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Reduction of OPEX cost in OCC lines

Innovations start at production



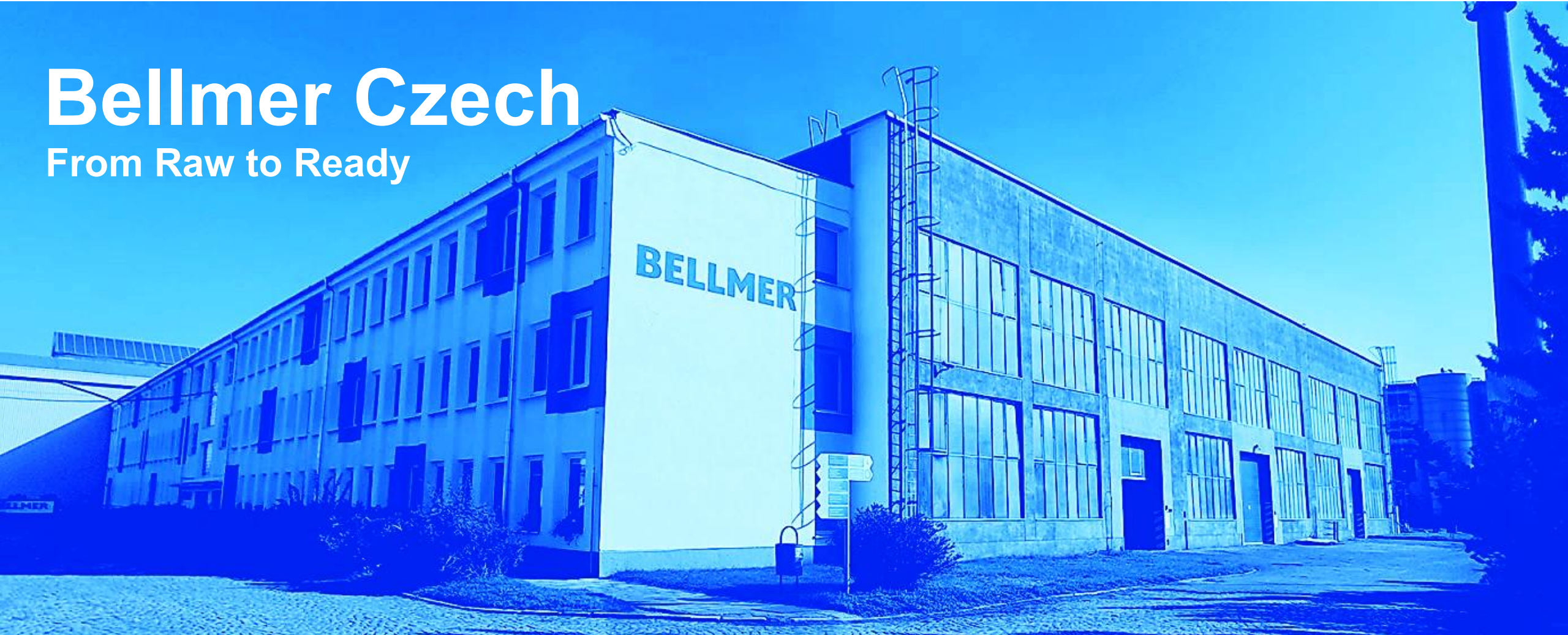
David Dostal
Managing Director Bellmer Czech



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Bellmer Czech

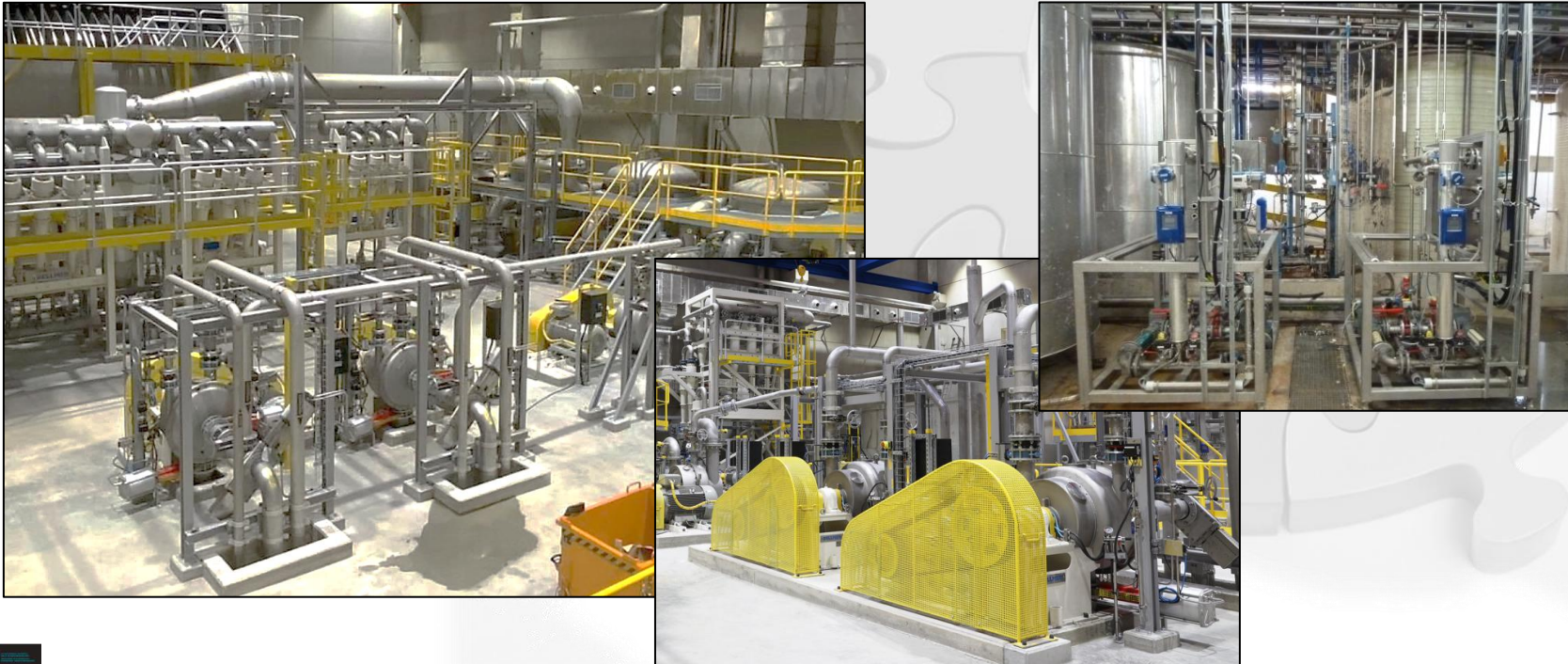
From Raw to Ready



BELLMER CZECH - INTRODUCTION

Bellmer Czech became a member of the Bellmer Group in 2019 to provide stock preparation lines and chemical dosing systems for the paper industry.

With our TurboLine product range we supply equipment from the pulp yard to the approach flow system. A further specialty are our dosing systems: we provide complete starch kitchens, coating kitchens, and additive dosing for a wide range of applications.

