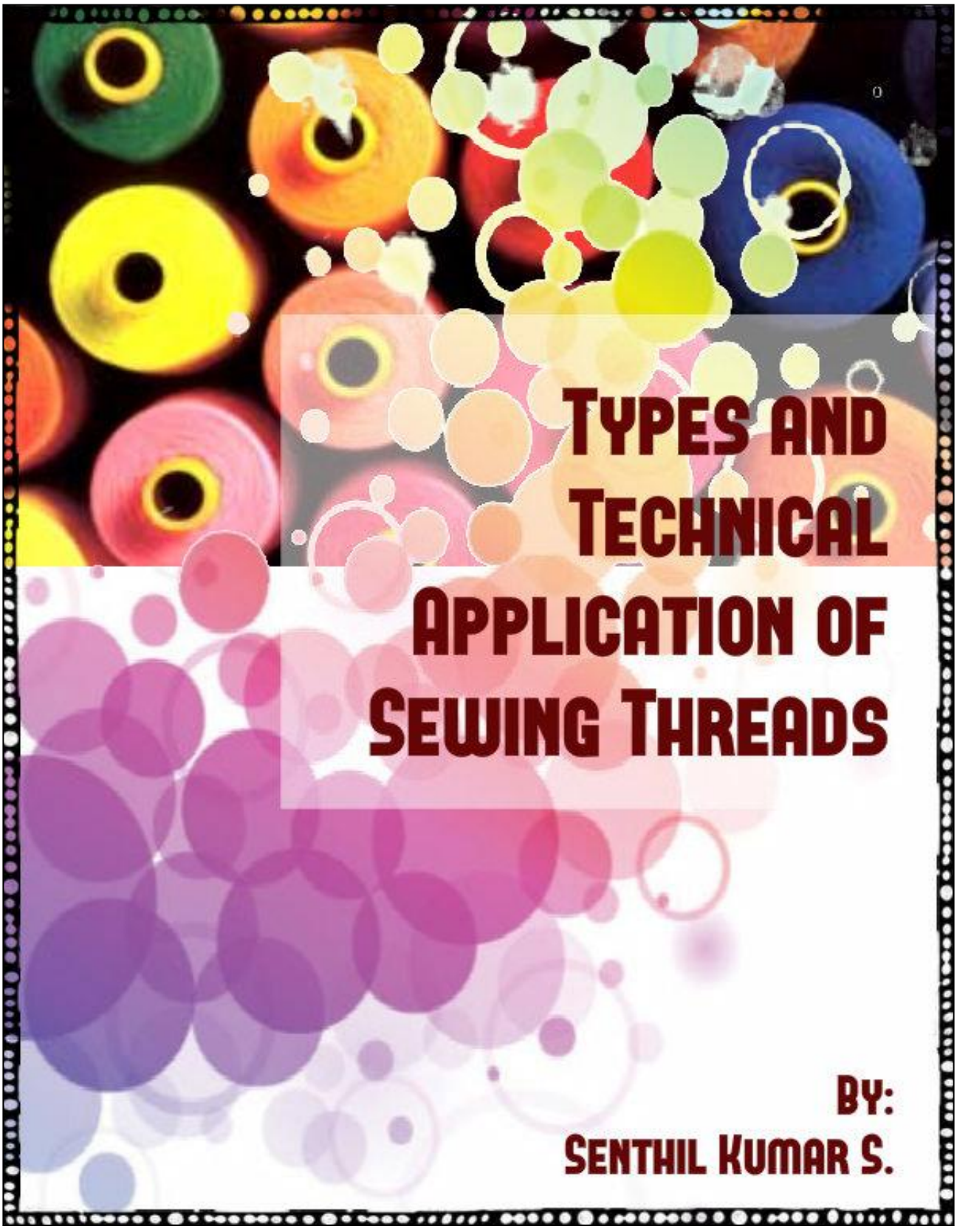
TYPES AND TECHNICAL APPLICATION OF SEWING THREADS
BY:
SENTHIL KUMAR S.

