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CAD/CAM Solution for Textile Industry – An Overview

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GUI,
Peg Plan

A B S T R A C T

CAD/CAM Technology is a cutting-edge tool (in software and/or hardware) catering to the various needs with respect to designing, production, marketing and presentation of designs/weaves of the textile industry as a whole. This state-of-the-art technology has been acclaimed all over the world by whoever has used it, be it a novice, an expert, a professional Designer, Exporter or Textile Institute, as "The No Limit" or "The Ultimate" solution for textile designing and manufacturing. Although a number of CAD/CAM Systems are commercially available today, but their core components/modules and functionalities are almost the same, covering a very vast application area from Dobby, Jacquard and Screen Printing Industries to Blanket, Carpet, Knitting Industries and so on.

Introduction

Last decade industry worldwide has witnessed not only a tremendous modernization in technology but also adoption of IT and Computer Science in massive scale. In this new millennium, the era of liberalization and global competitiveness, none can just even think without the application of these two branches of science, and Textile Industry and Trade (both Handloom and Power loom) is not the exception.

The present article highlights on how the precision, efficiency and economy of CAD/CAM tools are being employed with ease to enrich the innovations in the field of textile designing and manufacturing, thereby revolutionising the Textile Industry world wide as a whole.

CAD/CAM Systems

The CAD/CAM systems provide an integrated technology solutions (software, hardware systems and associated services) dedicated to the Textile Industry as a whole, covering a very vast application area like bed covers, towels, plastic mats, carpets, dress materials, sarees, laces, table mats, labels, knit wears, suiting & shirting,

printing fabrics, furnishing, upholstery, blankets and so on. The followings are some of the winning CAD/CAM solutions developed by Indian IT Companies:

- *CadVantage Win* [1] – Teckmen Systems.
- *AutoTex* [2] – PLC Consulting Co., 61, Gokhale Market, New Delhi, Delhi - 110054, India.
- *TEX–Style/Jac–Art* [3] – M/S Wonder Weaves Systems, 34, Bindal Indstr. Estate, Kurla, Andheri Rd., Saki-Naka, Mumbai - 72. India, E-mail: wws@wonderweaves.com
- *JAY–CADTEX* [4] – Jay Instruments & Systems Pvt. Ltd., 606, Anand Mangal Complex – III, Opp. Core House, Ambawadi, Ahmedabad – 380006, Gujarat, India.
- *Textronics* [5] – Plot No. EL-109, 2nd Floor, TTC Electronic Zone, MIDC Mahape, Navi Mumbai – 400 710, India,

Some other leaders in the world for providing all sorts of CAD/CAM supports to the Textile Industry are:

- *LECTRA* [6]–Lectra16, 18 rue Chalgrin 75016, Paris, Tel: +33 (0)1 53 64 42 00, Web: www.lectra.com
- *Pointcarré* [7]–688 Avenue of the America's New York, NY 10010, Web: www.pointcarre.com.
- *Claudia Hang Textile Designer* [8]–Dorfstrasse 13, 82418 Hofheim, Web: http://www.hagn-design.com
- *Arahne* [8] – www.arahne.si

Development Tools Used

Latest Microsoft tools and technologies are used for development of these software solutions, and international standards of design, development and distribution are strictly followed. Development tools primarily used are: Visual C ++ for graphics, Visual Basic for business software, and ASP for web solutions. Most of the companies have developed a complete range of software products for the textile and carpet industries which range from sophisticated high end CAD/CAM solutions to presentation and marketing tools for their designs, to web enabled ERP solutions to take care of their business needs. Since has been developed by professionals with Image Processing and Graphics expertise, the core software technology is rich with building Blocks to which the latest software technologies and the skills are added from time to time. To this strong foundation is added the textile concepts making it a True Open Architexture.

