

Innovations for a better world.

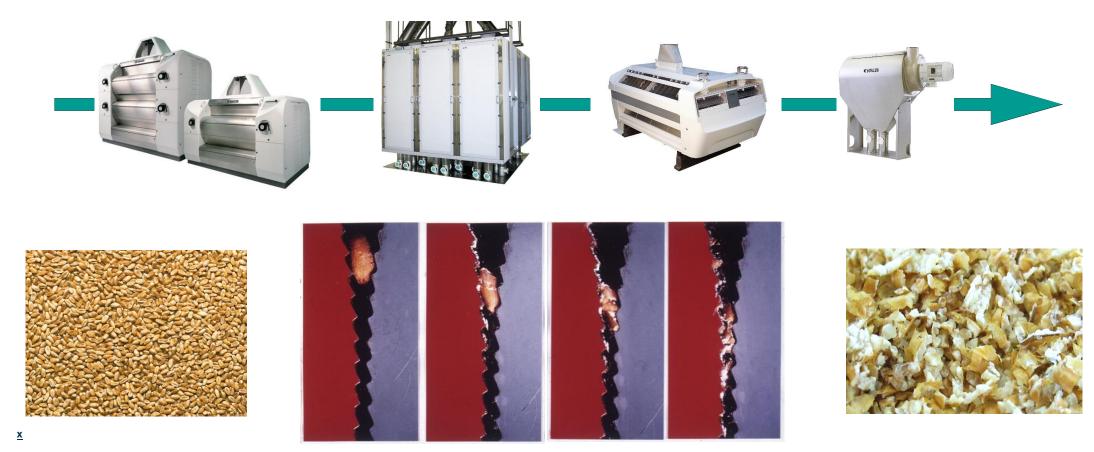
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Basic's - Know How?

How to get best mill performance?

Highest yields and flour extraction

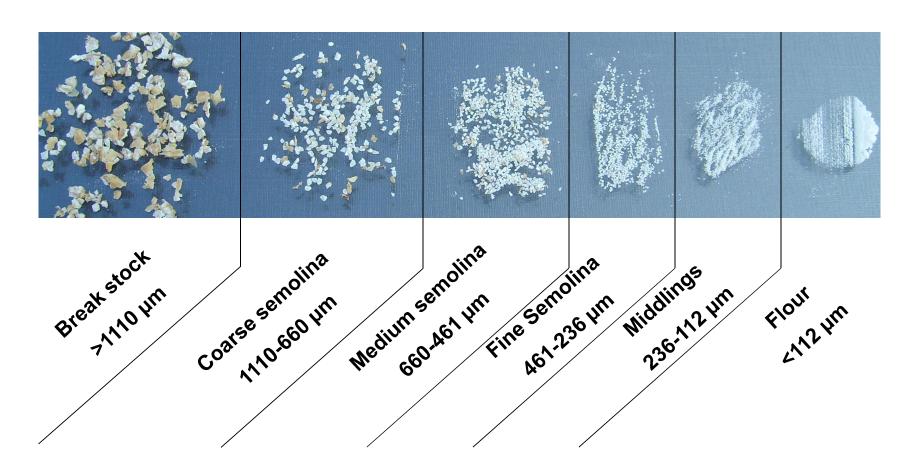
Through a direct product flow along the whole milling flow sheet including Purifier- and Bran Finisher machines!



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Grading of first Break

Perfect grading e.g. of first break is key for highest mill performance!



Why rollDetect & -Service?

Wear impact on various parameters

Throughput capacity

• Due to wear and tear capacity drops over time

Energy consumption

• Due to wear and tear energy consumption / input increases over time

Product quality

• Due to wear and tear product quality (granulation, ash contend.....etc) will change = product shift.

Yield loss

• Due to wear and tear yield / flour extraction will drop over time

Moisture loss

• Due to wear and tear more energy input = extra heat development = additional moisture loss!

