Case Study

Dolphin Energy Limited Migrates to Experion R400 Using On Process Migration

"Our team approach and the decision to use On Process Migration enabled us to mitigate risk while moving toward our objective in phases. We made many discoveries along the way to the conclusion of a successful project."

- Khalid Al-Khori, Dolphin Energy Ltd.

Benefits

Dolphin Energy Limited identified multiple areas of benefit that resulted from the decision to migrate to Experion R400. Some of the areas are:

- Trending
- Alarming
- Faceplate
- Safe View
- System Capacity
- Historization Capabilities

The benefits derived from these enhancements include:

- Major ease of use improvements
- More powerful analysis features
- More flexible use in customer displays

Background

Dolphin Energy Limited began gas production in July 2007. This unique strategic energy initiative involves production and processing of natural gas from Qatar's offshore North Field, and transportation of the processed gas by subsea pipeline to the United Arab Emirates and Oman.

The overall investment in wells, sealines, processing plant, export pipeline and receiving facilities has made this one of the largest energy-related ventures ever undertaken in the Middle East.

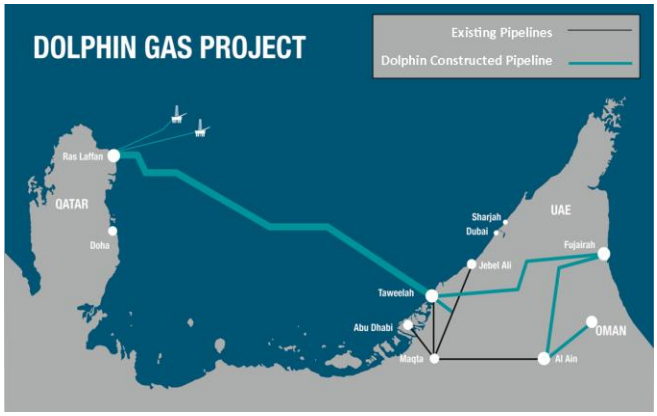

Figure 1. Dolphin Energy's facilities are located in Qatar and Abu Dhabi, UAE. The company is involved at every stage of the gas value chain- production of raw gas at the wellhead, processing onshore, removal of valuable by-products, and transmission of natural gas by export pipeline to the UAE and subsequent distribution to customers across the Emirates and Oman.

Challenge

Dolphin Energy's architecture with 10 redundant servers, 37 C200 controllers and 37 operator stations posed a unique challenge for on process system migration.

Dolphin Energy identified the project as Migration of Automation Systems and Sub-systems (MASS). The process control system included five separate areas to be addressed. Obsolescence was a key driving influence, with obsolete server and station hardware platforms, out of support Windows operating system software, and Experion R210 that required upgrading.

The company was well aware of the challenges and associated risk when changing out significant portions of the system.

Solution

Dolphin Energy evaluated On Process Migration (OPM) as a way to manage the transition to new hardware and software based on the following advantages:

- No process upset
- Increased availability
- Improved functionality
- No retraining
- Lower cost/ less waste
- Extended product life

To manage the migration, Dolphin Energy created the MASS Team, with representation from many areas of the organization, including:

- Automation Management
- Contract Department
- Production Department
- Field Safety
- Process Control System Engineers
- LTSA Engineers
- RMC (Regional Migration Champion)
- MHD (Migration Help Desk)

The major steps in the year-long process to reach Experion R400 included:

- Network preparations
- Upgrade all Experion Servers from R210U60 to R210U65
- Upgrade all C200 controllers from R210U55 to R210U65
- Domain Control Migration (High Security Package from R21X to R3XX)
- Migrate all Servers and Stations from R210U65HF3 to R311.3SP2 (including hardware change)
- Upgrade all C200 Controllers from R210U65 HF2 to R311.3 CP1
- Migrate all Servers and Stations from R311.2 CP1 to R400.2 SP2

Results

The MASS Project team developed a set of milestones to manage their challenging project. By developing a comprehensive plan and working within the plan guidelines, the company was able to complete the migration in 68 weeks.

Below are the benefits in the different areas:

Alarming Enhancements

- Alarm List size increase
  Experion alarm list (used to hold process, system alarms, and alerts) has been increased in size from 2000 to 4000.
- Alarm Shelving
  This functionality enables operators to prevent nuisance alarms from being displayed temporarily. When an alarm is shelved it is silenced, acknowledged and removed from an operator's view. No further instances of the same alarm will re-annunciate until the alarm is unshelved. An alarm can be unshelved manually or via a configurable timeout.Shelving of alerts is also supported.

Trending Enhancements

- Major ease of use improvements
- More powerful analysis features
- More flexible use in custom displays

Figure 2. Trend with events is a new trend view that allows operators to correlate and understand the relationship of process events with the process trend/history and to perform extensive analysis of process upsets and disturbances, increasing operator effectiveness. In this sample: ❶ Icons representing each event are shown in a bar below the trend at the point in time the event occurred; ❷ Use the splitter bar to show as much or as little of the event data as necessary; ❸ Clicking on an event puts a hairline on the trend. If more than one event occurred at that point in time, a scrollable tool tip indicates the events. As the operator scrolls through the events, they are highlighted in the event summary as well.

HMIWeb Faceplate Enhancements

- All Points
  - Engineering Unit (EU) Scale tick marks (Server-wide Settings)
  - Faceplate keyboard support
  - Auto-Select SP or OP based on mode (Server-wide Settings)
- Process Points (CEE points)
  - Preferred SP (Server-wide Settings)
  - PV Raw indication
  - Red Tag indication
  - Operator tag indication
  - Value direction indicator

Safe View Enhancements

- Screen Space – There are a total of two screens per station with resolutions of 1280 x 1024, giving a total usable space of resolution 2048 x 1280.
- The top screen has dynamic behavior, managing the following windows: graphics, alarm summary, two trend windows, and one group window.
- The bottom screen manages the following windows: graphics window, four faceplates, and one system display.

