

Thread Facts and Fiction

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Have you ever said,

“My machine won’t do that.”

“I could never do that!”

“That fancy thread never works.”

“Decorative threads break, jam, and shred.”

If you have experienced frustrations when working with specialty and decorative threads, this guide will help you solve the problem.

Problems with specialty threads can usually be traced to five causes.

1. **Quality** If you use a budget, low quality thread, you cannot expect your expensive machine to compensate. It cannot make a poor quality thread better. Start with quality thread that is worthy of your machine and your project. It does not make sense to spend thousands of dollars on a machine and then try to save a couple dollars on budget thread.
2. **Needles** Select the right type and start with a new needle every time you start a new project.
3. **Tension** Running your machine always at the same tension setting is like buying a new TV and never changing the channel. Quick and easy adjustments can make it perform as it should. Even if your machine has an auto tensioner, learn how to override it. Most machines are factory preset for sewing (not for quilting or embroidering) with a thin 50 or 60 wt. sewing thread.
4. **Delivery system** Some threads have a straight-wind pattern on a symmetrical machine spool. Others are a cross-wind pattern on a cone. Either type is OK but the intended use is different.
5. **Condition of machine** Machines require maintenance to stay in the best condition. A gradual decrease in performance is not readily noticed. Keep your machine clean and in good condition.

Thread

The higher the quality of the thread, the less special handling will be required. Poor quality thread breaks easily and can make any sewing project frustrating. Look for a guarantee. If you are not satisfied with the thread, can you return it for a refund? The best brands are not afraid to guarantee their products. Be willing to try new threads. Make sure the thread you select is intended for your application. New threads are exciting and provide new capabilities. Ask some basic questions for each project. What fabric am I using? What is the content and weight of the thread? What needle type and size? Do I need to change the tension? What would be the best thread to use for the effect I want? Each type of thread has specific characteristics and behave differently on machines. Threads are either made of a natural fiber (cotton, wool, silk, linen) or synthetic fibers (rayon, polyester, nylon).

Thread construction methods

Spun thread	Cotton or polyester staple fibers are spun into strands and then twisted together.
Core thread	Spun cotton or polyester fibers wrapped around a polyester core.
Texturized thread	Polyester or nylon that has been mechanically texturized to make the thread fuzzy and stretchy and “woollie-like.” Texturing is a procedure used to increase the volume and the elasticity of a filament yarn.
Filament	Round, shiny thread made of polyester, nylon, or rayon. Virtually lint free. Multiple strands are twisted together to make the thread.
Monofilament	Single strand of nylon or polyester filament. Avoid nylon. Polyester is preferred.

Thread types

Rayon Produced by pressing cellulose acetate through small holes and solidifying it in the form of filaments. The most common size for embroidery is 120d x 2 (40 wt.).

Characteristics of rayon

- high sheen
- soft, and works well in detail
- relatively heat resistant
- may not be colorfast
- not as strong as polyester
- less durable than polyester

Polyester Synthetically produced from polymer resins. There are three types of polyester thread:

spun poly: short staples (non-discontinuous fiber) spun together. Looks like cotton. Has less lint than cotton.

filament poly: continuous fiber.

trilobal poly: high-sheen continuous fiber. Looks like rayon or silk.

Characteristics of polyester:

- durable and designed for heavy duty use
- stronger than rayon
- colorfast
- retains shape
- recovers stretch
- can be made with a matte finish to look like cotton, or with a high sheen finish to look like rayon or silk
- trilobal poly has a sheen equal to rayon or silk and is lint free.

Nylon Nylon should exist in your sewing supplies only as a fusible (melting) thread. There is no other good reason to use a nylon thread. It melts, it goes brittle over time, and it 'yellows.' Most mono-filament threads are nylon. Some are labeled *polyamide* which is the chemical name for nylon.

Cotton The only 100% natural fiber thread made for high speed machines. Cotton has various finishes, each providing specific results.