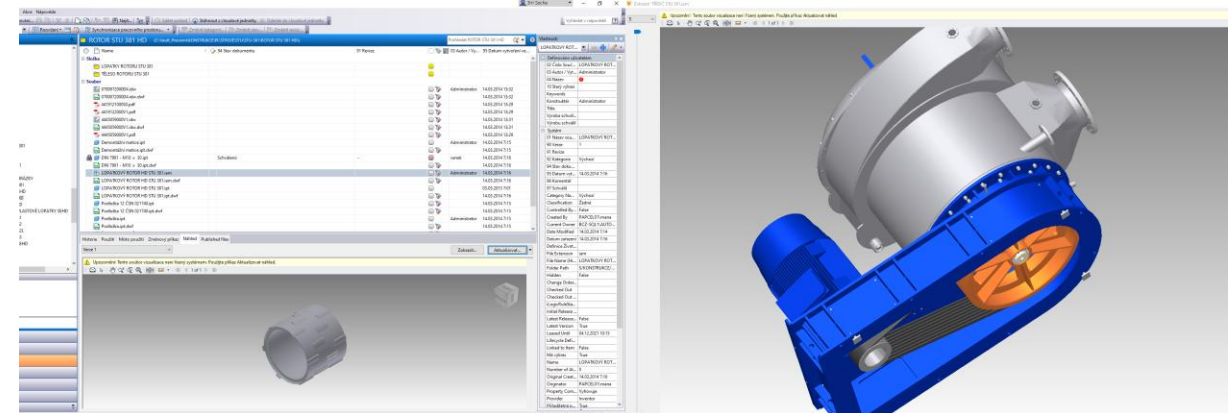


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BELLMER CZECH - INTRODUCTION



Bellmer Czech Team



Technical department



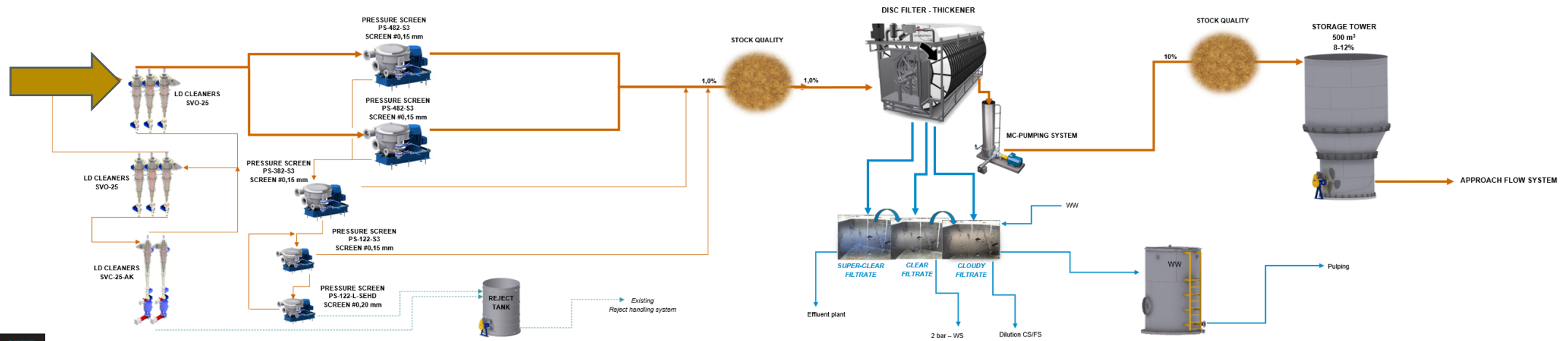
Innovation center



Production department



Norske Skog Bruck, Austria (750 TPD) - Continuous production care and after sale services



BELLMER CZECH – LATEST REFERENCE



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BELLMER CZECH - INNOVATION CENTER

As a global leader in papermaking technologies, Bellmer Czech drives innovation through its dedicated Innovation Center, where trials can be performed at flow rates between 10 and 5000 lpm.

Our mission is to continuously optimize stock preparation and paper production processes, delivering smarter, more efficient, and sustainable solutions tailored to our customers' evolving needs.



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Bellmer acquire Cellwood

Bellmer acquires Cellwood Machinery AB

Strengthening global position in Waste Paper Recycling and Stock Preparation

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Cellwood is best known for its Krima dispersing system, which has become a benchmark in the industry with over 700 installations worldwide. Their product portfolio includes well-known brands such as Metrans, Grubbens Pulper, and Algas Microfilter—all recognized for their energy efficiency, quality enhancement, and sustainable resource use.



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Our actual R&D

Engineering Tomorrow's Excellence



Main Operation cost

Fibres cost the most



Type of operation cost based on importance (extra cost calculated for 410 T/day line)

- » **Fibers in Reject (Extra 0,1% fibre loss=20.000 EUR/year extra cost)**
- » **Extra energy cost (Extra 1% of Sec KW/T= 15.000 EUR/year extra cost)**
- » **Cost of maintenance**



Fibres in reject are influenced by

- » **High reject flow**
- » **High reject consistency**
- » **Undersized equipment**
- » **Low efficiency equipment**
- » **Quality of wastepaper**
- » **Low reject washing**
- » **Low automatization**



COARSE AND FINE SCREENING PROCESS

TURBO DESINTEGRATOR

MODULAR
DEFLAKING

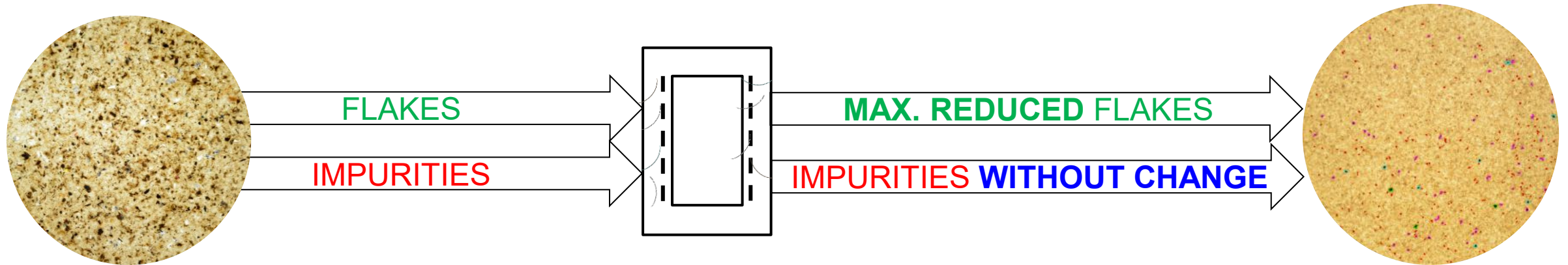


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TURBO DESINTEGRATOR (UNIVERSAL DEFLAKER)

A modern line with a proven concept does not prevent flakes from entering the cleaners and the fine screening. The amount of flakes is influenced by the quality of the raw material, the line's capacity design, and the efficiency of individual devices.

Over time, the demands on the line's performance increase, which also raises the amount of flakes. Effective LD-cleaning and Fine screening separate these flakes into the reject stream.

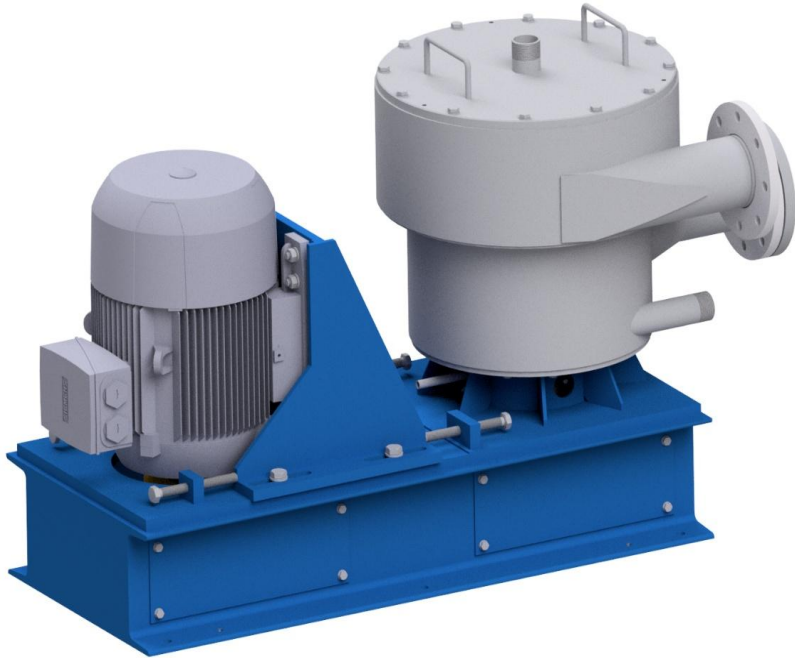


Bellmer has taken on the challenge of addressing the volume of flakes in the rejects and has developed a new type of deflaking machine, the TDS/TWD, **which is capable of operating across a wide range of consistencies, handling a high content of contaminants, is highly resistant to clogging, and does not further break down the impurities.**

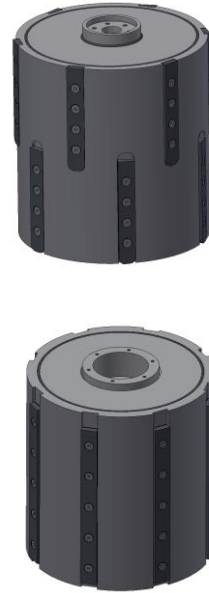


TURBO DESINTEGRATOR (UNIVERSAL DEFLAKER)

MODEL



DESIGN OF ROTORS



FIRST PROTOTYPE



The goal of development was to create a universal machine that minimizes fiber loss caused by flakes in the reject stream, while maintaining stable performance even under fluctuating operating conditions such as flow rate, contaminant load, or consistency.



