Different Textile Printing Techniques - Hand Block Printing, Screen Printing, And Digital Printing

Lavanya J¹, Dr. Neeti Kishore²

¹Research Scholar, Department of Fashion, Design and Arts Hindustan Institute of Technology and Science, Chennai, Tamilnadu, India.

²Assistant Professor, Department of Fashion, Design and Arts Hindustan Institute of Technology and Science, Chennai, Tamilnadu, India

Abstract

In India, the textile business is playing the leading role after the agriculture sector, digitization, and automation is directed to the carbon footprint. Textile printing is mainly depending on hand block printing, screen printing, and digital printing. With a novel hand block printing product made from recycled ink waste, the total findings revealed financial savings, reducing waste disposal, and environmental effects. The latest block printing is working on natural fibre, where this printing is performed through organza synthetic manifold fabrics. Block printed method investigations were performed on these materials in order to provide an ideal study. The block printing method used on organza synthetic textiles in modern apparel influenced by traditional Bodo attire is the product of this study. For this study, it is suggested that in-depth experiments be conducted, such as paint selection and blocks printing process kinds, in order to get the best possible end outcome. Despite the advent of new ways to screen, printing technology remains one of the most dependable printing technologies used in Nigeria. Interview questions were used to gather pertinent based on the scope of printing activity in the research area from screen printers. The results indicated that Direct Image printing machines, Large Format printing machines, and Flex cutting machines are the most often used digital technical equipment in printing. Digital technology is also changing the practice of screen printing in the areas of printing quality, costing and billings, and apprenticeships enrolment, according to the results.

Keywords: textile printing, hand block printing, screen printing, and digital printing

Introduction:

The practise of adding colour to cloth in specific patterns or designs is known as "textile printing." Textile printing. Printed textiles that are correctly attached to the fibres are resistant to washing and abrasion. Unlike dyeing, which covers the whole cloth with a single colour;
printing simply applies one or more colours to specific areas of the fabric and creates highly defined patterns.

There are a variety of printing methods that may be utilised to apply colour to the cloth. Capillary attraction may extend the colorants beyond the design's boundaries, hence thicker dyes are utilised in printing colorants.

There are a variety of ways to print cloth, and each has its own unique outcomes. There are several factors that go into choosing the sort of textile printing to be utilised, ranging from print runs to durability. Below, we've compiled and discussed a few of the more popular and often utilised approaches.

There are a lot of "myths and tales" about fabric printing. Understanding and selecting the proper fabric printing technology may have a huge impact on our customers' final products. Choosing the appropriate printing process, medium, and kind of dye may make or break the outcome of your project. The lack of a thorough and relevant description of the many printing methods available online prompted us to compile all of them here. Please allow us to assist you in making an educated decision.

A wide range of traditional textile printing methods may be broken down into four distinct categories:

- When the desired pattern is printed using colourants incorporating dyes, thickeners, and mordants or other ingredients required to set the colour on fabric, this is known as direct printing.
- A mordant is imprinted in the appropriate patterns on the cloth prior to dyeing, and the color adheres only where the mordant is present.
- When a wax or other material is printed onto a piece of cloth and then dyed, it resists the dying process. In contrast to the coloured background, the waxed portions do not receive the dye.
- Discharge printing, which uses a bleaching solution to remove part or all of the colour from previously coloured materials.

While resist and discharge printing were popular in the nineteenth century, combination printing, which employed indigo resist to produce blue backgrounds before block printing other colours, was also popular. [5] Directly printable processes are the most often used in advanced production printers.

Some preparatory steps are necessary to provide a long-lasting imprint, as well as a printmaking solution that may be used to design on the cloth.

- treatment of cloth before sewing
- Prep work for paints
- Ink-making process
- Employing printing technologies to create an imprint of paste on a cloth,
- The process of drying a cloth
- Using steam or hot air to seal the printing (for pigments),
Upon the completion of the processing steps.

