

## THE FOOTWEAR DESIGNING SESSION USING CRISPIN DYNAMICS ENGINEER

### 2 ND PART: Creating the parts, Estimating the material consumption, Grading

IOVAN-DRAGOMIR Alina<sup>1</sup>, DRISCU Mariana<sup>1</sup>

<sup>1</sup>Gheorghe Asachi,, Technical University, Faculty of Textile, Leather and Industrial Management, D. Mangeron nr.53,  
700050 Iași, Romania, [mcocea@tex.tuiasi.ro](mailto:mcocea@tex.tuiasi.ro), [adragomir@tex.tuiasi.ro](mailto:adragomir@tex.tuiasi.ro)

Corresponding author: Drișcu Mariana, E-mail: [mcocea@tex.tuiasi.ro](mailto:mcocea@tex.tuiasi.ro)

**Abstract:** *The diversification and customization of products are important characteristic of the modern economy and especially of the fashion industry. Because of this, the lifetime of the footwear product is very short and result the necessity to cut the design and production time. 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 a lot of the producer's time.*

*With CRISPIN Dynamics, one can visualize a range of designs on-screen; work out the costs of a new style and even cut out sample shoe components. Reliance on manual skills is largely eliminated, so the staff can work creatively, but with increased accuracy and productivity. One can even send designs to a distant office or manufacturing centre in a matter of minutes.*

*This paper presents the basic function of CRISPIN Dynamics CAD Suite Engineer for footwear design. The process of new product development has six stapes: digitized form of the medium copy, last flatting, model drawing, creation and management of individual parts, estimation of material consumption, multiplying the designed footwear product's pattern.*

*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.*

**Key words:** *pattern, assess, consume, grade*

## 1. INTRODUCTION

This paper presents the basic functions of **CRISPIN Dynamics CAD Suite Engineer** for footwear design. The software is a 2D application of the **CRISPIN Dynamics CAD Suite**. The **Engineer** program is broken into a series of 'tasks'. Each 'task' has a 'tool tray' that contains a number of separate functions to achieve the task. This are:

- ☐ **Drawing**
- ☐ **Grade**
- ☐ **Assess**

When the Engineering program first starts the Draw task is active and the tool tray is displayed, as shown in the above partial image

After develop the base footwear on create the individual parts and the consume estimation.

## 2. CREATE THE INDIVIDUAL PARTS

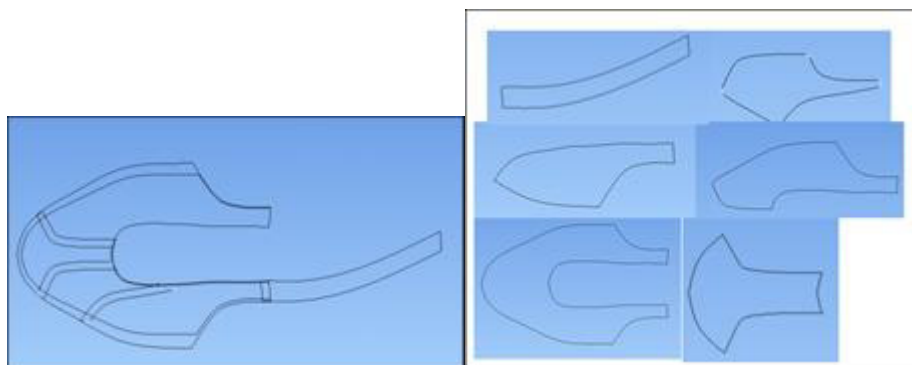
The individual parts (see Fig. 1) are created using the menu **Parts Manager** [1].

The selection, creation and management of parts are on the first tab of the dialog that 'slides out' from the right side of the workspace, when the mouse cursor comes within 5 pixels of the edge.

In practice you simply 'bump' the mouse pointer to the edge of the screen and the dialog is displayed. This is easier when the program is 'maximized' as the pointer literally 'hits' the edge of the screen.

This does not happen in all circumstances, for example when 'dragging' an area with a mouse button held down. Also to minimize the accidental selection of this dialog there is a 500 millisecond delay before it activates. This delay can be changed by editing the registry.

The dialog can also be 'pinned' in the 'out' condition. In this mode the dialog will stay visible until a function is started at which point it will be hidden when the function is complete the dialog will re-appear (see Fig. 1).



**Fig. 1:** Creating the parts using function 'Parts Manager'.

*Using this function allows the operator to quickly view the part names developed in the pattern with the ability to view the parts as required*

### 3. ESTIMATING THE MATERIAL CONSUMPTION

The user multiplies the pattern, which represents a working entity for Engineer, in order to find the economic arrangement for the reference points. In this purpose, the user must probe few arrangement variants, in the translation and rotate-translation system [2]. The same process is used in establishing the arrangement factor for the two points of reference of the designed footwear product.

#### 3.1. Assessment

Assessment in **Engineer** is a quick and simple method of checking the efficiency of a part based on the 'parallelogram' process. Interlock efficiency is important to know at the pattern stage of the shoe's development, as it can have an impact on the total cost of the shoe.

Assessment in **Engineer** is NOT in itself a costing facility, though the area data generated can be used for costing purposes.

##### 3.1.1. Process

The **Assessment** function interlocks a single part boundary with itself, either at the same angle to which the part was defined in the pattern or rotated 180 grades.

