SHOTBLAST RESISTANT MARKING HAS ARRIVED

Patent Pending Technology

A CHANGING AUTOMOTIVE ENVIRONMENT

More and more automobile manufacturers are requesting that direct part markings be made right at the extraction of the casting from the die, thereby ensuring complete traceability throughout the entire value chain. Information is encoded and engraved on the parts using protocols, such as the one used by Data Matrix Codes.

IMPLEMENTING TRACEABILITY WITH DATA MATRIX CODES

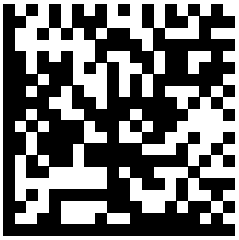

Figure 1: Typical Data Matrix Code

Data Matrix Codes (DMC) are the best type of barcode for harsh industrial applications:

- High density of information
- Encoding algorithm duplicate the message
- Message remains intact with up to 50 % of damaged code
- Well-established protocol

The number of rows and columns in the DMC determines its storage capacity.

LASER DIRECT PART MARKING ON METALS

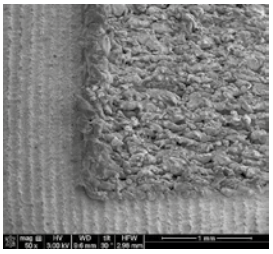

Figure 2: Image of a pale and dark markings using a scanning electron microscope (SEM)

Lasers use light as a means to deliver huge quantity of energy per unit surfaces to the targeted metal, resulting in the fusion of the targeted metal surface.

Crests and troughs can be created as the metal solidifies. Such structures can be seen at the bottom and to the left of Figure 2. These wavy patterns redirect beams in all directions, resulting in a pale mark.

Otherwise, a chaotic solidification of the melted metal creates protruding peaks and crevices. Deep crevices and high peaks (such as those that can be seen in the top right corner of Figure 2) reflect much less light, resulting in a darker mark.

LASERAX'S EXCLUSIVE SHOTBLAST RESISTANT MARKING

To maintain the legibility of the DMC throughout the shotblast process, it is necessary to protect the dark areas of the codes. Otherwise, the peaks and crevices would be blunted, thereby reducing the darkness of the marks.

Our laser technology experts have devised a patent-pending process that protects the high peaks and deep valleys from the blast media.

Pockets are dug into the surface of the metal, which creates walls around each dark cell. Thus protected, the markings keep a much better contrast level than that of regular laser markings.

EXPERIMENTAL RESULTS

Extensive testings were conducted to come up with the best laser parameters for Laserax's patent-pending shotblast resistant marking. In the following images, you can see such markings before and after a shotblast treatment.

