

## Informative New Letter for Plastic, Film, & Foil Industries from Resource Engineering Co., Baroda, India.

First of all, we thank you for your great patronage for visiting us at PLAST INDIA 2003. We were happy to see your great interest in our activities. We had to take a break for one quarter due to PLAST INDIA. Many of you suggested that, people would be preparing for the Exhibition and later on they would be busy purchasing and installing the new equipment. So, we hope by now companies would be running with newer equipments with better technology.

Last issue of **Tech Resources** had Glossary of Terms being used through out the converting industry. Of course, they were more useful for new comers. We received good compliments from many experienced people that the issue turned out to be aid in training. As many people requested, you will be able to download earlier issues of **Tech Resource** from our website [www.resource-engg.com](http://www.resource-engg.com)

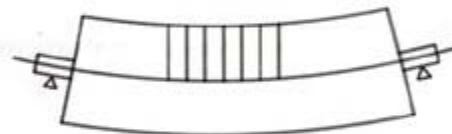
This issue is going to be about Slitters. We will discuss about some of the basic precautions for the machine and little on Process Parameters.

For almost all converting facilities, Slitter & Rewinder are not the most expensive machine of all. However, it turns out to be the most critical from all perspective as the final product gets produced from same machine. The final slitted reels are the reflection of company's credentials. Obviously, that has to be good.

We will look at a Slitter / Rewinder as a manufacturing unit. The function of the machine is to divide the material into multiple strips and wind it uniformly in a reel form. So, in simple words, there are two tasks-one is Slitting and the other is Winding. As far as we control these tasks, the Slitter/ Rewinder would give you good results. However, there are many variables which effects the task and gives problems.

### MATERIAL ROLL BUCKLING OR DEFLECTION:

If the parent roll deflects on its support mechanism such as Cone core with simple shaft, then sheer weight of the parent reel will cause the material roll to buckle (Figure 1). Due to buckling, the wrinkles in the web would enter before the converting process starts. Of course, wrinkles would lead to uneven edges, lose winding and tons of other process problems. So, a web holder such as Air shafts or Chucks should be used as per the process requirement of the machine and material. The same precaution should be exercised at Rewind end.



**Figure 1:** The Heavy Reels on Poor Holding Mechanism causes the material to bend and Wrinkle from Beginning.

### SLITTING KNIFE AXIAL RUNOUT

Many times uneven windings are blamed on poor winding. However it is due to Axially runout knife. If the knives are not checked for runout after installation, they tend to cut uneven edges. (Figure 2). To check for this, use a dial indicator to determine if the slitting knives shift laterally during rotation or under load. Many people try to detect runout by measuring slit width variation. However this includes errors due to bend shaft and its own runout.

### WEB ROLLER ATTRACTION

While passing the material through the roller, the material forms the wrinkle due to high variation in friction or contact. This is due to both adhesive and electrostatic forces. These forces have to be overcome for proper contact with a roller. If the forces are too high or variable, the result will be wrapped rollers or



Gear driven slitter make a positive cut against a hardened plate.

**Figure 2:** Slitting blade should not have any runout. Or the blade holding should be correct. Otherwise, uneven edges will be trimmed.

uneven shifting of material. Therefore, the roller should have proper coating or proper electrostatic discharge.

**WINDING ROLL DIAMETER VARIATION**

Many times, the web is getting pulled one side more than the other. This problem is generally faced initially or after long usage of the roll. The cylindricity of the downstream roller can cause a web to be pulled to the large diameter side. A winding roll with non-cylindrical profile will create the same effect, pulling the web to the larger diameter side. A standard practice for such problem is to slide a strip to increase the roller diameter to eliminate this problem.

**WEB ALIGNMENT**

Slitting a homogenous wide material into narrower rolls is relatively easy. However, slitting material with lines or stripes are critical. It puts the user under very high pressure as number of possible problems drastically go up. Normally, people separate web alignment problems and machine problems distinctly. Of course, machines with good slitting capability have a good Web Aligner with latest sensors to do precise job. The sensor must consistently detect the target stripe edge. Any sensor detection error or dead band will affect stripe-slitting error directly. The guide's mechanics and controls should be responsive

and rigid. The guide should have a range and actuation rate to match input roll quality and web speeds.

However, one must understand that only a web aligner with smart sensor is not going to solve the problems. There are three other tolerance factors — tensioning, flatness and input material. Each factor has variability, and controlling variability is harder for some than others.

**CUSTOMIZED AIR SHAFT FOR YOUR PROBLEMS**

- Better Gripping**
- Faster Machine Speed**
- Easy To Handle**
- Increases Life Of Core**
- Reduces Problem**

452, Makarpura Ind'1 Estate,  
Vadodara 390 010  
Tele : (0265) 2642718, 2632757  
Email : info@resource-engg.com

