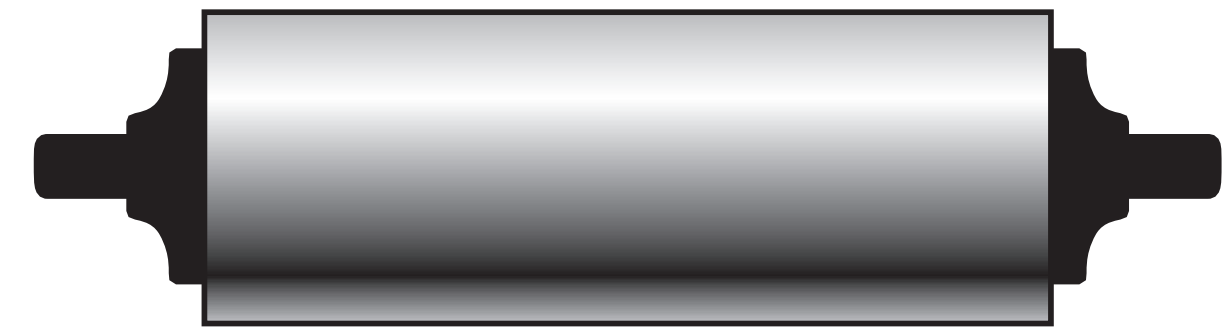


BARRING IN CALENDER ROLLS

PRECISION



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**WEBINAR
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WHY SHOULD I CARE ABOUT BARRING IN CALENDER ROLLS?

BARRING HAS A SIGNIFICANT NEGATIVE IMPACT ON:

- Paper properties
- Paper rejects (\$\$\$)
- Maintenance spending (\$)
- **Fiber usage (\$\$\$\$\$)**
- Roll change frequency (\$\$)

WHAT IMPACT DOES BARRING HAVE ON PAPERMAKING?

BARRING CAUSES:

- Variation in machine direction (MD) caliper
- Variation in machine direction strength
- Paper rejects related to reel building/winder runnability issues
- **Higher fiber usage**

