EMERSON EXCHANGE 2025

ACCELERATING INNOVATION

“Sticking” it to Brownfield Modernization Downtime

A Novel & Modular Approach

Session ID: 3-1686

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Company Information

ConocoPhillips Alaska (COPA)

ConocoPhillips is Alaska’s largest oil producer and has been a leader in oil and gas exploration and development in the state for more than 50 years.

Operated assets include the Kuparuk and Alpine fields on the North Slope. Additionally, we have significant interest in the Prudhoe Bay field and the Trans-Alaska Pipeline System. By expanding our Alpine field across a channel of the Colville River, we were the first company to build an oil development in the National Petroleum Reserve-Alaska.

We are proud to be part of an industry that has moved more than 17 billion barrels of oil, created thousands of jobs, supported communities and developed technologies that have unlocked additional resources on the North Slope.

ConocoPhillips Alaska

ConocoPhillips Alaska Alpine

The Colville River Unit (commonly referred to as Alpine) is located in the Colville River Delta on Alaska's western North Slope, 34 miles west of the Kuparuk River Field (Kuparuk) and eight miles north of the Inupiat village of Nuiqsut.

Alpine was the first North Slope field developed exclusively with horizontal well technology to access greater than 50 square miles of subsurface from a single drilling pad. Its one-day production record was 139,000 barrels in 2007.

After processing, the sales-quality crude oil from Alpine moves to market through an elevated 34-mile, 14-inch pipeline connecting Alpine to the Trans-Alaska Pipeline System via the Kuparuk Pipeline System.

ConocoPhillips Alaska Alpine

The purpose of the ConocoPhillips Alaska (COPA) Alpine Instrumented Control and Safety System (ICSS) Modernization project is to replace the existing obsolete systems with a new Emerson DeltaV ICSS system that will service the Alpine site for at least the next twenty years.

The solution will be a single integrated DeltaV ICSS at Alpine Central Facility and Drill Sites.

Project Goals

Initial Project Goals

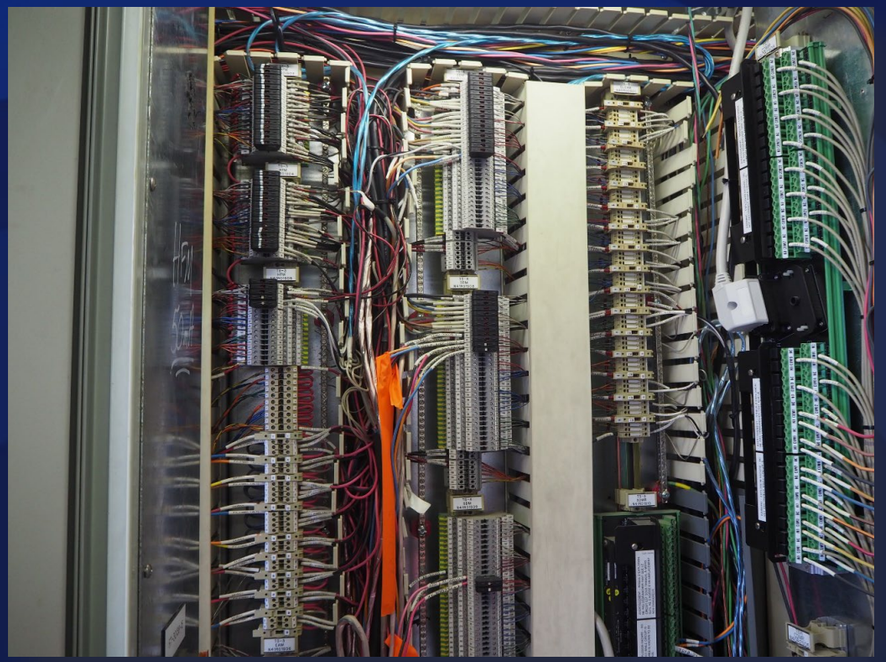
- Site survey and scoping walk completed Summer of 2022
- Strategy Sessions with ConocoPhillips Alpine PM called out the following goals
  - Complete the project in the planned shutdowns in 2024, 2025 and 2026
    - 2023 – July 10th through July 13th (4 days)
    - 2024 – July 9th through July 12th (4 days)
    - 2025 – July 9th through July 24th (16 days)
    - 2026 – July 9th through July 12th (4 days)
  - Not to consider the cost of lost production as a cost driver
  - Focus on low-cost solution

Initial Project Goals

- The project was initially doing a full demo of the legacy system and re-install with DeltaV.
- The initial day 0 plan required 85 days (over 3 years) of deferred production.
- The EMR and COPA teams were challenged to not add shutdown days to the 3-year plan.

