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Oil, Gas and Petrochemicals

Modernization and upgrades of
Safety and Automation Systems (SAS)
Extending oilfield life span

Extended responsibility for installed SAS solutions Seamless system expansions, modernizations and upgrades

ABB works closely with our customers to determine ways to optimize plant automation and safety. When system upgrade or modernization becomes necessary, we provide total Engineering, Procurement, Construction and Installation (EPCI) services to ensure smooth implementation of new SAS technology.

Maintaining efficient operations as production and processing requirements evolve presents many challenges to oil and gas operators. As a world-leading supplier of both SAS (Safety and Automation Systems) and total EIT (Electrification, Instrumentation and Telecom) solutions, ABB has the technology, expertise and capabilities to manage large modernization and upgrade projects from start to finish.

Modernization of Safety and Automation Systems may become necessary due to technological advancement, changing markets, operational requirements or more stringent safety and environmental regulations. When the time comes to update the existing SAS, ABB can provide analysis and recommendations for full or partial system replacement, implement the necessary hardware, software and infrastructure and implement a smooth migration.

A highly complex migration process

The modernization process for automation systems is highly complex, and may involve upgrades and/or replacement of items such as control hardware and I/O's, operator interfaces and work stations, monitors and displays, data and communication networks, documentation, control and communication software, work processes, data bases and electronic tags. To avoid unnecessary disturbance in production, this migration must be performed seamlessly and in accordance with HSE guidelines.

Total EPCI services for SAS upgrade projects

For more than 25 years, ABB has delivered automation solutions to offshore and onshore production and processing facilities. This long experience has provided us with a unique level of expertise in all areas necessary for providing total EPCI services for SAS modernization and upgrade projects, including electrification, instrumentation and telecom. The value-added benefits gained by placing total EPCI responsibility directly with ABB include significant cost savings, high project management efficiency and a fully optimized installation that is well-prepared for the future.

ABB's Engineering, Procurement, Construction and Installation services contribute greatly to successful oil and gas projects. From an early project phase, ABB Engineering Services design overall system solutions that are seamlessly integrated and highly optimized to meet all current and future project requirements.

Advanced engineering and simulation tools

Powerful engineering tools are used to build transparent applications that give operators, engineers, maintenance personnel and planners a single view into the entire installation. Advanced simulation tools and multi-discipline expertise reduces engineering efforts, risk and cost overruns resulting from interface challenges.

As the project matures, ABB Procurement Services ensure that items are selected, orders are placed and deliveries are received in the most timely and cost-efficient manner. To assure high HSE and quality standards, quality assurance and compliance requirements are tightly monitored and all documentation is specified to meet the same high standards and follow a unified format.

With expert Installation and Commissioning Services, ABB is a total project partner with our customers, providing single-source responsibility for both ABB- and third-party deliveries. Ongoing communication and coordination with all project contractors and sub-contractors helps assure timely, efficient project execution.



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Automation technology for the life of the field

Several generations under one roof

Implementing new automation technology is challenging in itself, but updating large existing automation systems with new control and HMI solutions - with no shutdown in operations and transparent operator interface changeover – presents many additional challenges. For large oil and gas process plants, ABB is uniquely qualified to extend the lifecycle of delivered SAS solutions as modern operational demands require.

Ongoing upgrade capabilities

ABB automation and control solutions are based on open architecture to enable straightforward integration with previous generation automation products and to provide flexible interface possibilities for future automation technologies. This future-proof approach ensures that our automation technologies can keep pace with operational demands today, tomorrow and well into the future.

To ensure ongoing modernization capabilities, system levels may be updated independently. However, the Workstation and Server level must be the same generation or newer than the controllers. This level is normally upgraded first and can be modernized independent of the Controller level. New controllers may be added without upgrading all controllers in the installation.

With the 800xA Operator Workplace, the operator sees minimal difference between processes controlled by new controllers and those controlled by earlier-generation controllers. Shown below is the control room at StatoilHydro's Tjelbergodden complex.

