



# SHOE DESIGN SOFTWARE CRISPIN CAD CAM

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## Abstract

The process of design and manufacturing footwear with CAD/CAM systems is increasing rapidly in the shoe manufacturing industry. This paper gives an outline of the whole process of shoe making in industrial environment. The work is done following step by step the procedure of design and realization of a production process for a prototype. The same workflow can be followed to execute a production order with large quantities of shoe pairs required by different clients. The positive aspects of using these systems appear not only on the products produced but also on the impact they have on the work environment. These systems make it possible to reduce manual labor which can be difficult and with consequences on the wellbeing of workers. It is very important to emphasize that the use of the CAD/CAM system in the footwear manufacturing industry significantly increases quality and productivity.

**Keywords:** CAD/CAM, Footwear, Shoe design, Shoe production, Shoe quality

## **1. Introduction**

Shoes are considered as one of the most important fashion accessories. During walking, the foot plays the role of a flexible shock absorption system, deforming on uneven surfaces before undergoing through a series of biomechanical changes that allows it to act as a rigid lever of force [1]. Elements such as toe cap shape, sole and heel shape and dimensions should be taken into consideration in order to solve the main problem of static and dynamic foot pathologies. For creation of personalized shoes a 3d scanning system can also be integrated to capture the exact freeform geometries of foot [2]. Shoe designers take into account the styles and trends of the markets. The demand increment for specific design and customized shoes for persons with impaired abilities, has faced this sector with new techniques and technologies [3]. CAD/CAM software is used in the shoe industry for the shoe design process, technical multiplication of shoe parts, molds and soles [4] CAD design was introduced into the shoe industry in the 1970s. It was originally used for the technical multiplication of molds [5]. CAD/CAM generates data at the design stage, which can be used for better monitoring and understanding problems than can arise, by eliminating them before initializing the production stage.

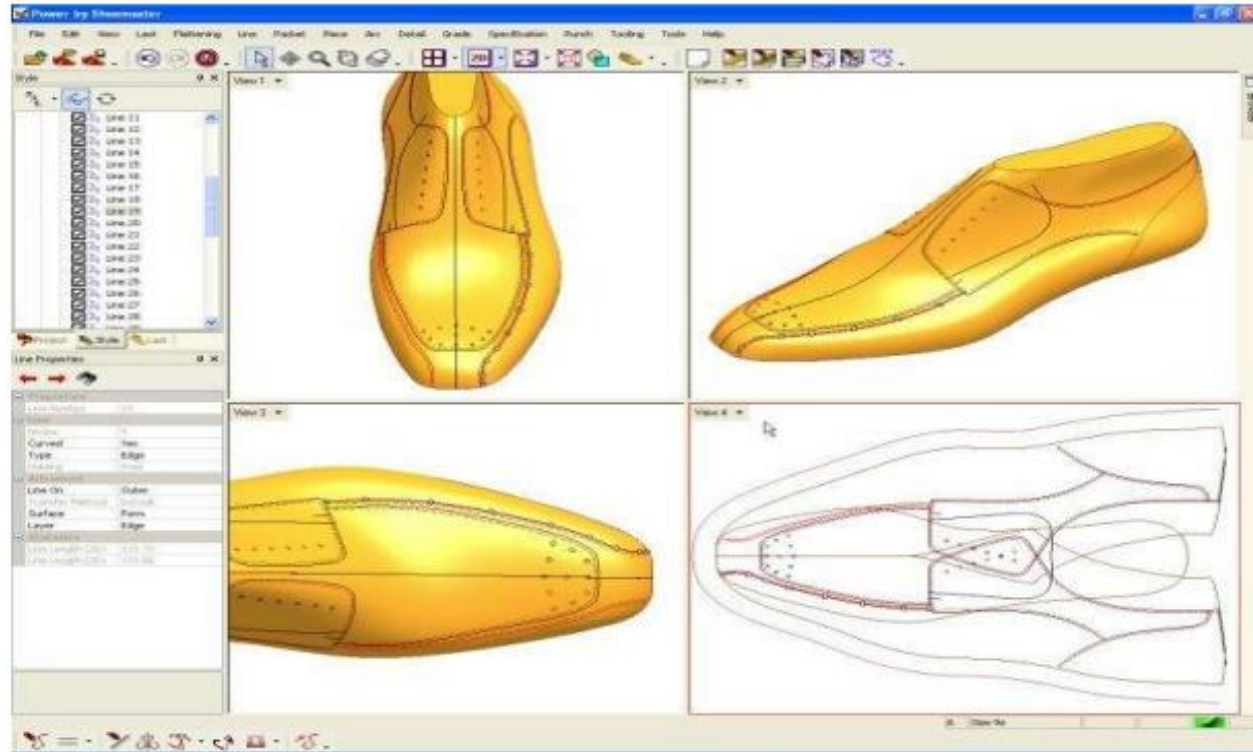
Today, advanced CAD/CAM shoe systems are created with a wider range of functions and personalized plugins. Logos, textures and other embellishments can be incorporated into the design of the product for both the upper and the sole of the shoe helping to reinforce the brand in all parts of the model. It enabled manufacturers to develop complex measures relatively simply and in a shorter time. The shoes production process has become a very specialized job and requires sophisticated machinery as well as technically qualified manpower [6, 7].

