

Summary of the first paper

Comparative Study for Both Manual and Machine Embroidery on Knitted Fabric Properties

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Introduction: Manual embroidery has been a hobby, but nowadays there is no time, so modern stitchery has to be quick and easy to complete. It must be practical too, resulting in the saving of money. Embroidery machines have revolutionized the art of embroidery. Many technical problems can appear during the process of embroidering, these problems which affect the final quality of embroidery, are caused mainly by the high amount of stretch in knitted fabrics, plus non-appropriate choice of the size of needles used or to unadjusted fullness of the embroidery stitches. It is necessary to overcome defects and the technical problems of embroidering knitted fabrics and to apply new innovations in order to find practical and technical solutions for these defects.

Aim of study: Try to study the Comparative of Both Manual and Machine Embroidery and its effect on Knitted Fabric Properties.

Experiments: Three different embroidery stitch types (satin stitch, blanket stitch and herring bone stitch) were used, These stitching methods were done manually and by embroidery machine on 100% viscose blended knitted fabric stacked with two layers of non-woven backing (fussing) fabric, Three different embroidery threads types (Rayon, Polyester spun, and Metallic) were used.

Experimental tests: Testing stitches included stitch appearance and embroidery pucker evaluation, mass loss due to abrasion and embroidery thickness was measured on stitched line. Tensile strength, elongation and Stiffness test were tested too.

Results:

- 1- Embroidery thread type has a significant effect on fabric properties.
- 2- Embroidery stitch type has a significant effect on fabric properties.
- 3- Machine stitches are more compacted and durable than manual stitches.
- 4- Manual embroidery gives more extensibility than machine embroidery.
- 5- Machine embroidery gives better abrasion resistance than manual embroidery.
- 6- Manual embroidery gives higher pucker than machine embroidery.
- 7- Manual embroidery gives lower appearance than machine embroidery.
- 8- Choosing the right stitch density per inch avoids pucker.
- 9- Selecting the suitable stitch and thread type for embroidering apparel parts is an important factor to achieve high quality products.

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Comparative Study between Functional Properties of Different Fabric Structures

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Introduction: Clothes act as protection from the elements, including rain, heat, wind and other weather conditions. Clothes also reduce the level of risk during activity, such as work or sport. The primary function of clothing is to improve the comfort of the wearer. Function has become more and more important and synthetic materials have become more accepted, consequently materials have to fit the purpose to maximize the comfort of the wearer.

Aim of study: Determine the relationship between knitted fabric structures and garments function, as it concerned with the physiological comfort as it is a fundamentally important element of garments.

Experiments: three different knitted structures (single jersey, interlock and rib1/1) from polyamide 6.6 were used.

Experimental tests: Some physical factors determining the functional properties of textiles were tested. All tests were done in conditioned atmosphere of $20^{\circ}\text{C} \pm 2$ and $65\% \pm 2$ RH. These properties were abrasion resistance, elongation, pilling, water repellency, water absorption, water absorbency, air permeability, stiffness, and heat insulation.

Results:

- 1- Knitted structure type has a significant effect on functional properties.
- 2- Interlock structure has the highest abrasion resistance then rib 1/1 then single jersey.
- 3- Rib 1/1 structure has the highest elongation then single jersey then interlock.
- 4- Rib1/1 and interlock structure had no-pill while single jersey had low-pill.
- 5- The kind of fiber is a more effective factor on pilling resistance than the fabric structure.
- 6- Interlock structure is more water repellency then single jersey then rib 1/1.
- 7- Rib 1/1 structure scored the highest water absorption and water absorbency then single jersey then interlocks.

- 8- Single jersey structure has the highest air permeability then rib 1/1 then interlock.
- 9- Rib 1/1 structure has the highest stiffness then single jersey then interlock.
- 10- Interlock structure has the highest heat insulation then rib 1/1 then single jersey.