Types and Technical Application of Sewing Threads

By: Senthil Kumar S.

1. INTRODUCTION

Imagine a life without thread. Sewing threads are truly the "ties that bind" our garments together. Without them, we would still be draping skins, furs or material across our bodies to keep out the wind, weather and unwanted attention. Like an artist's palette, sewing threads come in a rainbow of colors, and are available in various materials and sizes.

Selecting the right type of threads for any sewing work is important because the color and texture of the design, and eventually the look of the final product depend on the material and type of thread used. There's a wide variety of sewing thread to choose from, so take your time to decide what type or combination should be best for the design you have in mind. More importantly, thread selections should be based on Sewability, Seam Performance and Appearance, Availability and Cost.

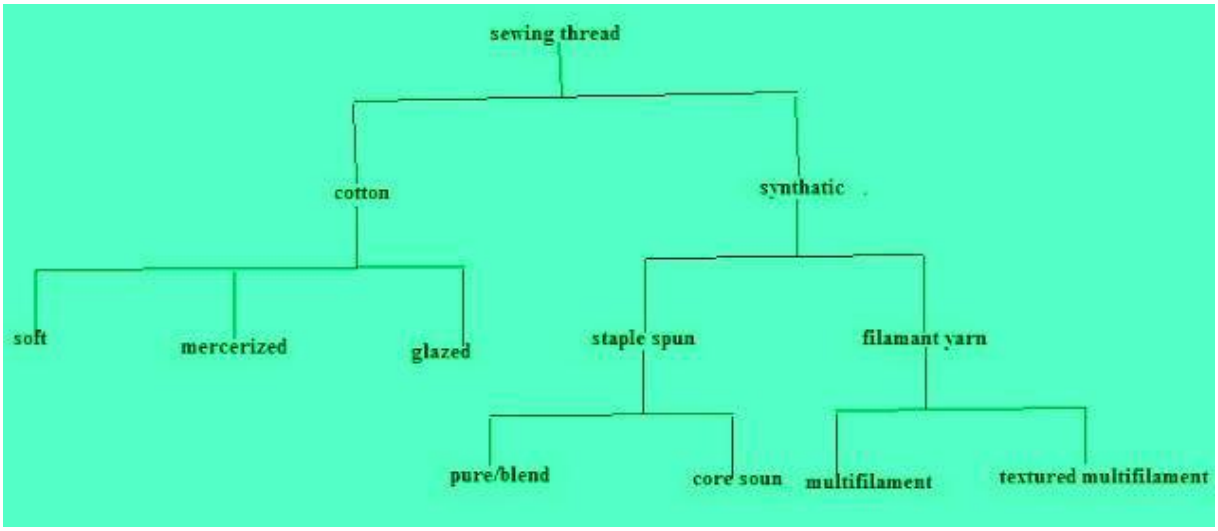

Figure 1: Classification of sewing threads

Sewing threads can make or mar garments, and hence a thorough understanding of their processing and properties is vital for the industry to choose the right type of the threads. According to the definition given by ASTM, sewing thread is a flexible, small diameter yarn or strand usually treated with a surface coating, lubricant or both, intended to be used to stitch one or more pieces of material or an object to a material. It may be defined as smooth, evenly spun, hard-twisted ply yarn, treated by a special finishing process to make it resistant to stresses in its passage through the eye of a needle and through material involved in seaming and stitching operations. Sewing threads form efficient stitches without breaking or becoming distorted during the useful

life of the product. The basic function of a thread is to deliver aesthetics and performance in stitches and seams.

2. CLASSIFICATION OF SEWING THREADS

The usage of thread made from natural substrates is now minimal in industry applications. However, the most commonly used natural thread is cotton thread**.**

2.1. Cotton

It has good strength and, low extension with resistance to shrinkage .It does not melt even at high sewing rate. Abrasion resistance also found appreciable. The negative aspects of the cotton could be due to its less durable nature, weaker then the synthetic fiber made yarns and poor mildew resistance. It can withstand at a high temperature then the synthetic fiber yarns. It based on the end uses classified in to three types.

