

Troubleshooting

The Ultimate Quality Control Tool – “The Perfect Roll”

Many successful companies spend lots of time and money to measure film characteristics. Poor roll geometry is a common problem, even with oscillating nips. Minute variations become visible as the roll diameter increases because the roll contains thousands of layers. The best tool for solving roll geometry problems is a well-trained operator.

Potential causes can be grouped into three factors: raw material, equipment malfunctions and processing conditions. The six most common roll defects and typical causes are:

1. “Puckered” rolls refers to random hard and soft spots. These defects are caused by Cross Direction gauge variation. Material causes include blending resins with a very different melt index or resin density. The most common equipment causes are dirty dies or air rings. Winding with film tension too high, film too hot or air drafts across the bubble are typical processing condition causes.
2. “Tin Canning” refers to wrinkles in the middle of the roll and smooth ends, just like a tin can. Material causes include blending resins with a very different melt index or resin density. The most common equipment cause is too much drag in collapsing frame. Winding with film tension too high, film too hot or air drafts along the bubble (chimney effect) are typical processing condition causes.
3. “Tapered” rolls refer to rolls that have a larger diameter at one end. The most common equipment causes are misaligned dies, air rings and haul-off nips. A large difference in melt temperature can cause more melt flow on one side of the die. This is known as melt channeling and is usually caused by incorrect extruder temperature settings. Melt channeling or air drafts across the bubble are the most common processing condition causes.
4. “Telescoped” rolls occur when the film slides from to one side. Too much slip additive is the usual raw material cause. Misaligned idler rollers can permanently stretch the film on one side. Another equipment cause is a misaligned lay-on roller in the winder. The most common processing condition causes are setting the lay-on pressure or film tension too low in the winder.
5. “Starred” or “Spoked” rolls refer to gaps that radiate out from the core. The gaps are visible when looking at the ends of the rolls. The most common equipment problem is poor tension control. Film tension increases with roll diameter in centre driven winders. This processing condition problem can be corrected by reducing (tapering) the tension as the roll builds up.
6. “Buckled” rolls can result in crushed cores. It is impossible to remove the core from the shaft in some cases. The problem can also be caused when the web overhangs end of core (equipment). Typical processing condition causes include film whose tension changes too much; film wound too hot or not enough lay-on roll pressure.

Many operators increase film tension to compensate for roll problems. A better approach is to increase lay-on pressure first, and film tension only if necessary. Experienced operators test film tension by touching the film just before it enters the winder. The film tension can be calculated with the formula shown below. In most cases it is best to relax the film prior to wind up. Film tension is usually measured in PLI (lbs./linear inch/mil). It can be calculated with the following formula:

$$\text{Film Tension (PLI)} = \frac{\text{Total Pressure (psi)} - \text{Pressure to raise dancer (psi)}}{\text{Gauge (mils)} \times \text{Width (inches)} \times \text{Layers (1 for sheeting, 2 for tubing)}}$$

For further information, contact Paul Waller at Haremar Plastic Manufacturing Limited

Phone (416) 745-0736 Ext. 25, Fax (416) 745-2800.