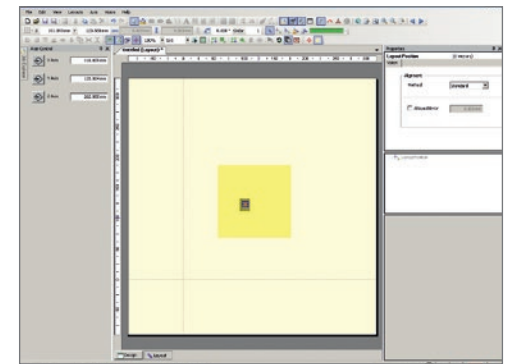
Custom MarkUS Runtime interface

Unique features: 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 square physical (yellow) 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 (ID) or outer diameter (OD) of a cylinder. FOBA's 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 MarkUS' innovative approach to segmentation the mark is just perfect.

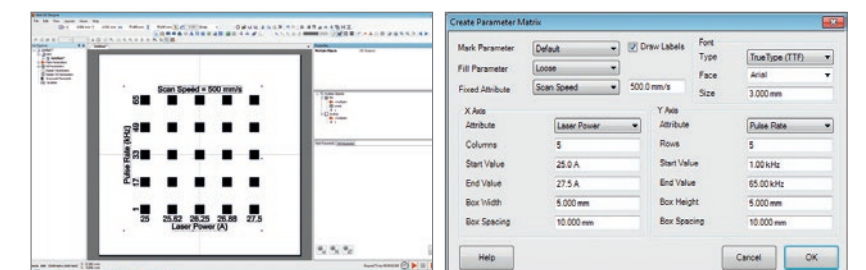


Parameter Matrix Tool

Quickly finding the laser parameters that provide the best contrast and mark quality is always a challenge. Users can spend hours tuning laser power, pulse rate and scan speed without knowing if the selected set of parameters is truly optimized. Thanks to the parameter matrix tool, laser parameter tuning is now significantly less complex and no longer a lengthy trial and error process but a **simple point and click operation**.

Save valuable time and increase efficiency and quality:

- Quickly determine optimum parameters: Pick the best parameters with confidence and certainty in just a few minutes
- No more trial and error
- Achieve the best contrast and marking quality.
- Optimize marking performance for speed and readability.
- Easy to use: little to no training required.



The matrix pattern generated in MarkUS and the control tool



For precision and repeatability: Innovative vision alignment tools

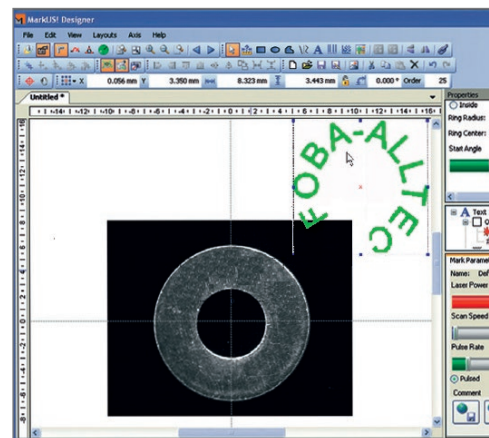
The vision systems IMP (Intelligent Mark Positioning) and Point & Shoot ensure ultimate precision and repeatability. With Point & Shoot marking contents are placed manually directly on a screen image of the product to be marked. This system is perfect for the processing of high-quality work pieces and 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.

Vision alignment with Point & Shoot

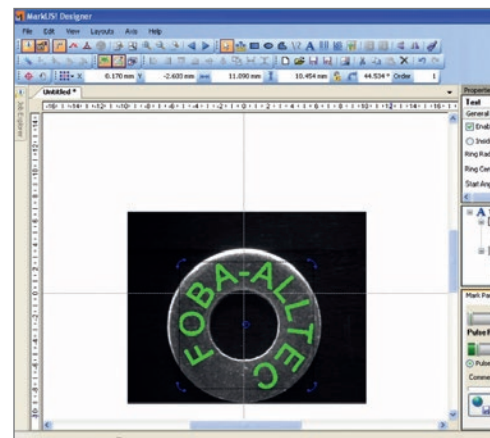
The innovative vision tool option, Point & Shoot, is a powerful feature for manual mark positioning. Point & Shoot is fully integrated within the Designer tool, it eliminates the lengthy phases of trial-and-error. This exceptional vision tool also allows users to create marking jobs from existing pre-marked 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.

