

Digital Production of Traditional Costumes

Yeonkyung Kang
Digital Clothing Center
Seoul National University
Seoul, Korea
aurore@digitalclothing.org

Sehee Wu
Digital Clothing Center
Seoul National University
Seoul, Korea
seheewu@digitalclothing.org

Hyeong-Seok Ko
Dep. of Electrical and Computer Engineering
Seoul National University
Seoul, Korea
hsko@hsko@graphics.snu.ac.kr

Young-A Ko
Digital Clothing Center
Seoul National University
Seoul, Korea
kya@digitalclothing.org

Kathi Martin
Antoinette Westphal College of Media Art & Design
Drexel University
Philadelphia, USA
martink@drexel.edu

Abstract— The role of the museum has changed from a "one-sided information delivery" system focusing on exhibition and education to "community as culture". Creating richly detailed digitized reproductions of museum holdings can stimulate the social media dialogue between museum and visitor. The purpose of this study is to determine the feasibility of reproducing traditional costumes using digital technology. For this experiment, we selected a woman's robe and a man's ensemble of the Rococo era of the 18th century. Using historical reference material we first analyzed the design features of the silhouette, and the fabrics, hairdos and accessories of the period. This paper details the application of 3D technologies, DC Suite and Maya Qualoth, to reconstruct them.

Keywords— *Historic costumes; Rococo era; Digital fashion; 3D simulation; Virtual fashion exhibition; Social tagging*

I. INTRODUCTION

Recently, the cultural content industry has been receiving special attention from around the world as a new engine of economic growth. Advances in our knowledge-based society and the development of digital technology have dramatically changed the nature of the cultural content industry, spinning off a new practice known as social tagging. This practice is especially present in museum websites, which provide digitized images and information on exhibitions, inviting responses of "appreciation", "interpretation", "participation" and "sharing" from their audiences online. The value of the digital heritage object is derived directly from the viewer's acceptance of the real object as authentic. Its presence on a museum's website endorses the authority and integrity of the inscribed meanings accorded to the real [1]. This has changed the role of the museum from a "one-sided information delivery" system, focusing on exhibition and education, to "community as

culture" using social media [2]. These changes have also affected costume museums.

Costume heritage has a relatively short life, since costume fabrication consists of organic fiber which is vulnerable to the environment and quickly degrades, compared to the fabrication of other relics [3]. To preserve these antique garments and accessories some museums display them in 3D form. Manovich [4] goes on to argue that "synthetic computer-generated imagery is not an inferior representation of our reality, but a realistic representation of a different reality". However, they present only static images of garments on mannequins without dynamic visualization. This study deals with the issues surrounding the reproduction of costumes in digital form in producing a better application of the social tagging service of digital costume museums. In the dynamic 3D experiment we generated, two costumes from the Rococo era of 18th century, regarded as a period with some of the most glamorous dresses in history. Through the process of garment modelling and movement simulation on virtual figures, we ascertained the advantages/disadvantages of digital technologies in the reproduction of historic costume.

II. PRODUCING TRADITIONAL COSTUME WITH DIGITIZATION

The fundamental process of digitizing the costumes in this study is as follows.

(1) Replicating the appearance of people in 18th century paintings and engravings, a male and a female body were created using Maya software. In order to express the voluminous shape of the skirt of the woman's dress, a panier - shaped object was attached to the waist of the female figure that moves together with the body.

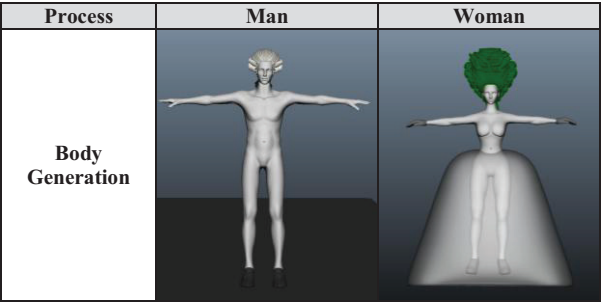


Fig. 1. Virtual body generation in Maya

(2) Two styles of costume commonly worn by the upper class of the era were selected for the experiment [5]. The patterns for each costume were generated using DC Suite (software for pattern-making and draping simulation): shirts, a vest, pants, and a coat for men's wear; and a set of robes with an X-silhouette for the women's wear. In the production of the digital garment, the original tucks were converted to gathering.

(3) The virtual body produced by Maya was imported into DC Suite. Virtual sewing was carried out by first positioning the patterns around the bodies in layers and then seaming them together.

(4) Simulations were run to check the accuracy and fitness of each garment.

