ABSTRACT
The silk industry in Kanchipuram is one of the fastest growing industries in India. The modernization of handloom industry through introduction of fast designing process, varied colour combination using Computer-aided designing (CAD) is making the handloom fabrics more competitive to meet the rapid changing mood of the consumers. The use of CAD has not only helped in creating new and complex designs but has also reduced the time involved in the entire process. The acceptance of these silk sarees by the consumers has also increased with the automated designing process. Actually CAD makes it possible to visualize saree designs ahead of its production and gives the ability to create new colour combination at the click of the mouse. It has indeed increased the flexibility and reduced the time for realizing new designs. The handloom industry has greatly benefited through the new technology for creating different designs for most product groups/clusters. However certain clusters/product groups continue to use the traditional design craftsmanship. The main aim of the present paper is to develop awareness among those weavers who are still not aware of the CAD technology and hence are lagging behind when they can actually benefit a lot in the process of development of saree designing. Not only can this but they also popularize this new technology that has been revolutionizing the handloom industry, in particular, by eliminating the manual and cumbersome process of designing. This paper highlights on how the efficiency and economy of Computer Aided Designing can be employed with ease to enrich the innovations in the field of handloom industry.

Key words: Handloom Industry, silk sarees, traditional motifs, CAD Technology

INTRODUCTION
Tamil Nadu has a unique name for its traditional handloom weaving. The handloom sector plays an important role for economic growth of Tamil Nadu. It preserves nation’s rich culture and heritage. There are many places producing silk and silk blend sarees in India, in Southern India Kanchipuram, Arni, Kumbhakonam, Tiruchirapalli, Coimbatore, Salem, Bangalore, Mysore Venkatagiri, Kothapalli, Balaramapuram are the famous places.

Places producing Silk saree in Southern India
- Kanchipuram (locally called Kanjivaram) – Tamil Nadu
- Coimbatore – Tamil Nadu
- Chinnalapatti – Tamil Nadu
- Chettinad – Tamil Nadu
Among all, Kanjeevaram silk sarees are the most well known, names in the silk sarees. Kancheepuram is known as the “Silk Paradise” of the world, no wonder when one talks about silk saree then immediately the name of Kanjeevaram naturally comes to the mind. These sarees are famous with the tradition loving people of not only Tamil Nadu but the entire country so much so that –no celebration is complete without the sheen and class of a Kanjeevaram saree draped to perfection to enhance the beauty of an Indian woman. Fashion designers the world over go for their royal and rich look and feel.

Kanjeevaram sarees -A proud possession of womanhood will always catch the limelight for being a traditional trousseau of South India. With its rich vibrant colour, exotic pattern and gaudy look it still continues to hold its glorious past. – Rupa

Kanjeevaram silk sarees are known for their bold and bright hues. Some designs of kanjeevaram sarees are

- Saris include pyramidal temple (Pallava) borders, checks, stripes, floral buttas, Rudraksham (representing Rudraksha beads), Gopuram (representing temples), mallinaggu, mayilkan (peacock’s eye), Kuyilkan (nightingale eye) borders.

- Emblematical motifs such as, fresh mango, sweet grapes elephant, the sun, moon, chariots, yali, swans, elegant peacocks, parrots, lions, coins, the graceful three bells of an anklet diamond, lotus, pot, creeper, flower, parrot, and henare very common in these sarees.
• Tribal designs
• Contemporary Indian patterns
• Places and paintings patterns on the saree
• Scenes from the Ramayana an the Mahabharata and Bhagwad Gita in the form of art
• A decorative saree has zari woven with the silk; the zari work in the border and the palla are woven in gold- dipped silver threads. The more the zari the more expensive is the saree
• Little gold motifs on the saree

Elephant motif

Peacock motif

Mango motif

Temple motif

Motif of a famous painting

Lion and bird motifs

Floral motif

Rudraksha motif
Traditional motifs of Kanjeevaram sarees

MOTIF DEVELOPMENT:
The sketches below are some of the traditional Kanjeevaram motifs created from the various objects and certain natural influences of our environment. For example:

<table>
<thead>
<tr>
<th>Sketch</th>
<th>Name</th>
<th>Inspiration</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Rudraksha" /></td>
<td>Rudraksha</td>
<td>Inspired from the lines in Rudraksha seed</td>
</tr>
<tr>
<td><img src="image2" alt="Manga buta" /></td>
<td>Manga buta</td>
<td>Inspired from the mango shape</td>
</tr>
<tr>
<td><img src="image3" alt="Mayil Kannu" /></td>
<td>Mayil Kannu</td>
<td>Inspired from the eyes of peacock</td>
</tr>
<tr>
<td><img src="image4" alt="Kuyilkann" /></td>
<td>Kuyilkann</td>
<td>Inspired from nightingale eye</td>
</tr>
<tr>
<td><img src="image5" alt="Kammalam" /></td>
<td>Kammalam</td>
<td>Inspired from the flower lotus</td>
</tr>
<tr>
<td><img src="image6" alt="Thazhumdu Muggu" /></td>
<td>Thazhumdu Muggu</td>
<td>Inspired from Eucalyptus tree</td>
</tr>
<tr>
<td><img src="image7" alt="Salangai" /></td>
<td>Salangai</td>
<td>Inspired from jewelry which is worn in the Anklet</td>
</tr>
</tbody>
</table>
TRADITIONAL DESIGN PROCESS:

Motif Development

In the traditional method, a designer draws design directly or traces a design by using a trace paper. Once the final motifs are drawn and approved the next process would be repeat setting. In this process, the borders and pallu designs are set with proper repeat size using the developed motifs. Motifs and other geometrical patterns are arranged according to the trends, colors, materials and handloom capacity.

