Laser Marking +
Engraving Solutions

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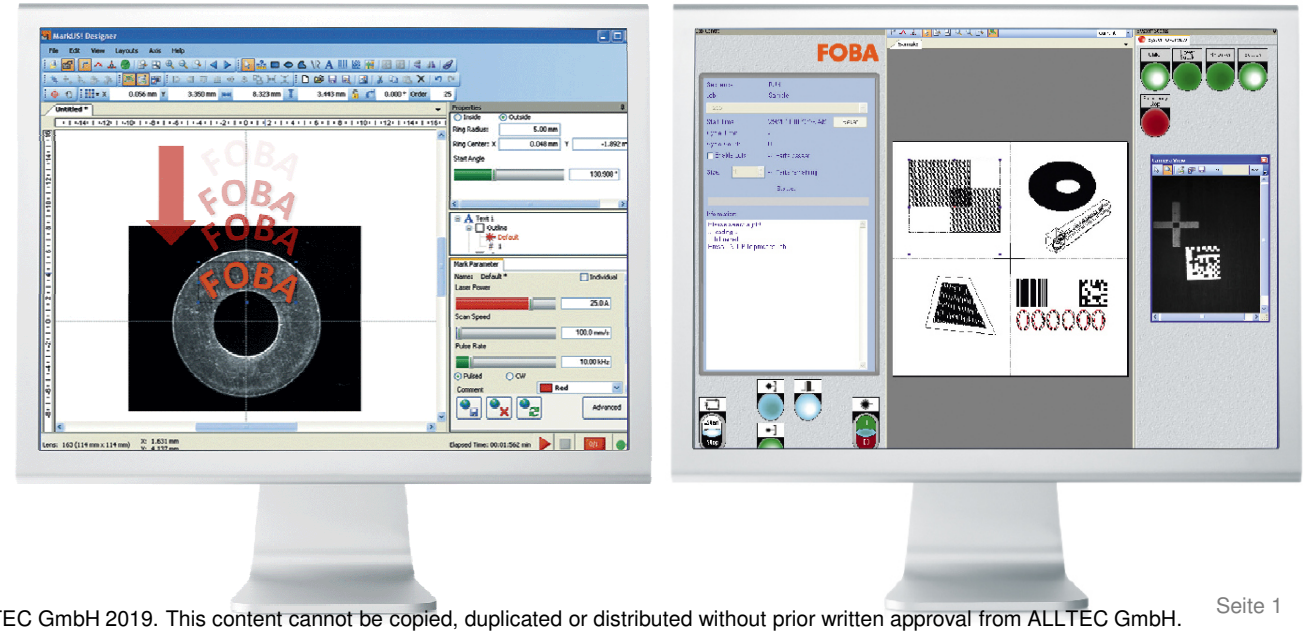
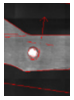
MarkUS: Mosaic™
An introduction, for FOBA distributors



MarkUS MOSAIC™

Mosaic combines IMP with the scan feature from an early version of MarkUS.

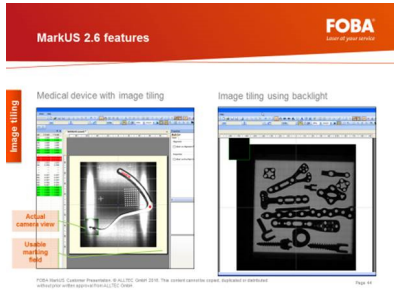
Users can create a vision model that can be used to track the part position and orientation like IMP but now, the feature to track can be as large as the entire marking field of the laser.



IMP

Intelligent Mark Positioning

+



Scan

Existing scan feature introduced in MarkUS 2.6 provides a view of the laser marking field

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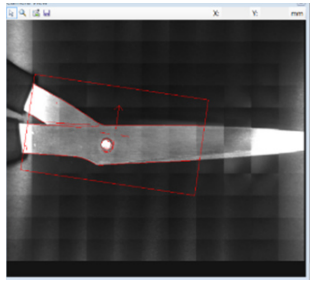

Mosaic

Mosaic™: Rotor Video : See youtube channel

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FOBA Mosaic: Marking without fixtures

FOBA M3000-P with 30W fiber laser and 254 mm lens on disc brakes

High-precision marking without fixtures:
- Higher yield and throughput
- Lower reject rate and production costs
- Faster return on investment

MarkUS MOSAIC™: Customer's Benefits

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No engineering design and manufacturing of fixtures

- No engineering resources needed
- No overhead for storage, handling, etc.
- Immediate production start

Simple Poka Yoke Usage and Part Handling

- No operator training on how to use fixtures
- Easy part placement > pick-place-mark
- Less errors caused by operators

Faster operation

- Faster job setup as it takes less time to train parts
- Different parts can be processed/marked in one step

MarkUS MOSAIC™: Quantification of Customer's Value

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The following model is an approximate representation of the steps required in designing a new fixture ready for production and the associated cost.