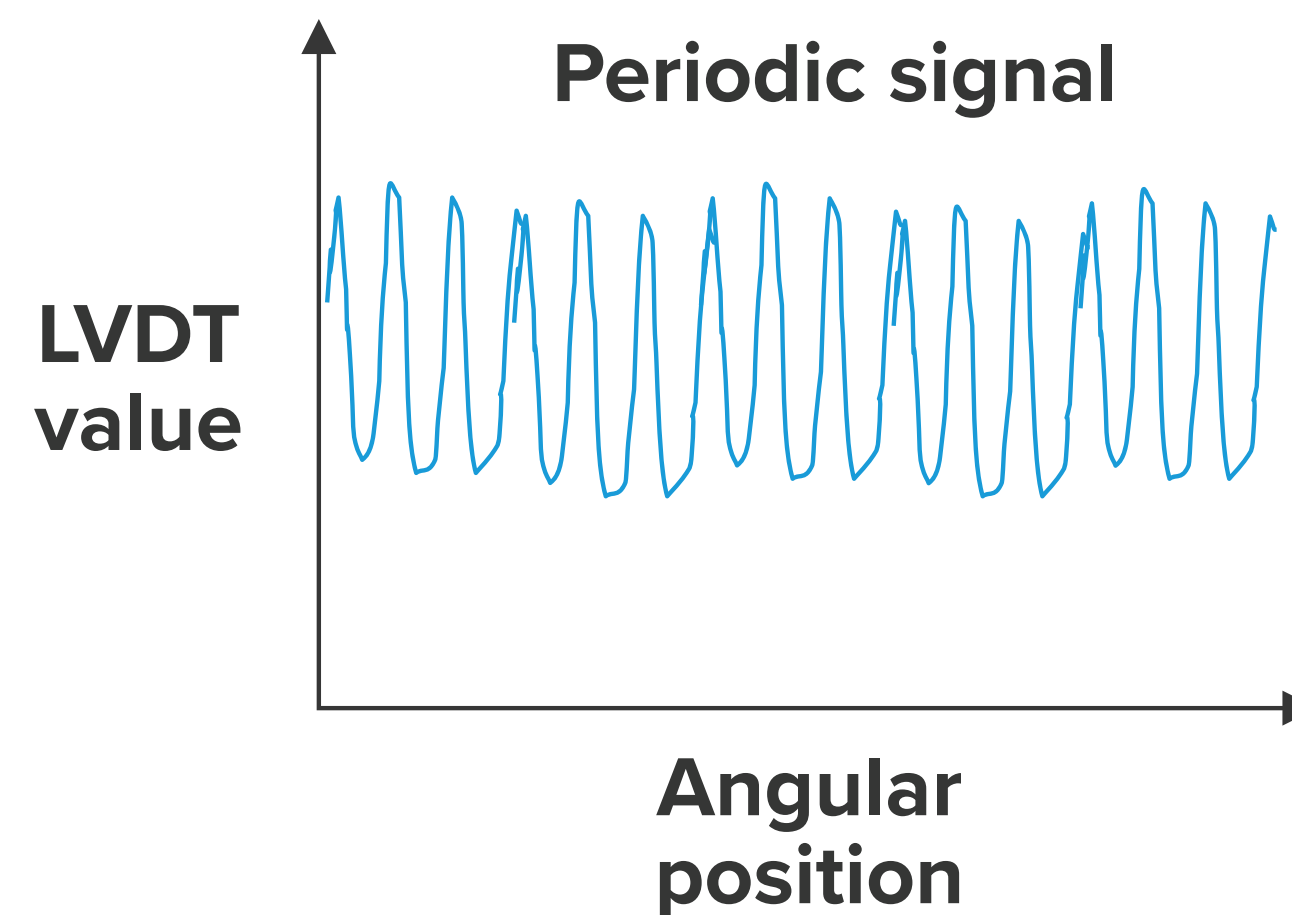
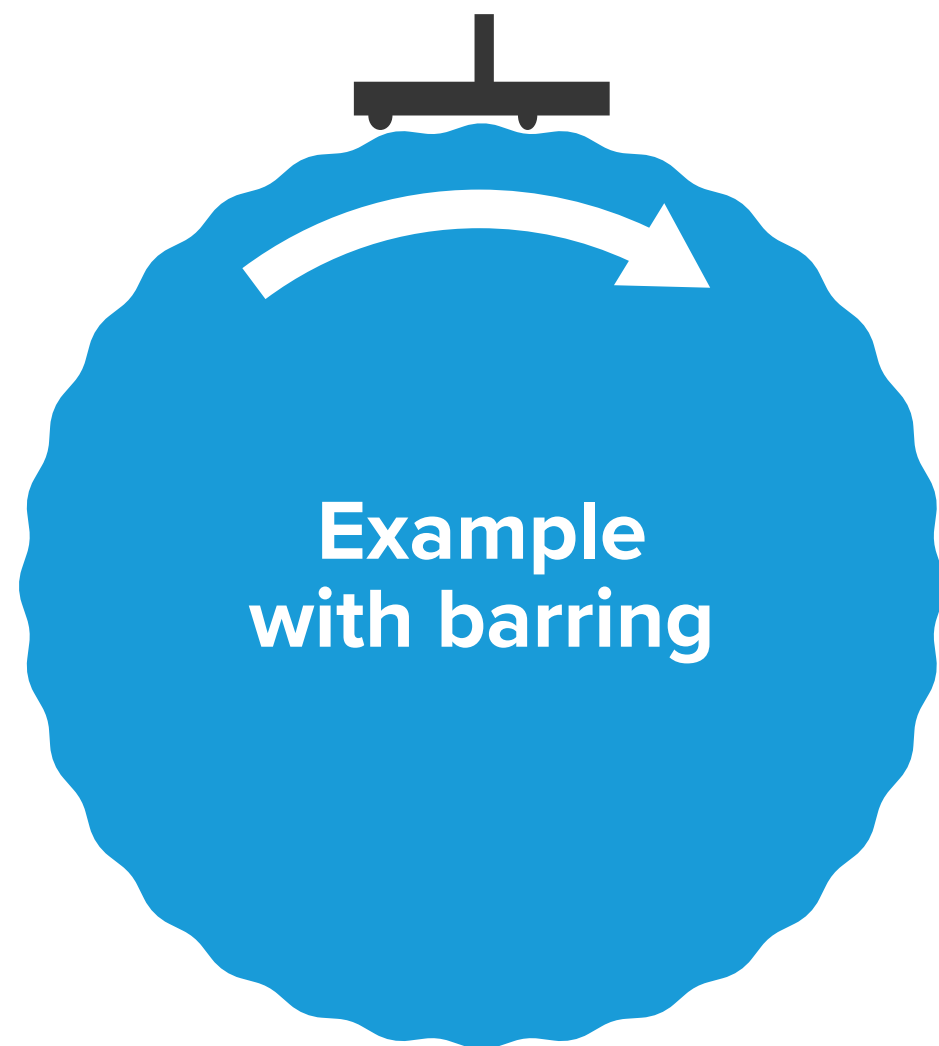
WHAT IMPACT DOES BARRING HAVE ON MAINTENANCE?

BARRING CAUSES:

- Excessive vibration
- Reduced roll bearing life
- **More frequent calender rolls changes**
 - Increased labor costs to change rolls (\$)
 - Higher expense to service rolls (\$)
 - Reduced calender roll life (\$\$)
 - **Increased downtime to change rolls (\$\$\$)**

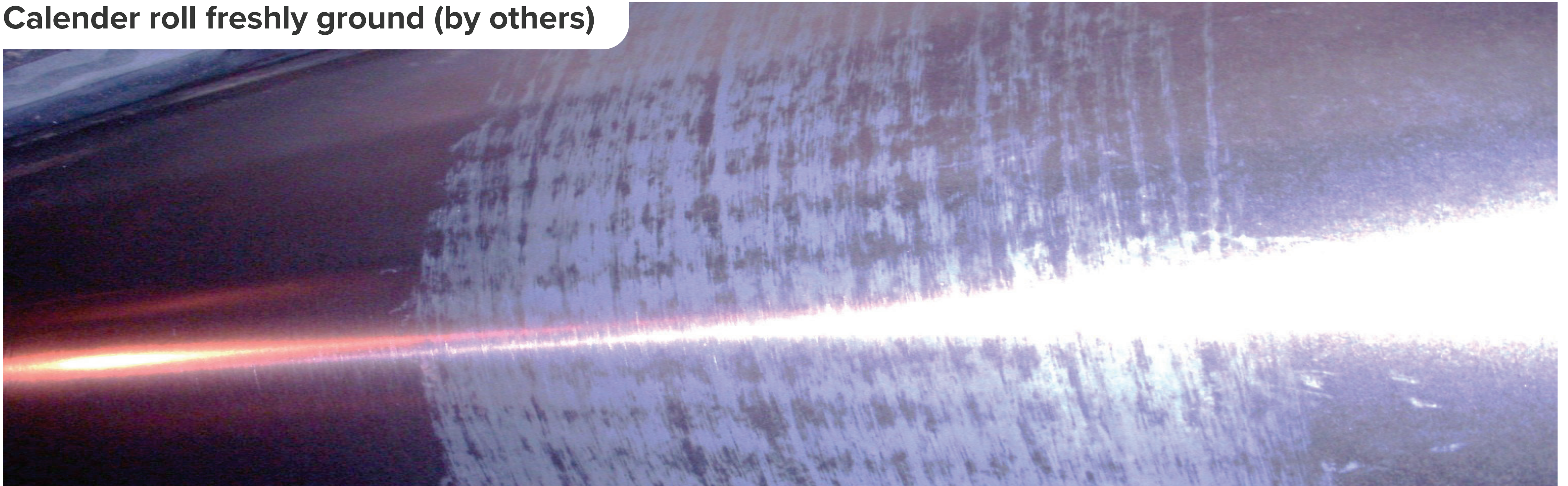
WHAT THE HECK IS BARRING, ANYWAY?

