

Improvement of the Traditional Techniques of Artistic Casting through the Development of Open Source 3D Printing Technologies Based on Digital Ultraviolet Light Processing

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Abstract : Traditional manufacturing techniques used in artistic contexts compete with highly productive and efficient industrial procedures. The craft techniques and associated business models tend to disappear under the pressure of the appearance of mass-produced products that compete in all niche markets, including those traditionally reserved for the work of art. The surplus value derived from the prestige of the author, the exclusivity of the product or the mastery of the artist, do not seem to be sufficient reasons to preserve this productive model. In the last years, the adoption of open source digital manufacturing technologies in small art workshops can favor their permanence by assuming great advantages such as easy accessibility, low cost, and free modification, adapting to specific needs of each workshop. It is possible to use pieces modeled by computer and made with FDM (Fused Deposition Modeling) 3D printers that use PLA (polylactic acid) in the procedures of artistic casting. Models printed by PLA are limited to approximate minimum sizes of 3 cm, and optimal layer height resolution is 0.1 mm. Due to these limitations, it is not the most suitable technology for artistic casting processes of smaller pieces. An alternative to solve size limitation, are printers from the type (SLS) "selective sintering by laser". And other possibility is a laser hardens, by layers, metal powder and called DMLS (Direct Metal Laser Sintering). However, due to its high cost, it is a technology that is difficult to introduce in small artistic foundries. The low-cost DLP (Digital Light Processing) type printers can offer high resolutions for a reasonable cost (around 0.02 mm on the Z axis and 0.04 mm on the X and Y axes), and can print models with castable resins that allow the subsequent direct artistic casting in precious metals or their adaptation to processes such as electroforming. In this work, the design of a DLP 3D printer is detailed, using backlit LCD screens with ultraviolet light. Its development is totally "open source" and is proposed as a kit made up of electronic components, based on Arduino and easy to access mechanical components in the market. The CAD files of its components can be manufactured in low-cost FDM 3D printers. The result is less than 500 Euros, high resolution and open-design with free access that allows not only its manufacture but also its improvement. In future works, we intend to carry out different comparative analyzes, which allow us to accurately estimate the print quality, as well as the real cost of the artistic works made with it.

Keywords : traditional artistic techniques, DLP 3D printer, artistic casting, electroforming

Conference Title : ICAT 2019 : International Conference on Arts and Technology

Conference Location : Amsterdam, Netherlands

Conference Dates : May 14-15, 2019