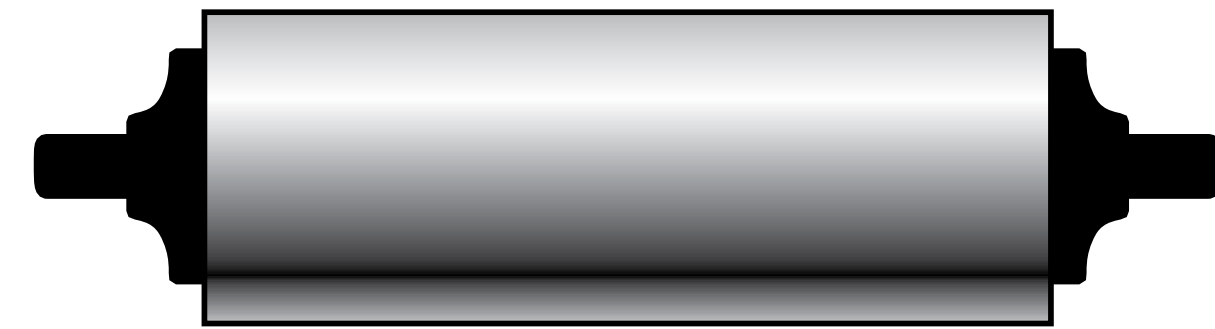


# PRECISION GRINDING CALENDER ROLLS FOR ALL INDUSTRIES — IT'S A MUST

**PRECISION**



**ROLL GRINDERS**

*Over 50 years of value-added service*

**WEBINAR  
SERIES**

[precisionrollgrinders.com](http://precisionrollgrinders.com)

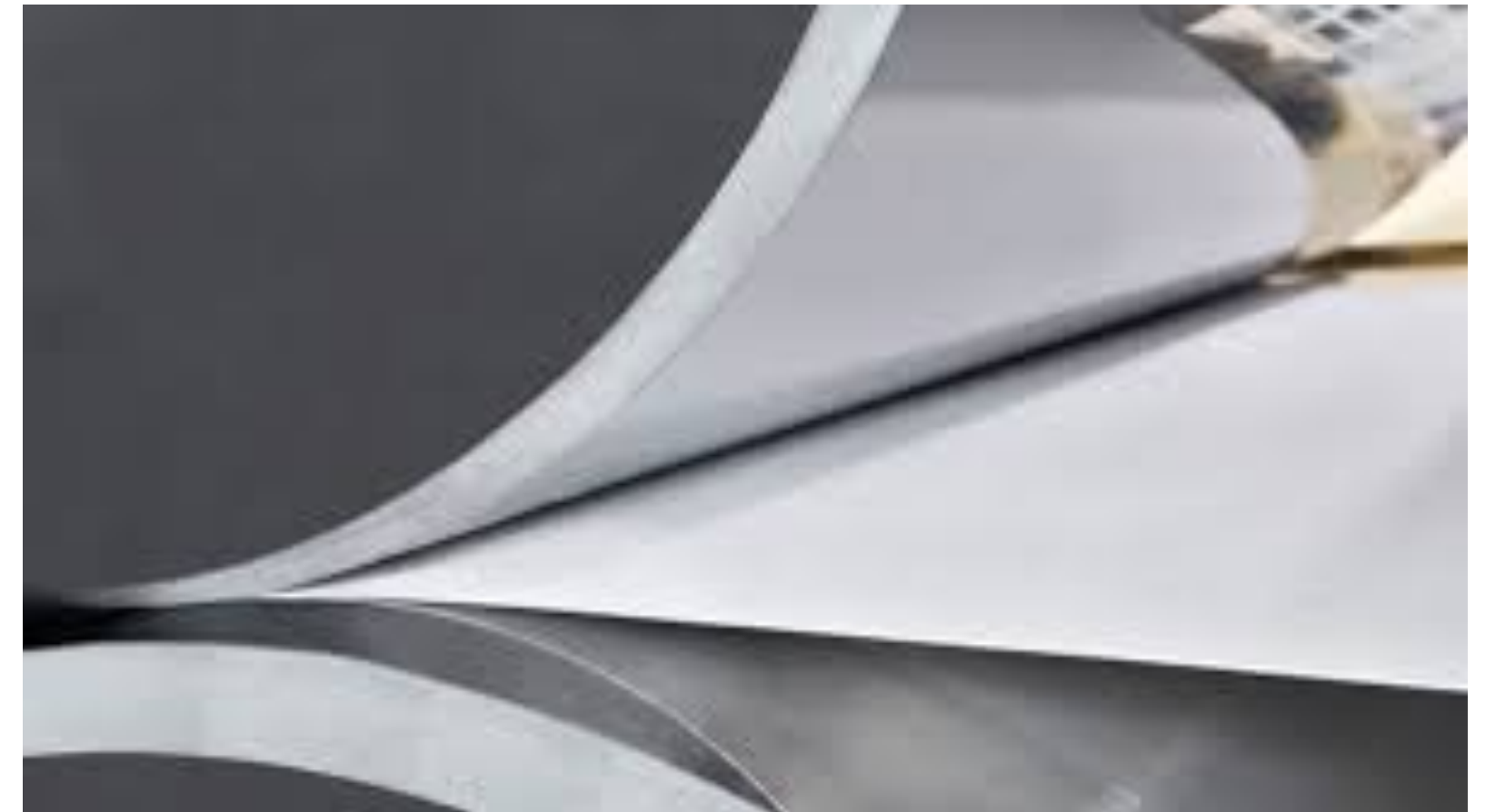
# CALENDER ROLLS DRIVE REAL ECONOMIC VALUE

## CALENDER ROLLS ARE CRITICAL IN ANY PROCESS

Rubber, Paper, Plastic, Non-wovens

- Thickness and caliper control
  - Machine-direction variation reduction
  - Cross-machine variation reduction
- Final product surface finish and smoothness
- Critical for final product strength

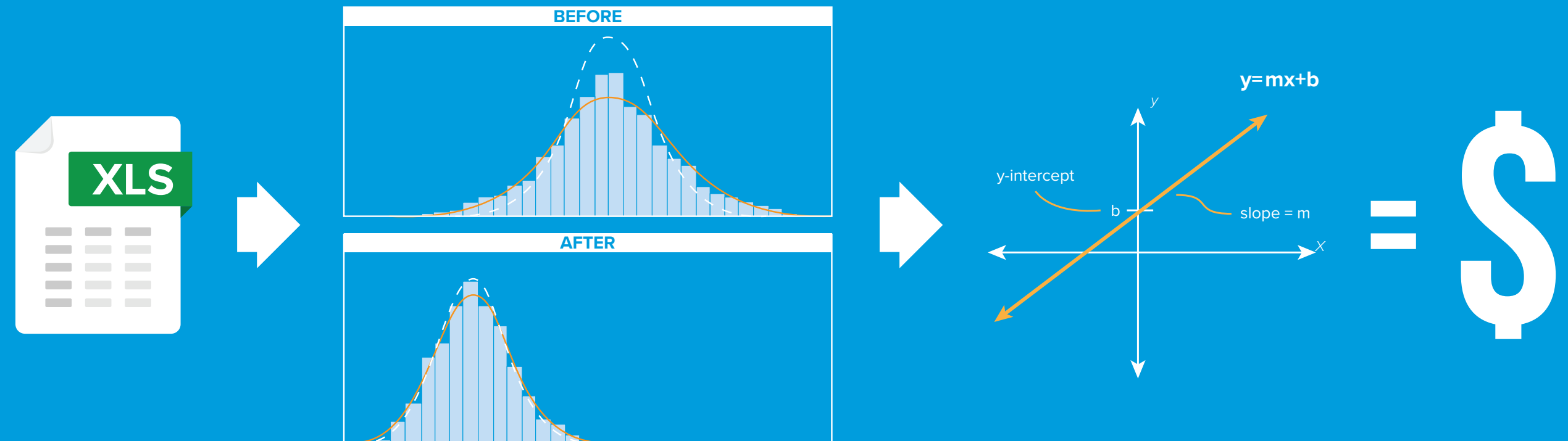
**PRECISION CALENDER ROLLS = \$\$**



# PRG'S PROMISE TO PROVIDE REAL ECONOMIC VALUE

## PROCESS VARIATION IMPROVEMENT = \$

- Joint Design of Experiment to reduce variation
- Data analysis on current process
- Implement plan for variation improvement
- Data analysis on improved process – predictive equation



