

Experiences on Smart Designer and Smart Knitter on Fashion Knitwear

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Abstract

Two local made softwares Smart Designer and Smart Knitter are evaluated for their suitability for small and medium-sized knitwear companies in Hong Kong. Smart Designer was found to be useful for loop simulation and jacquard design. Smart Knitter was found to be useful for making knitting instruction (fabric dimension) and fully fashion calculation.

Keyword: CAD system, knitwear design, knitwear production, fully fashion, jacquard

1. Introduction and Background

Knitting has been considered as craft more than design in past years due to its technical requirement [1,2]. Many knitwear designers still do not like using CAD, because in their opinion, no matter how good the fabric simulation is, the experience of looking at a printed piece of paper can never match the experience of handling and looking at a piece of knitwear. In addition, turnkey CAD/CAM systems like Shima Seiki and Stoll knitting machines require large capital investment and steep learning curve, the benefits of CAD/CAM knitwear design systems are restricted to a few large enterprises. Those SME (Small and Medium Enterprises) companies in Hong Kong and China, therefore, cannot take advantages of them [3,4].

This research project reported two Hong Kong made software for knitwear industry that can bridge the gap between small and big companies. They are low cost and focus on knitwear designer. The first software, Smart Knitter is aimed for knitwear production and the second one, Smart Designer is aimed for knitwear design and fabric simulation. Traditionally, knitwear production is relied on the skill and experience of technician. The knitting variables like material (cotton/acrylic/wool), yarn count, loop length, stitch density and machine gauge all will affect the final fabric width, length and fabric hands. To determine the correct fabric dimensions (number of operating needles in V-bed machine and number of courses in production), knitwear technicians rely on their skill and experience. This trial and error approach is uneconomic and time consuming. The new software provides standardize and scientific method for knitwear production and calculation. The Smart Knitter has a unique "template" for different styles (V-neck, round-neck) for easy knitwear production. Based on the material used, yarn count and loop length, Smart Knitter can calculate the material consumption, operating parameters in V-bed machine (number of stitches and courses in production) to have correct fabric length and width.

The second software, Smart Designer is to assist fashion designer to create their knitwear design using simple knit, tuck, miss and transfer loops. Once created, the program can convert these basic knitting structures into realistic knitwear loop simulation. The loop length can be adjusted according to machine gauge, yarn count and knitting tension. Compared with Shima Seiki Paint program and Stoll MI CAD softwares, local knitwear designers found this software is easy to use, and has rich collection of fabric libraries (cable stitches, aran stitches) for diamond, stripe and square designs. The output of this software can be directly read from Shima knitting machine (jacquard design) or indirectly as a spreadsheet format on hand machine production.

2. Experimental Details

2.1 Smart Designer

The Smart Designer CAD system is used for knitwear design and fabric simulation. Four areas will be investigated in this CAD system, namely 1) stitch simulation, 2) jacquard simulation, 3) simulation on sample block and 4) link with Smart Knitter for production planning.

2.2 Smart Knitter

The Smart Knitter CAD system is used for knitwear production planning. A single knit plain jersey fabric was created on Smart Knitter CAD system for twelve gauge machine with 36 inches width. The total number of knitting needles was 432. Four areas will be investigated for this CAD system, namely 1) style/material planning; 2) knitting instruction planning and 3) fully fashion (widening/narrowing) instruction planning.

3. Results and Discussions

3.1 Smart Designer CAD system

3.1.1 Stitch simulation

One of the criteria for evaluating Knit-CAD systems is to make realistic loop simulation. The Smart Designer can simulate knit, tuck, miss and transfer stitches. The system has a full knit libraries for rib, lace, cable, aran, honey cone and net. The program can convert different knitting structures into both realistic loop simulation and codes instruction for manual/machine knitting as shown in Figure 1.

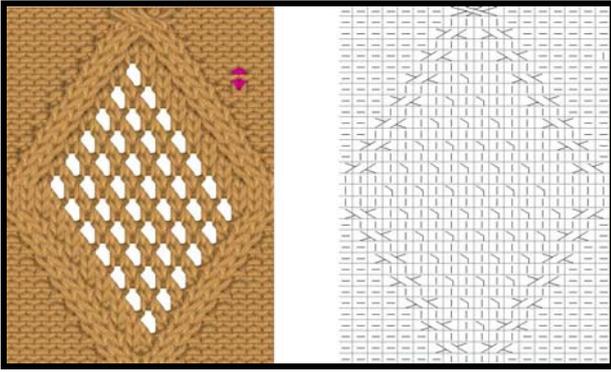


Figure 1. Loop simulation and code instruction

The quality of knitting simulation in Smart Designer is very high that not only designers and clients can view clearly, but also can print out as spreadsheet format on hand knitting machine production. It can reduce cost on wastage and posting samples in business.

3.1.2 Jacquard design

Apart from different stitches using on designing knitting structures, jacquard pattern can also be created in Smart Designer. User can convert loop simulation by simply import images into the program directly. One of the problems with scanned images or digital photo images is too many colours are created by the system and it is not possible to translate those colours images to knitting codes. Smart Designer, however, has colour reduction and colour grouping tools to reduce the final colour into eight for knitwear production. A simulated jacquard design with reduced colour is shown in Figure 2.