Cost of Fixtures	Time	Cost
Total number of new fixtures per year		10
Material cost and machining for one fixture		$2500
Total cost of fixtures		$25000
ROI ~ 6 Months		

This representation does not include the cost relative to the day to day maintenance of tooling and fixtures.

Eliminating the design of 10 fixtures quickly pays off for the Mosaic option.

Mosaic™: Forceps Video: See youtube channel

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FOBA Mosaic: Marking without fixtures in split marking field

FOBA M3000-P with 30W fiber laser and 254 mm lens on Kelly Forceps

High-precision marking without fixtures:
- Higher yield and throughput
- Lower reject rate and production costs
- Faster return on investment

MarkUS Mosaic™: Points to Consider

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Mosaic: Where it should not be used?

- Mosaic is not as repeatable as IMP. IMP's repeatability is within ±0.05mm while Mosaic is repeatable within ± 0.2mm (163mm lens) under ideal conditions.
- Mosaic is intended for large parts (bigger than 40mm) that do not require high accurate mark placement.
- For customers who want better accuracy than ± 0.2mm, they should consider IMP.

Important: Like any other technology, Mosaic will NOT work with certain parts like spheres.

All specifications are subject to change without notice.

MarkUS 2.12: Points to Consider

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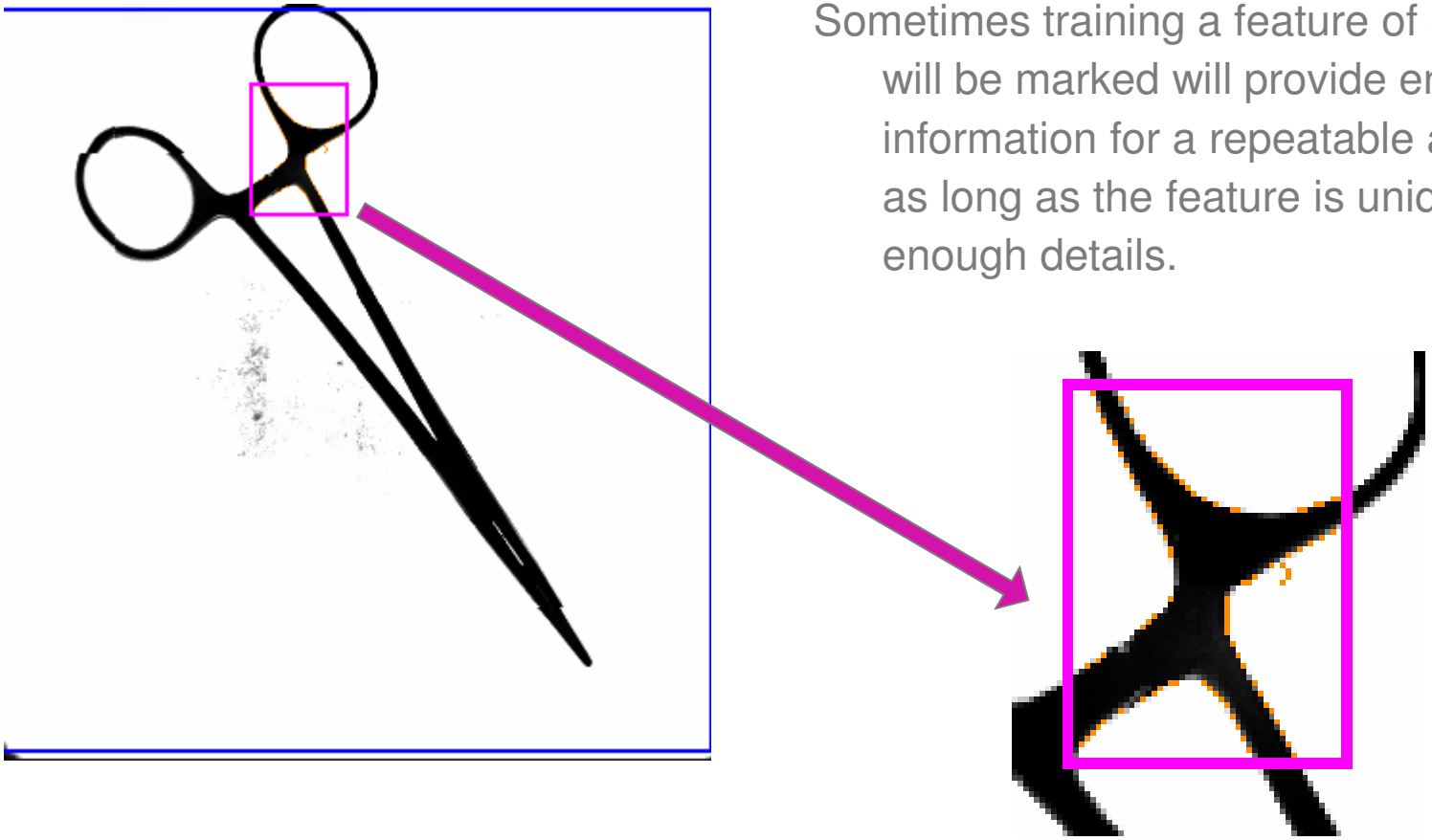
Mosaic: Part of an object is sufficient for alignment