# ANALYSIS (6S) PROVIDING REAL ECONOMIC VALUE

## PROCESS VARIATION IMPROVEMENT = \$

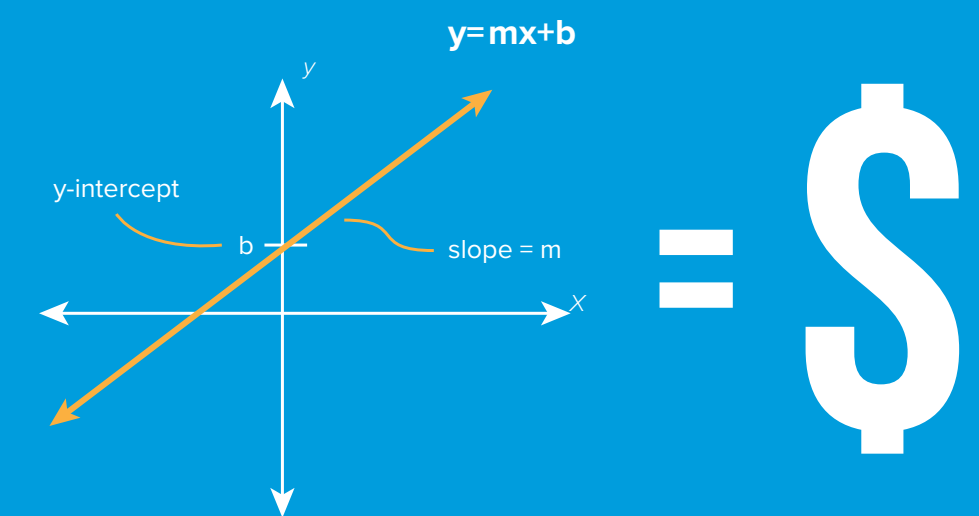
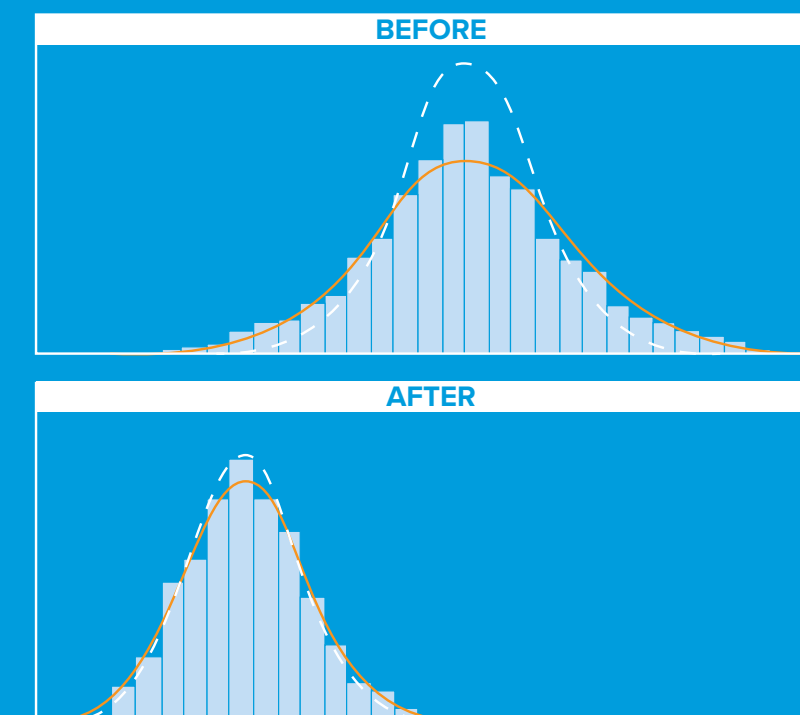
D – Joint Design of Experiment to reduce variation

M – Measurement of current process before/after change

A – Analyze data with 6s rigor (MiniTab) – confidence levels

I – Improve process with change

C – Control process = predictive equation



# APPLICATION ENGINEERING FOCUS

## Precision Roll Grinders Application Engineering

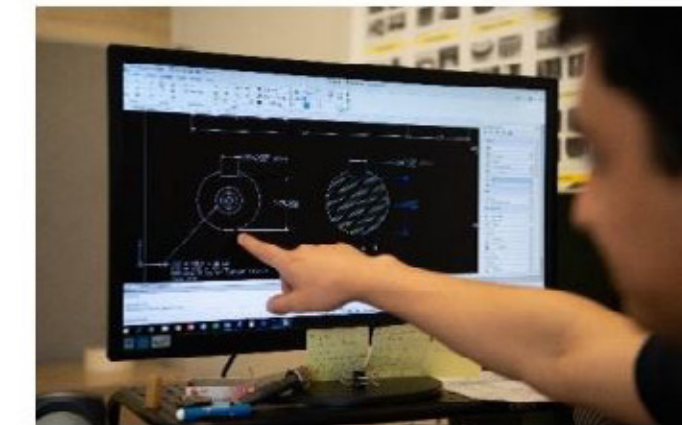
### PRG's Application Engineering:

At Precision Roll Grinders, we are dedicated to showing you the value of our services in your manufacturing line. By using our dedicated team of industry specialists and engineers, we work with our customers to develop a statistically validated study to show the improvements that our rolls provide. This may be longer roll life, improved quality, or material savings that all lead to increased profit. This not only provides our customers with confirmation of their process improvements but verifies that our team is providing the best quality services available.

### Design of Experiments (DOE):

#### Setting Objectives and Defining the Process Variables

Our studies are custom designed for each customer's facility and product production process. It begins with a consultation to decide what process(es) the customer would like to study and the objective(s). The process variables that support the objective(s) would then be chosen as the data collection focus.



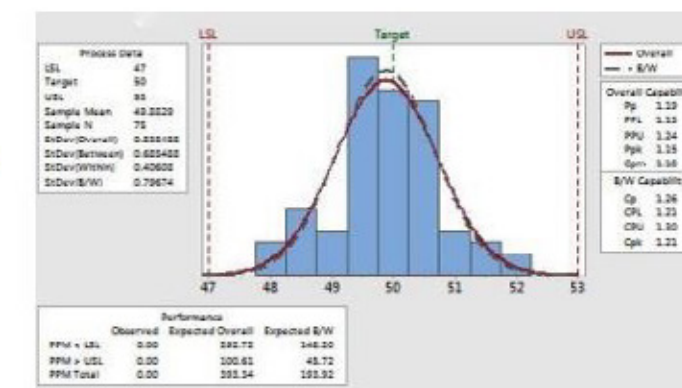
#### Experiment Design

PRG develops a process for data collection for the chosen subject of the study. This may be through the manual measurements taken from product samples or by using customer-supplied data if it is sufficient for the study. When necessary, the measurement system will be verified using MSA (Measurement System Analysis) to ensure that the data is being collected in an accurate and repeatable manner. When needed, a timeline for data collection with our customer is made to ensure sure the data will accurately represent the results of the study.



#### Execute, Analyze, and Interpret

Once the preliminary study has been outlined, PRG will work with your facility to carry out the data collection. Once the data has been collected, we analyze the data in software and provide the results and what they can mean for your production facility in terms of real economic benefit.



