BlueLine –
Sustainable Solutions for Stock Preparation Plants

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Introduction

Rising energy and raw material costs are meanwhile the biggest cost drivers in paper mills all over Europe. Beside this, water consumption, chemicals, etc. are increasing the expenditures for papermakers, additionally. With the BlueLine family Voith Paper developed new plant components and also some re-designed equipment to support the paper industry regarding those challenges.

As pulping of the raw material is one of the biggest energy consumption processes in stock preparations, the Intensa series, like the IntensaPulper™ (off-set arrangement of rotor), was developed with the main purpose to decrease energy consumption at the same or even better flake reduction. This principle is adaptable to existing pulpers, as well as for most of the competitive products. As the amount of impurities in the raw material is increasing day by day, the IntensaMaXX™ detrashing machine ensures a constant and reliable detrashing of the pulp at lowest fiber loss, wear and energy costs.
Regarding screening, new rotors as i.e. the EclipseRotor™ were developed, ensuring high capacity and high screening efficiency at lower energy consumption and wear. In combination with the constant enhancement of screen baskets it is possible to upgrade existing screening plants to highest performance.

Also in case of refining the principle of “low intensity refining” was developed further. With the family of Pluralis fillings nearly all double disc refiner types can be optimized regarding energy consumption and strength development. Last but not least our DiscFilter technology with BaglessPlus™ segments made out of stainless steel will help reducing operating costs. With the BaglessPlus™ technology it is possible to rebuild nearly all kinds of Disc Filters to improve capacity, filtrate quality and yield as well as to reduce water consumption and maintenance.
**Experimental and Results**

**IntensaPulper™**

- Off-set arrangement of rotor
- Double cone bottom comes closer to the ideal circle-shaped
- Round tank has lowest flow losses
- Reduced energy for the same pulping quality
- Perfect turbulence and optimized flow with lower energy consumption than with previous pulpers
- Min. 20% Energy Savings compared to conventional pulpers
Case Studies:

1. Rebuild of a 50 m³ Pulper to IntensaPulper™ (rebuild of existing pulper)

<table>
<thead>
<tr>
<th></th>
<th>Original Pulper</th>
<th>IntensaPulper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>18DHPS</td>
<td>IP50</td>
</tr>
<tr>
<td>Operating Volume</td>
<td>43 m³</td>
<td>50 m³</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>400 kW</td>
<td>420 kW</td>
</tr>
<tr>
<td>Production</td>
<td>450 bdmt/d</td>
<td>850 bdmt/d</td>
</tr>
<tr>
<td>Flakes (Somerville)</td>
<td>25 %</td>
<td>12 %</td>
</tr>
<tr>
<td>Pulping/Accept Cons.</td>
<td>6/4 %</td>
<td>7/4 %</td>
</tr>
<tr>
<td>Specific Power</td>
<td>21 kWh/t</td>
<td>12 kWh/t</td>
</tr>
</tbody>
</table>

Energy savings about 75.600 €/a!!
### Case Studies:

2. Rebuild of KBC Pulper with PlateRotor & NDuraPlate_ES (rebuild of existing pulper)

<table>
<thead>
<tr>
<th>Type</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Material</td>
<td>KBC Hydrapulper Continous</td>
<td>OCC</td>
</tr>
<tr>
<td>Throughput</td>
<td>382 bdmt/d</td>
<td>382 bdmt/d</td>
</tr>
<tr>
<td>Pulping Consistency</td>
<td>4,5 %</td>
<td>4,5 %</td>
</tr>
<tr>
<td>Rotor Speed</td>
<td>192 rpm</td>
<td>192 rpm</td>
</tr>
<tr>
<td>Installed Power</td>
<td>300 kW</td>
<td>300 kW</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>247 kW</td>
<td>197 kW</td>
</tr>
<tr>
<td>Rotor Type</td>
<td>KBC Vokes Rotor</td>
<td>Voith PlateRotor</td>
</tr>
<tr>
<td>Screen Plate</td>
<td>Standard hole plate</td>
<td>NDuraPlate ES</td>
</tr>
<tr>
<td>Accept Flakes content</td>
<td>23,9 %</td>
<td>20,9 %</td>
</tr>
</tbody>
</table>