Textile pre-treatment before printing

The technique of creating textile printing colours requires a thorough understanding of chemistry as well as substantial hands-on expertise, since the materials must not only be in the correct proportions but also be specifically selected and compounded for the job at hand. When more than one colour is used in a design, each one must be able to endure the numerous processes required to produce and fix the others, such as shade, quality, and fastness. Technically, all printing pastes, whether or not they include colour, are referred to as colours.

Composition has a significant impact on colour. Almost majority of them come pre-packaged with everything you'll need to make and mend your own. While some are just thicker mordants, others are only coloured mordants that need further treatment. It is a salt or other material that acts as a mordant, either directly by steaming or indirectly via the process of dying. Thickening is necessary for all printing colours so that they may be transferred from the colour box to the fabric without running or spreading beyond the pattern's bounds.

Methods of printing

There are so many types of textiles, mainly using three types of textiles printing i.e:

➢ Hand block printing
➢ Screen printing
➢ Digital printing

Literature survey:

Fardhani, A. Y. S. [2020] It employs both quantitative and qualitative methods. It is possible to get both quantitative and qualitative data via theme experimentation and literature reading and observation. The Modular stamp is a modification of the fundamental block printing process that attempts to generate fascinating patterns and give many additional motif options by reducing the stamp size. Compared to printing and screen printing methods, the modular stamp technique with block printing may cut gas emissions and prevent water pollution. [1]

Meitei, O. B., et al [2021] While there are many causes behind the disparity, the study proposes ways to address it, including access to tools and information, as well as best practises for capacity building for craftsmen from all corners of the globe. It also examined various support methods for intermediate facilitation by Manipal Jaipur, such as workshops, redistribution and training. [2]

Saraceno, B et al The technique of adding colour to cloth in specific patterns or designs is known as textile printing. Printed textiles that are correctly attached to the fibres are more resistant to washing and friction than those that aren't bonded properly. Dyes are applied to the cloth in the same way as printing, but with dyeing, the whole fabric is coated in one colour, while with printing, only certain areas of the fabric are coloured. Colors may be applied to the cloth using stencils, engraved plates, rollers, or silkscreens. Printing inks
employ dyes that have been thickened in order to prevent capillary attraction from spreading the colour beyond the boundaries of a pattern or design.[3]

Kight, K. [2011] Fabric design and printing advice from prominent designers are included in this step-by-step guide. Kim Kight, a textile connoisseur and the author of the famous blog True Up, is here to show you how.[4]

Badoe, W., et al [2015] As a method of offering new and diverse ways of embellishing textile materials, this study examines creative printing processes. People's fabric choices are always changing as a result of the ever-changing fashion trends. As a result, there is a pressing need to investigate diverse printing technologies in order to meet the fabric requirements of these emerging trends in textile design. For these pieces, experimental and exploratory methodologies were applied in an art studio-based research design. A number of imaginative techniques have been utilised, such as spray printing, local sponge and broomstick printmaking, twigs block printing, marble printmaking, bottle printmaking (Acripuff/Acrilex printmaking), brush printmaking, lace transfer printing, and fabric painting. Combining and altering existing processes, as well as experimenting with a variety of materials and equipment, has resulted in a number of ground-breaking printing approaches.[5]

El-Kashouti, M., et al [2019] Dyeing and steaming are then carried out, followed by washing to remove any remaining dye residues. This kind of printing is known as direct printing. The cured binder film adheres the pigments and cured binder to the cloth surface in pigment printing. There is no need for further therapy. Direct printing is often regarded as the most significant printing method available. As defined by the Textile Institute, fibres are units of matter with a high ratio of length to thickness and fineness. All textile materials are constructed from fibres. Natural or man-made fibres may be used to make textiles, which can be used for anything from clothing to bedding.[6]

