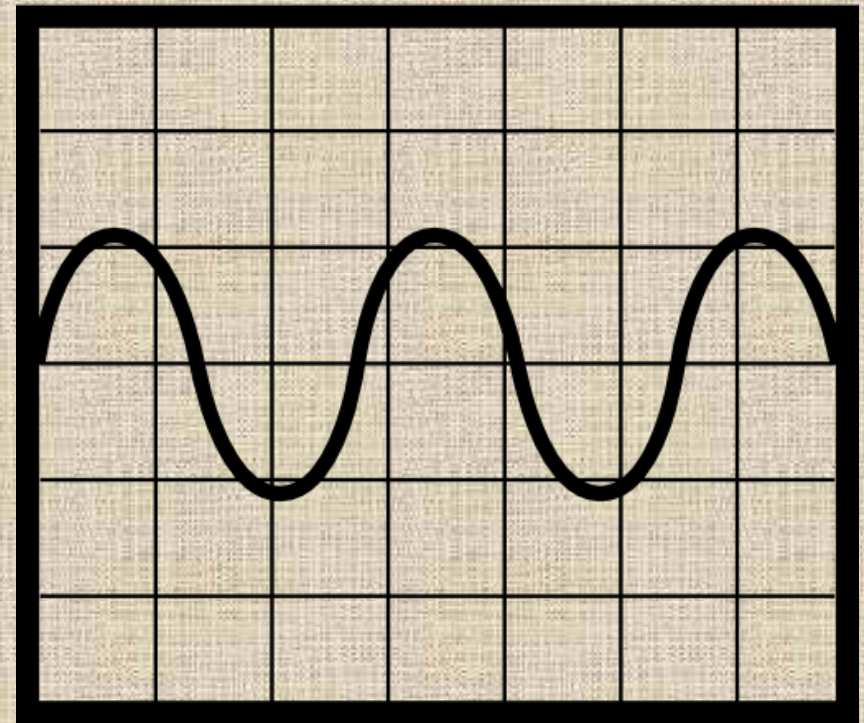


Web 201.52a – Oscillation

A Study of Oscillation – Part 1



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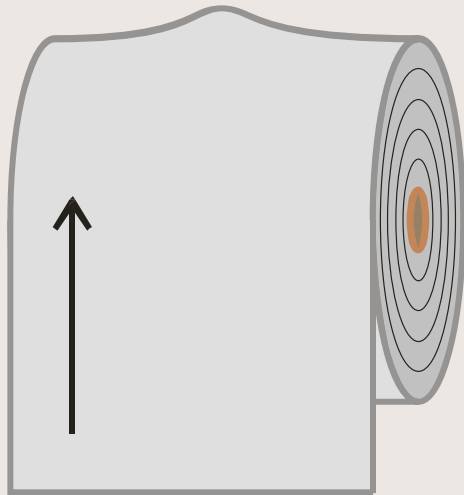
Finishing Technologies, Inc.

Courtesy Freepik from www.flaticon.com

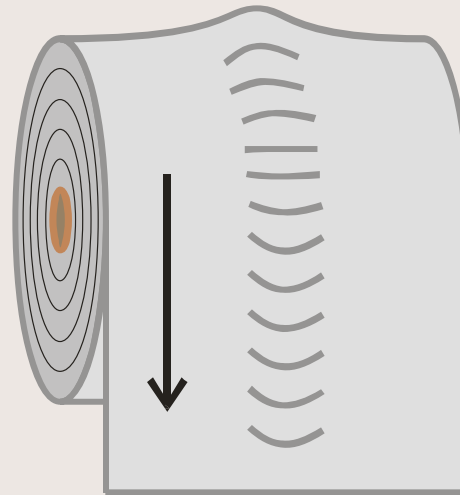
201.52a.1

Bagginess and Gage Variation

- Winding



- Unwinding



The size of the **diameter variation** that might do this could be as little as **1/1,000**

The web **gage variation** that caused this may be in the range of **1-10%**

Land, Cecilia Baggy paper webs: Effect of uneven moisture and grammage profiles. Ph.D thesis, Karlstand University, Sweden, Oct 2010

Roisum, David R. *The Secrets of a Level Process and Product*. Various venues, 2001.

