Chapter 12
Augmented Reality as an Efficient Tool During the Product Design Process in the Manufacturing Industry

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ABSTRACT

Manufacturing processes are divided into stages: the initial phase is the design of the product, then continues with the cutting of the fabric and concludes, roughly speaking, with the assembly of the previously elaborated pieces. All these stages are carried out to achieve the desired product, however, the assembly stage could be considered as the most important in the development or manufacture of a garment. To make manufacturing processes more efficient, it is important to make use of new technologies, such as augmented reality, which show the physical reality of the product virtually. In this work, interviews and observation of maquiladora companies in the apparel industry were used and, derived from the results obtained, it is possible to propose a system based on augmented reality that shows a different way of designing patterns (which will later be called prototypes), as well as highlighting the possible benefits that could be obtained with the use of this technology in some manufacturing processes.

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INTRODUCTION

Manufacturing areas are key elements in the manufacture of products of any kind, which are of fundamental importance and require, in turn, new methods to help optimize all their processes (Paszkiewicz et al., 2020); consequently, cutting-edge methods are emerging, which help to complement and improve production processes, such is the case of additive manufacturing or also called 3D printing (Jandyal et al., 2022). Undoubtedly, 3D printing is revolutionizing the manufacturing industry, due, among other things, to the fact that 3D printing serves to create large-scale parts (Thang and Kim, 2025; Roschli et al., 2019). Other developments that include smart technology of various types and come together as important parts of the production process are computer-based models, manufacturing systems and sensor technologies, virtual/augmented reality (Sakr and Abdullah, 2024), the Internet of Things (IoT) (Hassan et al., 2020; Ahmad and Zulkifli, 2022), and technology trends that correspond to global patterns, which reveal a wide range of sectoral applications (Turovets et al., 2019). These tools must be contextualized in research that focuses them towards points of help to build intelligent and avant-garde factories, by the technological era in which we live and, above all, capable of improving and facilitating all processes related to manufacturing so that, as a result, useful products for people are more accessible and of better quality (Sun, Shahzad, Ali and Razzaq, 2025).

The production phase begins with the design of a product, which will serve as a prototype and must meet certain parameters related to measurements, materials, and specifications. The pattern of a product is geometrically elaborated following the indications of the model created by a designer, who is usually a person fully qualified for this profession. Once the product has been designed, the model (prototype or sample) is translated into assembly terms by the manufacturing area personnel, who give their construction interpretation, especially in the elementary details of the garment; this interpretation may sometimes be erroneous or different from the original proposal. If this interpretation is correct, then a quality product will be obtained, otherwise, a product with defects may be obtained, and consequently, it may not be sold or its value may be diminished. These problems show the need to introduce state-of-the-art technological tools that help optimize manufacturing processes through the visualization of patterns, which can be coupled/adapted to each person who must interact with the model. Undoubtedly, on this type of technology adjacent to the factories, research should be conducted that is oriented towards the advancement of manufacturing processes in a digital world, which is present in everyday life and is essential for any type of activity.