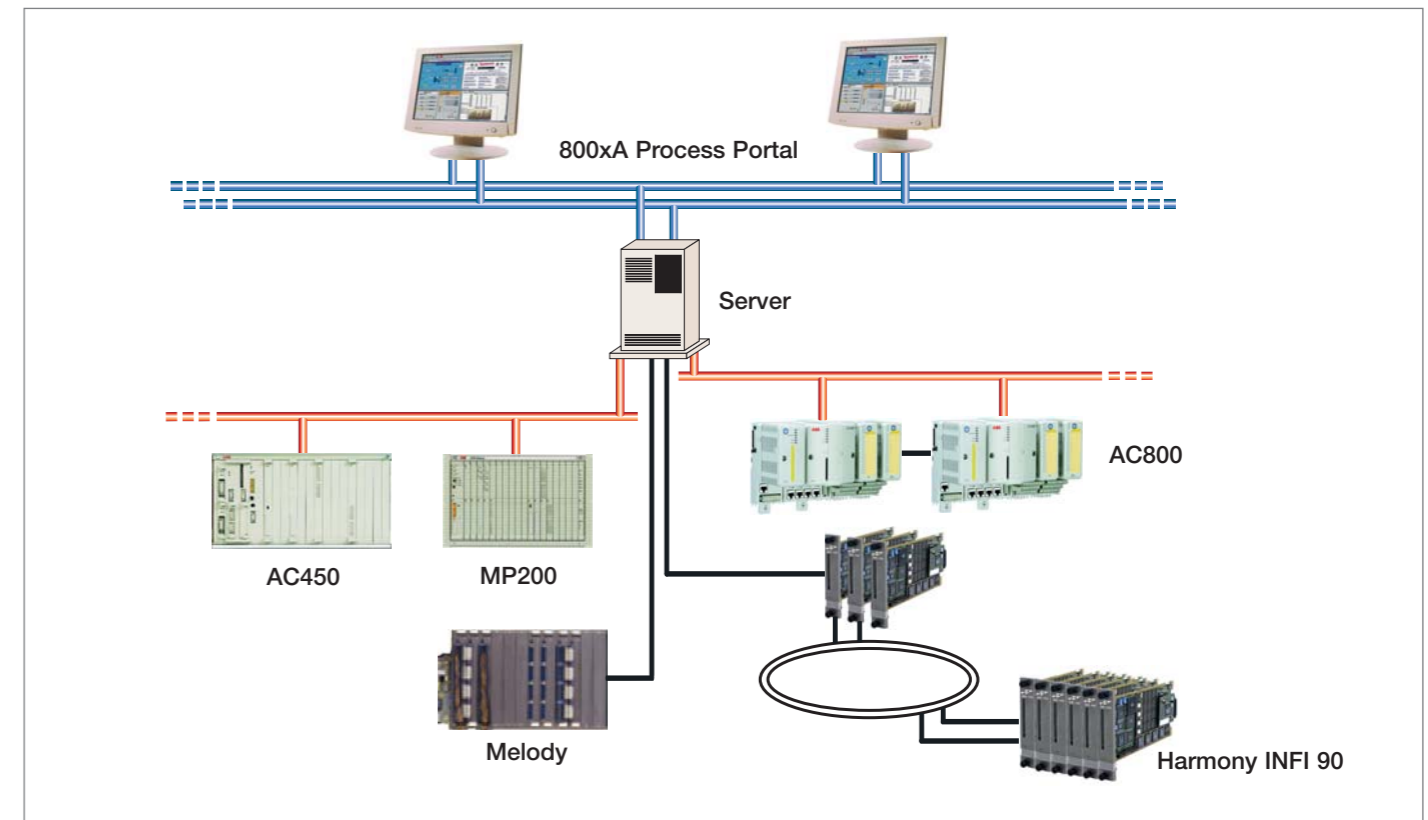


800xA Automation System

System 800xA is ABB's award-winning Extended Automation System. System 800xA extends the scope of traditional control systems to include all automation functions in a single operations and engineering environment - enabling your plants to perform smarter and better at substantial cost savings.