# PRECISION CALENDER ROLLS – WHAT MATTERS = \$\$

## GRINDS FOR PROPER TOLERANCES AND SHAPE

- Reducing Variation

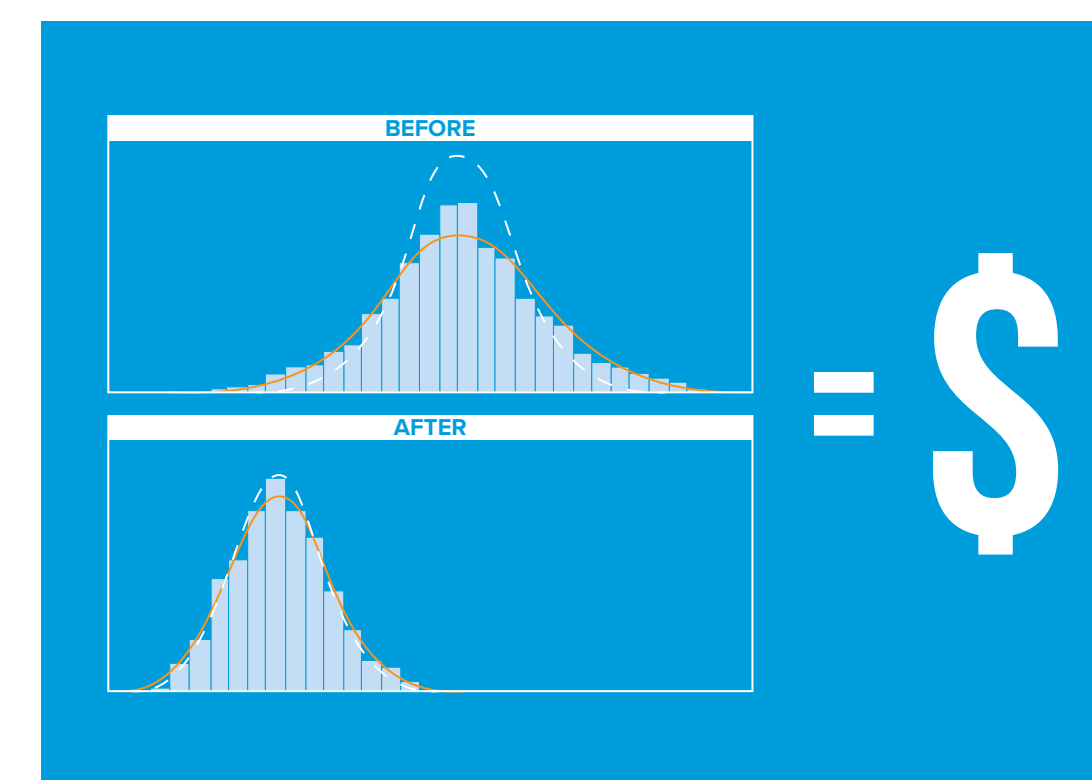


## MAINTAINING THE SURFACE AND OPTICAL PROPERTIES YOU NEED TO PRODUCE HIGH-QUALITY PRODUCT

- World-Class Product Quality



## VALUE-DRIVEN RESULTS THROUGH MATERIAL SAVINGS (STRENGTH), PRODUCT QUALITY AND ROLL LIFE

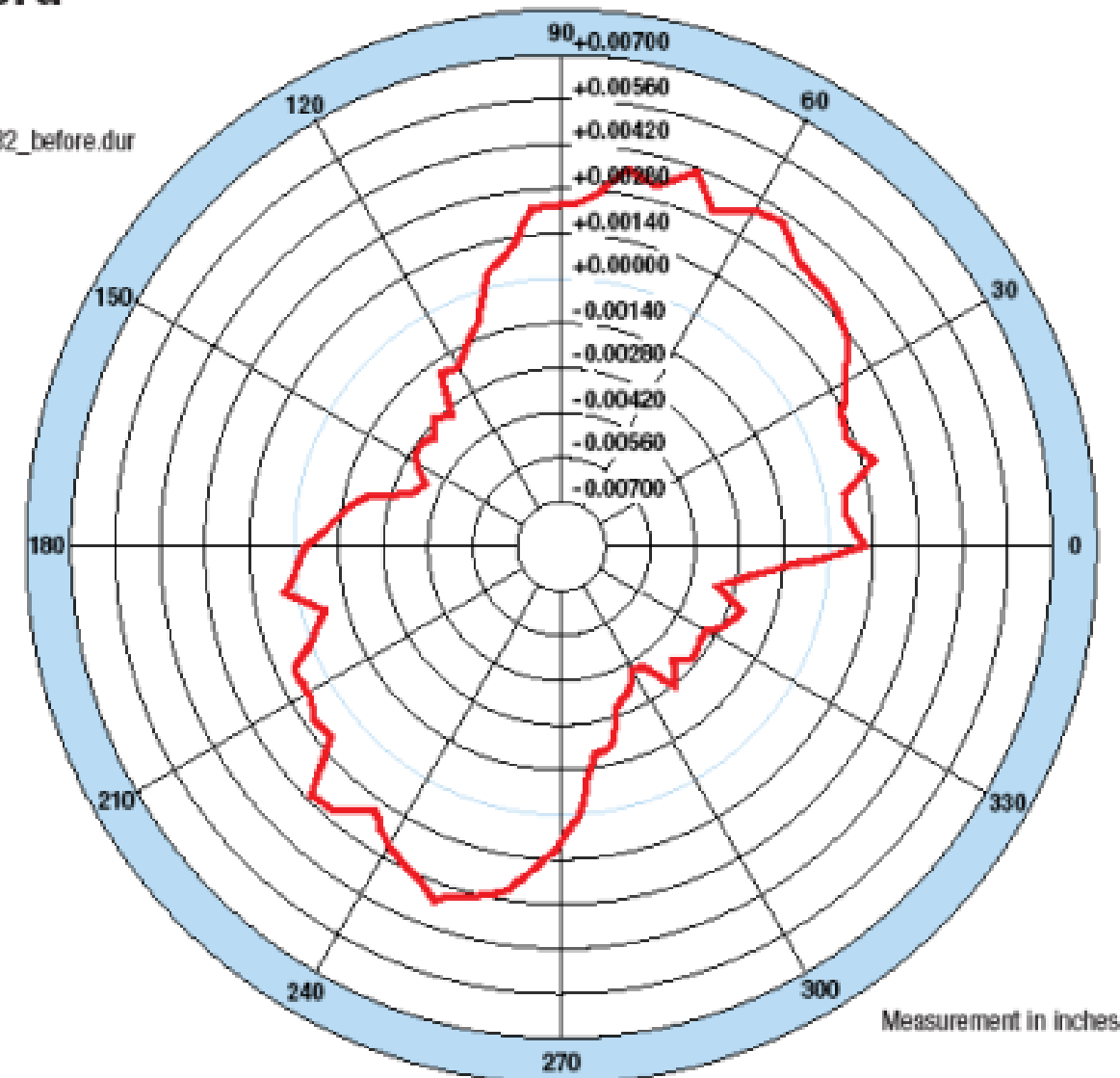


# REDUCING VARIATION – ROLL ROUNDNESS MATTERS

## IMPROPERLY GROUND

### Measurement Record

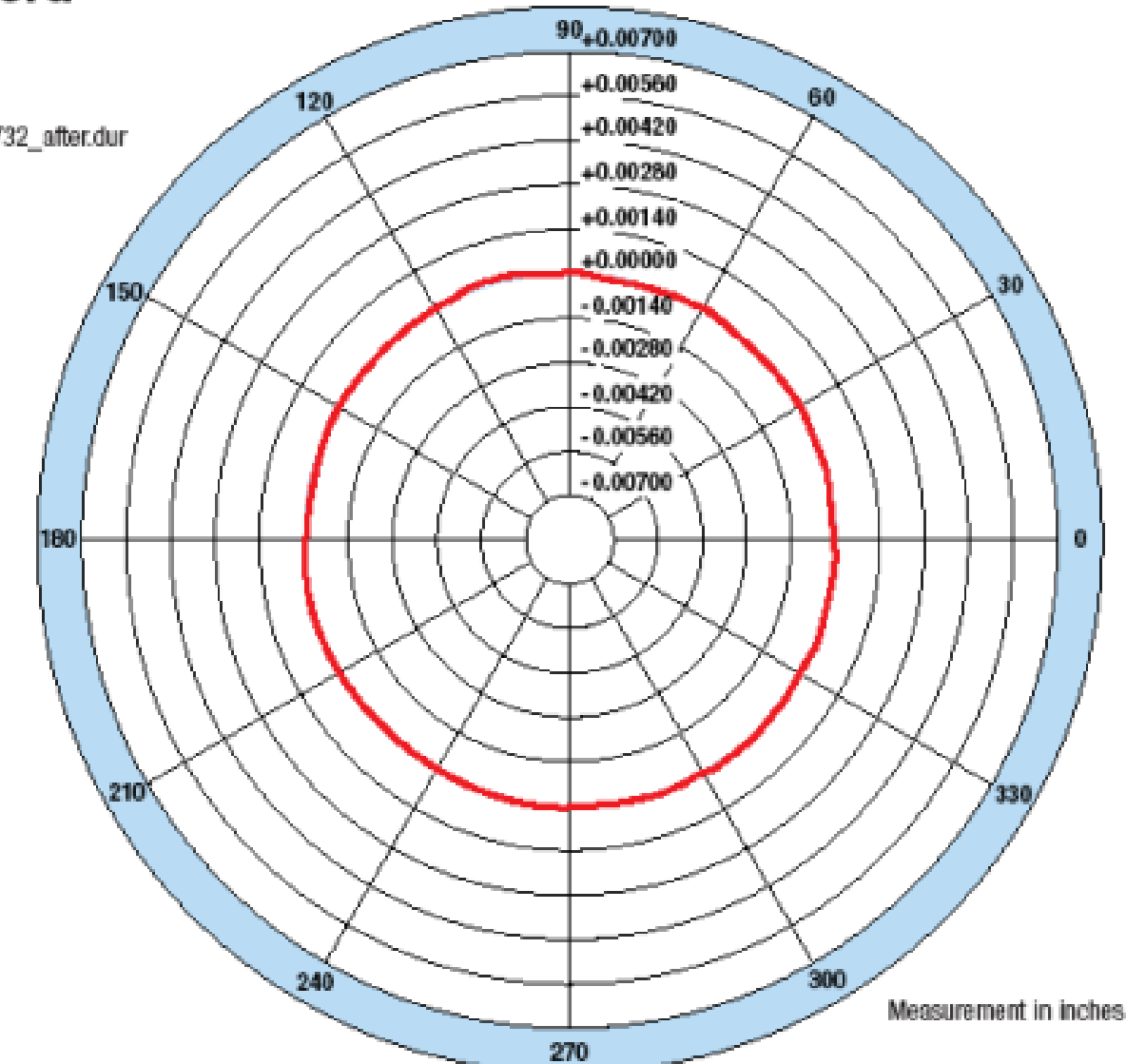
Customer: Confidential  
Customer Roll Number: competition/q00732\_before.dur  
Roundness: competition/q00732\_before.dur  
Measure Time: 18-10-05, 21:07  
Probe Mode: T1+T2  
Curve Zero Point: 77.0000 inch  
Measurement Position: 263.5000 inch  
Roundness: 0.00682



## PRECISION GROUND

### Measurement Record

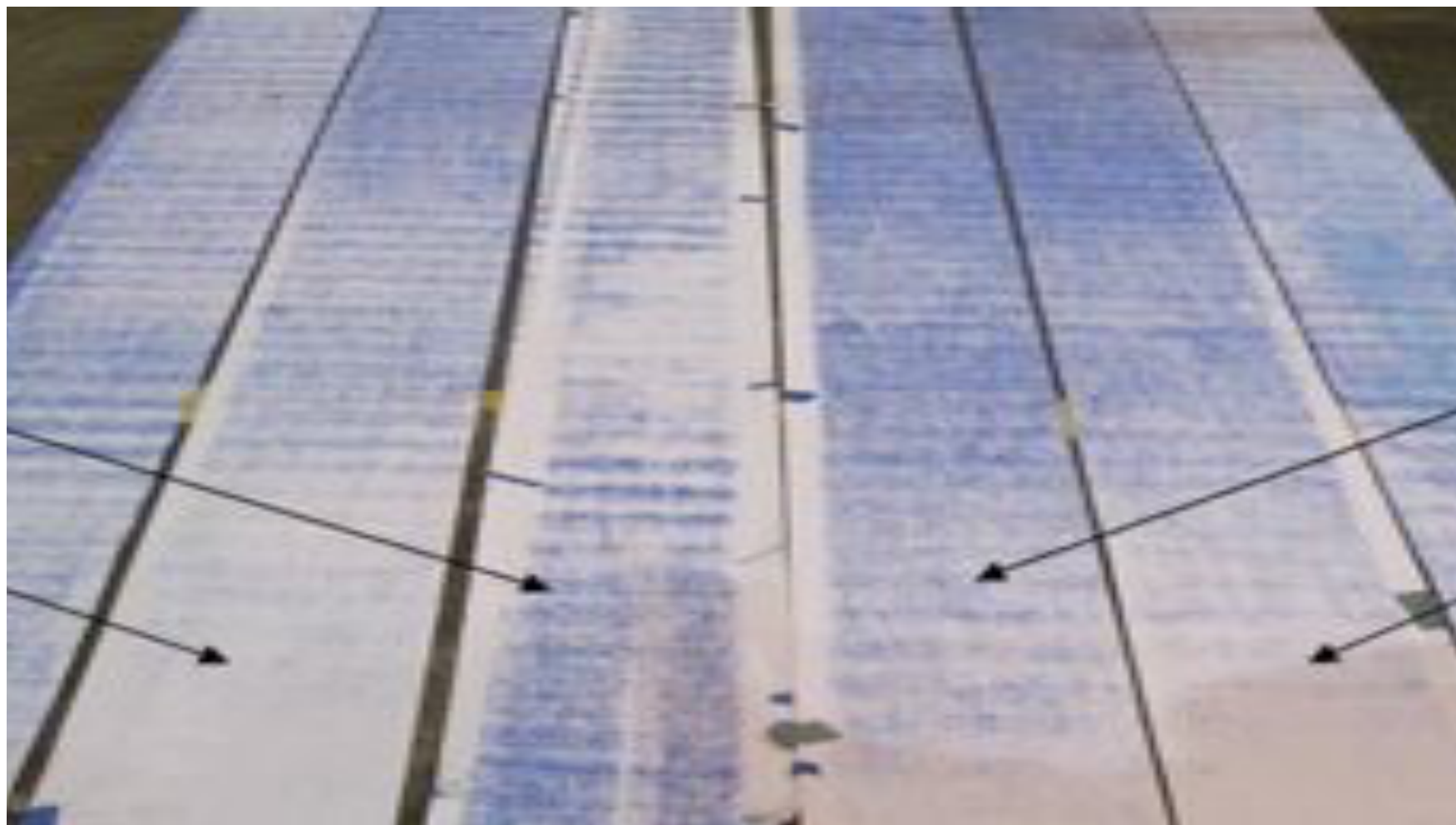
Customer: Confidential  
Customer Roll Number: competition/q00732\_after.dur  
Roundness: competition/q00732\_after.dur  
Measure Time: 19-10-05, 09:13  
Probe Mode: T1+T2  
Curve Zero Point: 77.0000 inch  
Measurement Position: 263.5000 inch  
Roundness: 0.00021