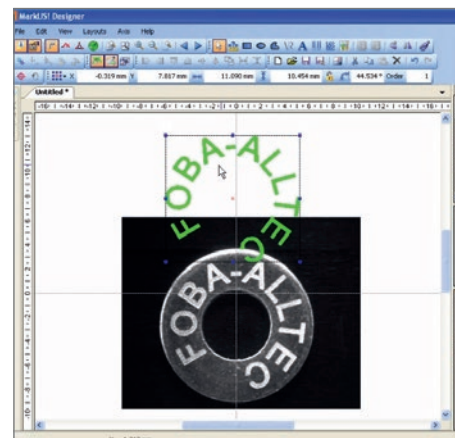
The Point & Shoot camera focuses (through the lens) on the marking field, creates an image of the part, and displays it on the screen. The user creates the marking and places it (via drag & drop) where it should be applied on the product.*



Part in place



Mark content aligned manually

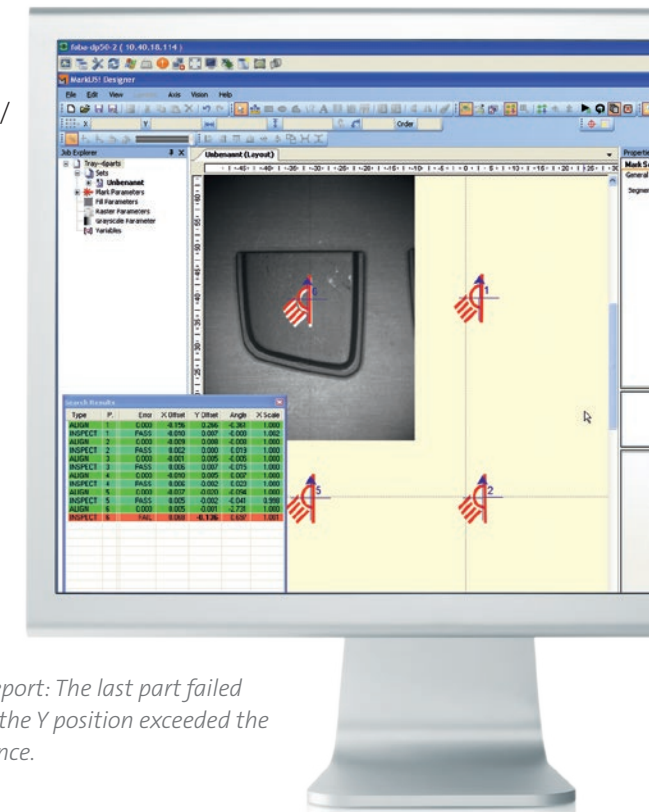


Part marked accordingly

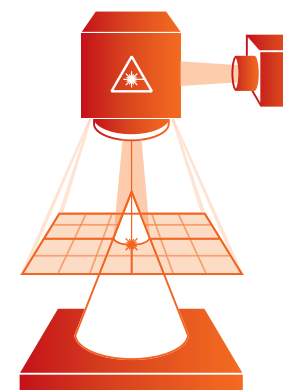
Vision alignment with IMP (Intelligent Mark Positioning) Patented and proven

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:** Users from different markets are bound 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. The pre-mark verification feature 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.



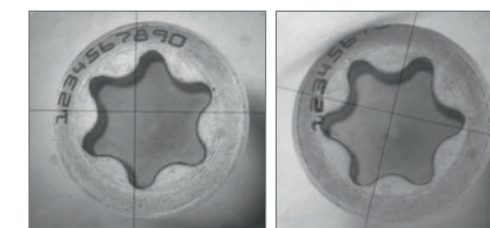
Verification report: The last part failed inspection as the Y position exceeded the 0.1mm tolerance.



