Coats

02

Bulletin Post

COATS SEWING SOLUTIONS

Thread Elongation

One area of sewing thread technology which is perhaps not so well understood is that of thread elongation. This is often mentioned in connection with synthetic sewing threads generally when manufacturers try to use it as a basis for comparing different threads; but more often than not, these comparisons lead to confusion.

What is elongation?

If the length of a thread measuring 100 cms can be stretched to 110 cms, at which point it breaks, it is said to have 10% elongation at break. In other words, *elongation* is simply the amount (expressed as a percentage of its original length) that a thread is extended at its breaking point. This is quite different from *elasticity* which refers to the ability of the thread to stretch and recover its original length following the removal of any load-causing tension.

Production methods and materials utilised for sewing threads vary widely, and it's no surprise to come across threads which differ considerably in the amount that they can be stretched. It is also not uncommon to find a thread manufacturer specifying an elongation of, say, 20% for a particular thread, while another manufacturer will claim superiority for his product with an elongation of 14%.

An unnecessary consideration

Thread users are understandably confused by claims like these, for it is hard to know how useful this information is and the extent to which it should influence their choice of thread. The truth is that figures representing elongation at break give little indication of a thread's pattern of behaviour during sewing.

There is a simple reason for this: under normal sewing conditions, synthetic thread is never subjected to tension even approaching its breaking load. As far as practical sewing applications are concerned, it is inappropriate to consider how the thread will react under hypothetical conditions. Factors such as elastic modulus, lubrication, thermal resistance and regularity are most important with regard to sewability. Elongation at breaking point is important only as a single factor involved in seam stretch. Loop strength, shrinkage (wet or dry), abrasion, and chemical resistance, etc., are important in achieving other seam properties.

Elongation at sewing tensions

It would be much more useful to evaluate thread elongation at the actual tensions a thread encounters during sewing. Unfortunately, the complexity of sewing operations, and the variety of machines and thread that would then need to be taken into account, make it virtually impossible to establish a comprehensive set of figures for elongation during sewing, for the full range of sewing threads.

However, measurements obtained during high speed sewing, using a tension transducer developed in Coats' laboratories, have shown that the maximum tension developed in medium grist threads rarely exceed an applied load of 500 grams force (gf) and are generally much lower, in the course of normal sewing.

Recent research has shown that the stretch characteristics of the thread upto this load affect the loop forming properties of the thread during sewing and hence, its potential to suffer from skip stitching.

Consider three staple spun polyester threads – A, B and C – prepared using different methods and with elongation at breaks of 15, 17 and 21% respectively. The elongation of A is quite different from that of B and C which are similar at a load of 250 gf (Fig. 1).

Using video / stroboscopic techniques, the sewing loop of threads A, B and C were studied and their relative sizes compared. Figure 2 shows the graphic representation of these three thread loops.