- Axial lines (bars) of non-uniform hardness
- Peaks are harder than the valleys
- Peaks are evenly spaced around the roll circumference (harmonic)



BARRING IS OFTEN NOT VISIBLE (BUT CAN BE REVEALED WITH THE LEAD TEST)

Calender roll freshly ground (by others)



Even after grinding, this roll still has significant barring
Barring is not visible until revealed by lead test

BARRING CAN ALSO BE DETECTED WITH A PRECISE TIR MEASUREMENT

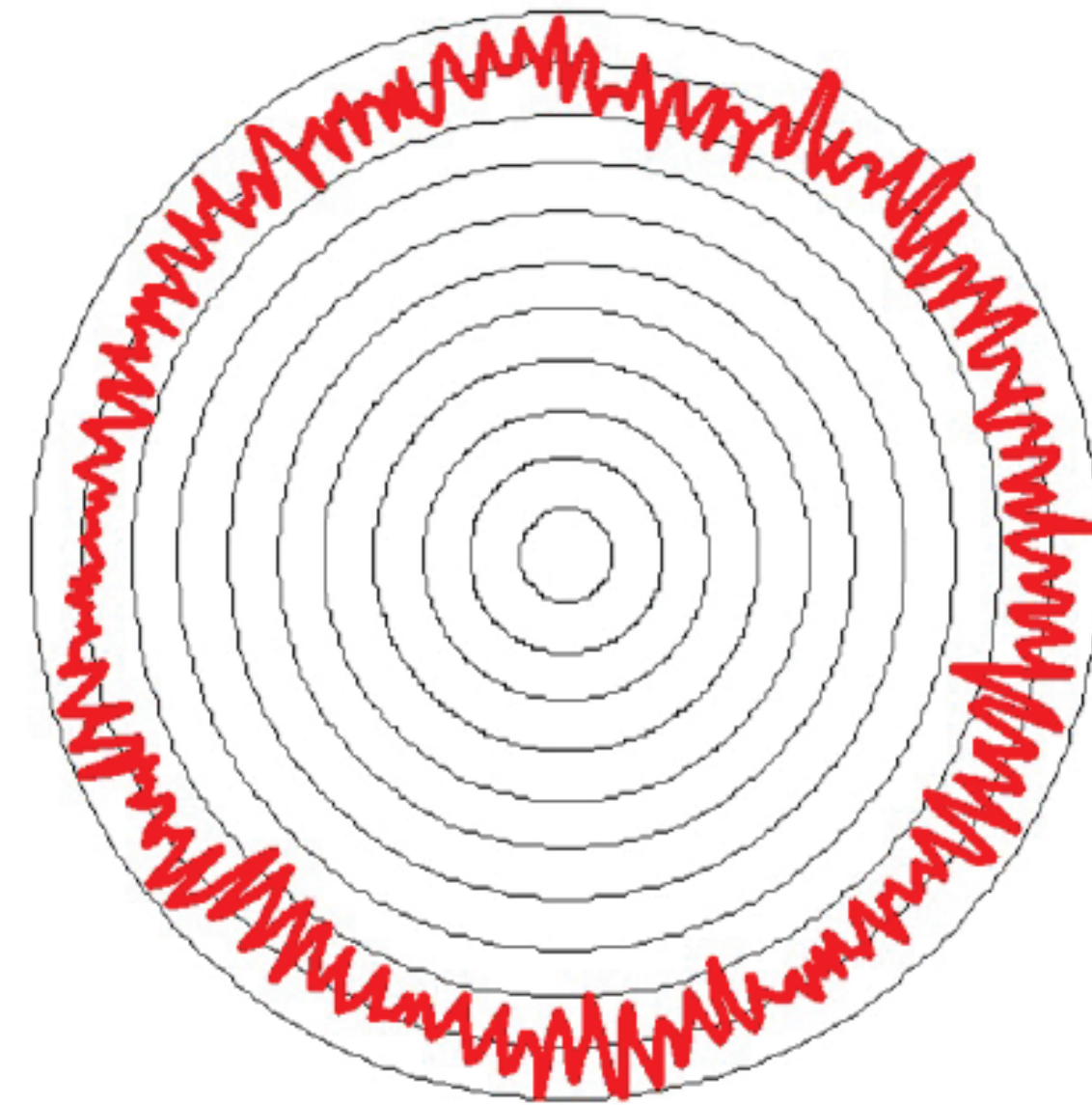
This is a freshly ground roll (ground by others).

Even after grinding, barring is still present as shown by a precise TIR measurement.

The amplitude of the peaks is approximately 0.000 080 – 0.000 120 inch in this example
(very small numbers!)