Components/Modules

All the CAD/CAM software solutions basically consist of several common modules/components like Edit module, Dobby module, Jacquard module, Print module, Weave Library, Yarn Library, Color Library, Checks & Stripes module etc. Edit is the mother/foundation of all other modules. It is one of the modules/components which can cater to the needs of Jacquard, Furnishing, Carpets, Durries, Plastic Mats, Sarees, Labels, Towels, Dress Materials, Knitwears, Laces, Printing and many more industries. This module combines an excellent collection of painting tools, and powerful retouching capabilities all-in-one easy to use Windows application [Fig. 1, 5, 6, 7, 8]. Checks & Stripe is a very simple yet creative tool for creating designs for the Checks and Stripes industry. This component produces virtually unlimited varieties of check and stripe effects in the fabrics woven either in plain or other varieties of weaves and provides us simulation printouts and production related outputs instantly [Fig.2].

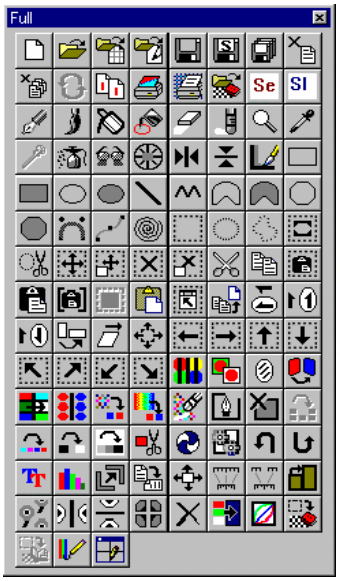


Fig. 1 – Tools of a typical Edit Module.

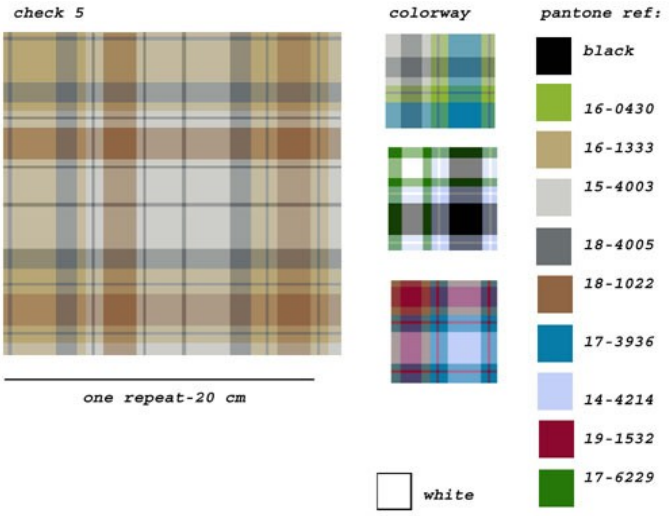


Fig. 2 – Check Effect and Simulation Colourways produced by Checks & Stripes Module.

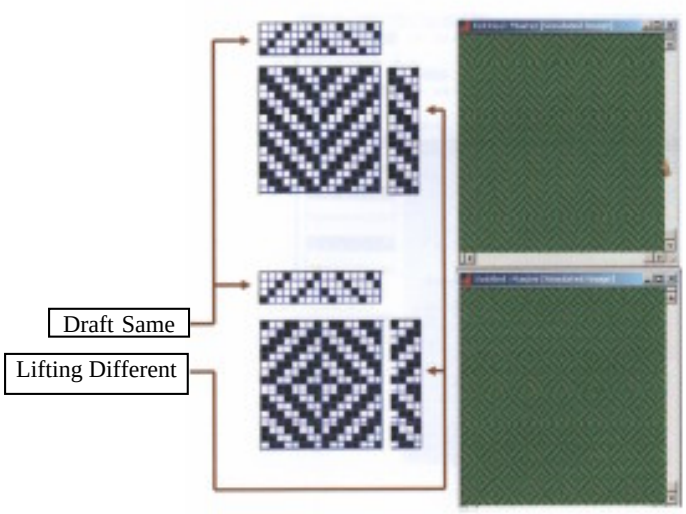


Fig. 3 – Dobby Designs & Corresponding Simulations Produced by Dobby Module

Fig. 4 – Peg Plan Report Obtained from Dobby Module

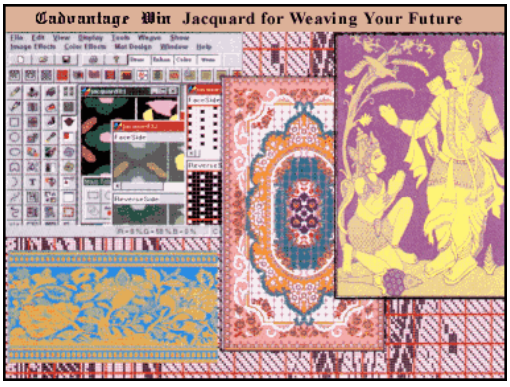


Fig. 5 – User Interface of CadVantage Win Jacquard with different views & Simulations

