TECHNICAL SESSION II
1 JUNE 2017

INNOVATIONS & IMPROVEMENTS: SUSTAINABLE, PERFORMANCE ENHANCING AND ENERGY SAVING SOLUTIONS -

BTG’S COMPREHENSIVE APPROACH TO RISE YOUR PRODUCTIVITY

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TISSUE BUSINESS DEVELOPMENT MANAGER LA
BTG AMERICAS, BRAZIL

Carlos Hernán Llanos Acosta graduated as chemical engineer specialized in pulp and paper at Universidad del Valle (Colombia) and has a MBA degree in Business Management at FGV (Brazil). He worked with Nalco for 20 years as Technical Sales Rep. in Colombia and Brazil, servicing pulp mills, fine paper mills and most Tissue Mills in Latin America.

During the last 11 years he worked as industrial technical manager and industrial development manager for Latin America. His main responsibilities were introducing and supporting new technologies focused on improving tissue paper and productivity. His current responsibility as sales manager for Latin America at BTG is to manage and support all BTG’s technologies related to tissue paper manufacturing with focus in wet end and creping processes. Carlos is leading several projects for increasing productivity, improving softness and monitoring Yankee dryers’ health.
BTG’s comprehensive approach to rise your productivity

Tissue World São Paulo 2017

São Paulo, May 2017
Carlos Llanos
- Main Tissue-making cost
- Measure to control
- Using the right technology
- Think bigger
I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind....

William Thomson “Dr. Kevin”
May 3, 1883, lecture on “Electrical Units of Measurement” (Popular Lectures, Vol. 1, page 73):
Papermaking costs
Papermaking costs

Pulp 43%
Papermaking costs

Pulp 43%

Chemicals 12%
Papermaking costs

- Pulp 43%
- Chemicals 12%
- Energy 26%
Papermaking costs

- Pulp 43%
- Chemicals 12%
- Energy 26%
- Water 10%
- Others 8%

Source: Valmet
Save your fiber
Save your fiber
Reduce 3-5% of total paper cost

- Reduce Basis Weight variation then reduce Basis Weight
- Measure to minimize fiber wasted to Waste Water Treatment
- Measure and control retention

80 TPD tissue mill,
30% - 100% DIP, Eucalyptus, NSWK tissue grades
Case History
Reduce 3-5% of total cost or USD250,000/year

Run an audit
- Check Mixing
- Calculate consistency
  Standard Deviation
Case History
Reduce 3-5% of total cost or USD250,000/year

Run an audit
- Check Mixing
- Calculate consistency
  Standard Deviation

Choose the right solution
- Consistency range
- Velocity
- Furnish
Case History
Reduce 3-5% of total cost or USD250,000/year

Run an audit
- Check Mixing
- Calculate consistency
  Standard Deviation

Choose the right solution
- Consistency range
- Velocity
- Furnish

Install and Control
- Dilution water
- Right dimensions
- Sampling
- Consistency lab method
Audit results
Reduce 3-5% of total cost or USD250,000/year

Mixing & blending
- Improve blending at thick stock tanks
- Reduce consistency standard deviation from 0.42% to 0.10%
- Reduce Wet Strength by 3-5 Kg/ton
Audit results
Reduce 3-5% of total cost or USD250,000/year

Mixing & blending
- Improve blending at thick stock tanks
- Reduce consistency standard deviation from 0.42% to 0.10%
- Reduce Wet Strength by 3-5 Kg/ton

Replace and update transmitters
- Reduce consistency variation from 3% to 1% narrowing production to 79.2 – 80.8 TPD
- Production increased by 1.6 TPD
- Savings of extra 0.6 TPD in more expensive fiber
Audit results
Reduce 3-5% of total cost or USD250,000/year

- **Mixing & blending**
  - Improve blending at thick stock tanks
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- **Install, maintain and control**
  - Install TCR Optical transmitters
  - Improve Sampling and calibrating process
  - Start Up and annual service package in place
Picking the right solution
According to %Cs range and precision

- TCR
- MEK
- TCT
- ACT
- TCS
- MBT
- SBT

%Cs
Right Solution
According to project scope

- Install 3 - BTG TCR-2511 in Saveall, A Holding, and A Dump
- Install BTG TCR-2511 at machine Chest

<table>
<thead>
<tr>
<th>Measuring principle</th>
<th>Light reflection and scattering using BTG’s patented Peak method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured range</td>
<td>0.5 to max. 16 %Cs total consistency</td>
</tr>
<tr>
<td></td>
<td>0 – 10 % filler consistency</td>
</tr>
<tr>
<td>Measured value</td>
<td>Total consistency in %Cs or mg/l</td>
</tr>
<tr>
<td></td>
<td>Ash in % or mg/l (only for TCR-25x2)</td>
</tr>
<tr>
<td>Customer interface</td>
<td>CPM-1300</td>
</tr>
<tr>
<td></td>
<td>Calibration by CPM</td>
</tr>
<tr>
<td>Communication</td>
<td>4-20mA</td>
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<tr>
<td></td>
<td>Profibus</td>
</tr>
<tr>
<td></td>
<td>HART® / DD communication</td>
</tr>
<tr>
<td></td>
<td>Remote access via BTG-Software</td>
</tr>
</tbody>
</table>
Right Solution
According to project scope