Stability / production safety

Due to unwanted product shifts caused by the wear and tear instable run **CBUHLER**



Why rollDetect & -Service? How you evaluate wear today?

Visual check (subjective observation)

· Optical check with magnifying glass / lens

Break release (objective measurement)

• Check for granulation and particle size distribution

Energy consumption (objective measurement)

• Power measurments or tracking if available

Yield / extraction loss (objective measurement)

· Check and track yield calculater

Moisture loss (objective measurement)

· Check and track moisture loss in lab

Ash curve or color = Minolta (objective measurement)

Check and track ash curve in lab

Evaluation of the corrugations

Laboratory analysis of products

Power measurements on 1st Break

Recording of process variables

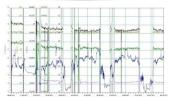
Laboratory analysis of products

Laboratory analysis of products

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Why and when shall I make a refurbishment? Business case e.g. Ø 1'500 Kg/h grinding capacity

Main action crushing & cutting average specific power consumption = 4.5 kWh/t

Δ 8.5 KWh/t = 200%

Main action grinding & pulverize average specific power consumption = 13 kWh/t

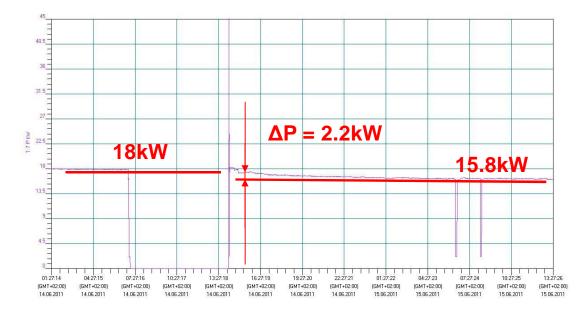
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Real life example of measureing the specific grinding parameters Energy consumption of a Break 1 passage

Parameter	Before Roll Refurbishment / Change	After Roll Refurbishment / Change
Power Consumption	17.60 kW	15.75 kW
Throughput Capacity	3.78 t/h	3.83 t/h
Specific Grinding Power required	4.70 kWh/t	4.10 kWh/t

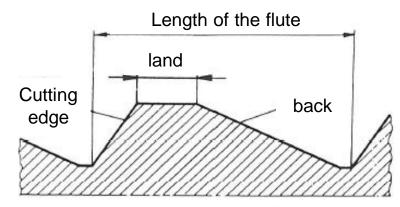


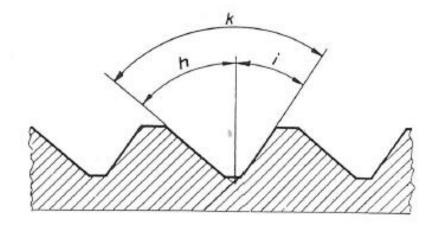


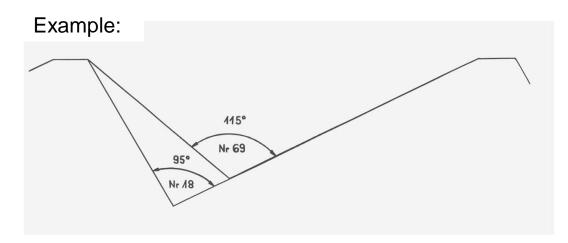
Smart Corrugations

Corrugation basics

Facts & Figures







h = Back angle – Dull angle

i = Front angle – Sharp angle

k = Flute profile - Flute angle

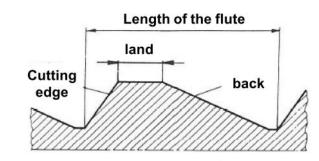
Corrugation basics

Typical flutes for various passages used today

	4-Brea	ak-Mill	5-Break-Mill		
Passage	Flutes / Circumference	Flutes / cm	Flutes / Circumference	Flutes / cm	
B 1	250 – 300	3,2 - 3,8	250 – 275	3,2 – 3,5	
B 2	425	5,4	375 – 425	4,8 - 5,4	
B 3 gr.	625	8,0	500 - 550	6,4 - 7,0	
B 3 f.	675	8,6			
B 4 gr.	800	10,2	675	8,6	
B 4 f.	850	10,8	750	9,6	
B 5 gr.			800	10,2	
B 5 f.			850	10,8	
KI.M.	950	12.1	950	12,1	
D 1	650	8,3	650	8,3	
C 10	1100	14,0	1100	14,0	

Corrugation basics

rollDetect tool can verify all kind of corrugation style! Corrugation Selection – Be organized.