(When reviewing similar graphs, always note the scale used when plotting, since the scale has a large influence on the appearance of the graph.)

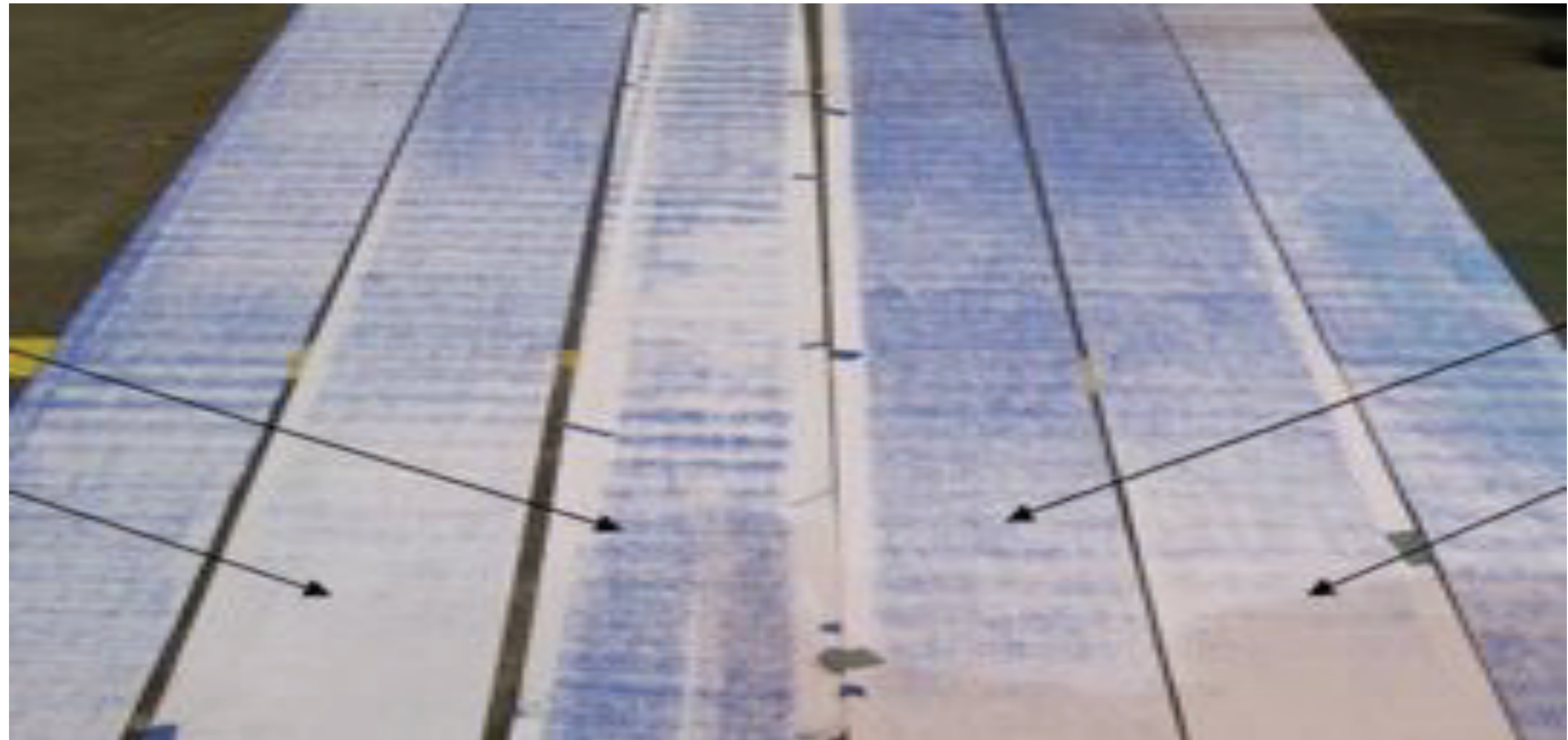
Roll CS-543 : center
Line spacing = 0.0001 in



ANOTHER WAY TO DETECT BARRING IS WITH NIP IMPRESSION PAPER

NIP IMPRESSION PAPER

Rolled through
the calender stack
in the machine
direction can
reveal barring.



IF THE BARRING IS SEVERE, IT CAUSES RADIAL LINES ON THE SIDE OF THE REEL

When the spacing of the caliper variation becomes a multiple of the reel circumference, hard and soft lines may appear in the reel of paper resulting in **paper rejects and poor runnability** at the winder and at converting operations.



WHAT CAUSES BARRING?

VIBRATION CAUSES BARRING...