TURBO DESINTEGRATOR TDS-20 – TEST RESULTS IN BCZ

Inlet 1,3%, container carton



Flow 1200 lpm
1,3%, container carton

Results



Averaged

Non-pulped area	3560.78 mm2 (13.2055 %)
PA - average	5.2843 mm2

Averaged - by content of impurities

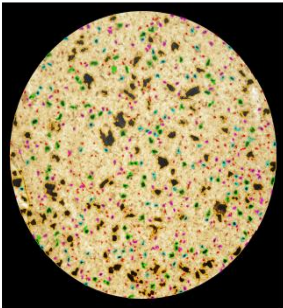
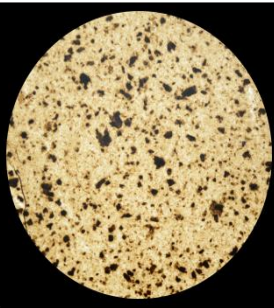
Range	0.2 - 1.0 mm2	1.0 - 3.0 mm2	3.0 - 5.0 mm2	5.0 - 10.0 mm2	> 10.0 mm2
Non-pulped area	0.47 %	1.17 %	1.11 %	2.00 %	8.46 %
Non-pulped area	126.75 mm2	315.47 mm2	299.58 mm2	538.69 mm2	2280.28 mm2
PA average	0.49 mm2	1.78 mm2	3.91 mm2	7.03 mm2	26.40 mm2
Count	266.67	203.00	98.00	105.00	200.33

Results					
Averaged					
Non-pulped area	195.66 mm2 (0.7258 %)				
PA - average	0.8475 mm2				
Averaged - by content of impurities					
Range	0.2 - 1.0 mm2	1.0 - 3.0 mm2	3.0 - 5.0 mm2	5.0 - 10.0 mm2	> 10.0 mm2
Non-pulped area	0.30 %	0.27 %	0.09 %	0.05 %	0.02 %
Non-pulped area	80.23 mm2	72.58 mm2	25.22 mm2	12.36 mm2	5.28 mm2
PA average	0.45 mm2	1.66 mm2	3.80 mm2	nan mm2	nan mm2
Count	184.00	50.67	7.33	3.33	0.33

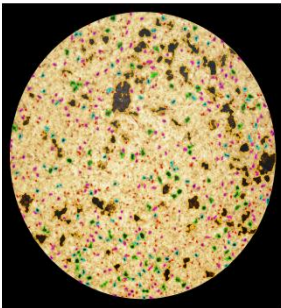
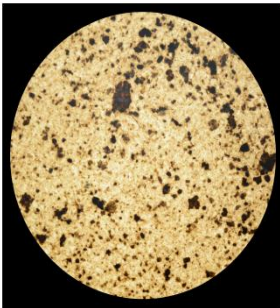
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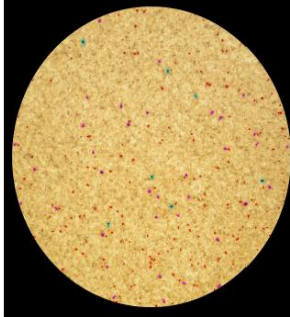
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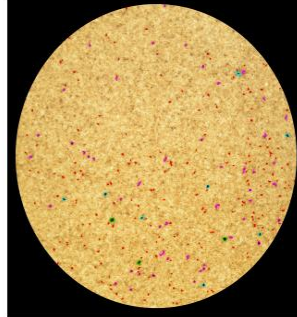
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Subsection: Sheet no. 181 - sample no. 2



Subsection: Sheet no. 181 - sample no. 1



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TURBO DESINTEGRATOR TDS-20 – TEST RESULTS IN BCZ

Inlet 4,4%, container carton



Flow 900 lpm
4,4%, container carton

Results

Averaged						
Non-pulped area	3156.99 mm2 (11.7151 %)					
PA - average	4.1506 mm2					
Averaged - by content of impurities						
Range	0.2 - 1.0 mm2	1.0 - 3.0 mm2	3.0 - 5.0 mm2	5.0 - 10.0 mm2	> 10.0 mm2	
Non-pulped area	0.64 %	1.28 %	1.01 %	2.00 %	6.79 %	
Non-pulped area	172.21 mm2	344.80 mm2	271.76 mm2	538.55 mm2	1829.67 mm2	
PA average	0.50 mm2	1.79 mm2	3.81 mm2	7.05 mm2	25.25 mm2	
Count	365.33	228.00	89.67	109.33	180.00	

Results

Averaged

Non-pulped area	281.88 mm2 (1.0461 %)
PA - average	1.0484 mm2

Averaged - by content of impurities

Range	0.2 - 1.0 mm2	1.0 - 3.0 mm2	3.0 - 5.0 mm2	5.0 - 10.0 mm2	> 10.0 mm2
Non-pulped area	0.32 %	0.32 %	0.14 %	0.11 %	0.15 %
Non-pulped area	87.26 mm2	86.29 mm2	36.54 mm2	30.92 mm2	40.88 mm2
PA average	0.44 mm2	1.63 mm2	3.77 mm2	6.51 mm2	15.12 mm2
Count	209.67	64.67	13.00	8.67	9.00

