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# DIGITAL PRODUCTION OF TRADITIONAL COSTUMES

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## ABSTRACT

*The purpose of this study is to find out the possibility of reproducing traditional costumes using the digital technology. For this, we selected a women's robe and a men's suit in the rococo era of the 18<sup>th</sup> century. For the reconstruction, we analyzed the costume focusing on the figurative features of the silhouette, and then applied the 3D technology to reconstruct them.*

## KEY WORDS

Traditional costumes; Rococo era; Digital fashion; 3D simulation; Virtual fashion exhibition; Social tagging

## INTRODUCTION

Recently, a cultural content industry has been receiving special attention from all over the world as a new engine of growth. The environment of the cultural contents industries, which has been dramatically changed by our knowledge-based society and development of digital technology, spun off a new system known as social tagging. This system is especially present in museum websites, which provide information on exhibitions and, by extension, involve their audiences in "appreciation", "interpretation", "participation" and "sharing" online of the apropos of works of art by digitising all collection information. In other words, the role of the museum has changed from a "one-sided information delivery" system focusing on exhibition and education to "community as culture" using social media (Trant et al., 2006). Such changes were transferred over to costume museums as well. Costume heritage has a relatively short life, since costumes normally consist of old organic fibre which is vulnerable to the environment and quickly degrades, compared to other relics (Ahn, 2007). For this reason, some museums display relics in 3D form. However, they present only static images of garments on mannequins and hardly exhibit any dynamic visualisation.

This study therefore deals with the issue of reproducing costumes in digital form for a better application of the social tagging service of digital costume museums. This study attempted to generate two costumes in the Rococo era of 18th century which is regarded as a period with some of the most glamorous dresses in history in 3D form, and explored the advantages/disadvantages of digital technologies through the process of reproduction of garment modelling and movement simulation in virtual figures.

## DESIGN FOR THE REPRODUCING COSTUMES

This study tried to explore the representability of two programmes, DC Suite and Maya Qualoth, for costume creation, and the similarity between their outcomes and actual costumes in order to provide a basic reference for improved social tagging services of the online costume museums. I tried to reproduce costumes of the 18<sup>th</sup> century Rococo style, that are delicate and elegant, using three-dimensional technology.

First, for men, I made a complete men's suit of coat, waistcoat culottes, and so on, while for women, I created robe à la française including panier. The references are as shown in <Table 1> and <Table 2>.

- **Man's Costume**

- Design point: revealing the bodyline with slim waist and tight hips and thighs
- Waistcoat: length up to mid-hip, collarless

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- Coat(Habit à la française): Flared coat style with High stand collar
- Sleeves: narrow and up to elbow + wide cuffs+cuff lace
- Breeches(culottes): length up to knees
- Cravat: length up the chest
- The hair style was done in Cadogan wig style, with low heel shoes with buckles.

**Table 1: Reference for the man's costume**

Costume					
	<b>Coat</b> <a href="http://www.allposters.co.uk">http://www.allposters.co.uk</a> <a href="http://www.fashion-stylist.net">http://www.fashion-stylist.net</a>	<b>Waistcoat</b> <a href="http://www.lesartsdecoratifs.fr">http://www.lesartsdecoratifs.fr</a>	<b>Breeches</b> <a href="http://18thcenturyhistory.com">http://18thcenturyhistory.com</a>	<b>Cravat</b> <a href="http://americanduchess.blogspot.kr">http://americanduchess.blogspot.kr</a>	
Hair and Accessory					
	<b>Cadogan wig</b> <a href="http://pinterest.com">http://pinterest.com</a>		<b>Shoes</b> <a href="http://outlandishobservations.blogspot.kr">http://outlandishobservations.blogspot.kr</a>		

• **Woman's Costume**

- Design point: silhouette in 'X' shape, deep neckline, ample bosom, slender waist and a broad skirt
- Panier: used to form a full-flowing skirt, spread flatly on both sides, fixed on the waist
- Robe: Stomacher in front of the body, center of the skirt in 'A' shape that shows a glimpse of underskirt
- Engageantes Sleeves: elbow-length short sleeves with two to three layers of laces
- Hair style was reproduced in fontange style in a form of huge structure and shoes are bejeweled.

