ADVANCED REGULATORY CONTROL (ARC) FOR ETHANOL PLANTS

OpX Control, Inc.

Trident Automation
THE INTEGRATION OF INNOVATION

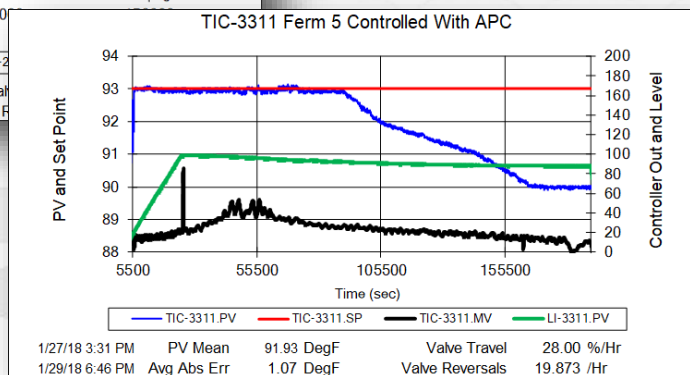## FERMENTATION

- Model Based Tuning

- Ramped Set Point (SP) Staging

- Adaptive Tuning
  - Level < 20%, control via cooler outlet temperature
  - Level > 20%, control via fermenter temperature

- CWS and CCS Management with Chiller Demand Constraint Control
  - Currently seeking a Beta Site

ARC is a fraction of the cost of the APC
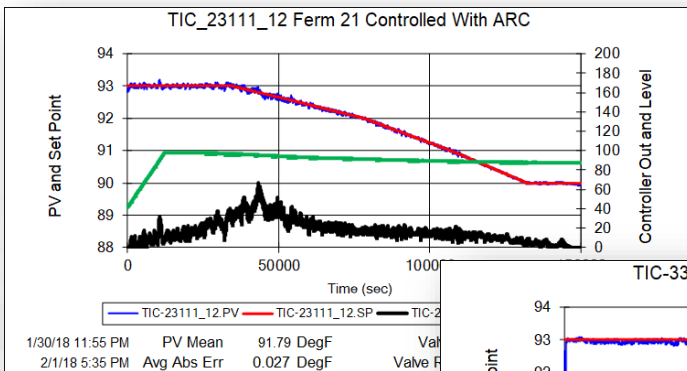
Fermenter temperature control with OpX ARC

Control with APC
Note: Actual Setpoint unavailable for APC fermenter control.

DISTILLATION

- Currently seeking a Beta Site

FRONT-END

- Model Based Tuning

- Slurry Density Control
  - Percent Backset Ratio/Cascade
  - Slurry Solids (Density) Cascade to Total Cook Water
  - Thin Stillage Inventory (Tank Level)
    Manipulate Percent of Backset Flow to Slurry

- Corn Milling
  - Mill Balancing & Operator Bias Control
    Balances Load During Maintenance
    Allows Operator Input to 'Push' Mills Harder
  - Fermenter Gap (Inventory) Control
    Manipulates Mill Feeds
    (with Mill Amps Constraint)

- Water Balance

- Cook Water Tank Inventory (Level) Control
  Cascade to CO_2 Scrubber Flow(s)
  Bias Input to Meet Lower Limits per Scrubber
  Low Level Control Admits Fresh Water

DRYER/ENERGY CENTER

- Model Based Tuning

- Cascade Dryer Temperature to Gas Flow Control

- Dryer Inlet (Combustion) Temperature Constraint Control

- Predictive Control
  - Centrifuge Feed (Front End Dryers), Syrup (Back End Dryers)

- Soft Sensors (DDGS Moisture)
  - Future