Sometimes training a feature of a part that will be marked will provide enough information for a repeatable alignment, as long as the feature is unique and has enough details.

MarkUS Mosaic™: Points to Consider

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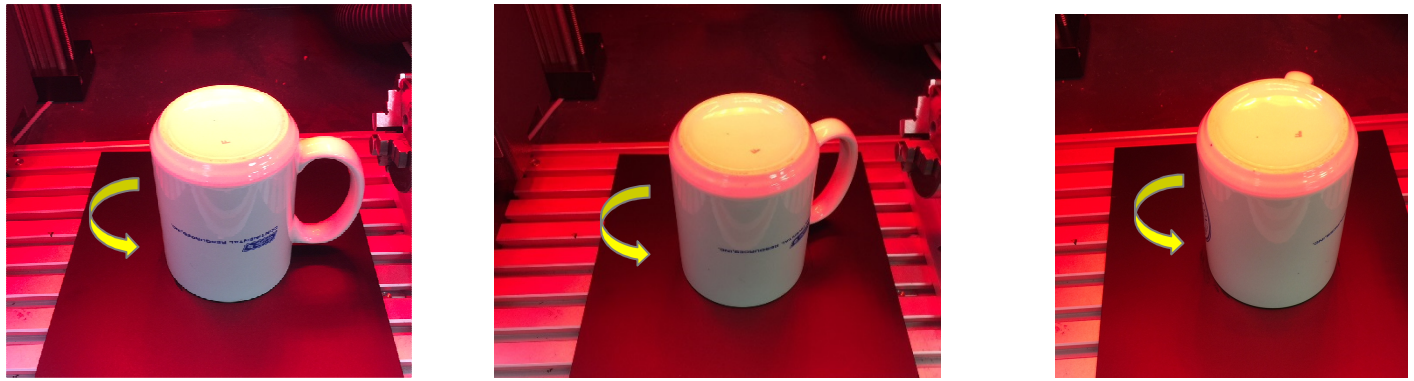
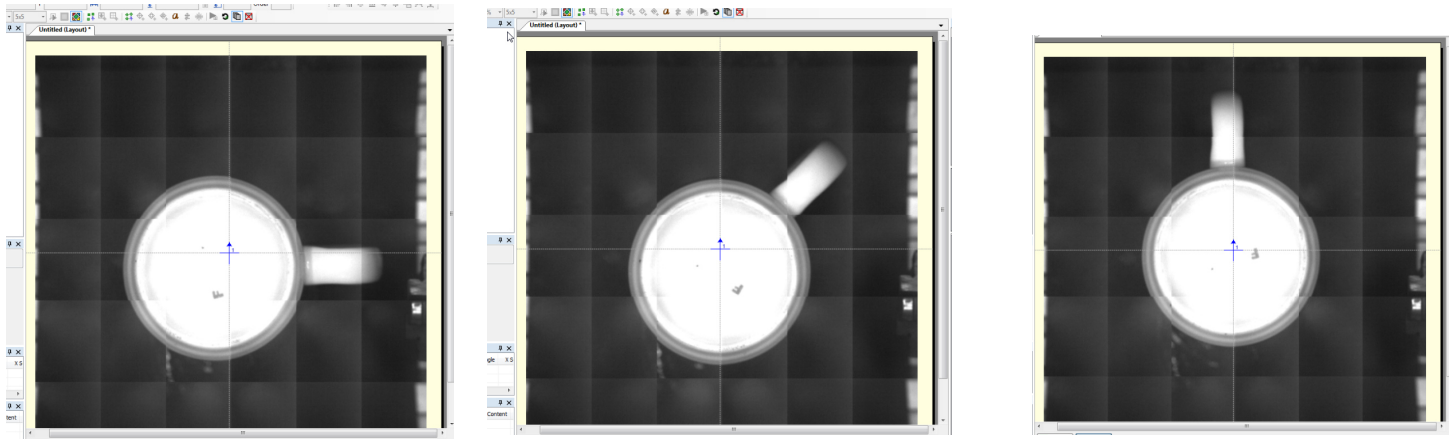
Mosaic: How is it different from an external camera?

