3M Science. Applied to Life.™

Addressing 6 Common Tape and Film Roll Challenges

Medical Materials & Technologies

Addressing 6 Common Tape & Film Roll Challenges

Authors:

Gene McNamara | Advanced Application Engineering Specialist

Morgan Perron | Manufacturing Technology Engineer

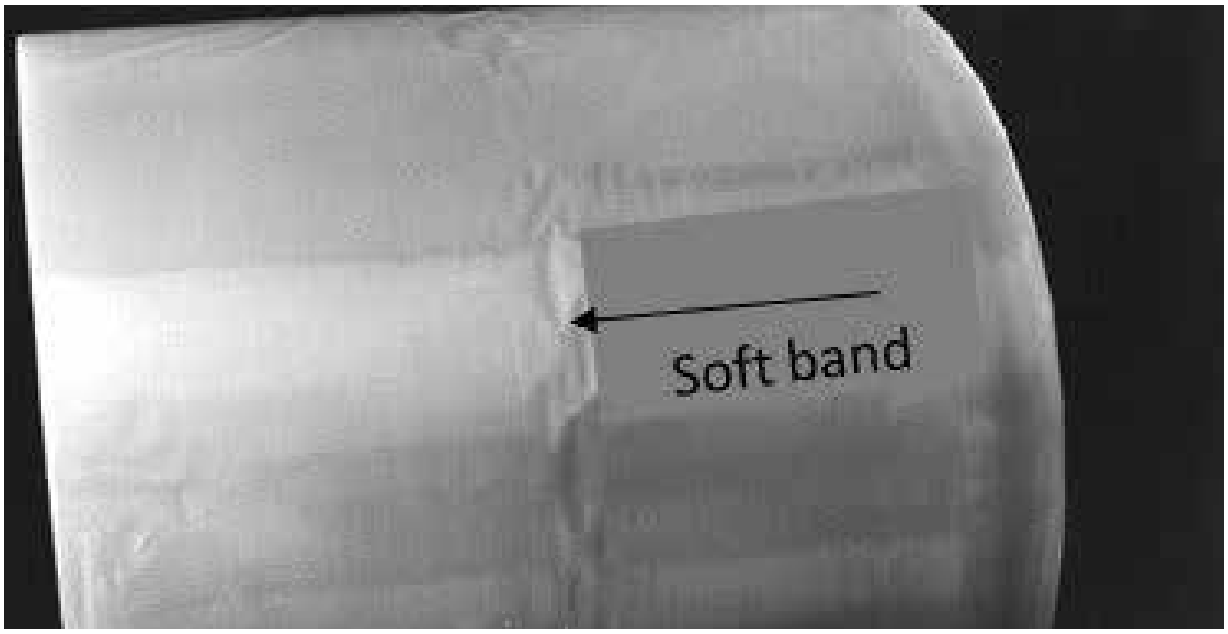
Introduction

The design of materials and processing controls plays a part in overall quality and yield of roll good products. To help maintain the product's integrity, it is important to be aware of and able to identify common roll good visuals when processing tape or film rolls. Common visual imperfections include (but are not limited to): gauge bands, hard or soft edges, wrinkles, loose winding, telescoping and variability in slit edge quality. This paper will help you to identify these common visual imperfections and provide you with potential solutions. For engineers working with premium adhesives, care must be taken to avoid costly issues. However, with the proper considerations during scale-up, these products can be processed efficiently.

