**Oil and Gas Case Study - BP Sharjah, United Arab Emirates**

*Hot cut-over* is the process of migrating from an old to new DCS / control system without shutting the plant down. The basis of the methodology is shown above. Some prior enabling work may be required to allow full hot cut over. This is work is assessed as part of the loop criticality review.

**Hot cut-over methodology avoids plant shutdown**

ABB use its proven hot cut-over* methodology to enable BP to manage the overall risk of installing, testing and commissioning a new control system, with the plant online.

BP's Sharjah gas plant in Sharjah was built in 1982. The plant's control system, a Rosemount (Emerson) RS3, needed to be replaced with a modern DCS system owing to obsolescence issues. BP tendered for the new DCS and a Yokogawa system was finally chosen. The gas plant in Sharjah provides gas exclusively to industrial and domestic users in the Sharjah Emirate. The upgrade of the control system during a shutdown window was never considered to be viable option due to the economic costs of providing a replaced energy source during this period. This meant that a hot cut-over was required.

**Solution**

As a leading provider of a wide range of professional engineering services to complex and high hazard process industries across the world ABB have an extensive range of engineering specialists and technical consultants, all with the operational experience to allow them to make expert judgments, resulting in pragmatic solutions to operational issues.

We worked with BP Sharjah from the start of the project, providing consultancy support and design engineering services. These ranged from the migration study through to on-site support during commissioning and most importantly during the key phases of the cut over.

After the completion of the migration study, ABB presented its findings to the plant in Sharjah and a breakdown of activities were agreed. The DCS vendor would provide the standard E/I design plus their system configuration. BP chose ABB to develop the crucial procedures needed for a step by step guide to managing and performing the cut over.

The control system on the plant consisted of 1450 classic I/O and 5500 serial I/O.

The work was carried out in a series of phases as detailed below:

**Phase 1**

Undertake a migration study on options to upgrade the current DCS system. We provided experienced control systems consultants and engineers to develop a scope of work; URS, enquiry package and budget for the replacement of existing plant DCS. This covered a review of existing documentation and on-site survey work, development of generic URS and enquiry package for DCS vendors and a proposed migration strategy and a review of the technical implications of DCS.

We also produced an overall project budget estimate from returned tenders and ABB project experience / norms and relevant information from BP. This included a level 1 project plan.
Phase 2
Carry out a I/O survey. The migration study highlighted that plant records did accurately reflect the installed base. ABB provided a survey team to document the installed system and provided a number of deliverables. The documentation of the current RS3 I/O, associated termination details and DCS architecture. Investigation and documentation of possible hot cut-over points. Identification of possible pre-work to enable a cut-over to proceed and extraction and documenting of the RS3 I/O schedule from the Emerson databases provided by BP.

Phase 3
Implement critical loop survey and enabling work Packs. To ensure a full hot cut over could be completed, it was vital that all the loops were assessed to rank their criticality.

Phase 4
Implement pre and cut-over procedures and a schedule. The work flow that was adopted to produce the Pre-cut-over and hot cut-over work packs is detailed in the flowchart below.

ABB arranged visits to meet with plant personnel to discuss any issues with the cut-over procedures. It was important that the operations staff had full ‘buy-in’ as to how the work would be carried out. These meetings were supplemented by Failure Mode Effect Analysis (FMEA) reviews of the cut over procedures, so that an objective risk assessment was carried out.

During this phase we produced a number of work packs for pre-cut-over, hot cut-over and serial I/O cut-over. In addition we also produced the overall hot cut-over plan plus daily cut-over program.

As the cut over date approached, extra support was needed to assist personnel and that of the DCS vendor. This was provided by several engineers working on a rota basis until the last loop was successfully cut over. This demonstrated ABB’s commitment to the project.

Benefits
- No need for a full plant shutdown, which resulted in financial and production benefits to BP
- Allowed BP to manage the overall risk of installing, testing and commissioning the new control system with the plant online
- No replacement energy source was needed which enabled a more cost effective solution
- No impact to industrial and residential users in the Sharjah Emirate

After determining the critical loops these were then reviewed to understand what could be modified during a minor shutdown / plant outage to enable them to be cut over on line was carried out. This covered a survey of the ‘1A’ critical I/O which included gathering supporting documentation. This was discussed with plant personnel to provide possible options for the enabling work. This led to the production of detailed work packs to allow the enabling work of the ‘1A’ critical I/O to be implemented.

The contents of the enabling work packs consisted of installation scope of work, hook-ups (before and after) and loop diagrams (before and after).