Site Survey Findings

- Space constrained REIMs (Remote Electrical & Instrument Modules)
- Highly distributed legacy system (30 different REIMs)
- “Standard Cabinets” ➔ IO with adjacent marshalling
  - Standard cables at IO Cards and Fan outs at the marshalling
  - High failure rate on existing 24VDC power supplies
  - Field wiring will not need to be replaced
  - Cabinets generally at capacity or over capacity
- Fiber infrastructure will support new DeltaV ICSS
- Documentation in very good shape



2022 Proposed Solution

- Cold cutover of all sites
- Add new cabinets as needed
- Pre-manufactured backplanes with power, network & controllers
- Extend outages as required

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Project Challenges

Challenges

- Heightened focus on total cost of migration including lost production
- Project must deliver within the scheduled shutdowns
- The project team was asked to optimize the proposed solution
- The project team to complete a Theoretical Maximum Performance (TMP) Exercise

New Project Drivers

Reduce shutdown time to reduce the impact of deferred production.

- Deliver a solution that is planned around minimizing production impacts
- Maximizes risk reduction
- Delivers a supportable migration strategy.

Pre-Install the new ICSS in the footprint of the running system.

- Very limited existing space for traditional pre-installed equipment using pre-fabricated cabinets
- Traditional “swing frames” and mounted stands outside of existing cabinets could be used
- Migration of FTA’s and conventional DeltaV IO will not work

Move more construction and commissioning tasks outside the S/D window

- Pre-Installation of ICSS
- SAT the system prior to the shutdown
- Use Hot and Warm cutovers to minimize the commissioning activities that will be required in the SD
- Only critical/must run equipment will be cutover during the SD

2023 Conclusions

To be successful we need a new solution

The new solution must meet the following constraints

- No extensions to the existing shutdown schedules
- Work with right sized construction crews
- Deliver more small scopes, rather than few large scopes
- Work packages for single REIMs
- Programmatic approach to deliver over a longer project timeline

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Collaboration Process for Solution

Collaboration Around The World

Collaboration

- **Workshops in Houston & North Slope between COPA team and Emerson team**
- **Field surveys and creative solutions by the Emerson and COPA teams brought the final solution into focus**
  - Need to build in the footprint of the legacy system
  - Flexible/Simplified construction methods are needed to reduce installation risks
- **Focus on modular pre-shutdown construction**
  - Modular construction reduces engineering time for subsequent projects
  - Reduced panel fabricator time and costs (menu ordering and production line delivery)
- **Procure the right construction contractor**
- **Execute pre-shutdown cutovers**

Collaboration

Site surveys with new objectives by the Emerson and COPA teams was essential to assess the existing systems and potential free real estate for pre-TAR installation of equipment.

- Limited room between walls and cabinets
- Very little room for new equipment
- Many cabinets were overloaded with field wiring
- On site Installation Flexibility needed to reduce risks
- COPA and EMR aligned that diversity of experience would yield a practical and cost-effective solution

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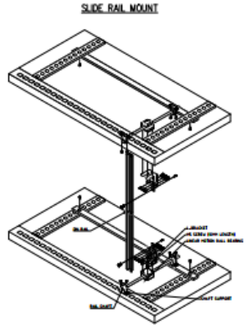
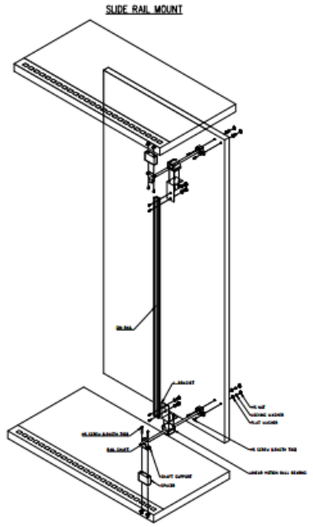
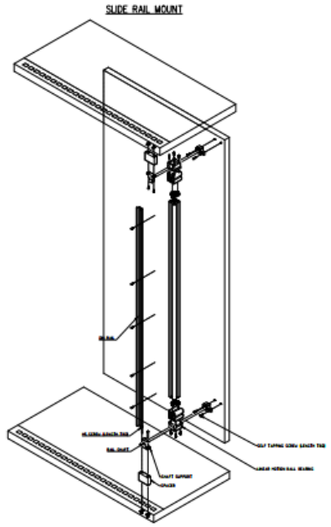
Solution and Results