- Install 3 - BTG MPS-1000 sample valves
  - Blend Chest
  - Machine Chest

<table>
<thead>
<tr>
<th></th>
<th>MCS-1000</th>
<th>MPS-10x0</th>
<th>PPS-10x0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating range</td>
<td>0 – 16 %Cs</td>
<td>0 – 8 %Cs</td>
<td>0 – 8 %Cs</td>
</tr>
<tr>
<td>Max calculated</td>
<td>PN25 [263psi at 68°F]</td>
<td>16 bar [230psi]</td>
<td>16 bar [230psi]</td>
</tr>
<tr>
<td>pressure (closed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max media pressure</td>
<td>PN16</td>
<td>10 bar [145 psi]</td>
<td>10 bar [145 psi]</td>
</tr>
<tr>
<td>(open)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max media temp</td>
<td>110°C [230°F]</td>
<td>90°C [194°F]</td>
<td>90°C [194°F]</td>
</tr>
</tbody>
</table>
Stop wasting fiber
Measure and Control

- Online consistency measurement of waste water prior or after treatment
- Online measurement of ash and fiber in percentage
- If flow measurement is incorporated, total waste load is calculated online
- Control of clarification chemicals
- BTG Sewer Loss Monitoring System can be installed in low velocity pipeline or canal
Choose your white
Stop rejecting paper
Save USD 160,000/Year

- Paper rejected because brightness (L a b) issues
- Impossible to correct L a b at machine
- High variation coming from Deinking Plant
- Erratic relationship between brightness at DIP and paper
- Wet end chemistry upset
Stop rejecting paper
Save USD 160,000/Year

Reel Brightness versus Blend Chest Brightness Meter

<table>
<thead>
<tr>
<th>Brightness</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>Jan 1st</td>
</tr>
<tr>
<td>67</td>
<td>Feb 20th</td>
</tr>
<tr>
<td>69</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td></td>
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<td>73</td>
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<td>81</td>
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<td>83</td>
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<tr>
<td>85</td>
<td></td>
</tr>
<tr>
<td>87</td>
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BTG
RAISING YOUR PRODUCTIVITY
Stop rejecting paper
Save USD 160,000/Year

Reel Brightness versus Blend Chest Brightness Meter

Time

Jan 1st

Feb 20th

Brightness

65
67
69
71
73
75
77
79
81
83
85
87

Reel
15 per. Mov. Avg. (Reel)
Stop rejecting paper
Save USD 160.000/Year

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<th>Measuring principle</th>
<th>Reflectance with BTG’s patented 4-Beam™ Principle</th>
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<tr>
<td>Measured range</td>
<td>Approximately 5 – 96 ISO</td>
</tr>
<tr>
<td>Measured value</td>
<td>Measures brightness, OBA, color (L<em>a</em>b*) and ERIC</td>
</tr>
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<td>Customer interface</td>
<td>CPM-1300</td>
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Stop rejecting paper
Save USD 160,000/Year

Reel Brightness versus Blend Chest Brightness Meter

- BTG
- Reel
- 15 per. Mov. Avg. (Reel)

Brightness vs. Time
Jan 1st - Feb 20th
Stop rejecting paper
Save USD 160,000/Year

Reel Brightness versus Blend Chest Brightness Meter

Jan 1st

Feb 20th

BTG

Reel

1

15 per. Mov. Avg. (Reel)
Stop rejecting paper
Save USD 160,000/Year

- Paper on spec
- OAB used to control (L a b)
- Potential replacement of more expensive fibers
- Balanced Wet End Chemistry
Use Power Wisely
Energy. Save it. Now
Save USD 90,000/Year

- Calculate specific energy, flow rate and consistency is required
- Choose the refining strategy based on paper quality
- Reduce °SR variation
- Expected drainage and softness improvement
Energy. Save it. Now
Save USD 90,000/Year
Maximize Productivity
Maximize Productivity
Save USD 350,000/Year

- Reduce Yankee wear between grinding
- Increase blade life 2X to 10X when using Ceramic
- Eliminate time for blade holder cleaning
- Control Stick out and Set Up angle at your will
- Prevent Chatter monitoring vibration
- Control edge deposits
Maximize Productivity Vigilance™
Save USD 350,000/Year

- Measure and monitor blade holder vibration
- Control blade change based on vibration
- Detect issues after blade change
- Select best C&R program
- Prevent Chatter marks
Maximize Productivity Vigilance™
Save USD 350,000/Year
Maximize Productivity
Save USD 350,000/Year
Maximize Productivity CBC™
Save USD 350,000/Year

- Avoid high loads
- Avoid Yankee accidents
- Reduce Yankee wear
- Minimize time changing Set Up
Maximize Productivity CBC™
Save USD 350,000/Year

- Change Stick Out on the run
- Control edge deposits
- Apply even pressure to Yankee face
Conclusions

- Measure to control is the key to recognize and catch savings opportunities
- Implement short term payback projects starting at papermaking fundamentals
- Get rid of time consumer issues
- Avoid decision making processed based on operational perceptions