Vision system IMP

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

- + Ideal for automated serial processing
- + Consistently highest processing quality
- + Faster finishing
- + Improved accuracy
- + Increased efficiency
- + Increased productivity
- + Reduced scrap

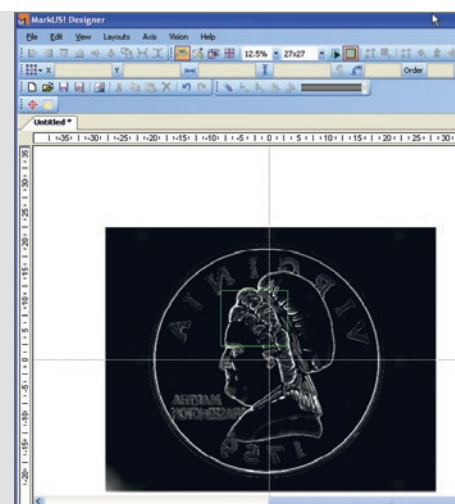


Left: mark was aligned with IMP. Right: shows a misaligned mark, a common problem when not using a vision system like IMP.

Vision feature: Image tiling

The Point & Shoot and IMP features have been taken to its next level of simplicity and user friendliness. MarkUS users are now able to stitch multiple view images from the live camera to create an accurate and highly detailed tiled image of the physical mark field. Image tiling is ideal when training large trays or large objects.

MarkUS tiled images with a floating live image (green = camera image size)



Vision feature: Node editing

Imported mark contents do not always match the part to mark. In some circumstances a quick edit of the contours can get mark contents to match perfectly the part. MarkUS provides means of editing the shape of imported contours to the node level by providing tools to move, add or delete nodes as needed.





Best aid –
Not only for medical marking applications

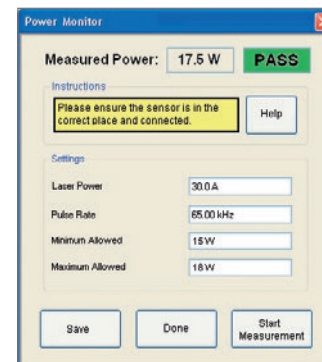
System Health Monitor

Laser power measurement

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.
- Machine operators can use the tool during production cycles.
- Configure pass fail parameters.
- A modifiable help window (custom instructions for customers with strict performance qualification (PQ) requirements).
- A logging history on the laser source performance.

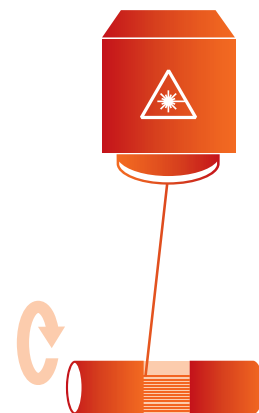
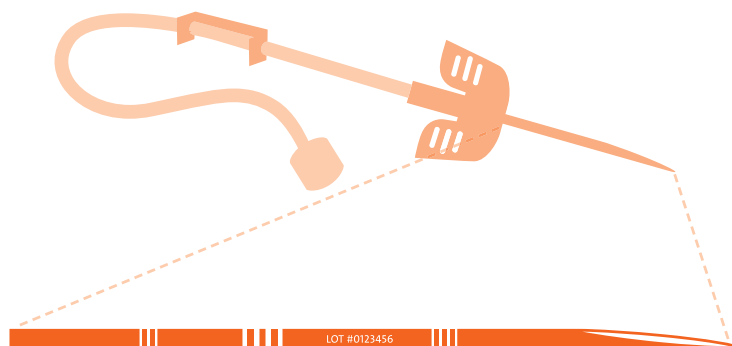


The power monitor

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



Catheter with bands and alphanumeric content

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.

Optical Character Verification (OCV)

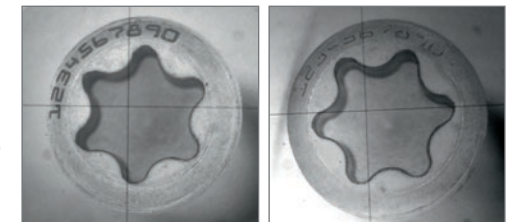
FOBA's OCV feature, bundled with FOBA's vision alignment system IMP, enables users to validate that any laser marked text or glyph matches the expected content. OCV catches marking errors before the parts leave the workstation and flags marking flaws such as power degradation as they happen.