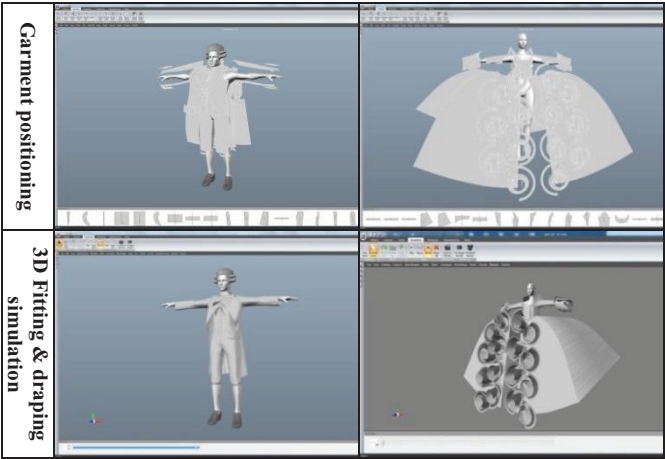
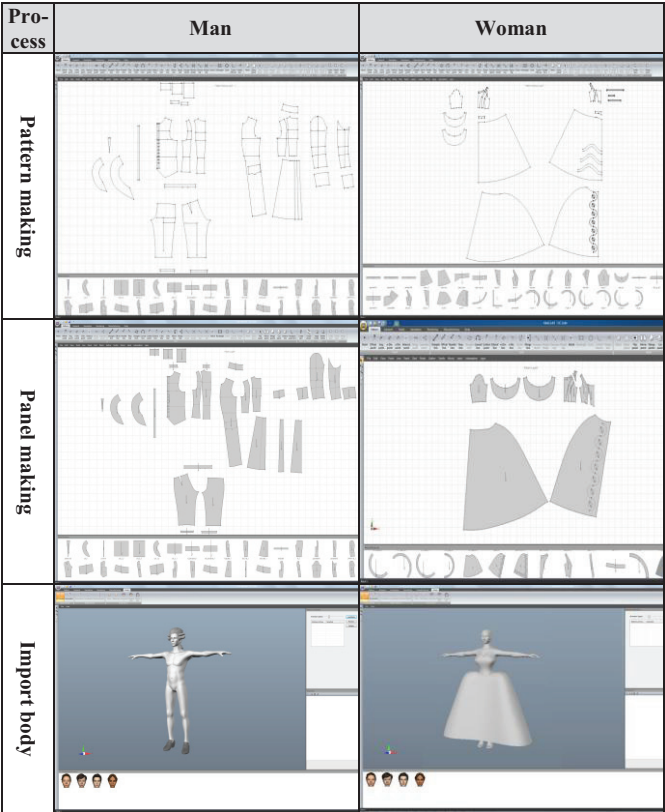


Fig. 2. Garment production in DC Suite

(5) The digital clothing produced by DC Suite was then imported into Maya using a plug-in programme to apply special effects.

(6) Textiles and textures of the fabrics (jacquard, lace, brocade and silk) which were popular in the 18th century were reproduced by applying state-of-the-art computer graphics techniques (e.g., bump mapping). The textiles were produced using Photoshop software for surface details. By applying ‘Shader’ to the textile images, we created realistic surface texture. Then we produced the final simulation by applying the appropriate level of material properties for the drape and weight of the individual jacquard, embroidery or lace fabric used in the garment.

(7) To achieve professional image quality for the movie, Maya and V-ray were applied. Finally, simulation and rendering were executed.