2.1.1. Soft thread: Most commonly used soft threads need no special treatment. Low friction lubricant only required.

2.1.2. Mercerized Thread: For general stitching, button holding and embroidery purposes the mercerized threads are used. Improved luster and strength add value to the sewn fabric.

2.1.3. Glaced: Starch and lubricants are coated in the soft thread with high speed polishing performed by rotating brushes to give glazed appearance. Leather and heavy fabrics need such threads.

2.2. Synthetic

Due to the limitations of natural fibers, thread users have turned to threads made from synthetic fibers as they have desirable properties of exceptionally high tenacity, high resistance to abrasion and good resistance to chemicals. They are also not significantly affected by moisture, rot, mildew, insects or bacteria.

2.2.1. Staple spun thread: It is considered one of the best and most satisfactory performing sewing thread due to high strength at cyclic loading, good chemical and abrasion resistance properties with dye and light fastness properties with low cost. Comparative hairiness in the thread reduces thread friction and improves the Suability

2.2.2. Core-spun Sewing Threads: Extra ordinary strength and abrasion resistance of the polyester filament are provided strong and firm seams. Superior heat insulation of cotton cover makes seam totally a heat proof and excellent elastic recovery with no thread breakage at point of stress. Lubricant is retained well in the surface of the cotton to provide superior cooling to prevent thread burnout at the needle eye

2.2.3. Filament yarn: It is having good fiber strength to fineness ratio. Puckering may results due to unfavorable extension characteristics.

2.2.4. Multifilament yarn: Filaments often bonded with synthetic fiber copolymer that bonds the individual filaments and yarns together to give optimum sewing performance.

2.2.5. Textured Filament Yarns: It provides discontinuous thread in the surface, which helps to reduce the danger of thread fusion at high sewing speeds .the soft handle fulfill the soft seam requirement.

3. FIBER CONTENT OF THREAD

3.1. Rayon

This is currently the most popular thread used in embroidery machines. It has very good sheen and is often used as a lower cost alternative to silk threads. Stitches sewn with Rayon threads are very smooth, leading to a higher quality embroidery work. However, the disadvantage of this thread is that it deteriorates over time and needs to be maintained well.

3.2. Polyester

This type of thread is synthetically produced from polymer resins. It can be made with a matte finish to look like cotton or have high sheen finish like silk. It is a strong and economical thread. The advantage of polyester is that it won't fade or shrink when washed. It has a medium luster and can be suitable for any type of sewing. Due to its strength and color fastness, it is becoming one of the most popular embroidery threads available.

3.3. Nylon

This is another synthetically produced thread with good strength. However the disadvantages are many, like, not being heat resistant, not colorfast (becomes yellow over time) and also become brittle through laundering and exposure.

3.4. Cotton

This is the only 100% natural fiber thread made for high speed machines. These threads perform beautifully in machines and have a soft sheen. Embroidery floss is made up of 6 strands that can either be separated or kept together. This is usually used for cross-stitch. The advantages of cotton threads are that they are soft, durable, easily adjust to fabric for shrinkage, it is an easy care thread and is available in various thread weights. However, cotton threads aren't as strong as polyester and do not have a distinct sheen.

3.5. Metallic / Plastic

These aren't threads actually. They are made from thermoplastic with an aluminum coating which is then cut into thin strips with a laser and wound. It must be completely unwound to be used and must be sewn with a metallic needle.

3.6. Metallic

These threads are also made of gold or silver filaments but are uncommon as it is quite expensive. These threads are blended with other embroidery threads to give a contemporary look to the finish. The quality of this thread variety could be very good or very bad. A quality metallic thread has components like nylon core, rice paper construction and an outer coating.

