Section Abstracts

Rollers

Rollers are the building blocks of all web manufacturing and converting machinery. Rollers perform vital functions of web routing, path and tension control. While most rollers are intended to be in traction, insufficient wrap, low friction surfaces and air entrainment all may conspire to allow the web to break loose at which time both path and tension control is lost. However, some elements, such as folding bars and pans, are intended to be in sliding. Other elements, such as floater dryers, are intended to support the web on an air cushion. It is the task of the designer, process troubleshooter and maintenance to ensure the proper mode is maintained at all times across the entire width of the machine. It is also necessary for good machine and process performance to be sure that rollers are sized and maintained properly.

Tension Control

Controlling tension is vital for minimizing waste and delay because many if not most web troubles are tension sensitive. We must first choose a tension range for our machinery and then a tension setpoint for a particular grade and section of the machine. We must also determine how much tension variability is tolerable. The four most common forms of tension control are: draw/speed, torque, dancer and load cell. Each has many design and maintenance details that must be attended to for good process health. No less challenging is the programming of drives. While the full-featured name brand systems are impressive in capability, hardware alone will not ensure good results. Our industry faces a crisis due to the lack of the specialized skills necessary to program and tune web drives. A consequence is that a drive upgrade may at times actually degrade performance.

Nip Control

Transport nips, such as pull rollers and winder layon rollers, are used to move the web through machinery. Much more interesting are process nips that form and convert the web such as calendering, coating, laminating, pressing, printing and so on. While all of these nips appear quite different, they share the same underlying physics. Also, they share the same goal in that a uniform web product will require a uniform nip. There are many ways the nip can be nonuniform such as due to roller imprecision, bending deflection, loading system problems and so on. It is the task of the designer, process owner and maintenance to make sure that their nips are uniform. Finally, each specific application such as rubber covering, calendering, laminating and winding have concerns beyond the physics common to all.

Wrinkling

Wrinkling is common to thin materials of most any chemistry on most any machine. As such, wrinkling may be overall the number one cause of waste in the web industry. Until recently there was no organization or science applied to this area. Now we are able to easily diagnose major wrinkling cases based on visual appearance alone. The most common cases are the Machine Direction Trough wrinkle, the Diagonal Shear wrinkle and the Baggy Web. Within the major cases are sub cases dealing with excess width, crookedness or nonuniform forming/deforming respectively. Recognizing the sub case allows one method to wrinkle reduction, namely, remove the root cause.