Lawrence, G. M. [2002] Fabric and garment firms are using digital fabric printing more and more. The adoption of this technology will be made easier with the development of new inks, faster production rates, and an increase in the number of print heads. New and novel textile design approaches can be developed using digital printing technology, even if it has yet to achieve its full potential. Digital fabric printing’s design potential has received little attention up to this point. Traditional batik and discharge surface design methods were the focus of this study to see whether they could be replicated using digital printing processes like Photoshop. A variety of digital batik and discharge textiles were made and reviewed by both non-experts and specialists throughout the investigation.[7]

Briggs-Goode, A., et al [2011] A brief history of printed textile design is provided in this chapter, as well as an overview of its technical, historical, and production aspects. Introduction to textile printing is followed by a discussion of how the print and design processes interact. The influence of digital technology on both design and printing is discussed, as are current concepts and applications, as well as possible future developments in the industry.[8]
Dawson, T. L., et al [2000] Textile printing is an ancient art form that predates recorded history. Egyptian archaeologists have unearthed a full garment, as well as carved wooden printing blocks [1]. From 400 to 600 AD, these are Coptic artefacts. Textile printing industry review article covering pre-print techniques, printers, direct printing, discharge and resist prints and transfer prints as well as elements of the employed dyes and pigments and dyestuffs during the last 15 years.[9]

Ujiie, H. [2015] Printing textiles rather than weaving or knitting patterns into the cloth might be a more cost-effective option. There are a range of printing processes and procedures that may be employed after the cloth has been prepared (see Chapter 18). The use of digital inkjet printing technology in textile printing is on the rise. This chapter combines scientific knowledge with design considerations and commercial issues when choosing textile patterns, colours, and printing procedures.[10]

Claypole, A., et al [2022] Sporting performance may be improved by a person's ability to maintain a stable body temperature. However, the flexibility, homogeneity, and resilience of present systems are severely constrained. Screen-printed Nanocarbon heaters that can withstand bending, folding, tensile expansions of up to 20%, and machine washing are on display in this demonstration. As a result, the heated garments may safely flex without interfering with their wearers. It uses a conductive ink based on Graphite Nanoplatelets and Carbon Black to heat a 15 x 4 cm area uniformly. That's due to conductive carbon's low roughness and well-connected carbon particles, as well as its homogeneous distribution.[11]

Senthilkumar, P., et al [2022] A look of biobased textile dyeing research is provided in this chapter, which examines alternate dyeing methods in addition to the usual one. There are four parts to this chapter. This book is divided into four sections: the first deals with natural dyes, the second with bioprinting methods, the third with biomordanting methods used in dyeing, and the fourth and final portion looks at biobased decoloration methods that have just lately been examined.[12]

Trujillo-Vazquez, A., et al [2022] Unlike ordinary pigments, so-called "effect pigments" are based on the phenomenon of structural colour, or selective reflection, rather than selective light absorption. In addition to its angle-dependent hue and ability to make lightfast hues, structural colour has a pleasing visual quality. Color management and preprinting become more complex since it is more difficult to monitor and control the colour when used as a pigment. The purpose of this work is to compare the behaviour of effect pigments in lithographic and screen printing processes with conventional pigments used in so-called process inks, and to assess their optical characteristics whether employed alone or in conjunction with absorption pigments. Amber beads were shown in lithographs and screen prints. There were three different sets of inks: CMYK, RGB, and golden inks are all included in this collection, which includes inks created with Merck Iriodin TM and Pyrisma TM effect pigments.[13]

Azadmanjiri, J., et al [2022] Stacking functional compounds in additive-free MXene ink formulations with screen printing are also discussed in this paper, as are the difficulties in fabricating high-quality screen-printed patterns using these agents. Because of their high
energy density and rapid charge/discharge rate, MXene ink-based micro-supercapacitors have been discovered to be significant for wearable constructions. It has now been addressed how to print high-performance MXene micro-supercapacitors utilising cost-effective ink composition techniques.[14]