Roisum, David R. Web201.45c Baggy Web Troubleshooting - Caliper Variations

Screening Bad Rolls

1. Excessive Hardness *Average*
2. Excessive Hardness *Variation*
3. Excessive Risk

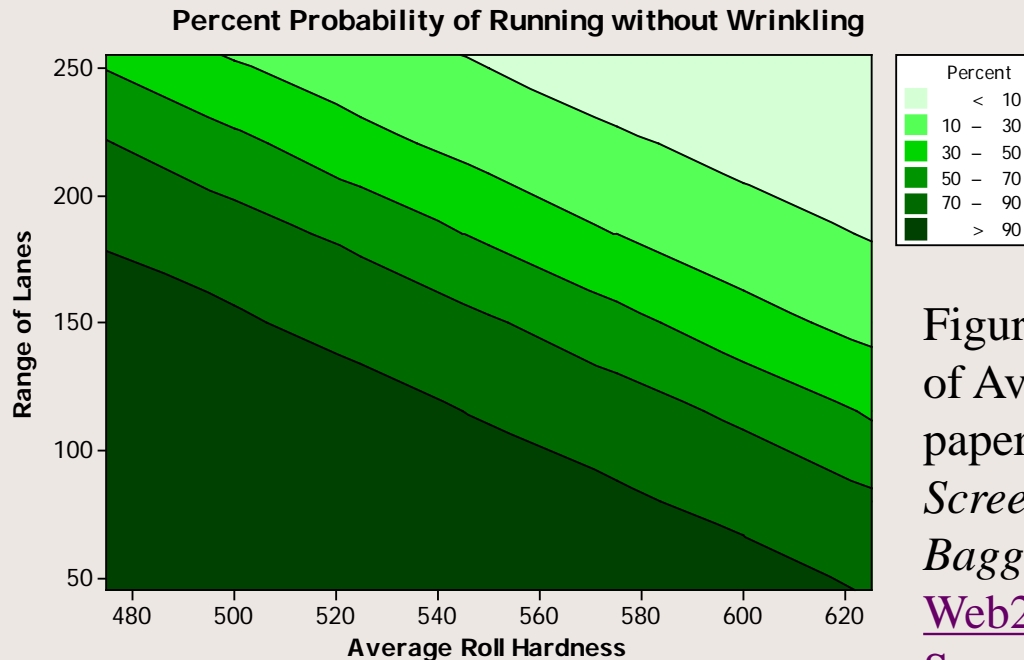
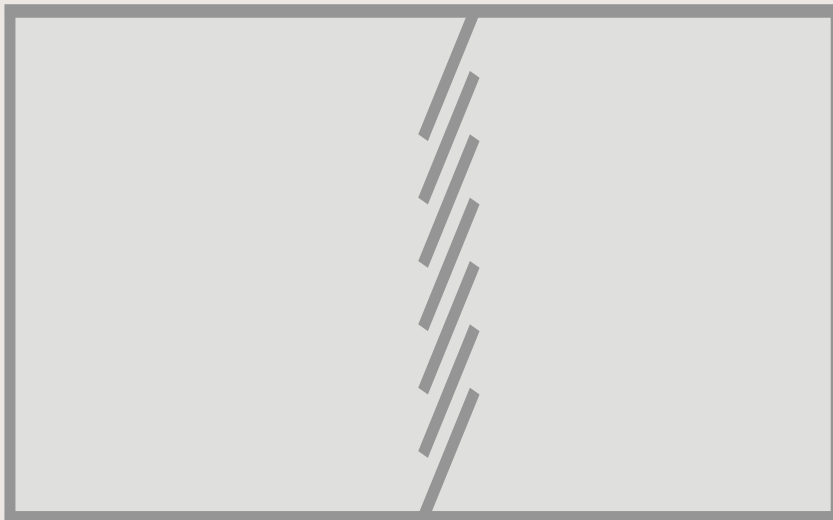


Figure Courtesy of Amy Thuer of Avery Dennison from her paper *Using Roll Hardness to Screen for Excessive Web Bagginess*. IWEB13

[Web201.07 Baggy Web Screening](#)