01 15 55	09 31	27 25 45	25	33 25	41 22 7.	49 35 65	57 15	65 5	73
02 55 69	10 45	18 35 65.	26	34 25 7.	42 25 50	50 55 65	58 15	66 5	74 45 - 55
03 35 35	11	19 55	27 38 52	35 \$5.	43 25 65 3000000	51 \$5.55	59 \$ 57	67	75 8 85
04	12	20 5	3/1/1/10.	36 35 37	44 25 50. 100000000000000000000000000000000000	52 55 45 27777711.	60 5 18	68	76
05 245 715	13	21 3	29	37 350	45 25 10.	53 35 70.	61 55 55	69 45	77
06 45 45	14	22 22 25	30	38 21 65	46 25 60.	54 35	62	70 ss - 5:	78
07 25 65.	15	23 25 65	31 20 60	39 21	47 55 50° 3/11/1/1.	55 45 50	63 55	71 55 - 70.	79
08	16	24	32 25 50.	40	48 55	56 \$5.	64	72	80

rollDetect

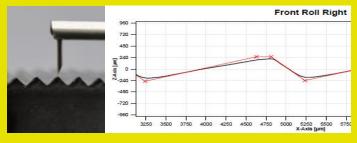
rollDetect Service

Preparation

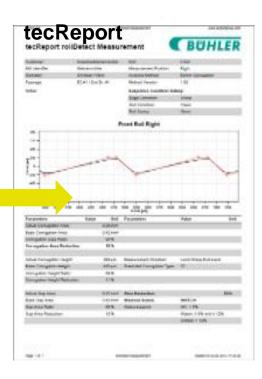
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Measurement





Report



rollDetect

Solution for optimal use of rollers

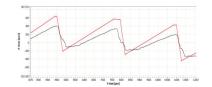
The right time for a roller service or roller change is crucial for a consistent high product quality and cost optimization.

Therefore, the condition and wear of rollers needs to be measured and objectively evaluated.

Bühler rollDetect service enables optimal use of rollers offering

• contour measurements for corrugated rollers





• roughness measurements for smooth rollers









Collecting data from the rolls - something else that is new - ecoReport





rollDetect

Services at a glance

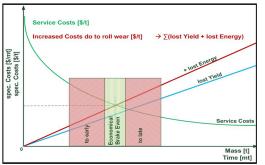
rollReport for corrugated rollers @ Workshop

- quality report and service transparency after revision
- target value, actual value and tolerances of corrugation

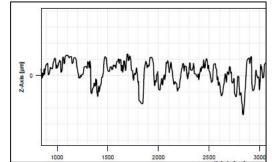
ecoReport for corrugated passages @ Customer

- economically optimal time for a roller revision
- based on measurements tecReports and customerspecific operation data









tecReport for corrugated rollers @ Customer

- graphic representation of target and actual corrugation profiles
- wear prediction & recommendation for next roller revision

tecReport for smooth rollers @ Customer

- recommended date for next roller revision
- measurement of roller roughnes Ra along the product flow

Corrugated rollers Contour measurement

For several years, Bühler has been offering the rollDetect service for contour measurement on corrugated rollers. The measuring device allows reliable data to be taken, so that the condition of a roller and the point of time for a roller change are not anymore determined at the operator's own discretion.

Contour stylus

The current contour stylus shows the **profile of corrugated rollers**. This procedure allows the state of a corrugated roller to be detected and from that, the **optimum time for changing** it.