Firmanda, A., et al [2022] Using cellulose as a biopolymer for 3D printing ecologically friendly items is a fascinating topic. Inks derived from cellulose and its derivatives may be created as environmentally friendly inks for 3D printing objects with the required 3D design. Various industries, including biomedicine, electronics, building construction, sensors, packaging, paper manufacture, live bioinks and more, are projected to benefit from cellulose ink-based 3D printing technology. Sustainable 3D printed cellulose-based goods have numerous intriguing and varied functions and uses, as this review shows.[15]

Hamdy, D., et al [2022] One of these physical methods is plasma treatment for almost all synthetic and cellulosic fabrics. In contrast to chemical treatment, plasma therapy does not need the use of dangerous chemicals, and hence there are no environmental concerns. The research found that high-quality plasma radiation can be used to print on a wide range of materials, including natural synthetics and mixes, utilising pigment printing processes. It's a green process that's expanding quickly, and it has a few possible uses. Using polyester plasma treatment and surface alterations, according to the research, printing issues may be resolved. Prior to the cationization procedure, a PET fabric is treated with an efficient plasma method that activates the surface.[16]

Tao, X., et al [2022] E-textile systems, their components, applications, and usages in the realm of medical innovation are discussed in this review publication. The suggested characteristics and limits of e-textile systems, which are incorporated into bespoke medical goods, are examined. Finally, several suggestions for improving the integration of the e-textile system into the medical profession are put forward.[17]

Qi, Y., et al [2022] Microscopic structures that reflect incoming light at a certain wavelength and in a specific direction may generate a variety of hues called structural colours via interference, diffraction, scattering, and other means. We’ve seen SCMs employed extensively in a broad range of applications, including environmental sensing, intelligent displays and information coding. SCMs have also been used in anti-counterfeiting and textile colouring.[18]

Zhang, Y., et al [2022] There are a large range of porous materials available, therefore selecting the proper one is critical to producing high-performance electronics for a certain application because of their great variation. A variety of flexible porous substrates are described in this article and their design, fabrication, and application are discussed in detail. Finally, several approaches to functionalizing these porous substrates are described and contrasted. Also on display are some of the most recent developments in flexible porous substrate-based electrical technology Discussion of unresolved issues and future plans is also included in this section.[19]
Park, Y. G., et al. [2022] For electrical devices, the capacity to create arbitrary 3D structures gives a new level of complexity and more flexibility. High-resolution 3D printing technologies may provide substantial possibilities for freeform electronics since recent advances in electronics have broadened their use in different industries where structural conformability and dynamic configuration are necessary. A overview of recent advances in 3D printing technologies for freeform electronics is presented here, with a focus on 3D-printable functional materials and procedures for a wide range of devices. 3D-printed electronic components, including as interconnects, antennas, and sensors, are also discussed in detail to provide an overview of the current developments in 3D-printed electronics. Next-generation printed electronics are also examined in terms of the obstacles and opportunities they face, as well as possible trends, based on current discoveries.[20]

Ball, H.L. [1] Survey research has a well-established approach that strives to provide reliable results via thorough investigation. However, the quality of survey research has deteriorated as a result of easy-to-use online survey platforms. This article highlights the advantages and disadvantages of online surveys and stresses the fundamental concepts of survey research, such as questionnaire validation and sampling. Researchers can find several manuals to help them run thorough surveys online, but this is not a simple task. The use of online survey websites and software may be helpful in the design and delivery of questionnaires, but it also has the potential for introducing bias. We strongly advise survey researchers who are contemplating doing online surveys to do their homework on how to minimise bias and increase rigour online. As well as informing researchers on the hazards of online surveys, this article seeks to provide journal readers with the knowledge they need to evaluate research papers that rely on online surveys in a critical manner.[21]

Evans, J.R. [2] Online surveys have evolved significantly since Evans and Mathur's (2005) essay on their utility, and this work aims to provide an in-depth and critical examination of this development. Online survey research was still in its infancy at the time. Present and future internet studies are also discussed. There are several findings and suggestions [22].