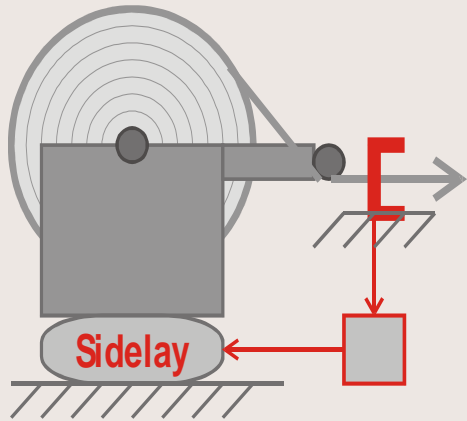
Corrugations

- A.K.A. Ropes, Chain Marks, 'Tin Can'
- Caused by Winding
 - A caliper-varying product
 - Tight, especially with nip

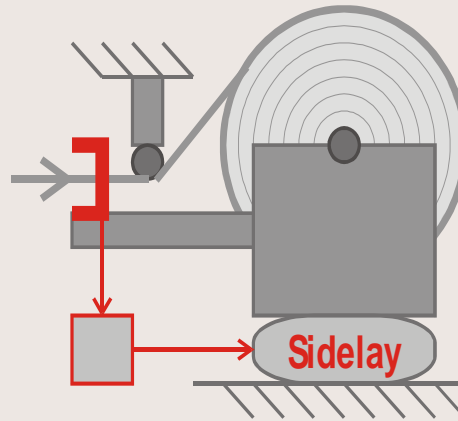


All Guides can Oscillate

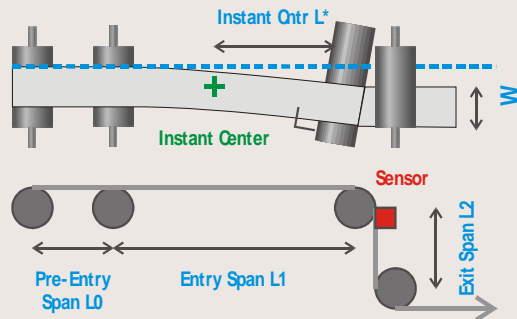
Unwind



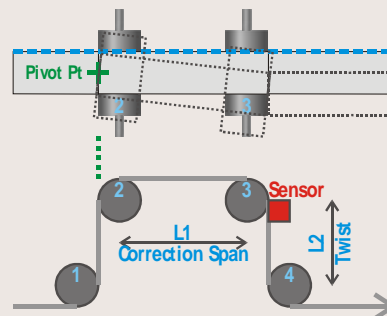
Winder



Steering



Displacement



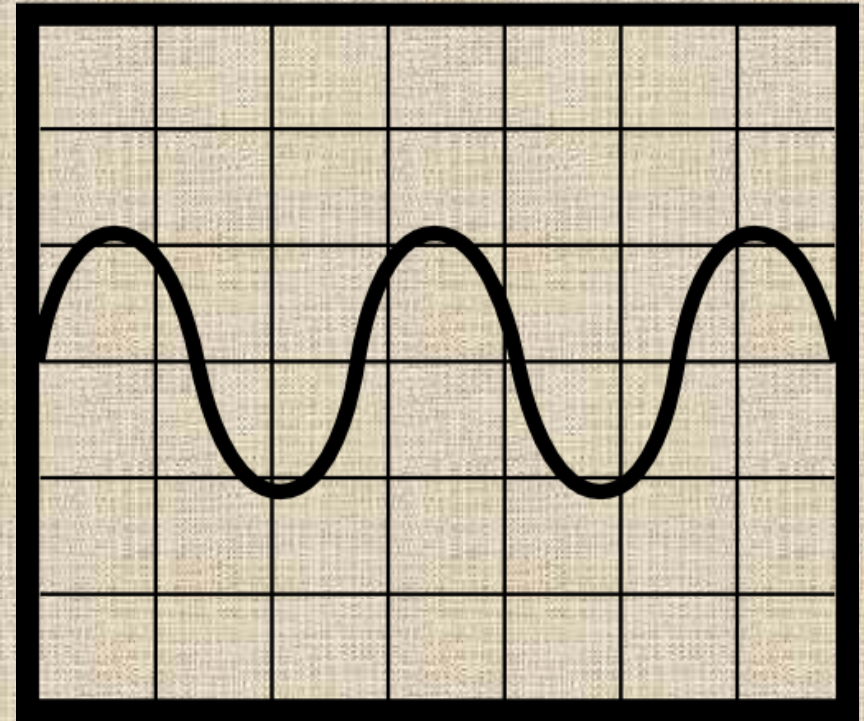
Also:
End Pivot
Side Shifting

Oscillation Parameters

- Stroke
 - Speed
 - Shape
 - Zig-Zag
 - Sine Wave
 - 360 Degree (blown film)
- Other
Limits?

