

# Digital Filters: A New Way to E-Wear Jewellery

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**Abstract.** The objective of the paper is to analyse how digital technologies are used in jewellery design in an era in which products and environments are becoming increasingly intangible to leave space to digital worlds, thanks to augmented and virtual reality. The paper gives an outline of jewellery within the contemporary scenario, analysing the direction traced by digital technologies within the jewellery system as well as the impact of virtual environments. To this end the contribution describes the results of an applied research case study developed during a five-day design workshop at Politecnico di Milano. The aim of the experience was to explore the contribution of digital and virtual tools in shaping and conferring value to jewellery items. In conclusion, the paper analyses the outcome of the case study in terms of concepts of preciousness and wearability, being defined based on personalization, interaction, and fruition.

**Keywords:** Jewellery design · Virtual environments · Digital ornaments · Innovation

## 1 Introduction

Historically, jewellery has always been a middle ground between art, craftsmanship and design. Ambiguous objects with contrasting values, from unbridled luxury to conceptual avant-garde, from the dazzling preciousness of materials to more or less latent design values. On the one hand there is art, with the concept of authorship, on the other fashion, with the fleeting nature of its present, and in the middle jewellery, with the defence of precious materials as bastions of eternity [1]. For a long time, the value of a piece of jewellery was synonymous with its preciousness, i.e. the physical cost of the material. Today this idea is outdated. The value of a piece of jewellery is the result of the quality of the project, the ability of the designer or artist to generate a storytelling around the object thanks to the choice of form, material, or production technologies [2]. In the past, jewellery was linear and sequential; today it is fragmented, heterogeneous and multiple. In all this complexity, digital technology and the transition from physical systems to digital ones, further subvert the values that orbit around the world of jewellery [3]. Physical products are today complemented by virtual twins, which can in turn be worn and displayed through screens. Virtual items are designed digitally with high photorealistic features but rather than be produced, they remain virtual and are used online, for their social media, their avatars, on life simulation video games. Brands take

action to design and extend their online presence with augmented reality try-on and virtual appointments that allow them to satisfy customer needs with an inclusive and virtual experience [4]. This leaves increasing importance to the experiential component, where the user interaction plays a predominant role. Indeed, for example, the digital realm opens unprecedented possibilities in terms of personalization, enabling products to look and actively respond accordingly to the wearer's will and behaviour [5]. A growing number of software programs have been developed to support the process within the jewellery sector value chain: once a 3D virtual shape is created, its aesthetics can be digitally modified, changing proportions and colours. Moreover, in this way, jewellery can be virtually tested, even in its immaterial phase. This is made possible thanks to Virtual Prototyping and Augmented Reality, which allow users to interact directly with digital products as if they were physical [6]. In a dimension where most purposes are forcibly dematerialized and filtered through screens, technology is increasingly used to enhance digital social experiences, not only among peers but also in the dynamics of interaction with brands, from purchase to product use.

## **2 Directions Traced by Digital Technologies (VP e AR)**

The virtual space is increasingly the place where new buying and wearing dynamics are forming, close to the new generations. According to Epson [7], 75% of European consumers would change their shopping behaviour if retailers were more experiential. This means consumers would shop more often and retailers would be able to attract more younger consumers: Millennials (67%) and Generation Z (65%) continue to be attracted to shops that offer experiential elements. This finding provides an opportunity for jewellery retailers to start taking advantage of experientialism by adding immersive elements to their marketing strategy. Interest in immersive technologies has surged as brands have begun to realise the importance of integrating them into their digital strategy [8]. According to Shopify statistics, products enhanced with augmented reality integration showed a 94% higher conversion rate than others [9]. A Retail Perceptions' report on augmented reality for retail [10] showed that most consumers would like to use this kind of technology to make the right purchasing decision, so, anyone with a smartphone or laptop can virtually try on the piece. The jewellery industry has always relied on offline interaction to facilitate sales. However, the market situations of the last year have accelerated the urgency for companies in every sector to go digital. The closure of physical shops has led to an inevitable migration of the customers to online channels motivating brands to invest in the development and application of new digital technologies. It is also estimated that "over the next five years, online sales of fine jewellery are expected to grow at a compound annual growth rate (CAGR) of 9 to 12%" [4]. This is the demonstration that augmented reality has created a successful virtual shopping space with the 'try-before-you-buy' function. Through augmented reality-powered virtual try-on, consumers can interact with the brand and its products, increasing engagement and sales numbers. Indeed, although digital leads to an inevitable dematerialization of reality [11] and can lead to an alienation of social interaction, the human aspect in online sales remains essential [4]. Through this system, jewellery brands also can access consumer data. They can then use these technologies to track the performance of their products and

