

THE TOTAL SOLUTION FOR DEVELOPING NEW PRODUCTS AND NEW MARKETS OF INDUSTRY FOOTWEAR

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Abstract: This paper presents new solutions for shoemakers, for developing new products and new markets of industry footwear using the basic function of the system **CRISPIN Dynamics CAD SUITE**. These are the key issues - this is why **CRISPIN Dynamics CAD SUITE** have developed a range of quality software products to give you the shoemaker a major advantage in shoemaking.

1. INTRODUCTION

By classic methodology, designing footwear is a very complex and laborious activity. That is because classic methodology requires many graphic executions using manual means, which consume lot of the producer's time. The decisive step in this way has been made some time ago, when, as a result of powerful technical development and massive implementation of electronically calculus systems and informatics, CAD (Computer Assisted Design) systems were used in footwear industry. One of the most important uses of calculus systems in footwear design is interactive designing by using the CAD system. These are the key issues - this is why **CRISPIN Dynamics** have developed a range of quality software products to give you the shoemaker a major advantage in shoemaking. This paper presents the basic function for footwear designing using the system **CRISPIN Dynamics CAD SUITE**, a system CAD/CAM for footwear.

2. ABOUT FOR CRISPIN DYNAMICS CAD SUITE

This application offer functions for creating realistic looking designs of the footwear products and flatten the styles for development in 2D. There are also facilities to re-centre front and back guide lines, change foot (no need to re-digitize) and set the correct heel height and roll. You can create guidelines to save with the last and extend the last for a boot design. The last type can also be changed to a type that allows the entire last surface to be used for a design. The applications in the suite are:

- **LastMaker** - a program providing the means to design and modify lasts with outputs to various 3D file formats.
- **ShoeDesign** - a program for designing uppers on 3D lasts provided by **ModelTracer** or **LastMaker**. Create realistic looking designs and flatten the styles for development in **Engineer**.
- **ShoeCost** - a program to estimate the cost of producing a particular design. Takes input from various sources including **Engineer**.
- **2D Engineering** – a program for designing on 2D lasts provided by Shoe Design, and Digitizing. This product has been developed for shoemakers who wish to ensure that their business remains competitive by increasing the efficiency, speed and accuracy of pattern development and grading.

This paper presents the main functions for footwear designing in 3D and 2D space using the applications **Last Maker**, **Shoe Design and Engineer** [1], [2].

3. FUNCTIONS FOR CREATING AND ADJUSTING THE SHOE LAST

Computer-aided manufacturing (CAM) system is widely used in shoe last manufacturing, which has realized the digitalization of the machining program from the free-form surface detection method to produce numerical control (NC) requirement by the shoe last CAM software system automatically. In this type of free-form surface NC machining, it is common to digitalize the shape of the entity through the three dimensional (3D) measuring system after obtaining the scanning data and the process of the natural pattern; the next step is the rebuilding of the surface model. There are two steps involved in remodeling the discrete data, which has become an entity shape in recent years: the first is the sequencing of the measurement data, the second is the generating for creating the design. In this section on discusses method for measurement data technique and creating format solid corps of the shoe last technique using the application **Last Maker** [1], [3]. The main function for creating and modification the format of the shoe last are following:

3.1 Recording the shape of the last

The shape of the last is recording in format 'point cloud data' on execute with the application ModelTacer. The digitizing process on execute with MicroShibeG2X. For digitize the shape of the shoe last on execute the steps:

- steps for recording the base point,
- steps for recording the boundary of the shoe last and the points for creating format "could data" of the last (see fig.1).