Methodology:

Hand block printing

Isfahan, Iran, traditional paisley fabric printmaking on wooden hand stamps. The oldest, simplest, and slowest printing technology is the lithographic process. Prepared wooden blocks are used for drawing or transferring a design. There must be a separate block for every colour in the design. To prevent damage to the finer and more delicate work, a block cutter begins by carving off the wood surrounding the larger, more densely packed objects. Final results will be like a flat relief carving with the design prominently shown. Fine features, which would be impossible to carve out of wood, are created using bent and pushed edgewise strips of brass or copper. Coppering is the term for this process shown in figure 1.
This process involves applying ink to an ink-block and pressing it firmly on a piece of fabric, which is struck with a wooden mallet as shown in figure 1 and 2. The printer ensures that the second impression registers identically with the first by repeating the process of making an imprint. Using pins at each corner of the block, the patterns may continue without interruption. This process repeats itself over and over again until the whole length of fabric is printed. After that, it's dried by being twisted around rollers. A single colour is initially printed over the whole surface of the fabric, cured, and then the next colour is printed over the top shown in figure 2.

By hand, block printing takes a long time. The effects may be very creative, and some are impossible to achieve using any other way. [8] This method was used by William Morris in the creation of a number of his textiles.

Table 1. Ink Wastage Survey

<table>
<thead>
<tr>
<th>Survey Data</th>
<th>No.of Machines Studied Phase-wise</th>
<th>No.of cleanings per day</th>
<th>Ink wasted per clean (mI)</th>
<th>Disposal method for ink waste</th>
<th>Machine working hours per day</th>
<th>Machine working days per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>Users: No 31</td>
<td>4-5</td>
<td>5</td>
<td>Drainage</td>
<td>12-18</td>
<td>22-25</td>
</tr>
<tr>
<td></td>
<td>Users: No</td>
<td>4-5</td>
<td>4</td>
<td>Drain into</td>
<td>8-12</td>
<td>28-30</td>
</tr>
</tbody>
</table>
Semi-Industrial machines with Epson head type

**Screen printing**

Using a mesh, screen printing transfers ink onto a substrate, excepting where stencils block the ink from passing. With one forward stroke, ink is applied to the screen's open mesh holes and then the screen briefly makes contact with the substrate with a blade or squeegee in the opposite direction. Afterward, the screen springs back, and the ink is drawn out of the mesh holes. A picture or pattern may be created by printing one color at a time on many screens.

**Figure: 3 screen printing**

Varied names are given to what is basically the same process under various terminology. Silk was utilized in the technique, which is why it was formerly referred to as "screen printing" or "silkscreen printing." In addition to serigraphy and serigraph printing, serigraphy is also known. Synthetic threads are often utilized in screen printing these days since they are more durable. Polyester mesh is the most often used mesh among the general public. "Nylon and stainless-steel mesh are accessible to screen-printers for special-purpose applications. Mesh
size also affects the final result and appearance of the design when printed on a material shown in figure 3.

Screen printing was brought to Europe from Asia in the late 18th century, but it didn't catch on until silk mesh became more widely accessible for commerce and a lucrative market for the technique was identified in Europe.

![Figure 4. Screen printer representation](image)

From above figure 3 represents A - Ink, B - Squeegee, C - Image, D - Photo emulsion, E - Screen, F - Printed image.

To print their artwork, screen printing artists employ silkscreen, a squeegee and hinge clamps. As seen in figure 3, the hinge clamps keep the screen in place as the ink is pushed through the meshes with a rubber squeegee shown in figure 4.