Corrugated rollers rollReport

Customer benefits

- quality report and service transparency
- target value, actual value and tolerances of the corrugated roller profile

rollReport

- measuring of corrugated rollers after revision
- information about target value, actual value and tolerances of the corrugated profile
- graph with measurement curve
- measurement at Bühler workshops
- rollReport is generated and given to customers

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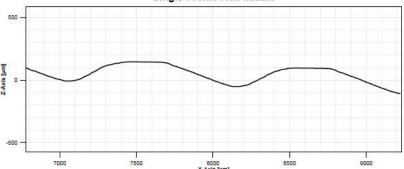
Bühler AG rollDetect Measurement www.buhlergroup.com

rollReport



Customer:	Test	Serial #:	234567890
Operator:	Jörn Degasperi	Analysis Method:	Bühler Corrugation
Passage:	Workshop	Method Version:	1.00
Notes:		Measurements:	
		After Renewing:	06.01.2017 08:23

Single Profile Roll Middle



Production Target Values	Target Value	Actual Value	
	Value Unit	Value Unit	Tolerance Unit
Form Type:	54		
Sharp Angle:	35 °	55 °	3 °
Dull Angle:	75 °	66 °	3 °
Land Length:	200 µm	349 µm	60 µm +
			60 µm -

Spiral:	8 %	
Number of Flutes:	800 #	
Roll Diameter:	250.0 mm	

Subjective Condition	Rating	
Edge Condition:	Sharp	
Roll Condition:	No impact	
Roll Stump:	Good	

Corrugated rollers tecReport

Customer benefits

- interpretation of the wear pattern and possible optimization
- wear prediction
- recommended date for next roller change

tecReport

- graphic representation of target and actual corrugation profiles
- visual determination of the condition of the roller surface and corrugation edge
- current **condition** of the corrugated rollers (as a **percentage**)
- measurement at the customer's site by Bühler process engineers
- initial consulting according to measured values
- generation and e-mailing of the tecReport

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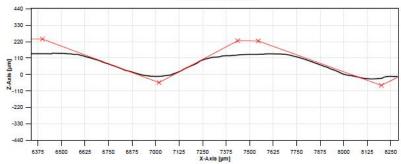
Bühler AG rollDetect Measurement www.buhlergroup.com

tecReport rollDetect Measurement



Customer:	Florin	Roll:	Front	
Mill Identifier:	MillA	Measurement Position:	Middle	
Operator:	Florin Bühler	Analysis Method:	Bühler Corrugation	
Passage:	B1 #1 / 1st Br. #1	Method Version:	1.00	
Notes:		Subjective Condition Ra	ating:	
		Edge Condition:	Heavily rounded	
		Roll Condition:	Impacted	
		Roll Stump:	Good	

Front Roll Middle



			SON ANGARDRASO		
Parameters	Value	Unit	Parameters	Value	Unit
Actual Corrugation Area:		0.11 mm²			
Base Corrugation Area:		0.14 mm ²			
Corrugation Area Ratio:		79%			
Corrugation Area Reduction:		21%			
Actual Corrugation Height:		159µm	Profile Orientation:	Land-Dull-Sharp-Land	
Base Corrugation Height:		243 µm	Corrugation Type:	74	
Corrugation Height Ratio:		65%			
Corrugation Height Reduction:		35%			
Actual Gap Area:		0.06mm²	Area Reduction:	21%	
Base Gap Area:		0.14mm²	Wearout Status:	CRITICAL	
Gap Area Ratio:		45%	Status Legend:	OK: < 5%	
Gap Area Reduction:		55%		Watch: ≥ 5% and ≤ 12%	
				Critical: > 12%	

Corrugated rollers summaryReport

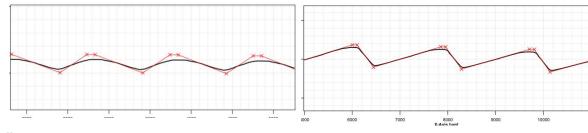
Customer benefits

- all selected roller measurements at a glance
- recommendation for maintenance action

summaryReport

- summary of the tecReports for corrugated rollers
- wear out status of each corrugated roller (OK, WATCH, CRITICAL)
- recommendation for action (good, exchange)