Web 201.52b – Oscillation

A Study of Oscillation – Part 2



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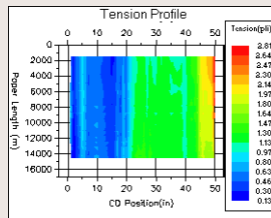
201.52b.7

Thickness Variations are Streaky

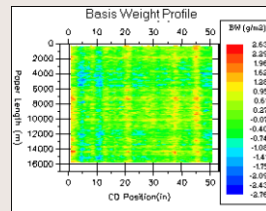
- Almost all web manufacturing and converting thickness profiles tend to be streaky.
- CD profiles tend to be stable for hours, to days, to even perhaps for life

Frost, Paul J. *The Application of Statistical Process Control to Web Products*. Conf paper 1989 and book 1991.

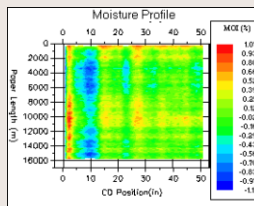
Tension



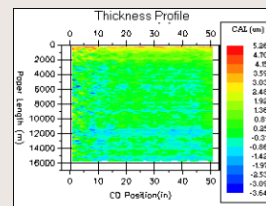
Basis Weight



Moisture



Thickness

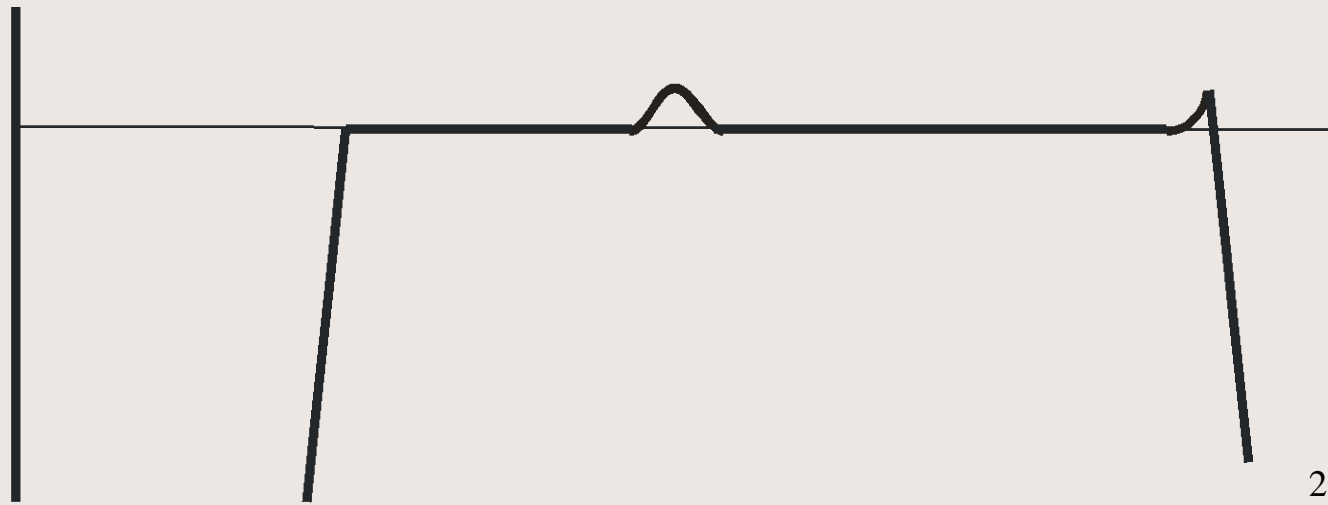


Figures Courtesy of FPinnovations
(PAPRICAN)

