



EXPERIMENTAL RESEARCH REGARDING LEATHER APPLICATIONS IN PRODUCT DESIGN

PRALEA Jeni¹, ȘOLTUZ Elena¹

¹”George Enescu” University of Arts, Iași, Faculty of Visual Arts and Design, Design Department, 189 Sărărie Street, 700451 Iași, Romania, E-Mail: fapdd@arteiasi.ro

Corresponding author: Șoltuz, Elena, E-mail: soltuzelena@yahoo.com

Abstract: *This paper presents the role and importance of experimental research in design activity. The designer, as a researcher and a project manager, proposes to establish a relationship between functional-aesthetic-constructive-technological-economic, based on the aesthetic possibilities of the materials used for the experiments. With the aim to identify areas for the application of leather waste resulted from the production process, the paper presents experiments conducted with this material in combination with wood, by using different techniques that lead to different aesthetic effects. Identifying the areas to use and creating products from leather and/or wood waste, is based on the properties of these materials. Leather, the subject of these experiments, has the advantage that it can be used on both sides. Tactile differences of the two sides of this material has both aesthetic and functional advantages, which makes it suitable for applications on products that meet the requirements of "design for all". With differentiated tactile characteristics, in combination with other materials, for these experiments wood, easily "read touch" products can be generated to help people with certain disabilities. Thus, experiments presented in this paper allows the establishment of aesthetic schemes applicable to products that are friendly both with the environment (based on the reuse of wood and leather waste) and with the users (can be used as applications, accessories and concepts of products for people with certain disabilities). The designer's choices or decisions can be based on the results of this experiment. The experiment enables the designer to develop creative, innovative and environmentally friendly products.*

Key words: *leather, wood, eco design, experiment, aesthetic.*

1. INTRODUCTION

Experimental research in design is aimed at increasing customer satisfaction based on the designer's well argued choices in his capacity as project designer. Experimental research is a scientific approach to reality in order to establish a cause-effect relationship between two observable and measurable phenomena [1]. From the designer's point of view the experimental research, involves assessing situations that present potential ways to develop a project [2]. Out of respect for the environment and for disadvantaged groups, the designer approaches the areas regarding the use of ecological materials with both functional and aesthetic potential. This proposed experiment, highlights the attributes of two materials, leather and wood, that were subjected to various forms of processing, in order to obtain aesthetic effects with the potential to be used in ecodesign and to meet the principles of the new trend "design for all" [3]. Universal design or design for all with increasingly broad applications in design, refers to ideas for products, buildings and environments that must be accessible to more categories of people: the elderly, people with and without disabilities. The term "universal design" was invented by architect Ronald L. Mace to describe the design concept applicable to all products and built environment for aesthetic and easy to use, to the most possible extent, by everyone, regardless of age, ability or status in life [4]. Universal design or design for all must propose concepts with a broad accessibility, adaptive technologies and support, in which the aesthetics is a basic element. To apply the principles of Universal design is necessary to understand the phenomenon of product design that responds to varied categories of users.