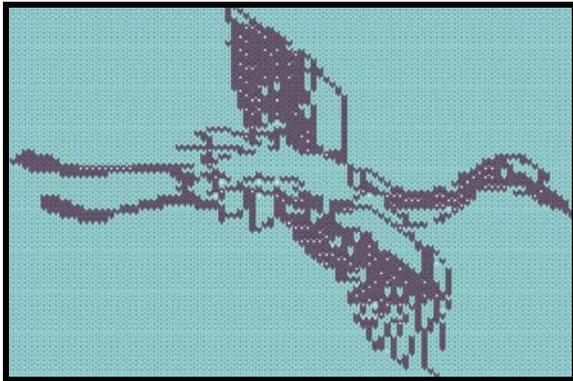


Figure 2. Jacquard pattern simulation

3.1.3 Simulation on Sample Block

By selecting different modes, a range of color combinations, stripes and diamonds can be calculated for design use. Sample blocks are also available in the library. User can adjust the outline of blocks into various styles like V-neck, round neck, open chest and loose fit. After creating different knitting structures or jacquard patterns, user can drape them on sample blocks for simulating appearance on garment.



Figure 3. Simulation on garment

3.2 Smart Knitter CAD system

3.2.1 Knitting Style Planning

Smart Knitter is aimed for knitwear production. There are many different knitting styles (templates) available for production. Different measurement methods are also available from Smart Knitter. For example, to change the measurement from collar to shoulder. Figure 4 shows that spreadsheet format is available in Smart Knitter to fill in the information on client, date, garment style, size, material, machine gauge, number of operating needles, etc. Through selection and combination of yarns user can create stripes in a wide range of color and orders.

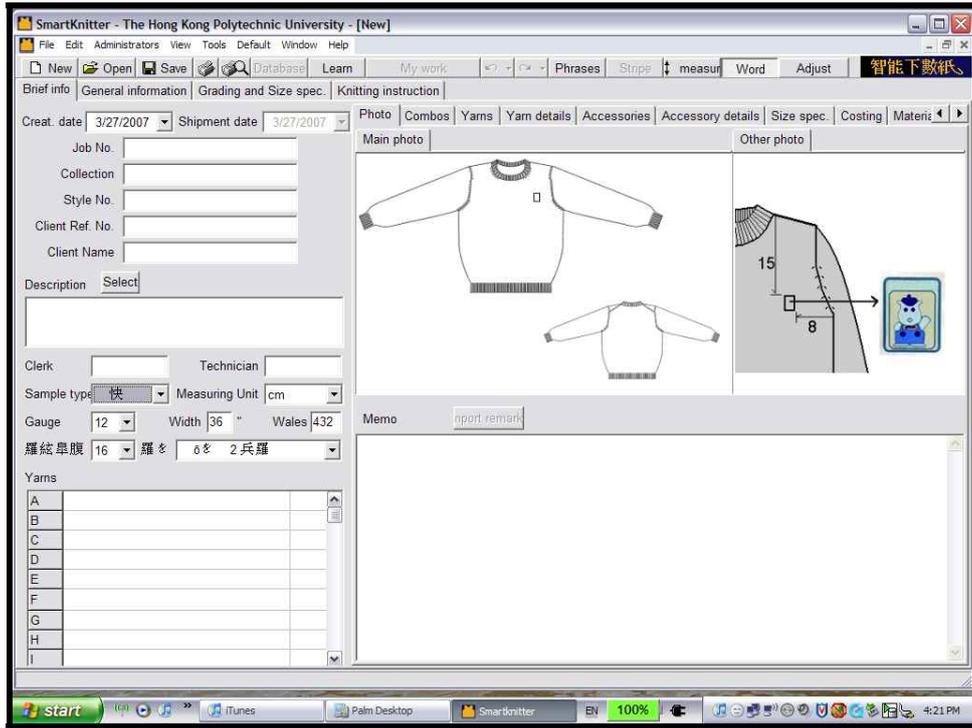


Figure 4. Style selection template from Smart Knitter

3.2.2 Knitting Instruction Planning

Once the knitting style is selected from the template from Smart Knitter, the knitting instruction on number of operating needles (fabric width) and number of knitting courses (fabric

height) will be calculated by Smart Knitter as shown in Figure 5. Medium size will be used as a reference for calculation and it can be adjusted manually.