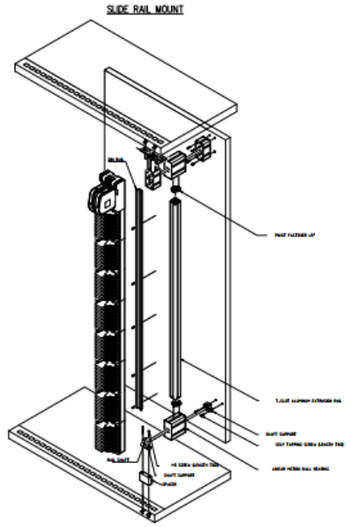
Solution

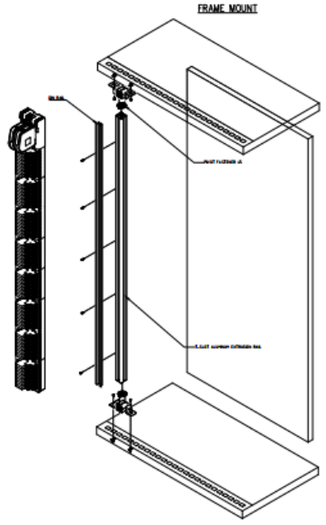
The project teams worked on ideas for a modular solution to pre-install CHARMs I/O