3rd Break through 5th Break



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Bühler AG rollDetect Measurement

Bühler AG
Gupfen Strasse 5
9250 Uzwil
www.buhlergroup.com
Customer Service Grain Milling



www.buhlergroup.com

Quality Roll Report Summary

	Mill Identifier	Passage	Corru		Area	Edge Condit	tion Wear out Sta	tus Recommendations
			L	M	R			
1	Mill 3202 3rd Break 3	B3 #3 / 3rd Br. #3	4%	8%	6%	Sharp	WATCH	Good
2	Mill 3112 3rd Break 1	B3 #1 / 3rd Br. #1	3%	5%	9%	Sharp	WATCH	Good
3	Mill 3102 3rd Break 2	B3 #2 / 3rd Br. #2	2%	1%	1%	Sharp	ок	Good
4	Mill 3212 3rd Break 4	B3 #4 / 3rd Br. #4	1%	4%	2%	Sharp	OK	Good
5	Mill 3182 4th Break 1	B3 #8 / 3rd Br. #8	2%	0%	2%	Sharp	ОК	Good
6	Mill 3192 4th Break 2	B3 #8 / 3rd Br. #8	1%	1%	3%	Sharp	OK	Good
7	Mill 3272 4th Break 3	B3 #8 / 3rd Br. #8	1%	2%	3%	Sharp	ОК	Good
8	Mill 3183 5th Break 1	B3 #8 / 3rd Br. #8	0%	0%	0%	Sharp	OK	Good
9	Mill 3193 5th Break 2	B3 #8 / 3rd Br. #8	2%	3%	4%	Sharp	OK	Good
10	Mill 3273 5th Break 3	B3 #8 / 3rd Br. #8	3%	3%	3%	Sharp	OK	Good
11	Mill 3022 1st Break 2	B1 #2 / 1st Br. #2	8%	7%	7%	Rounded	WATCH	Exchange
12	Mill 3032 1st Break 3	B1 #3 / 1st Br. #3	4%	3%	4%	Sharp	OK	Good
13	Mill 3013 2nd Break 1	B2 #1 / 2nd Br. #1	3%	3%	2%	Sharp	OK	Good
14	Mill 3042 1st Break 4	B1 #4 / 1st Br. #4	9%	7%	8%	Sharp	WATCH	Exchange
15	Mill 3043 2nd Break 4	B2 #4 / 2nd Br. #4	2%	2%	2%	Sharp	OK	Good

Corrugated rollers ecoReport

Customer benefits

 the ecoReport indicates the economically optimal time for revising or changing a roller

ecoReport

- based on measurements and customer-specific operation data:
 preparation of a profitability analysis (break-even)
- shows the customer's service costs, energy loss due to non-optimal maintenance as well as resulting lost yield and calculates savings potential on that basis
- graphical visualization of results
- · measurement at the customer's site
- · customer-specific data needed
- · ecoReport is generated and given to customers

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Bühler AG ecoReport www.buhlergroup.com

ecoReport

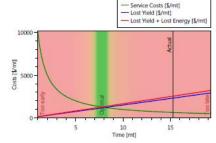


 Company Name
 Schulmühle
 Address

 Mill Identifier
 Uzwil
 Country

Operator Degasperi

Outcome ecoReport Date 14.01.2016 Service costs [\$] 10'000 Lost Energy [\$] 3'419 Lost Yield [\$] 35'372 Total Saving Potential [\$] 28'791



Measurements

	Operation Lifetime [mt]	Avg. Passage Wear [%]	Passages Changed [#]	Lost Energy [\$]	Lost Yield [\$]
B1	15.25	12.0	1	3'419	35'372
B2	0.00		0	0	0
Sum / Avg.	15.25	12.0	1	3'419	35'372