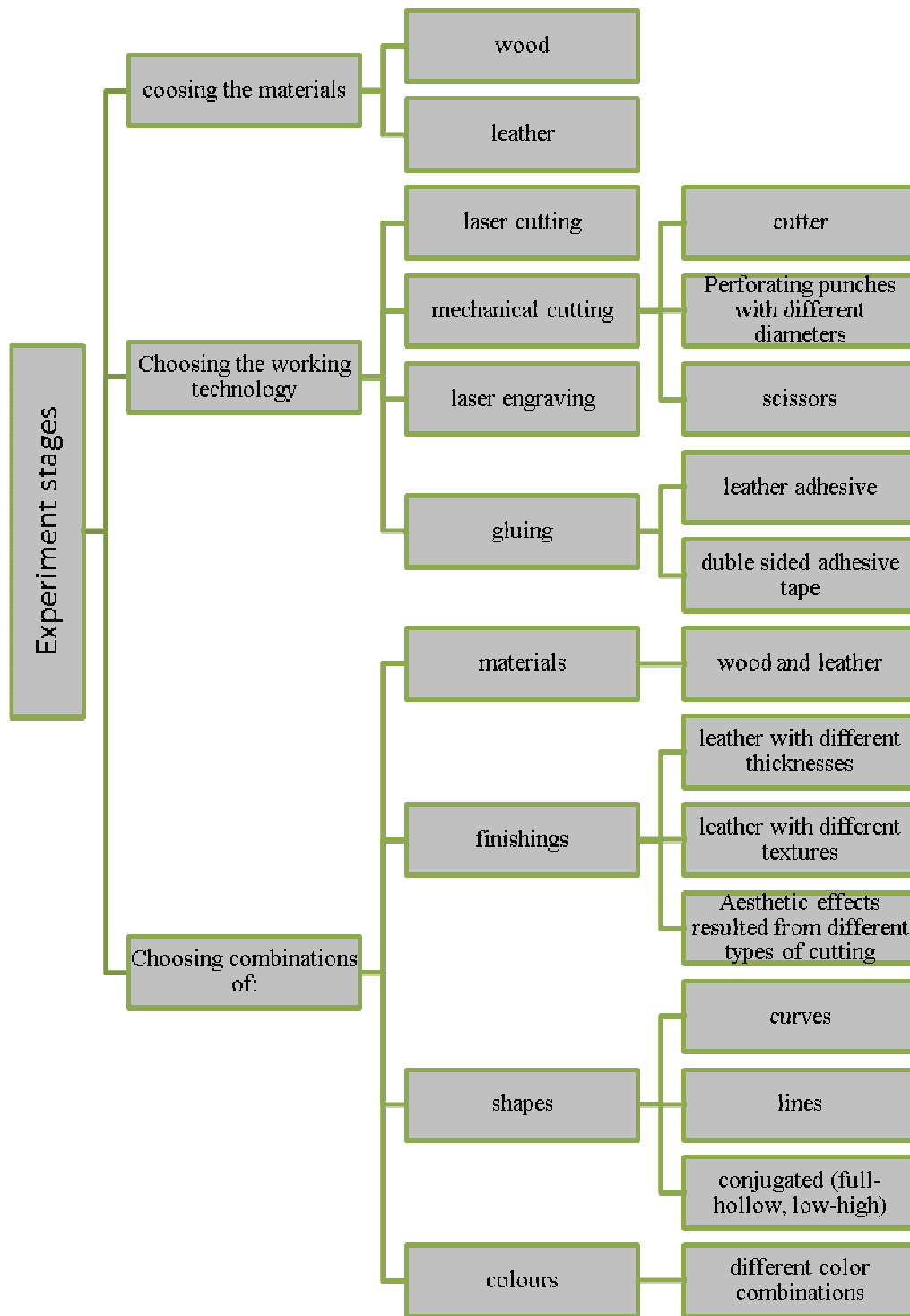


Fig. 1: Scheme of the experiment stages



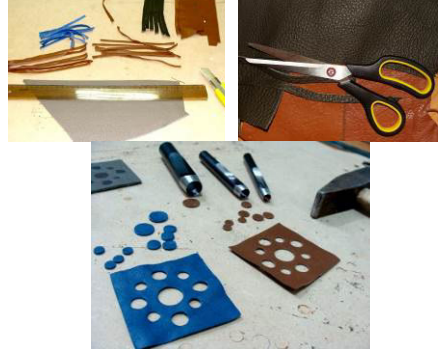

2. GENERAL INFORMATION

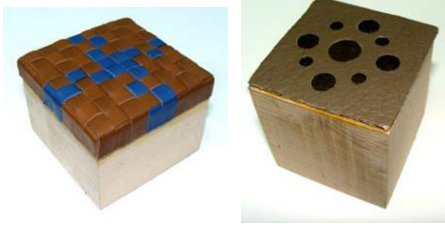

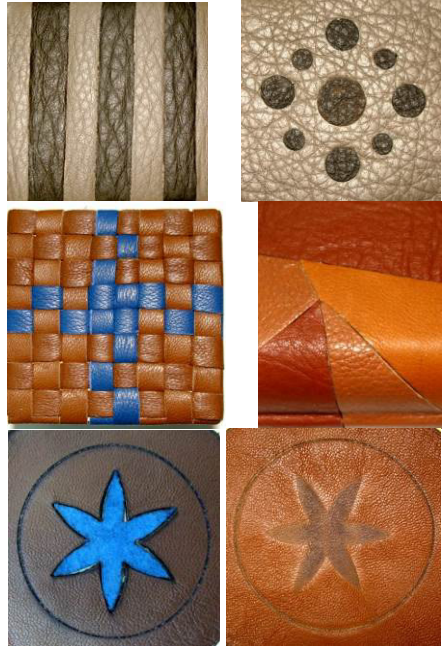

2.1 Establishing the work plan of the experiment


Respecting the specific stages of performing an experiment, an experimental plan was created, whose steps are shown in **Fig.1**. For the experiment the designer chose two organic materials: leather and wood. These ecological materials come from waste resulted from technological processing. These technological residues come from furniture, sofas, clothing and footwear manufacturers. According to ecodesign principles [4], and in compliance with professional ethics [5], emphasizing the need for both aesthetic design concepts, functional, economical, and environmentally and user friendly, certain processing were applied to create different aesthetic effects. The experiment offers the opportunity to understand and develop rules regarding the approach of a design project [6], creating opportunities for the disadvantaged and for creative industries area [7].

