

Cajo Laser vs. other Marking Solutions

- based on customer experiences and an objective research

There are several ways to make markings on different types of materials and products. The most common ways to do standard markings like traceability or safety markings are labels, engraving, inkjet, etching, traditional laser, (pad) printing and dot peening. Each of these methods have pros and cons, depending on application's requirements such as volume, available resources, needed accuracy, the use of the object etc.

Cajo Technologies offers highly competitive and even superior marking and branding method compared to all other, more traditional methods. The customer companies of Cajo have evaluated the Cajo laser to be cost-effective, fast and service free compared to their previous marking machinery.

This white paper is to indicate and to point out the differences between Cajo and other markings methods, as well as to indicate the pros and cons based on an objective research done by a student of a University of Applied Science and Technology.

Cajo Laser vs. Labels

Labels are one of the most common ways to mark products, even when their weak spot is permanence: stickers fall off and ink fades. When you use Cajo laser, you have a permanent mark that will stand the test of time. That means even if you are marking a part that won't need replacing for years, your customer will still be able to read that part number or scan its barcode.



The cost savings are significant when preferring Cajo laser over labels. Especially high volume manufacturers can greatly reduce costs with Cajo laser marking, which only costs \$0.02 per mark, compared to \$0.07 – \$0.09 per mark for ink or labels. The consumable cost for ink or labels will far exceed the initial cost of a laser. There's also a difference in the visibility: A laser marking is easy to read and vibrant, making it far superior to a printed mark.

CUSTOMER CASE EXAMPLE:



Lappset Group Oy is one of the leading manufacturers of playground equipment worldwide. Lappset was lacking a possibility to do playground signs and plates in colors, to improve the visibility and to make customized graphics for diverse locations.



Cajo Laser vs. ink jet

Ink jet marking is an on-the-fly, non-contact marking process, accomplished by forcing pressurized ink through a nozzle. The technology is capable of marking fast moving parts, can create color marks and the capital costs are rather low. Still, the quality of marks is low, the need for ink results in high running costs, and materials are limited by ink adhesion. Considering the service and maintenance costs and interruptions in the production lines when refilling the ink system, the cost savings are remarkable when using Cajo Laser system. Cajo System is also ecological as no additives or pigments are used in the process.



CUSTOMER CASE EXAMPLE:

BOLIDEN

Boliden, the world's fifth largest producer of zinc metal from smelters, previously used the ink jet method to mark the batch number and date of manufacture on their zinc bars. The method was challenging because of surface humidity and temperature variation. Thanks to Cajo's technology, highly precise and abrasion-resistant marking with uniform quality can be carried out, regardless of the environment and surface. In addition, the location and content of the markings can be easily changed using an easy-to-use interface. The solution allows for inserting additional information in the marking, such as graphics, a bar code and a data matrix. It is essential for the further processing of the product that Cajo's technology allows marking in an ecologically sound way with no additives or pigments.

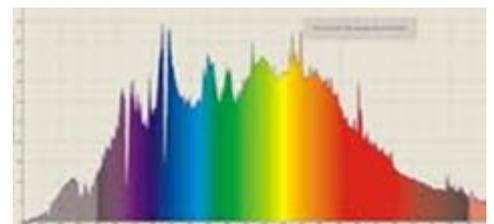
Cajo Laser vs. etching

Electrochemical etching is a contact marking process that requires a mask, an electrolyte solution, and an electrode marking head. The mark is created as material is removed by forced corrosion according to the mask in various degrees to produce an oxide black surface effect, or an etched mark where the image is engraved into the material. The equipment costs for electrochemical etching are low, the equipment is portable and excellent contrast can be created on stainless steels, but compared to Cajo Laser the process lacks flexibility and the operating costs through the cost of masks and the need for wastewater equipment are relatively high. Compared to the wide range of materials, that can be marked with Cajo Laser, electrochemical etching covers only conductive materials. Hazards associated with the equipment and etching process need to be identified and safe working environment ensured when processing with electrolyte solutions.



Cajo Laser vs. Traditional Laser

By laser marking a focused light from a laser interacts with a material to produce a high quality, permanent mark on an object. The marks are high in quality and flexible in design, the process is quick and wide range of materials can be marked.



Cajo's laser marking is ecological, fast, and does not affect material attributes. Cajo is providing marking solutions for materials which have been difficult or impossible to mark with lasers previously. Unique way of controlling the traditional laser beam is enabling to mark without graving and that brings the material selection wider than

what can be done with traditional lasers. When comparing Cajo laser with traditional laser, Cajo laser is found to be even more flexible and more accurate.