**Table 2: Reference for the woman's costume**

Costume				
	<b>Panier</b> <a href="http://pinterest.com">http://pinterest.com</a>	<b>Robe à la française</b> <a href="http://www.polyvore.com">www.polyvore.com</a>	<b>Engageantes Sleeves</b> <a href="http://www.textilforum.cz">http://www.textilforum.cz</a>	
Hair and Accessory				
	<b>Fontange style</b> <a href="http://versaillespassion.skyrock.com">http://versaillespassion.skyrock.com</a> <a href="http://classic-costume.blogspot.kr">http://classic-costume.blogspot.kr</a>		<b>Shoes</b> <a href="http://blog.naver.com">http://blog.naver.com</a>	

## PRODUCING TRADITIONAL COSTUME WITH DIGITIZATION

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

- (1) A male and a female body were created copying the appearance of people in the 18th century. In order to express the voluminous shape of the female dress with a skirt, a panier - shape object has been attached to the waist of the female figure so that it moves together with the body.

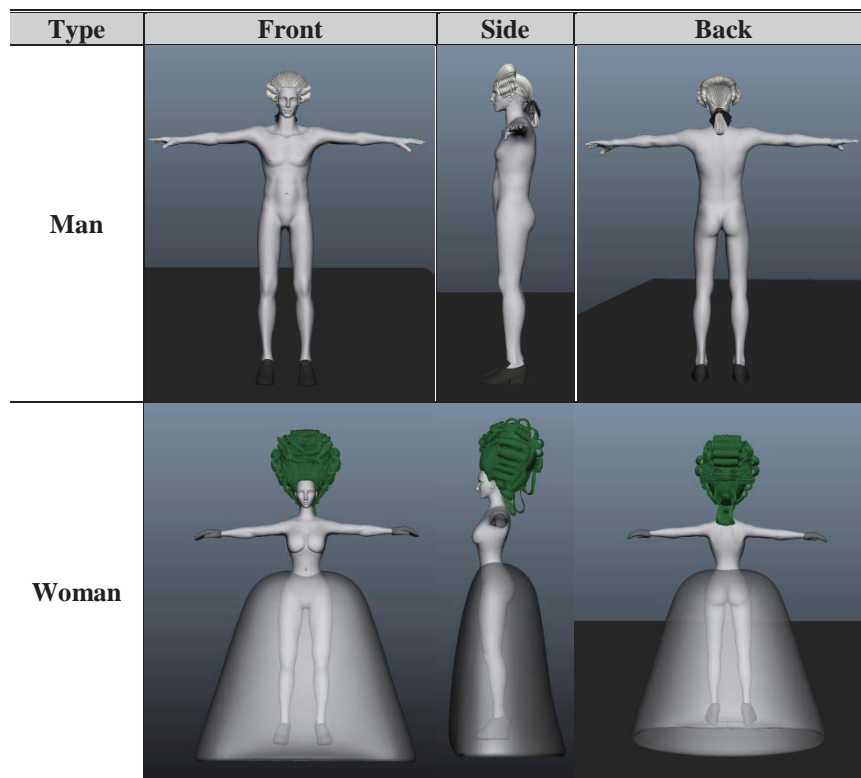
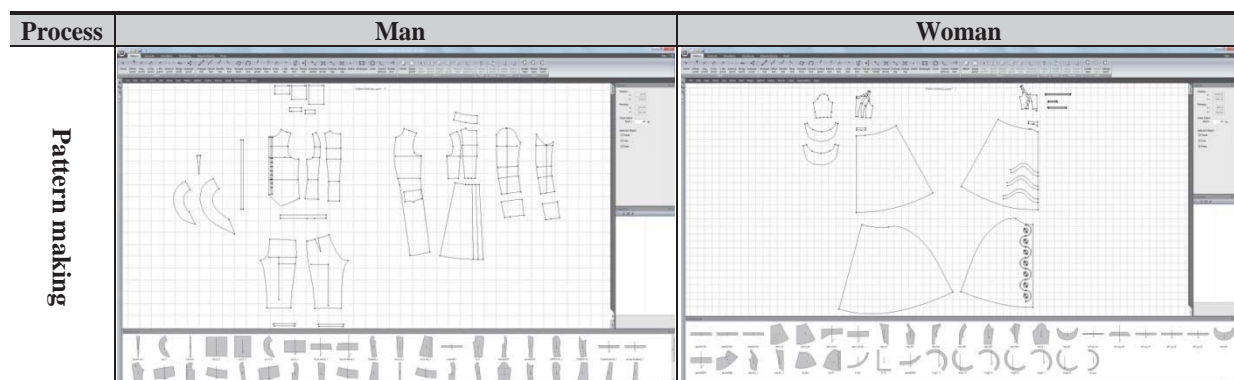
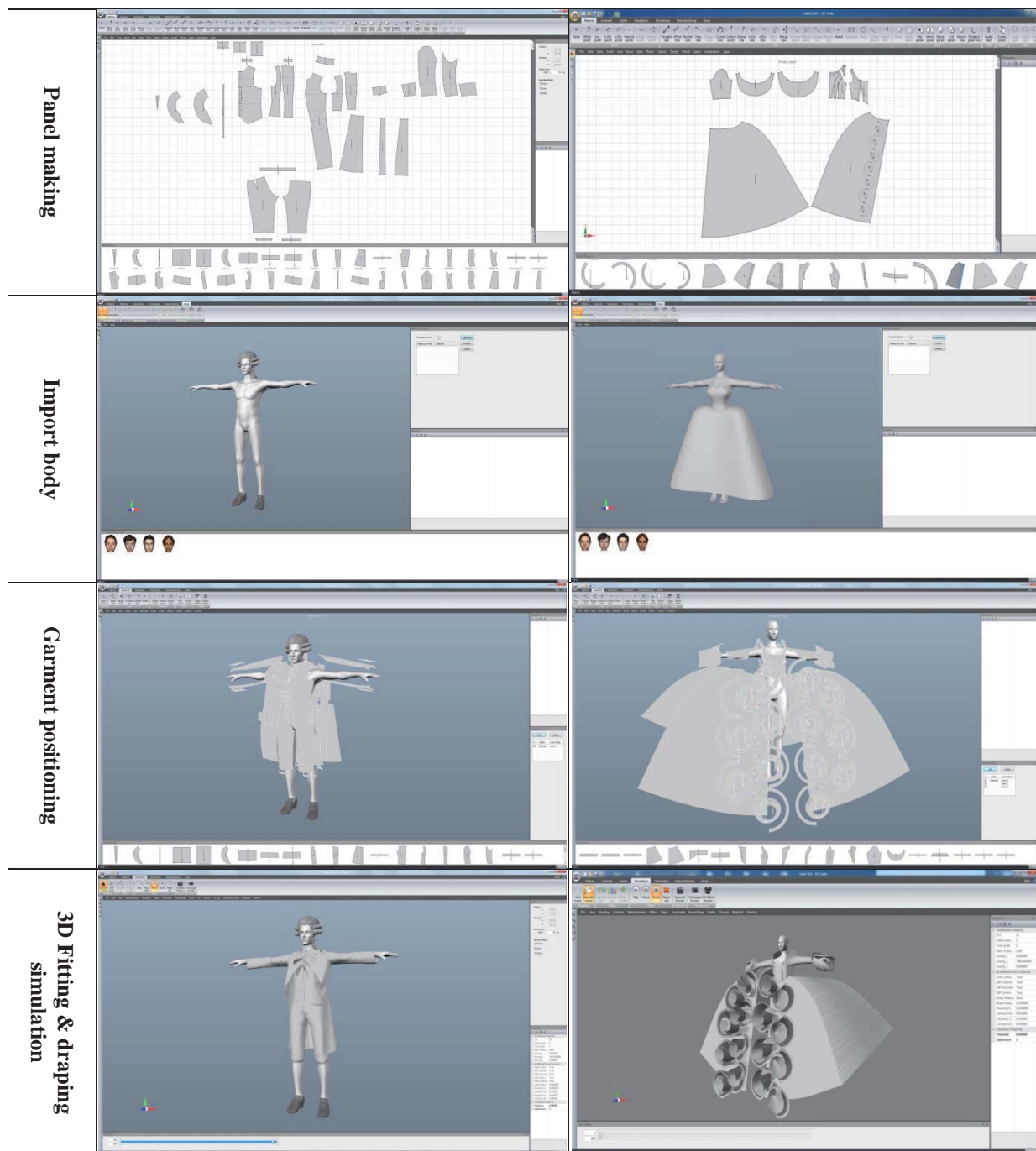