Common Visual Imperfections in Tape and Film Rolls

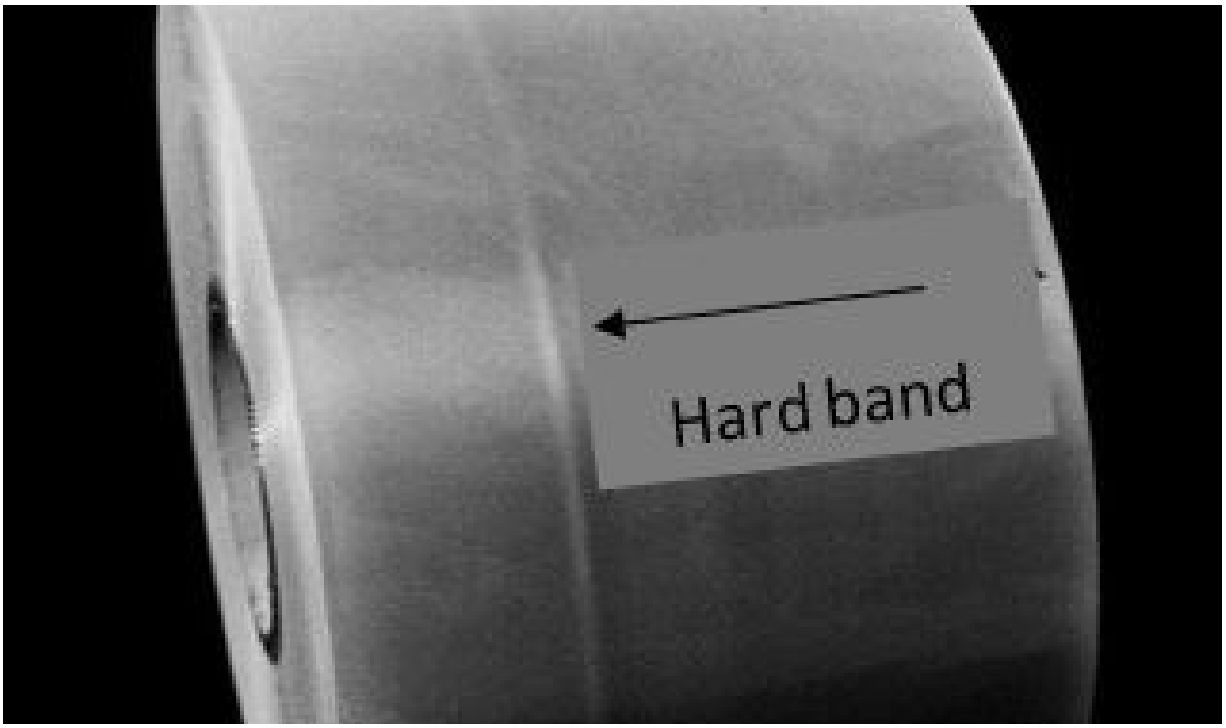
Visual Imperfection 1: Gauge Bands

There are two types of gauge bands: soft and hard. A soft band is a continuous lane of film that is thinner than the film on either side it. This produces a soft band around the roll which will be visible and/or feelable. A soft band pattern may appear similar to that of a chain mark or tire tread.



Soft gauge band

A hard band is a continuous lane of film which is thicker than the film on either side it. Just as with a soft band, this produces a visible or feelable raised band around the roll.



