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STUDY ON KNITTING WITH 3D DRAWINGS USING THE TECHNOLOGY OFFERED BY STOLL

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Abstract: *There are different techniques that can be successfully applied for the production of 3D knitted materials or those with 3D effects on knitting machines with electronic selection. In the present work were treated different aspects of some knits with 3D embossed drawings obtained by making incomplete rows in order to obtain an embossed knit effect. The designed knit was made on the knitting rectilinear machine, CMS 530 HP 7.2, finesse 14". This machine is a new generation machine, a multigauge knitting machine. This means that the machine is of finesse 14 but it is equipped with knitting needles that can be selected so as to obtain knits of finesse 7. The drawing chosen to be embossed on the knit was transposed on a knit jacquard, made in two colors, on a knitting machine Stoll. After importing the image into the M1plus graphic program, which is a design program of STOLL knitting machines, it was placed on a jacquard structure in two colors. In the case of these knits with embossed drawings, 3D increased attention is required to the adjustments made on the knitting machine. The most important adjustment is that of the main and auxiliary pulls of the knitwear, as well as the adjustments of the looping depths for the retained stitches, but also for those made on the opposite cast iron within the incomplete rows.*

Key words: *Knitting, 3D effects, electronic knitting machines.*

1. INTRODUCTION

The brand STOLL, as a part of the Karl Mayer Group, is a leader in flat-knitting machine technology, offering innovative tools and services for the knitting of tomorrow. They have a strong reputation for providing highly sophisticated knitting solutions and also as an independent thinker and developer in the section of Fashion & Technology. With the M1plus® softwear STOLL [1] boasts a well-proven system for creating knitting designs and knitting patterns for making many different structures and designs [1]. Knitting can efficiently fabricate stretchable and durable soft surfaces [2].

Knitting is a process of converting yarn to fabric by forming a series of loops dependent on each other [3].

Knitting is a technical, real and complex system that requires modelling and optimization of encountered problems [4]. The graphic representation of the knitwear structure consists of transposing by drawing the position of the thread and the shape of the component elements (normal stitches, elements with modified evolution, additional threads), from yarn with the same colour or from threads of different colours [4].

Knitting by shape is an important feature of the knitting technology because it allows the formation of knits modelled in 2D and 3D sizes [5]. At the moment there are various techniques that

can be successfully applied for the production of 3D knitted materials or those with 3D effects [6] on electronically selected knitting machines. The 3D fabrics or fabrics with 3D effects exhibit a higher thickness, compared to the single yarn diameter [4]. The flexibility of the knitting process in combination with the possibility of integrating reinforcing threads into the fabric structures captures the attention of many researchers [7]. In addition, textiles with excellent comfort properties still remain a challenge for quarrels [8].

2. EXPERIMENTAL PART

The process of knitting has several important phases, and one of them is the design stage of the pattern [9]. In the case of computer-controlled knitting machines, the models are developed on special modelling stations, using a programming language [9] specific to each manufacturer brand of knitting machines.

In the present work, different aspects of some knits with 3D embossed drawings obtained by making incomplete rows in order to obtain an embossed knit effect, were treated.

The designed knit was made on the knitting rectilinear machine, CMS 530 HP 7.2, finesse 14". This machine is a new generation machine, a multigauge knitting machine and this means that the machine is of finesse 14 but is equipped with knitting needles, that can be selected so as to obtain knits of finesse 7.

***Fig. 1**: Knitting machine Stoll*

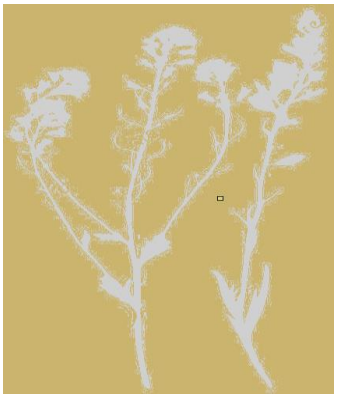

***Fig. 2**: Implemented drawing*

The drawing chosen to be embossed on knit was transposed on a knit jacquard, made in two colours on a knitting machine Stoll. **Fig. 1.**