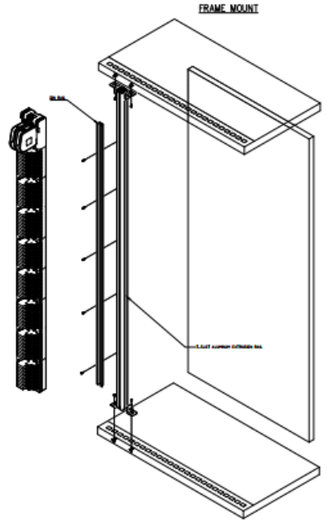


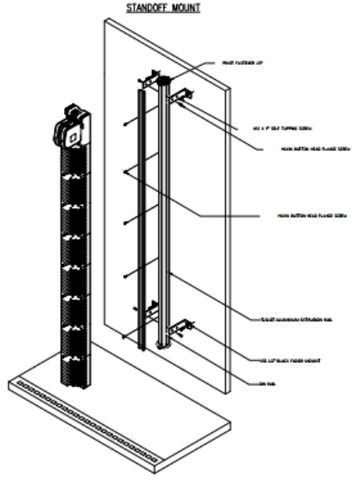






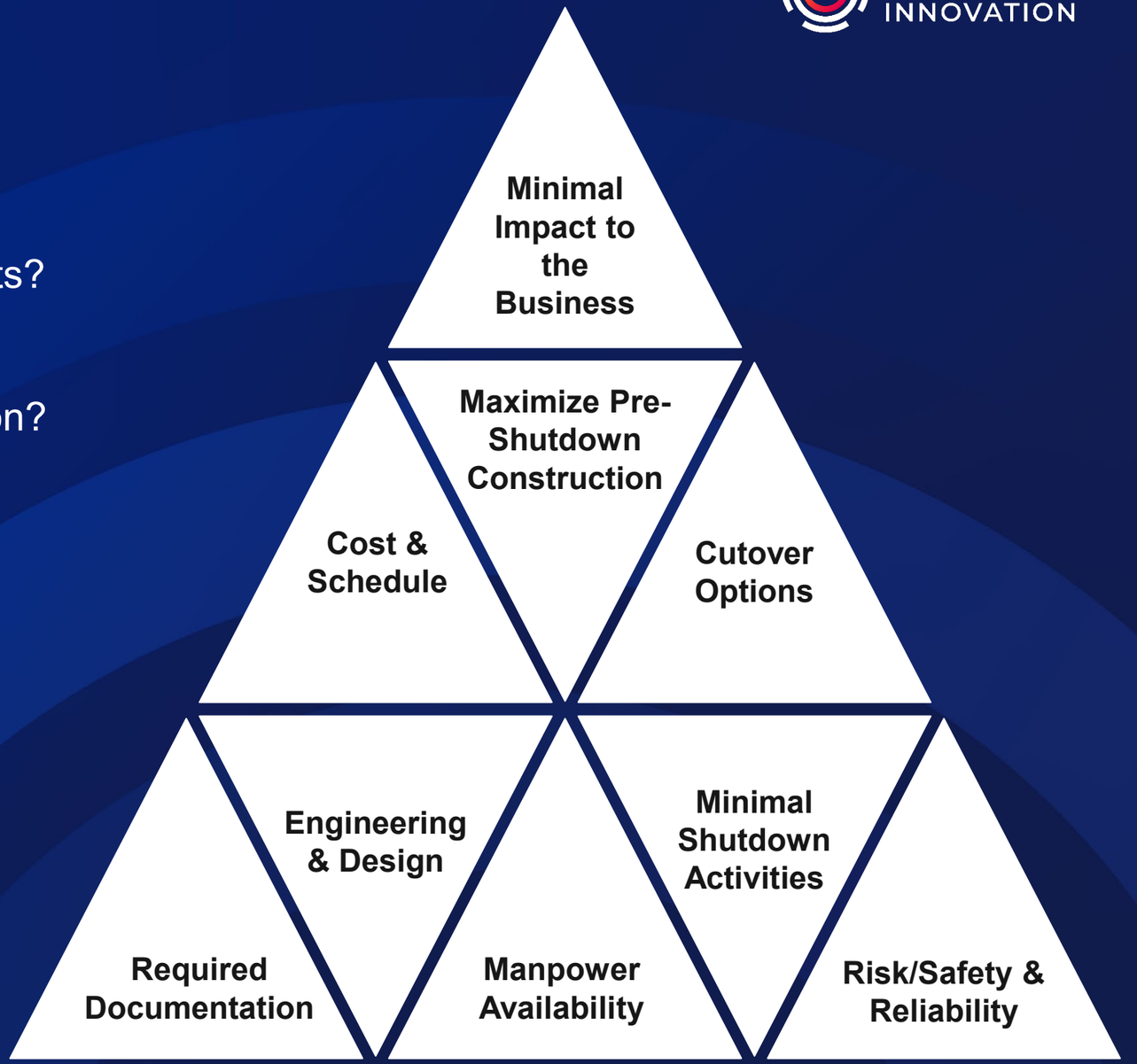






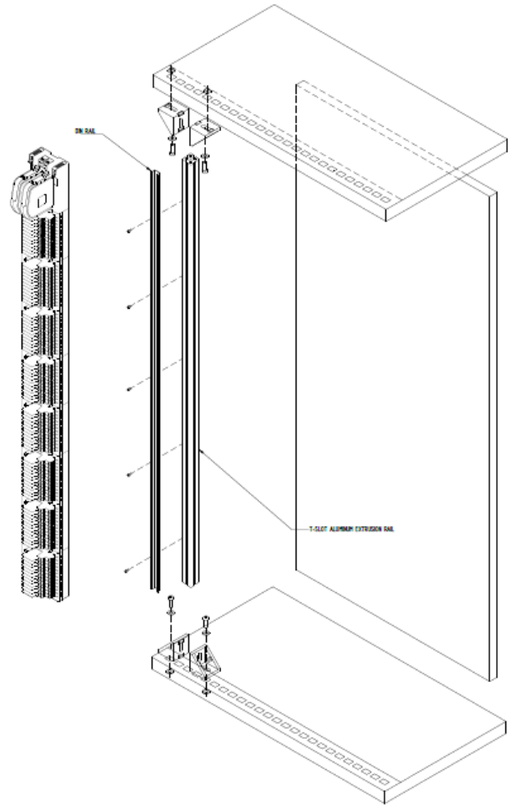
On Target?

