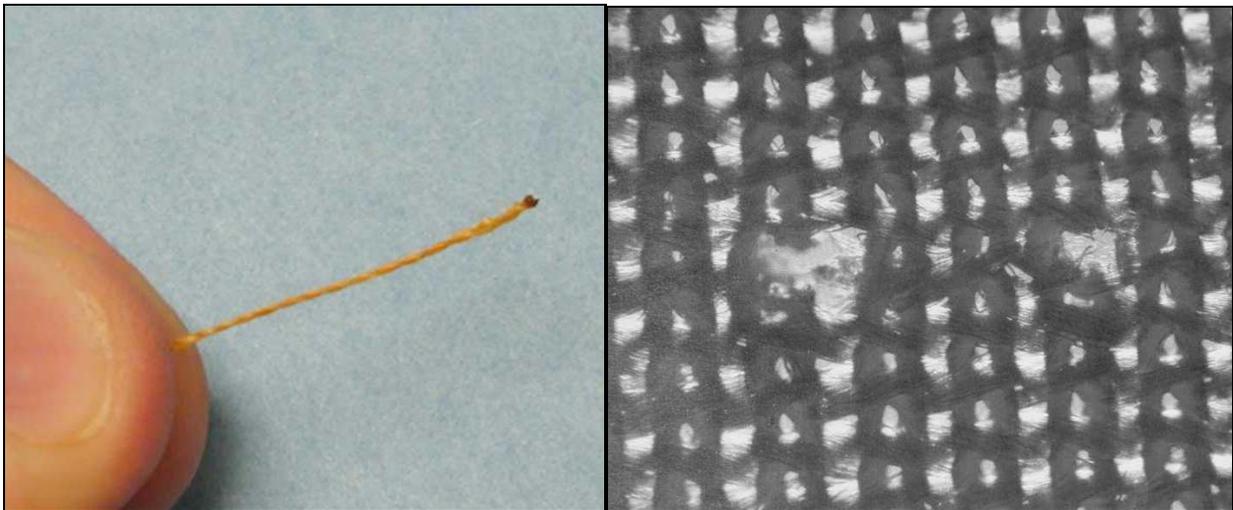


MINIMIZING NEEDLE HEAT

Today, many high-speed industrial sewing machines sew at very high speeds from 4,000 to 10,000 stitches per minute. Also, most apparel or non-apparel items are sewn with synthetic threads like polyester or nylon. Since these synthetic threads are produced using a melt-spinning process, they can melt if the needle temperature surpasses the melting point of the thread. Many fabrics being sewn are also made from synthetic fibers that can be impacted by excessive heat. Some needle holes that appear to be needle-cuts are actually caused by excessively hot needles. In this bulletin we will discuss what are the causes of needle heat and what can be done to minimize this problem.



Nodule on end of Thread

Needle Holes caused by Needle Heat

Needle heat is the result of the friction between the needle and the fabric during sewing. The following factors can impact the amount of heat that is generated:

- * Thicker fabrics
- * Fabrics with harsher finishes or greater density
- * Fabric color or density (darker colors generally are worse than lighter colors)
- * Higher sewing machine speeds
- * Needle contact surface
 - Larger Needle Sizes have more contact area
 - Longer Needle Types have more contact area
 - Single grooved needle has more contact area than double grooved needles.
 - Some needle surfaces generate more friction than others.

Needle heat is generally more of a problem when sewing either synthetic threads and / or synthetic fabrics and can cause excessive thread breakage and / or damage to the fabric being sewn. Needle heat will cause thread breakage when the operator stops sewing after a long run and the thread comes to rest in the needle eye not during sewing. The result is that the polyester or nylon thread melts and breaks. Both polyester and nylon have a melt point of approximately 485°F or 252°C. Whenever the needle reaches a temperature higher than the melt point of the thread, the thread will melt. Needle thread breakage due to needle heat can be detected by checking the end of the thread to see if there is a hard nodule where the thread melted and resolidified.

Thread companies put a thread lubricant on the thread to help minimize needle heat and give the thread good frictional characteristics to set a uniform balanced stitch. Generally, larger sizes of thread that are sewn into to heavier weight garments have a heavier lube application to protect the thread against needle heat.

WAYS OF MINIMIZING NEEDLE HEAT

1. Use a smaller diameter needle whenever possible. A smaller diameter needle has less surface area and therefore will minimize needle heat. This may be the solution in marginal situations.
2. Use a "ball eye" needle. A "ball eye" needles have a larger diameter across the eye (.003 or .004 inch) than the blade diameter, therefore, it opens up a larger hole minimizing the friction on the needle blade. Some needle manufacturers even have "oversized ball eye" needles that can be used to also reduce needle heat.
3. On leather, vinyl and other homogeneous fabrics, it is recommended to use needles with either a diamond, triangle or wedge point. These point types actually cut through the fabric minimizing the penetration resistance and needle heat. Cutting point needles are not recommended for woven or knitted fabrics due to the potential for fabric damage.
4. Use needles with special low friction surfaces. Most needles have a low friction chrome plating, however there are other special needle coatings like Teflon or Tungsten that will minimize the friction between the needle and the fabric.
5. Use needle coolers or devices that blow cool compressed air on the needle during sewing. This requires the availability of compressed air and lines carrying this air to the sewing machines. This is standard on many new high speed sewing machine available today.
6. Use a cotton wrapped polyester corespun thread like A&E's D-Core. The cotton wrapper acts as an insulator protecting the thread from the heat.

7. Ask your thread supplier if they have products available with heavier lube applications. The danger of using excessively high lube applications is finish migration in to the seam.
8. Equip the machine with a needle-positioner that positions the needle down after long high-speed runs. This allows the fabric to help dissipate the heat and hopefully preventing the thread from melting, however, it can cause more needle holes on synthetic fabrics.
9. Reduce the sewing machine speed to an acceptable level to minimize thread breakage due to needle heat.

If you have any questions concerning this Technical Bulletin or you would like additional assistance, please contact your local A&E representative.