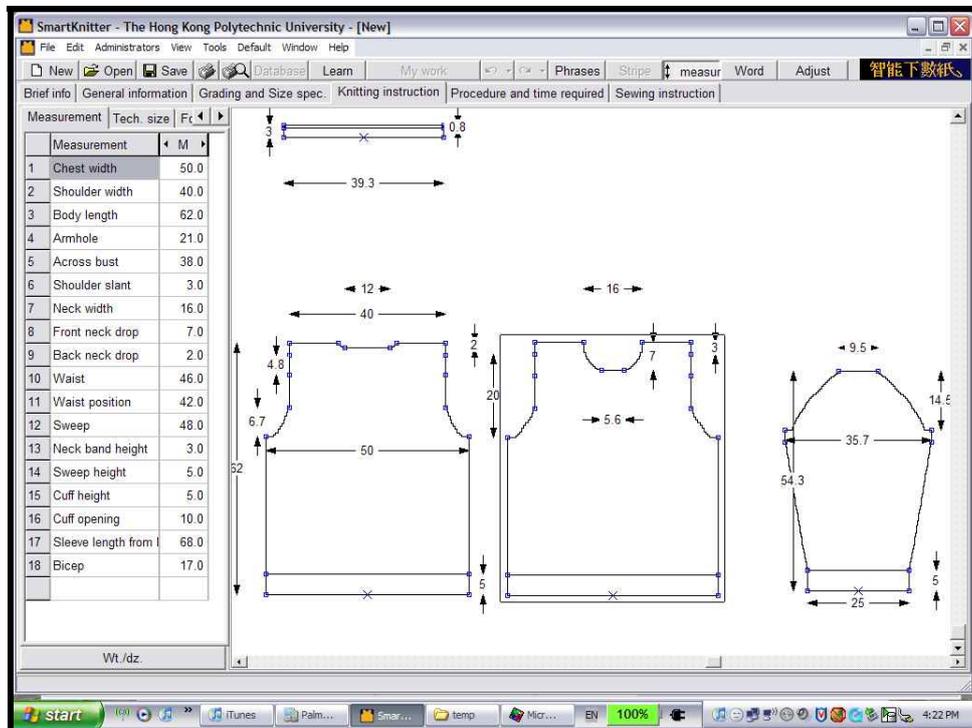


Figure 5. Knitting instruction planning

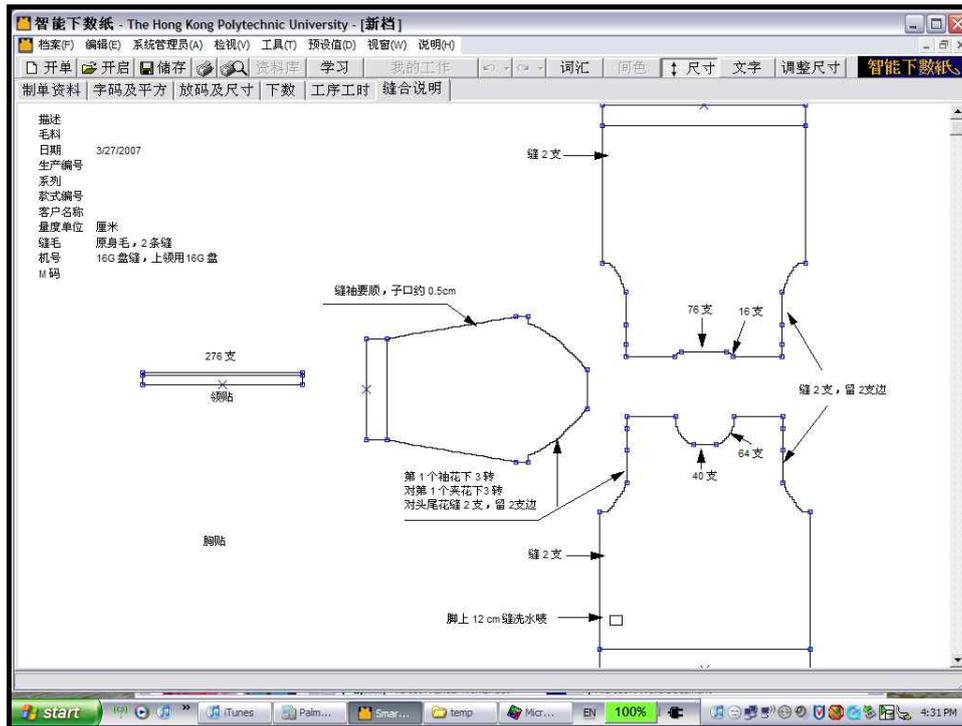


Figure 6 Fully Fashion and Sewing Instruction from Smart Knitter

3.2.3 Fully Fashioning

The widening and narrowing of knitwear panels (body and armhole) are the most important aspect for knitwear design and production. The Smart Knitter can provide a number of options to select and control the widening and narrowing sequences (Figure 6). The conventional trial-and-error approach on knitwear design can be eliminated by this system.

4. Conclusions

Both Smart Designer and Smart Knitter CAD systems provide a simple and inexpensive solution to local small and medium-sized companies for knitwear design and production planning. Smart Designer provides a realistic loop simulation (knit, tuck and miss stitches) and colour jacquard fabric simulation. The output of the design can be linked directly to Smart Knitter or indirectly as graphic file format for sales or marketing presentation.

By using template (different knitting style), Smart Knitter provides a simple and quick solution for knitwear planning and production. Knitting instruction on fabric dimensions, operating needles and knitting courses can be calculated directly from Smart Knitter. Smart Knitter also makes

suggestion on widening and narrowing of knitwear panel and eliminates the trial-and-error approach on conventional knitwear production.

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