perform in-depth customer analysis. Brands such as Tanishq, De Beers and Boucheron have already moved in this direction and have seen a significant increase in online traffic and transactions leading to increased sales.

But today, it is not only about digitising the shopping experience, but also the virtual dimension is the opportunity to create dematerialised, intangible products that can only be purchased and worn through avatars. Caronia's virtual bodies [12] begin to take shape: the digital permeates identities, shaping one or more of digital bodies, which can be dressed and can act in a virtual environment. Today, indeed, consumption occasions are changing, and the pandemic has only accelerated a long-standing process of digitisation: in this context, technology is increasingly used to enhance the social digital experience among users. We may talk about digital wardrobes: even if a jacket, bag, or a pair of sneakers are not real, users can still wear them as Instagram filters in any video, photo or story they post. Some brands are born in the digital environment and evolve as physical collections, brands capable of communicating with a younger generation on social channels [4]. It is possible for example to simulate brands' products through social media filters, studying the information contained in the simulation, such as engagement, demographics and psychographics. Eventually producing in real life, the products as filters that retain the most appealing metrics. This allows to save a huge number of natural resources in the process. This is for example the case of Impossible Brands. This model can be referred to as virtual-to-consumer. It allows to introduce a fast digital fashion, made of thousands virtual products, simulated by their digital twins, and a slow physical one, made of limited, data-driven physical collections. Through virtual reality customers can become models at the same time. They can parade with the garments they intend to buy and interacting with other customers. They can decide to buy the physical piece, or just its virtual version.

### **3 Applied Research: A Digital Tailor for Intangible Jewellery**

Based on these reflections, we conducted an applied research experience in the educational sphere to explore the contribution of digital and virtual tools in shaping and conferring value to jewellery items. The experience consisted in a five-day design workshop at the Specializing Master in Accessory Design at Poli.Design, the consortium company of the Politecnico di Milano, Milan. The short course involved 13 masters' students and it was specifically aimed at investigating the impact of digital technologies in the jewellery sector, focusing on the way today's businesses can be transformed toward faster, smarter, more efficient, and sustainable pieces.

#### **3.1 Workshop's Design Aims**

The workshop addressed

1) the definition of general research of jewellery styling thanks to the creation of a map of jewellery piece-face winning associations for the following micro-categories: (i) harmony of colours (colour palette, seasonal colour analysis, stone, precious metals in accordance to skin, hair, eyes colour); (ii) harmony of proportions (defined by the

relationship between body anatomy and jewellery length, volume, shape, lines); harmony of composition (layering of the products and creating suitable compositions); 2) the research of jewellery styling. Starting with the rules emerged from the previous research and data from assigned products, students had to create winning combinations that could best enhance each person; 3) the design development of a jewellery item that perfectly matched with their own body features. Students had to ideate and design the most suitable jewellery piece starting from the characteristics of one's own face (identifying oneself in one of the profiles traced during the research phase). The jewellery item had not been produced physically but conceived as a digital filter.

### **3.2 Methodology**

The workshop was structured around a specific brief: students were asked to design jewellery digital pieces starting from the characteristics of users'/wearers' own aesthetic features: harmony of colours, proportions, and composition. They were asked as well to imagine an app which, by scanning the face, could suggest the most suitable jewellery piece for each user, in the manner of a digital tailor.

The actors involved in the workshops:

- 3 teaching staff members from the Politecnico di Milano, both from the fashion design field;
- 13 masters' students.