System 800xA Process Portal

The ABB System 800xA Process Portal is an extended operations environment that provides a single window to the process, a maintenance view to asset conditions and work processes, an engineering view to process performance and engineering tools, and a management view to overall productivity Key Performance Indicators (KPIs). It is an intuitive and easy-to-use system interface that gives direct access to process control equipment, smart field devices, asset optimization tools, information management systems, safety systems, Manufacturing Execution System (MES) applications and beyond.



Based on open architecture, the System 800xA supports earlier ABB automation technologies such as Harmony, Melody, MasterPiece and Advant systems as well as most major third-party controllers.

Technology-driven control rooms

ABB provides complete control rooms that are designed for comprehensive and easy-to-use operator monitoring and control functionality. Control rooms include the ABB Extended Operator Workplace, which provides operators a comprehensive overview of the process, enabling faster decision-making and action by the operator. The system is modular and flexible, making it possible to combine several workplaces with multiple monitors for more viewing space and better placement and location of important information.

Tailored solutions for better operator performance

To reduce operation errors, personalized process views can be created according to the operator's individual style and preferences. An extensive graphics library of standard process control components are available in the integrated 800xA Engineering environment, and custom graphics may be easily created. Quick, flexible and secure access to intelligible displays and information make monitoring and control actions efficient and accurate.

Compatible with the past, prepared for the future

As large oil and gas installations expand and evolve, aging process controllers and operator interfaces may become prematurely obsolete due to integration problems and discontinued product support by the manufacturer. A preferred solution is to extend the life span of the current system by running several generations of controllers in parallel with full integration and a common, shared HMI solution.

Based on open architecture, the System 800xA supports earlier ABB automation technologies such as Harmony, Melody, MasterPiece and Advant systems as well as most major third-party controllers. The new AC800M process controller is also compatible with earlier-generation ABB controllers, providing transparent and trouble-free upgrades and modernizations.

In addition, ABB has developed a comprehensive product lifecycle management model that maximizes the value of the equipment by ensuring long-term availability of the product, spare parts and product support and expertise.

Project in focus

Gullfaks Safety and Automation Systems upgrade

StatoilHydro signed a total EPCI contract with ABB in 2005 for upgrade of the control systems at Gullfaks A, B and C in the Norwegian North Sea. This contract was separate to the frame agreement ABB has with Statoil Hydro for ongoing modifications to installed control and safety systems. The main goals for the project have been to prepare Gullfaks with the automation technology, topology and competences necessary for Integrated Operations (IO) and to enable tail-end production through to 2030.

The three platforms in the Gullfaks field have been in successful production since the mid- to late-1980's, when ABB installed the original control systems. Today, the field utilizes a combination of three generations of ABB control systems, including many of the original controllers installed over 30 years ago. Phasing out these first-generation controllers has been an important part of the upgrade project. To prepare Gullfaks for an extended lifetime through to 2030, another important goal has been to ensure that the total solution shall not limit the implementation of work processes, either offshore and onshore. In this way, strong focus has been placed on Integrated Operations (IO).



Gullfaks A began production on December 22, 1986.