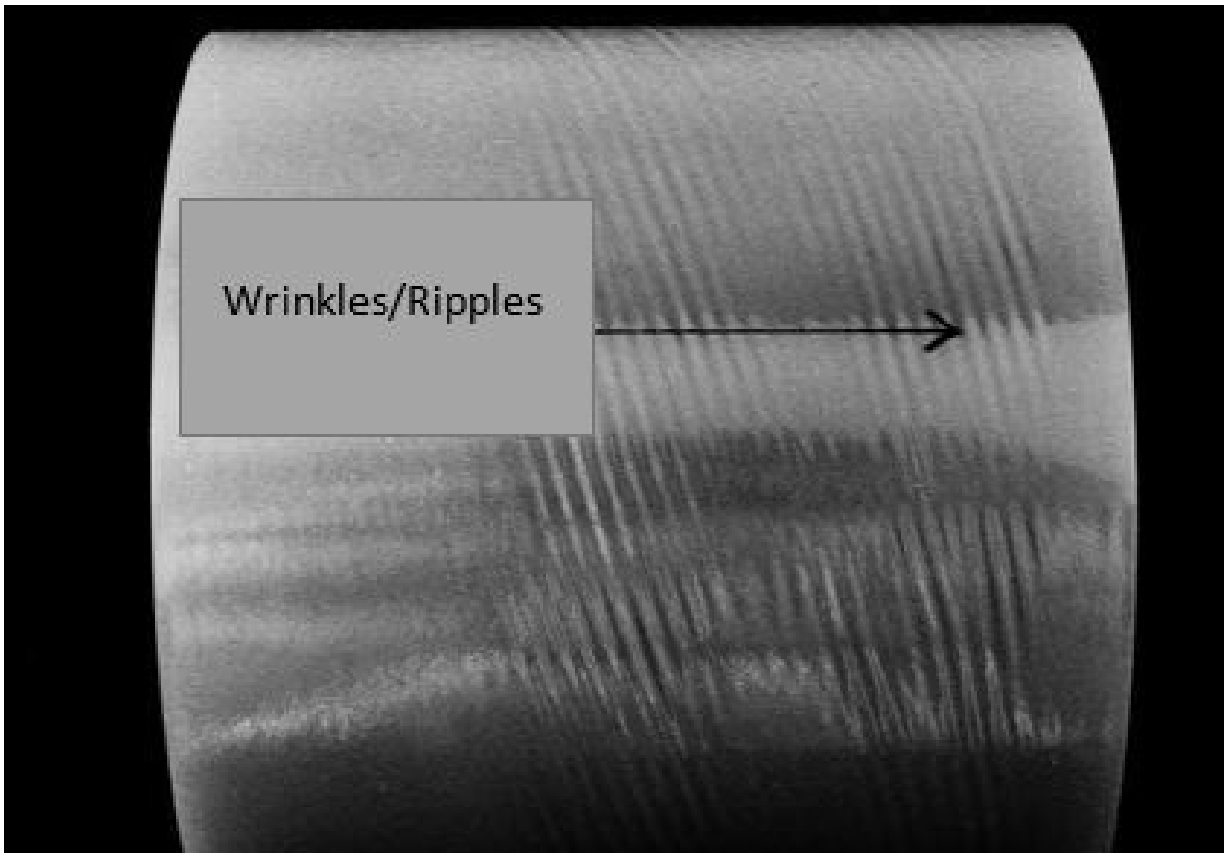
Hard gauge band

Visual Imperfection 2: Hard or Soft Edges

Hard or soft edges are a result of the same variation in thickness that causes hard and soft banding. It is considered hard or soft edge when it occurs on the slit edge.

Visual Imperfection 3: Wrinkles

Wrinkles (also known as ripples) run in a diagonal direction in the film web and vary in length. They may also be present in a straight down web pattern referred to as “soup-canning” as the pattern can mimic the texture of a soup can. This pattern is inherent in PET-based films of less than one mil.



Wrinkles / ripples

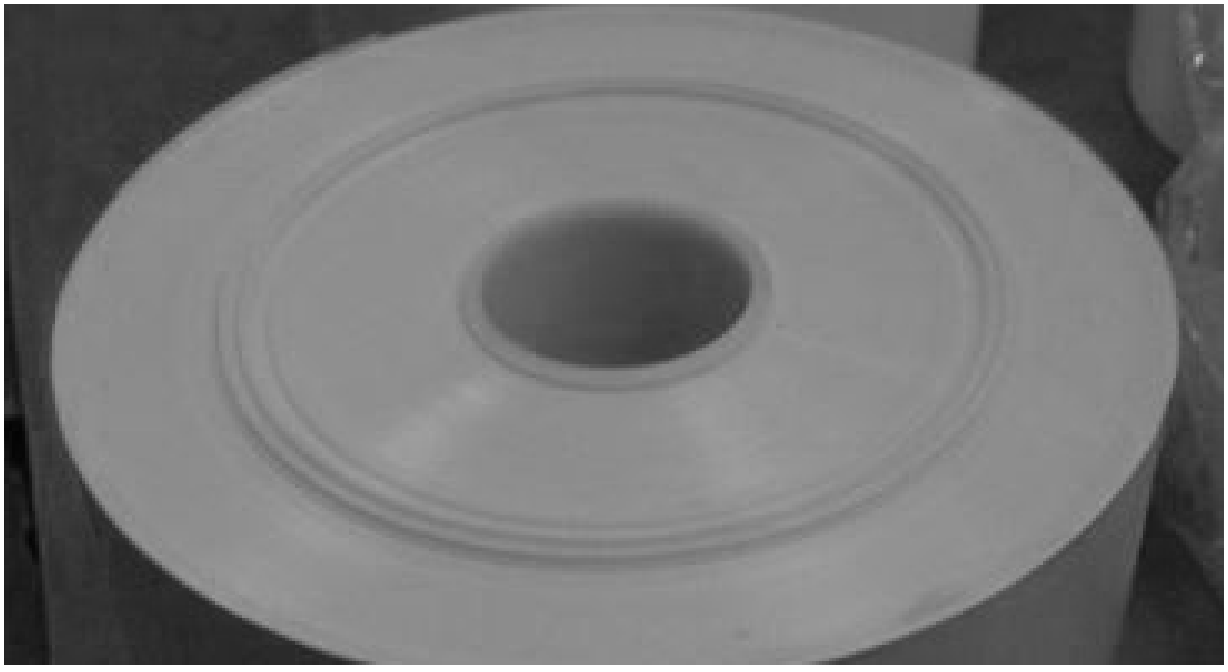
Visual Imperfection 4: Loose Winding

Loose wind occurs when there is moderate gapping between wrapped film layers.