The two interlocked parts are then duplicated and the duplicates interlocked with the two original parts. These four parts are then duplicated and interlocked with the preceding four parts.

With these eight parts in place, the software will then determine a parallelogram between four of the eight parts. The parallelogram will be created on the same intersections for each of the four parts. This is to ensure that one pair of the parts are completely represented within the efficiency area.

##### Note:

Within **Engineer** assessment can only be carried out on 'real' boundaries. A mirrored or other dependant copy of a boundary will be ignored.

##### Calculation

Taking the whole area used within the parallelogram and subtracting the known area of the parts leaves the waste area. The difference between the actual area used and the waste area remaining, gives the efficiency percentage.



Fig. 2: Calculation the efficiency of a part based on the 'parallelogram' process

#### 4. RESULTS

In the follow figure are the results using the function assessment for base footwear and in the follow table is centralized the norm of the consume [3].

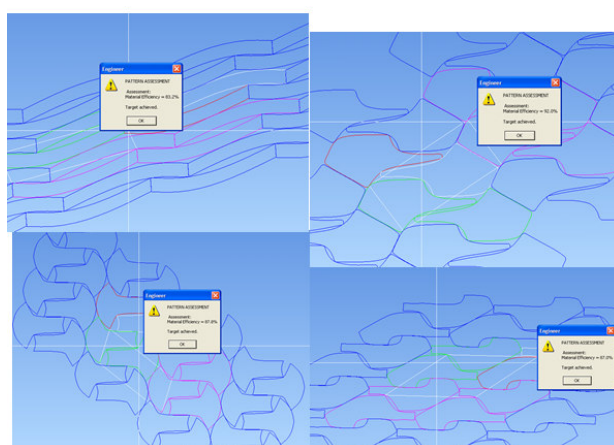


Fig. 3: For the pattern of the base footwear calculation the efficiency of a part based on the 'parallelogram' process

Table 1: Calculation the material consumption

Name part	Pieces number for 1 pair	Area (dm <sup>2</sup> )		Parallelogram area (dm <sup>2</sup> )		Perimeter (dm <sup>2</sup> )		Material utilization procent
		Of 1 pc.	For 1 pair	Of 1 pc.	For 1 pair	Of 1 pc.	For 1 pair	
Toe	2	0.4247	0.8494	0.557349	1.114698	3.16	6.32	76.2
Vamp	2	0.4274	0.8548	0.465577	0.931155	3.27	6.54	91.8
Outside quarter	2	0.8343	1.6686	0.929065	1.858129	4.44	8.88	89.8
Inside quarter	2	1.1751	2.3502	1.318855	2.63771	5.62	11.24	89.1
Back strap	2	0.314	0.628	0.33298	0.66596	3.26	6.52	94.3
Vamp lining	2	2.1675	4.335	3.065771	6.131542	9.91	19.82	70.7
Strap lining	2	0.2941	0.5882	0.301024	0.602047	3.09	6.18	97.7
TOTAL	14		11.2742		13.94124		65.5	80.86941

#### 4.1. Multiplying the designed footwear product's pattern

Another indispensable stage of the process in designing footwear products is the multiplying the patterns in order to obtain the patterns for the superior and inferior number of the medium size number of the product [5].

The two reference points, the upper and the heel counter, were multiplied by following the arithmetic methods, also used in classical methods. The results of the two multiplied patterns are presented in figures number 5.

Using Crispin the grading a pattern and/or parts can be making using the **Grade Task Tool Tray** [6]. This task is many functions witch launches the dialogs providing all the facilities to set up a size range and grading parameters. In picture 5 presents one examples of grade pattern.

The major functions for the grade are:

- Choice of **Arithmetic** or **Geometric grade** and whether or not width fittings apply.



Fig. 4: The window function for grading

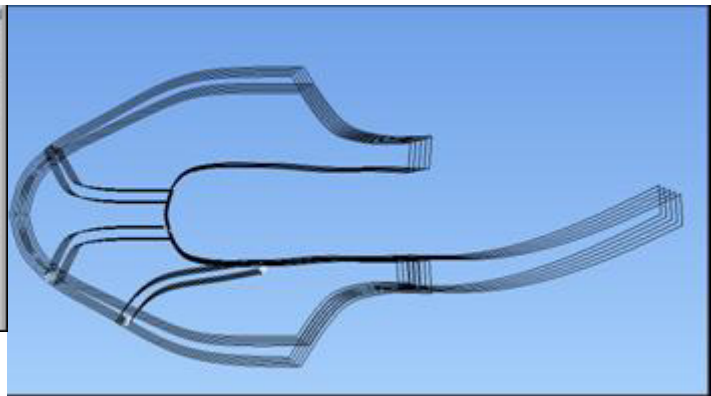


Fig. 5: The results after application function for grading

The shell-based grading system can be fully customized to suit the customer's requirements with both arithmetic and geometric calculations

## 5. CONCLUSIONS

The software produced by **Crispin Dynamics** has remarkable results in footwear design but it is working with an authorization of the company. A license 'authorizes' a computer to run specific **CRISPIN Dynamics** software. Licenses are often also used to specify which options within an application can be run.

The license for the Faculty of Leather and Textiles, **Crispin Dynamisc Engineer** was installed thanks to the generosity of **Luca Caironi, Sales Manager** for **CRISPIN Systems Limited**. We would like to take this opportunity and express our gratitude to him. 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.

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