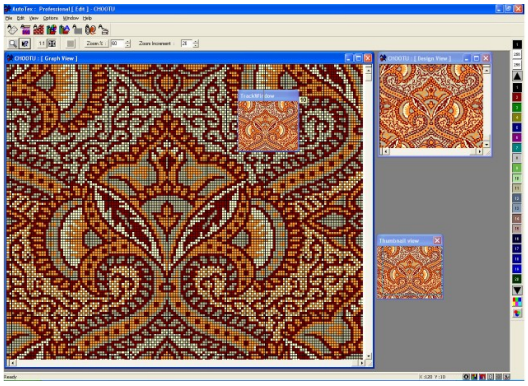


Fig. 6 – AutoTex Jacquard Edit Interface with different views

The modules are industry specific and need based. The unique Customization feature of the software systems facilitates redesigning the Graphic User Interface [GUI] according to the needs of the users. This together with different views facilities makes the jobs much easier.

System Requirement

The followings are the minimum system requirements for optimum performance of these high-end graphics intensive software packages:

Hardware

IBM compatible INTEL Core2Duo / 2.4 GHz or higher, 2 GB RAM or higher, 500 GB HDD or higher, DVD Super Multi Drive, LAN Card, AGP Card 1 GB or higher [with 32 bit or higher colour support], 17″ color monitor (32 color support or higher), Keyboard, Mouse.

Operating System

MS Windows XP Professional or higher

Peripherals

Flatbed Scanner, Cordless Digitizer (preferably 12 in X 12 in), Inkjet Color Printer, Laser Printer, Plotter (24″ / 36″ / 42″) UPS (1 KVA).

CAD/CAM Module for Dobby Industry

This module is dedicated for Textile Dobby Industry (both handloom and powerloom). This is an excellent tool for designers, manufacturers, exporters and buyers of Dobby industry.

Features of Dobby Module

This software module together with Weave Library, Color Library and Yarn Library facilitates – • Easy creation of any kind of weave, • Automatic generation of draft & peg plan from a given weave, • Automatic generation of weave from any given peg plan & draft, • No limitation of the size of design repeat or the number of heald shafts to be used to produce the design, • Keeping the draft constant and by changing the peg plan only, we can create a wide number of different kinds of designs effortlessly. Thus, we can create designs without changing the drafting order repeatedly, which is one of the unique features of this module, • Warp colour pattern can be applied to weft automatically, • Warp and weft colour patterns can be interchanged instantly, • Extra warp or extra weft can be added to an existing design automatically, • Gives reverse, mirror and invert views of the weaves simultaneously, • Merges two or more designs into one, • Provides yarn requirement for producing different materials, • On-line weave creation and filling facility, • Production report printouts–both peg plan report (i.e., weaving parameters) and graph printouts can be obtained easily to weave the created design into actual fabric form, • can be interfaced with various dobby looms (Staübli, Dornier, Somet, Sulzer, Picanol, CDL and Pignone), the Staübli electronic punchers, the drawing-in machines (Vega, Staübli Delta 200, Reed Chat-wood) and the Benninger warping machine. Some companies are ready to develop other interfaces upon user's demand [Fig. 3, 4].

CAD/CAM Module for Jacquard Industry

This module can be used to create all kinds of jacquard designs in any size and ends/in, picks/in (EPI, PPI) value taking care of all aspects of designing for production of a fabric. It handles all the main issues confronting the Textile Jacquard Based Industry.