... if the vibration is a “harmonic” of the roll rotational speed

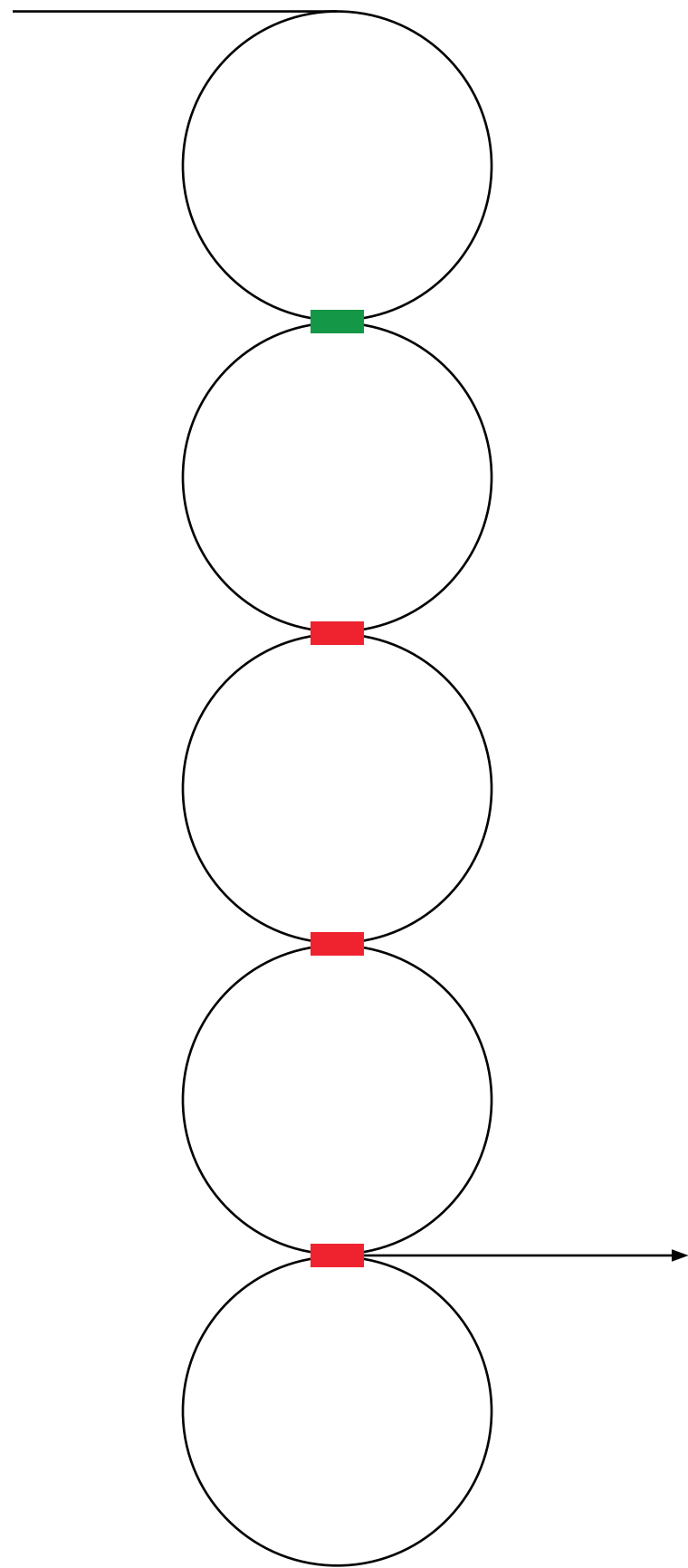
(harmonic means a multiple of the roll speed; for instance 2X, 3X, 4X ...).

Harmonic vibration **work-hardens** the metal in axial lines or bars.

WHAT CAUSES BARRING?

- Bearing issues, drive coupling issues
- Rolls operating close to semi-critical speed
- Periodic thickness variations in the paper web (pulsations at the headbox, fan pump vane pass, screen bar pass)
- Stock impurities (OCC)
- **Rolls not properly ground (barring not completely removed)**

BARRING SPREADS LIKE A VIRUS



If paper is marked by some vibration in the **first nip** ...

that mark will cause vibration in **other nips**.

If the vibration is a harmonic of the roll rotational speed, then barring starts (localized work hardening).

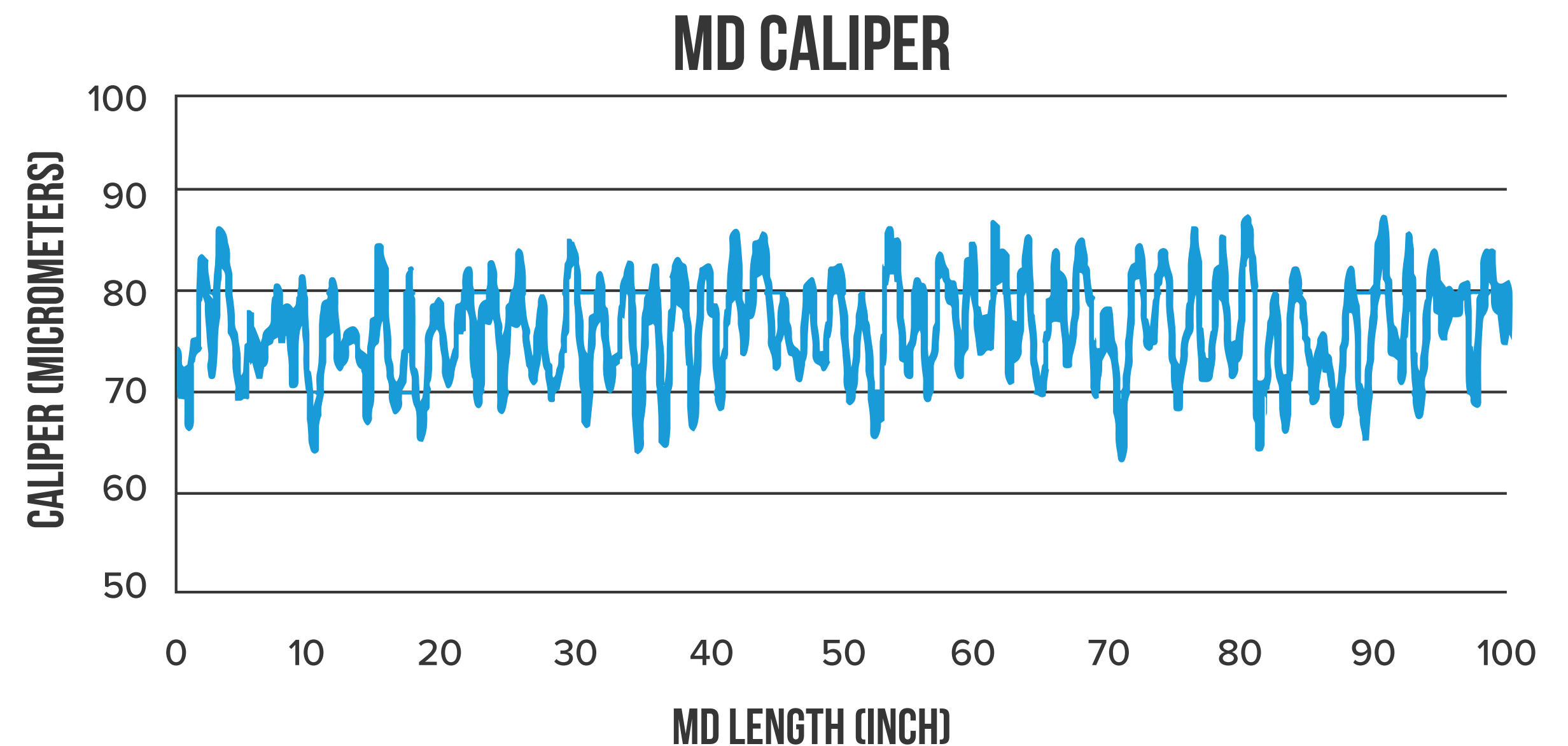
Barring will transfer to other rolls in the calender stack.