**Energy savings about 29.400 €/a!!**
**IntensaMaXX™**

**Why is the machine trouble-free?**

**Rotor on top**
- Difficult for big contaminants to flow against gravity
- Therefore less wear, no blockages, no rotor damages
- Reliability proven since decades in Contaminex™ CMV

**Asymmetrical Tank Design**
- Benefit of all the asymmetrical features helps to prevent rags and wear while keeping maximum turbulence

**Position of reject nozzle**
- Short & direct channel between feed & reject nozzle for quick reject extraction
- Lowest position of nozzles ensures rejecting of all types of rejects
Case Study:

Rebuild of 2x Fiberizer to 1 IntensaMaxx

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine Type</td>
<td>2x F2-T.S</td>
<td>IM15</td>
</tr>
<tr>
<td>Raw Material</td>
<td>OCC</td>
<td></td>
</tr>
<tr>
<td>Throughput</td>
<td>1.000 bdmt/d</td>
<td></td>
</tr>
<tr>
<td>Installed Power</td>
<td>2x 160 kW</td>
<td>75 kW</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>2x 128 kW</td>
<td>60 kW</td>
</tr>
</tbody>
</table>

Energy savings about 160.000 €/a!!
EclipseRotor for Screening Applications

StepRotor: 12,5 mm gap  EclipseRotor: 5 mm gap

- **Influence factors and weighting for rotor energy consumption:**
- 60% use of energy goes to blank rotor drum
- Remaining use of energy is influence able by:
  - Quantities of Foils
  - Arrangement on drum surface
  - Height of Foils
  - and Rotor-basket gap
- Whereby gap has biggest influence
EclipseRotor for Screening Applications

Eclipse Performance:
• Higher throughput performance up to 20%
• Specific use of energy reduced up to 45%
• Similar thickening factor for both rotor types
• Up to 30% higher screening efficiency

Operational Recommendation:
• For rebuild and new installation instead StepRotor
• Rotor tip speed 18 to 20 m/s
• Fiber consistency 2 to 4.5 %
• Used Rotor-Basket gap is 5 mm
• Basket combination: All styles
Case Study:

Corse Screening Rebuild of Black Clawson UV400 MC – hole screening primary stage

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotor Type</td>
<td>Black Clawson</td>
<td>Eclipse F</td>
</tr>
<tr>
<td>Paper Grade</td>
<td>B&amp;P</td>
<td></td>
</tr>
<tr>
<td>Inlet Consistency</td>
<td>3.7 %</td>
<td></td>
</tr>
<tr>
<td>Rotor Speed</td>
<td>20.2 m/s</td>
<td>18 m/s</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>93 kW</td>
<td>62.5 kW</td>
</tr>
</tbody>
</table>

Energy savings about 18.000 €/a!!
Pluralis Fillings for Refining Applications

Flow optimized bar and groove design
- Higher hydraulic capacity
- Smooth surface
- Low draft angle

Designed for different fiber types
- Pluralis effect treats higher number of fibers more uniformly (Larger plate gaps)
- Inlet area adapted to process requirements
- Target optimal cutting edge length (CEL) for each fiber type
  SSF/SF/IF/LF/AO/CF
Case Study:

Pluralis vs. Techmelt fillings for LBKP – 30” 1SDM Refiner

<table>
<thead>
<tr>
<th></th>
<th>Techmelt</th>
<th>Voith Pluralis SSF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar width</td>
<td>1,7 mm</td>
<td>1,3 mm</td>
</tr>
<tr>
<td>Groove width</td>
<td>2,0 mm</td>
<td>2,3 mm</td>
</tr>
<tr>
<td>Cutting edge length (CEL)</td>
<td>100 %</td>
<td>108 %</td>
</tr>
<tr>
<td>Hydraulic capacity</td>
<td>100 %</td>
<td>124 %</td>
</tr>
<tr>
<td>No-load power (water)</td>
<td>100 %</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Energy savings about 75.000 €/a!!
Disc Filter Rebuilds for nearly all Disc Filter Applications

