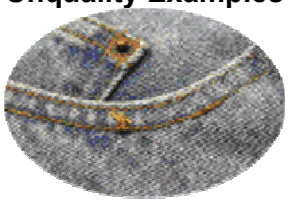
Optimizing Seam Performance for Denim Garments

Introduction

Selecting the proper thread for denim garments is very important to minimize sewing and seam performance issues. There is an old saying that: *Thread only makes up a small percent of the cost of the finished product … but shares 50% of the seam responsibility*.

Unquality Examples



Restitched Seams

Broken Stitch on Waistband

A typical pair of adult size jeans will have from 200 to 250 yards of thread in them depending on the seam construction. Most major jean manufacturers have experimented with different thread types and sizes and have found that corespun threads give the best overall performance. The cost of this high-performance thread will be approximately $.20 to $.30 per jean depending on the seam construction and size of topstitching thread. Obviously, the more thread consumed, as well as the larger the topstitch thread used on the outside of the garment, the more the thread will cost per garment.

Most jean manufacturers put their products through various wash processes after the garment is assembled, and these processes can be very harsh. The cost of these wash-processes can be from $.75 to $3.00 per jean depending on the chemicals, stones, enzymes, and process time required. The total thread cost should include the thread price and all the additional costs related to the threads performance on the production floor and in the laundry. The thread must be able to withstand the toughest wash / sand blast / sanding process, and hold the seams together for the life of the garment. In most cases, the repair costs in the laundry caused by using an inferior thread will be far greater than the cost difference of using the right thread to begin with. Don't also forget that every repaired seam after laundry (called a "re-stitched seam" on topstitching) would not be considered as 1st quality merchandise by most consumers.

Factors To Consider for Selecting the Right Thread

When you talk about sewing denim, five key issues that need to be addressed are:

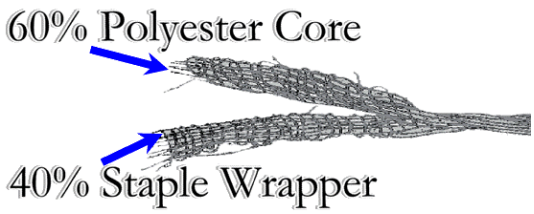
1. What weight denim is being sewn?
2. What seam appearance, boldness of stitch, do you need?
3. What wash process will the jeans see?
4. What is the after wash color that you desire?
5. What degradation issues need to be addressed?

With these questions answered, you will be able to produce jeans that meet the requirements for today's variety in Jeans-Wear. From a basic 5-Pocket Jean to the most creative pair of High-Fashion Jeans, your sewing plant can produce the quality for each.

The threads of choice used by most quality denim garment manufacturers for sewing on all types of sewing equipment, including multi-directional sewing machines, and for withstanding chemical degradation and abrasion, are the corespun threads:

- Cotton Wrapped Polyester Core - ***D-Core***™.
- Poly Wrapped Polyester Core - ***Perma Core***™.

Core Spun Threads



Core threads are made by spinning a wrapper of cotton or polyester staple around a bundle of continuous filament polyester fibers to form a yarn, and then two or more of these yarns are twisted together to form a corespun thread. Generally, the core makes up approximately 60% of the thread construction contributing to a more uniform and higher tenacity sewing thread as compared to a 100% spun polyester sewing thread. For example, a T-60 Perma Core™ thread will have a breaking strength of approximately 8.7 lbs., while a T-60 Spun Polyester thread will have a breaking strength a little over 5 lbs.

When wrapped with a cotton wrapper, D-Core™ corespun threads have very good needle heat resistance. When wrapped with a polyester wrapper, Perma Core™ corespun threads have excellent chemical resistance and color fastness. The fibrous surface on either thread reduces the shiny look and also contributes to superior frictional characteristics.

Some designers prefer the thread to wash-down during the wash processes and, if this is the case, you would select a D-Core™ Cotton-Wrapped Core thread. Degrees of color fastness will vary with particular shades. With this known factor, a user of D-Core™ Cotton-Wrapped Core should look at all wash codes to insure the thread color will be appropriately maintained. We also recommend doing pre-production wash testing to assure that the wash-down look will be acceptable.

On the other hand, many jean designers want the thread to maintain its color for the life of the garment and offer a signature look. If color fastness is key, then select a Perma Core™ Polyester-Wrapped Core thread. Also with Perma Core™ Polyester Wrapped products, you have the option of picking the desired color from a color palette to obtain the look you want after the wash procedures. This will allow a more controlled shade, which will be maintained after continual washes by the consumer. We still recommend doing pre-production wash testing prior to going into production. D-Core™ Cotton-Wrapped and Perma Core™ Polyester Wrapped Core threads offer excellent abrasion resistance to the varied wash codes that a pair of jeans may be exposed to. While most of the wash codes are now a combination of chemicals and stones to obtain the desired look, stonewashing is still predominately used along with other finishing techniques including sandblasting and hand sanding.