Salient Features of Jacquard Module

Jacquard module together with the powerful Edit module offers the following features:

• Creation of virtually any kind of design – from simple to intricate, • New design creation in a blank graph paper or editing a scanned photograph – both methods are fully supported, • We can assign weaves to our design and get the weaved graph instantaneously, • Sophisticated editing/retouching tools, • More than 200 tools & utilities, • Scanned image editing as well as scanned image tracing facility, • Superfast weaving by *Weaving Wizard* which ensures that no prior knowledge is required to weave the designs, • *Production Outputs* – Different kinds of outputs according to the needs can be generated to give a design into the actual fabric shape. We can print the required output according to our needs like • 'Saree Punching Calculation', • Weaved Graph for Jacquard Card Punching, • Electronic outputs - to feed Electronic Jacquards directly, all popular electronic jacquards are fully supported, • Other Printouts like Punched Cards & Weave Parameters
[Fig. 5, 6].

CAD/CAM Module for Printing Industry

Based upon the advanced designing engine Print module is an excellent tool for unleashing the user's creativity for the Screen Printing Industry.

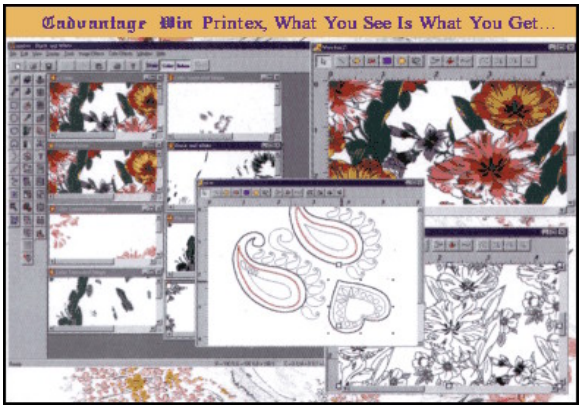


Fig. 7 – Interface of CadVantage Win Printex

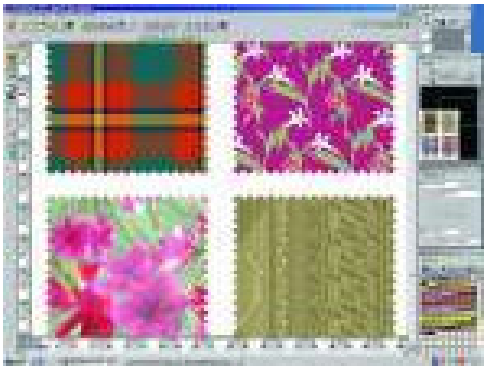


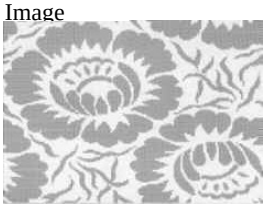
Fig. 8 – Edit Interface of Pointcarré Print Module

Salient Features of Print Module

This module together with powerful Edit module provide the following unique features – • New Design Creation, • Scanned Design Editing, • Super fast Colour Reduction,• Super fast Colour Separation – Exact Alignment, Registration Mark, No Outline Gap, • Multiple Colour Combinations, • Option to use own/custom Shade Library, • Separation Printouts – Instant Separation Printout and supports for Transparencies, • Half Tone Effect. • More than 200 tools & utilities, • Powerful editing & retouching tools, • Any size of design creation, • Repeat arrangement facility, • No limitation on the number of colours in the repeat, • Retains all technical details respective to Screen Printing Industry, • Print Setup and Print Preview facilities for created design [Fig. 1, 7, 8, 9, 10].

Sample Image

Sample Image with 50,



Sample Image with 75

Sample Image with 50

Sample Image with 100

Fig. 9 – Image Processing using CAD/CAM Print

Fig. 10 – U4ia Print Interface of

Yarn Handling —— Ordinary and Fancy Yarn support: Yarn Library enables to create different types of commonly used yarns —— both regular and fancy. We can store scanned yarns also and use them for viewing the fabric simulation. Yarn specification like yarn count/fineness, twist per inch (TPI), twist direction (S/Z), colour and other properties can be defined in the Yarn Information dialog box while creating the yarns.