Mercerized The thread is treated in a solution, causing the fibers to swell. This allows the dye to better penetrate the fibers and increases the luster of the thread. It also increases the strength of the thread.

Gassed Also called "silk finish" or "polished" cotton. The thread is passed through a flame at high speed to reduce the fuzz.

Glazed The thread is treated with wax, starches, or other chemicals. Although the result is a glossy, hard finish which protects the thread, the glaze does rub off and can gum up the needle and machine. OK for hand sewing. Not recommended for machines. If a cotton thread appears wiry and has no fuzz, it is glazed.

Cotton-wrapped poly. Not necessary. The outer wrapping is very thin and easily unravels. If cotton is too weak, use poly. If you don't like poly, use cotton. Most are 65% poly and 35% cotton and will be more similar to poly than cotton.

Characteristics of cotton thread:

- soft
- strong and durable if a high quality cotton
- easily adjusts to changes in the fabric because it is a natural fiber
- available in various thread weights
- easy care
- most cotton is colorfast. Some hand-dyed cottons are not.
- heat resistant

Metallics The quality of metallic thread ranges from very high to very low. A good metallic thread does not require additional lubricant. Always use a size 90/14 Topstitch or Metallic needle and loosen the upper tension when sewing with metallic thread. Most stores sell the 80/12 size and that is too small. Quality metallic thread has the following components:

- strong nylon inner core. Polyester and rayon cores are weaker.
- rice paper construction. This adds strength and cohesiveness and makes the thread more soft and supple, reducing the wiry feel. It also reduces tangling.
- protective surface. Inexpensive metallics have no outer protective surface. This means the metal foil rubs against the needle, creating friction, resulting in discoloring and shredding. A good metallic has an outer protective surface which reduces friction and acts as a protective layer.

Hologram or Flat thread. Produced by bonding layers of metallized polyester together and then precision cutting to a desired width. Available in either 2 ply or 4 ply. Always use a size 90/14 Topstitch or Metallic needle when sewing with hologram thread.

- colorfast
- brilliant, reflective, colors. Can be produced in a hologram effect.
- heat resistant. can be ironed on low or medium heat.
- 4 ply brands are much stronger than 2 ply brands.

Thread size measurement

There are many standards of thread measurement. Some companies use the Tex standard. Others use the weight standard. Others use the Number standard. Some mix up the standards resulting in misleading information. One spool of thread may be stamped No. 50, another spool may be stamped Tex 50, another spool may be stamped 50 wt., and yet another spool of thread may be stamped 50/3. All four of these are measured using different standards and we must not assume they are similar in size. When comparing threads, make sure you use a consistent standard of measurement. The top five standards for thread measurement are

1. Weight
2. Tex
3. Denier
4. Number
5. Composition

1. Weight This is the most commonly understood method and is intended for natural fibers such as cotton and silk although synthetic fibers such as polyester and rayon have arbitrarily adopted this method. The weight of a thread is actually a length measurement. A thread is labeled 40 weight because

40 kilometers weighs 1 kilogram. If it takes only 30 kilometers of a heavier thread to weigh 1 kg., it would be a 30-weight thread. Smaller numbers indicate heavier threads.

2. Tex Weight in grams of 1,000 meters of thread. If 1,000 meters weighs 25 grams, it is a Tex 25. Larger numbers indicate heavier thread.

3. Denier This method is intended for synthetic fibers. Denier is the weight in grams of 9,000 meters of thread. If 9,000 meters weighs 120 grams, it is a 120-denier thread. Most embroidery threads are 120d/2, which means two strands of 120-denier thread twisted together making 240 denier total. Larger numbers indicate heavier thread.

4. The Number standard is used on many thinner threads and is written as No. 50 (or #50) or No. 100 (or #100). Some confuse this with a Weight measurement and incorrectly suppose a No. 100 thread is a 100 weight thread. The Number standard was developed in Japan and is known as the Gunze Count system. The smaller the number, the heavier the thread.