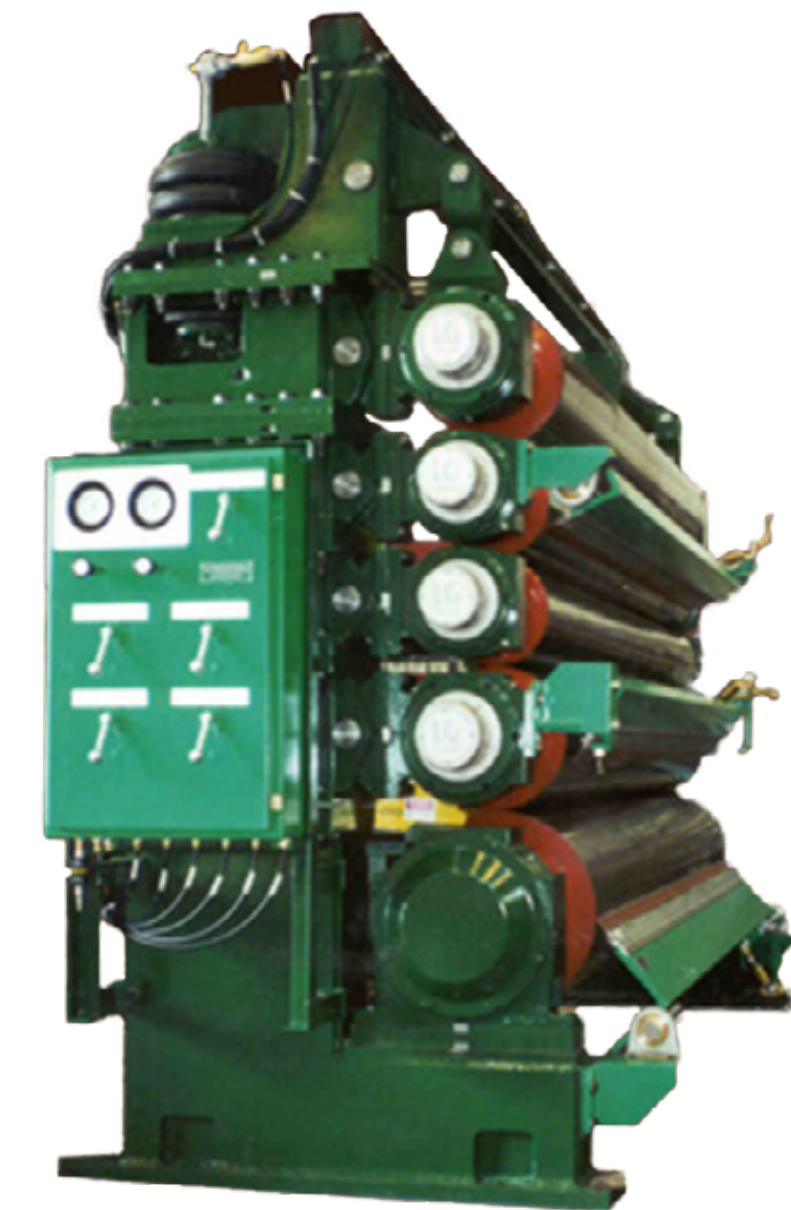
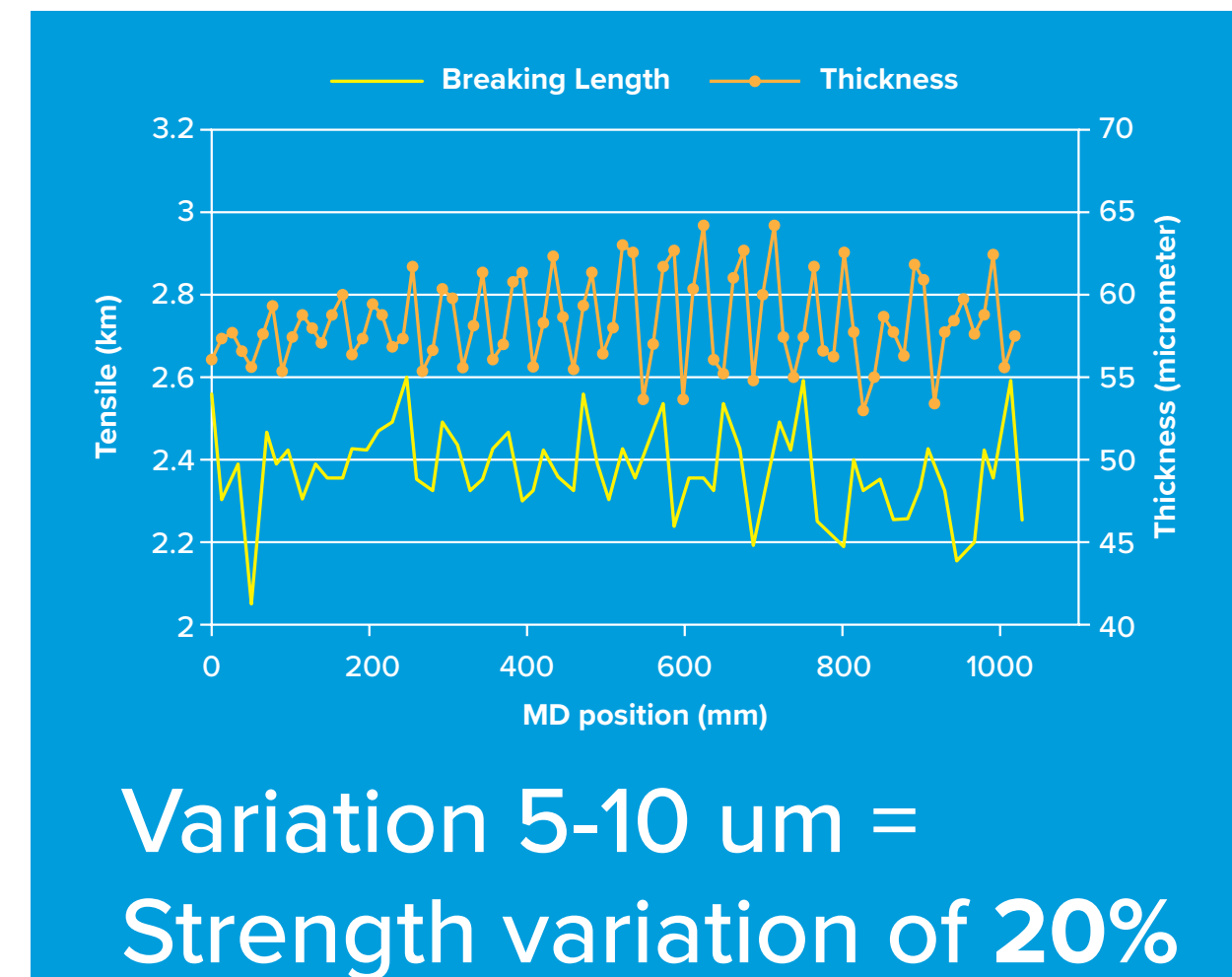
# ROLL ROUNDNESS PERFORMANCE

