



Wrinkles

Wrinkling is the number one cause of defect waste in the web industry. This subject is so important that a complete chapter has been written on WRINKLES by Dr. David Roisum in the new TAPPI book - *Roll and Web Defect Terminology*. [Please go to this link for more information on this book-](#)

Wrinkles can be soft (non-creased) or hard where they actually fold over and form creases. They are **Man**, **Material** and/or **Machine** induced. Most wrinkles are a combination of these elements.

Wrinkles caused by **Man** (improper settings) can usually be attributed to improper web tension and/or winding settings. Wrinkles can form in the web in the process line by running tension settings (**Man**) that are too low or too high in combination with **Material** and **Machine** deficiencies. Roll wrinkle defects, such as Baggy Lanes, Buckles, Corrugation Wrinkles and Crepe Wrinkles, are caused by improper roll structure settings (improper use of the **Tension**, **Nip**, and or **Torque** roll structure tools) or the winding of non-uniform webs too tightly into a roll form.

Wrinkles caused by **Material** are due to non-uniform formation, conditioning, coating, drying and/or laminating in the web's process history. The root cause of many wrinkles is the non-uniformity in the cross machine direction surface of the web. Since no web is perfectly flat or uniform across its surface, our challenge as Web Processors is to handle webs with acceptable variations in consistency and to produce wrinkle free products to our customers that will run on their processes without problems.

Wrinkles caused by **Machine** deficiencies are the focus of this Tech Tip. Many times **Material** deficiencies, which produce soft wrinkles, can be turned into hard or creased wrinkles when the web goes over a highly wrapped idler roll or through a nipped section. If these wrinkles are straight in the machine direction (M.D. Wrinkles), then either the web **Material** is trying to expand and the **Machine** won't let it, or M.D. Wrinkles are caused by excessive roller deflection or grooving. When these M.D. wrinkles show up in the wound roll, this defect is often referred to as "Tin Canning". Adding proper web spreading in the proper location or ensuring that the spreaders already provided are in proper adjustment and/or pulling less web tension will normally correct these M.D. Wrinkles. [Click on this link to access a Tech Tip on Spreading on the Davis Standard Website.](#)

If the M.D. wrinkles are at an angle to the machine direction, then these wrinkles are known as Shear Wrinkles. Shear Wrinkles are always caused by the fact that SOMETHING IS

CROOKED! It could be the web profile, moisture or temperature that is uneven from one side of the web to the other (**M**aterial). However, in most cases, something is crooked in the **M**achine which is causing this Shear Wrinkle problem. The suspects are that either a roll is out of alignment or nip pressures are uneven from one side of the machine to the other. Large roller diameter variations can also cause Shear Wrinkles. Shears Wrinkles can be either symmetrical (on both sides of the web but disappear in the center) or asymmetrical (only located on one side of the web). However, in both cases they will always point to the loose side of the web and will move towards the tight side of the web. See Figure #1.

Whether a web will wrinkle when something is crooked depends on a number of variables. First are the **M**aterial properties. The thickness of the web (t) as well as the web's stiffness or modulus of elasticity (E) will affect the degree of misalignment which can be acceptable without generating Shear Wrinkles. Also, as stated above, web tension can be increased to get out of the wrinkle window or it can be decreased to remove shear wrinkles from the webs. This is nicely illustrated by Dr. David Roisum in Figure #2 below.