Parameters (Real)

 Service costs [\$]
 10'000

 Yield
 Before [%]
 After [%]

 1. Quality
 55.0
 55.3

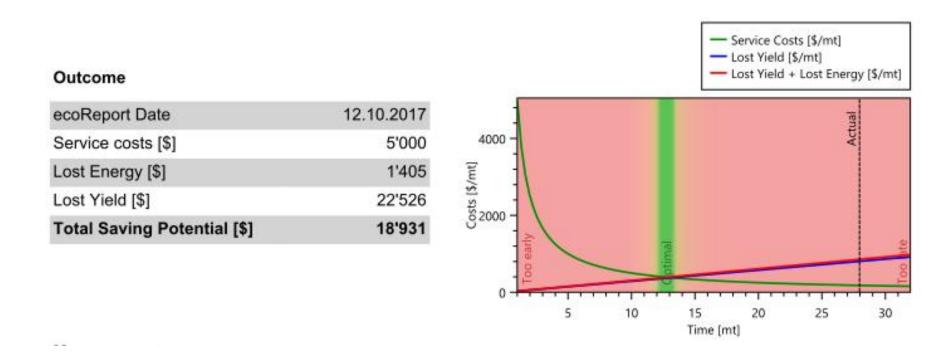
 2. Quality
 20.0
 19.8

 Bran
 25.0
 24.9

Recommendation for Corrugation Change

	Wear [%]	Time [mt]
B1	9	11
B2	7	

Being profitable in the mill – selecting rolls that make the most profit.



Using roll wear data to select the rolls that make the most money to change out.

Smooth rollers Roughness measurement

To determine wear on both corrugated and smooth rollers, we have developed a **new stylus** that can be used for **roughness measurements**.

Roughness stylus

The roughness stylus has a **very fine and sensitive diamond tip** that allows **precise recordings of roughness on smooth rollers**. This profile data can be technically interpreted so that the **maintenance date** for smooth rollers can be **optimized** in the future.





Smooth rollers tecReport

Customer benefits

• recommended date for next maintenance

tecReport

- measurement of roller along the product flow
- surface structure display
- representation of the roughness value in Ra (average roughness) to DIN EN ISO 4287
- condition of the roughness (OK, WATCH, CRITICAL)
- roughness measurement at the customer's site by Bühler process engineers
- initial consulting according to measured values
- generation and e-mailing of the tecReport

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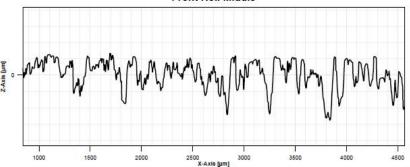
Bühler AG rollDetect Measurement www.buhlergroup.com

tecReport rollDetect Measurement



Customer:	Schulmühle	Roll:	Front
Mill Identifier:	A-Mühle	Measurement Position:	Middle
Operator:	Degasperi		
Measurement Type:	Smooth		
Passage:	C4 #1 / 4th Gr. #1		
Notes:		Subjective Condition Rating:	
		Surface Condition:	Not blank
		Roll Condition:	No impact
		Roll Stump	Good

Front Roll Middle



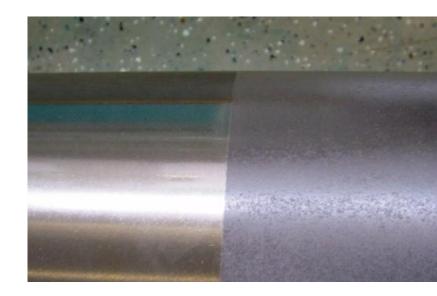
			X-AXIS [µm]	
Parameters	Value	Unit		
Roughness:	2.25	μm		
Roughness Status:	WATCH		Status Legend:	OK: 2.5 - 3 μm
				WATCH: 2 - 2.5 μm
				CRITICAL: 0 - 2 um

Roll Technology & Know How Smooth Rolls what is important?