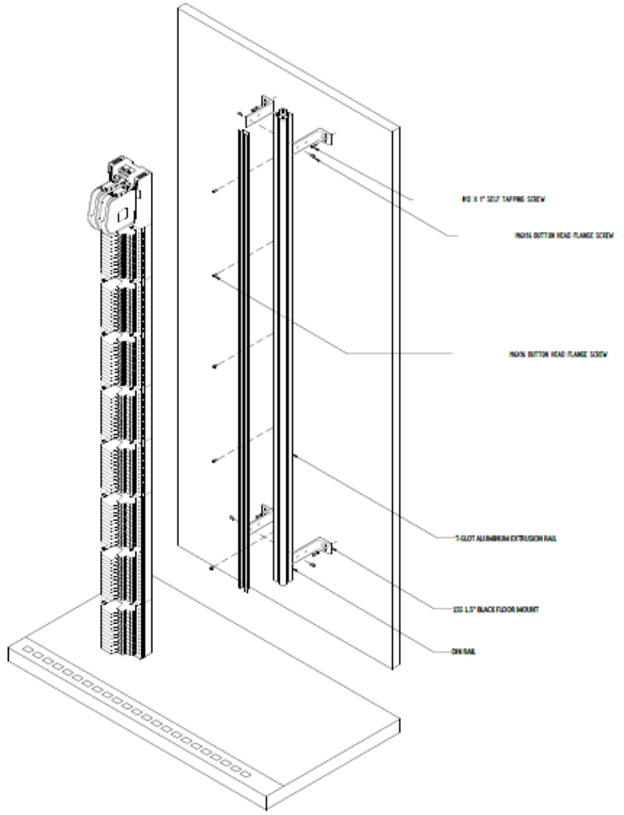
- Does the proposed solution meet the new requirements?
- What needs to be done to address the gaps?
- What levers do we have to adjust our proposed solution?
  - Technology
  - People
  - Constraints
- Lessons Learned
  - Fabrication
  - Field installation



Solution

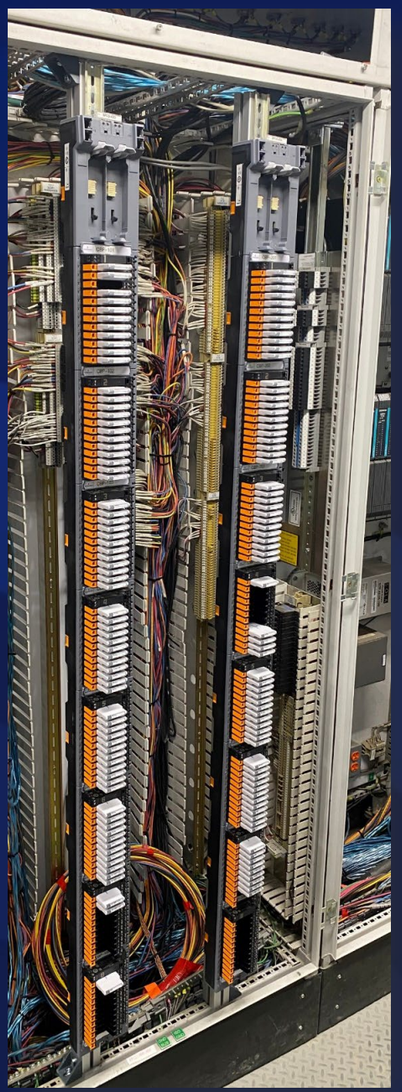
The ideas merged into a CHARMs IO Stick solution.