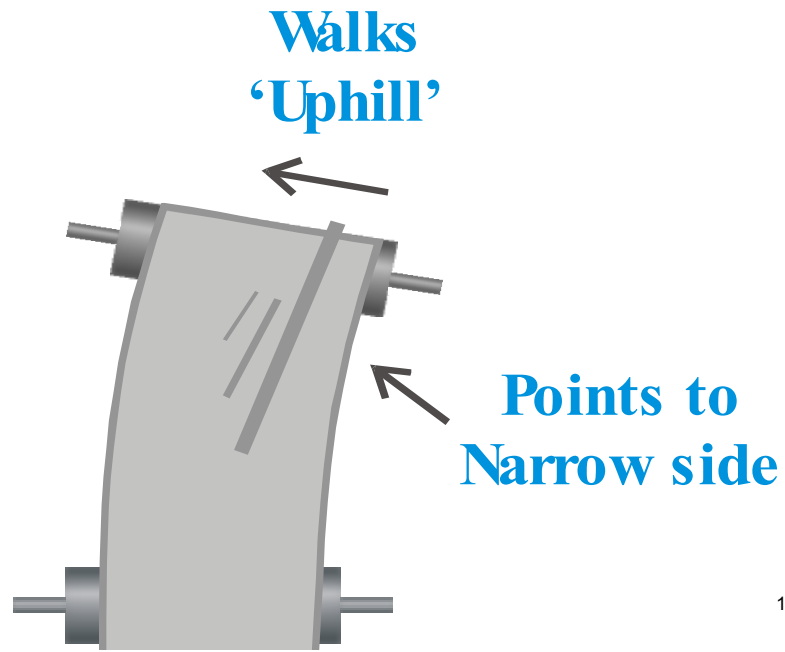
The Web Handling Challenge is to isolate the root cause of the Shear Wrinkle and eliminating it. This can be done by optically aligning every web handling roller in a machine to within the thickness of a hair, which is very time consuming and extremely expensive!

The better solution is to do a **M**achine audit to isolate the section or sections that are prone to generate Shear Wrinkles and then spend your resources in being sure that this section is aligned as close as possible or add spreading in that section to help to insure that wrinkles do not occur. The proper way to do this **M**achine audit is to run the thinnest and widest material that can be run on the process line. First run this material at the lightest tension possible and at the lowest speed possible. Start at the unwind and work downstream towards the winder. Use an incident light to follow the web through the line looking for shadows that could be wrinkles in their infant stages. Always be careful and abide by good safety practices and common sense when working around a moving web and rotating elements!

When you see a wrinkle, note the location and do a sketch of shape of the wrinkle and where it appeared across the web. The problem roller or nip will be just downstream towards the winder of where you first see the wrinkle appearing. This is the element that needs to be investigated.

Then, do the same **M**achine audit with the same thin, wide web, only this time increase the web tension to the highest amount that the web or machine can handle, again at the slowest possible web speed. Note the location and sketch any new wrinkles that may now appear under the high tension test that may not have been noticed during the low web tension audit. Use Dr. Roisum's Wrinkles Chapter from the TAPPI book ***Roll and Web Defect Terminology*** to help identify the Causes and Remedies to correct the root cause of the wrinkles. Especially when the wrinkle starts to appear in a long web draw section of the line, it may be necessary to add a spreader device just before the element that is causing the wrinkle. Again, please refer to the Spreading Tech Tip on the Davis-Standard Web site bc-egan.com under Converting Systems / Company Information and then under the Publications and Technical Documents tab.

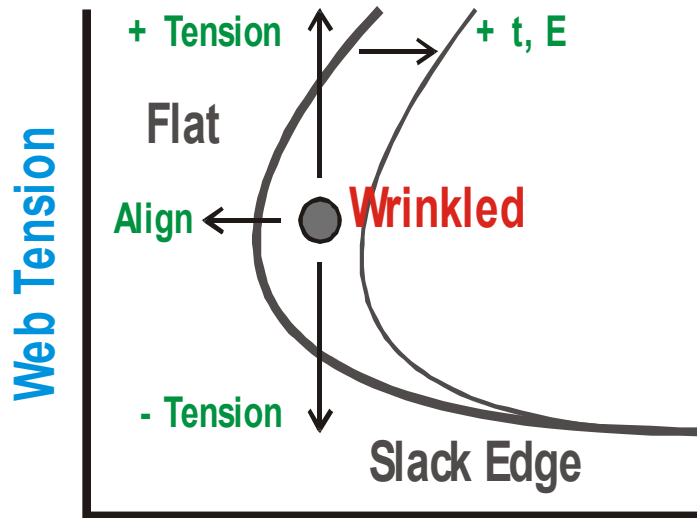
We hope that you found this Tech Tip helpful. For further assistance in identifying and eliminating wrinkles please contact R. Duane Smith, Product Manager of Specialty Winding, Davis-Standard LLC at smithd@bc-egan.com or David Roisum, Finishing Technologies at drroisum@aol.com .



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Shear Wrinkles

Figure #1 (Courtesy of Dr. D.R. Roisum)



Misalignment Angle

Wrinkle Window

Figure #2 (Courtesy of Dr. D.R. Roisum)

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