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2

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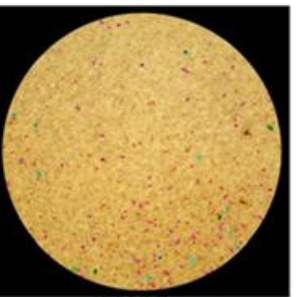
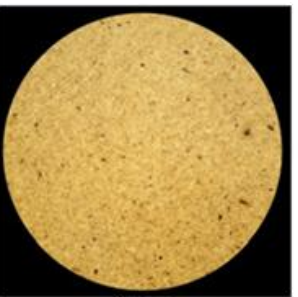
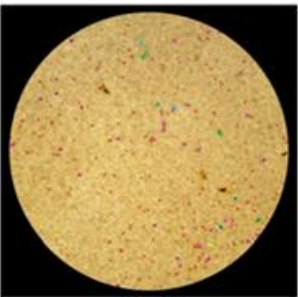
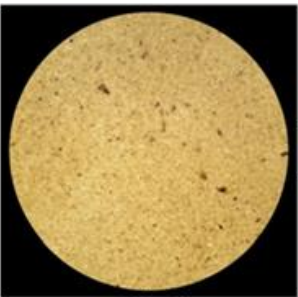
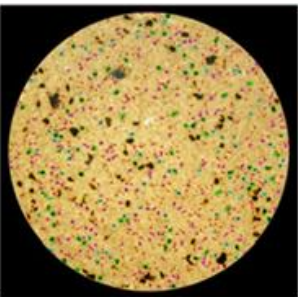
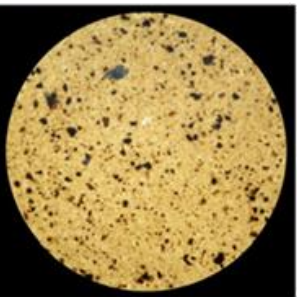
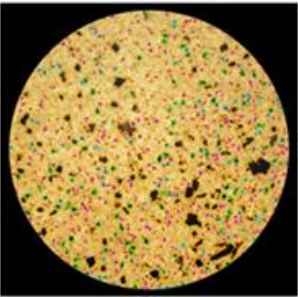
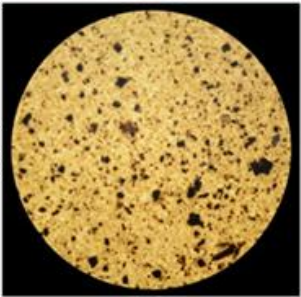
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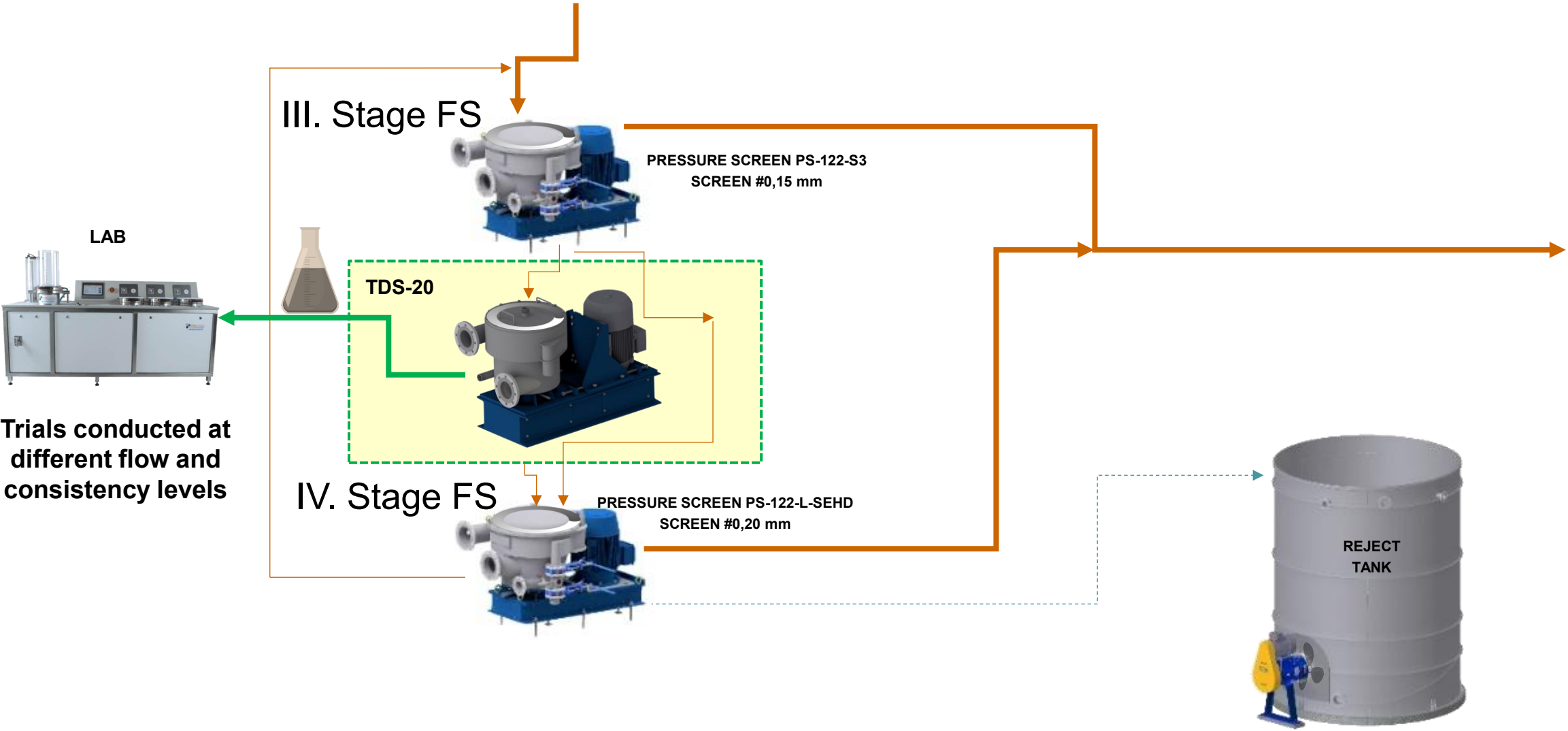
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Subsection: Sheet no. 230 - sample no. 2



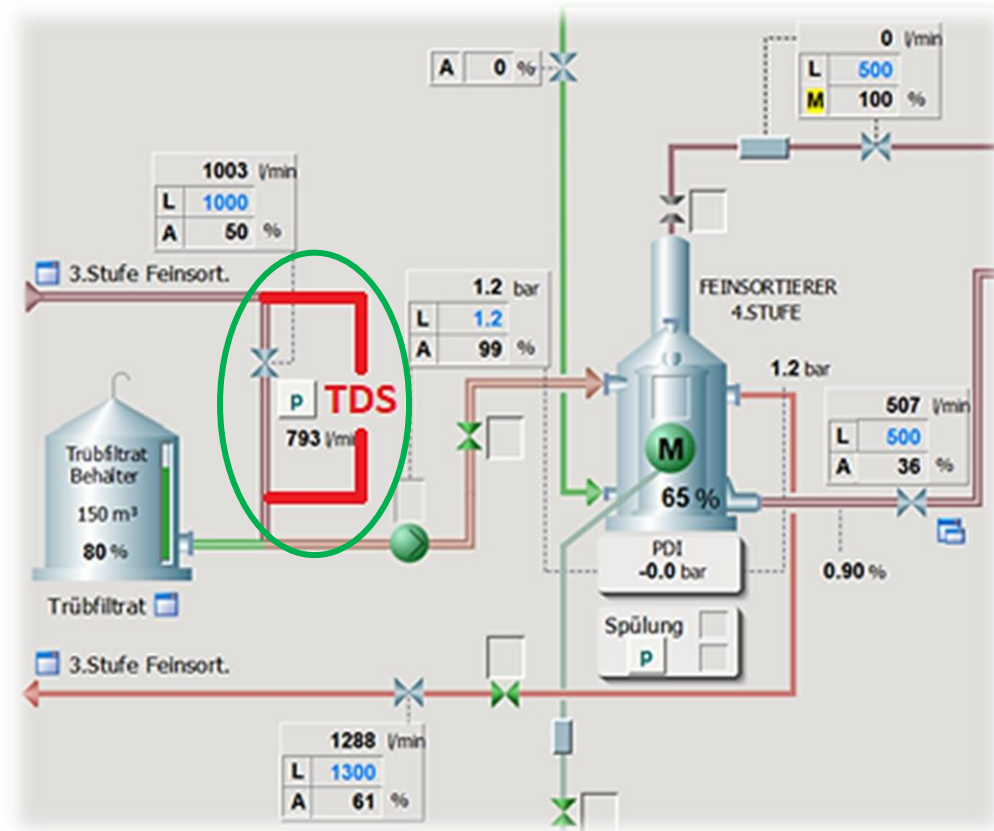
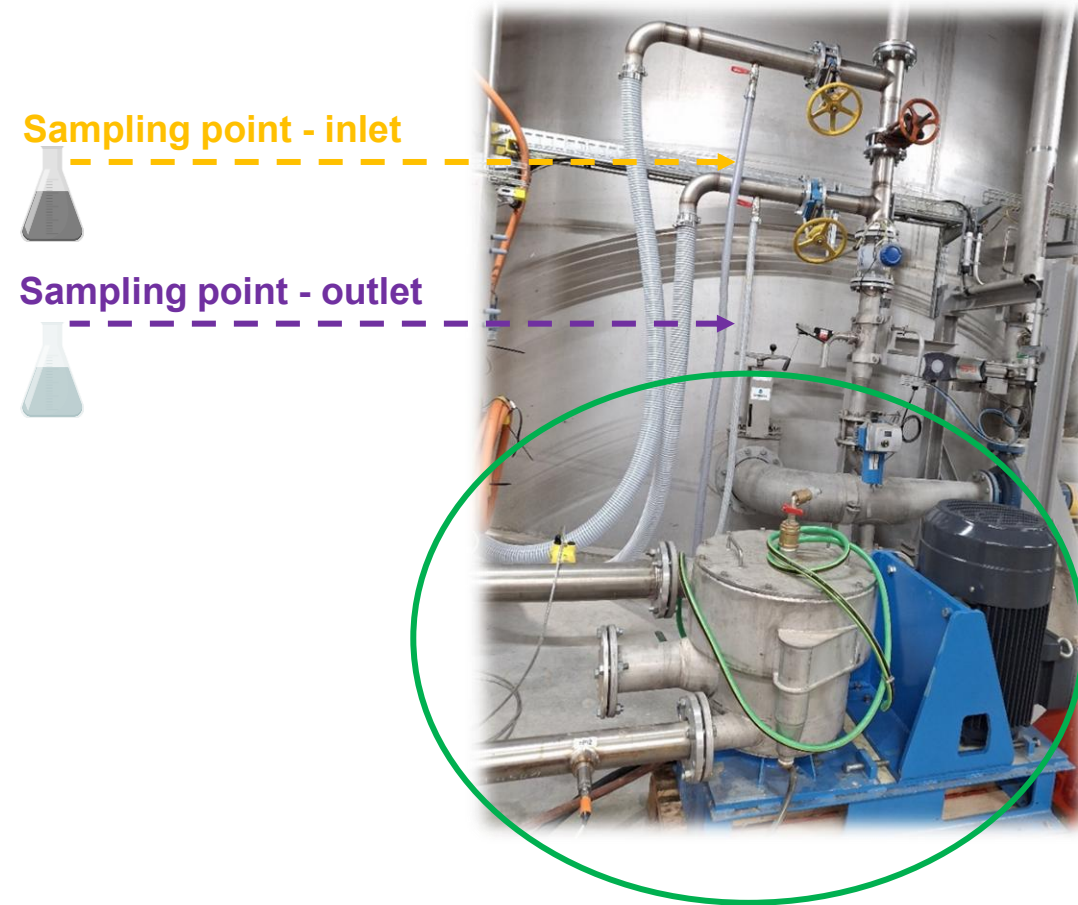
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TURBO DESINTEGRATOR – TESTING AT CUSTOMER



