Laser Engraving accessibility for traceability with industry products

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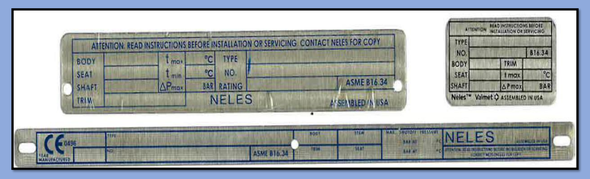
Abstract

Valves are in several industries such as food, gas, and oil. The evolution of marking equipment allows parts to be identifiable in all production lines and on the field, which increases reliability. This paper aims to present a laser engraving system that replaces the dot peen and scribe method with a laser engraving method. The new system contains a laser engraving machine, chassis, and new software to mark nameplates. During this process, laser engraving with different metals and frequencies was carried out as well as learning a new interface for it to be operator friendly. The impact from the engraved nameplates allowed for valves to be identifiable in rough terrain and industries allowing time and cost savings or trying to identify the valve type and pressures.

Introduction

This project took place in the company Valmet Flow Control, specifically in its Shrewsbury, MA USA location. Traceability with the valves at Valmet is an important part to be identifiable with the correct type, pressures, date made, temperature, and any other requirement set for the type of valve. The company was using a dot peen and scribing method for identification on tags which caused several issues as time moved on the field. Due to the type of machine, three issues arise:

- The machine was discontinued in 2014, leading to no support each time it was out of service.
- Out-of-service led to an issue with on-time delivery.
- When valves return for service, the tags become illegible.
- Each unique product requires specific information such as minimum and maximum temperatures, pressures, manufacturing dates, order numbers, and other pertinent details. Currently, tags or nameplates are individually produced, resulting in time inefficiencies. Subsequently, these tags are affixed to products, conveying the necessary information.



Methodology

The research method used in this project was requesting demos from different companies and the machine and software. After collecting information on the price, accessibility, and trainability of the team and the operators, the company has decided to go with SIC Marking company. The laser machine that was chosen is from a company called SIC Marking (Pittsburgh, PA, USA). It is a device built using a fiber laser that enables high-quality marking with different materials in a shorter cycle time. It emits a wavelength of 1064 nm with a fiber length of 3 m. The Shrewsbury team decided it would be beneficial to mimic the same machine as the Finland team

Table 1
Bill of Materials

Resources	Cost
XL-Box with software	$39,652
Adapter	$9.50
Chassis	$2,534
Total	$42,195.50

New laser equipment and process analysis

The project assumption was to find a machine that engraves legible data without damaging the nameplates and the integrity of the valve. On average, it takes the scriber machine about 1 minute to set up and insert the data and 30 seconds to scribe the tag. For the XL-BOX, the inputting of data plus engraving during the trial run was a minute.

An issue that was occurring was the transfer of a .dxf file into the SIC file. A question that was asked was if the files will be able to be transferred or do they need to be created again. After several test runs, while testing different frequencies and speeds, the files from the previous machine can be used for the SIC machine.

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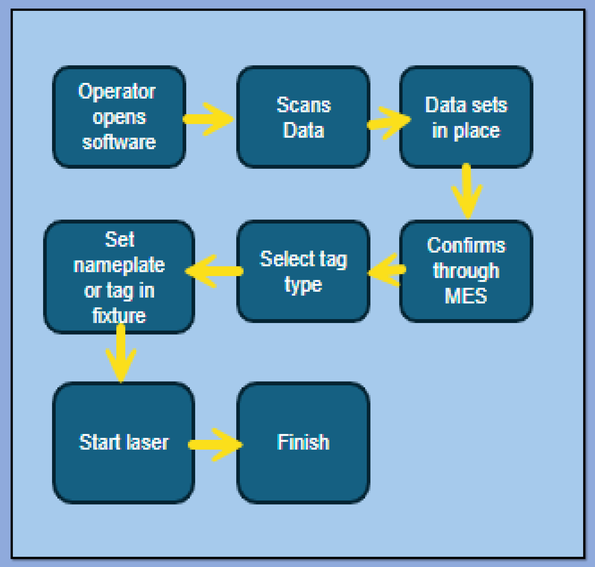
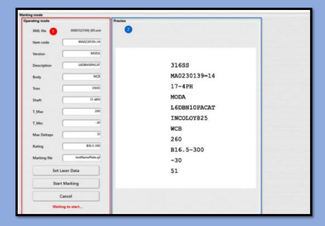
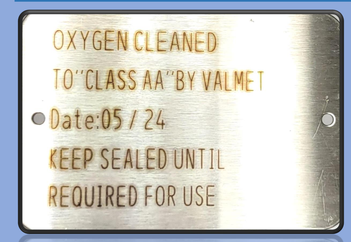


Interface



The headquarters in Finland have an operator-friendly interface that can gather the information needed without the operator manually inputting the information which can cause errors. By using the same interface as Finland, the files can be replicated allowing a quick turnaround with little to no downtime.

Conclusions



This paper presented the direct change of replacing the previous scribe machine with a laser engraving machine. The fiber laser engraving machine reduced the cycle time from 2 minutes to under a minute diminishing wasted time for each operator.
The fixture used in the scriber was able to be used in the new machine to place the nameplates in a location and for the laser to hit each section precisely. The files of the old machine were transferred after several trials of understanding the software. A chassis was ordered due to the table that held the previous machine being unable to support the weight of both the machine and the power supply.

References

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[2] Szymański, Michał, et al. "The Influence of Selected Laser Engraving Parameters on Surface Conditions of Hybrid Metal Matrix Composites." Materials (1996-1944), vol. 16, no. 19, Oct. 2023,