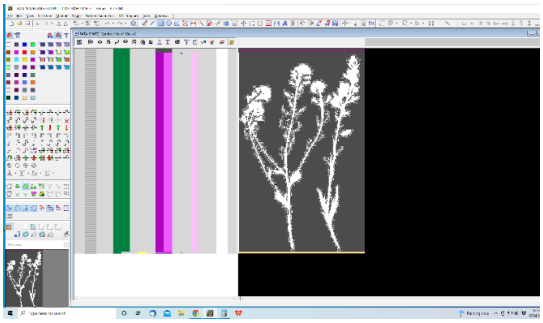

***Fig. 3**: Importing the drawing into the program*

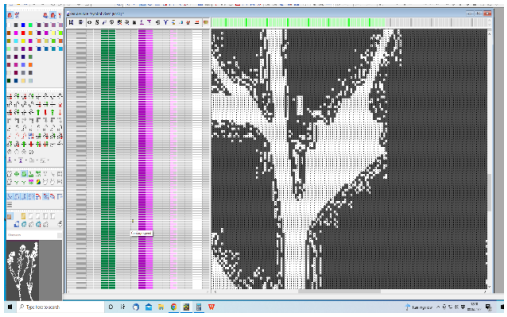

***Fig. 4**: Placing the drawing on the jacquard structure*

In the next step, the import of this drawing was made (.jpg) **Fig.2**, in the graphic program M1plus **Fig.3**, which is a design program of knitting machines STOLL. After importing the image, it was placed on a jacquard structure in two-colours. **Fig 4**.

Considering that this design program, Stoll M1plus, works on two monitors, on the first monitor we have presented jacqard structure, in the section rows of stitches and on the second monitor we have presented simulation of the layout of the image in knit. **Fig 5.**

The imported image in the graphic program M1plus can be put on a knit intarsia or a knit jacquard. The difference between the knit intarsia and the knit jacquard, is given by the final thickness of the knit. Thus, intarsia knits are characterized by fields of different colours, joined together by structural elements with modified evolution and in the case of jacquard knits it is a simultaneous evolution of all the threads that make up the drawing of the knit. In the case of jackard knits this change of appearance of each color on the knit's front, is made according to the drawing, the other colours are arranged on the back of the knit.

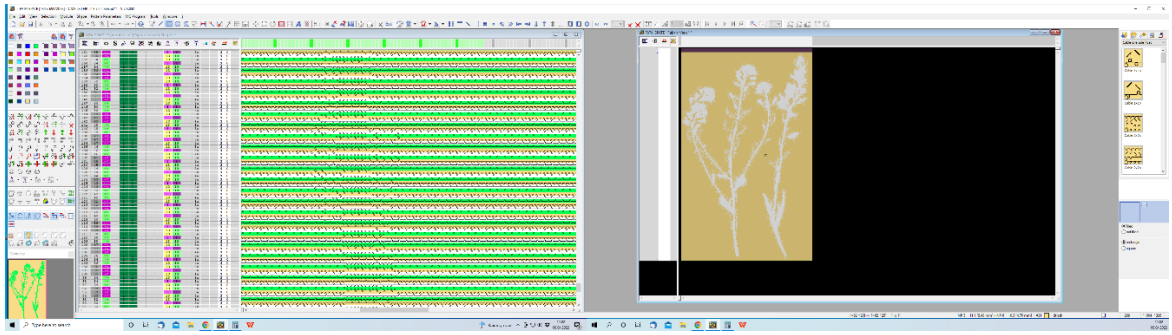

Fig. 5*: Representation of the jacquard structure and simulation of the layout of the image*

5. CONCLUSIONS

In the case of these knits with embossed drawings, 3D increased attention is required to the adjustments made on the knitting machine. The most important adjustment is that of the main and auxiliary take down of the knit, as well as the adjustments of the looping lenghts for the retained stitches, but also for those made on the opposite cast iron within the incomplete rows.

A take down too big can lead to the breakage of the knit on the knitting machine, while a take down too small can lead to accumulations of thread, incomplete or not at all knitted stitches and even dropped stitches.

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