**ROLL ROUNDNESS PERFORMANCE = LOWER PROCESS VARIABILITY**

- Machine-direction variation or barring



- This causes strength variation

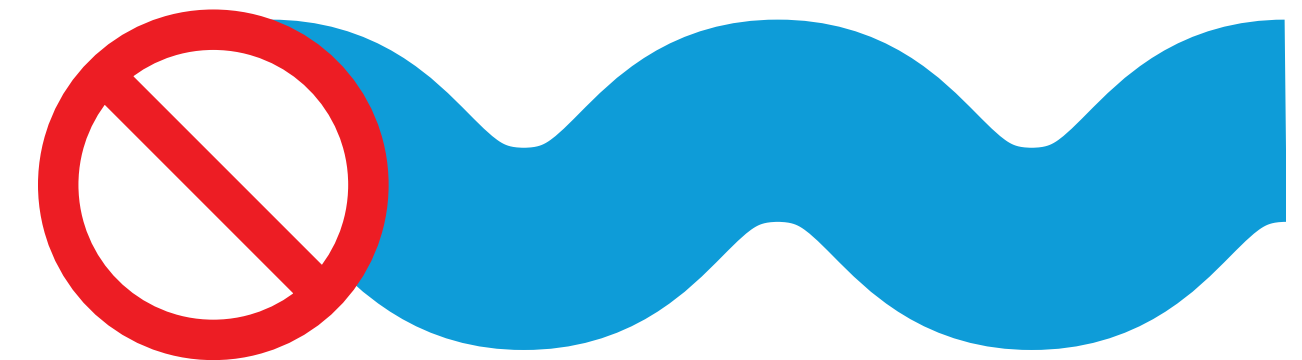




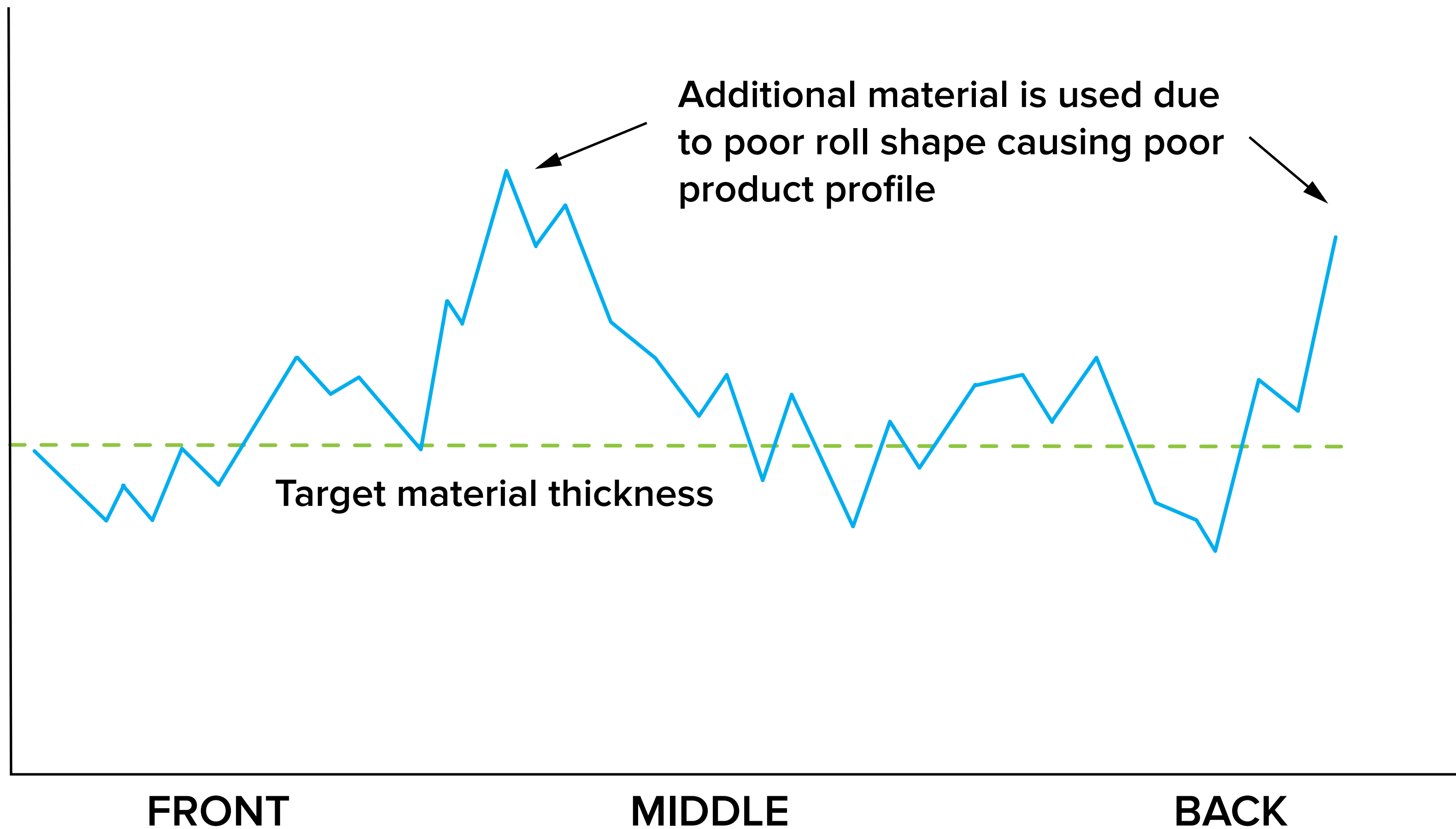
# REDUCING VARIATION – ROLL SHAPE MATTERS

## UNIFORM MATERIAL THICKNESS

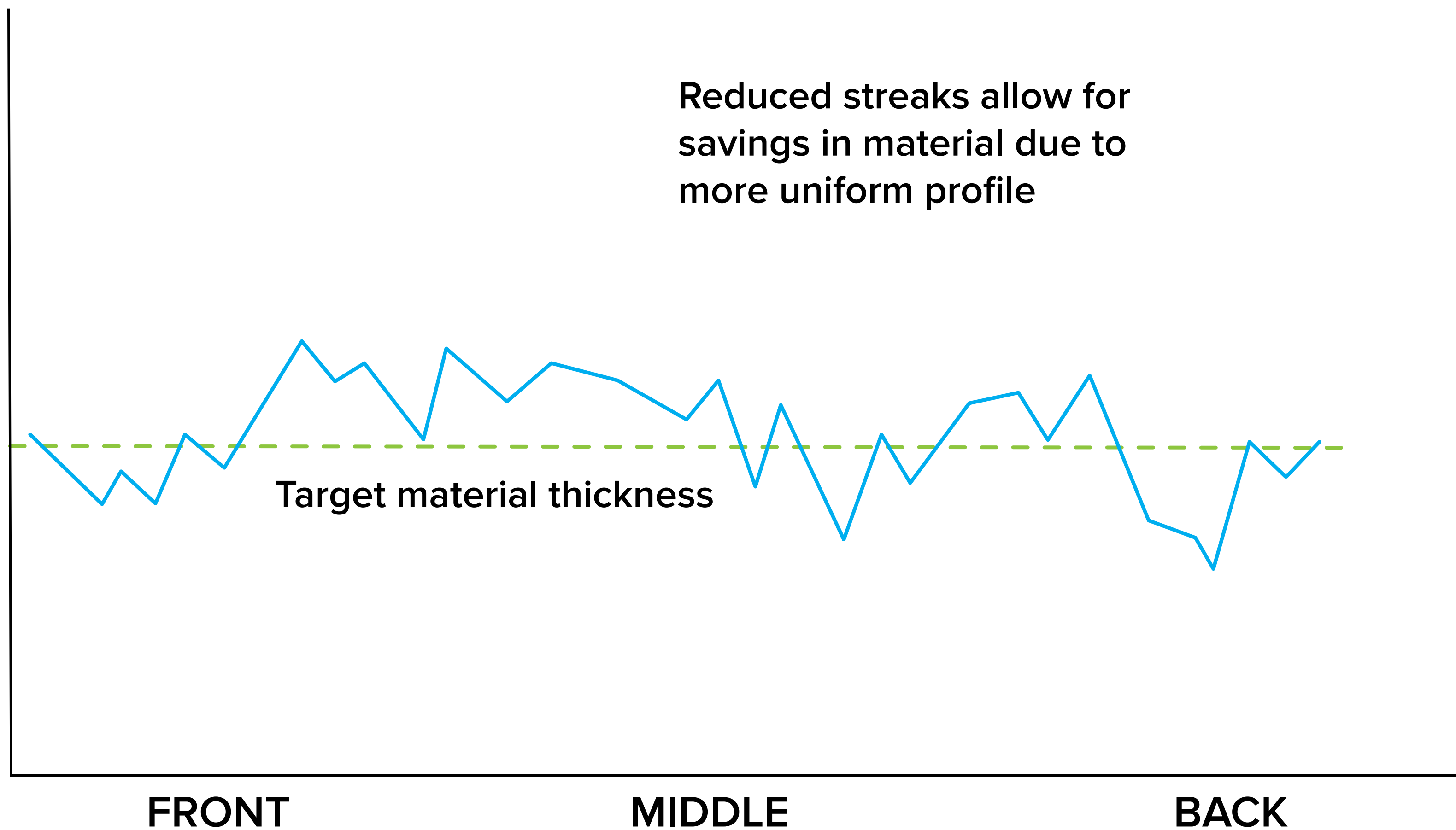
- Reduced material usage due to thick or “wavy” profiles
- Reduced defects due to localized thinning in the material profile
- Improved end-product construction
  - Reduce defects caused by a deviation in the material thickness
  - Improved construction productivity with a more uniform material thickness



# POOR ROLL SHAPE = LOST MATERIAL



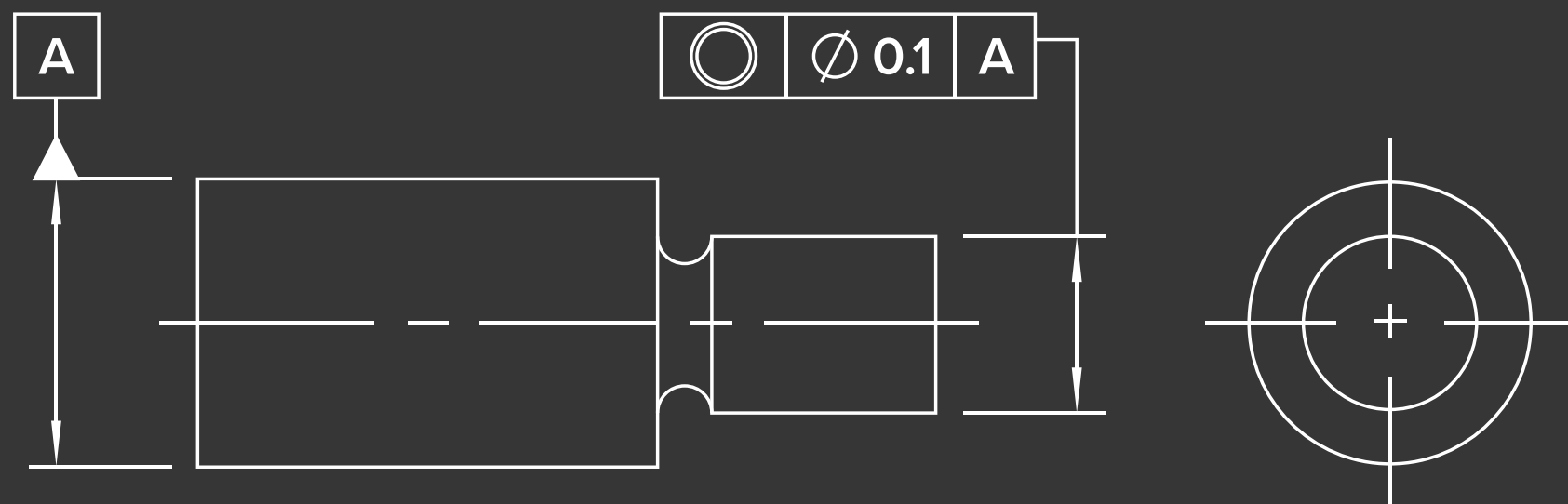
# GOOD ROLL SHAPE = MATERIAL SAVINGS



# REDUCING VARIATION – ROLL CONCENTRICITY MATTERS

## CONCENTRICITY

Concentricity is a tolerance that controls the central axis of the referenced feature, to datum axis.



Concentricity must be attained to ensure roundness and shape.

Poor concentricity leads to material losses and shorter roll life.

Often overlooked.