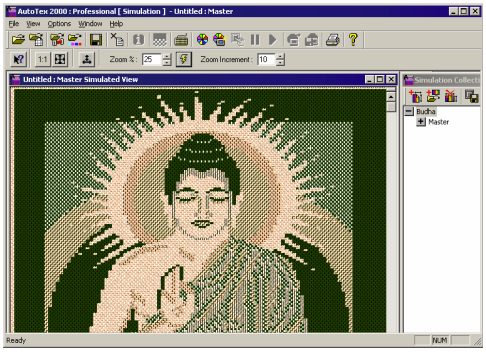


Fig. 11 – Double Fabric Front Simulation produced by Jacquard Module

Fig. 12– Simulation Colourways produced by Dobby Module

Colour Library: Colour Library enables to create library of our own colours and use them for viewing colour combinations during fabric simulation. This feature

facilitates making of custom colour pallets, colour specifications, saving of pallets, loading/retrieving of pallets, editing shade numbers, and searching of a particular colour.

- **Fabric Simulation:** This feature allows to simulate the fabric effect (both front and back side) on woven designs. All the settings related to simulation like yarns to be used, warp pattern, weft pattern, yarn density etc. can be defined in the Simulation Setup control [Fig. 3, 11, 13].
- **Simulation Colourways:** Powerful *Simulation Colourways* feature which acts just like a colour matching studio offers different colour combinations of any simulated design (i.e. virtual fabric) in both Manual & Auto mode. There is no restriction on the number of colours to be used. If System Colour Pallet is used, we can view the same in 16.7 millions colour combinations. Using *Automatic Colourways* feature (auto mode), we can get one colour combination per second (though, time can be altered in the Simulation Setup Wizard). If any colour combination satisfies us, the auto mode can be paused, and after saving the combination with a name the auto mode can be resumed. Automatic generation of colour combinations from multiple colour libraries is also supported [Fig. 12, 13].

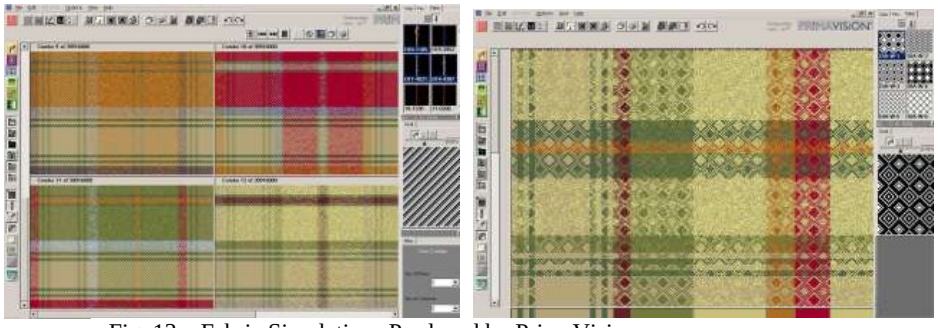


Fig. 13 – Fabric Simulations Produced by PrimaVision Weave Module of Lectra

Fig. 14 – 3D Rendering/Draping Using Pointcarré Shape Tool

Over a decade, various IT companies like PLC, Teckmen Systems, Lectra, and Pointcarré have been catering to the needs of designing, production, marketing and management issues of the carpet industries taking care of the needs of different carpet and rug segments like Machine Made Carpets, Hand knotted rugs, Hand tufted rugs, Silk knotted rugs and so on. This CAD/CAM solution with plethora of tools and utilities unleashes the creativity of the designers, creates modern, Persian, Tibetan or any other type of designs in various qualities, finds accurate wool consumption by colour, and produces all the required outputs to allow the craftsman to weave the exquisite carpet loved the world over. The "Naksha", "Plate", "Trace" and "Taleem" are available at the click of a mouse button.

CAD/CAM Solution for 3D Draping

"AutoShow" of PLC Consulting Co., "Just Drape It" / "CadVantage Win Texture" of Teckmen Systems or Pointcarré Shape Software are the virtual trial room in cyberspace. The image of the model is just captured or a photograph is scanned. Using these tools, the model is dressed with the chosen dress material within a few seconds. All we need to do is select our fabric design and drag and drop it on the photo. The mapping is done automatically. These types of CAD tools have a large application area like medium and large showrooms, fashion designers, exclusive retail outlets of branded textiles, textile shopping malls, etc. These can be applied in the domain of garments, furniture, curtains, made-ups, accessories, and anything except our imagination [Fig. 14].