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paper

Effect of Sewing Specifications on Artificial Leather Seam Properties

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Introduction: Nowadays more and more people prefer to wear synthetic leather, as an alternative to real leather because this textile material is eco-friendly and no animals are involved in its production. Today numerous advanced types of artificial leather materials have been developed. Thus artificial leather is best alternative for the genuine leather. Its consistent popularity is that it is a very versatile fabric that can be made into virtually any accessory or item of clothing. Many technical problems can appear during the process of sewing artificial leather; these problems affect the final quality of apparel. It is necessary to overcome the defects and the technical problems of sewing to apply new innovations in order to find practical and technical solutions for these defects.

Aim of study: Studying the effect of sewing specifications on artificial leather seam properties.

Experiments: Three different masses of artificial leather were sewed with denim by using two types of press foot (plastic and metal) at three pressing levels (level 1 light press by loosen the presser 20 cycles, level 2 middle press by loosen the presser 11 cycles, level 3 heavy press by loosen the presser 4 cycles).

Experimental tests: These seams examined for thickness, stiffness, tensile strength, extensibility, seam pucker and seam appearance according to standards. Comparisons have been made between the eighteen different samples; this was done with reference to seamed lines' durability, efficiency and appearance.

Results:

- 1- There's direct relationship between artificial leather's (mass-thickness) & seam (thickness, stiffness, tensile strength, extensibility and appearance).

- 2- There's inverse relationship between artificial leather's (mass-thickness) & seam pucker.
- 3- Metal presser gives lower seam thickness, seam tensile strength, seam extensibility and seam appearance than plastic presser.
- 4- Metal presser gives higher seam stiffness and seam pucker than plastic presser.
- 5- It's concluding that using plastic presser gives better seam properties.
- 6- There's direct relationship between pressing level and (seam thickness, seam stiffness & seam pucker) as the press increases these properties increases and vice versa.
- 7- There's inverse relationship between pressing level and (seam tensile strength, seam extensibility & seam appearance) as the press increases these properties decreases and vice versa.
- 8- It's clear that decreasing the press gives better seam properties.

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Summary of the forth paper

Effect of Coating with Silver Nanoparticles (AgNPs) on Cotton Fabric Functional Properties

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Introduction:In the last decade, the advent of nanotechnology has spurred significant developments and innovations in this field of textile technology. Fabric finishing has taken new routes and demonstrated a great potential for significant improvements by applications of nanotechnology. The properties and performance of textile fibers are essential to fabric manufacturing and utilization. Functional properties of coats and overalls which are used by workers in Al- Ahram newspaper (commercial press) has to be improved to satisfying the final use requirements.

Aim of study: Studying the effect of coating with silver nanoparticles (AgNPs) on cotton fabric functional properties.

Experiments: Fabric which is used by workers in Al- Ahram newspaper (commercial press) has been coated using silver nanoparticles (AgNPs).

Experimental tests: Fabric before and after treatment has been scanned, using a scanning electron microscope to show the effect of silver nanoparticles treatment on fabric surface. Physical and functional tests were carried out. Those tests were mass, thickness, tensile strength, elongation, air permeability, water repellency, water permeability, soil release, bacterial and microbe resistant.

Results:

- 9- Coating cotton fabrics with silver nanoparticles (AgNPs) has a significant effect on performance and functional properties.
- 10- Silver nanoparticles coating makes a very thin film that is invisible with naked eye as the look and texture of fabric doesn't change after treatment.
- 11- Silver nanoparticles treatment makes fabric more durable and long lasting.
- 12- Despite the treatment makes cotton fabric exactly waterproof, it's breathable and sweat can still pass through the fabric therefore it's comfortable.

- 13- Whereas cleaning oily stains from cotton fabrics is very difficult. Treatment with silver nanoparticles earns fabric self-cleaning property, achieving an aesthetic appeal.
- 14- Known that cotton fabric is highly affected with bacteria and microbe. While after silver nanoparticles treatment, it became anti-bacterial and anti-microbe, that makes fabric suitable for various applications such as medical clothes.
- 15- From all the above results authors think there was accepted advantages by coating cotton fabrics with silver nanoparticles which effecting on function properties of apparel. This useful information can be used by the sportswear and work wear designers. Finally authors recommend Al- Ahram newspaper (commercial press) to apply the treatment on workers coats and overalls.