5. Composition Standard. This standard was developed for cotton thread but has also been adopted for polyester threads. A cotton thread and a polyester thread with identical Composition numbers will be similar, but not exactly the same size. For exactness, it is always necessary to compare cotton to cotton and poly to poly. The Composition standard uses numbers like 30/3 and 50/3. For heavier threads, the first number represents the same number used in the Number Standard. The second number represents the number of plies of thread twisted together. For example, a 30/3 means the thread is a 3-ply No. 30 thread.

Thread Measurement Cross Reference Chart

Weight	Tex	No. (#)	Composition	Denier	Example
11	88	no. 20	20/3	750	
17	59	no. 30	30/3	530	Brytes, Perfect Quilter, Poly Quilter
24	44	no. 40	40/3	400	King Tut
28	35	no. 50	50/3 (if spun poly)	320	NiteLite ExtraGlow
40	25	no. 75	50/3 (if fil. poly)	225	Rainbows, Highlights, Metallic, NiteLite, So Fine
50	20	no. 90	50/2	180	MasterPiece, Vanish-Extra
60	17	no. 100		150	The Bottom Line
100	10				

Myths, Rumors, and Truths

The type and weight of the thread relates to several aspects of the project, including needle type and size, tension settings, and final result. Quilters and embroiderers often ask the following questions:

Q. How accurate are thread labels?

- A. If you place three different brands of 50 wt. thread side by side, you'll notice that they are not identical in size. Because there are many different and confusing standards of measure, labels are not always accurate. Thread measurements have become arbitrary in today's world. Synthetic threads such as polyester and rayon often use the wt. standard when this standard is meant only for natural fibers such as cotton, silk, and wool. This isn't likely to improve. The important point is to rely more upon your sight and touch than the printed label.
- Q. Should I use a 20, 30, 40, or 50 wt. thread for quilting?
- A. It depends whether you want the thread to blend or stand out.
“Heavy to show, thin to blend.”
 If you use a decorative thread, most likely you want to add dimension to the project and highlight the thread. Therefore a medium to heavy weight thread is better. A lighter weight variegated thread will not be nearly as visible as a medium or heavier variegated thread. Therefore, most lighter weight threads are not variegated.
- Q. Should I only use cotton thread in my quilts?
- A. Many quilters are traditional quilters, using only cotton fabric, cotton batting, and cotton thread. Back in Grandma's time, most of the available thread was cotton and the quilting was usually done along the pieced seams. Recent trends show a growing percentage of quilters seek an effect that cotton thread cannot provide. Many of the winning quilts at shows are done in metallics, high-shen variegated polyester, and other decorative threads. Times have changed and machine quilting has opened up a new world. No longer is quilting done only along the seams. Machine stitching can enhance the beauty of the quilt by adding intricate and complementary designs throughout the entire quilt. Machine quilting does not add stress to the quilt. Everywhere the thread goes, it strengthens the overall piece. The stress points remain in the piecing. Some say that polyester thread is too strong and will tear the fabric. If the fabric ever tears as a result of heavy use, most likely it will tear at the seams. The seams are the true stress points of a quilt, not the machine quilted areas. One solution is to piece with cotton thread, thereby matching the nature of the fabric fibers with the thread fibers. This equalizes the stress points of the quilt. Then, use other threads such as metallics, polyester, and medium and heavier cotton threads to decorate and enhance the quilt by creative quilting.
- A. Will polyester thread tear the fabric?
- A. No. Thread will not tear through a fabric solely due to its fiber content. If a thread ever tears through a fabric, it is because it won the strength contest. In a battle of heavy use and high stress placed on a quilt, the strongest component will always win. It is not accurate to say that a polyester thread is stronger than cotton. One major brand of thread is labeled 100% cotton quilting thread. It is 50% stronger than a comparable polyester thread. Although it isn't labeled as such, it is coated with a glaze which strengthens the cotton fibers and makes the thread rather wiry. In a strength test, it beats a comparable size poly, rayon, and metallic every time. In a heavily used quilt, this stiff, wiry cotton thread could do more damage than a soft polyester thread. And it is cotton. The point is this: The traditions, myths, and rumors that polyester thread will tear the quilt are not true. Under extreme use, a strong polyester thread might. But so will a strong, glazed cotton thread. Under normal use, softer non-glazed threads will not tear through the fabric and it is perfectly fine to use any type of quality thread, except nylon. Nylon will go brittle and discolor over time. Choose