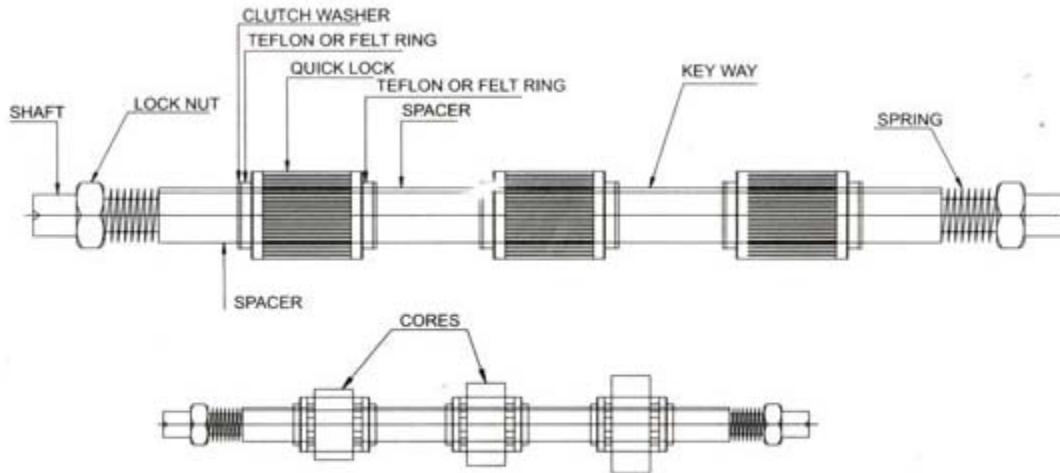


Figure 3: Differential Winding arrangement to avoid slippage problem using Quick Locks, Spacers and Springs

### SLACKNESS FROM WINDING – DIFFERENTIAL WINDING

At most place winding is done on metal rod with simple lock nut and core holding spacers. However, the winding done using this method is sensitive to roll-to-roll diameter variations. Without differential winding, rolls will have lot of slippage problems. Thinner slits may lead to smaller diameter roll buildup with less web tension. Of course, this winding problem is widely sorted out with quick locks (Figure 3).

### CONSISTENT TENSIONING

Most of the issues discussed so far are regarding the machine, but good machine also needs good process parameter control for good slitting. Here, we will not get into details of tension control. However, we will just discuss the effect of tension variation on cutting knife. As we had discussed earlier, the runout in knife creates uneven edge. The same result is generated if the tension of the web is not maintained evenly. Constant tension is needed to create constant necking into the knives and consistent width recovery when tension is removed. If the tension is not maintained it will effect the winding and tracking.

Of course, tension by itself is a big topic and there is a whole lot of mechanism goes into it. Every machine has it's own system of maintaining tension. Some machine has Electronic Tension control with all latest technology. The bottom line is to control this parameter as precise as possible for good results.

### WEB FLATNESS

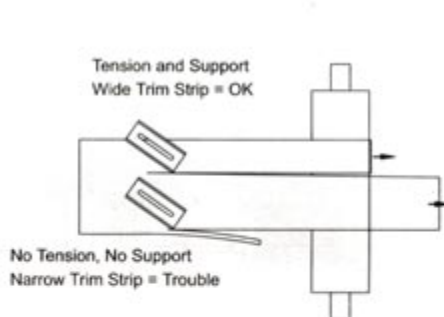
When the web comes near the knife, the lead in angle plays a very important role in finishing. The web should be visibly flat entering the shear knives. This position is helpful for normalizing the tension. Many

### INEXPENSIVE SOLUTION FOR DIFFERENTIAL WINDING



- Great Improvement in setup Time
- Better Gripping
- Reduced Web Breaking & straching

452, Makarpura Ind1 Estate, Vadodara 390 010  
 Tele : (0265) 2642718, 2632757 Email : info@resource-engg.com

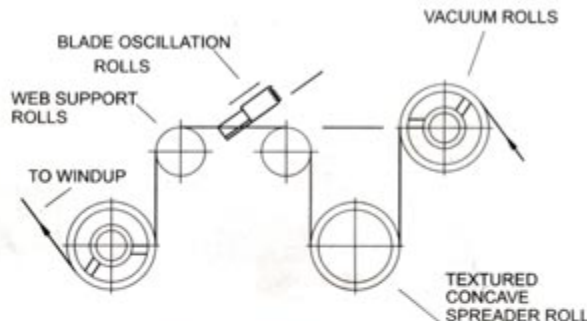


**Figure 4:** While slitting, web tension must be balanced on both side of the slitting blade.

slitters include a web-spreading device immediately upstream of the slitter knives to ensure the web is taut laterally.

### INPUT MATERIAL

The raw material should have consistent thickness and modulus. The input material must have consistent width and spacing. Any web bagginess should be pulled out easily with normal tensions. Input material variability may be the most difficult of these factors, since the input quality is usually out of your control.



**Figure 5:** The Web should be as flat as possible to make sure that the blade is in contact with the web at particular angle.

### BIBLIOGRAPHY

- Schable, Reinhold; "Four Factors to consider in slitting" converting magazine, March 2000.
- Hawkins, William; "Making a slitter/winder upgrade work for you", Paper, Film, Foil, Converting, May 2000.
- Walker, Timothy; " Strand Tracking Problems on your Slitter/Winder"; Paper, Film, Foil, Converting, May 2002.
- Durrant, W; "Slitting & Trimming"; Web control, North wood publication Ltd.; P.69

If you have any question, please feel free to contact, Viral Shah, Mahesh Shah at [info@resource-engg.com](mailto:info@resource-engg.com) or +91-265-2642718, 2632757. If you want more copies of this to be sent to your friends at other companies, please send us the fax with their Name, Mailing address and phone number at +91-265-2638048