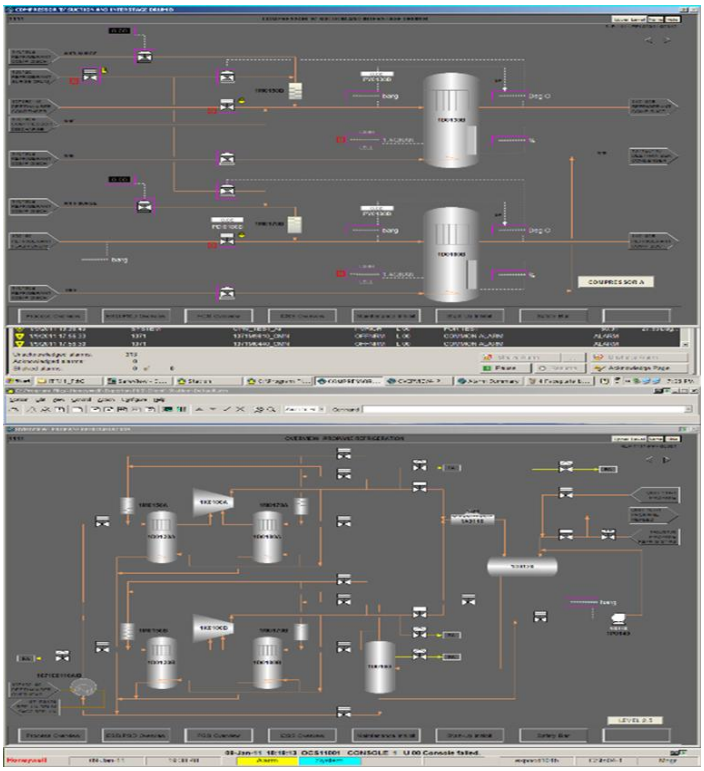

Figure 3. This graphic illustrates Safe View Enhancements.

System Capacity Enhancements

System capacity enhancements include the following functional areas:

- System Size – Maximum server clusters per system
- DSA – Maximum DSA connections per server
- Cluster Sizing –Maximum CF9s per cluster
- C300 – Includes a number of CDA publish out and subscribe capacity enhancements
- ACE –Maximum available memory resources and number of OPC gateways per ACE platform
- FIM4 – Maximum number of virtual communication relationships per H1 Network and CDA publish out total
- OPC Gateway – Number of OPC Gateways per ACE server node
- Inter-Cluster Gateway – Number of OPC clients supported per inter-cluster gateway

Historization Capability Enhancements

Each online history file can hold up to 100,000 samples for each parameter, with the number of snapshots and interval averages captured for standard (maximum 10,000 point parameters) fast (maximum 1,000 point parameters), and Extended (maximum 5,000 point parameters.

Wisdom Based on Experience

The Dolphin Energy MASS Team learned a great deal from their migration experience. Below is a condensed list of “Lessons Learned” to help others in their migration efforts.

- **Don’t panic during Migration** – check the basics before you act!
  Example: During PC check, the monitor hang
  Resolution: The monitor cable was loose!
- **Don’t ignore checking hardware – even though it is new!**
  Example: One station failed to connect with the Domain.
  Resolution: There was a hardware issue with the NIC.
- Some things can happen that aren’t caused by On Process Migration!
  Example: Server switched over to DOL1 during power cycle of C200.
  Resolution: After TAC investigation, found that this issue was not related to OPM and Green light was given to continue the migration.
- Container points with errors and warnings are not computable or detectable with Experion R311.3.
  Example: After Server B migration completion on ODS, tried to connect the EPKS Consoles R311.3. However, these consoles were not able to connect. Was not synchronizing and file replication failed.
  Resolution: Do not attempt to proceed when errors/warnings are present.
- Always check SM (Systems Management) Services prior to server switchover.
  Example: During Defragmentation of the server, the SM services were disabled. During server switchover, OPC failed.
  Resolution: Make sure SM Services are not disabled.

Some simple Best Practices to be followed

- Copying migrated graphics files to a station prior to connecting to the network (i.e., offline copying) saves significant time.
- Assign 50GB storage space for all servers.
- When in doubt, read the documentation!

Recommendations

Recommendations offered by the MASS Team focus on readiness to mitigate risk.

- **Method of Statement**
  Develop a comprehensive Method of Statement, with details customized from the User Guide (EMUG). This Method of Statement should be used in both the Offline Development System (ODS) and the live production system.
- **Task Risk Assessment (TRA)**
  Follow a methodology for risk assessment with simple steps:

  Dolphin Energy was able to use this methodology to identify and rank more than 100 concerns during the project, identify safeguards, and develop recommendations to ensure the safe and successful conclusion to the project.
- **Set up an Offline Development System (ODS)**
  The ODS helped Dolphin Energy develop improvement in OPM execution to
  - Reduce the time of Dual Primary Mode from 7 days to 72 hours, and
  - Reduce migration time for OCD (ESTV, 2 ES-C and 3 ES-F) to one week by using “box by box” replacement for the ES-Fs.
- **Use Virtualization to simulate/virtualize actual scenarios**.
  Virtualization helped to simulate the actual system with limited hardware, facilitated testing all possible scenarios, and simulated RTDB, OPCs and 3rd party interfaces.

Summary

If a system migration is in your future, or if you would like additional information on any of the areas addressed in this Case Study, contact your Honeywell representative.

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