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Summary of the fifth paper

Effect of Thread Type and Tension Control on Cotton Fabric Sewability

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Introduction: Thread plays an important role in the apparel manufacturing process. When the thread is stronger than the material that it is being used to join and if seams are placed under stress the material may tear before the thread breaks. Garments are usually sewn with threads of lesser strength than the fabric so that if stressed the seam will break before the garment. Tension control is also a very important element that is used to adjust how loose or tight sewing stitches are. Top thread and bobbin thread should be meeting between the two layers of fabric. If the top thread is not going into the fabric, the tension should be loosen; and vice versa, if the bobbin thread is not going into the fabric the tension should be tighten. Thread runs between various tension disks, and the amount of tension which is set by the regulator will determine how much pressure these disks put on the thread.

Aim of study: Studying the effect of thread type and tension control on cotton fabric sew-ability.

Experiments: Five different tensions are applied on four types of thread by using super imposed seam.

Experimental tests: Seams examined for thickness, stiffness, seam appearance, seam pucker, tensile strength and extensibility according to standards. Tests took place into conditioned atmosphere of 21°C and 65% RH. Comparisons have been made among the five different tensions and the four different thread types this was done with reference to seamed lines' durability, efficiency and appearance.

Results:

- 1- Thread and tension control are very important elements in apparel manufacturing process.
- 2- Sewing thread which is described by fiber type, construction, and size, has a significant effect on seam properties.
- 3- Thread 1 gives best result, due to its small size as well as its polyester fiber type in addition to its spun construction. So the authors recommend using it for its best sew ability.
- 4- Thread tension has a significant effect on seam properties.

- 5- Tightened thread tension causes seam pucker that raises seam thickness which effect inversely on aesthetic appeal.
- 6- By loosen the thread tension fabric during sewing became uncontrolled and bobbin thread was gathered behind fabric that leads to worst seam properties.
- 7- The authors recommend using the middle tension (tension control 3) that gives the best seam properties.

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Summary of the sixth paper

An Investigation into the Physical and Functional Properties and Sew Ability of Faux Leather

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Introduction: Faux leather is one of the most common synthetic leather with higher quality. Real leather goods are preferred by many customers because of their excellent properties, such as good water vapor permeability, and wearing comfort. Therefore, the development of faux leather with excellent performance as a supplement of real leather has gained increasing attention and has become a widely interesting research topic. Faux leather has been emerged in recent years and became the most ideal substitute for real leather. Continuous development in this research area led to an expansion of faux leather applications. Many technical problems can appear during the process of sewing faux leather; these problems affect the final quality of apparel. It is necessary to overcome the defects and the technical problems of sewing to apply new innovations in order to find practical and technical solutions for these defects.

Aim of study: Studying the effect of faux leather types on physical, functional and seam properties.

Experiments: Three different types of faux leather were examined before and after sewing with superimposed seam.

Experimental tests: Tests were applied to determine the physical properties like thickness and stiffness, the functional properties like tensile strength, elongation, crease recovery, air permeability, vapor permeability, abrasion resistance, and colorfastness to light in addition to the seam properties like seam thickness, seam stiffness, seam tensile strength, seam pucker and seam appearance.

Results:

- 1- Faux leather has a significant effect on each of physical, functional and seam properties.
- 2- There is a direct relationship between faux leathers mass and its thickness.
- 3- There is an inverse relation between faux leathers elongation and each of stiffness and tensile strength.
- 4- There is an inverse relation between faux leathers stiffness and crease recovery.
- 5- There is an inverse relation between faux leathers thickness and each of air and vapor permeability.
- 6- Seam properties of each thickness, stiffness and tensile strength of tested faux leathers go in the same manner like before sewing.
- 7- There is an inverse relation between faux leathers seam pucker and its seam appearance.
- 8- Faux leather1 (brown) is like lamb nappa for its soft and light-weight. It's distinguished than the other tested leathers for its smallest mass, thickness and seam thickness, highest air and vapor permeability, in addition to its lowest seam pucker and its greatest seam appearance. Therefore authors recommend using it for making sportswear jackets.
- 9- Faux leather3 (off white) is like cow nappa for its smooth and soft surface. When comparing it with the other tested leathers, results referred that it has the advantage of smallest stiffness and seam stiffness, highest elongation, crease recovery and abrasion resistance making it suitable for a host of fashion apparels.
- 10- Faux leather2 (yellow) is like goat suede for its velvet-like surface. It's characterized only by tensile strength and seam tensile strength than the other tested leathers. Therefore the authors recommend using this type in apparel parts which are more subjected to high tensile strength.
- 11- There is no doubt that real leather exceeds faux leather by durability, abrasion resistance, breathability and vapor permeability but in general these properties are greater in faux leather among all the other synthetic leathers.
- 12- Faux leather exceeds real leather by elongation, drape ability, crease recovery and color fastness which effects on its aesthetic appeal. In addition it is considerably cheaper.
- 13- In the fashion world, authors' advice designers to use faux leather since it can add value to their products, and customers to purchase it duo to its high-end image and performanc

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Summary of theseventh paper

The Influence of Knitted Fabrics' Structure on Adequate Stitch Type and Density for Performance apparel

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Introduction: Performance apparel is playing a significant role in industry for special end use applications. One of the applications involves the formation of yarns to be made into performance fabrics through knitting or weaving. Performance CoolMax/Micro Modal, knitted fabrics, for purposes of this paper, are defined as fabrics used in specialty apparel, that are engineered for use in high-energy sports and activities performed in extreme environments. Clothing made of performance fabrics are said to be designed not only for fashion or just a passive cover for the skin, but to critically influence the comfort and performance of the wearer. Manufacturers have engineered these fabrics to manage moisture, regulate temperature, and provide protection from the surrounding environment. They are designed to interact with and modify the heat-regulating function of the skin as the surrounding environment interacts with them.

Aim of study: Studying the effect of knitted fabrics' structure on adequate stitch type and density for performance apparel

Experiments: Two different types of CoolMax/Micro Modal knitted fabrics (single jersey plated and interlock double face) with two various masses were produced for athletic sport suit. They were examined before and after sewing with two types of stitches (stitch type 512 and 601) and three different stitch densities.

Experimental tests: Tests were applied to determine the functional properties for performance depends on several factors like air permeability, water absorption and water absorbency to determine moisture management, abrasion resistance and crease recovery, which are quite important factors for knitted garments especially for sportswear. These properties may offer higher flexibility in designing such garments with optimized comfort

properties. In addition to seam properties like seam thickness, seam stiffness, seam breaking force, seam pucker and seam appearance.

Results:

- 14- Fabric type has a significant effect on performance.
- 15- Fabric1 (CoolMax/Micro Modal single jersey plated) has very high breathability and moisture management, therefore authors recommend using it for T-shirts and shirts of athletic sport suits. It's also ideal for other apparel items like underwear, nightwear and lingerie due to its comfort properties.
- 16- Fabric2 (CoolMax/Micro Modal interlock double face) has very high abrasion resistance and crease recovery which gives performance and aesthetic appeal, in addition to its good breathability and moisture management, therefore authors recommend using it for athletic sport suits. It's also suitable for polo-shirts, outer garments and active wear.
- 17- Fabric type has a significant effect on seam properties.
- 18- Seams of fabric2 have higher thickness, stiffness, breaking force and pucker compared with seams of fabric1. On the other hand seams of fabric1 gives better appearance than those of fabric2 because there is an inverse relation between seam pucker and its appearance.
- 19- Stitch type and density has a significant effect on seam properties.
- 20- Seams using stitch type1 (512) gives more thickness, stiffness, breaking force and pucker compared with those using stitch type2 (601).
- 21- While stitch2 provides higher seam appearance than stitch1. Therefore authors recommend using stitch type1 for sewing apparel parts which are more exposed to high stress, whereas stitch type2 can be used for sewing apparel parts that required better aesthetic appeal.
- 22- There is a direct relationship between stitch density and their seams thickness, stiffness, breaking force and pucker. Therefore authors recommend choosing higher stitch density to achieve seams with needed durability.
- 23- There is an inverse relationship between stitch2 at their different densities and their seam appearance while the relation between stitch1 at their different densities and seam appearance was directly proportional. For aesthetical seams authors recommend choosing higher stitch density in the case of stitch1 and lower stitch density in the case of stitch2 to increase performance.

