Agenda

• Safety Moment
• Ethylene Market Dynamics & Operational Challenges
• Schneider Electric Strategy
• Driving Client Value
• Demonstration Scenarios
Safety Moment
DID YOU KNOW
Always use a ladder properly and safely

…but not like this!

At Schneider-Electric, solving customer challenges is second only to keeping everyone safe and healthy
Ethylene Market Dynamics
Operational Challenges
Ethylene Market Dynamics

- **Increasing demand** – global, regional – India & China
- **Fluctuating price** of crude relative to natural gas
- **China** – coal to methanol, methanol to ethylene
- **Low cost feed** - regional impact

Operational Challenges

- **Flexibility** – advantaged feed
- **Optimization** - coke laydown vs run-time between decoking
- **Real-time accounting** – feedback to operators
Schneider Electric Strategy
Schneider Electric Strategy

- Won Lotte Axiall Chemical Complex (LACC) ethane steam cracker in USA.
- Become market leader by maximizing client profitability
  - Operational excellence – High performance HMI
  - Low cost – Ethylene Toolkit, control & safety universal remote I/O
Driving Client Value

1. Control and Safety Integration
2. Operator Proficiency
3. High Performance Graphics
4. Asset Management
5. Key Performance Indicators (KPIs)
Control & Safety Integration

- **Reduce CAPEX & OPEX** by auto generation of Foxboro Evo blocks in Triconex
- **Most secure** isolation of SIS from DCS using proprietary TSAA protocol
- **HART diagnostics from safety field devices** to initiate work orders
- **Integration of control & safety diagnostics and monitoring** in the DCS
Operator Proficiency
-Operator Training Simulator

> Train operators for infrequent operations like startup

> Exact replica of Control & Safety system

> High fidelity process model – accurate dynamics
  - Test control system design & configuration
  - Test process design – dynamic behaviour
  - Test procedures
  - Train commissioning crew & operators
  - Familiarise process engineers

> High fidelity steam and utility models
  - Train to balance producers & consumers
High Performance HMI – Situational Awareness

- Color reserved for alarms, otherwise grey
- Situation Awareness Library
  - Symbols relating one to many – radar, analog meters
  - Alarms for level 3 passed to level 2 & 1 displays
  - Operational context
    - Safety limits
    - Operational limits
    - Optimum range
  - Single symbol representing redundant field devices
    - Mid-select
    - 2 out of 3
Asset Management

- Maintenance Response Center
  - Maintenance planner que
  - Prioritize work
  - Assign work orders
- Field Device Manager
  - Field device management from Foxboro Evo
  - Synchronize field device databases with DCS
  - Reduce commissioning time utilizing DICED (plug-and-play)
- Risk based maintenance
- Predictive based maintenance
- Condition based maintenance
Key Performance Indicators

Performance and Health Monitoring

> SIS Performance
  - SIF Manager – bypass management, time in bypass, SIL violation

> Economics
  - Severity - yield
  - Coke laydown rate
  - Energy efficiency

> Process stability – operator performance
> Process health
> Production scheduling performance
Demonstration Scenarios
Typical Ethylene Steam Cracker
Demonstration Booth

Observing a furnace trip
Trip furnace – watch safety controls in action
Operational Benefit
• Safety controls awareness
• Safety controls validation and check-out

Responding to a make-up boiler trip
Make-up boiler trips, cracked gas compressor recycle valves open
• Safely reduce furnace firing rate
• Reduce resulting flare
• Maintain compressor from surging
Operations Benefit
• Reduce flaring and avoid compressor surge damage

Responding to feed composition changes

Unexpected increase in feed C4s
• Adjust COT & Steam-HC ratio control to maintain severity/yield
• Adjust COT & Steam-HC to maximize severity/yield
Operational Benefit
• Awareness of feed quality impact on controls
• Awareness of control handles to yields
• Awareness of control handles to constraints

Maintaining production after a furnace trip
Trip furnace 2, ramp-up furnace 1 to make-up production
• Increase furnace feed
• Adjust cracked gas compressor operation
• Adjust COT and Steam-HC
Operational Benefits
• Familiarization with safe furnace ramp-up
• Acknowledge constraints and limitations
• Enhance understanding of control handle interactions (COT, SHC, Feed Rate, Feed Quality)
Monitor and manage operations while dynamically adapting to plant conditions

Level 1 Production Monitoring

- Key process data
- Overview of all production areas
- Attention to problem areas
- Actionable information
- Drill-down to subunits and areas

Quick View Complete Unit Health
Manage Subunits and Control Areas

- Furnace
  - Rate, COT, Steam-HC
  - Burner/Flue
- Quench Tower
- Cracked Gas Compressor
  - Surge
- Steam System

Manage and Control Process Areas
High Performance Graphics - Detailed Operator HMI

Customizable Intuitive Control Screens

- Boilerplate for typical Ethylene Steamcracker areas
- Templated icons for quick access to build
- Object-oriented icons for reproducibility and standardization
- Customizable and enhanced graphics to increase operator productivity
- Fast refresh rate

Manage and Control Process Areas
Some Schneider-Electric Ethylene Experience

USA:
- BASF
- Dow Chemical
- Huntsman
- Shell Chemical
- SUN Chemical
- Union Carbide
- Texas Chemical
- Chevron Phillips
- Exxon Chemicals

Canada:
- Alberta Gas
- Nova Petrochem
- Petromat

Brazil:
- Copesul

Mexico:
- Pemex

Venezuela:
- Pequiven

Kuwait:
- Equate

UK:
- BASF
- DSM
- ICI
- Mobil

France:
- Atochem

Spain:
- BASF
- Innovene (2 sites)
- Tiba Oel
- Ruhr Oel (BP 4 sites)

Belgium & Holland:
- BASF
- DSM

Germany:
- Petrochemia

Poland:
- Gazprom

Russia:
- Qilu Petrochem
- Xinjiang Ethylene
- Dushanzhi (CNPC)
- Jinshan Petrochemi
- Lanzhou (CNPC)
- Maoming Petrochem
- Yangzi Petrochem
- Yanshan Petrochem

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Brazil:
- Copesul

Mexico:
- Pemex

Venezuela:
- Pequiven

Kuwait:
- Equate

India:
- Reliance
- Haldia Petrochem

Saudi Arabia:
- Sadaf
- Petro Rabigh
- Sabta

Malaysia:
- Optima
- Union Cardibe

Singapore:
- Esso

Australia:
- Kemcor

China:
- Qilu Petrochem
- Xinjiang Ethylene
- Dushanzhi (CNPC)
- Jinshan Petrochem
- Lanzhou (CNPC)
- Maoming Petrochem
- Yangzi Petrochem
- Yanshan Petrochem

Korea (S):
- Daeil Chemical
- Hyundai Petrochem
- Lucky Petrochem
- S K Corporation

Taiwan:
- Formosa Petrochem
- Chinese Petroleum Corp

Thailand:
- Rayong Olefins
- TOC

Russia:
- Gazprom

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