Getting Control of Your Tension

It's Critical in Tow Cutting

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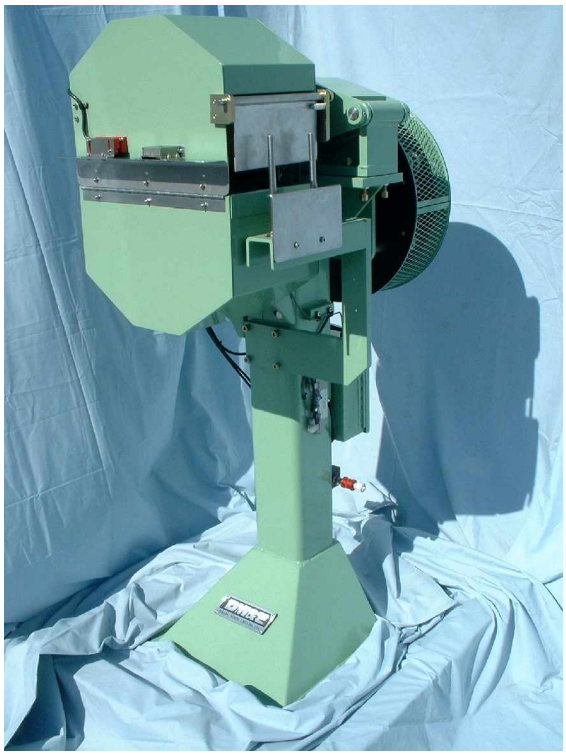

DM&E Mk4 two-roll Tension Stand w/optionalbrake.

The manmade fiber industry is filled with tension. Production schedules that fall behind, processes that will not cooperate, or employees who fail to follow even simple instructions can cause tension. Problems like these create personal tension, and we all make an effort to eliminate this tension. But some tension is essential, especially when it concerns tow cutting.

With a few exceptions, the radial blade tow cutter is universally used to cut manmade fiber into staple. Fiber is wrapped around a reel fitted with razor blades facing radially outward. As the reel turns, successive wraps accumulate around the blades until the inner wraps are forced against and through the blades by a fixed presser wheel.

Tension applied to the incoming tow secures tow against the blades. If the tension is too high, the tow will slip when the reel turns. On longer cut lengths excessive tension can apply enough force on the razor blades to sever the tow. Insufficient tension creates a loose wrapping around the reel. The loose tow will then accumulate in front of the presser wheel until the excess tow folds over and the resulting three layers of tow must be cut. Gutting the folded tow frequently breaks blades, and always causes cut-length problems.

Threading tow through a ladder of polished bars can create tension in the tow being pulled into the cutter. As the tow is wrapped around more bars, final tension increases. The problem with ladder bars is that any increase in infeed tension is multiplied as the tow passes through the ladder. If the tension from the supply increases, the first bar is gripped tighter, which causes the second bar to also grip tighter. Multiplication continues as tow progresses through the ladder. This is the least preferred method of applying tension to tow.

Many cutters employ a two-roll stand to supply tension to the tow band. These stands can vary the tension by controlling the compression force between two rubber rolls as they grip the tow. Varying the compressing pressure changes the rolling resistance of the rolls. Stands of this nature are generally limited adding 40 Ibf (180 N) of tension to the tow band. Two-roll stands always add tension. There is no feedback of downstream tension and the arrangement will add up to 40 Ibf (180 N) of tension regardless of any other devices in the tow path. Without a brake, two-roll nip stands cannot maintain tension during a cutter stop and restart, which is essential for cut length control. For less critical products and low-tension processes, these stands offer an economical solution.

For accurate cut-length control, consistent tow band tension is essential. As increased throughput on tow cutters is demanded, higher tensions are required to maintain cut-length uniformity. Very short cut-length applications also require high controlled tension. Regulating tension stands are essential to satisfy these requirements.

TENSION STAND IS BEST

Only a tension stand that measures and regulates the final tension of the tow band can deliver consistent performance. Typically, the tow is gripped by a nip roll arrangement, and a dancer system, or tension roll, senses the tension in the tow band as it is pulled by the cutter. A brake or motor connected to the nip roll is electronically adjusted to control resulting tension in the tow band.

Tension stands that utilize a disc brake system to regulate tension offer simplicity and consistent tension control. Brake controlled tension stands function best when the infeed tension is a small fraction of the tension required at the cutter. These stands require only a pneumatic connection and 110/220 VAC power. They offer tension control independent of speed, and maintain tension when the cutter stops. With very low maintenance requirements and consistent performance, tension stands of this design can economically control tension from 50 to 600 Ibf (220 to 2700 N).

DM&E 310 Regulating Tension Stand.

When the supply tension exceeds requirements for the required tension at the cutter, a motor controlled regulating stand must be used. The motor drives the tension stand when the supply tensions are high and changes transparently to function as a brake/generator when braking force is required. The tension stand motor can be coupled electrically to the cutter motor. Excess energy developed during braking action can then be transferred to the cutter motor. Sharing the excess energy with the cutter motor offers energy savings, but requires a compatible motor system on the cutter.

The software and equipment requirements for speed coordination with the cutter can be complex, and may outweigh the energy savings over a brake controlled tension stand. Motor controlled regulating tension stands are also available for installation as independent units, and either can be configured to control tension from near zero to 600 Ibf (2700 N).Getting control of essential tow cutting tension will reduce many personal tension problems.

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