The workshop took place over 5 days, from Monday to Friday, full day. The combination of lectures and the learning-by-doing approach was chosen as teaching method, guiding students throughout the design process. In particular, the lectures dealt with issues related to jewellery design, fashion tech, value in fashion and jewellery design, communication design and methods of visual communication. For each day the learners had specific activities to address. The students were first asked to work in small groups to research and map jewellery piece-facial features winning associations (1) and to create winning combinations that could best enhance each persons' aesthetic features (2) The design phase (3) was then conducted by each student individually. The didactic methodology consisted in a learning-by-doing part with constant reviews by the teaching staff, from research to ideation, from conceptualization to the digital prototyping.

A peer observation marked a continuous monitoring process throughout the duration of the workshop, combined with a final informal discussion to share opinions and results around the week of the workshop.

### 3.3 Workshop's Delivery Instructions

Students on the first day were asked to produce the following material for the final digital delivery on the 5<sup>th</sup> day.

- 2 boards // research on harmony of colours (inspiration images + keywords + colour palette + max 300 characters description)
- 2 boards // research on harmony of proportions (inspiration images + keywords + max 300 characters description)
- 2 boards // research on harmony of composition (inspiration images + keywords + max 300 characters description)
- 1 board // mood board
- 1 board // concept + technical details
- 1 board // digital prototype including a simulation of the digital filter

### 3.4 Output

Halfway between the physical and virtual realm, the project aimed to open new possibilities of wearing jewellery, not only in the real dimension but also through filters that could best adorn the user's digital body. The latter also becomes the subject of research and design: not only the jewel is designed, but also the digital interaction that connects the jewel-filter to the user, implementing the digital experience. The experience highlighted constraints that were no longer those of the traditional production, but the ones of a virtual reality in which precise frames delimit the spaces of wearability Figs. 1, 2 and 3.



**Fig. 1.** M'ama by Sofia Martinelli. Starting from the seasonal colour analysis and the proportion theory, M'ama was designed to enhance the personal features of the wearer: oval face, medium neck length, long hair and Spring colours. M'ama represents childhood memories of spring, pulling off daisies' petals saying "m'ama, non m\ama" (Italian for Love me Love me not). Its will is to bring back to adulthood these playful memoirs in a contemporary jewel.



**Fig. 2.** RootedFlow by Benedetta Molea. A digital necklace inspired by two pillars of the students personality: strong roots and ability to flow. Indeed, this piece want to express both fluidity and stillness through its shapes.



**Fig. 3.** Acquasalata by Manfredi Cacioppo. Winter skin tones matches with metals like white gold and copper that enhances this natural palette of cold colours; long squared face and medium neck match with rigid necklaces; the wavy long hair matches with choker, matinée necklaces and rigid ones. The jewel is inspired by fluid, organic, shiny and wavy shapes.

## 4 Conclusion

The paper analysed how digital technologies are used in jewellery design in an era in which products and environments are becoming increasingly intangible to leave space to digital worlds, thanks to augmented and virtual reality.

The paper gave an outline of jewellery within the contemporary scenario, highlighting how the value of a jewel has been progressively changed with the digital shift, marking the increasing importance of the immaterial aspect related to the experiential component, where the user interaction plays a predominant role. This is exemplified by the possibilities offered by the digital realm in terms of personalization, enabling products to look and actively respond accordingly to the wearer's will and behaviour. The user becomes a co-creator of contents and meanings, and the personalization of the online experience increases the loyalty and connection with the brand.

Subsequently, the paper analysed the direction traced by digital technologies within the jewellery system as well as the impact of virtual environments: technology is increasingly used to enhance digital social experiences, not only among peers but also in the dynamics of interaction with brands, from purchase to product use.

Lastly, the contribution described the results of an applied research case study developed during a five-day design workshop at Politecnico di Milano. Students worked on the design development of jewellery digital pieces starting from the characteristics of users'/wearers' own aesthetic features: harmony of colours, proportions, and composition.

The case study is intended as a starting point to consider an alternative approach to the traditional concept for the jewellery world. In the current market scenario, companies should be proactive in considering new technological advances and integrating them to provide a better consumer experience. The presence of digital selves [13] is growing, non-physical users who can act in virtual environments and whose digital presence can be designed. The current pandemic has acted as a catalyst for this digital transformation. Whether it is try-before-you-buy or products that are only meant to be bought and worn digitally through avatars, virtual is an opportunity for brands to integrate immersive technologies into their business models to create immersive experiences for their customers.

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