The aesthetic effects proposed and obtained by the designer, are the result of the combination between macrogeometry and microgeometry of material's form, finishings (leather was used on both its sides, giving different aesthetic and tactile properties on each side exposed), processing types, different colors of the analyzed materials and the scale size of the object.

Table 1: The result of the experiment

Nr. crt.	Experiment steps	The result of the experiment	Comments	
			Avantajes	Disadvantages
1	Materials coosing			
	Wood and leather technological waste		Using waste falls into ecodesign principles, and it represents a challenge and a material base for the designers and creative industries.	Design concepts based on reusing materials that result from technological processes, allows the designer to make unique or small series ecoproducts (due to variations in structures, shapes, colors and sizes).
2	Choosing the working technology			
	Laser cutting and engraving		Precision cut, design compliance, the possibility of obtaining complex shapes.	Superficial burning of edges to certain categories of leather. Workpiece edge deformation by contracting.
	Mechanical cutting: -Cutter -Scissors - Perforating punches with different diameters		Mechanical cutting can be done manually (as is the case of this experiment) or by using industrial machinery. Obtained contour is clean, accurate, and the material can undergo insignificant deformations.	Shape and dimensional accuracy depends on the nature of the material (elasticity, thickness, texture), and on the precision of the cutting technique used.
	Gluing		A large variety of combinations of materials, textures, finishes, geometries (macro and micro geometry), and different colors can be obtained. Flexibility and elasticity allows a correct solder assembly of the two materials, which accurately tracks the curved or straight profile of the piece. The advantage of using double-sided adhesive tape consists	Defects can occur due to: excess use of adhesive, non-compliance of working technology, the mismatch between the contours of the parts (dimensional and form deviation of the parts to be joined), the life of the part depending on the quality of the glue or of the double-sided adhesive tape used.

			in obtaining a more precise assembly.	
3	Choosing combinations of			
Materials: Wood (different species and types of plywood) with leather		The combination between the two materials offer a wide range of aesthetic possibilities as a result of geometry, finishings, colours and size scale of the pieces used.	Being reusable, the materials present a large range of different dimensions so that the products obtained are more difficult to address in terms of large series technologies for industrial products.	
Finishings -Leather with different thicknesses -Leather with different textures -Both sides of the leather are aesthetically valued -Aesthetic effects resulted from different types of cutting		Due to the large range of wood and leather textures, several combinations can be obtained with aesthetic effects (variants of: textures, different cutting technologies, contrast between the quality of the surface of the leather and wood fiber surfaces, including wood fiber orientation).	Cutting and assembly technology can create defects in the final product quality finishes. When assembling the pieces of leather it will be taken into account the thickness of the leather assembly which is mounted on the wooden object, to avoid joining defects to occur, especially for right angle joints.	
Shapes: -Curves -Lines -Conjugated (full-hollow, low-high, Braided, simple, double or another version, fluffy-smooth, glossy-matte)		The high versatility of the two materials is an advantage for obtaining a large variety of shapes (flat, curved, combinations of depths).	Aesthetic and dimensional accuracy of the finished product depends on the accuracy of the shape and dimension of the component parts.	
Colours: different color combinations		Both leather and wood allow a wide variety of color combinations that can be obtained using ecological materials and coloring technologies. One can appreciate different aesthetic effects obtained by applying leather pieces	Choosing colors should take into account the dimensional tolerance and shape of parts, preventing aesthetic failures due to joining imperfections, by choosing similar colors for the support surfaces (background color).	

