Glasstop Simulator Installation
Brunswick Nuclear Plant – Larry Dunlap
Glasstop simulator acquired for the purposes of:

- **Primary purpose**
  - Human factors development of U1 Turbine Control System
  - Operator training for new TCS system
    - TSC to be installed on U1 first – Full scope simulator is U2 reference plant
  - Procedure development
    - Development & review of procedures for Operations and I&C using the glasstop simulator to test & validate both the procedures & the system

- **Secondary purpose**
  - Operator training for Initial License Class Systems phase
  - Select training for Operator Continued Training
  - Basic Systems training for I&C, Engineering, and other disciplines
  - Plant modification development
Procurement considerations

- Western Services Corp (WSC) previously installed a glasstop simulator at Duke Energy’s H.B. Robinson Plant. Brunswick contract was awarded to WSC in Sep 2014. Kickoff meeting for work start occurred Jan 2015.

- Scope
  - Provide full size control room panels and backpanels to duplicate I/O capabilities of existing full scope simulator.
  - Collaborate with the current vendor of the existing full scope simulator (Exitech) to integrate WSC 3KeyMaster Graphical I/O Glasstop Touchscreen technology with the Exitech Simulator Executives and Models.

- Panel hardware was fabricated by Mauell in Pennsylvania.
- Panels were then sent to WSC in Maryland for monitor installation and graphic design/testing.
Simulator development

- Factory Acceptance Test was held at WSC facility in MD by WSC and Duke Energy personnel.
- Facility at BNP was being prepared by Duke Energy Major Projects Group
- Simulator was shipped to BNP and installed late July/early August 2016
- Delivery to site
  - Multiple delivery vans unloaded over 3 days
  - One representative from WSC and one from Mauell
  - Labor by site contract personnel, oversight by Duke Energy Major Projects
- **On-site preparations for installation**
  - Refurbishment of building to accept new simulator panels, computer system, lighting, and furnishings.
  - Raised flooring platforms, carpet, electrical work, phone and network cabling done by site contract personnel.
  - Identical furniture as in the actual Control Room and the Full Scope Simulator was acquired and installed by original furniture vendor, RDH Systems.
Brunswick Plant Glasstop Simulator Installation
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Brunswick Plant Glasstop Simulator Installation
Final View
Brunswick Plant Glasstop Simulator Installation
Brunswick Plant Glasstop Simulator Installation
Brunswick Plant Glasstop Simulator Installation

Completed Glasstop Simulator View
Brunswick Plant Glasstop Simulator Installation

Full Scope Simulator View
Brunswick Glasstop Simulator being used for training December 2016
Lessons Learned

- Factory Acceptance Test took longer than expected
- Version control issues
  - As graphic problems were found and fixed, the fix wrote over previously fixed items
- Data request/Communications issues
  - Slow resolution of data requests back to WSC
  - Needed more direct involvement by vendor at site to gather data directly
  - Unclear data requests
- Vendor coordination
  - We ended up being the “middle-man” to resolve issues between vendors, whereas they should have worked directly with each other to handle problems. Once we got the right people together, things got worked out.
- Language barrier
  - Although the WSC programmers spoke better English than we speak Russian, it was still problematic at times!
Questions?

Contact information

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