3.7. Silk

Silk threads are used in many kinds of embroidery. A good example will be the Victorian crazy quilts. Silk threads absorb dye extremely well and it sews smoothly without breaking. It has the strength of polyester and stability of cotton. It also has a distinct sheen due to which it is costlier than the other varieties.

3.8. Wool

Wool is an animal fiber which has a soft look when stitched, and does not reflect a lot of light. It has a soft texture**.** It is used for a 'homespun' effect.

4. IMPORTANT CHARACTERISTICS OF SEWING THREAD

4.1. Tensile strength/ breaking strength

It is one of the most essential properties of the thread. It has to bear several kinetic/lateral movements during sewing.

4.2. Initial modulus

High initial modulus is important to ensure minimal thread deformation during the shock loading, which occurs at several points in the stitching cycle. High modulus is essential for good loop formation, good sewing efficiency and prevention of skip stitching. The thread must be relatively stiff to produce a clear loop during stitch formation, because high modulus value is closely related to high stiffness value.

4.3. Abrasion resistance

Abrasion resistance of thread is to play a major role because it affects the yarn breakage during sewing.

4.4. Frictional properties

Frictional properties should uniform so that equal lengths of thread are pulled forward for each stitch and each stitch pull is equally tight. The process that causes significant strength loss due to severe friction among thread, fabric, needle and other machine components.

4.5. Resistance to high temperature

It is an important characteristic of the thread. As sewing at very high speed causes, needle temperature to raise to approximately 3000C and even more which is generated by friction between needle and the material/thread, may cause fusing of fabric/thread importing poor look, poor durability of garment and reduce sewing efficiency.

4.6. Evenness with negligible faults

The sewing thread should be even and should contain minimal number of knots, faults and neps. Reason being, these faults may not pass through needle eye and may become one of the strong factors for thread breakage and poor seam appearance.

4.7. Elongation

Elongation is the amount of thread stretches before it breaks. Thread with high elongation gives seam elasticity, but it can cause poor loop formation leading to excessive skipped stitches and thread breakages.

4.8. Shrinkage

Sewing threads should have minimum shrinkage. Otherwise it will lead to seam puckering in garments. Synthetic threads suffer less from this problem then cotton threads, owing to their much lower moisture absorbency.

4.9. Balanced structure

Balanced twist and for that purpose thread is given opposite twist in playing/cabling to that of spinning. Use of highest twist factors for having better breaking strength/elongation result in snarling tendency and necessitates twist setting.

5. THREAD SIZE

Thread selection for any specific application is based on many parameters; thread size is the primary consideration in achieving the functional and aesthetics requirements of the finished product. The thread size refers to the diameter or thickness of the thread.

Thread size in US and the world market is most frequently indicated by ticket number (T). References may also be made to denier and cotton count systems. The ticket number or Tex system is based on the gram weight of 1,000 meters of sewing thread. It is a direct numbering system meaning the larger the number, the larger size of the thread; the finer thread, the lower the ticket number. When more than one ply of yarn is twisted into a thread, finding the resultant size of the thread by considering all the plies becomes necessary.

- In fixed weight systems: Resultant size = Individual yarn count / Number of plies.
- In fixed length systems: Resultant size = Individual yarn count x Number of plies.

A particular resultant size can be made with any number of plies.

- Higher the ticket number, finer the thread.
- Lower the ticket number, thicker the thread

Table 2: Calculation for ticket number

Fine ↓ Less Fine	Tex	dTex x Ply (When 2-ply)	dTex x ply (When 3-ply)	Total Decitex (dTex)	Ticket No.	Calculation for Ticket No.
	Tex 40	200 x 2	133 x 3	dTex 400	75	(1000 / 40) x 3
	Tex 60	300 x 2	200 x 3	dTex 600	50	(1000 / 60) x 3
	Tex 80	400 x 2	267 x 3	dTex 800	38	(1000 / 80) x 3
	Tex 100	500 x 2	333 x 3	dTex 1.000	30	(1000 / 100) x 3

To convert any Tex Number to a Ticket Number value: divide 1,000 by the Tex number and multiply by 3.

