Automation Technology & Process Control

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Why Automate

- Automation cannot correct for equipment limitations.
  - Automation cannot do the impossible.
- Automation CAN do what a human has learned thru trial and error, but with greater
  - SPEED
  - ACCURACY
  - DOCUMENTATION
Why Automate

- Operational efficiencies
- Revenue-generating output
- Value-add operations (repack)
- Control exposure to hazards
Why Automate

- Competitive objectives
- Precise blends
- Agronomic, economic and environmental
- Timeliness
Speed

- Pumping Rates?
  - Does flow rate give you the speed you need?
  - Additional load out bays?
  - Efficiency?
Speed

- Automation Objectives - Keep trucks moving thru organized and sequential operation
  - Select Order or Recipe
  - Size the load to the tender truck
  - Press “Go” and let it happen
  - Staging of valves and pumps
  - Flooding delay
  - Shut down sequence to reduce hammering
  - Keep trucks staged and moving
Speed

- Repetitive operations
- Value-add
- Repackaging
- Record keeping
Accuracy

- Mass Flow Meters
  - Legal for resale
  - Measure any liquid product regardless of temperature or density
  - Measure temperature and density
Mass Flow Meters
- Flexibility for product changes
Accuracy

- MAG Meters
  - Legal for resale for a single product
  - Works best with fluids that have good conductivity
  - Conductivity requirements to measure
  - Conductivity requirements to be NTEP
Accuracy

- Positive Displacement Chemical Meters
  - Legal for resale
  - Requires adjustment for accuracy as density or viscosity changes
  - Single product
Accuracy

- Deck Scales
  - Legal for resale
  - Always accurate
  - Multiple products
More scales
Accuracy

- **Automation advantages**
  - Allows reading or meters and scales in motion
  - Stages, controls and manages all pumps and valves to accomplish order
  - No concern of under or over loading the transaction
Documentation

- Did I write it down?
- Did the ticket get to the office?
- Did all the transactions get billed?
Documentation Objectives

- All actuals are recorded for each transaction
- Operator can review if order was correctly dispensed
- Accuracy of each product can be analyzed
Documentation Objectives

- After the Transaction
  - Transaction can be sent to office electronically for billing
- Inventory is updated
  - Supports operational planning
  - Allows review to be sure transactions were billed
- Historical data and Reports
  - All transactions are saved to file
  - All transactions can be reviewed in event of customer inquiry
What can be Automated?

◦ Liquid Blenders
  ◦ Make product to go directly to grower
  ◦ Make product to go to storage
  ◦ Operate mixer sequentially
  ◦ Decrease inventory of raw ingredients
  ◦ Increase inventory of “made product”
What can be Automated?

- Review the process
  - Make sure an expert has reviewed the process
  - Write the sequence down for any product to be made
  - Set up the automation to do this precisely
What can be Automated?

- **Truck Loading**
  - Single ingredient dispense (wholesale products)
  - Blended order dispensing
    - “Splash Blending” - sequential
    - “Line Blending” - simultaneous
How do I put it together?

- **Design a plan**
  - Put a plan together as you wish the plant to operate
  - Review the plan for accuracy and speed
  - Review the plan for “compatibility”
  - After you think you have it right, have an industry expert review this for problems

- **Review the process for automation sequences**
  - Work closely with Agronomy or Transaction Management Software provider
  - Review sequential priorities
  - Size the pumps to accomplish the procedures

- **Develop a plan to manage inbound inventory**
Some common starting points

- Products
- Amount per load
- Target load times
- Incompatibilities
  - Tolerance of cross-product
  - Air-purge or follow-by
- Staff or unstaffed
- Data flow
- Traffic flow
- Receiving
- Recirculation
Anything else?

- Get buy in from your employees
  - Talk the new system over with the operators and employees
  - Review your goals
  - Explain how automation will speed up all facets of the process
  - Have a “person who owns the system”
Anything else?

- **Safety**
  - Begin with a plan
  - Build for it with components safe for your employees and customers
  - Communicate it
  - Be sure all procedures are followed to keep everyone safe from harm
Thank you!

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