2019 IULTCS/ERRETRE/TFL Young Leather Scientist Grant

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□ Basic Research ■ Machinery/Equipment □ Environmental/Sustainability

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DETERMINING LEATHER PROPERTIES REQUIRED FOR 3D SIMULATION PROGRAMS AND OBTAINING REALISTIC VISUALIZATIONS

Introduction:

Once a garment is designed and its patterns are created with CAD systems in a 2D platform, a physical prototype is produced with these utilities in a real world. After critics and regulations on the model, the batch production begins. Conversion of a 2D design to a 3D platform and prototype production can be time and money consuming. Since companies can now decide whether to take or not to take a product to market using 3D technology without a physical prototype, or fewer prototypes, the cost of rejecting a style (in terms of material, labour, and time) is significantly lowered.[1] Rosenberg states that the usage of virtual technology can cut the prototype need and lead time from 10% - 60%.[2] According to Clarke a single prototype can cost anywhere from $250 to $1,000 and much more when design and development costs are factored in.[3] The costs might be expected higher for leather garments. A report shows that the European companies, who have tried 3D prototyping feature, have provided a feedback that it reduces the number of samples they require by about 50 percent, which saves fabric and modelling expenses and allows them to bring new styles to the market faster.[1] Commercially available 3D CAD systems for 3D garment visualization and virtual try-on software require efficiency and realism. Engineers require accuracy and precision about the behaviour of the cloth material. Thus, they deal with the properties of cloth such as Young's modulus, bending modulus, stress-strain curves, etc. Analysing the mechanical properties can enhance to determine the behaviour of the fabrics during clothing exploitation.[4,5,6]

In database of Human Solutions Assyst Vidya software, one of the popular 3D software on the market, properties of many textile fabrics are measured and well defined; however there are not enough pre-defined leather materials. This database is not sufficient for leather apparel companies because of the variety of leather material. The main problem of this lack of information can be explained with some reasons: Firstly, these programs are not popular in leather industry as in textile industry. Secondly the standard physical tests of textile and leather are not same. Additionally, leather is not a uniform material from a structural perspective. The physical properties of leather change depending on the animal type and the animal individually.[7]

In this project, required tests to obtain data for 3D software will be done for garment leathers. Material properties are determined by FAST system (Fabric Assurance by Simple Testing) by using Vidya Software Suite.[8] Then; the data will

be interpreted into the program. Then these materials will be simulated in a dress design. Correspondingly, the dresses will be sewn in real world. Finally, the simulation visuals and real products will be compared.

Objectives:

The major objective of this project is to apply or adapt the leather material options in 3D visualization and simulation program as including many different properties of leathers especially for the garment leathers. This will open up new issues for different types of leather manufacturing by beginning with the garment leathers and many leather companies as well as leather departments will take advantage of newly provided data to the program. Detailed objectives are listed below as:

-Testing the mechanical properties of leathers by using different test methods, which are written for textile materials and investigating the accuracy of the tests for leather,

-Using FAST (Fabric Assurance by Simple Testing) on leather for first time,

-Performing the visualization and simulations with the obtained information and compared with the real postures.

Methods:

Local: Some part of this research was performed at Amsterdam University of Applied Sciences, School of Digital Media and Creative Industries and Amsterdam Fashion Institute (AMFI) for using FAST. The other tests and simulations will be done at Ege University Leather Engineering Department, under the advice of Prof. Dr. Mehmet Mete Mutlu.

Source of materials: Garment leathers have been provided from Canbol Leather Apparel Company.

Test Methods: FAST standards. Test methods written at Vidya Software Suite Manual. Results will be evaluated, interpreted and used as input to Human Solutions 3D Vidya visualization and simulation program.

Production: 36 size female mannequin will be scanned by using body scanner for 3D Vidya. Then the pattern of dresses will be created in 2D Assyst CAD and will be drawn on pattern paper. Then, the dresses will be sewn.

Hypothesis/Expected Results:

Within the scope of the planned project; it is aimed to analyse the properties of different garment leather materials, which are not already available in the program, by using the determined physical tests and to interpret these data to be entered into the program and to ensure that the leather garment in the simulation is displayed as close as real.

For this purpose, physical (elasticity, bending stiffness, weight, thickness, friction coefficient, etc.) and visual surface properties of the different types of leathers used in production are determined by using FAST system, which is usually used on fabric materials and thus this project will be first on leather. Additionally, database of the program will be enhanced to be productive in leather industry.

Research benefit for the local or global leather industry (one sentence only):

The benefit of this research will be to define a path to build up a leather material database for 3D simulation programs and thus to make the final realistic visuals of the leather garment in the form of a sample or in the form of production variations without any mistake and as per customer request at a point where the leather cost is not existing which will increase the competitiveness of leather apparel industry.

Literature:

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