Seed Handling and Treatment Equipment 101

IPSA Webinar – June 19, 2014
Agenda

• Equipment requirements for seed treatment system
  • Seed handling equipment
  • Seed treating equipment
  • Control of equipment

• Elements to the seed treating process
  • Seed and Liquid

• Impact of liquid metering, seed metering and seed size on treatment application accuracy and efficiency

• Volumetric vs. gravimetric liquid and seed rate metering

• System layout and design options

• What level of automation is right for your organization

• The value of data collection, data management, and process reporting tools
Polling Question
KSi Conveyors – History

- Seed Handling Innovation
  - Patented, Cleated Belt
- Bulk Seed Delivery Systems
  - Single scaling systems / MultiFlow
- Automation
  - Bulk Seed Handling / Batching
  - Seed Treatment (all brands of treaters)
- KSi Applicator
- KSi Data Management Systems
Main Equipment Requirements
Main Equipment Requirements

- Conveyors
- Scale
- Seed Treater / Applicator
- Seed Metering / Control
- Liquid Delivery System
- Control
  - Manual / Basic
  - Automated
- Advanced
  - Bulk Seed Storage Bins
  - Automation
  - Data Management
Conveyors

• Gentle Seed Handling
  • Belt
  • < 400 ft/sec

• Considerations
  • Handle Seed 2-7x
  • Steeper Angles = Less Floor Space
  • Capacity Needs
  • Quality / Durability
• Batching
  • Single scale hopper – one draft at a time

• Continuous Batching / Scaling
  • Faster throughput for larger orders

• Industry Options
  • KSi
    • Single Hopper
    • KSi MultiFlow (dual 80 / 120 unit scale hoppers)
  • USC
    • Single Hopper
    • Tri-Flow
      • Rotating inlet diverter to rotate between three, 30 unit hoppers
      • Continuous scaling / treating
**Scale – KSi Options**

- **Single 65-375 Unit Scale Hopper**
  - Automatic drafting with KSi Automation
  - Scale required for KSi VariRate seed flow control
- **KSi MultiFlow (80 unit / 120 unit)**
  - Continuous scaling / treating of seed
  - Treats and fills simultaneously
  - Treat a semi as fast as 20 min.
  - Ability to disable one of the scales in the case of a hardware (load cell) failure and still continue to treat through other scale
Seed Treater / Applicator

- Treatment application chamber / atomizer
  - Initial application of treatment onto seed
- Drum
  - Mixing / drying / polishing of treated seed
- Industry options
  - Bayer RH Series (OnDemand)
  - USC LPX Series
  - KSi 4808NGA Applicator
Seed Treater / Applicator – Bayer

- Bayer RH Series
  - Atomizing Head
    - 15.35” diameter
  - Drum
    - 36” or 48” diameter
    - 8’ long drum
    - Drum reverses at end of run to cleanout
    - Drum slope is adjustable for longest seed retention time
Seed Treater / Applicator – USC

- USC LPX
  - Atomizing head
    - 16” diameter
  - Drum
    - 36” diameter
    - 6’, 8’ or 10’ long
Seed Treater / Applicator – KSi

- KSi 4808NGA Applicator
  - Atomizing head
    - 26” diameter for a larger seed curtain
    - Seed distribution
    - Liquid distribution
Seed Treater / Applicator – KSi

- KSi 4808NGA Applicator
  - Drum
    - 48” diameter
    - 8’ long
    - Three different sections inside drum
    - Discharges from center of drum for lower head height
Elements to the Seed Treating Process
Elements to the Seed Treating Process

- Seed flow control
  - Seed wheel (volumetric)
  - Loss-in-weight (gravimetric)

- Liquid flow control
  - Flow meter (volumetric)
  - Loss-in-weight (gravimetric)

- Ultimate objective: Apply the right amount of treatment on the right amount of seed
Elements to the Seed Treating Process

Liquid Flow Control

Seed Flow Control
Seed Metering / Control
Seed Metering / Control

- Types of control
  - Manual Gate
  - Seed Wheel (Volumetric)
  - Loss-in-Weight (Gravimetric)
- Basic principles of flow control
Seed Metering / Control – Manual

- Manual
  - Affected by seed size and seed flowability
  - Ideally measured and corrected often
  - Reality: set and forget – assume all the same

Set Gate Position

Estimate new gate position

Time for known quantity of seed
Seed Metering / Control – Volumetric

- Seed Wheel
  - Speed setting determined by:
    - Weight of seed in calibration container
      - Each seed size will have a unique calibration weight that needs to be known by the system
    - Calculation is either manual or automatic depending on system integration
    - Integrated systems including a scale can do automatic corrections