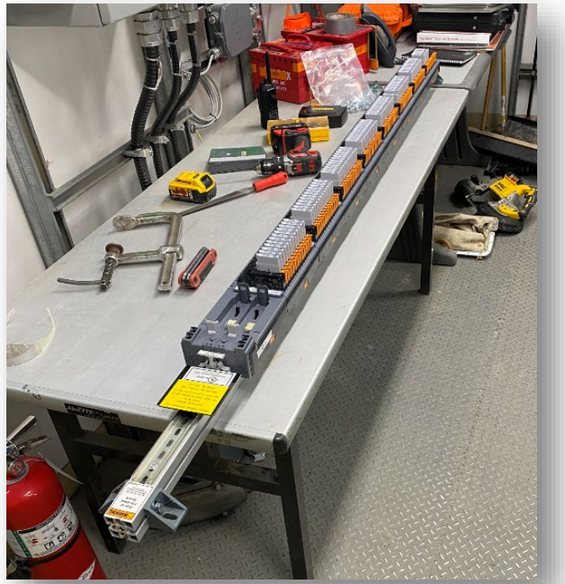
Solution

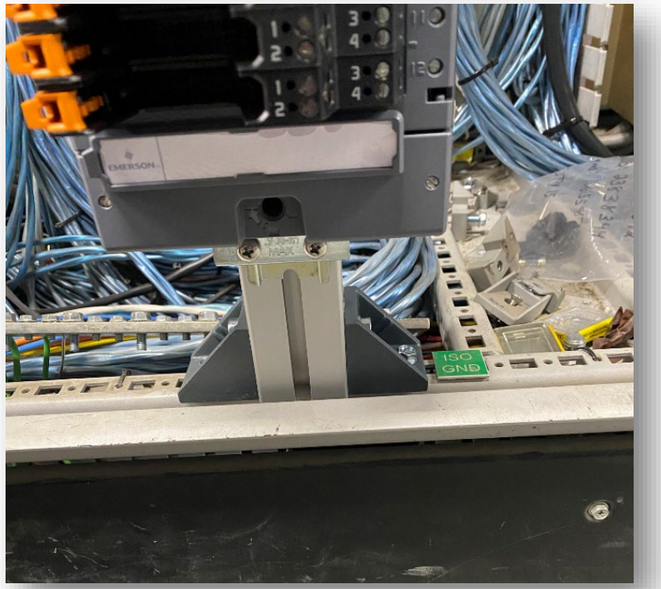
- CHARMs I/O Sticks Testing (FAT setup)
- Mimic the field installation
- Minimal setup for full function testing of IO
- Standard Stick with Tagged IO assigned
- Easy to package for safe shipment to slope

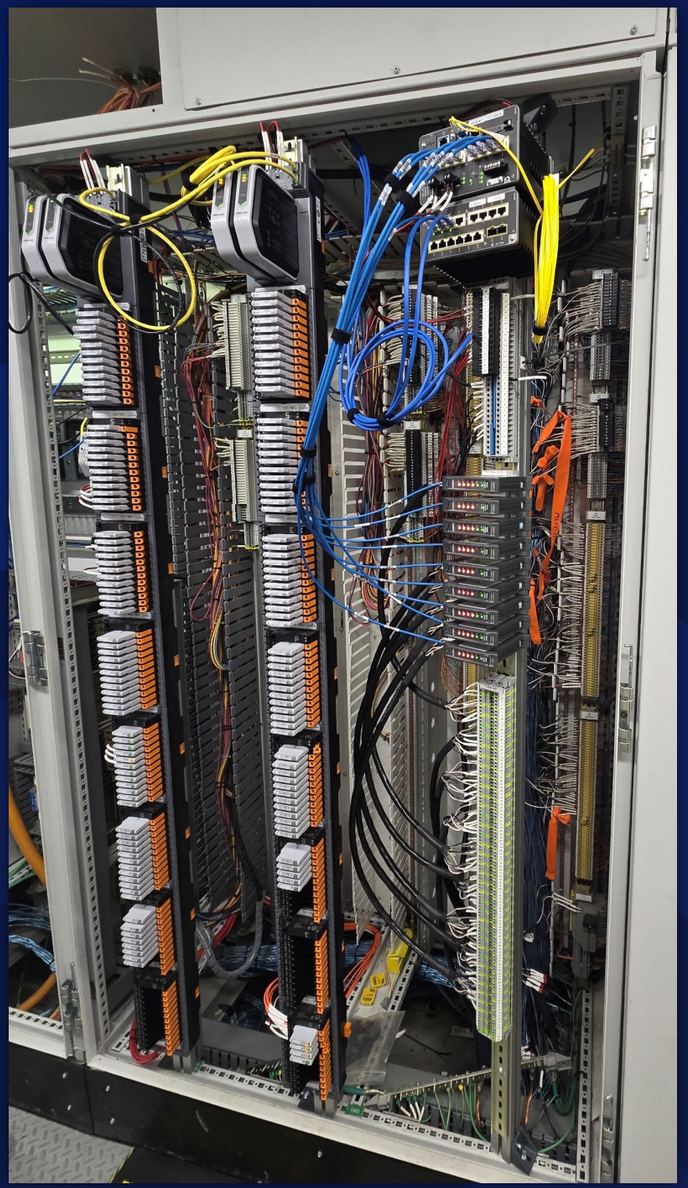


Solution

- A Frame mounted T-slotted extruder bar for CIOC/CHARMs baseplates mount
  - Enables sticks to be pre-installed inside of existing cabinets.
  - Flexibility to move sticks allows easier wiring and demolition for technicians.
  - Small/lightweight sticks allow easy transportation and storage.
  - Pre-Installation in under 10 minutes per stick (96 IO).