		<p>with the same colour, but used on different sides on the same surface.</p>	
--	---	---	--

2.2. Experimental data

For the experiment, samples of different materials were collected: wood and leather. These samples were processed by being cut with laser or mechanical tools such as: different diameters perforating punches, scissors and cutter. Cutting was carried out by selecting different types of lines: straight, curved and combinations between them. Collecting wood specimens aimed to achieve benchmarks with different radius of curvature and surface finishes (different roughness and orientations of the fibers). Leather specimens used were collected by cutting the samples with different thicknesses of material, colors and finishes. Combinations of materials (wood, leather), with different finishes (thickness, glossy-matte, printing, engraving, and color) and shapes (curved, straight) were made. Combinations obtained allow the designer to associate the experiment with different objects with different sizes (objects can be furniture, accessories, industrial products, decorative objects). The game of shapes and finishes allows designers to create objects that can be easily identified by people with visual disabilities. **Table 1** presents the results of the experiment. It should be noted that the result of the experiment allows the designer to understand the phenomena that occur during processing, so it can avoid defects that may occur and prevent or solve them by applying the aesthetic factor. It can be mentioned that by laser processing, the edges of the shape can be defective because of the burning. This phenomenon attracts other deformation (by heat) by contracting the generated contour of the shape. This defect generates an imprecise and unaesthetic combination/assembly, so a possible scrap. Engraving the leather surface generates the same defect, a superficial and unaesthetic deformation of the workpiece surface. Cutting and processing using mechanical technologies (cutter, scissors, perforating punches) is more accurate, resulting in a burr-free and more aesthetic contour. Although the material can get deformed by bending, it will come back into shape and the surface flatness can be restored. The combinations of shapes, finishes and colors are different, as well as the fields in which these aesthetic applications can be used. Tests were performed by using both the nature of these materials and the possibilities of joint: mosaic, braids, conjugated forms. The tactile behavior of different surfaces (two possibilities for leather) generated both by the material properties and how varied they can be treated can lead to obtaining products easily accessible to disadvantaged people: the material is warm to the touch, the surface may present different microstructures that can be "readable touch" obtained by printing, engraving, cutting inside or outside with circular or rectilinear surfaces or in combination, the two materials can be colored by using different ecological treatments and organic colors. Flexibility of the leather type material has the advantage that it can be assembled with a wooden piece by following its geometric shape (easily taking its shape) and can easily be fixed with adhesive and double sided adhesive tape. Classical mechanical assemblies are not excluded.

3. CONCLUSIONS

The experiment demonstrates the versatility of materials that can be recovered from the industrial product processing. Whatever the nature of the materials analyzed and geometric forms (wood, leather), thickness of the faces and finishes used, the waste can provide the designer with a wide range of constructive possibilities, aesthetics and functional.

The following conclusions result from the experiment conducted and summarized in **Table 1**:

1. The waste resulted from the manufacturing process of industrial products, in this study, wood and leather, can be a starting point, as a raw material in creating new products and as a starting point for creative industries.
2. The aesthetic capacity and the possibility of tactile recognition specific for the analyzed materials, allows their use in products made for people with visual disabilities. The materials are warm and have varied textures, resulting in multiple combinations that can be applied in product design.
3. The materials used allow the development of products with a variety of shapes, textures and colors that can be obtained through both industrial and manual manufacturing technologies.

4. From the analysis of the experiment conducted it can be concluded that based on the principles of eco design, eco-friendly concepts can be developed.

REFERENCES

[1] Byrne, Bryan and Sands, "Creating Breakthrough Ideas", Westport, CT: Bergin and Garvey, ed (2002), 'Designing Collaborative Corporate Cultures', in Bryan Byrne and Susan E. Squires (eds), pp. 47–69

[2] Friedman, K. (2008), "Research into, by and for design", Journal of Visual Arts Practice, 7: 2, pp. 153–160, doi: 10.1386/jvap.7.2.153/1

[3] Isabella Tiziana Steffan, "Barriere architettoniche e Design for All Quale contributo dell'ergonomia?", Professione ergonomia, 2006.

[4] Jeni Pralea, Elena Șoltuz, sa, *Ecodesign*, ISBN 978-606-547-011-8, Editura Artes 2010

[5] DAJ, I. „Educație deontologică și formare profesională în designul industrial”, Buletinul AGIR, nr. 1 /2010 (ian.martie.), ISSN 1224-7928, Ed AGIR, București

[6] Bas Raijmakers, Mike Thompson, Evelien van de Garde-Perik "New goals for design, new roles for designers?" *Helsinki-Espoo*, Cumulus Working Papers Publication Series G Aalto University, School of Arts, Design and Architecture, pp 93-94, 28/12/2013

[7] EIDD-Design for All Europe, *The EIDD Stockholm Declaration*, Stoccolma 2004, [Online]. Available: <http://www.design-for-all.org>