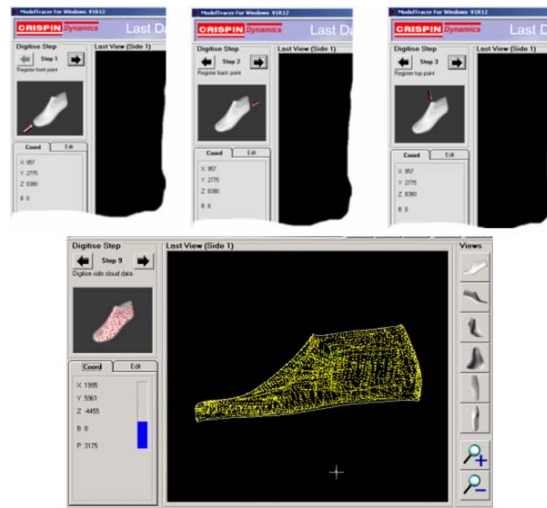
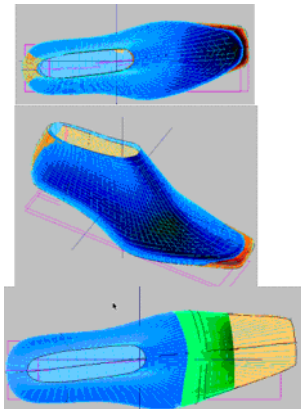


Fig. 1 The steps for creating a shoe last format "point cloud data"



3.2 Import the shoe last in other application

Shoe last is import in application **Last Maker**. Application offer information about the last: Gender, Size, Index, Width index, Toe Spring, Heel Height. This information displayed in the Last Info option is automatically changed accordingly (see fig. 2).

Fig. 2 Import the shoe last in Last Maker and modification the initial format

3.3 Adjusting last parameter, comparing and analyzing the new Shoe Lasts

Using the function of the application Last Maker on visualized and modified the parameters for shoe last. Comparing function brings possibility to compare two different lasts; the result can be measured or displayed as a solid lasts (fig. 2).

3. 4 Proportional Grading

In the dialog Gender Table select Gender you want use for grading and size and width parameters of the current last. In figure 3 are: Window of Gender Table and the results of function grading.

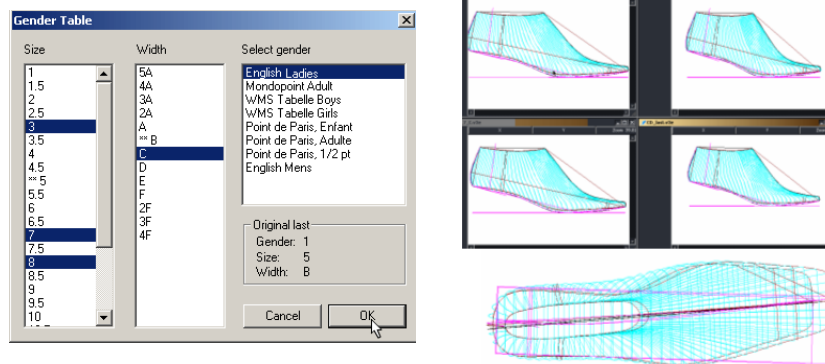


Fig. 3 Creating the shoes last for other numbers and with using application Last Maker

4. FUNCTIONS FOR CREATING AND ADJUSTING THE 3D DESIGN OF THE FOOTWEAR

The module **Shoe Design** brings cutting-edge CAD/CAM technology to footwear designers providing benefits through all stages of their product development process. Major benefits include the ability to visualize a design for appraisal and the transfer of the design into **CRISPIN 2D** pattern development products, see table nr. 2. This allows increased productivity, shorter lead times, accurate interpretation of 3D designs in 2D and a reduction in the number of samples needed before approval of the design.

4.1 Input of last data can be from **CRISPIN Model Tracer** from our **CRISPIN Last Maker** product. The last can be extended for designing industrial, leisure or fashion boots (see fig. 4). Guidelines and reference points can be embedded in the last surface to help maintain design standards etc.

