FOBA helps Raval to make their automotive components reliably traceable, and thus makes a substantial contribution to improved product quality and process reliability.

The broad range of solutions FOBA marking lasers provide for traceability in the automotive industries goes far beyond the pure laser marking of an identification code. Particularly important, what sets the FOBA solution apart from its competition is its unique three stage closed-loop marking process: The part validation, the laser marking, and the verification of traceability codes.
A melted engraving for the traceability of venting valves for fuel tank systems

Raval is a World’s leading manufacturer of fuel tank venting systems. For many years now, Raval puts trust in FOBA’s CO₂ laser marking systems. The automotive part supplier that is headquartered in Israel and manufactures in the US, China and Luxembourg, uses FOBA marking lasers to mark its venting valves for fuel tank systems with a reliably readable traceability code.

Secure part tracking
Raval primarily engraves alphanumeric codes directly on several of its plastic components. These permanent and perfectly machine-readable traceability codes are used to tell Raval any time when, where and by whom the fuel tank venting components and valves have been manufactured, processed, stored or shipped. Should any defects be found or problems regarding the fuel venting systems arise, it must be completely traceable when and by whom the related parts have been manufactured and at what point of the production process the defect or error occurred.

A simple laser engraved mark was sufficient for Raval, an optically appealing laser marking was not required. The traceability codes Raval applies only have to be excellently machine-readable at any time.

It is a matter of cost-effective built-in traceability
Raval uses these marked product codes simply for traceability and quality assurance. This sets special requirements on the utilized identification systems. FOBA’s laser markers had to ensure that all alphanumeric characters are clear, forgery-proof and uncompromisingly traceable.

Raval also required marking times less than a second as individual cycle times have to adhere to production line constraints. Moreover, auto parts manufacturers such as Raval experience an enormous cost pressure. Their customers are usually not willing to pay for traceability marks even though they would not accept products without these marks. Consequently, the marking process itself has to be designed economically.

With the Alltec CO₂ laser marking systems FOBA provides efficient identification marking systems that not only mark fast, but also apply all required contents with the highest quality so they are any time reliably traceable.

The comprehensive package for a smooth marking process
Round the clock, six of FOBA’s Alltec CO₂ laser markers are used at Raval’s manufacturing site in Luxembourg. Worldwide installations amount to over twenty FOBA systems. One reason is within the powerful marking lasers. For years, they are just doing what they are supposed to do: reliably and efficiently mark traceability codes on Raval parts. Another reason is FOBA’s comprehensive global support that ranges from product and applications consulting through hardware and software installation and training to technology and spare parts service. FOBA’s support is always at hand and within easy reach.

“Technology providers such as FOBA have to be trustworthy. Reliability is extremely important to us,” said Denis Pascolo, Maintenance Manager for Raval in Luxembourg. Pascolo is particularly responsible for a smooth production process. Laser marking technology helps him ensure this.

Convincing laser technology, reliable service
In terms of technology, FOBA prevailed with the compact system design of the Alltec LC300. The marking laser was easy to integrate in existing production lines and provided all required interfaces to ensure a smooth data exchange (RS232, TCP/IP). Available options for an even easier integration such as beam delivery units added to this positive impression. In terms of service, Raval particularly values FOBA’s replies to any request, be it of commercial or technical nature, for its responsiveness and reliability. For this reason, Raval, according to Pascolo, wants to “continue with this good relationship also in the future” and expresses the intention to “move forward together.”

For many years used by Raval:
FOBA’s 10W and 30W CO₂ marking lasers Alltec LC100 and LC300

CO₂ marking lasers
Alltec LC100 and LC300
High-speed vector scanners for the quick and reliable product identification
→ High-quality markings, reliable legibility and reproducibility
→ Various marking contents: multiline texts, graphics, machine-readable codes
→ Compact system and communication design for flexible and fast integration in production lines such as those of Raval in Israel and Luxembourg
Part tracking and traceability are fundamental elements of modern manufacturing processes. Especially in the automotive supply industry where various safety-critical components are manufactured. Auto parts have to be controlled and completely tracked to ensure safe and high-quality products and production processes. To this end, both automobile manufacturers and suppliers to the industry – such as Raval – mark their products with various alphanumeric character strings and complex codes: Traceability codes that are then used to monitor and track these parts any time during their life cycle.

Perfectly marked, reliably identified
To properly identify and trace back parts, it is essential to mark them properly and as efficient as possible. That requires that only the correct information is marked on the correct position of the correct part and that this mark is absolutely traceable throughout the product's lifecycle. The marking process itself must be repeatable in order to ensure high efficiency and eliminate waste. For these reasons, laser marking is among the preferred procedures.

FOBA supports global automotive parts manufacturers such as Raval with their product identification tasks and provides sophisticated laser marking process solutions with integrated vision technology. These solutions ensure process reliability before and after laser marking and thus substantially contribute to improved product quality and process reliability.

The comprehensive three-stage approach: All-in-one process for marking traceability codes in the automotive industry

Raval successfully utilizes FOBA laser technology for the application of traceability codes. The range of solutions FOBA marking lasers provide for traceability in the automotive industries goes far beyond the pure laser marking of an identification code. What sets the FOBA solution apart, is the closed-loop marking process: In addition to the laser marking itself, the process assurance before and after marking the traceability codes is particularly important. FOBA offers a three-stage approach that helps manufacturers to...