TURBO DESINTEGRATOR – TESTING AT CUSTOMER

PILOT TEST AT THE CUSTOMER



TURBO DESINTEGRATOR TDS-20 – TEST RESULTS

Flow 980 lpm, consistency 1,27%,

Inlet to TDS: - **25,1%** flakes + impurities
(11,8% WSP + impurities)

Outlet from TDS: - **17,8%** flakes + impurities
(10,9% WSP + impurities)



25,1%:
• 13,3%
• 11,8%



17,8%:
• 6,9%
• 10,9%

Somerville



From: 13,3%

Deflaking efficiency 53%

To: 6,9%

However, there was almost no increase in stickies contamination in the line (from 11.8% to 10.9%).



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TURBO DESINTEGRATOR TDS-20 – TEST RESULTS

Parameters of TDS: radial speed 16,5 m/s, installed power 30 kW, consumed power 27 kW

	Flow Accept IV°FS (lpm)	Consistency Accept IV°FS (%)	Flow Reject IV°FS (lpm)	Consistency Reject IV°FS (%)		Weight flow A IV°FS (kgpm)	Weight flow R IV°FS (kgpm)
Without TDS	1300	0,58	300	1,82		7,5	5,5
TDS + standard settings	1300	0,58	300	1,5		7,5	4,5
TDS + increased dilution water and accept flow IV°FS	1800	0,49	300	1,15		8,8	3,5

A reduction in rejects from 7.9 tpd to 5.0 tpd was achieved, representing a 36% decrease.



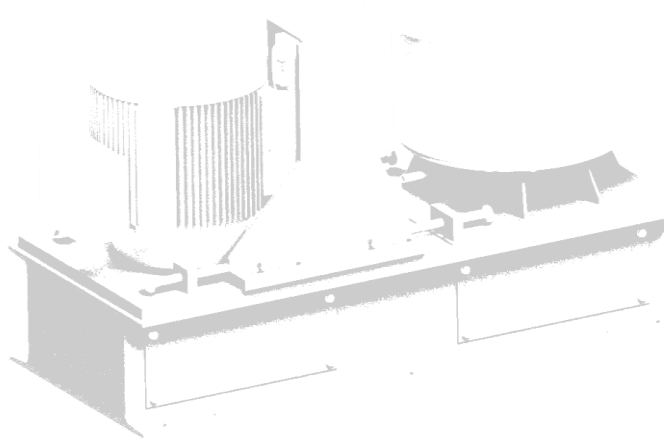
TURBO DESINTEGRATOR

NEW CONCEPT

IMPRESSIVE RESULTS:

- Proven performance in full-scale operation (750 TPD), achieving:
 - + Fiber savings of 3 tons/day (~1,000 tons/year)
 - + Landfilling costs reduction of 1,650 tons/year
 - - SEC 1.1 kWh/t

Annual savings of ca. **150.000 EUR** for a 750 TPD line.



BENEFITS:

- Modular Deflaking solution - a high-efficiency deflaker designed exclusively for fiber disintegration, without breaking impurities.
- It is possible to use this machine for very wide range of consistency, between 0.0% and 7.0%.
- Suitable for both greenfield installations and retrofits.
- **Performs reliably even with variable contaminant loads and variable flow.**
- Each unit is dimensioned based on throughput in cubic meters per hour (m³/h), ensuring optimal performance. We utilize image-based analysis to support machine selection and process tuning.
- Low energy consumption at high efficiency.
- Low maintenance costs, high availability.

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Energy consumption influenced by

- » Too many of equipment
- » High energy demand of equipment
- » Oversized equipment
- » Operation at low consistency- high pumping cost
- » Wrong lay out
- » Too many and big tanks
- » Recirculation
- » Low automatization