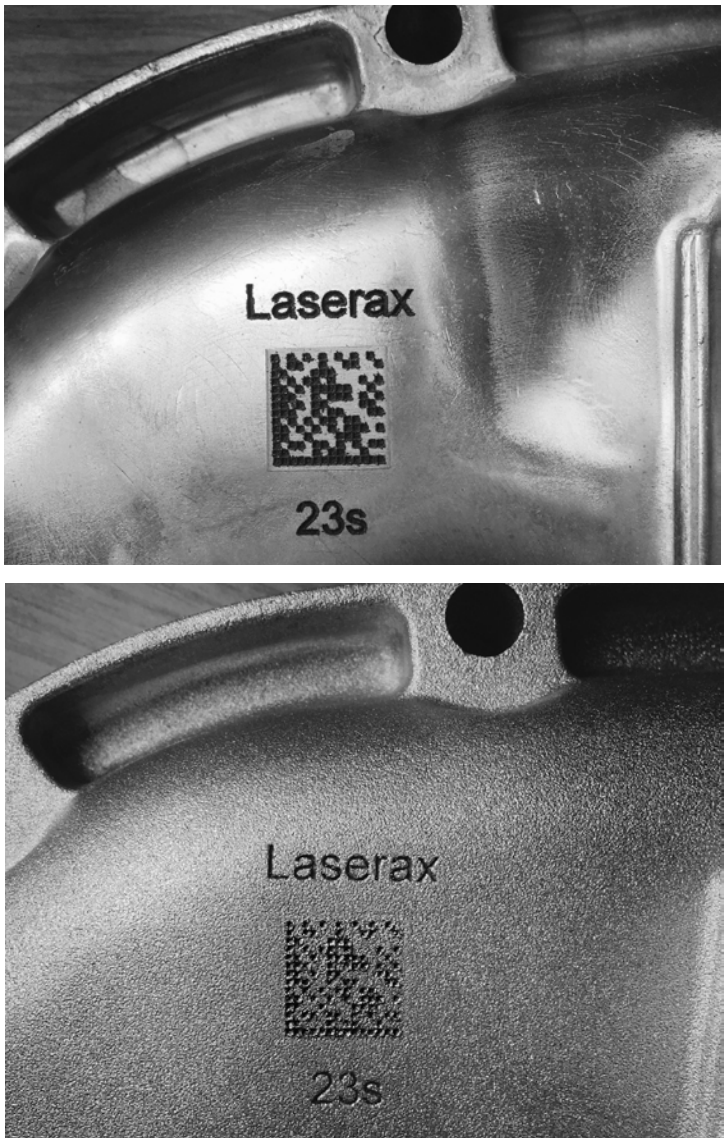

Figure 3 – Photos of a DMC etched using Laserax's shotblast resistant marking a) before shotblast and b) after shotblast

The time required to etch a shotblast resistant marking using Laserax's technology with a 100 W laser depends on the number of cells in the DMC, the pocket size and the pocket depth.

RECOMMENDED PARAMETERS FOR SHOTBLAST RESISTANT MARKING

- Pocket to cell size ratio: 80 %
- Pocket size: 0.7 mm
- Pocket depth: 0.30 mm (2 laser passes)

Given these recommended parameters, the following table provides the etching times along with the storage capacity of the DMCs.

NUMBER OF CELLS IN DMC	DMC STORAGE CAPACITY (NUMBER OF CHARACTERS)		TIME (S)
	ALPHA-NUMERICAL	NUMERICAL	Pocket Size: 0.7 mm Pocket Depth (approx.): 0.30 mm
10 X 10	3	6	13.42
12 X 12	6	10	17.35
14 X 14	10	16	22.96
16 X 16	16	24	30.21
18 X 18	25	36	39.55
20 X 20	31	44	46.05
22 X 22	43	60	54.76
24 X 24	52	72	64.58

Table 1 – DMC storage capacity and marking time required for Laserax's patent-pending shotblast resistant laser marking using a 100 W laser with a pocket to cell size ratio of 80 % for different DMC size

TURNKEY LASER MARKING SYSTEMS

To gain the most benefit from your traceability project, the diecasts should be marked as soon as they are produced, next to the diecasting press. Laserax recommends two types of machines for the integration of its patent-pending shotblast resistant marking in a die casting cell: a **rotary table system (RTS)** or an **open air system (OAS)**. If manual operation is preferred, the **rotary table workstation (RTW)** is the way to go.

ROTARY TABLE WORKSTATION (RTW)

- 100 % laser safe system
- Fed by operators
- Can be moved from one production line to another
- Give you more time to mark, marking is done in hidden time

OPEN AIR SYSTEM (OAS)

- 100 % laser safe system
- Fed by robots
- Inline marking station
- Marking is done in your current production flow

ROTARY TABLE SYSTEM (RTS)

- 100 % laser safe system
- Fed by robots
- Inline marking station
- Give you more time to mark, marking is done in hidden time

TURNKEY LASER MARKER SELECTOR

The choice of the right turnkey laser marker for inline applications depends on the time that can be allocated to the identification of the parts plus the number and types of characters that have to be etched. The following table gives the results for the time-constrained scenario (pocket to cell size ratio: 80 %, pocket size: 0.7 mm, pocket depth: approximately 0.30 mm).

NUMBER OF ALPHANUMERIC (NUMERIC) CHARACTERS TO BE ENCODED IN DMC	TIME ALLOCATED FOR MARKING				
3 OR LESS (6 OR LESS)	RTS	OAS	OAS	OAS	OAS
4 TO 6 (7 TO 10)	RTS	RTS	OAS	OAS	OAS
17 TO 24 (11 TO 16)	RTS	RTS	RTS	OAS	OAS
11 TO 16 (17 TO 24)	RTS	RTS	RTS	RTS	OAS

Table 2 – Laser marking system selection guide for Laserax's patent-pending shotblast resistant laser marking process

WE ARE GRATEFUL FOR HAVING BEEN ABLE TO COUNT ON THE COLLABORATION OF GREAT DEVELOPMENT PARTNERS. ALL OUR THANKS GO TO MERCURY MARINE, GROUPE CANIMEX AND CASCADE DIE CASTING GROUP.

MERCURY

Groupe CANIMEX

Cascade Die Casting Group

LASERAX IS A LASER SYSTEM MANUFACTURER THAT PROVIDES EFFICIENT, INNOVATIVE AND SAFE SOLUTIONS FOR THE MOST DEMANDING INDUSTRIAL APPLICATIONS. WE RELY ON A TEAM OF LASER TECHNOLOGY EXPERTS TO OFFER A COMPLETE RANGE OF PRODUCTS FOR LASER MARKING AND LASER CLEANING.

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