- Highest stable filtrate quality over the whole lifetime of BaglessPlus due to endurable & high end design of sector → ROI < 0.8 year!
- Lowest maintenance and operation cost due to long lifetime of Bagless
- Highest capacity due to corrugated surface of discs, optimal knock off with nozzles and/or HiCon installation
- Clear defined split in cloudy, clear and/or super clear filtrate by the filtrate valve due to high constant vacuum
Case Study:

Rebuild of 4x GL&V saveall disc filter 520 in China 2012, board and packaging application

<table>
<thead>
<tr>
<th>Superclear filtrate</th>
<th>Before</th>
<th>After rebuild</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM3</td>
<td>160 to 370 ppm</td>
<td>25 to 35 ppm</td>
</tr>
<tr>
<td>PM4</td>
<td>200 ppm</td>
<td>40 ppm</td>
</tr>
<tr>
<td>PM5</td>
<td>150 ppm</td>
<td>25 to 35 ppm</td>
</tr>
<tr>
<td>PM13</td>
<td>150 ppm</td>
<td>20 to 30 ppm</td>
</tr>
</tbody>
</table>

Results and Benefits

- Fresh water savings
- 80% reduction in super clear filtrate consistency
- Capacity increase possible by up to 25%
- Reduction in heat and chemical consumption
- Reduction of solid material losses to effluent

Value Added Savings

- Payback calculated to 8 to 12 months
- Savings in retention chemicals
- Less maintenance
Voith Paper Fiber and Environmental Solutions (FES) has a lot of machine parts and equipment to help our customer saving energy, improving quality and increasing easily the production. Furthermore FES provides tailor-made rebuild offers based on an experienced survey from our Voith experts.
References

• IntensaPulper™ - new
  * Saica PM11 in GB, 73 m³ for 1040 t/d EOCC (2012)
  * Wuxi Long Chen (PRC), 73 m³ for 650 t/d COCC/EOCC (2012)
  * Houli Cheng Loong (ROC), 95 m³ for AOCC/TOCC (2011)
  * Donghae (Korea), 40 m³ for 150 t/d BCTMP (2010)
  * Dunaujvaros (HU), 120 m³ for 1440 t/d OCC (2009)
  * Soka Mill (JP), 60 m³ for MW (2008)

• IntensaTechnology™ - rebuilds
  * Atena (JP/2013), B/P grade:
    * KBC 14DHPSC, new equipped with Intensa™ rotor, deflector, rotor cap and vat modification
  * CMPC Maule (Chile/2012), B/P grade:
    * Voith VS40, new equipped with Intensa™ rotor, deflector and rotor cap
  * Procor (Bra/2011), Tissue grade:
    * Voith UP90, new equipped with Intensa™ rotor and rotor cap
  * Stockstadt (DE/2010), graphical grade:
    * Andritz Fiber Solve, new equipped with rotor modification and deflector
  * Thai Paper (TH/2009), B/P grade:
    * Tampella HD5500, new equipped with rotor modification, deflector, bale breaker and services
• IntensaMaXX™
  Varel (DE/2012), B/P grade: IM15
  Thai Union Bangkok (TH/2012), B/P grade: IM08
  Kreuzau-Metsä (DE/2012), B/P grade: IM30

• EclipseRotor for Screening Applications
  Freital (DE/2012), OmniScreen OS8 MC - slot screening primary stage
  Freital (DE/2012), OmniScreen OS4 MC - hole screening primary stage
  Freital (DE/2012), OmniScreen OS2 MC - hole screening secondary stage
  Paprinsa (E/2013), Black Clawson UV400 MC - hole screening primary stage

• Pluralis Fillings for all Refining Applications
  Varel (DE/2012), OCC: Voith TF3E
  Hillegossen (DE/2012), BSKP/BHKP: Voith 1SDM
  Krapkovice (PL/2012), virgin & DIP: Voith TF1E
  Burg (DE/2011), OCC: Voith TF3E
  West Carrollton (USA/2010), DIP: Beloit DD
  SCA Ortmann (A/2010), DIP: Sprout
  Dunaujvaros (HU/2009), OCC: Voith TF4E

• Disc Filter Rebuilds mainly Saveall DF
  Aisa especially Lee&Man (PRC/2012), DF from Andritz and GL&V
  NAFTA countries, DF from GL&V, Beloit, Dorr Oliver and Andritz/Impco