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SLITTING BASICS

I. SHEAR SLITTING: Set-Up Methods: Final Adjustments: Overlap, Side Pressure, Cant Angle

a. Machines with Male and Female shafts

VOCABULARY:

Male Knife = Top Knife = Upper Knife = Dished Knife

Female Knife = Bottom Knife = Anvil Knife

Arbor = Shaft = Mandrel

Cant Angle = Toe-In / Toe-Out of the knife pair

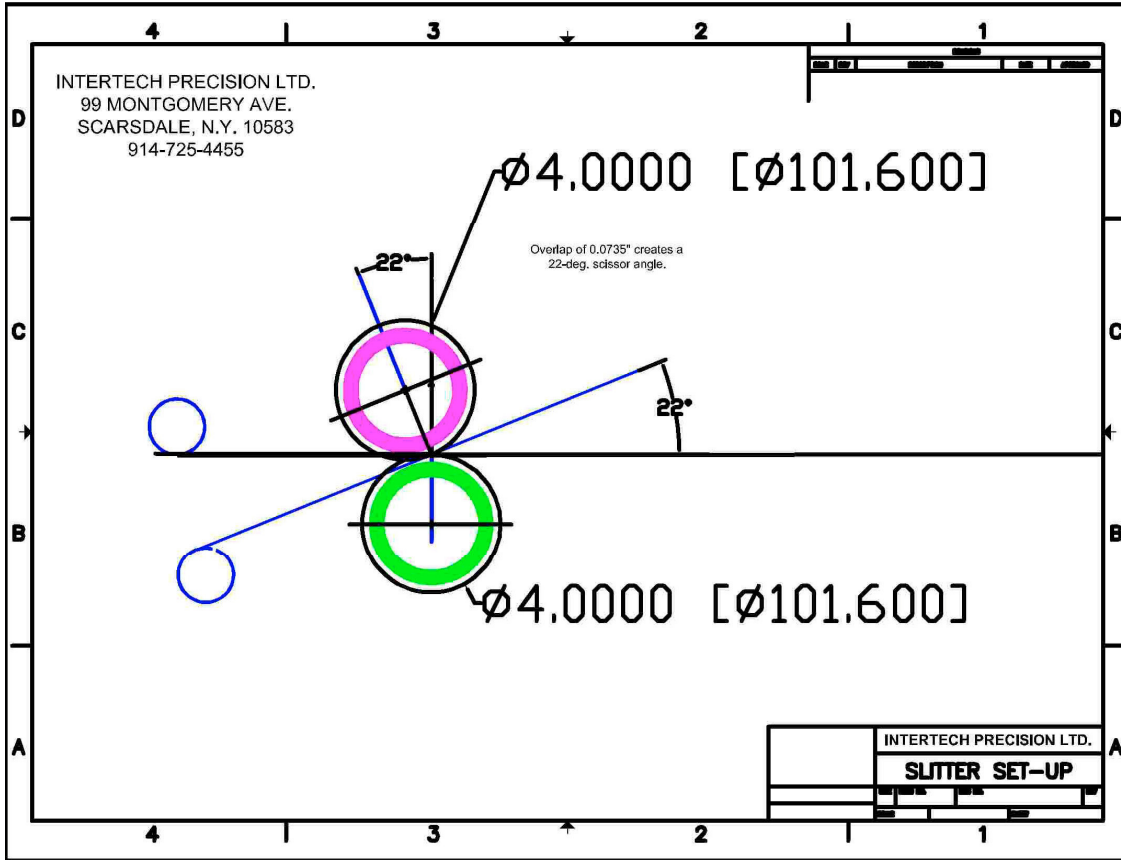
Set-up Adjustments:

1. The **OVERLAP AMOUNT** between the Male and the Female Knives.
2. The **SIDE PRESSURE** between the Male and the Female Knives.
3. The Proper **LEVELING** of the Slitting Machine itself (Tramming / Cant Angle).

OVERLAP

There is a fairly precise overlap amount that will produce optimum shear slitting results.

