High Value Roll to Roll Workshop
December 2 - 3, 2015

David Ventola
Director Business Development, EP
B&W MEGTEC Overview

• Babcock & Wilcox MEGTEC
  De Pere, Wisconsin
  – MEGTEC employs approximately 350 people in the US and approximately 600 globally

• De Pere Facility includes:
  – Chemical, Mechanical and Electrical Engineers and Designers
  – 100+ Service, Technical and Support Personnel
  – 100+ Manufacturing Personnel
  – Dedicated R&D and Pilot Laboratory Support Team
  – Oracle ERP, Risk Management Programs

365,000 ft² manufacturing facility
# B&W MEGTEC: Businesses

## Markets

<table>
<thead>
<tr>
<th>ENVIRONMENTAL SOLUTIONS (ES)</th>
<th>ENGINEERED PRODUCTS (EP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Pollution Abatement</td>
<td>Energy Storage</td>
</tr>
<tr>
<td>Carbon Management</td>
<td>Renewables</td>
</tr>
<tr>
<td>Energy Recovery</td>
<td>Membranes/Composites</td>
</tr>
<tr>
<td>Biofuels &amp; Renewable Energy</td>
<td>Printing/Packaging</td>
</tr>
</tbody>
</table>

## Products

<table>
<thead>
<tr>
<th>Wet &amp; Dry Electrostatic Precipitators</th>
<th>Regenerative Thermal Oxidizers (RTOs)</th>
<th>Air Flotation Dryers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet &amp; Dry Scrubbers</td>
<td>Solvent Recovery Systems</td>
<td>UV Dryers</td>
</tr>
<tr>
<td>Pulse Jet Fabric Filters (Baghouses)</td>
<td>Carbon Adsorption Systems</td>
<td>IR Dryers</td>
</tr>
<tr>
<td>Multicleone® Dust Collectors</td>
<td>Distillation Systems</td>
<td>Coaters</td>
</tr>
<tr>
<td>SCR/SNCR Systems</td>
<td>Heat Recovery Systems</td>
<td>Material Handling Equipment</td>
</tr>
<tr>
<td>Evaporative Gas Cooling Systems</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Services

<table>
<thead>
<tr>
<th>Replacement Parts and Service</th>
<th>Efficiency Upgrades</th>
<th>Energy Optimization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Rebuilds</td>
<td>Preventive Maintenance</td>
<td>Equipment Relocation</td>
</tr>
</tbody>
</table>

---

B&W MEGTEC: Li-Ion Battery & EDLC Electrodes

- Coating Lines; Lab to Mass Production

- NMP Recovery & Purification
In the short to medium term for Battery Electrode manufacturing:
Apply lessons learned from other markets / industries

Reference Industries

- Chemical Process Industry for slurry preparation
- Converting Industry for Coating & Drying, Calendering, Slitting
  - AIMCAL represented here at this workshop.
  - The Association of International Metallizers, Coaters and Laminators
Chemical Process Industry

- Drive to continuous operation
  - Shift from batch to continuous processes
  - Minimize changeovers
  - Operate at steady state
  - Process models for scale-up from lab to production

- Examples
  - Polyester film manufacturing
  - Oil refining
  - NMP production
Converting Industry

- Drive toward higher efficiencies and higher yields
  - Push toward wider webs
  - Achieve faster line speeds
  - Grouping / ganging steps
  - Process models for scale-up from lab to production
- Examples
  - Film Industry – several meters wide substrates
  - Paper Industry – calendering & slitting in-line
Research by BCG in the 1970s observed experience curve effects for various industries that ranged from 10 to 25 percent. These effects are often expressed graphically. The curve is plotted with cumulative units produced on the horizontal axis and unit cost on the vertical axis. A curve that depicts a 15% cost reduction for every doubling of output is called an “85% experience curve”, indicating that unit costs drop to 85% of their original level.