# SURFACE FINISH MATTERS

**OUR TYPICAL TOLERANCE IS 5 UM.**

**10% OF OUR WORK HAS TOLERANCES LESS THAN 2.5 UM.**

	Diameter	Face Length	Tolerances	Finish
Battery	400	420	2 um	0.05
Battery	320	280	2 um	0.05
Battery	445	305	1 um	0.025
DOD	880	990	1 um	0.1
Coating	365	610	1.3 um	0.15
Coating	305	460	1 um	0.15
DOD	320	280	2 um	0.05
Plastics	610	1730	1.5 um	0.15
Plastics	610	1820	1 um	0.05
Plastics	610	1830	2 um	0.1
Plastics	720	2690	2 um	0.02

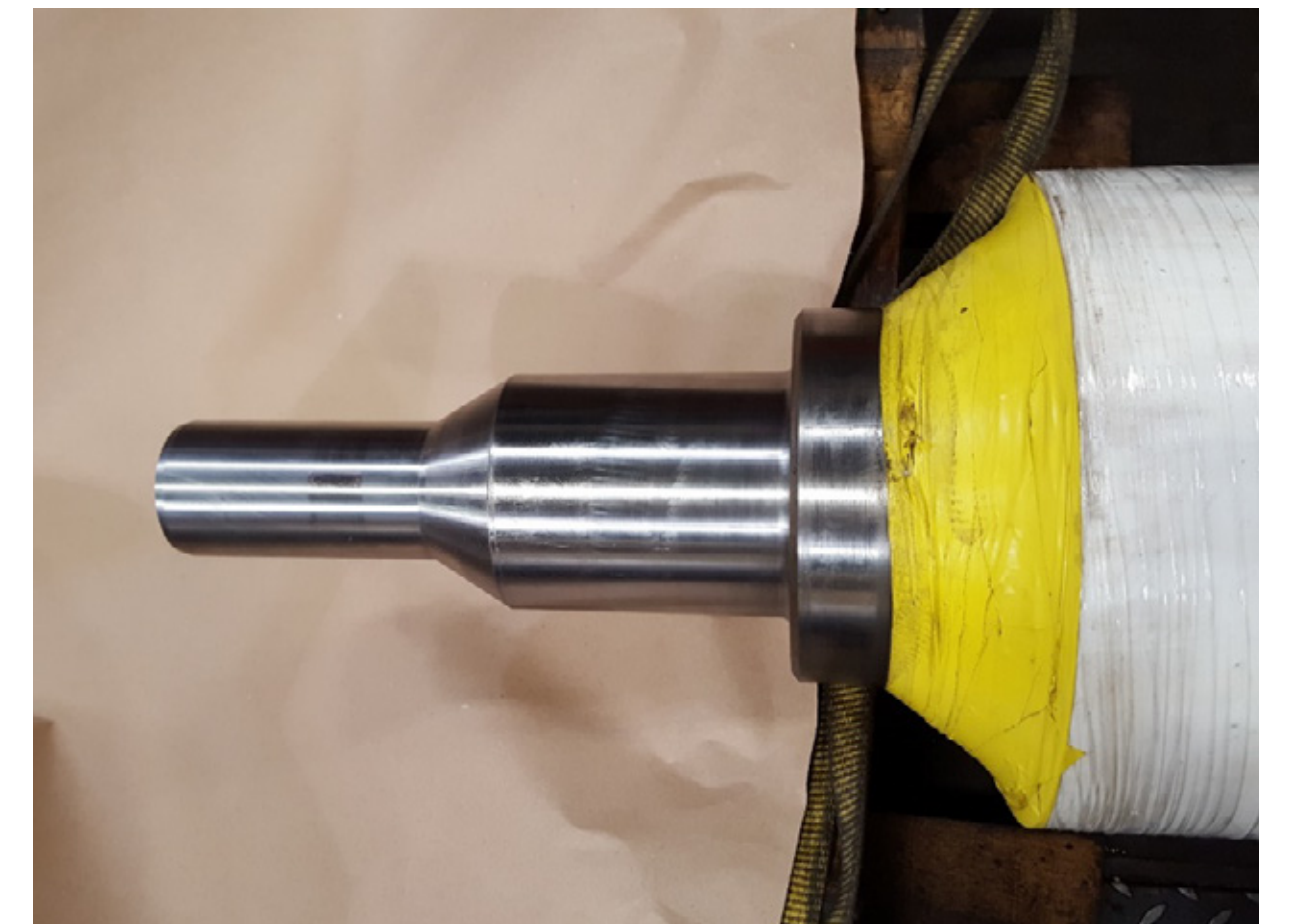
# COST OF IMPROPERLY GROUND ROLLS

DESCRIPTION	VARIABLE	AMOUNT
PRG Grind Cost	\$20,000.00	
PRG Roll Life (months)	14.00	
Competitor's Grind Cost	\$10,000.00	
Competitor's Roll Life (months)	6.00	
Annual Savings due to Extended Roll Life		\$2,857.14
Production Hours Lost due to Improperly Ground Roll	2.00	
Lost Revenue Per Hour	\$3,500.00	
Total Lost Revenue due to Improperly Ground Roll		\$7,000.00
Scrap While Running Improperly Ground Roll (pounds)	50.00	
Cost per pound	\$50.00	
Total Scrap Cost due to Improperly Ground Roll		\$2,500.00
Revenue Per Hour at Normal Production Speed	\$3,500.00	
Percent Production Lost due to Degraded Speed	0.10	
Hours Run at Degraded Speed	24.00	
Revenue Lost Due to Degraded Speed		\$8,400.00
<b>TOTAL COST OF IMPROPERLY GROUND ROLL</b>		<b>\$17,900.00</b>

To use this justification tool, simply insert the values appropriate for your operation into the green cells. Your projected savings will be automatically calculated and displayed in the lowest cell on the right.

# ROLL LIFE AND START-UP – MECHANICAL EXCELLENCE

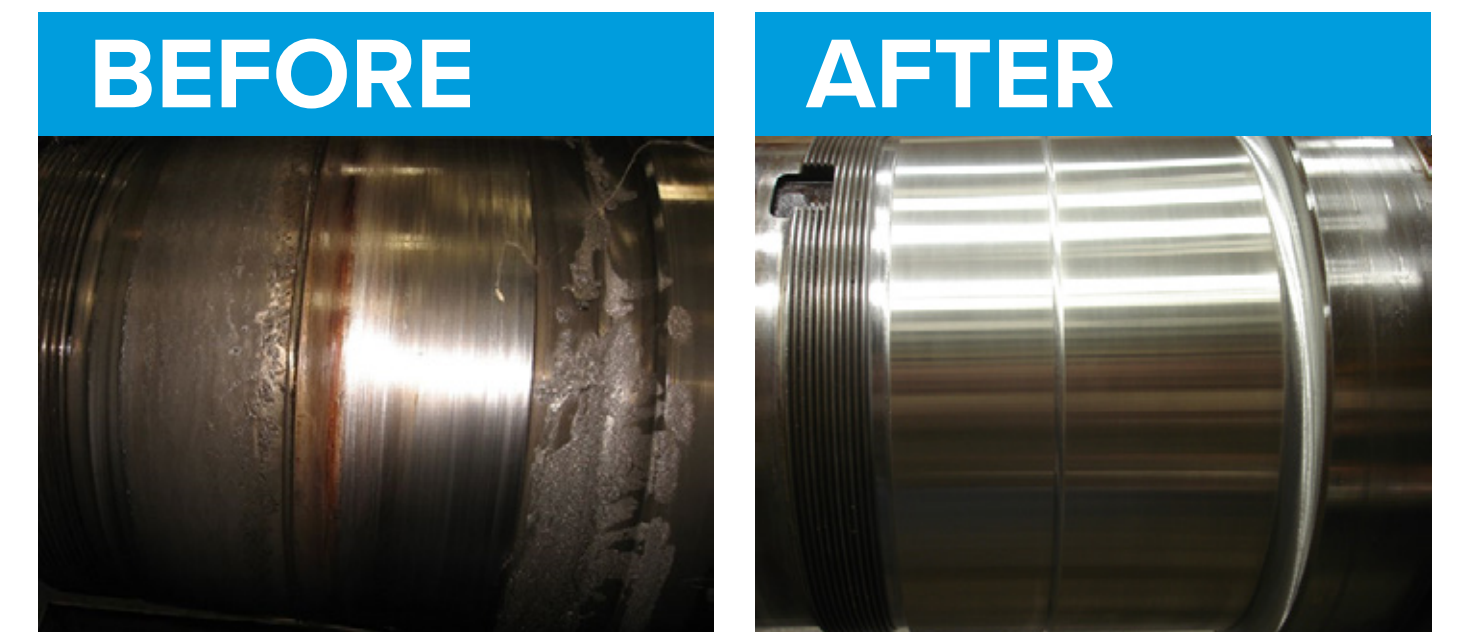
- Bearing Inspection
- Bearing Seat Grinding
- Bearing Replacement
- Complete Roll Inspection
- Complete Rebuilds/  
Reconditioning
- Dynamic Balance
- Dynamic Leak Test
- Grinding
- Head Fit Repairs
- Journal Repairs
- NDT
- New Housings
- New Journals
- New Rolls
- Roll Modifications
- Vacuum Testing  
of Suction Rolls



# ROLL LIFE AND START-UP – MECHANICAL EXCELLENCE

## PRECISION MAINTENANCE IS MORE THAN JUST PRECISION GRINDING

- Thorough inspection of bearings and housings
- Proper assembly of bearings and housings
- Replacing worn or damaged bearings and bushings
- Journal repair and replacement
- On-time start-up and profitable production