- The exact value will range from 0.025" for knife diameters of 3" ; 0.035 for 4" knives and 0.045" for 5" knives.
- Wide machines with small diameter shafts and larger number of knives may exhibit shaft deflection when slitting heavy materials. Deeper than the above recommended engagement depths must be used.
- All of the Male Knives **MUST BE** exactly the same outside diameter.
- Reground Male Knives must be kept in carefully marked (color coded) sets to facilitate exact overlap amounts across the entire shaft. (see Intertech grinding info).





SIDE PRESSURE

“The lighter the better” (for knife life, that is). Other factors for the correct knife to knife loading value include the material thickness and stiffness.

- Easy to slit materials (thickness > .001” and stiffness > 3*) require approximately 4 to 20 ounces.
- Thin and limp materials require top condition knives and a level machine.
- Stiff and thick materials require 1 to 3+ pounds of side load per knife pair.

LEVELING of entire machine

The slitting machine is often not sitting exactly level on the factory floor. The best way to confirm this is to make a test slit with tissue paper (the tissue test).

FINAL TESTING

TISSUE TEST:

- First, test slit a foot or two of soft facial or toilet tissue in the normal run direction of the slitter.
- Next, test slit a foot or two in the opposite direction (put the tissue in the output side of the knives) and turn the shaft backwards.

A level machine cuts equally well in both directions whereas a machine with a slight twist (out of level side frames) will slit well in only one direction. If the slitting is good in the normal machine direction, you are ready to run the job. Otherwise, the forward leg on the right side of the machine must be raised when the bottom knife-edges are facing to the right looking downstream towards the rewind section. This helps correct the “toe-out” condition that is detected using the tissue test.



SCISSORS TEST:

The scissors test and the tissue test offer a valuable insight into the requirements of a Rotary Knife Slitting and Rewinding Machine. Good, new scissors or medium or even old, bad scissors offer up information when used to test the material to be slit in your machine.

- New Scissors show how easy or difficult it actually will be to cut your current material before you run it in your slitter. A good (new condition) scissors are the only type that can cut non-wovens, tissue paper or other difficult materials.
- Medium condition Scissors mimic slightly worn slitter knives and gives an indication how sensitive your material is to knife wear. If your material can be cut even with slightly worn scissors you should have no significant trouble slitting this material in your machine....if all the above requirements are met.
- Old, loose and worn Scissors indicate whether your web material is so easy to slit that even a poor knife condition does not prevent you from running the job (photocopy paper is an example of easy to slit material).
- A hand held magnifying lens with 10X or 20X magnification will allow you to view and compare the slit edges. Look and see if the slit edge on your material looks as good as the edge created by making a test cut using a good condition scissors to cut your own material.
- Machine slit edges that look ragged are caused by knives with worn, ragged edges; or by improperly set-up knives; or by machines set-up to "Kiss Slit" where the inbound web is not *EXACTLY* aligned with the nip point of the knife pair.



SLITTING CONSIDERATIONS:

There are many other aspects of slitting and converting that need to be considered when trying to understand and improve your slitting results. Some of these include:

- Set-Up Methods: Slit Widths with Male and Female Knives.
- Set-up Methods: Using Spacers; Using Twist Lock; Combinations.
- Female Spacing: Via spacers; via set-screw or twist lock; air shafts.
- Male Spacing: Via spacers; via set-screw or twist lock; air shafts.
- Actual slit width and number of ribbons per setup.
- Relative slit width compared to material thickness (ratio).
- Set-Up Methods: Final Adjustments: Overlap, Side Pressure, Cant Angle.
- Set-Up Methods: Tangential Web (kiss slitting) or Wrapped Web.
- Web Material Properties: such as thickness, stiffness, strength and coating properties.
- Web Types: laminates, wovens, nonwovens and pressure sensitive materials.
- Web tension and control method.
- Operating speed (web speed) relative to knife diameter.
- Machine type and rewind design: Center Wind, Surface Wind and Combinations. Simplex or Duplex Rewind. Differential Rewind with torque control etc.
- Web tension in PLI (pounds per linear inch of web width).