Correct matting of the rolls:

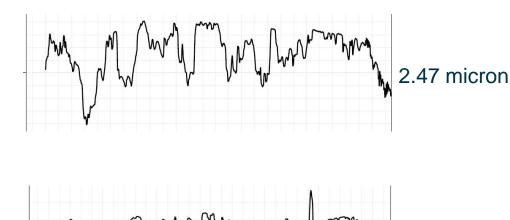
Reduction set-up, smooth rolls need a correct roll surface roughness of Ra 2.5 (micron) micron to Ra 3.5 (micron).

Completely blank rolls will not grind but only press semolina particles resulting in poor flour yield.



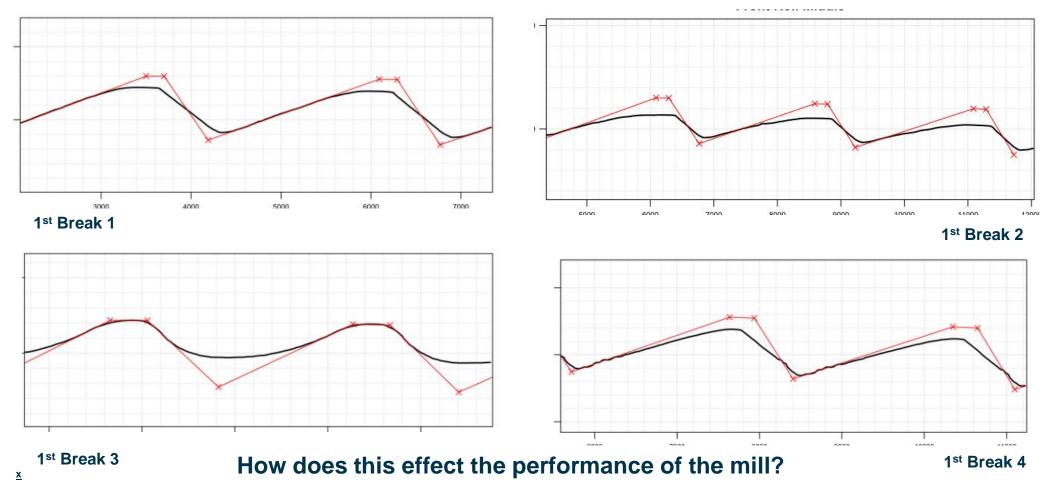
Influence factors smooth vs. fluted rolls

	Flour	Ash
 Polished roll (shiny) < 1.0 Ra 	less	low
• Light matting roll > 1.0 – 2.5 Ra		
• Strong matting roll > 2.5 – 3.5 Ra		
Fine fluted > 14 flutes / cm	more	high € BÜHLE



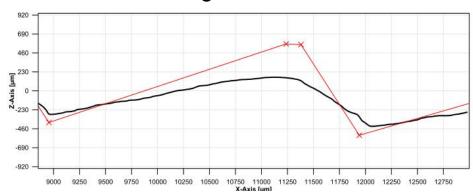
Practice examples I.

4 x 1st BK rolls in the same milling line.

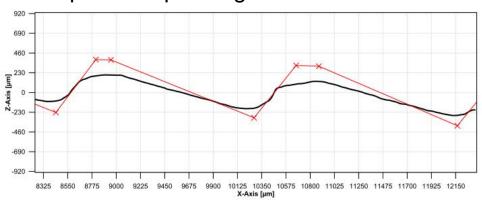


Practice examples II. What are these rolls telling us? What can we see from this corrugation profile?

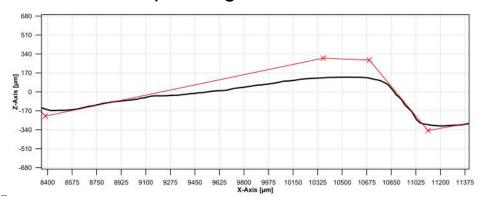
Dull to Dull configuration with - 42% wear.