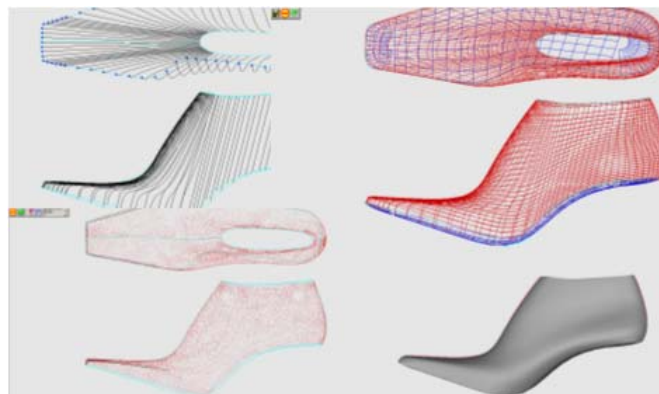


Fig. 4 Creating the shoes last format 'solid corp.' using session Last Maker of application Shoe Design

4.2 Creating Style-lines

Style-lines are generated on the last surface with this 'user friendly' software product allowing new designs to be achieved in minimum time whilst achieving an accurate representation of the shoe (see fig. 5).

Fig. 5 Creating style-line on the last surface with this 'user friendly' using session of application Shoe Design



4.3 Flattening The last form, last bottom and style lines can be accurately flattened at any time during (see fig 6) this process and transferred to a **CRISPIN 2D** pattern development product.

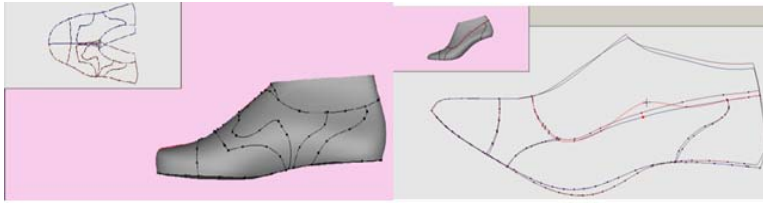


Fig. 6 Using Shoe Design on execute flattening of the shoe last for creating 2D part

4.4 Analyzing format of the shoe last and creating design and panel

The shoe can be rotated for visualization or to assist in generating the style lines enabling the designer to view the design from any angle to achieve the desired result (see fig. 7). Enhanced visualization is achieved by applying features such as stitching, eyelets and laces together with colors and textures. An interactive sole design facility is provided.



Fig. 7 Creating and analyzing realistic looking designs of the footwear products

5. FUNCTIONS FOR DEVELOP INTO A FULL SHELL, MAKING THE PARTS AND GRADING

For creating 2D designing of the footwear on using **CRISPIN Dynamics Engineer**. Using this task on execute process following: digitize the flattened half shell or standard, develop into a full shell using various dependant line types, create the individual parts and grade.

5.1 Input is from a 2D digitizer or CRISPIN ShoeDesign. You can use any 2D digitiser supported by the 'Wintab' standard. Digitising is easy to learn, fast and accurate (fig. 8).

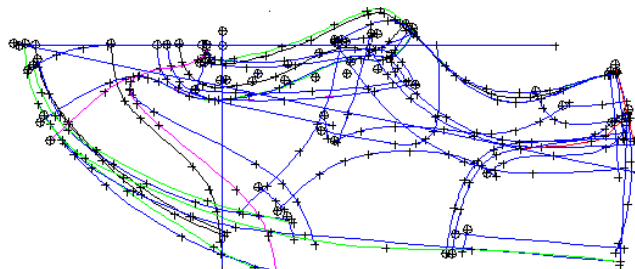


Fig. 8 The session Engineer for digitize base model



Fig. 9 Full shell and sundries effect for footwear patterns

5.2. Creating 2D design (fig. 9). Using the CRISPIN function we develop into a full shell and create sundries effect for the footwear patterns.

5.3 Pattern development

Using the function 'Parts Manager' allows the operator to quickly view the part names developed in the pattern with the ability to view the parts as required (see fig. 10).

5. 4. Displayed the database of the pattern

Engineer features ready-to-use database connectivity through our 'Data Store' product. This will allow the transmission of patterns around the world for evaluation or interactive on-line 'redlining'.