CALENDER ROLL BARRING CAUSES VARIATION IN MACHINE DIRECTION CALIPER

Amplitude of the MD caliper variation is 0.000 400 – 0.000 600 inch, in this example (***very small numbers!***)

The spacing of the variation is every 2.1 inches in the MD>

(Due to the very close spacing, this variation may not be detected by the online scanner or the quality lab.)



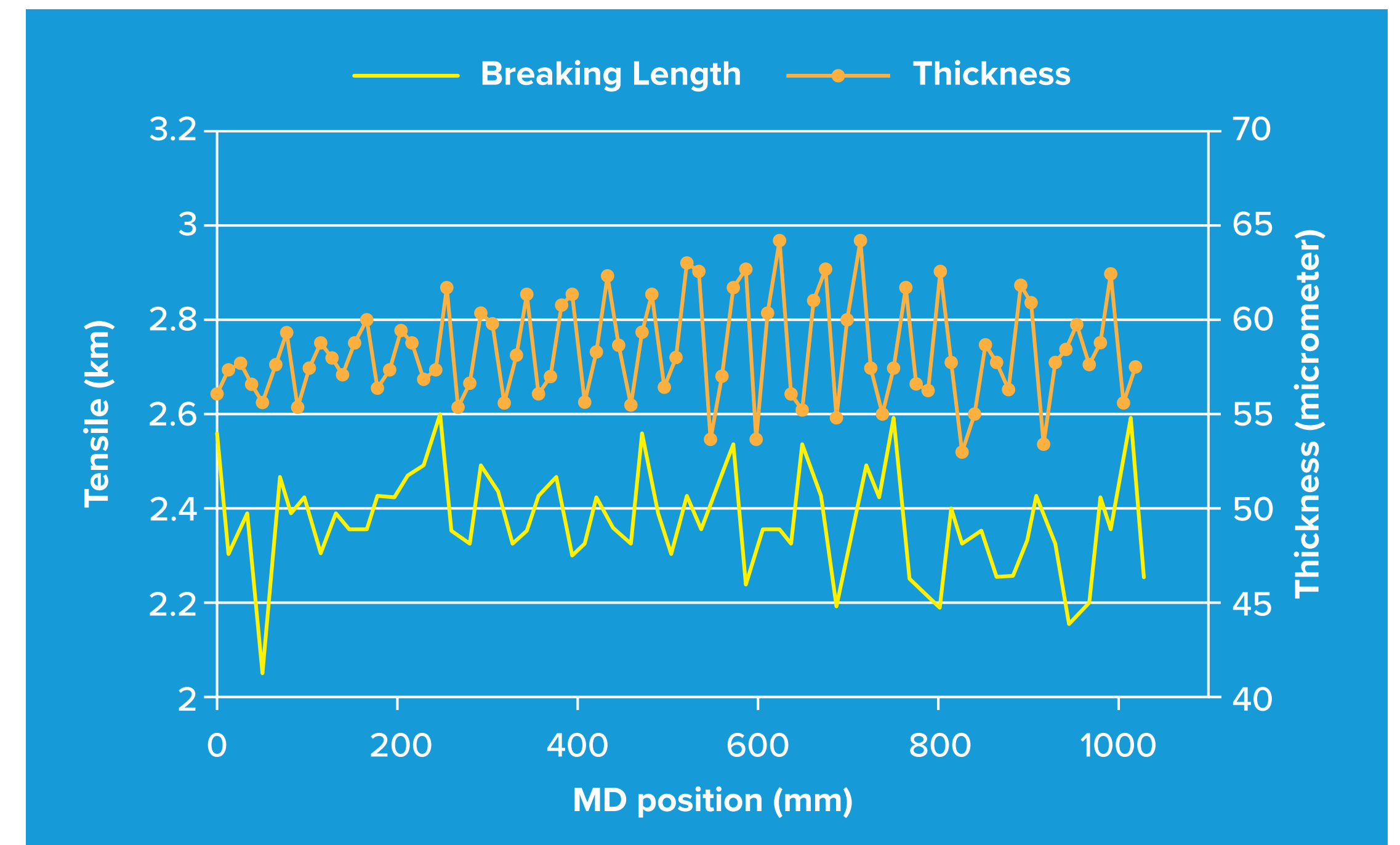
MD CALIPER VARIATION CAUSES MD STRENGTH VARIATION

Amplitude of the MD caliper variation is 0.000 400 – 0.000 600 inch, in this example (***very small numbers!***)

Corresponding MD strength variation is 20% (***very large effect!***)

(FPIinnovations Study)

Extra fiber (\$\$\$\$) is needed to overcome the loss in strength.