Center & Edge Ridge

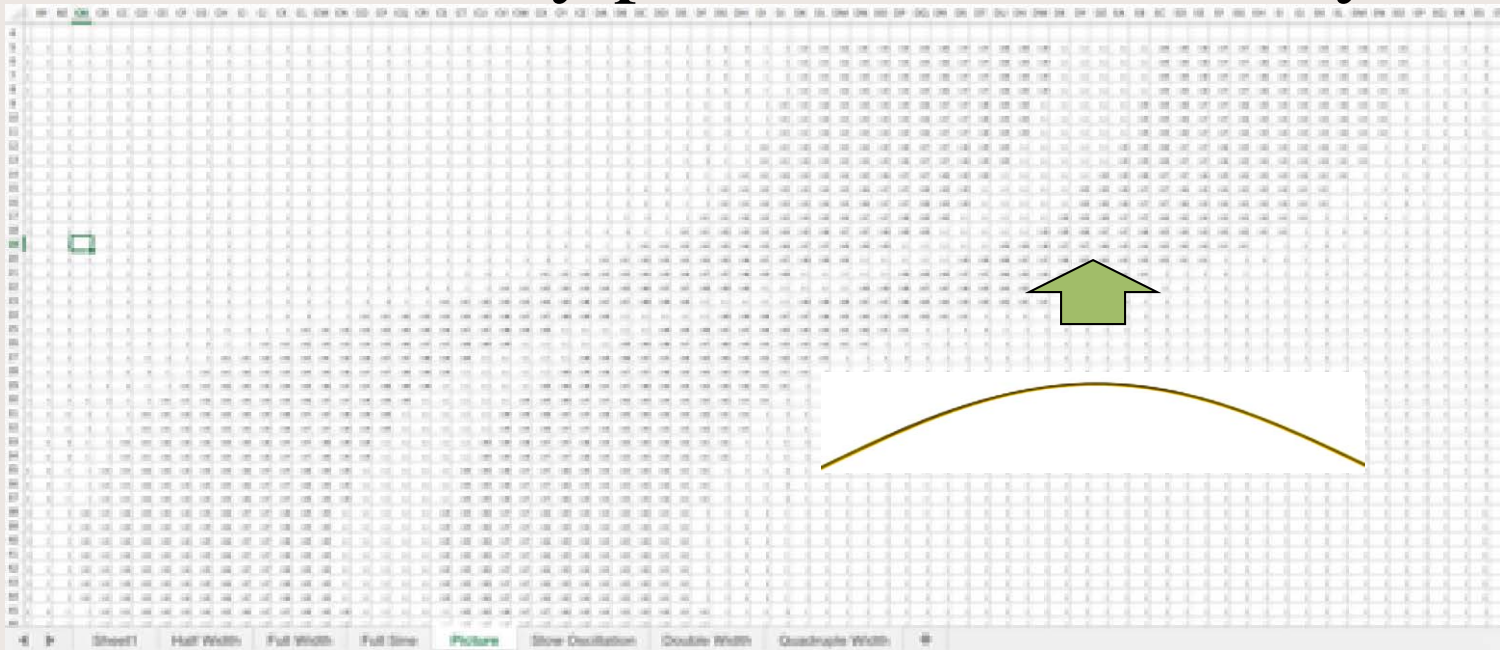
- *Usually* high lanes worse than low lanes, examples
- **Gage Band** from manufacturing or converting
- **Slitter Lip** caused by cutting distortion
- **Size range:** 1% no problem, 10% no product