5.5 Using the task Assess on execute part pattern assessment for determined efficiency economic (fig. 10)

5.5. Grading

The grading a pattern and/or parts can to make using the **Grade Task Tool Tray**.

This task is many functions which launches the dialogs providing all the facilities to set up a size range and grading parameters. The major functions for the grade are: Choice of **Arithmetic** or **Geometric grade** and whether or not width fittings apply.

Using Arithmetic grading basically means that you simply add the size increment value to the previous graded size. If you were to plot the size change on a graph you would find that the resulting line is straight. Geometric grade, where the increment values are applied as a percentage, will produce a curved line.

Using Geometric grading basically means that you apply the size increment value as a percentage of the previous graded size. If you were to plot the size change on a graph you would find that the resulting line is curved.

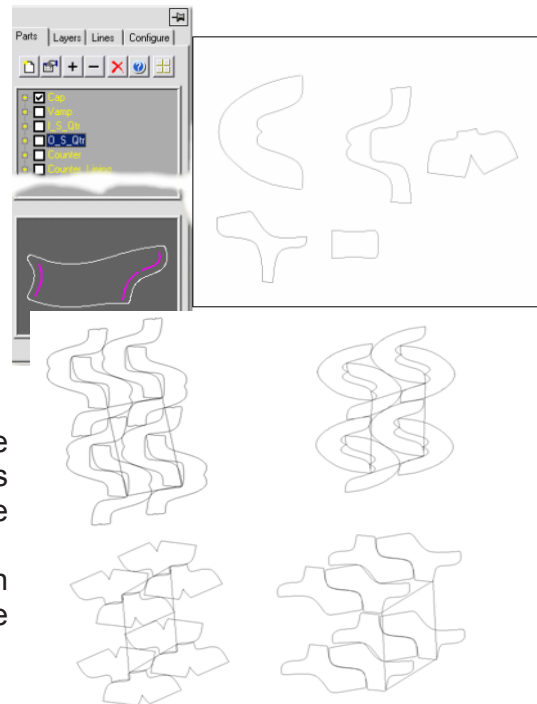


Fig. 10 Pattern development, creating and visualization data base of the components parts the base model's and part pattern assessment

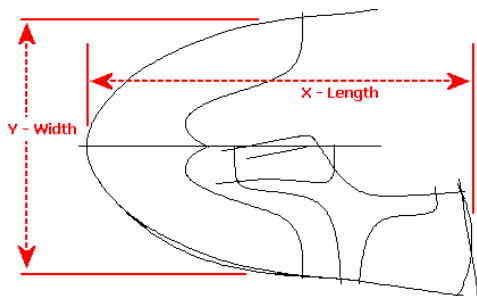


Fig. 11, Dimension the base model

– The definition of the model size, its length and width measurements. The button at the left will start a special measure function. (see picture 10) The values measured are actually stored within the pattern documentation.

– Create and place **Grade Centres** to control the grading process

Notes:

1. A 'free space' grade centre actually 'sits' on a single point base line.
2. Any subsequent grade centres can be placed on any standard line type or the intersection of any two lines.
3. When a single line is picked you will be able to put the grade centre at either end of the line.
4. A grade centre can be placed on another grade centre's base line point, thus 'stacking' them at a single location.

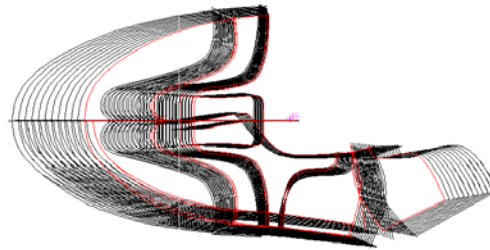


Fig. 12, Results of the grading

6. CONCLUSION

Function of the system **CRISPIN Dynamics CAD SUITE** offers new solutions for shoemakers, for developing new products and new markets of industry footwear. This have developed a range of quality software products to give you the shoemaker a major advantage in shoemaking.

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