

Precision Laser Engraving for PCB Slot Cutting: SOP Development and Validation

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Aim of the Project

Develop and validate standard operating reproducible procedures to ensure operation of the FOBA laser engraver. Focusing on creating precise slots on printed circuit boards without melting the embedded paraffin wax actuators..

Introduction

This project focuses on developing and validating SOPs for the FOBA laser engraving system to achieve precision in cutting slots on PCBs without affecting embedded paraffin wax actuators. The aim is to ensure repeatable and accurate manufacturing laser in outcomes processes.



Methodology

- Developed detailed SOPs for laser engraver start-up, shutdown, and engraving procedures.
- Conducted validation tests and operator training for each SOP.
- Parameters Evaluated for their • suitability.
- Ran a DOE on steel to understand the process in a controlled environment.
- Assessed optimal parameters for PCB marking.
- Carried out a DOE on PCBs to optimise parameters.

Results

- Developed clear, detailed and validated **SOPs**
- The DOE on steel provided a baseline understanding of laser parameters on a homogeneous material.
- Slots were successfully created in PCBs, demonstrating the laser system's capability to perform precise engravings.

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Photo of: Parameter Matrix





Discussion

The DOE results for PCB marking were inconclusive due to the poor selection of measurable response variables.

Although initial testing demonstrated the feasibility of laser engraving slots, further refinement evaluation of response variables are required.

Additional experimentation and careful parameter adjustments are necessary to achieve an optimised and reliable outcomes for the engraving process.

Conclusion

The validated SOPs significantly enhance operational consistency and support highquality laser engraving of PCB slots. While initial results indicate success in controlling effects, thermal ongoing research experimentation and are essential to establish fully validated and optimised procedures.



Photo of: PCB

Acknowledgments

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References

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