your threads based on quality, feel, and appearance, avoiding wiry glazed threads. Although they are rarely labeled as such, if a cotton thread is extremely strong and wiry, it has a glaze coating. Whether you are creating a showpiece or a daily-use quilt that will be put to the ultimate tests, it is perfectly fine to use quality polyester or non-glazed cotton threads.

Bobbin Thread

Q. Does the bobbin thread need to match the top thread in type and size?

A. No. The bobbin thread can be a lighter weight than the top thread and still provide sufficient strength without adding bulk. Using a cotton top thread with a poly bobbin thread is fine. Using a 50 wt. cotton bobbin thread with a 30 wt. cotton top thread will also work. If you want a reversible look to show off decorative thread on both sides, of course it is fine to use the same thread on top and in the bobbin.

Q. What type of bobbin thread is best?

A. Because the bobbin thread does not go through a needle, there are fewer problems with bobbin threads than with top threads. Most common bobbin threads are cotton, spun poly, and filament poly. Choose a smooth, low-lint bobbin thread for best results.

Cotton Quilters love it. It keeps the fiber content consistent with the fabric, batting, and top thread. For embroidery, it is OK, but on dense fill designs, cotton bobbin thread will result in a stiff design. Beware that lower quality cottons produce more lint which in turn requires more frequent machine cleaning. Choose a good quality extra-long staple bobbin thread.

Spun poly Stronger than cotton. Like cotton, it does not have a slick surface and sometimes tends to grab the top thread too tightly creating uneven stitches and top thread breakage. Choose a type with very low lint.

Filament poly (not monofilament) This thread has a shiny appearance and is virtually lint free. It can be thin and lightweight, yet strong. Embroiderers love this thread since it creates a soft backing, even on dense designs. Many machine quilters like using a filament poly thread in the bobbin. Due to its slick surface, it works well with metallic threads and heavy cotton threads because it does not snag or grab the top thread. If you've had trouble using metallics or heavy cotton threads, a slick bobbin thread may solve some problems.

Sewing machines are factory preset to have the top and bottom thread form even stitches. If the top and bottom threads are identical in fiber and weight, adjustments should not be necessary. However, if we use cotton on top and poly underneath, or metallic on top and poly underneath, or a heavy thread on top and a thin thread underneath, it is necessary to adjust the tension settings. It is fine to use different thread types and weights on the top and bottom.

Think of the top and bottom thread as having a tug of war. If the threads are identical and you are sewing on a single layer of fabric, both sides have equal strength and the result will be a draw. The sewing should therefore produce perfectly even stitches with no top thread showing underneath and no bobbin thread showing on top. However, in the real world, the teams are rarely equal. One team will be stronger or bigger or faster than the other. We use decorative threads on top. We often use different fibers for the top and bottom threads. We also add stabilizer or batting. Sometimes we might use a cotton bobbin thread and other times we use a polyester bobbin thread. All these factors make it necessary to adjust the tension for

each project. By adjusting the top tension either tighter or looser, we are able to add or take away strength on the top thread team to equalize the tug of war battle.