Other Thread Types Used in Denim

Spun Polyester

Spun polyester threads like A&E's Perma Spun™ or Excell™ are made from staple fibers that are spun into a singles yarn and then plied to make the sewing thread. They are also commonly used in denim particularly as a looper thread or serging thread to minimize the thread cost. However, spun polyester threads are much weaker than the same size of corespun thread and are not as durable to chemicals and abrasion. In many cases a larger spun polyester thread will be required even on the inside loopers and overedge seams to maintain seam strength. For example, many manufacturers are using a T-40 corespun thread for serging but they may need to use a T-45 (40/3) or T-60 (30/3) to obtain similar seam performance. Using larger thread sizes increases the cost of thread in the garment.

Air Entangled

Air entangled polyester threads like A&E's Magic™ are made from continuous filaments of polyester thread that have been entangled together into a cohesive bundle and then heat set to make the finished thread. Because air entangled threads are not made in a plied construction, they are very flat and ribbon like. This allows them to have superior abrasion resistance and makes them less susceptible to cut or broken stitches. Air entangled threads are much stronger the comparable size spun polyester threads and are ideal for loopers and overedge seams to help reduce the thread cost while producing a more durable seam.

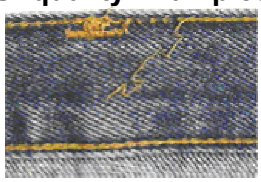
Thread Size

Both of these thread types are available in sizes to meet the variety of denim fabric weights. From a Tex 40 to a Tex 150, you can achieve the desired performance throughout the sewing floor and after the varied finishing processes. Use the correct size to obtain the desired look while maintaining seam integrity. Some basic sizes used in today's denim are:

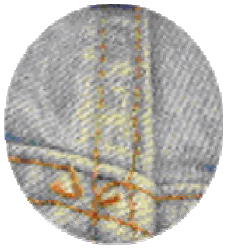
Needle Thread	Looper Thread	Serging	Application
Tex 150	Tex 80 or 60	T-40	Extra Bold Appearance
Tex 120	Tex 80 or 60	T-40	Extra Bold Appearance
Tex 105	Tex 80 or 60	T-40	Bold Appearance
Tex 80	Tex 60 or 40	T-40	Bold Appearance
Tex 60	Tex 40	T-40	-
Tex 40	Tex 40	T-40*	-
*Eight Oz. Denim usage			

Cut or Broken Stitches

Unquality Examples



Broken Stitch on Waistband



Broken Stitch on Seat Seam

Most manufacturers of denim and twill garments that pre-wash garments after they are assembled have experienced problems with excessive "cut" or "broken" stitches. In fact, many manufacturers have found this problem to be significant, reaching in excess of 20 to 30% of the products being sewn.

Many times this problem occurs when a previously sewn stitch line is crossed during a subsequent operation and the needle damages the thread in the seam. Broken stitches can also occur when there is excessive abrasion or chemical degradation of the thread during the wash process. Let's now discuss what are some of the major causes and solutions to these problems.

Solutions

1) Many manufacturers have significantly reduced the number of "cut" and "broken" stitches by using high-performance sewing threads. Make sure the correct thread type and size are being used in both the needle and bottom (looper) positions. Core threads that have a continuous filament polyester core in each singles yarn are more resistant to cutting and degradation than 100% spun polyester threads and other thread constructions.

2) Usually, the larger the thread size, the more resistant the thread is to being cut by the needle or feed or to failure due to chemical degradation or heat. Because of this, many manufacturers have increased the thread size on critical operations like waistbanding, seat seaming, etc. Typical thread sizes used on heavy denim run from T-150 down to T-60 depending on the desired look. Typical thread sizes used on twills used in the manufacturing of chinos run from T-40 to T-60.

3) Inspect the needle point at regular intervals and check for sharp or burred points. If the needle point is damaged, replace the needle. Many companies have found that it is best to replace the needle on critical operations at regular intervals once or twice a day.

4) Use proper thread tensions. Make sure the stitch on the seam line is loose and be able to move if the needle hits it during a subsequent sewing operation. This will also allow the stitch to flex during washing minimizing broken stitches. Tight machine thread tensions will not allow proper flexibility in the stitch and will increase "cut-stitch" damage. Generally, on chainstitch seams, the ideal stitch balance is when the needle loop on the underside of the seam lays over half way to the next needle penetration. This can be checked by unraveling the looper thread and observing the needle thread on the underside of the seam.