Side camera



Mosaic



Typical Questions for MarkUS Mosaic™: Specifications

Requires **MarkUS 2.12 and IMP**

Available with **CP10 scanhead only**

Usable area: ~ 80 -95%. Varies with lenses.

Alignment time : ~1sec to 1.1 sec in Designer and < ~0.8sec under Runtime.

Accuracy depends on part shape: Typical ± 0.2mm (163 mm FL)

Minimum object size: 40mm (163 mm FL)

Maximum object size: alignment feature must fit within marking field

Shiny parts: We strongly recommend using a backlight

All specifications are subject to change without notice.

What is required?

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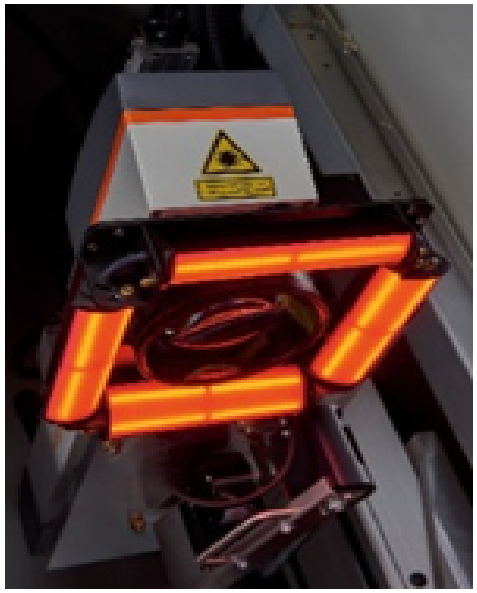
CP10 + IMP

Basic system Y.0XXX
M1000 Y.0XXX
M2000-R Y.0XXX
M2000-B Y.0XXX
M2000-P Y.0XXX
M3000-R Y.0XXX
M3000-B Y.0XXX
M3000-P Y.0XXX



Questions

Q: Does MOSAIC work together with IMP?

- YES but on CP10 scanhead only and you will need MarkUS 2.12 or higher.

Q: What is the alignment accuracy of Mosaic?

- The alignment accuracy of Mosaic depends on various factors, for example:
- Where the part is located in the marking field (center area vs. outer area of the marking field)
- Acceptance level
- Robustness of alignment vision model
- Lens

Pricing

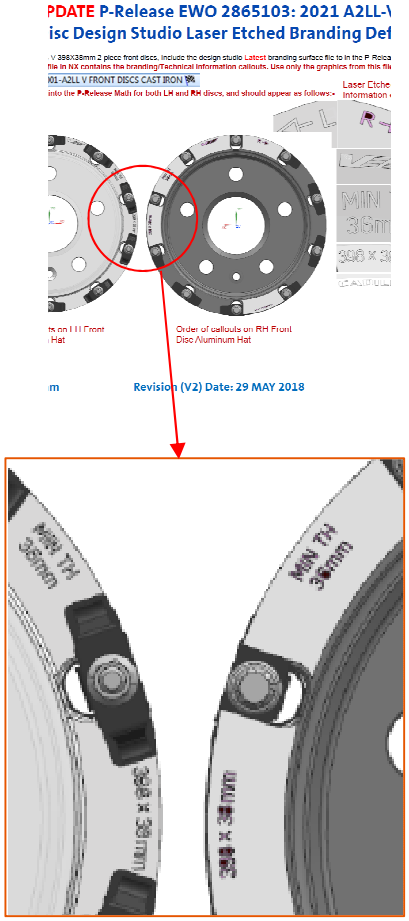
Please discuss with you FOBA’s Sales Engineering

