Heavy yarns

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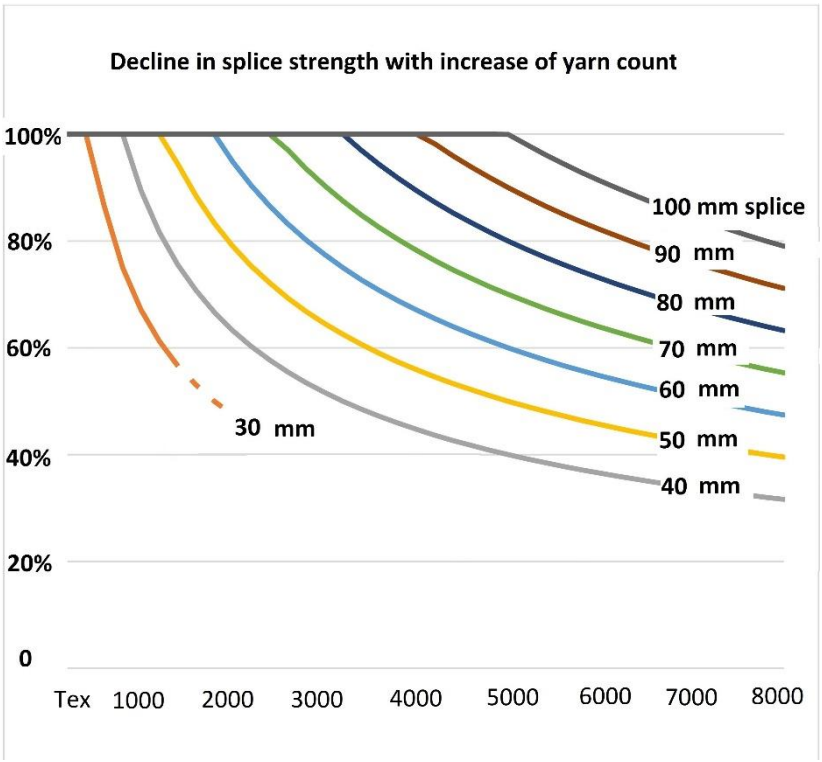
The problem of “scaling” with big yarns – longer splices

Most pneumatic splicers have a pair of cutting knives. Knives are useful because they allow the operator to place yarns into the splicing head without taking too much care, secure in the knowledge that the splicer will trim off the excess unwanted yarn. Most splicers have a knife separation of around 30 mm, so that the splice is also about 30 mm long.

As yarns increase in size, a problem of “scaling” begins to appear. Ideally, all splices, regardless of the diameter of the yarns, should have a similar geometry; the length of a splice should increase approximately in direct proportion to the diameter of the yarns being joined. A common measure of yarn size / weight is “Tex”. As examples, ladies’ hosiery yarns are 2 Tex, clothing yarns are about 50 tex, and carpet yarns up to about 1000 Tex. As yarns increase in size, strict performance parity can only be achieved by making a corresponding increase to the size of the splicer, and the separation of the cutters. No standard splicer (typically 30 mm splice) can do this. The chart shows how performance declines with increase in Tex.

New yarns for modern industries go up to 16000 Tex; we need a very long splice, exceeding 100 mm.



So we are left with one of two options:

- Do away with the knives, and trim by hand.
- Make a big and complex splicer, with wide or variable knife spacing.

But splicing carbon and glass poses additional problems; making a bigger splice is not enough, because brittle filament are easily destroyed by the air blast. The designer is faced with an impasse:

- He needs to create many wraps.
- With a high-modulus fibre, he needs to raise the air pressure, to persuade the filaments to wrap.
- With a brittle fibre, he cannot apply the pressure sufficient to generate the required geometry without breaking filaments

These requirements seem incompatible. But Airbond tried new approaches, which involved making a discrete number of splices, side-by-side, at a defined spacing. Excellent splices can be made by using three splice actions, making a triple-splice about 100 mm long, at a lower air pressure than would be used for a single splicing chamber. Splice appearance is good and strength excellent – up to 95% of parent yarn strength. Low pressures ensure that carbon, in particular, is largely undamaged. Already, counts exceeding 15000 tex are being spliced successfully.

The Models 113, 114 and the 700 Series achieve these ends, and are kept simple, and require hand-trimming.

We do make a big, complex splicer, which does everything automatically. It has wide-spaced knives, and multiple splicing chambers. It can have full electronic control. It produces superb results, but is more expensive than the other products.

The problem of cutting performance on big yarns

Assume that we offer a splicer with knives which are set wide. Then we have to consider the cutting efficiency of the knives. Though not part of the intermingling process itself, cutters perform a very important function in a splicer, and if they are not effective, they can ruin the splicing performance.

The primary function of a splicer is to make an unobtrusive joint. In the case of the standard ends-opposed splice, the profile of the joint itself should be as flat as possible; in addition, the "tails", fibres projecting out of the ends of the splice, should be as small as possible. If the tail on either side of the joint projects too far, and is too "fluffy", then the tail may get caught in a needle eye, thereby defeating the whole purpose of the splice. The chances of getting an unobtrusive tail are maximised if the cutter knives are effective. If the fibres on each side of the joint are cut efficiently, cleanly, and quickly, then the splicing action is more likely to draw in the fibres on either side of the joint, thereby causing the tails to become small or invisible. If the cut is poor, one or more fibres will remain un-cut, thereby making the splice rough and untidy, and the tails long, In extreme cases, very poor cutting can completely ruin the splice.

So, even if the matter of knife separation is solved, eventually we shall encounter a yarn which is either too big or too tough to be cut. Our big new splicer offers quite a good solution. It has cutters which are driven by air, but, instead of making one simple scissor-cut, they vibrate very rapidly. So they can cut tough yarns, because the cutting action is very violent.