PRECISION CALENDER ROLL GRINDING ELIMINATES ISSUES CAUSED BY BARRING

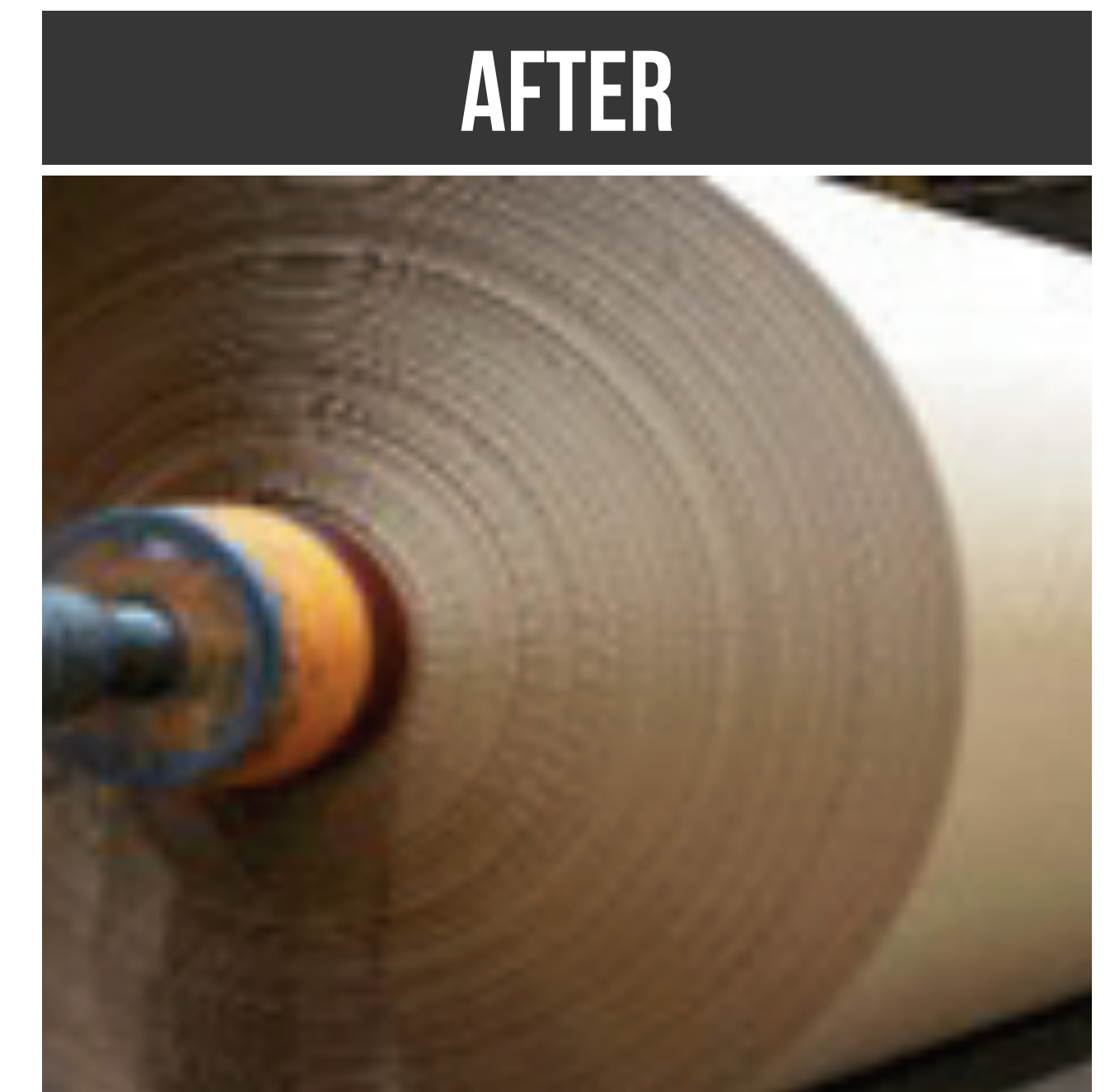
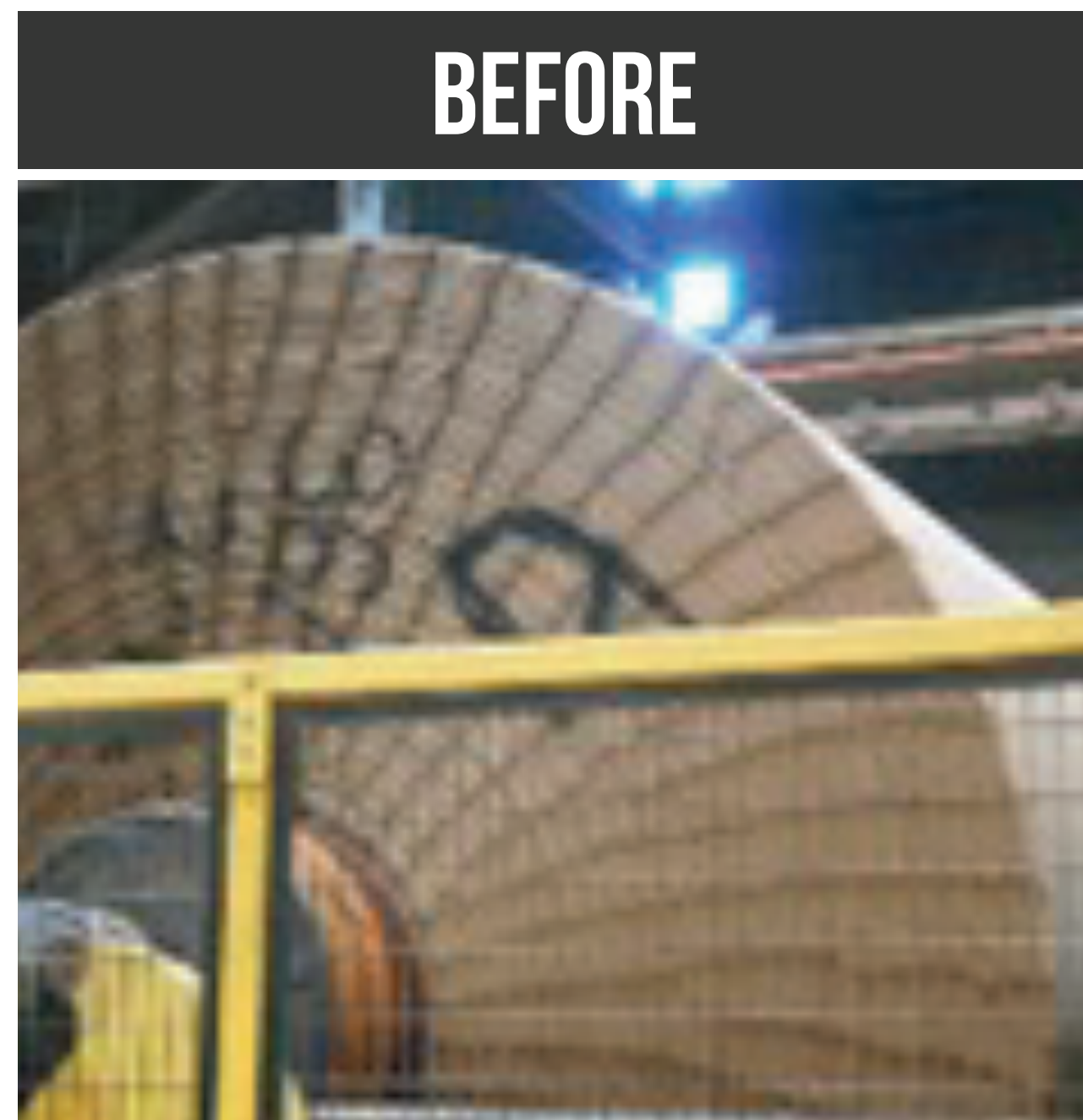
Recently, this **customer switched to precision grinding tolerances (PRG)** for calender roll grinds.