Cajo's system is also 25% faster than other lasers on the market. Cajo Technologies has patented the method, by which it is possible to create all the colors of the rainbow on stainless steel, with no additives or pigments being used. This creates added value for unique branding and product design.

The investment costs are significantly lower for Cajo's solution when compared to other competing lasers. The flexibility, and the ability to process multiple materials with only one system makes Cajo superior on cost efficiency. For example, Cajo can mark all grey color range colors on aluminum with one third of capital investment needs, compared to main rivals.

CUSTOMER CASE EXAMPLE:



The Sartorius group is an international pharmaceutical and laboratory equipment supplier, covering the segments of Bioprocess Solutions and Lab Products & Services. Earlier Sartorius was using a traditional laser to mark their plastic objects for medical industry. Service and maintenance of the marking machine play essential role to avoid interruptions in the production lines. In addition to this, the markings in medical devices need to be stable and precise in all plastic types being used. Sartorius replaced the traditional laser with Cajo Mira laser marking system to fulfil all the requirements and chose to automate the marking process with a rotating table.

Cajo Laser vs. (Pad) Printing

Pad printing involves the use of specialized mechanical equipment called a pad-printing machine. This machine can be used to “stamp” images onto varying objects with irregular surface types and/or complex geometries. Images applied via pad printing are typically less than 5” in diameter and can provide tones, edges, and details not found in screen printing.

Pad printing is utilized by a number of different applications such as printing on electronic components, industrial buttons, promotional items, and household appliances. Pad printing generally has higher overall costs than Cajo’s laser marking system (pad printing including e.g. printing inks, printing pads and image plates). With pad printing you may also find it difficult to work with certain inks, like silicone, and larger ink deposits. The noise impact is also significant compared to laser marking.

Cajo Laser vs. Dot Peening

Dot peening is a contact marking process in which pneumatically or electromechanically driven single or multiple carbide styluses create a mark by physically indenting the surface of the material by impact. The machinery is cheap and the marks are highly permanent, but the quality of the marks is low compared to Cajo laser markings. The materials to be marked by dot peening are limited by their hardness and marking speed is slow. The noise impact is also significant compared to Cajo laser marking.



Cajo Laser vs. other Marking Solutions

PARAMETER	TRADITIONAL LASER	INK JET	DOT PEEN / ENGRAVING	CHEMICAL ETCHING	LABELS	PAD PRINTING	CAJO
Color marking		X	X		X	X	X
Suitable for all "hard" materials	X	X	X		X	X	X
Suitable for curved surfaces	X	X				X	X
No additives	X		X				X
High quality markings (pictures)					X		X
Maintenance free	X						X
Support high speed process		X		X	X		X
No starting costs	X	X			X		X
Support for markings changing on the fly	X	X	X		X		X
Marking is permanent	X		X	X			X

Cajo Technologies' patented color marking method



Currently known laser technology manufacturers that are providing color markings, are mainly focusing on stainless steel annealing. However, this approach is not technically feasible for high quality color markings. An EU funded research project was carried out

concerning laser color marking and the contributing factors. The study concluded that the biggest challenge is the stability of the process. According the study, repeatability requires 1-2% stability for the laser to effectively produce the marking.

Currently Cajo is the only company who has reached the required stability on stainless steel color marking. The need for process stability in laser marking is illustrated by the fact that the thickness of the oxide layer created in the marking process is only few hundred nanometers.

No negative effect on material's qualities - the laser markings made on stainless steel with Cajo laser have been tested according to ISO 9227 standard in stainless steel manufacturer Outokumpu's testing environment. The conclusion was that the laser markings show equal or even better resistance for abrasion and corrosion resistance as base material before laser marking. Other laser marking treatments often result in micro cracks and corrosion resistance changes.

If you are considering a Cajo laser marking system, or just want to talk to an expert about the options available to you, call or contact us at Cajo. We have experts who will be glad to answer your questions and help you find the right solution for your business — customer service and your satisfaction are our top concerns.

Want to see how Cajo Laser can mark your parts? REQUEST A SAMPLE from info@cajo.fi.

Following companies, among others, use Cajo Technologies' laser markings systems:

					
<i>Consumer Products</i>	<i>Marine industry</i>	<i>Hydraulic services</i>	<i>Locking systems</i>	<i>Medical equipment</i>	<i>Metal industry</i>
					
<i>Steel Industry</i>	<i>Steel Industry</i>	<i>Outdoor media</i>	<i>Research Industry</i>	<i>Gas bottle Industry</i>	<i>Medical equipment</i>