Graph Simulation

Once the sample color and design is approved, the designers have to convert each motif/pattern adjusted with the different hooks capacity of the loom into graph form manually.

Manual Card Punching and Manual Card Lacing Process

The design is then punched and the punch card prepared. In this process, once the cards are punched from the machine and it is arranged in a tray with proper numbering and then shifted to the lacing machine. Lacing is the process of tying the cards with one another in sequence as per the design by using nylon or thick cotton thread. The punch card or the design pattern is then given to the weavers for the saree to be woven. The whole process takes around 5 hours and it is very complex and tedious.

![Process flow chart of manual designing](image)

**Manual card punching**

**Manual piano card cutting machine**
DESIGNING BY CAD SYSTEM:
CAD system is merely a tool and it cannot replace the primary skill of the designer but it helps to elaborate the imagination and increase work efficiency. Geometric figures can be drawn using the various tools as circles, lines, polygram, curve, square, and ellipse. Free hand, Bezier, pen tool, B-spline are the tools which help in creating design. With the help of shape tool every created design can be shaped properly. Every design can be filled with colour from the 16.7 million colour shades. A pattern can be repeated many times on fabric in various orientations. Therefore the processing and manipulation become easier as the designer can represent digitally.

DIGITIZING THE CONVENTIONAL MOTIFS:
The process of digitizing the motifs involved has three stages:
- Design input,
- Design processing and
- Design printing.

The first stage is the input of design i.e. either creation of motifs or copying an old design by coloured scanner. Design processing is the second stage of designing. On opening the corel-draw software the designer has two options either to create a new file or to open an existing one. If the option is ‘new file’ then the designer has to specify the width x height of the design required in specific unit of measurement such as inches, millimeter etc. On the other hand, if the option is ‘existing file’ then the designer has to resize the existing design by specifying the width x height required. Soon after giving command the CDR sheet with given specification is ready for design creation or editing. Editing of design includes modification of motifs, colour combinations by creating specific colour separations for printing this can be done until one would not be satisfied with the final design. Once the design is ready, the designer has an option to take the simulation of the design produced or can save the same as CDR or JPEG bitmaps file.

Final phase is the output phase. The actual size of the printed design is very critical as it is the input of the production phase.
Process flow of digitizing the motifs using CAD software - Corel draw x5

Development of motif and its various arrangements on saree through CAD system: Below the figures 1-4 shows the application of motif on saree designing. The peacock motif has been developed by CAD system and adapted with different arrangements and colour combinations on saree. The designer can visualize the design and print in as many different colour combination and arrangements as he desires.

Fig 1 Peacock motif

Fig 2
Application and arrangement of traditional motif through CAD

Fig 1 Maple leaf motif

Fig 3

Fig 4
Application and arrangement of contemporary motif through CAD

ADVANTAGES OF CAD TECHNOLOGY:

- Eliminating the manual and thus time-consuming process of designing and introducing the ordinary weavers and designers to the efficiency and economy of computer-aided design technology.
- The ease of innovation in designing and multiple colour combinations.
- Preservation of old designs with the help of digital storage and their subsequent retrieval.
- Creation of virtually any kind of design from simple to intricate.
- The user can set the horizontal or vertical repeats at any fractional value as the system is user friendly and is a powerful tool for colour separation, repeats, settings and retouching.
- One of the benefits of drawing components on CAD is that these drawings can be converted to Drawing Exchange Format (DXF) and transferred to the Computer Numeric Controlled (CNC) machines for automated production.
- Making the stake-holders of the industry self-dependant and showing them that they can make their own destiny.

CONCLUSION:

CAD is like a revolution in the field of designing. It has definitely changed and broadened the face of apparels of different styles. It not only helps to create patterns and motifs but aids in bringing in innovations skillfully in less time yet with perfection. One can visualize ones creations that serves as a simulation. This aids in discussions on saleability and market trends much before the actual investment and production takes place thereby eradicating losses or failures to a certain extend. CAD goes a long way in saving times and enhances the scope of innovative patterns that otherwise appeared intricate and difficult to develop. CAD is more of a fashion statement that has changed the world of fashion technology by producing designs from history, geography, environment...infact whatever that appeals to the Mind's Eye and to the inner being gets a shape, size and illuminations of different hues.

REFERENCES:

B. Bowonder and JV Sailesh . ICT for renewal of a traditional industry : a case study of Kancheepuram silk sarees. IJSTM(2005)342-355

Prof. Kumaraguru Kasinathan, A Sustainable Synergy Of Traditional And CAD Based Silk Saree Designing / Production, Pearl Academy of Fashion, Chennai Campus, India

Shameembanu A. Byadgi, Digitizing Conventional Patterns of Gujarat Embroidery and Product Development, MSc. Thesis, University of Agricultural Sciences, Dharwad, India
http://silksareedesign.blogspot.in/2007_04_01_archive.html
http://www.sareeoutlet.com/knowledgebase/kanjeevaram-sarees.html
http://textontextiles.wordpress.com/tag/kanjivaram/
http://www.angelfire.com/electronic/handloomproject/Project_Name.html