Barring was eliminated, resulting in improved MD caliper variation.

Spool losses decreased by 250# per reel (approx. 12 seconds of run time).

Resulting paper savings is 1,000 tons per year = \$300,000 per year.

Breaks at the winder have gone down significantly, for an additional savings of \$100,000 per year.



TELL ME AGAIN, WHY SHOULD I CARE ABOUT CALENDER ROLL BARRING?

BARRING HAS A SIGNIFICANT NEGATIVE IMPACT ON:

- Paper properties
- Maintenance spending (\$)
- Roll change frequency (\$\$)
- Paper rejects (\$\$\$)
- **Fiber usage (\$\$\$\$)**

WHAT CAN I DO ABOUT CALENDER ROLL BARRING?

1. SPECIFY VERY TIGHT TOLERANCES

for calender roll grinds, knowing that barring peaks can be very small, and still have a large impact on paper properties

2. INSIST THAT ALL BARRING BE REMOVED DURING GRINDING

3. LOOK FOR CALENDER ROLL BARRING, TO CONFIRM IT IS REMOVED

- Lead Test
- TIR measurements (precisely measured/plotted)
- Nip impressions in the machine direction
- Looking at the side of the reel

OUR GUARANTEE TO YOU:

- NO FEEDLINES
- NO CHATTER
- NO BARRING

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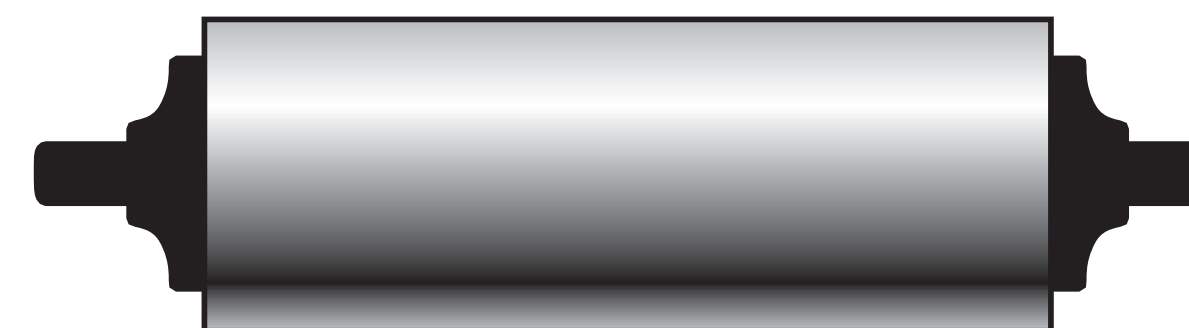
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THANK YOU!

QUESTIONS?

SUGGESTIONS?

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