CAD/CAM System for Jacquard Card Punching

CadVantage Punch Compact of Teckmen Systems is a Cutting Edge Technology that is very much useful for punching or cutting the cards for all types of jacquards. It punches all types of cards: white card for handloom, green card for powerloom and plastic card for plastic mats. This is basically a hardware-software system possessing the following unique features: • High speed cutting —— 200 cards/hr (for 400/600 hooks), • Automatic feed with sensors to detect card bin empty, • Manual feed with easy card feeding and card size setting, • Easy to use software for card cutting with features like selvedge, extra selvedge, repeat card cutting, testing, etc., • Hooks supported —— 120, 240, 256, 400,600, 800, 1200 or as required, f) Custom diameter of punch and pitch to suit any jacquard, • Complete feed back control system for 100% accuracy checking, • Compatible with all Textile CAD software.

CadVantage Punch Retro

It is basically an Electronic Retrofit Kit developed by Teckmen Systems to make the traditional pedal operated Card Punching Machine semi-automatic. This system has been specially developed for the handloom weavers and for those who have already invested in pedal operated Card Punching Machine [Fig. 15].

CAD/CAM System for "Design to Fabric Direct"

CadVantage Win Jacquard Direct of Teckmen Systems is basically a hardware-software system that uses tradition with a touch of technology for making "Design to Fabric Direct". The salient features of this system are: • No point paper designing, no card punching, no punching machine is required ——— which means faster design changes plus cheaper design cost, • Can be designed for any kind of jacquard either coarse pitch or fine pitch from 120 hooks to

1200 hooks, • One single Jacquard Direct Controller can work for a maximum of 32000 hooks, • Only driver cards have to be incremented depending on hooks used. Each driver card can control 128 hooks, • One IBM PC can control more than 6 Jacquard Direct Controllers from central control station with remote administration, • All the designs can be kept at the Control Station archive and free from tampering. Last minute changes can be made to designs sitting at the Control Room, • All designs from the Design Station can be downloaded to the Controller Station via network so that no data loss or media corruption problem arises [Fig. 16].

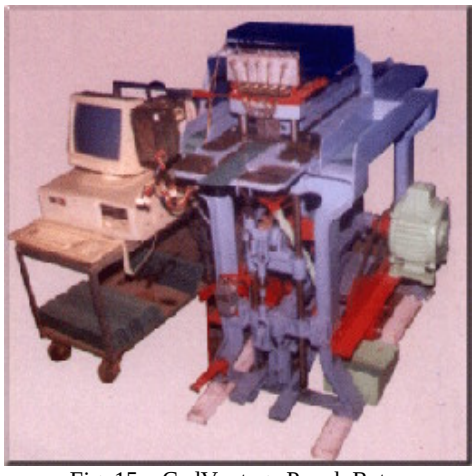


Fig. 15 – CadVantage Punch Retro

Fig. 16 – CadVantage Jacquard Direct

Conclusion

Introduction of CAD/CAM solutions through adoption of modern designs and colour combinations is making the textile fabrics more attractive and competitive to meet the rapid changing mood of the consumers for fashionable designs both nationally as also internationally. In handloom industry, this in tern, results in value addition of the produce thereby leading to overall enhancement of income and social empowerment of the handloom weavers' community, and enables them to withstand competition effectively in domestic and international market. The CAD/CAM system through its ease, efficiency and economy of reproduction has been revolutionising the textile industry (both handloom and powerloom), and the textile designing in particular. This cutting-edge tool rather technology (in software and/or hardware) has been acclaimed all over the world as "The No Limit" solution for textile designing and manufacturing. No one can just imagine without it in this IT-driven era of global competitiveness. With numerous inputs and feedback from Experts, professional Designers, Manufacturers, Exporters, and Actual Users, these CAD/CAM systems are now the "Ultimate Solution" for Textile Industry and Trade as a whole.

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