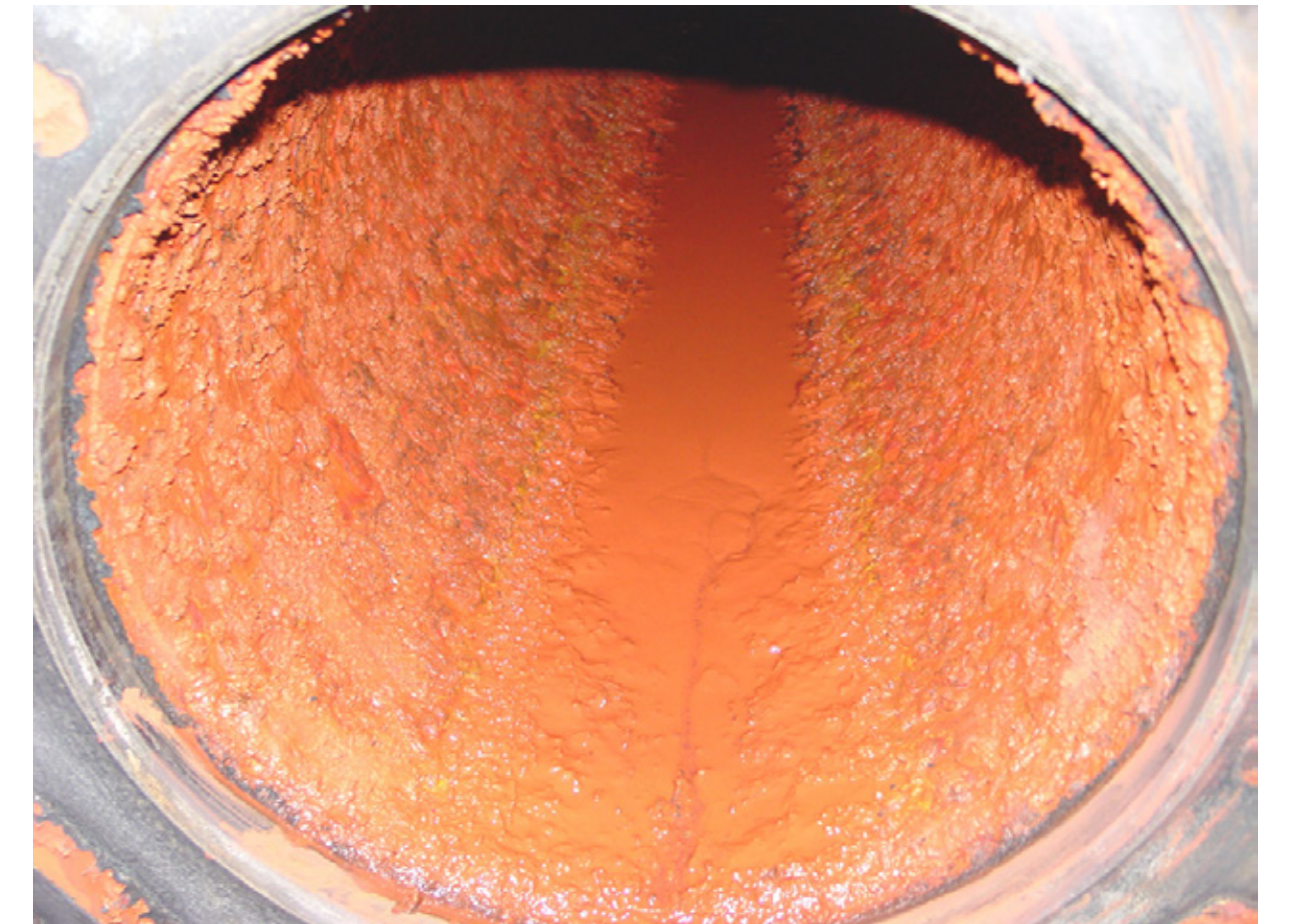




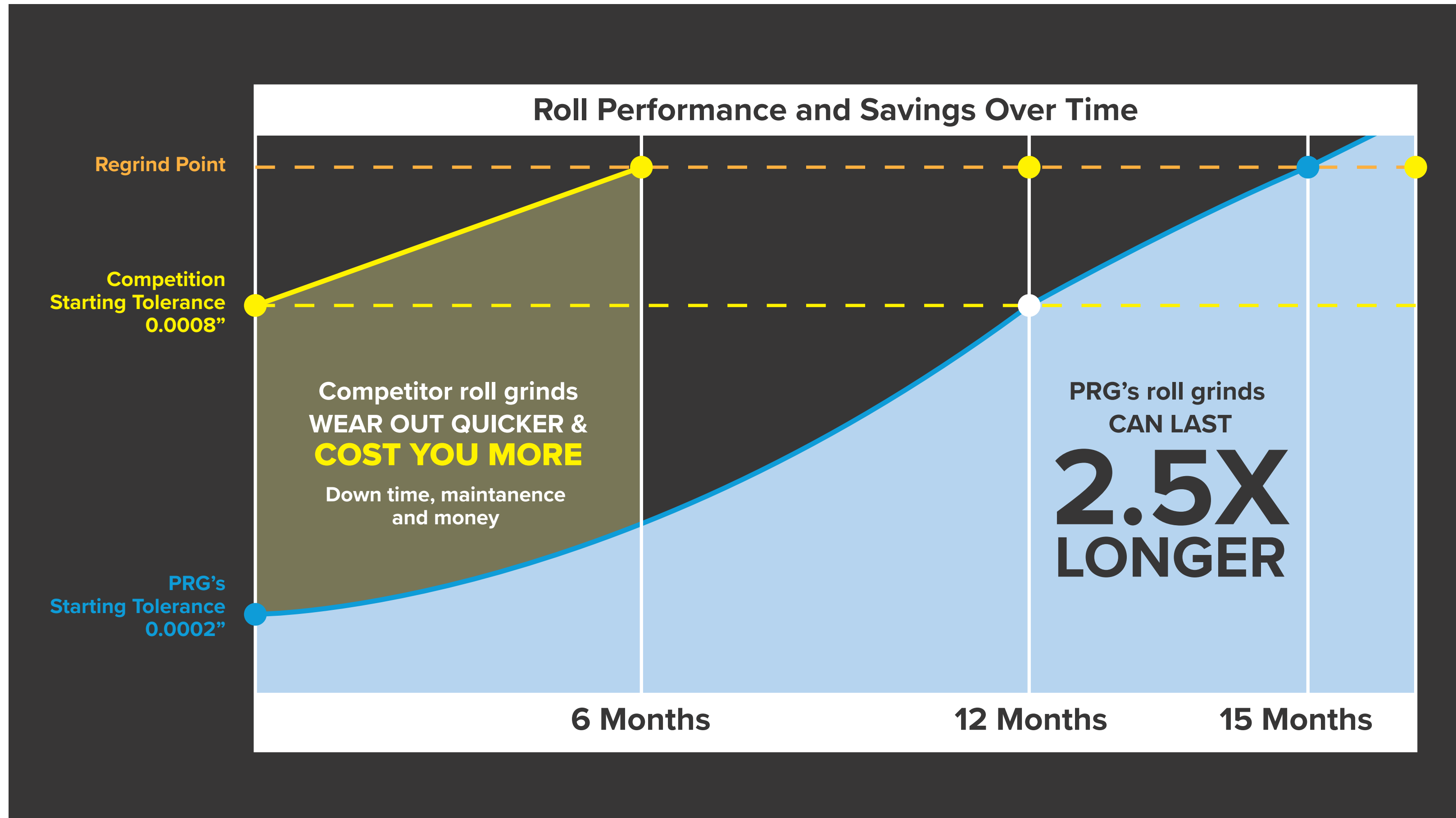
# ROLL LIFE AND START-UP – MECHANICAL EXCELLENCE

## UNIFORM ROLL SURFACE TEMPERATURE: TEMPERATURE TRANSFER AND ROLL TIR

- Temperature control
- Reduce sheet scorching and hot spots
- Prevent “thermal” runout (TIR) due to plugged passage
  - Can cause machine-direction material variation
- Increase production speeds



# ROLL LIFE AND START-UP



**ROLLS THAT  
START CLOSER  
TO PERFECTLY  
ROUND START  
UP FASTER &  
RUN LONGER!**



# PROMISE TO PROVIDE VALUE – PAPER CASE STUDY

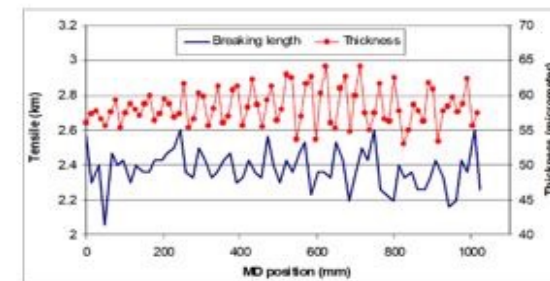
## Precision Roll Grinders Value Study:

### The Case for Precision Grinding Linerboard Machine Calender Rolls

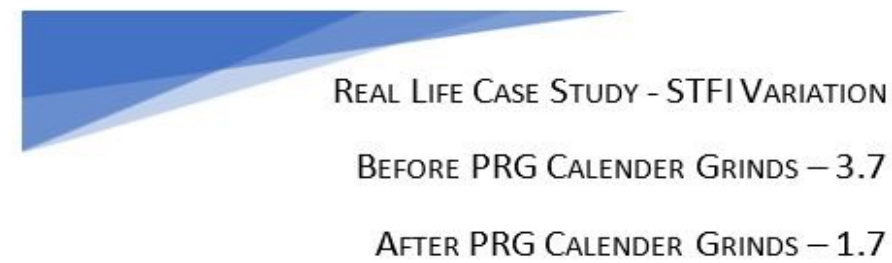
All too often calender roll grinds are considered 'non-critical' on linerboard machines. After all, linerboard is driven by the strength of the paper, not by fine paper quality. Why would a linerboard machine need precision (0.0002" roundness) grinds? Isn't that a waste of money? NO. Linerboard calender roll grinding is an *investment in your machine's profitability*, not just a maintenance cost. Here's why:

#### Calender roll 'barring' and grind variation leads to strength variation:

Paper industry researchers (FP Innovations) proved that short-term calender variation leads to strength variation in the lab. PRG and its partners proved it in mills!



Caliper variation 5-10 um =  
Strength variation of 20%



54% IMPROVEMENT LED TO BWT REDUCTION 35.3# TO 35.1# = \$500,000/yr

#### Poor calender roll grinds = losses at each turn-up = poor winder runnability



Saving 250# of spool loss per reel = 1,000 tons/yr  
\$300,000/yr of savings!

Improved Winder runnability = \$100,000/yr

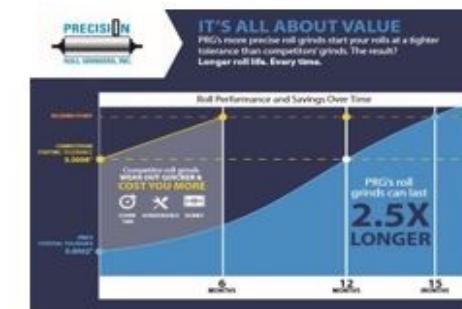
#### Additional Real-Life 'Perks' of Precision Calender Grinds

CD Caliper 2sigma-0.6 to 0.3/ Sheffield Smoothness-380 to 365/ Mullen Variation-12.4 to 7.5  
CalCoil, Air Hoses - REMOVED, Crowns in control/ Roll life extended 6 months to 18 months!