KSi  
USC  
Bayer
Seed Metering / Control – Gravimetric

- KSi VariRate
  - Directly measures and controls seed flow using loss-in-weight from scale
  - Independent of seed size
  - Independent of seed flowability
  - No calibration for different seeds

Set Desired Flow Rate

Scale monitored, rate calculated several times per second

Control gate position corrected several times per second
Liquid Metering / Control
Treatment Flow Control

- Manually set pump speed
- Manually set pump speed with continuously monitored flow
- Closed loop based on flow meter
- Closed loop based on loss-in-weight

Set ➔ Correct ➔ Monitor ➔ Set
Manually Set Pump Speed

- Calibration container and stopwatch used to determine flow rate
- Ideally measured and corrected often
- Reality: set and forget – checked occasionally
- Pump output influenced by temperature, viscosity, etc.
Manually Set Pump Speed with Monitoring

- Set pump speed based on flow rate read-out
- Checked/adjusted on a batch-wise basis based on totalizer
- Calibration of flow meter required to ensure read-out accuracy
Closed-loop Treatment Flow with Flow Meter

- Calibration of flow meter required to ensure read-out accuracy
Closed-loop Treatment Flow with Loss-in-Weight

- Weight to volume (density) calibration required

Set Desired Flow Rate

Pump Speed Adjusted Automatically

Scale monitored and flow rate calculated automatically
Liquid Delivery System – KSi Liquid Stands

- Assembly configuration with any combination of the below
  - Liquid Stand with drip collection
  - Pump – High Rate / Low Rate
  - Flow Metering – Gravimetric with Scale / Volumetric with Flow Meter
  - Tank – Poly Tank / Micro-Matic Keg Couplers for Keg fit up/ Existing Tank
  - Calibration Tube
  - Recirculation / Transfer Pump
- KSi AutoTreat setup for up to 15 different liquid stands of any combination
- Recipe Based Control – liquids come together at treater head through static mixer (optional separate entry for inoculant)
System Layout / Design Options
Box to box treating systems

- Scale
- Conveyors
- Applicator / Seed Treater
- Liquid Stands
- Accessories
Complex Bulk Seed Treating Systems

- Bulk Bins
- Scale
- Conveyors
- Applicator / Seed Treater
- Liquid Stands
- Accessories
Automation

Which level is right for your organization?
# KSi Automation Approach

<table>
<thead>
<tr>
<th>Level</th>
<th>Liquid Flow</th>
<th>Seed Flow</th>
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<tbody>
<tr>
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<td>Volumetric (flow meter)</td>
<td>Loss-in-Weight (scale)</td>
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<tr>
<td>1 Monitoring</td>
<td>Flow Monitoring&lt;br&gt;Flow Meter, Cal Tube, Electronic Readout</td>
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<td>2 Control</td>
<td>Flow Control&lt;br&gt;Flow Meter, Cal Tube, Electronic Readout, Closed loop feedback for pump speed control</td>
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<td>3 Basic Integration</td>
<td>Flow Control&lt;br&gt;Flow Meter, Cal Tube, Electronic Readout, Closed loop feedback for pump speed control</td>
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<td>4 Full Integration</td>
<td>AutoTreat w/ Vol</td>
<td>AutoTreat w/ LIW</td>
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- Level 1 through Level 3 – Plug-and-Play/Modular and upgrades any treater
- Level 4 – Full integration, custom-tailored to site with full upgrade path
What Level of Automation is Right for You?

**Liquid Flow Control**
- **Level 1**
- **Levels 2&3**
- **Level 4**

**Seed Flow Control**
- **Levels 2&3**
- **Level 4**
Polling Question
Seed Transfer / Scaling

- How does seed get to the treater?
  - Box-to-box
  - Bulk

- Solutions
  - KSi Automation
    - Seed scaling / batching (KSi AutoBatch)
    - Integrated seed scaling / batching and treating solution (KSi AutoTreat)
  - USC Automation
    - Seed scaling / batching
    - Integrated seed scaling / batching and treating solution
  - Bayer On Demand
    - Treater control only
Data Management
Value of Data Management Tools

- Stewardship
- Accountability
- Reporting
- Integration
# KSi Data Solution Levels

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<tr>
<th>Level</th>
<th>Local DB Solution</th>
<th>Cloud Backup</th>
<th>Web Tools</th>
<th>Reporting</th>
<th>Mobile Access</th>
<th>3rd Party Integration</th>
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Q & A
Thank You!

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