

The Laser as a STEAM Engine

A Visual Guide on Cutting, Engraving and Making. Laser in Three Realms

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Abstract

This poster is based on a photo book by Eva Korae³, which is essentially a record of experiments performed on a CO₂ laser cutter from the maker's perspective. It sprung from an unfulfilled need for creative visual stimuli regarding the prospects of laser cutting technology. While popular publications efficiently explain the basics of operating and cutting, they appear to leave the more creative possibilities unexplored. While the possibilities of CO₂ lasers offer the capability of working with a wide variety of materials, users appear reluctant to try something they have not seen used before and this publication aims to fill this gap. Therefore the research question lies mainly on visually complementing mainstream information found in books, online discussion groups and commercial laser websites through explaining how to test for material suitability and recording the process of more than 100 materials. The results presented contribute to laser user confidence in performing unusual experimentations, while acting as a behind the scenes demonstration of published, internationally recognized creative outcomes.

Keywords and Phrases: Laser Cutting, Laser Engraving, Digital Fabrication, Creative Laser Cutting, Laser Acrobatics

1. Introduction

The study presented is separated into three sections, where the “Popular” section includes common materials, “Acrobatics” describes unusual testing and “Flourished” presents finalized projects in a variety of scales and methods. Spanning from the most common to presenting internationally recognized work, this collection of practical outcomes is aimed towards designers/artists as an insight into the possibilities of lasers with regard to their practice, hobbyists/beginner makers serving as stimulus to invest further in their craft, and engineers/laser operators as a demonstration of unusual processes.

1.1 Embracing diverse laser users

In addition to the aforementioned professionals, STEAM educators who may hold a different specialization to design and digital fabrication can be empowered through this poster by understanding the potential of laser cutting in a simple, image and demonstration filled manner. By witnessing the wide array of experimentation, and familiarizing themselves with the Beilstein Test² performed for the identification of



substances unsuitable for lasers, they will be able to confidently and pro-actively engage their students with a variety of innovative projects, practically building on their 21st Century skills.

1.2 Accomplished works

This poster includes internationally recognised work performed by the author and collaborators, some of which caused a stir in the public sphere. Makers Will Make: STEAM Toys⁴, tell Cypriot folk tales and were made from materials such as MDF, acrylic and EVA flooring. Ripples¹, a 12m interactive Moiré installation was also made from MDF, but at a much larger scale. Patterns from laser cut leaves which were left to dry and distort made it onto Adidas⁷ garments by Theo Mass Lexileictous. The Coperni Aerogel AirSwipe⁵⁺⁶ bag made by Ioannis Michalous in 2024, was branded on a CO2 laser cutter.

1.3 Limitations

Given the diversity in machine brands, models and specifications, what is described and shown as a final outcome may need many trials to be achieved. The laser used for the purposes of this study was a BRM 160100 and the operating program was LaserWorks 6. The settings mentioned in the book in detail will most likely need confirmation or they may even be completely different in case the operators use other programs such as Lightburn. In addition, the limitations of this study lie in the very disciplines it wishes to bridge. People's understanding of creativity, CAD skills and familiarity with material possibilities may hinder potential results.

2. Figures

In the next section one can find indicative photos of the way this study was conducted. From controlled precision cutting to the challenge of allowing to be carried away in unpredictable paths.



Figure 1: Makers Will Make: STEAM Toys, inspired from Cypriot folk tales. Awarded European Product Design Award 2023 in Toys, Gaming & Leisure / Toys: Educational Category. Photos: Pavlos Vrionides

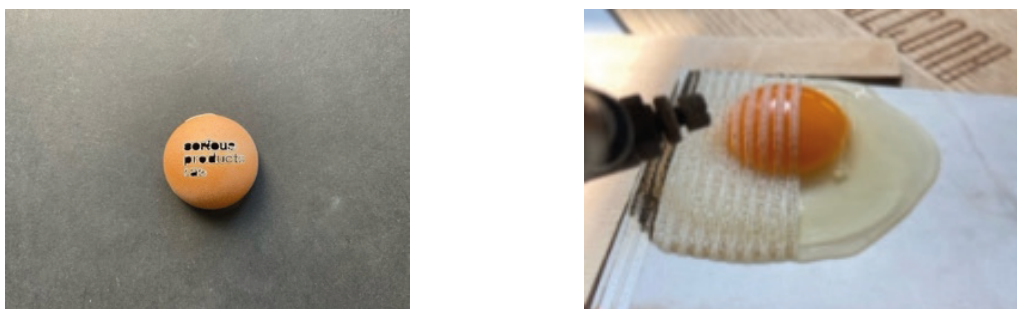


Figure 2: Engraving on egg shells and attempts to cook an egg. Photos: Eva Korae

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