+ 10% Gage Band



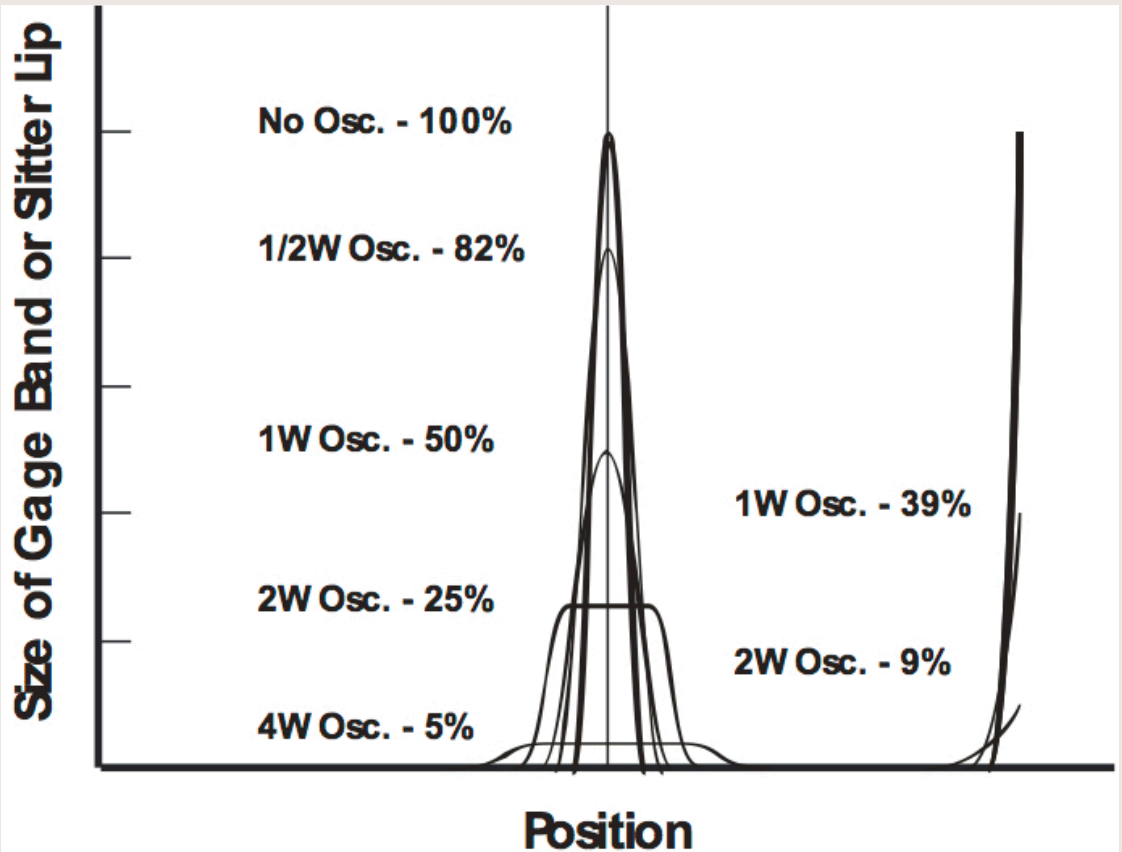
Spreadsheet Layout/Calculation

- This run is a sine shaped gage band of 10% height and 18 'units' wide.
- Shown is a tiny portion of width, $\frac{1}{2}$ cycle

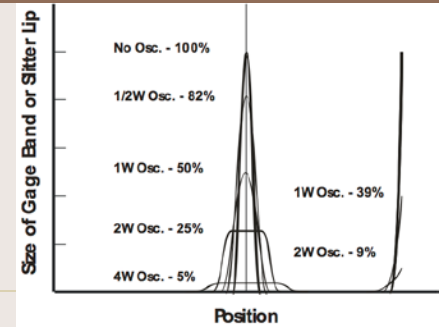


Results - Visual

- Sine shaped center ridge
- Exponential slitter lip
- Osc. Mag.
 - 1/2 width
 - 1X width
 - 2X width
 - 4X width



Results - Words



- Historical 1X width gives only 50% reduction
- May need 2-4X that wide
- Much more effective for raised slitter edges
 - Narrower to begin with
 - A 2X width brings lip down more than 90%
- A flat top begins just before 1X wide
- Shape of defect and oscillation unimportant
- Only *relative* heights and widths matter

What About Oscillation Speed?

- **All that is needed is $\frac{1}{2}$ cycle** to smear everything, (other $\frac{1}{2}$ cycle is just a repeat in other direction)
- The depth of influence is key. Various studies indicate that **most of the influence is the outer 2 cm (1")**.
 - Winding models and Roll hardness measurements
- Given above, **oscillation becomes sharply ineffective if less than $\frac{1}{2}$ cycle** takes place before an inch is added

Questions?

Answers:

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201.52b.14