REVEAL YOUR BEST

Valero McKee Refinery Undertakes DCS Modernization

Steve Cox
Slater Ebeling
June 11, 2019
Americas HUG
About Valero

• Valero Energy Corporation is an international manufacturer and marketer of transportation fuels and petrochemical products based in San Antonio, Texas

• Through its subsidiaries, Valero owns 15 petroleum refineries in the United States, Canada and the United Kingdom, with a combined throughput capacity of approximately 3.1 million barrels per day (BPD)

• Valero sells its refined petroleum products in both the wholesale rack and bulk markets
Profile of the McKee Refinery

• Valero McKee Refinery is a complex petroleum refinery located near Sunray, Texas
• Refining operations began in 1933 with expansions to the present total feedstock throughput of 200,000 BPD
• Situated in the Texas Panhandle, the refinery has access to crude oil from northern and west Texas, Oklahoma, Kansas and Colorado through an extensive network of pipelines, making it one of the most well-connected facilities in Valero's system
Modernization Motivations

- Refinery management sought to modernize process automation technology to coincide with the construction of a new, blast-resistant Central Control Building (CCB)
  - Consolidate all operations on one control vendor per Valero corporate guidelines
  - Stay on up-to-date versions of hardware and software to ensure a supportable DCS
  - Modernize display graphics based on ASM® guidelines for an efficient Human-Machine Interface (HMI)
  - Address legacy DCS due to its age and approaching obsolescence
Challenges to Project Success

• For Valero’s modernization project, it was essential to achieve buy-in from refinery operators on:
  – New technology
  – New graphics
  – New centralized control center
• Minimize risk and disruption to operations
• Execute project with limited Valero resources
• Get support personnel up-to-speed on new technology
History of Control Systems

- McKee refinery has utilized a mixture of DCS systems since the early 1990s
  - Two consoles of Honeywell High Performance Process Managers (HPMs) were installed in the early 2000s
  - Some units were upgraded from HPMs to C300 controllers
  - Additional units were equipped with C200 controllers and later upgraded to C300s
  - One unit was previously upgraded from HC900 to C300
  - Several units had C300s installed directly
  - All Universal Stations were updated to Experion Stations
  - Three consoles of other DCS equipment were installed during the same timeframe
  - DCS systems ran across eight different control rooms spread throughout the refinery
Partnering with Honeywell

- Valero has had a long and successful working relationship with Honeywell, resulting in its selection as DCS vendor for the McKee refinery modernization project
- Multi-year migration plan started with DCS vendor and control room consolidation
- Refresh infrastructure on Fault Tolerant Ethernet (FTE) and virtualization
- Honeywell’s LEAP project execution methodology was utilized for design work, and its Integrated Resource Analysis (IRA) workshops assisted with review of graphics
- Retain and expand Valero Intellectual Property (IP) in Honeywell systems, including supervisory control, base regulatory control and interfaces
Improve Maintenance and Enable Innovation

• Software transformation approach enabled by virtualization
  – Continuous improvement for next generation of workers

• Reduced footprint
  – Experion LCN (ELCN) enabled TPS virtualization and retained existing control
    ▪ Virtual ESVT, EST, HM
  – C300 replaced legacy DCS controllers

• Avoid extending coax from field instrument enclosures to the new CCB
Control Technology Upgrades

• Replaced third-party control systems with Experion
• C300 controllers were installed with Universal I/O to replace three existing consoles
• Servers and stations were virtualized on Honeywell’s premium virtualization platform and updated to Experion R501
• HMI graphics were rebuilt utilizing Honeywell’s Advanced HMIWeb graphics library
• New operator stations include 55-inch Experion Orion consoles with touch panels
Control Room Transformation

• Operator effectiveness improvements
  – Consolidating to one DCS vendor enabled cohesive operations
  – 9 consoles consolidated, 5 buildings eliminated
  – Centralized approach improved efficiency
  – Changes to operator displays and work practices were transparent

• Ergonomic Features
  – Experion Orion Console standardization
  – Special lighting
  – Advanced sound engineering
Supporting Site Resources

• Honeywell deployed a Site Support Specialist to work at the McKee refinery and provide assistance with implementing and maintaining new automation technologies
• Close coordination with Honeywell’s project group has contributed to successful results
• Honeywell’s specialist is knowledgeable on refinery operations, and has the training and skills to augment internal resources
• Expert support will help ensure that new control systems meet expectations over the long term
Choosing Early Experion LCN Adoption

• Significant economic benefits of TPS virtualization and LCN coax elimination in CCB
• Long time Customer Advisory Board membership
• Early evaluation, training and development engineering support
Understanding Lessons Learned

• Based on Valero’s experience, there were a number of valuable lessons from planning and executing a major DCS migration
  – Understand the importance of comprehensive planning when preparing for modernization
  – Maintain consistent technical support across various phases of the project
  – Work with engineers who understand all aspects of project implementation
  – Recognize the role of front-end design work in a successful outcome
  – Flexibility is key to executing technology upgrades on time and within budget

• When implementing newer technologies, excellent communications between developers and project engineers is essential
Conclusion

• Valero has implemented an effective strategy for modernizing its DCS systems
• Existing Honeywell units have been moved to the CCB, and roughly half of the other equipment cutovers have been completed
• In addition to avoiding a costly and disruptive rip-and-replace of existing systems, the McKee refinery has benefited from:
  – On-process migration
  – Unification of legacy systems with Experion
  – New capabilities to capture more value from existing assets
• Best of all, the refinery’s process automation continues to be reliable and secure
QUESTION & ANSWER
THANK YOU