Citation: **Doaa Elsaidet el. (2022), The Effectiveness of Integrating Digital Sculpting Technology with Upholstery Fabrics and Its Impact on the Development of the Furniture Industry, International Design Journal, Vol. 12 No. 6, pp 39-50**

The Effectiveness of Integrating Digital Sculpting Technology with Upholstery Fabrics and Its Impact on the Development of the Furniture Industry

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Abstract:

Three-dimensional printing is one of the techniques for implementing digital sculpture. It is not a new technology, as it has been around for almost thirty years, but it has not gained wide popularity until the last ten years. The tremendous development in modern technology, has facilitated its circulation among people. 3D printing techniques have brought about a radical change in the field of furniture manufacturing globally, but its applicability in the field of furniture locally is still limited because this technology requires special capabilities. **The research problem** is limited to the following inquiry: 1 .Is it possible to employ digital sculpting techniques in the field of furniture design and manufacture in the Arab Republic of Egypt in ways that fit the capabilities of local 3D printing machines? 2 .Does applying this technique to the upholstery fabrics in the Egyptian market improve the aesthetic and functional properties of the fabrics? **Research Objectives:** .1 Studying the possibilities of 3D printing technology globally and its applications in the furniture industry. .2the possibility of making prominent carving designs on furniture upholstery fabrics using 3D printing technology without affecting the basic function of the furniture. .3 Measure the effect of 3D printing on upholstery fabrics and their adhesion to the surface. **Research Importance:** 1 .Linking several different applied arts departments (furniture - sculpture - textile). 2 .Presenting the advantages of 3D printing and demonstrating its practical application in the local market. **Research Methodology :**The research follows the descriptive approach in covering the theoretical aspect, and The applied approach is represented in the applied aspect of the research by creating a design suggestion for a seat using the 3D MAX program and a design suggestion concept from the prominent sculpture inspired by the exterior shape of the seat using the 3D MAX program and then implementing it using 3D printing technology on two types of upholstery fabrics., The first type is chenille upholstery fabric, Three samples were produced in a double method, depending on the wefts and their density (polyester-cotton) used with chenille wefts, and the second type was pile warp knitted (100% polyester), under standard conditions for the characteristics of the printing machine and the plastic material used. Tests (peel adhesion test - (Max load, elongation in the direction of warp and weft, weight and thickness of the fabric before and after printing) were applied on research samples) . **Results**: The research concluded that 3D printing techniques can be employed with the local capabilities available in the furniture manufacturing field to obtain innovative pieces of furniture with ease, speed, and accuracy by applying them to upholstery fabrics The tests results showed that the executed design was more adherent to the double fabric sample that contains wefts of cotton (chenille upholstery fabric in the order of wefts (2 cotton wefts: 1 chenille weft), followed by pile warp knitted and also showed that the 3D printing technology works on increasing the Max load and elongation of the samples in the warp and column direction, while there was no significant effect of 3D printing technology on the Max load in the weft and row direction of the samples.

Keywords:

Digital sculpture, 3D printing on fabric, local furniture industry

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Paper History:

Paper received June 29, 2022, Accepted August 11, 2022, Published 1st of November 2022