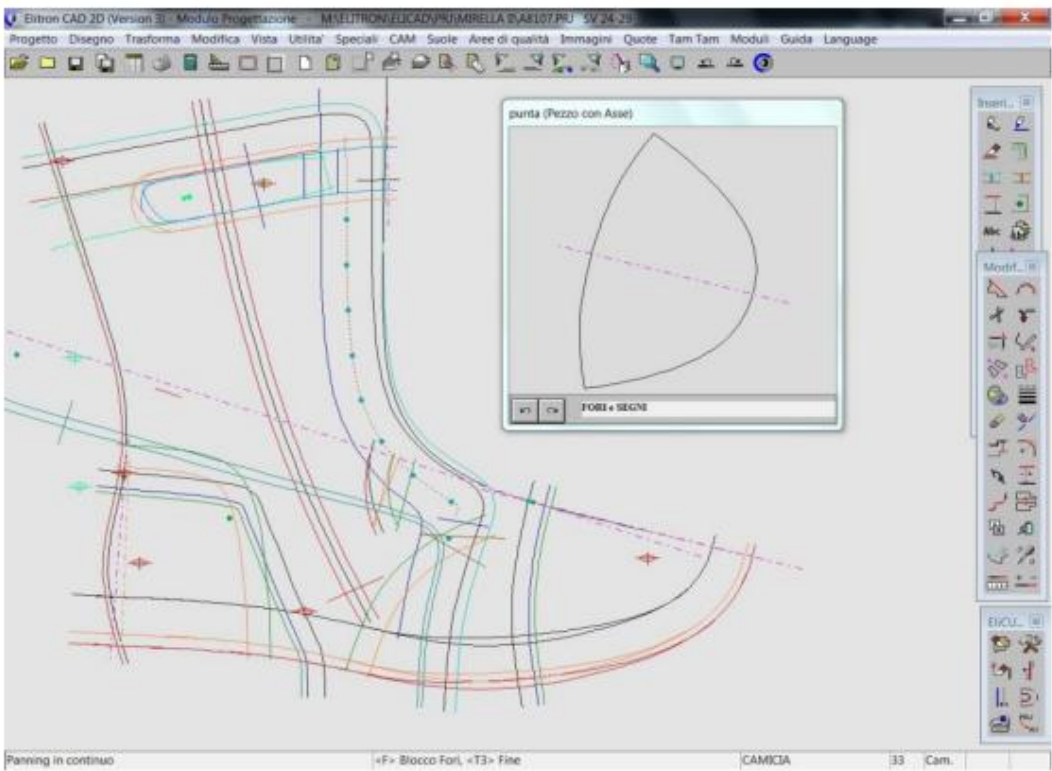
## **2. Methodology**

As in many areas where design is requested also the footwear design often begins with conceptual design. At this stage, the designer often uses sketches to bring out the most important design ideas, aesthetics and possibly color schemes. Styling and aesthetics greatly influence this stage. The result of the conceptual design can be a set of sketches, or sometimes even a photo of a work of art made using image editing software tools (e.g. Adobe™ Photoshop). Occasionally this step is followed by the realization of the physical sample, called mock-up. Standard shoe molds, possibly are modified to fit the desired shape and covered with a type of clothing in which the designer sketches the upper part of the mold. It is then cut, removed from

the mold, and stretched to obtain parts of the shoe pattern. The top can be built manually by cutting and sewing the designed materials.

Shoemaster [8] software is a leading CAD/CAM system that provides 2D and 3D solutions for the shoe manufacturing industry as shown in Figure 1. This program is designed by traditional shoemakers, and provides the necessary solutions and tools for the design, development, and engineering of shoe manufacturing.







Cutting materials for sewing the pattern can be done in two ways:

1) Cutting by hand

This cut is used only when the model is in the prototype stage or in the sample stage. The cut in this case is made with a professional knife by a worker specialized in the cutting process and who knows the materials to be used for cutting as shown in Figure 5. In this stage is also the opening of decorative holes or which can be used for different functions by means of personnel with different diameters.



In this case it is used a machine with CNC control adapted to accurately carry out the cutting process. This machine is capable of making cuts not only to make a prototype or a sample, but also to make a production process in large quantities, or to carry out a production process in series.





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**Enterprises**



### 3.2 The sewing process and assembly of the final product

The sewing phase is through the realization of a series of consecutive operations to get the end of the upper part of the shoe ready for assembly. At this stage during the realization of the production process a relatively large number of workers are needed because the operations that need to be performed are numerous. Operations performed during the sewing phase can be performed through the use of various machines, but there are also those operations that must be performed manually without the help of any machinery.







**Figure 8.** The final product

### **3. Conclusions**

In this work, the authors have given an overview of the use of the advanced CAD/CAM system in the footwear industry. The benefits that CAD/CAM system are almost comprehensive and have shorten the production time throw design, problem identification and production process. A comparison between the use of the CAD/CAM system and the use of the traditional system



where almost all operations are performed manually without the use of computerized systems is identified. The integration of advanced CAD/CAM system can save time, increase product quality and lifetime of the footwear, by increasing also people satisfaction. The integration of simulation feature of these advanced programs, gives the possibilities for faster errors identification by visualizing to the designer's possibility of correcting these errors in a very short time thus restoring the normal process of production and its completion within the set deadlines.