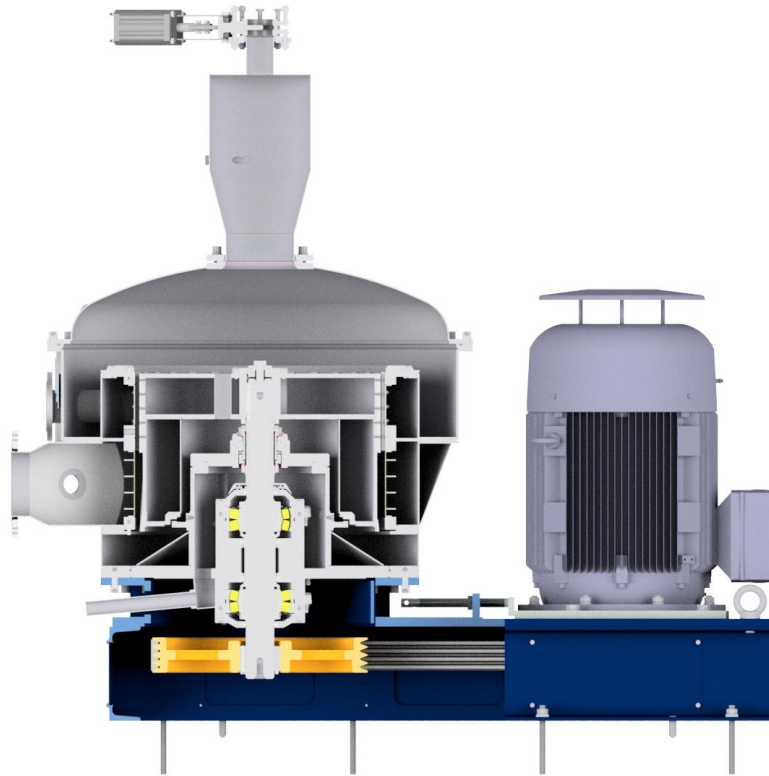


TURBO WASHING DESINTEGRATOR

MODEL



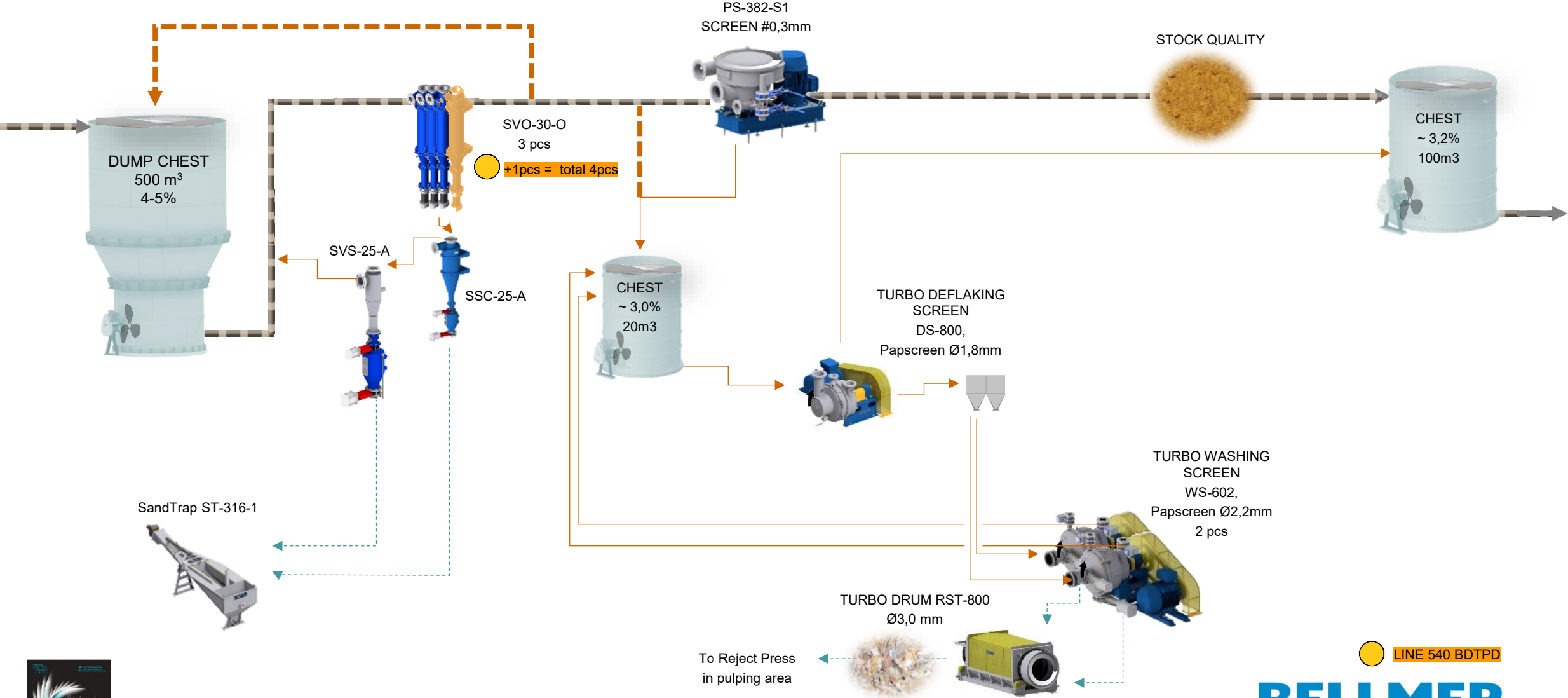
DESIGN OF ROTOR AND BASKET



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New line – Coarse screening

Preliminary concept

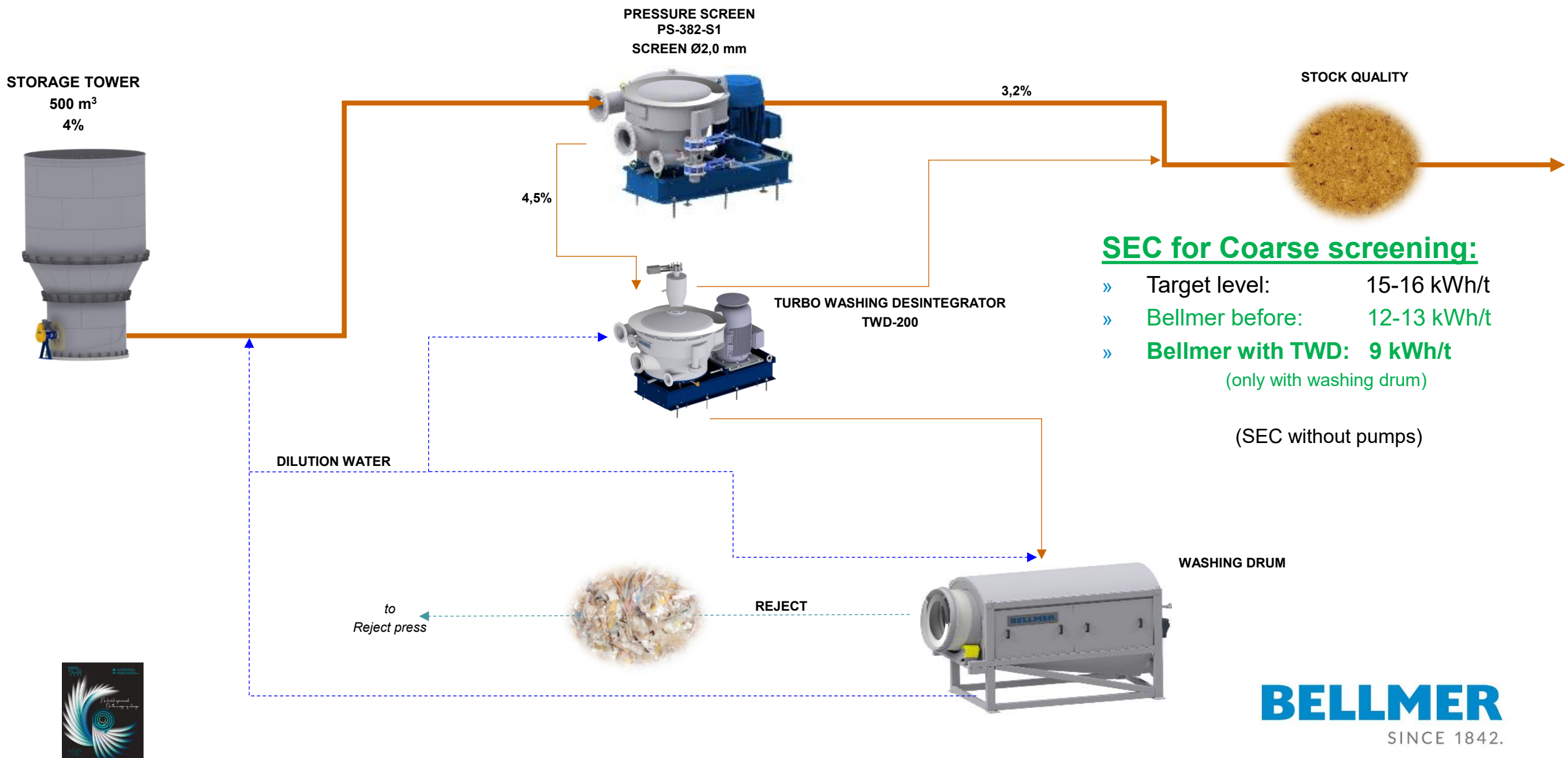


LINE 540 BDTPD

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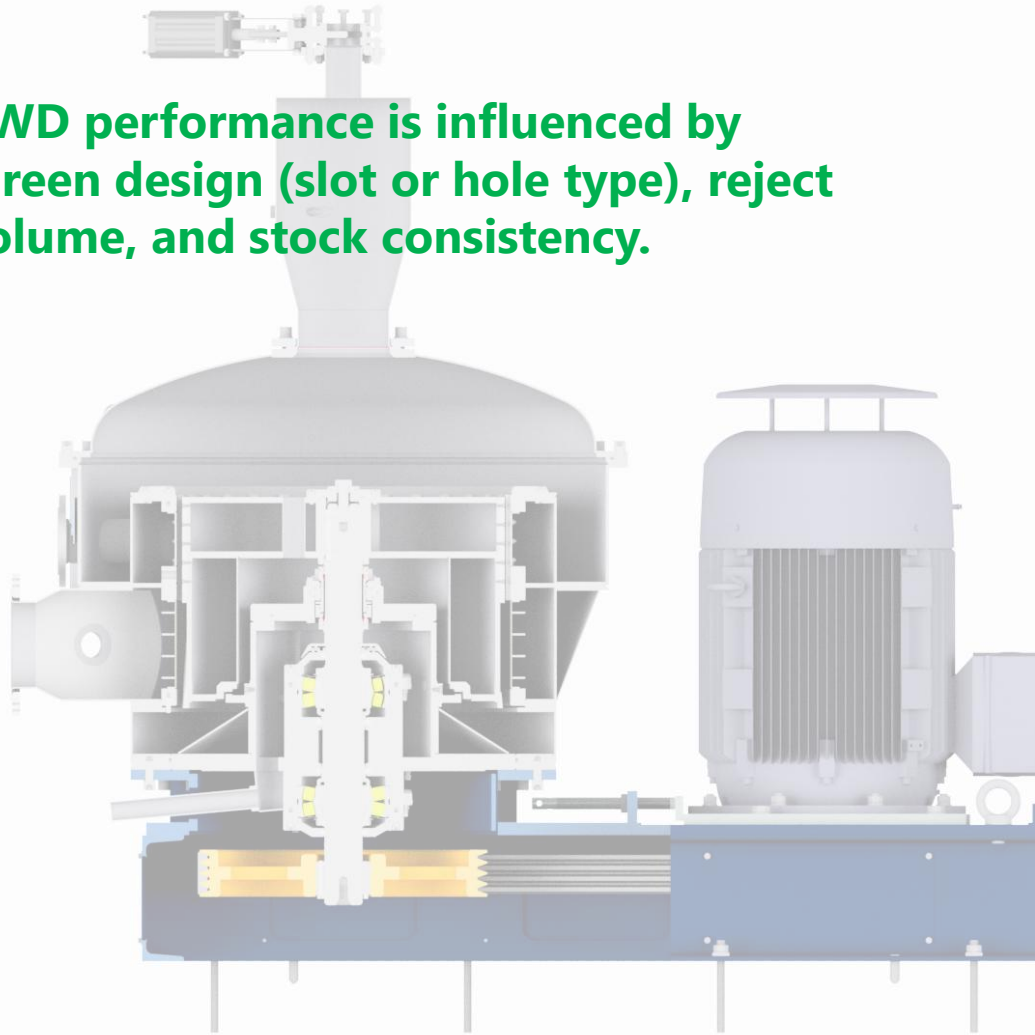
TURBO WASHING DESINTEGRATOR



TURBO WASHING DESINTEGRATOR

NEW CONCEPT of coarse screening

TWD performance is influenced by screen design (slot or hole type), reject volume, and stock consistency.