Figure 1: Virtual body generation in Maya

- (2) Two styles of costume which were commonly worn by the upper class of the era were selected for the experiment (Akiko Fukai et al, 2005). 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 women's wear. Tuck in the production of the digital version was resorted to gathering.
- (3) The virtual body produced by Maya was imported into DC Suite. Virtual sewing was carried out by positioning patterns around the bodies in layers.
- (4) Simulations were run to check the accuracy and fitness of each garment.







**Figure 2: Garment production in DC Suite**

- (5) The digital clothing produced by DC Suite was imported into Maya using a plug-in programme to apply a special effect.
- (6) Textiles and textures of the fabrics (jacquard, lace, brocade and silk) which were popular in the 18<sup>th</sup> century were reproduced by applying the state-of-the-art computer graphics techniques (e.g., bump mapping). That is, the textile was produced using software such as Photoshop for surface details. By using 'Shader' to the textile images, we created realistic surface texture. Next, we produced simulation applying adequate level of material properties for the stiffness of jacquard, embroiled embossing effect or lace.
- (7) To achieve professional image quality for the movie, Maya and V-ray were applied. Finally, simulation and rendering were carried out.

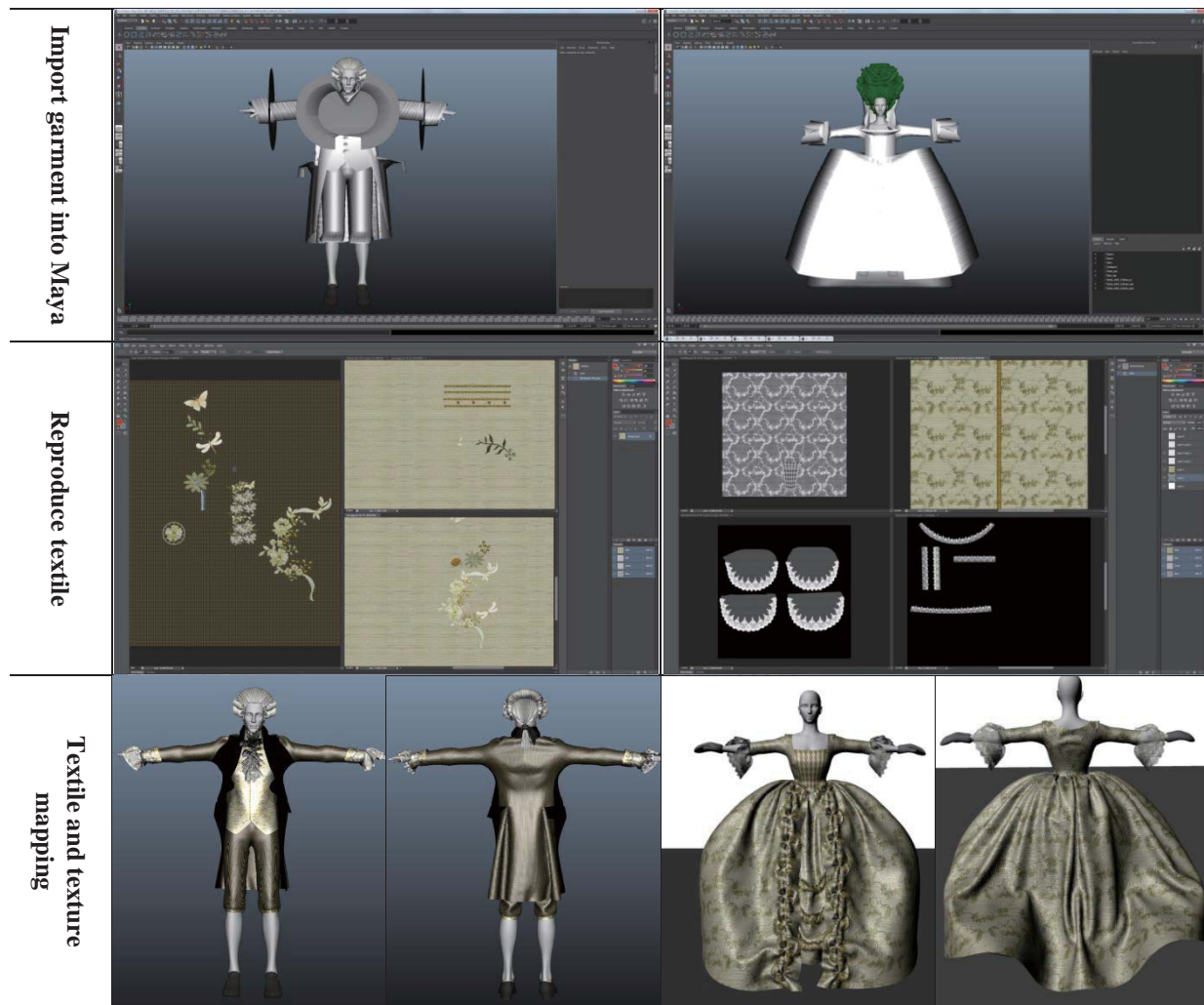


Figure 3: Textile and texture mapping

## IMPLEMENTATION DETAILS

This study tried to explore the capability of two programmes, DC Suite and Maya Qualoth, for costume creation, which can be a reference experiment for improved social tagging services of the online costume museums. DC Suite was applied for pattern making and virtual fitting tests, while Maya Qualoth was utilised for simulating and rendering. To realize the X-shaped silhouette of the lady's robe, we had the woman character have thin waist and voluptuous breasts and hips referring to the women's figure from the past. A challenging part was the pannier. To this end, we created a pannier of the bell-shaped structure to maintain the shape of ample skirt, so that the skirt flows over it. Another challenge was to reproduce the traditional pleated skirt. Although the real outfit is composed of tucks to create a voluminous