5) Check the edges of the needle plate and presser foot needle holes to make sure they do not have any sharp edges or burrs that can damage the thread during sewing. Properly remove all burred or sharp surfaces making sure not to oversize the needle holes which can lead to excessive "flagging".

6) Inspect the feed dogteeth directly behind the needle holes and make sure they are not sharp. If required, buff the feed dogteeth with a wire wheel or with a stone if they appear to be sharp. Be careful not to remove too much of the feed dogteeth that could hinder the feeding or interfere with chaining.

7) Use the minimum amount of presser foot pressure to get a uniform stitch length. Excessive presser foot pressure can cause the thread to be damaged when it is compressed against a relatively sharp surface. On some machines it is sometimes necessary to use a presser spring with fewer coils per inch to give more consistent pressure even when crossing heavy seams.

8) The proper type and capacity folder should be used to prevent stalling when crossing heavy seams. Feed stalling will increase the chances of "cut" stitches.

9) Check for signs of needle heat or excessive heat exposure during laundering that may be melting the thread. Usually, if the thread has been damaged by heat, the thread will have a hard melted surface that can be felt or seen using a magnifying glass. If you suspect that needle heat is a problem, try using a special coated needle or needle coolers to reduce needle heat. Make sure the thread has the proper type and amount of lube. Most major thread suppliers have developed high-performance lubricants to minimize heat damage on polyester threads. A cotton wrapped core thread may be more resistant than a 100% polyester thread.

Damage Done During Pre-Washing

Sometimes partially damaged thread from the sewing operation will fail during stone washing or other processes. Most of the time this damage is difficult to detect but should be investigated using the suggestions mentioned on the previous pages. On the other hand, many seams are damaged during the wash processes due to excessive abrasion, chemical degradation, and heat degradation. To reduce damage to the thread in the seams, we suggest the following:

- Make sure the correct thread fiber type, thread construction, and size are being used. For example, 100% polyester like A&E's Perma Core™ is much more resistant to enzymes and chemicals as compared to cotton wrapped core threads.

- Work with your laundry to develop good standards with regard to the type and amount of chemicals, rocks, cycle times, and temperatures that are being used in both the washing and drying processes. You should monitor and properly test the following:

    1. Changes of rocks and chemicals from one vendor to another.
    2. Changes of cycle times.
    3. Changes in temperature during the washing or drying cycles.

Evaluate the best way the garment should be processed, whether it should be inside out or right side out, the fly buttoned or not buttoned, etc. Care should be taken if the garments are turned right side out when they are still wet. Extra moisture in the garments can cause excessive whipping of the bottom hem seam causing excessive damage.

Thread Cost

Corespun threads generally have a higher purchase prices than spun polyester and air entangled threads. However, the total cost of thread, which should include any additional maintenance costs related to thread sewing and seam performance, generally makes corespun thread a real value.

Ways of Reducing Cost

In today's competitive market place, everyone must be concerned about costs. Ways of reducing thread cost without sacrificing performance might include:

- Using high performance threads like Perma Core™ and D-Core™ that reduces down time and rejects due to seam failure and minimizes repairs after laundry. Repair rates in the in the laundry can be as high as 20% to 30% when using spun polyester sewing threads. Our experience is that, if Perma Core™ and D-Core™ are used along with the other recommendations mentioned above, these repair rates would drop to less than 2%. This can result in a sizable cost savings in the laundry that usually overcomes the higher initial purchase price of core thread versus spun. (See the PDF file for Performance Gains Calculator Using A&E Core Thread on our website for evaluating these costs.)

- Using smaller thread sizes (example: using T-40 corespun thread on serging or using T-60 corespun thread in loopers on main seams instead of a heavier topstitch thread size).

- Using natural or white instead of dyed thread on the loopers or inside threads. Natural D-Core™ threads are less expensive than vat dyed, D-Core™ threads. White Perma Core™ threads are less expensive than vat dyed, Perma Core™ threads. This can reduce your thread cost by as much as 10 to 12%.

- Using a less expensive thread constructions on non-critical seams. This might include using Perma Spun™ (spun polyester) or Magic™ (air entangled) threads as looper and serging threads on the inside of the garment.

A&E has an excellent technical service team ready to assist with any questions that you may have concerning thread application or thread selection for any denim program you will sew. Also, they will be able make recommendations on the correct needle size and machine setup for obtaining the maximum efficiency and seam quality for each operation.