In the early 1910s, printing businesses experimented with photo-reactive chemicals, employing the actinic light-activated cross-linking or hardening capabilities of potassium, sodium, or ammonium chromate and dichromate chemicals with glues and gelatin compounds. It was tested by Roy Beck, Charles Peter, and Edward Owens using chromic acid salt-sensitive emulsions for photosensitive stencils. Although the introduction of photo-imaged stencils to the commercial screen-printing market by this trio of innovators would revolutionise the industry, adoption of this technology would take many years. Bichromate sensitizers are no longer commonly used in commercial screen printing since newer, safer and less toxic sensitizers are being used. You can get emulsion chemicals for manufacturing photosensitive stencils that have been pre-saturated and "user blended."

![Figure 5. Screen printing](image)

A common textile decorating process is digital hybrid screen printing, which combines analog screen printing with traditional digital direct-to-garment printing. Digital hybrid screen printing seems to be a screen-printing press with an integrated CMYK digital
enhancement that is fully automated. Variable data possibilities and screen print-specific processes are both possible with digital hybrid screen printing as shown in figure 5.

It is comprised of a mesh stretched over a frame. As an example, a finer and smaller mesh aperture would be used for more delicate designs that demand a greater level of detail. Nylon, for example, might be used for the mesh. The mesh must be put on a frame and be pulled taut in order to be effective. Frames for mesh may be built of wood, metal, or other materials depending on the machine's capabilities or a craftsman's skill. Mesh tension may be measured with a tensiometer, which uses Newtons per centimetre (N/cm) as a conventional unit of measurement.

### Table 2. Recipe for printing method

<table>
<thead>
<tr>
<th>Recipe</th>
<th>The original recipe (gm/l)</th>
<th>Adjustment</th>
<th>Recipe Saving</th>
<th>Cost Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactive print paste</td>
<td>800</td>
<td>800</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Ink waste</td>
<td>-</td>
<td>260</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Orange dye</td>
<td>47</td>
<td>44</td>
<td>3.0</td>
<td>8.5 / 42.5 × 100 =20%</td>
</tr>
<tr>
<td>Black dye</td>
<td>4.0</td>
<td>-</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Red dye</td>
<td>4.5</td>
<td>2</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>239.5</td>
<td>16</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Total (gm/l)</td>
<td>1000.0</td>
<td>1000.0</td>
<td>9.5</td>
<td></td>
</tr>
</tbody>
</table>

In order to create a stencil, the screen is covered with a negative representation of the pattern to be printed; that is, the ink will be applied to the substrate in the open areas.

During the pre-press process, an emulsion is "scooped" through the mesh of the frame and screen. This emulsion is then selectively exposed to ultraviolet light, via a film printed with the desired pattern, once it has fully dried. While the exposed sections of the emulsion get harder, the rest remains supple. To remove them, a water spray is used to remove them from the mesh, leaving behind a clean region that has the same form as the desired picture. It's a good thing.

A flat-bed, cylinder and rotary kind of screen-printing press are the most prevalent.

Artists like Max Arthur Cohn and Anthony Velonis, both of the Works Progress Administration (WPA), first used the term "serigraphy" in the 1930s to distinguish between the aesthetic and industrial applications of screen printing. [3] Silk and the Greek word "graphein" (silk) combine to generate the compound word "serigraphy" (to write or draw).

According to the Printers' National Environmental Assistance Centre, "Screen-printing is without a doubt the most versatile of all printing technologies. It's become a popular cultural style since screen-printing materials are so readily available and affordable, making DIY culture screen-prints seem less professional than their more professional counterparts."
Digital printing

Direct to garment printing, or DTG printing, is another term for digital textile printing, which is often referred to as digital garment printing. The printing of textiles and clothing is carried out using inkjet technology that has been adapted or customised. Fabric sheets with a paper backing may also be used to print inkjet images on fabric. Major inkjet manufacturers can now provide textile printing machines that can be utilised for both sample and large-scale production. They are now able to. Since the early 1990s, inkjet technology and water-based ink have made it possible to print directly onto polyester fabric utilising dye sublimation or dispersion direct ink. Here, the emphasis is on visual communication in retail and brand promotion (flags, banners and other point of sales applications). Printing nylon and silk using acid inks is possible. Reactive ink is used for printing on cellulose-based textiles like cotton and linen. Single piece, mid-run, and long-run digital textile printing employing inkjet technology is available to screen-printed cloth.