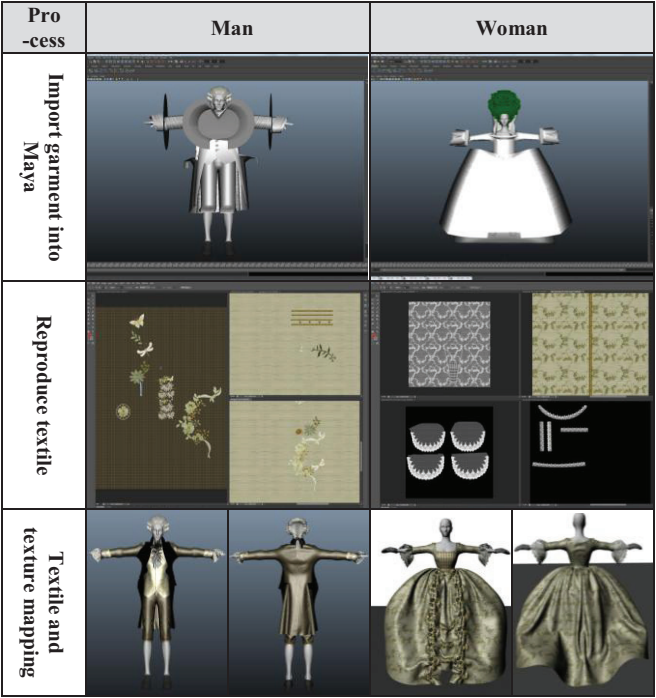


Fig. 3. Textile and texture mapping

III. IMPLEMENTATION DETAILS

This study investigated the capability of two programs, DC Suite and Maya Qualoth, for costume recreation. We hope the investigation can be used as a reference for improving the social tagging services of online costume museums. DC Suite was applied for pattern making and virtual fitting tests. Maya Qualoth was utilized for simulating and rendering. To realize the X-shaped silhouette of the lady's robe, we created the female character with a thin waist and voluptuous breasts and hips, referencing the women's figure of the Rococo era. The pannier was a challenge. We created a bell-shaped structure to maintain the pannier shape. Another challenge was to reproduce the traditional pleated skirt. The physical garment uses tucks to create the voluminous skirt. The current version of DCS cannot create these pleats. In the production of the digital version, we substituted gathering for the cartridge pleats of the original garment to generate the desired look. For the textile, we experimented with jacquard and silk laces, using a sophisticated flower motif and an embossed effect. In this production, we encountered some difficulties. However, we believe that the technology can be effectively used for reproducing historic costume in a dynamic display in which the model takes a realistic walk or dances to music by Mozart, liberated from the museum storage.

IV. DISCUSSIONS

The final outcomes are shown in Figure 4 and 5. Through the above experiment, we identified some positive aspects and some limitations of the technology.

Some positive aspects of the digital reproduction technology were:

1. The movement of the virtual figure and costumes delivers more dynamic visual information than display on static mannequins
2. With some amount of textile and texture mapping work, the technology can enable the realistic reproduction of various materials such as silk jacquard, lace, the embossed effect of embroidery, etc.
3. The technology allowed us to create a much more dramatic effect than general on-site exhibitions by providing viewpoints from diverse angles and camera positions, which can be helpful in understanding the construction and silhouettes of the costumes.

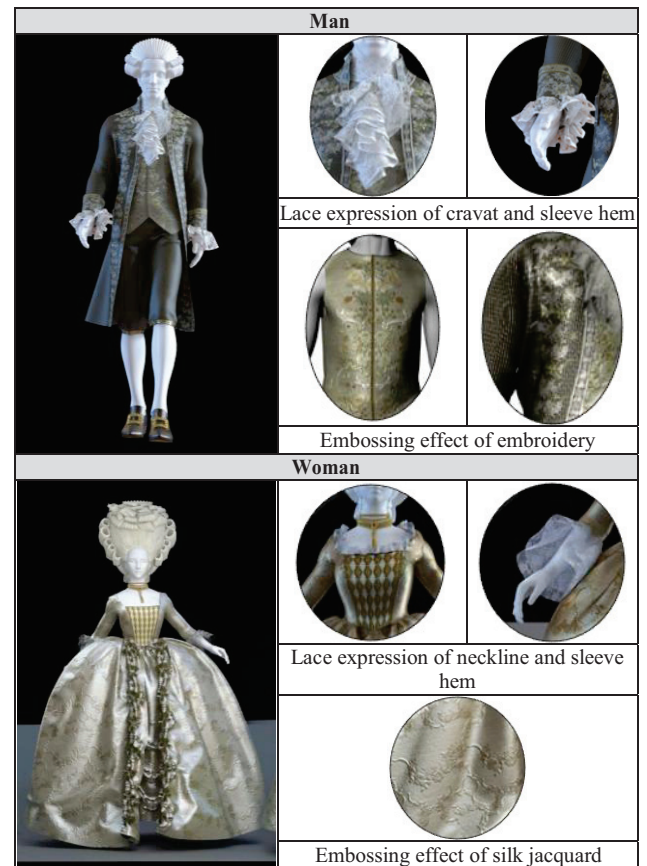


Fig. 4. Digital reproduction of traditional costumes in Rococo era

Some limitations of digital reproduction technology were also identified:

1. Although the woman's dress was decorated with the tucks of Watteau pleats at the back of the neckline and the waistline, this study could not represent this kind of technique since such function is not included in the software. The tucks of Watteau pleats were omitted and the tucks on the waistline were replaced with gathering.
2. The hand of the fabric of the female robe was stiffer in the simulated result than in the actual material.
3. Some puckering occurred in the process of virtually sewing the skirt and flounce of the woman's dress.



Fig. 5. Limitations of digital production technology

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