#### Bottom Line

\$900,000+ per year of ROI

This is a payback of 2 months or less even if the competitor's grind is FREE!



## Precision Roll Grinders Value Study:

### Increasing Yield on Coated Board Grades with Precision Calender Rolls

- Sheet finish (smoothness) is critical to your coated board customers.
- Achieving world class quality with the lowest possible fiber cost is critical to your profitability.
- Extending calender roll life between grinds while maintaining quality drives operational and maintenance excellence
- **It takes Precision ground calender rolls to achieve all of this.**
- **The impact to your bottom-line is HUGE.**

Real-World Case Studies:

- World-class coated board machine reduces yield losses by 1.75% = \$1,750,000/yr.
  - ✓ Improved sheet smoothness with Precision ground rolls (0.0002" roundness)
  - ✓ Elimination of sheet 'barring' due to Precision ground rolls (MD caliper variation)
- World-class coated board machine wins back customer lost due to sheet finish
  - ✓ Premium customer worth an additional \$500,000/yr. due to higher selling price
  - ✓ Improved sheet smoothness with Precision ground rolls (0.0002" roundness)
- World class coated board machine extends calender life from 6 weeks to 6 months!
  - ✓ Precision grinds last longer because you start closer to perfectly round
  - ✓ **Calender roll wear is a function of deformation - starting at 0.0002" is a MUST**



Reduced calender stack load while maintaining sheet finish properties = less fiber to achieve target caliper

#### Bottom Line

\$1.5M+/yr. fiber savings

\$500K+/yr. quality savings

Extended roll life



# PROMISE TO PROVIDE VALUE – PLASTIC CASE STUDY

## Precision Roll Grinders Value Study:

### Plastic Calendering – Huge Returns on your Roll Grinding Investment

When the product you are producing is measured in *thousandths of an inch* (0.005" – 0.009") your calender rolls need to maintain roundness and shape of **tens of thousandths of an inch or millionths of an inch** (0.0002" and well below). Without proper roll tolerances, the waste and lost profits add up fast...

A plastic film product being produced at 0.008" will typically have a variability tolerance of 0.0004" or less. This means your calender rolls **MUST** be at least ground to tolerances of less than 0.0002"! In addition, these rolls run at high operating temperatures. **PRECISION ROLL GRINDERS IS THE ONLY ROLL GRINDING PROVIDER IN THE WESTERN HEMISPHERE WITH THE GRINDING AND 3-D HOT GRINDING TECHNOLOGY TO PROVIDE THE TOLERANCES YOU NEED.**

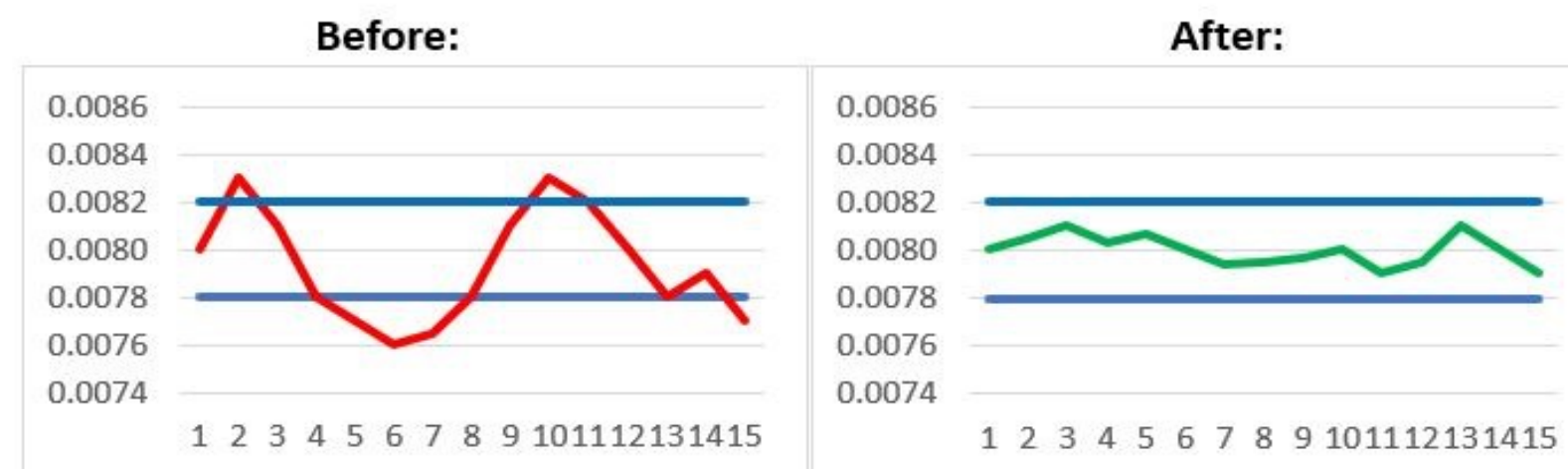
- Are you losing product because of gauge variability?
- Is the product not converting well?
- Do you have unscheduled downtime trouble-shooting variability issues?

**These issues lead to \$100,000's of lost profits in a short time!**

**Real-World Case:** A plastic film manufacturer was losing an unacceptable amount of product due to gauge variability. Precision Roll Grinders worked with them to provide a 3-D tight tolerance grind that led to less waste, less downtime and a better converting product. **Product variability was reduced by over 50%! ROI was measured in weeks, not months!**

**Let Data Do the Talking:**

The images below represent the film profile variation before and after a Precision grind. This partner of Precision's made the best product ever produced on the line! **This customer saved over \$100,000 almost immediately proving a Precision roll grind is an investment, not a cost!**



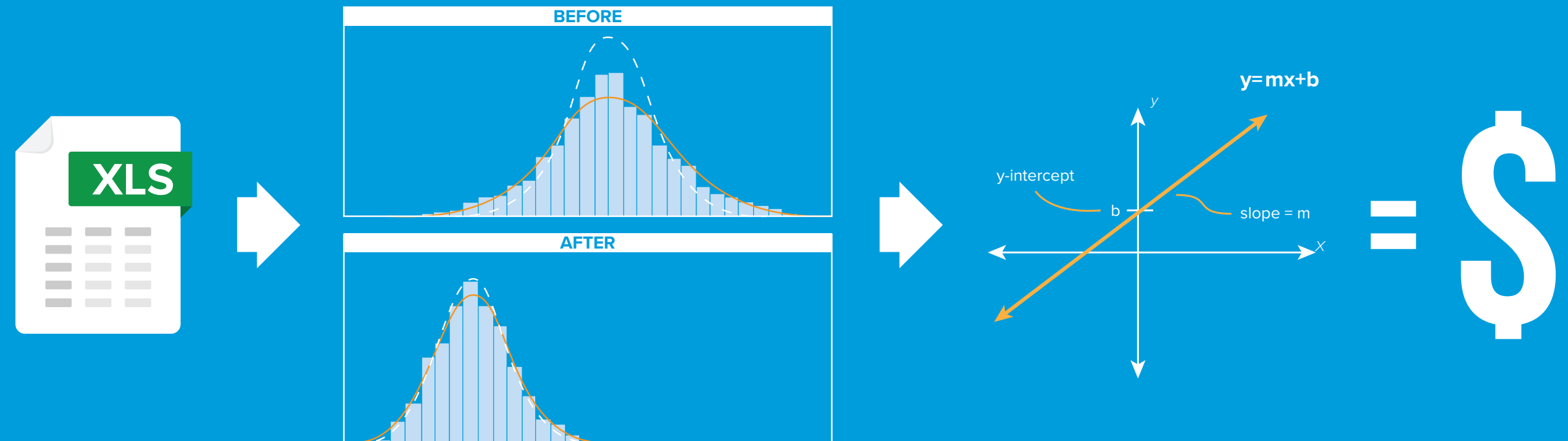
**Contact us today for a consultation on your plastic calender roll grinding.**

[www.precisionrollgrinders.com](http://www.precisionrollgrinders.com)

# PRG'S PROMISE TO PROVIDE REAL ECONOMIC VALUE

## PROCESS VARIATION IMPROVEMENT = \$

- Joint Design of Experiment to reduce variation
- Data analysis on current process
- Implement plan for variation improvement
- Data analysis on improved process – predictive equation



# CONTACT US

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**(770) 830-6323**

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**(270) 295-4990**

**TEXARKANA, ARKANSAS**

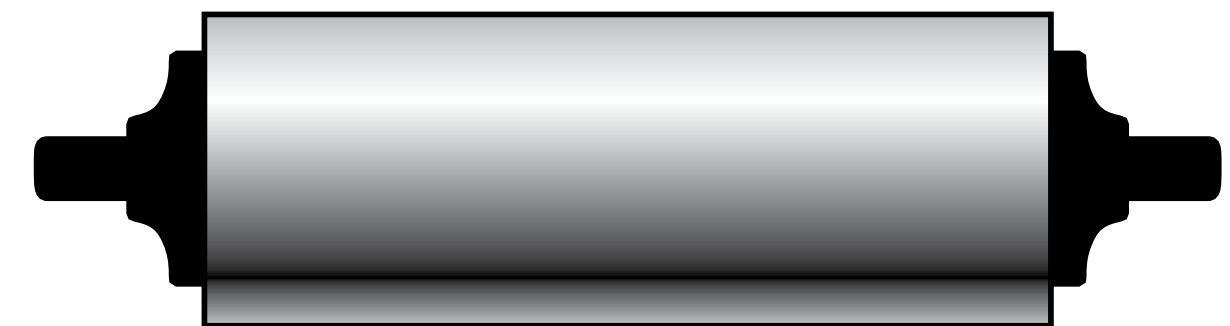
**(870) 216-4000**



**THANK YOU FOR  
YOUR TIME.**

**QUESTIONS?**

**PRECISION**



**ROLL GRINDERS**

*Over 50 years of value-added service*

[precisionrollgrinders.com](http://precisionrollgrinders.com)