Following is a list of things that affect stitch results:

1. Batting. This adds drag on top thread. Cotton batting tends to grab the thread more than poly batting, adding more friction on the thread.
2. Fabric type. Dense fabric puts more stress on the thread.
3. Top thread thickness and type. Metallic is less flexible than cotton or poly. Poly is stronger than either cotton or rayon.
4. Bobbin thread type. Cotton bobbin thread tends to grab more than a silk-like filament poly. Sometimes grabbing is preferred and sometimes it causes problems. A silk-like filament poly thread (not spun poly) in the bobbin will work better with metallic or a heavier cotton and spun poly thread because it's silk-like finish acts almost like a lubricant, sliding nicely with the thread.

Prewound bobbins

Approximately 70% of the machines on the market are compatible with the standard L size prewound bobbin. The debate continues but the prewound users are winning. Although some people may warn against using prewound bobbins, most machine manufacturers recommend and sell them. The only risk of prewounds is in the thread quality. Make sure you use a good quality thread and clean the bobbin area regularly. A lot of lint in the bobbin area means you've been using a linty thread. The advantage of prewound bobbins is in saving time and not having to wind your own bobbins. Prewound bobbins hold up to three times more thread than self-wound bobbins. Most prewound bobbins have cardboard sides, of which either none, one or both sides can be removed.

Needles

One of the most important parts of sewing machines is often the least appreciated and often ignored – the needle. We spend thousands of dollars on the most advanced machines, use the most beautiful threads and fabrics to produce our projects, but all too often this is all for naught because we either use an old, worn, damaged, or wrong needle. Needles can be damaged by normal use. You don't have to hit a pin while sewing to damage it. They can become dull or bent through normal sewing. Even some new needles have defects. Any of these conditions will contribute to frustrating thread breaks and a frayed look on your finished projects. The best advice is this: When you start a new project, start with a new needle. It's the least expensive part of the entire project. Overall, a clean, well functioning needle will result in sharp, well-shaped stitches. Keeping a good needle in your sewing machine is one of the easiest, least expensive ways to improve your embroidery and quilting projects. If you have a problem with a particular thread, first change the needle, even if it is new. This may solve the problem.

Needle type and size A 75/11 or 80/12 needle may be just right for some 40 wt. threads but will not work well with a heavier thread. If you are using a 30 wt. or 20 wt. thread, a larger needle (90/14 or 100/16) is essential. A Topstitch needle (made by Schmetz) works best because it has a larger eye to accommodate heavier or sensitive threads. If you are having problems running good quality specialty threads, try a Topstitch needle size 90/14 or 100/16 and reduce the upper tension. The trouble will likely disappear.

Needle sizes Needles range in size from a very fine 60/8 to a heavy duty 120/19. Most needles use two number measuring systems. The higher number relates to the metric system and defines the needle shaft diameter in hundredths of a millimeter. The lower number relates to the system in the U.S. and is an arbitrary number used to indicate relative needle shaft diameter. The Schmetz Topstitch needle is a favorite

of many professional embroiderers and quilters. It has an extra large rectangular-shaped eye which allows for smoother movement of thread. It also has a much deeper groove which works wonders with heavier threads. The deeper groove allows a heavier thread to lie in it, thereby reducing friction on the thread as it moves. The most popular sizes for medium and heavier threads are 90/14 and 100/16.

Tension

Tension is the term we give to the process of balancing the top and bottom threads so the machine will sew a good stitch with as few problems as possible. Not adjusting the tension is like buying a new TV and never changing the channel. You will get so much more use out of your machine when you learn to adjust the tension.

Thread tension is a combination of the thread passing through thread guides and the pressure applied to the tension disks via the tension spring. Tension is applied to the thread as it passes between a pair of tension disks. Increased pressure on the tension spring increases tension on the thread. Most machines are factory preset to sew with 50 wt. or 60 wt. sewing threads and require tension adjusting for heavier embroidery and quilting threads. If you run a heavier thread without adjusting the tension, you will have problems. The tension can be adjusted in all machines. Don't be afraid to change the upper tension. This will not hurt your machine. You can always change it back. If the tension is too high, the thread will break or will be damaged as it is pressed between the tension disks. If the tension is too low, the thread will loop on the back of the fabric. When instructions recommend lowering the top tension, the purpose is to make the upper thread more loose, which then is pulled by the lower bobbin thread, snugly through your project. This makes the stitch look formed and definite, which adds to the beauty of the project. Lowering the top tension also prevents the bobbin thread from showing on top.