MarkUS MOSAIC Applications: Rear View Mirror

- Location: Michigan USA
- Industry: Automotive
- Requirement: Laser mark align text and graphics to part position and orientation (mirror)
- Current solution: CO2 laser and custom vision system
- Why interested:
  - Reduction of tooling
  - Built-in vision
  - Eliminates current custom solution that requires resources and engineering
  - Simpler

MarkUS MOSAIC Applications: Brake Rotor

- Location: Michigan USA
- Product: Rotor for Cadillac.
- Requirement: Laser mark align text and graphics and 2D code on rotor. Mark placement needs to be accurate (see picture)
- Current solution: relies on operator and fixtures.
- Why interested:
  - Accurate mark alignment
  - Eliminate custom tooling for different types of rotor
  - Faster product change over



MarkUS Mosaic™ Applications: Bearings

- Location: Ohio USA
- Industry: Automotive
- Product: Bearing
- Requirement: Mark side bearing and inspect inverted or missing rollers
- Current solution: Laser marking station + laser mark inspection station + external vision system for missing or inverted roller inspection.
- Why interested:
  - Eliminate tooling to align bearing
  - Inspection

Questions & Answers

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With MOSAIC, can I randomly place parts into the FOBA Machine and MOSAIC will align the mark automatically?

- If all parts are different from each other. You will need to train each part individually and YES you can place the parts under the scanhead in random positions and orientations.
- If some or all the parts are the same, NO. You will have to allocate a specific area in the marking field for each part.

Does the accuracy of MOSAIC depend on the lens that is configured with the system?

- YES the longer the lens the lower the accuracy.

Why do I need to define the search area for MOSAIC?

- Because the system reports only one found part per search area, you need to define multiple non overlapping areas when you are marking multiples of the same part.

Is it possible with MOSAIC to recognize different parts on the marking field?

- YES

Can the z axis value be different for each part?

- YES each part can have a different Z height as long as the Z offset is reasonable (10 - 20mm). **For larger Z height offset values evaluate the part with the application team.**

Questions & Answers continue

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Q: Is it possible to read 2D codes with MOSAIC?

- NO. You will have to switch to IMP. A future version will have the capability to read 2D codes within Mosaic.

Q: Can a part be recognized with MOSAIC and the mark be marked outside of current marking field by traveling with the axis?

- NO. Marking is always within the marking field. If the alignment feature is in the mark area but the marked surface is outside the mark area, the vision will return an error.

Q: What are the limitations regarding part size for MOSAIC?

- MOSAIC works best with parts that are larger than 40mm, smaller parts will not perform as well particularly if less than 20mm.

Q: Can I use MOSAIC and IMP simultaneously?

- Absolutely, a job can use both IMP and Mosaic. Beware that the results from MOSAIC and IMP are NOT shared between the two features and the features run independently from each other.

Q: Can Mosaic be used with the SS10 Scanhead?

- NO, Mosaic runs with the CP10 scanhead only.

Questions & Answers end

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Q: What is the usable part of the marking field?

- Typically 80-90%, it will vary with the size of F-Theta lens.

Q: Can I upgrade an existing machine to Mosaic?

- Yes, you will have to upgrade to Markus 2.12 and need IMP.

Q: Can I use the inspection features with Mosaic?

- With Mosaic the inspection feature are available but because of the low resolution of the Mosaic image the performance are limited. **Always validate the desired performance with the applications team.**
- **Q: Can I use Mosaic first to find the "approximate" position in the marking field and then use IMP directly afterwards to find the very precise position of the part?**
  - No, that is not possible. The two features run independently from each other.
- **Q: When I move the part under the laser, does Mosaic show the movement?**
  - Mosaic refreshes images approx. every 1s. So Mosaic does not show a continuous live image, but a snapshot per second.

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Thank you for your attention….

For any questions contact your Sales Engineer.