skirt, in the production of the digital version, we resorted to gathering, which successfully generated the desired look. For the textile, we experimented with jacquard and silk laces with sophisticated flower shape which had the embossing effects. In the above production, we encountered some difficulties. However, with the improvements which are anticipated in the future, we believe that the technology can be effectively used for reviving traditional costumes in a more live form in which the model takes a walk or dances rather than storing them in the museum packed in a box.

## DISCUSSIONS

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

Some attractive aspects of the digital reproduction technology were:

1. The movement of the virtual figure and costumes delivered more dynamic visual information than static mannequins on a display.
2. In contrast to the offline museums, using digitised costumes opened the possibility to presenting each item of a costume from underwear to outer clothing, as well as the way of wearing it.

3. With some amount of textile and texture mapping work, the technology enabled the realistic reproduction of various materials such as silk jacquard with flower prints, lace, an embossing effect of embroidery, etc.
4. 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 to audiences to understand the formative characteristics of the costumes.



**Figure 4: Digital reproduction of traditional costumes in Rococo era**

On the other hand, some limitations of digital reproduction technology were also identified:

1. Although the female dress was decorated with tucks on Watteau pleats of the neckline at the back and the waistline, this study could not represent this kind of sewing since such function was not included in the software. The tucks on Watteau pleats were omitted and the tucks on the waistline were replaced with gathering.
2. The touch of the fabric of the female robe was more stiffly in the simulated result than in the actual material.
3. Puckering was observed in the process of virtually sewing the skirt and flounce of the female dress.





The tucks on the waistline were replaced with gathering. The touch of the fabric and puckering of the female robe

**Figure 5: Limitations of digital production technology**

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