When a 40 wt. thread is replaced by a heavier thread, the larger thread diameter pushes the tension disks apart, increasing pressure on the tension spring, resulting in more tension, and most likely, problems. Therefore, it is essential to adjust the tension by loosening the tension disks and/or reducing the number of thread guides through which the threads flows. Bypassing the first and/or last thread guide is sometimes the key to making a heavier thread work better because each thread guide adds to the overall tension.

Whenever you change threads, remember to take the diameter of the new thread into consideration and make adjustments as necessary.

Problem: The top thread frays.

Probable Cause: The needle is too small or the top tension is too tight. Burr in eye of the needle.

Problem: The bobbin thread shows through on the top.

Probable Cause: The bobbin is too loose, dirt under the tension spring, or the top tension is set too high.

Problem: The top thread snaps.

Probable Cause: The top thread is too tight or the needle type and size is incorrect.

Problem: The thread gathers under the needle plate.

Probable Cause: Either the top tension is too low or the machine is threaded incorrectly, bypassing the take-up lever.

Thread delivery system

The trend of the future is larger thread spool sizes. Traditional machine spools cannot hold as much thread as the cone-shaped king spools or mini-king spools. Much of the cost of a spool of thread is in the winding

process so the larger the spool, the greater the savings. If you use a cone shaped spool with a large opening in the base, it won't fit on the standard spool pin holders on most machines. Since machine manufacturers have not yet caught up with thread manufacturers, you will need either an adapter or a thread stand. The thread stand is advantageous over other home remedies such as a mason jar or coffee cup because it stabilizes the thread and elevates it higher than the machine. The vertical arm of the thread stand lifts the thread higher than the machine which then facilitates an even feed without added tension. Thread stands can accommodate any type of thread which is wound on a king spool or mini king spool. The thread on these spools is cross-wound, and is meant to pull off over the top as the spool sits flat on the thread stand. For small mini king spools, there are adapters available which fit onto the vertical pin spool holder. These are fine as long as the spool of thread is not too heavy. A heavy thread or a heavy spool placed on the vertical pin holder puts too much drag on the thread and prevents smooth rotation. If in doubt, choose a thread stand over a pin adapter. Some thread stands are all plastic, which sell for about \$5.00 and are so light that they tip over during use. Avoid those. For an additional three or four dollars, you can buy a heavy duty metal base thread stand.

The machine

Success is achieved by synchronizing quality threads, proper operator techniques, and maintaining the condition of the sewing machine. Settings and tolerances can be off, needles bent, moving parts become dirty or worn with use. All of this can affect the performance of the machine. Keep the machine clean and well adjusted. There are differences among the many machine types, but any machine should be able to run any quality thread.

If you have gone through all the above steps and still have trouble running a quality thread, it may not be thread's fault. Many factors can cause thread breaks, but not all are obvious. The tension setting, timing mechanism, lint buildup, and type of fabric and batting all contribute to the outcome. Adhesive sprays and glazed or coated threads can clog the eye of the needle, leaving less space for the thread to flow through freely.

Summary To successfully use specialty threads, the operator must be aware of the abilities and special requirements of both the thread and the machine.

- use a high quality thread on both top and bottom
- make sure the machine is threaded correctly
- make sure the entire machine is free of scratches and grooves along the thread path
- properly adjust tensions for the desired application
- use the correct type and size of needle and check that it is inserted correctly
- make sure the bobbin case is in good condition
- adjust sewing speed to compensate for other limitations

Instead of relying on the preset tension setting and a whatever-is-already-in-there needle, discover what works for you and your machine. Make necessary adjustments until you are getting the perfect stitch.