6. TECHNICAL APPLICATION OF SEWING THREAD

- Automotive
- Bedding and Mattresses
- Flame Retardant and Protective Wear
- Outdoor Goods and Sports Equipment
- Outdoor Pursuits
- Home Textiles
- Miscellaneous
- Filtration

Table 3: Classification of technical application

Automotive	Bedding and Mattresses	Flame Retardant and protective wear	Sports Equipments	Pursuits	Home Textiles	Filtration	Miscellaneous
Air Bags	Matters topper	Protective clothing	Fishing lines	Tarpaulin	Table cloth	Filter bags	Automotive painting
Side Door panels	Duvets and Comforts	FR embroidery	Hang gliders	Parachute harnesses	Pillows	Filter tubes	Batteries
Spare Wheel covers	Foundations	Cut proof gloves	Pool cues	Hot air balloon	Pillow cases		
Carpets	Quilting	Bullet proof vest	Canvas	Umbrella	Blankets	Geotextile	Book binding
Mats		Body Armour	Rocket covers	Stretch covers	Carpets		Bulk bags
Headliners	Multi needle quilting	FR textile	Safety belts		Curtains	Power station usages	
Gear stick covers		Safety hats	Sports bags	Tents	Furniture upholstery		Label attaching
Seat Belts		Industrial gloves	Sport Balls	Boat Tops	lace		
Seat covers	Mattresses	Safety Jackets	Sport mats			Shaker bag tech.	Polishing buffs
Seat trims		Footwear	Wetsuits				

6.1. Other application

- Femine hygiene
- Fiber optics
- Wire and cables
- Tea bags
- Tyre card

7. CONCLUSION

A high quality sewing thread that is uniform in its characteristics and dimensions can be used on a variety of machines and with a variety of fabrics. It is important to note that certain machines can accommodate a wider variety of thread sizes**.** Thread failure can often lead to product failure. Thread is not only vital to the performance of the garment, but it also affects the ease with which the fabric is sewn. Sewing thread must be carefully selected to ensure garment quality and the ease with which the product can be manufactured. When selecting sewing thread, all properties need to be considered. The way in which the various properties are inter-related should also be considered when selecting thread. To ensure quality, the physical properties of the thread, the fabric and the desired end use properties of the product all need to be taken into account. It is important to remember that one of the best resources for a sewn product manufacturer is the thread manufacturer. Thread manufacturers have competent technical personnel and laboratories that help with thread selection as well as troubleshooting problems that might arise during sewing. The sewing thread is of considerable importance, playing a major role in retaining the fabric appearance, look, and life of the garment in the long

run, even though it usually represents much less than 1% by mass of a garment. Nowadays, a numerous variety of sewing threads are available in the market due to diverse demands from the sewing industry, increasing use of different types of fibers in the garment industry and expanding application of textile materials in various fields like apparels, technical applications as well. Better understanding of the sewing process and its requirements as obtained through studies by modern instrumentation techniques has also greatly contributed to the development of new threads. It is also very much required and appreciable to have different types of sewing threads, which can suit various applications, since various end-user demand specific property requirements.

Reference

1. Kim Anderson, Selecting the Correct Sewing Thread. Textile/clothing technology, 2009.
2. M Subramanian Senthil Kannan, Processing & properties of sewing threads. Indian textile journal, 2009.
3. Chidambaram Ramesh Kumar, Dr. N. Anbumani, Prime Requirements and Classification of Sewing Threads.
4. Pradip V. Mehta, Satish K. Bhardwaj, Managing Quality in Apparel Industry, 2008.
5. Textile learner. Blogspot.com.
6. B. Sambath, Garment Technology. 2007.

About the Author:

Senthil Kumar S. is associated with the Department of textile technology at Kumaraguru college of Technology, Coimbatore.