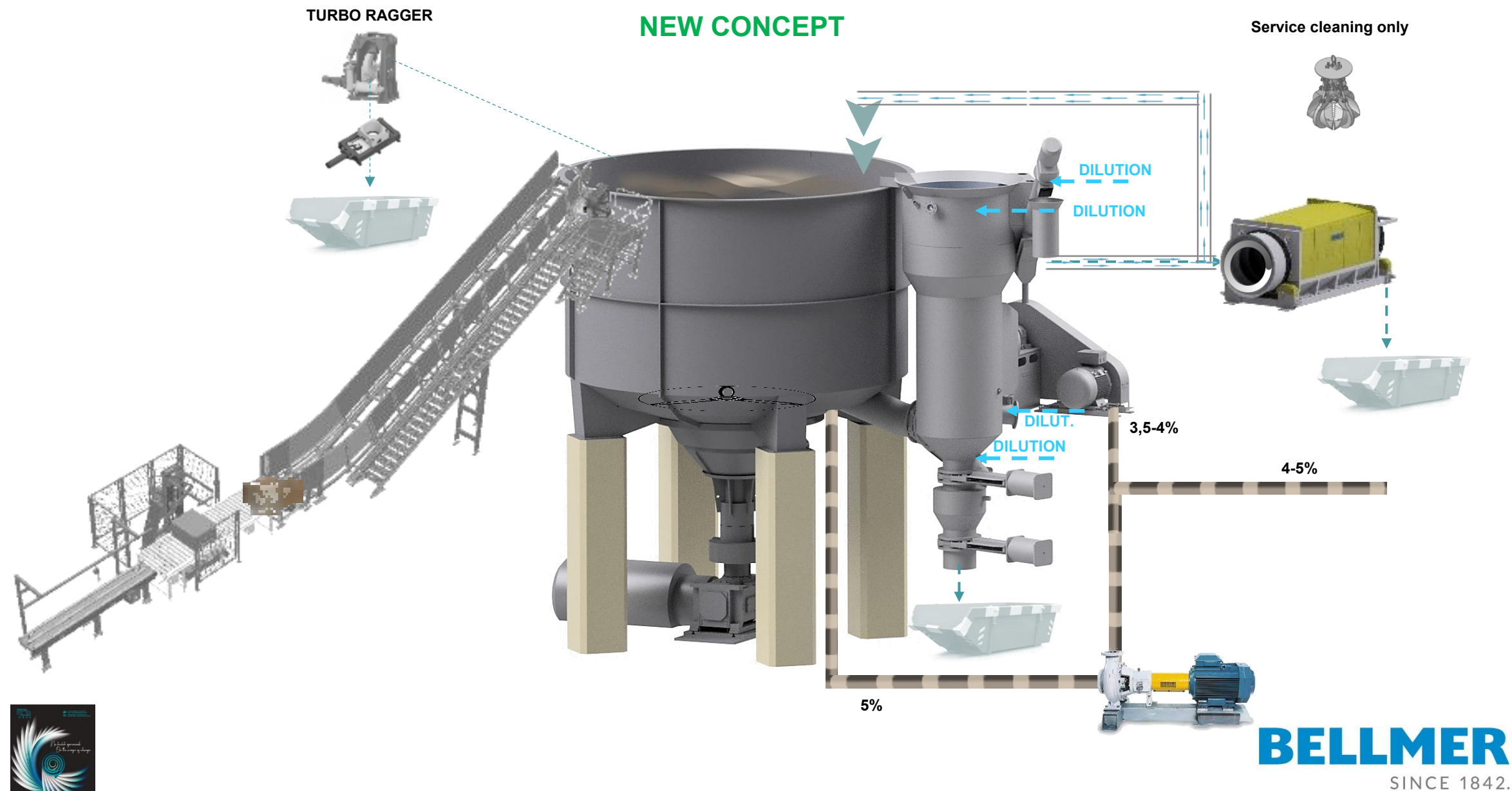
BENEFITS:

- Modular Screening solution with a high deflaking efficiency, without breaking impurities.
- Suitable for both greenfield installations and retrofits.
- **Performs reliably even with variable contaminant loads and variable flow.**
- Each unit is dimensioned based on throughput in cubic meters per hour (m³/h), ensuring optimal performance. We utilize image-based analysis to support machine selection and process tuning.
- Low energy consumption at high efficiency.
- Low maintenance costs, high availability.