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 with a fast and accurate validation process.
- Early detection of mark defects → early correction
→ reduced waste
- Reduced human visual inspection.
- Decreases time and efforts at final inspection.
- Improves product quality and yields.
- Cost saving related to the marking process.



Without OCV, mismatched 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.

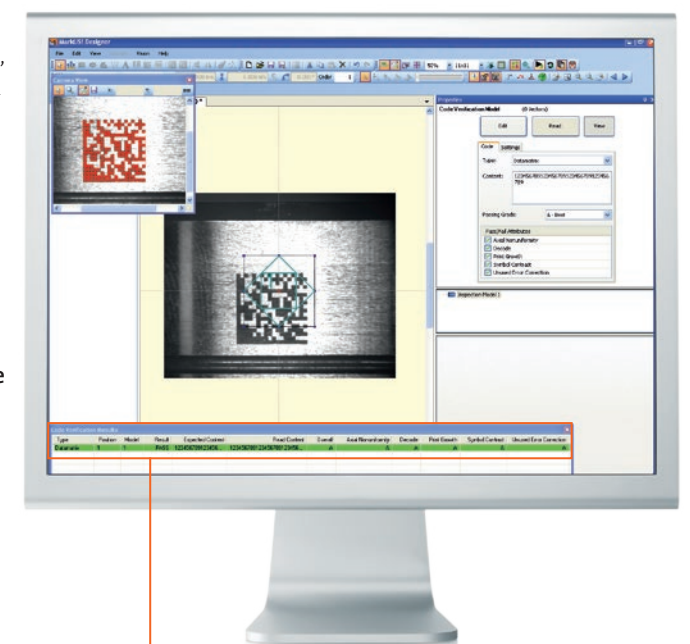
Code verification

Read and verify

MarkUS provides the ability to **read barcodes**. Serial barcodes, as well as 2D codes such as the QR and Datamatrix codes, can be read and validated in a fraction of a second after being marked.

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

The code verification 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.

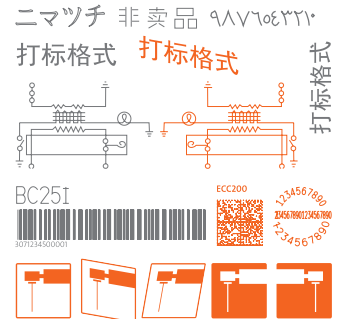


The code verification results from a datamatrix code read-out that validates the mark content.

[illegible]

For ultimate flexibility: Various marking formats

- Multiple language fonts
- Machine-readable codes (bar codes, 2D and QR codes)
- Graphics, logos, symbols, etc. (the most common formats can be imported)
- Grayscale images and contents
- Complex fillings (hatch, contour and meander)
- Linear, circular and angular text marking; ring writing, rotation, reflection, expansion, compression, horizontal and vertical stretching of marking contents and texts
- Sequence and serial numbering; automatic date, layer, time coding, real-time clock; on-line coding of individual data



FOBA MarkUS Technical Data

Standard features

Interfaces	MarkUS Designer, MarkUS Runtime, MarkUS Administrator
Axis control*	Support for up to 5 axes (X, Y, Z, rotary axis and swivel axis)
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.
Grayscale support*	Layout, design, editing of grayscale marking contents, e.g. graphics, images
File support	Import functions for the most common file formats: BMP, JPEG, TIFF, 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 V11)
Supported lasers	IR, UV, CO ₂
Parameter Matrix Tool	Helps to quickly find the optimum parameters to get the best contrast for a specific application by generating an N by N matrix of marks using different ranges of laser power, speeds or frequencies.
Rotary banding*	Creation of line marks around the circumference of cylindrical tube shaped parts (i.e. catheters).

Options

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). Image tiling is included.
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.
OCV	Optical Character Verification (OCV) validates each marked character for content and readability (included with IMP).
Barcode reading	Datamatrix (ECC200), QR-Code, BC128 A/B/C, BC39
Remote access	TCP/IP, Profibus or serial communication
Language support	Chinese, Czech, Dutch, English, French, German, Hungarian, Italian, Japanese, Polish, Portuguese, Romanian, Russian, Spanish, Swedish

* Needs additional and/or special hardware

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