Figure 6. Digital printer

Colorants are printed into fabric via digital textile printing, which is any ink jet-based process. If you're printing smaller images directly onto clothes (such as T-shirts, dresses, or promotional wear) or bigger designs directly onto large format rolls of textile, you're using digital textile printing, and that's where the term "large format rolls of textile" comes from. Ads and logos for businesses are increasingly being printed on polyester media in this later trend which can be shown by figure 6. Examples include flags, banners, signage, and store designs.

Printing types may be broken down into the following subcategories:

- Direct-to-Media
- Publish a Print
- Refuse to print
- Printing with Pigment
- Printing that reacts to the environment
- Inkjet printing on acid paper
- Print with a dispersed pattern
Sophisticated Design

In the late 1980s, digital textile printing was being considered as an alternative to analogue screen printing. Printing on textile medium using dye-sublimation and high-energy dispersion inks is now feasible thanks to the introduction of a dye-sublimation printer in the early 1990s, rather than printing sublimation inks on transfer paper and then using a heat press to transfer them to the fabric.

Figure: 7 respondents

Figure: 8 screen printing

It is necessary to create the following divisions within digital textile printing for the sake of visual communication shown in figure 7 and 8

- dye-sublimation printers
- Wide-format printers with medium-volume output.
- industrial printers capable of printing large volumes at fast speeds

Table: 3 comparison of fabrics
### Table 1: Fabric and Fillers Details

<table>
<thead>
<tr>
<th>Reference</th>
<th>Year</th>
<th>Fabric Description</th>
<th>Fillers</th>
<th>Acknowledged Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>This paper</td>
<td>2022</td>
<td>97% polyester / 5% elastane</td>
<td>GANP</td>
<td>GF ~ 40 @ 6%</td>
</tr>
<tr>
<td>[13]</td>
<td>2021</td>
<td>cotton</td>
<td>CANT</td>
<td>∆R/R₀ &lt; 0.2 @ 6%</td>
</tr>
</tbody>
</table>
| [14]      | 2021 | polyester as the core fibers and polyurethane as the exterior covering | Avg NWAS | GF ~27.9 @ 60%  
|           |      |                    |         | GF ~213.0 @ 130%        |
| [15]      | 2021 | 66% of polyamide nonstop threads and 37% of lycra | MAWCNT | ∆R/R₀ ~ 2.90 @ 15%  
|           |      |                    |         | ∆R/R₀ ~ 6.70 @ 25%     
|           |      |                    |         | ∆R/R₀ ~ 9.26 @ 35%     |

The above table 3 clearly explains about various printing methods related to textile industry

**Conclusion:**

The technique of adding color to cloth in specific patterns or designs is known as textile printing. Printed textiles that are correctly attached to the fibers are more resistant to washing and friction than those that aren't bonded properly. Dyes are applied evenly throughout a piece of cloth, while printing uses a variety of colors to create distinct patterns on specific areas of a piece of fabric. In this paper, we discussed three types of textile printing procedures that are most significant than the other models due to their advantages in textile printing. As a result, these three printing models obtained high accuracy, processing in-time, maintain good fabric condition, and a wide variety of fabric printing patterns, etc., Next, a design collection was created, and then a poll was undertaken to determine whether or not women liked the created collection and the combination of three approaches. The collection was a hit with all female respondents, and 66% said they would want to purchase it. To maintain and renew the fabric printing, such interventions will bring new designs and additional labour to the fabric printing sector and so support the fabric printing itself.

**References:**