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Summary of the eighth paper

Impact of Washing Stretchy Denim using Neutral and Acid Enzymes and Subsequent Softening Treatment on Physical, Mechanical and Sewing Properties

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Introduction: Comfort, versatility and durability continue to be stretchy denim's biggest assets, therefore it is known for its use in the manufacture of jeans; however, it can be used to make several apparels, depending on its mass. Even designers turn to it for inspiration occasionally. The main factors affect consumers when selecting garments are aesthetic appearance and fashion. Denim garments are subjected in industrial washing to obtain specific appearance and handle. The washing and finishing processes are utilized for the purpose of fashion and different recipes are applied for different effects which are quite significant for marketing. Washing is a novel process to impart worn-out look, to modify the appearance and to improve the comfort ability of apparel. Enzyme wash is used to fade the color of denim as well as it has an effect on the physical, mechanical and sewing properties of the denim also.

Aim of study: Studying the effect of washing stretchy denim using neutral and acid enzymes and subsequent softening treatment on physical, mechanical and sewing properties.

Experiments: Two different masses (380 & 320 gm/m²) of stretchy denim were sewed separately with lockstitch 301 by using two types of seams (lapped seam and flat felled seam) and washed using neutral and acid enzyme wash and then softened using silicone softener.

Experimental tests: The physical, mechanical and sewing properties were tested before washing, after washing and after softening. The properties that were analyzed include fabric mass, thickness, stiffness, tensile strength, seam thickness, seam strength, seam pucker and seam appearance.

Results:

- 1- Garments washing are being used as a novel process to modify the appearance, to impart worn-out look and to improve the comfort ability of the garments, especially denim garments. Enzyme washing of denim garments helps in bio-polishing and to fade the color of the denim to a desired degree depending on the processing time and conditions.
- 2- It is clear that color fading effect can be increased but that will reduce the serviceability of the garments. So an optimum enzyme wash should be chosen considering the required fading effect without compensating the important physical properties of denim.
- 3- By this paper it will be possible to know how denim apparel characteristics can be changed by industrial enzyme wash and softening.
- 4- It is further noted that tested denim before washed is almost heavier, thicker, durable, stiff and harder than the enzyme washed denim.
- 5- After the enzyme washing a significant change in stiffness was found in the tested denim and it can be said that, the softness of fabric increases after enzyme washing that gives distinctly soft denim which is more suitable for fashion garments.
- 6- The physical, mechanical and sewing properties of the tested denim are changed after washing and after softening compared within before washing. These properties are influenced by type of enzyme wash.
- 7- Acid enzyme wash actually reduces the mass, thickness, tensile strength and seam strength more than neutral enzyme wash, but the softness of the fabric increases more and the aesthetic appeal improves by using neutral enzyme wash.
- 8- Despite softening with silicone causes more loss in mass, thickness, tensile strength and seam strength, it has more positive effect on aesthetic properties whereas it causes more stiffness loss and more seam pucker loss which lets to reduce seam thickness and give better seam appearance.
- 9- Stitch A (lapped seam) scored lower seam thickness and pucker compared with stitch B (flat felled seam). While stitch B has higher seam strength and better appearance, therefore authors recommended using it.
- 10- Finally it is concluded that neutral enzyme wash supplemented with softening gives is the best value compared to all the tested denim washed properties.

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