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PULPING PROCESS – LIGHT REJECT CONCENTRATOR

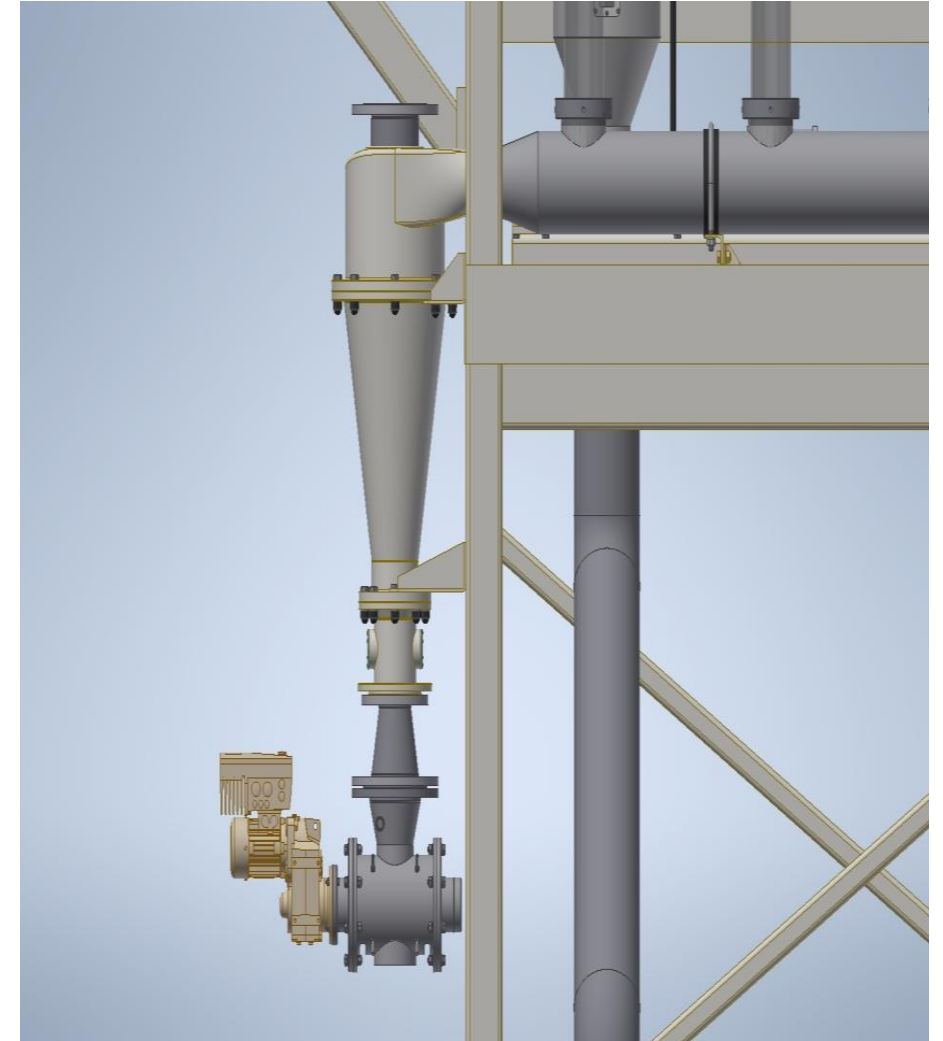
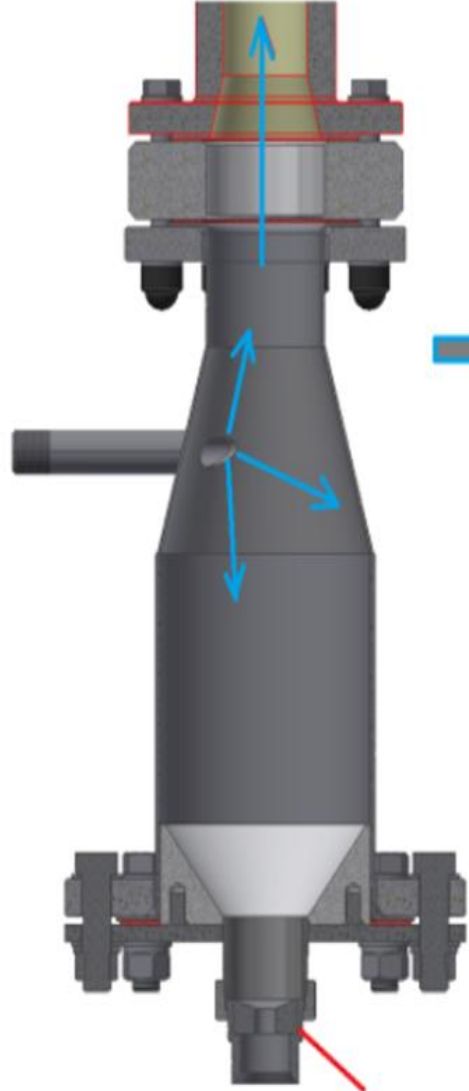
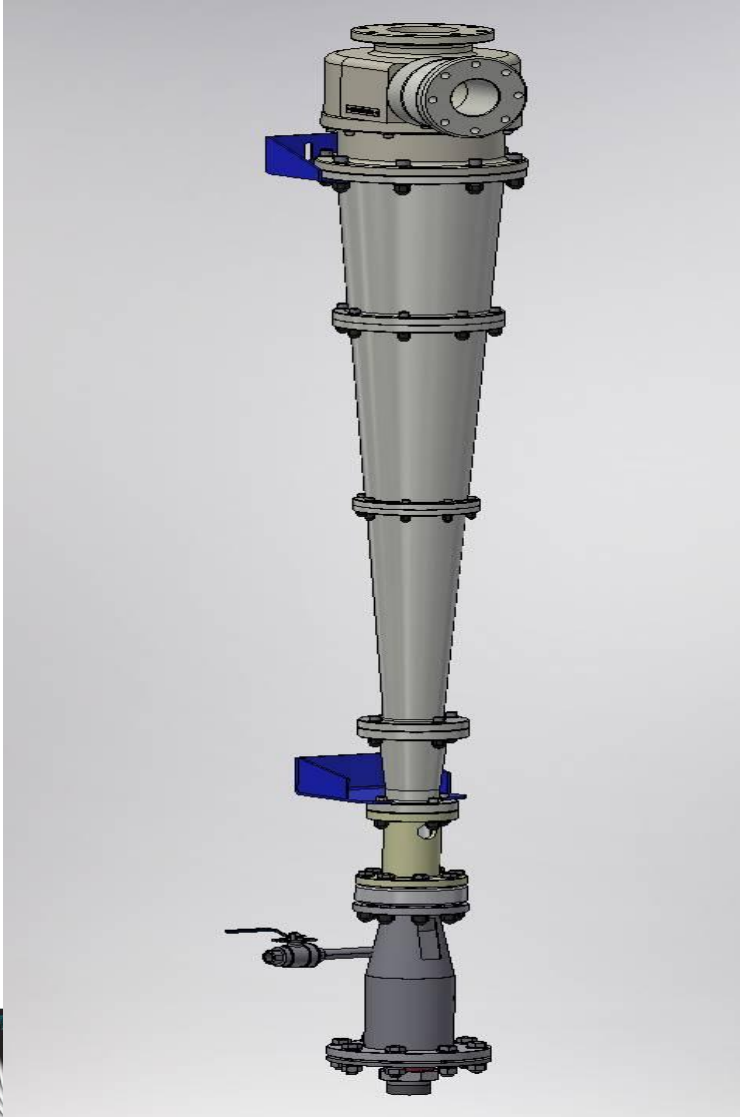


High maintenance cost influenced by

- » **Design of equipment**
- » **Quality of material**
- » **Maintenance quality**
- » **Inventory of spare parts**
- » **Periodically working valves and machinery**
- » **Cleaning**



New collection box with continuous discharge



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CR video from tests



4 periodically operating systems changed into continuous
20 pneumatic on/off valves eliminated





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Summary



Summary

- » **Close relation of Bellmer to customer with own Innovation centre results:**
 - » Improvement in Know how
 - » Fast Innovation
 - » Good training of staff
- » **Innovation reduces operation cost and investment cost for customer and they are increasing Bellmer competitiveness.**