Results

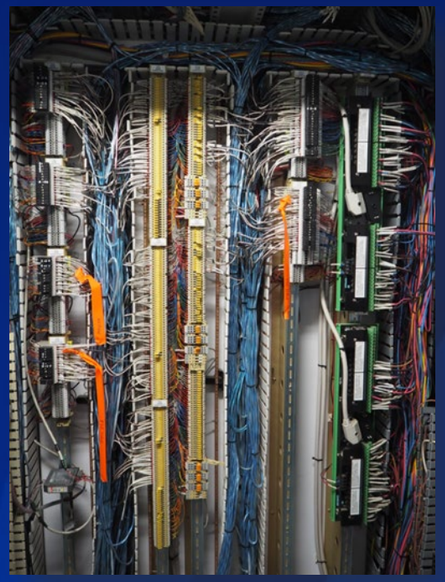
- Installed the core DeltaV ProPlus and System Hardware prior to starting field work
- Opportunity surveys to find space to mount DV controllers, power supplies, and switches
- Pre-Construction Phase to deliver:
  - Full ICSS Installation, SAT and power up
  - Cutover of non-critical and Critical IO (Warm Cutover - Mass cable disconnects and re-terminations)
  - Hot cutover with field mitigations
- Minimal critical IO will be cutover cold in shutdown window
- Post-Turnaround Demo of legacy system IO if desired.

Results

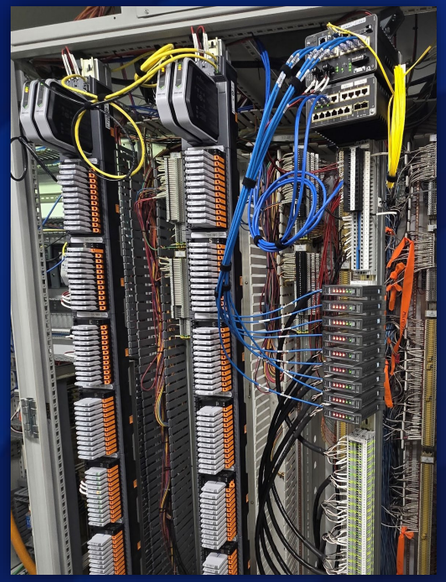
- Stick enables full pre-install and site acceptance testing of the DeltaV System plus facilitating a hot cutover window.
- Ease of transport and improved install time of sticks
- Reduced footprint to single mounted stick
- Existing wiring more accessible
- Minimal cable moves reducing risk of losing tags
- Increased space to manipulate existing wires for re-term on right side of CHARMs reducing occasional need for CHARMs “upside down” install
- Allows demo of existing equipment after wiring re-term.
- Easy install on existing Backplate with modular parts (handles, connection brackets)
- Safety/risks reduced by CIOC/CSLS equip. not temp. mounted outside cabinet
- Pre-Install allows Hot Cutover

Results

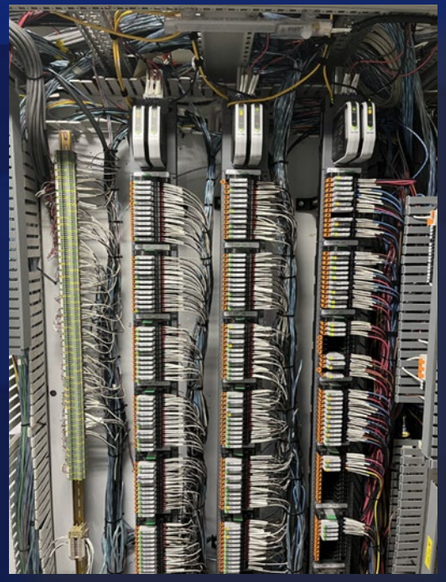
- CHARMs IO Sticks a significant enabler. Changes reduced planned deferred production by 50 days.
- Shop fabrication cost and time decreased by 20%
- On-site installation flexibility decreased contractor installation time.
- Moving these construction and commissioning tasks outside the T/A window has been the enabler to remove the ICSS from the critical path of the planned outages.



Pre-Cutover



Cutover



Post-Cutover

Questions?

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Thank You