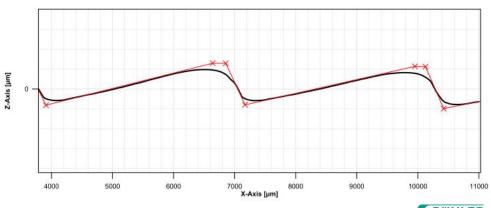
Sharp to Sharp configuration with - 27% wear.



Dull to Sharp configuration with -16% wear.



Sharp to Sharp configuration with - 5% wear.



Roll Service

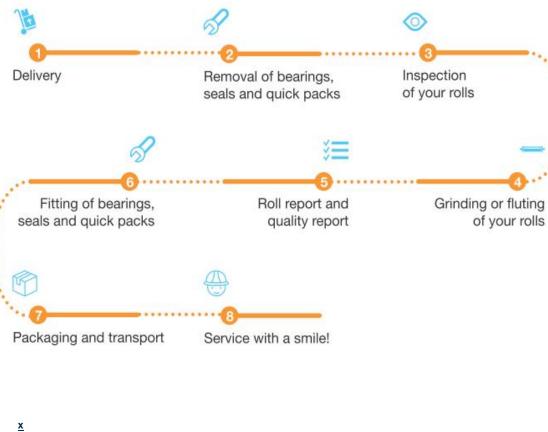
Bühler Roll Service World Wide available!

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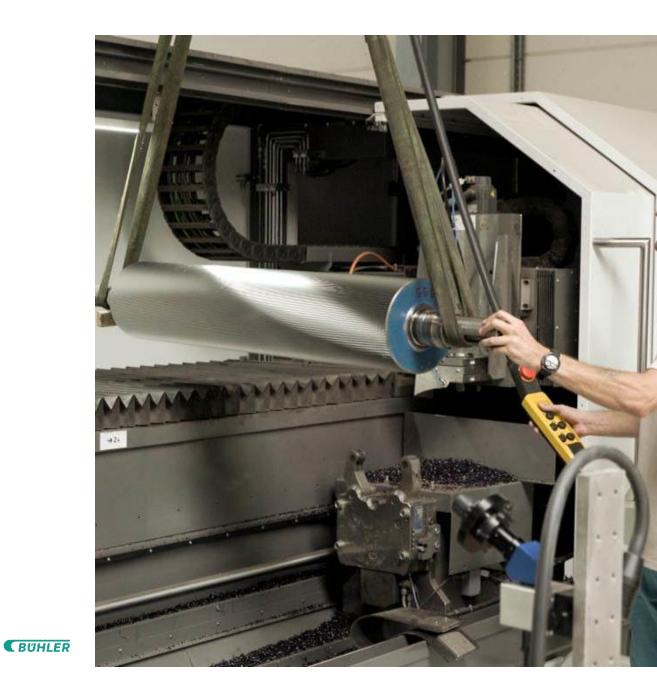
Roll Service





Roll Refluting / -Regrinding

- Longer service life
- High flute quality
- Optimal set up of parameters
- Stock rolls available



Fluting Service

Our service includes:

- Collection of your rolls to our workshop
- Inspection of rolls and shafts-journals
- Fluting or grinding
- Sandblasting of smooth rolls
- Check quality of rolls using rollDetect with before and after results
- Packaging and transport of rolls



Other Services

Assembly of bearings

We assemble new or old bearings including new seals

Overhauling Quickpacks

- o We overhaul your entire quick packs
- o Including bushings, pins, seals, grease and repair air cylinders

New Rolls

o Right rolls with correct surface characteristic for all applications

Тур	Surface	Hardness - Brinell	Case - Hardening	Lifetime
FERAN	Fluted	490 - 530	15mm +/- 5	100%
TITAN	Fluted	530 - 570	15mm +/- 5	Min. +30%
FERAN	Smooth	420 - 490	15mm +/- 5	100%











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Engineering Customer Success

Thank you very much for your attention.

Milling Solutions Customer Service