Loose winding

Visual Imperfection 5: Telescoping

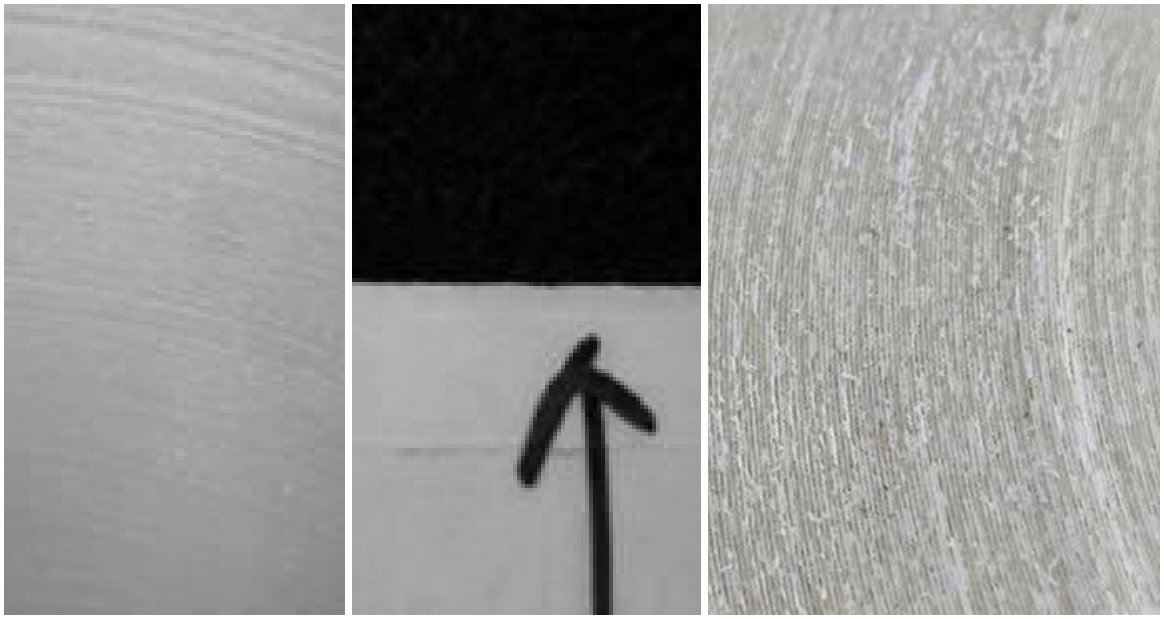
Telescoping is an abrupt lateral movement of a portion of the slit roll.



Telescoping

Visual Imperfection 6: Variability in Slit Edge Quality

Slit edge quality is typically influenced by knife type and/or condition. As an example, slit edges can appear rough and fraying may occur.



Examples of slit edge

Ways to Solve the Common Challenges

Once you can identify common roll good visual imperfections, the severity may be assessed.

In many situations, there are internal controls to ensure the visual imperfection's severity is low enough so the material is still useable. For example, the effects of minor caliper variation in a film may be less noticeable or not noticeable when unwound. However, if the visual imperfection is determined to be higher severity, there may be techniques to remove with further processing.

Solutions to Try: Gauge Bands, Hard or Soft Edges and Wrinkles

For instance, gauge bands, hard or soft edges and wrinkles may be minimized or eliminated by utilizing bumpering, spreader rolls, and/or adjusting web tension.

Bumpering involves applying a tape, ideally with a somewhat high friction surface, to the areas of the idler/process rolls at the edges of the film. The additional layer makes this part of the roller spin slightly faster which helps spread out the film with crossweb tension. This crossweb tension helps minimize or eliminate minor common roll formation visual imperfections.

Spreader rolls work similarly to bumpering by creating a crossweb tension on the film that pulls out the visible imperfections. There are many different types of spreader rolls available depending upon your equipment or application.

Solutions to Try: Loose Winding and Telescoping

Loose wind may be addressed by adjusting web tensions during rewinding, and telescoping may be addressed by using web-steering equipment.

Solutions to Try: Varying Slit Edge Quality

To minimize variability in slit edge quality, understanding the optimal type of slitting (for example, razor blade, shear cut or score cut) based on material properties is key. For instance, a razor blade could work well for a thin, uniform material but may not be the best choice for a thick, nonwoven one.

It is also important to consider material debris that may result because of the material's composition. For example, score cutting may not be an ideal choice for a paper-based material due to dust or debris that can result. Instead, shear cutting could be a better option.

Another factor to consider for slit edge quality is knife maintenance, including sharpening and cleaning. If you are slitting an adhesive coated roll, take into account the adhesive's tack. Also, consider if the knives should be used on other products. If the same knives will be used on multiple products, identify cleaning requirements and/or dedicate equipment to specific product families.

Identifying Visual Imperfections for Success

By being able to identify and troubleshoot common visual imperfections on roll goods, downstream issues can be avoided. In many situations, visual imperfections may be minimized or eliminated using standard process techniques. The same considerations can apply when developing a finished part converting process. Similar to slitting, taking into account the material properties (e.g., caliper variability) will determine optimal type of converting (such as rotary or laser cutting). Although not always top of mind, starting with the basics will set up a process for long-term success.

3M

Visit 3M.com/MedTech to learn more

Medical Materials & Technologies
3M Center, Building 275-5W-05
St. Paul, MN 55144-1000 USA

Phone 800-584-2787
Web www.3M.com/MedTech

70-2013-1196-9