→ ensure that all data that are expected to be marked on the product are actually marked on the product
→ improve product safety and product quality
→ improve process reliability and productivity

Traceability in the automotive industry: Looking back ensures more security

Make sure that all data that are expected to identify your parts are actually marked onto them!

In addition to laser marking (stage 2), for instance a 2D code, FOBA’s three-stage marking approach includes the reading and verification of all marked and expected marking contents (stage 3) – all while the marked product still lies under the marking laser. All is performed by the laser marking system and the integrated vision system IMP (Intelligent Mark Positioning). IMP is also used prior to marking to validate that only the intended mark will be applied at the correct position to the correct product (stage 1).

Components of FOBA’s closed-loop marking process:

→ Various laser rail markers for several applications (CO₂, fiber, Nd:YAG, Vanadat, UV) and production line ready
→ Laser class 1 workstations (compact manual workstations and high-precision workstations for automated productions)
→ Variety of accessories and options for a repeatable, accurate and highly precise manufacturing process

In addition to the hardware components, the process also includes all software features FOBA provides with its patented camera system IMP and the manual vision alignment tool Point & Shoot for pre- and post-mark verification.
Before and after laser marking: Six verification stages prevent marking errors

In order to eliminate possible marking errors and defects, FOBA offers six vision based verification stages to both the part and the laser mark. The vision system that accompanies the laser marking, IMP, is directly integrated in FOBA systems. Additional third party hardware or a separate inspection process for the verification and reliability of the marking process is thus not needed. Traceability marks are applied and verified with one system both efficiently and reliably.

### Three verification stages prior to laser marking

<table>
<thead>
<tr>
<th>1: Part validation</th>
<th>2: Pre-mark verification</th>
<th>3: Mark alignment</th>
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<tbody>
<tr>
<td>Part validation validates that the correct part is in place and prevents from marking wrong parts or defective products.</td>
<td>Ensures that the to be marked part has not already been marked.</td>
<td>Is a tool that aligns the mark relative to the position of the to be marked part. (Note that the part does not have to align to the mark, since the mark aligns itself accurately to the part).</td>
</tr>
</tbody>
</table>

### Laser marking

### Three verification stages after laser marking

<table>
<thead>
<tr>
<th>4: Mark verification</th>
<th>5: Optical Character Verification (OCV)</th>
<th>6: Code validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validates that marks are placed where they are expected (checks for positioning, alignment, size).</td>
<td>Validates that every character marked by the laser matches the expected content.</td>
<td>Reads the contents of 1D and 2D codes (Datamatrix, QR) and compares the results to the expected content. A classification of the code into quality classes is possible.</td>
</tr>
</tbody>
</table>

### FOBA IMP

**Intelligent Mark Positioning**

The patented vision alignment system, proven and tested in over hundreds of installations, detects the positioning of areas and components to be processed, and adjusts the laser engraving or laser marking precisely as required.

- Optical part detection and automatic alignment of the marking or engraving
- Perfect for accurate automated inline processes
- Quality control: optical verification of marking contents (graphics, 2D codes) and their placement

**Added values**

- Consistent high processing quality
- Faster and more efficient production
- Improved accuracy
- Increased productivity
- Drastically reduced product scrap

The code reading option (step 6) comes with a verification tool that provides means of passing or failing codes based on different factors such as the read content or the mark contrast.

The post-mark verification report (step 4): The last part failed inspection as the Y position exceeded the 0.1 mm tolerance.
Added value:
Laser marking as process solution

This extensive verification approach has the potential to address and prevent most of the five major components of marking errors and defects that cause costly waste. One, users benefit from less scrap, second, a better product and marking quality, third, a robust accurate marking process, fourth, a cost-reducing automated process and fifth, an increase in production efficiency. Not only suppliers to the Automotive industry but also Automobile manufacturers benefit with a sophisticated process solution rather than a system solution for product identification.

FOBA Laser Marking + Engraving is among the leaders in manufacturing and supplying precision laser systems for marking and engraving. Our laser marking and engraving technologies are used in a wide variety of automotive marking applications including sensors, switches, fittings, dashboard electronics, lighting components, day and night design elements or motor and brake components. FOBA marking lasers mark a variety of materials and parts not only in the key markets of Automotive and Medical but also in Electronics, Plastics processing, Safety and ID with text, numerical information, graphics and logos or bar codes and data matrix codes. FOBA laser workstations for marking and engraving are especially applied in the fields of Automotive part production and Medical device marking as well as in Tool, Metal and Mold Making, Plastics processing and Jewelry and Coinage. Worldwide sales and service branches service the most important markets. In September 2009, FOBA has become part of ALLTEC GmbH. Since then, FOBA is part of ALLTEC as a sales channel for laser part marking and engraving.

FOBA offers a complete spectrum of system and machine solutions for laser marking and engraving as well as sophisticated vision systems for the direct, permanent and process reliable identification of automotive parts and components.