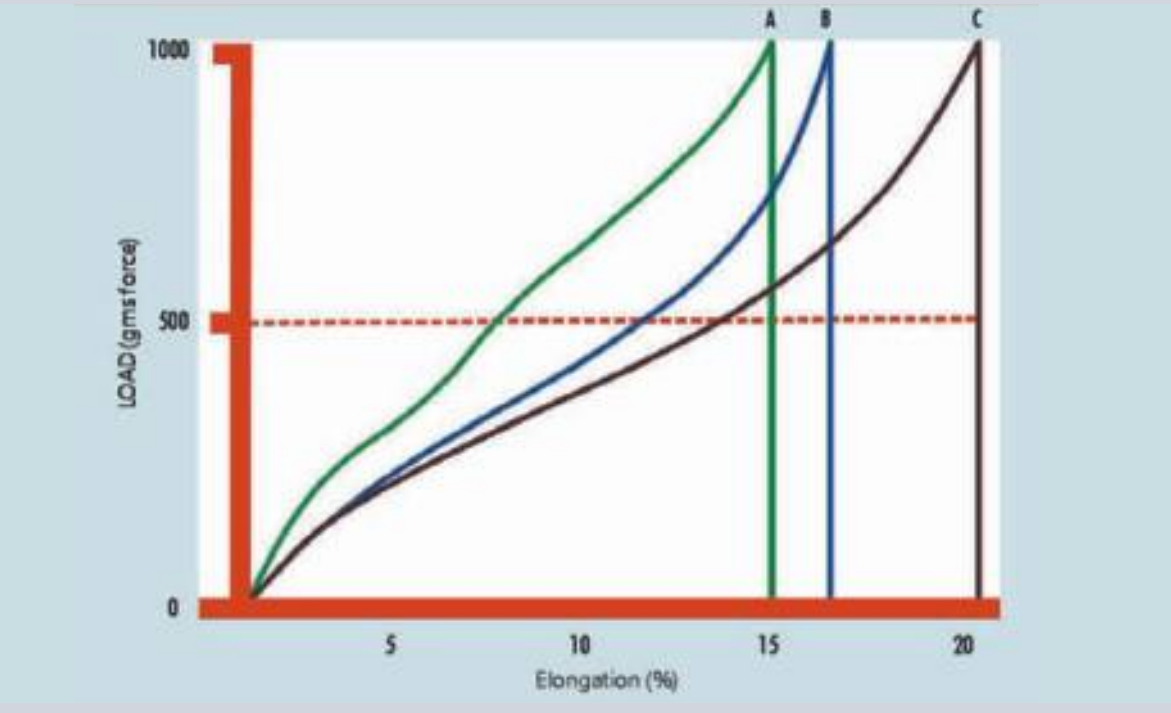

Fig 1. Elongation of three staple spun polyester threads, pre-stressed by different methods

Those of B and C are markedly smaller compared to that of A. So, when threads B and C are being sewn on a production machine, their smaller loop will give them a higher potential to skip stitches under conditions where:

1. The needle is deflected, for example, by sewing over previous seams
2. Fabric flagging occurs, and;
3. The loop taking device (hook or looper) being offset to the needle

Hence, there appears to be a link between these two factors and, by measuring a thread's elongation properties at low loads, it is possible to predict to a certain extent, its potential to skip stitches.

So, knowing the elongation at break is not particularly helpful when balancing one synthetic thread's sewing qualities against those of another, unless the elongation is above, say, 30%. If there is no significant difference in the thread's extensions at low loads, there is no justification for insisting on threads which have low elongation at break.

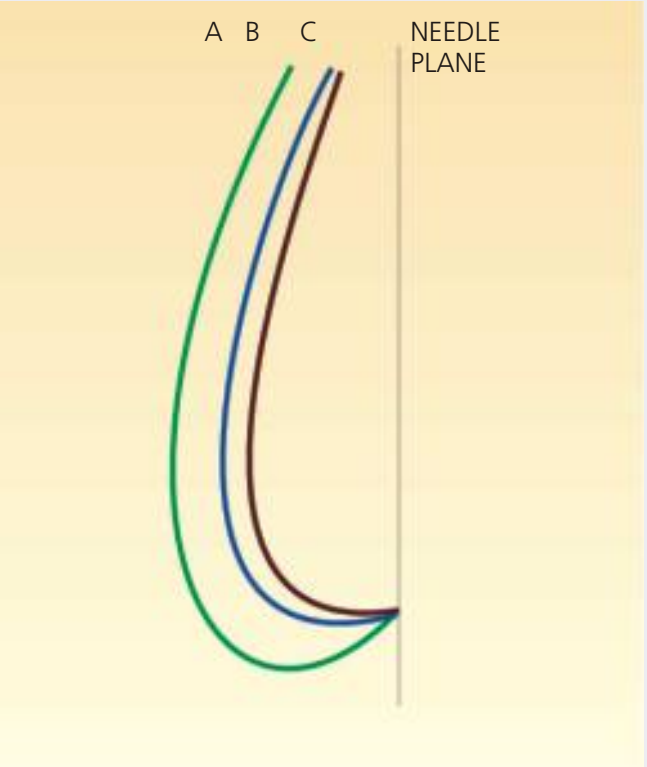

Fig 2. Loop sizes of the same three threads during sewing

Choosing the right synthetic threads for modern high speed sewing machines depends on other more important factors being considered – factors such as regularity and quality of lubrication, thermal stability, and low fault levels.

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