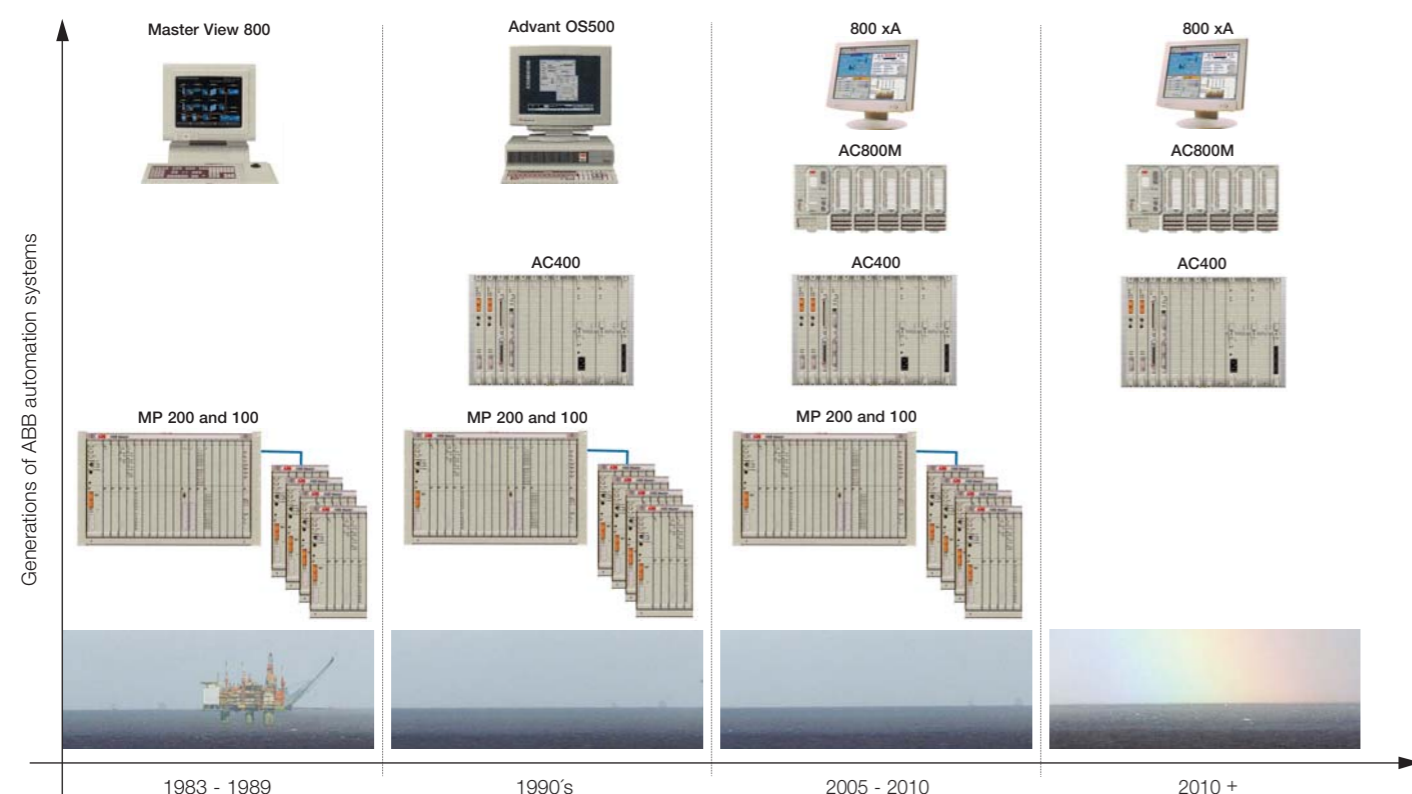
Gullfaks B began production on February 29, 1988.



Gullfaks C began production on November 4, 1989.

Seamless SAS evolution: 1986 - 2030

Implementation of new generation ABB automation systems for Gullfaks from start-up to 2010 and beyond



A comprehensive control system upgrade

The largest single task of the project has been the upgrade of the remaining MasterPiece 200/100 controllers at all three platforms, without causing disturbances in production. Local operation with push-buttons and indicators has been replaced by monitoring and control from a Central Control Room (CCR).

The HMI systems have all been upgraded from the ABB Avanta to the new 800xA control system, comprising update of all operator- and large wall screen displays and installation of new network structures.

Upgrade of the Gullfaks process controls and workstations includes:

- Upgrade 34 MasterPiece 200/1 and 250 MasterPiece 100 (DCM) to AC800M
- Installation of approx. 10,000 I/O's in existing cabinets
- Advacommand Unix OS for process/safety to 800xA
- Convert approx. 3300 faceplates/displays to 800xA
- Implementation of new network infrastructure

Life Cycle Information (LCI)

More than 10,000 existing documents were updated or voided and around 30,000 tags were electronically updated according to StatoilHydro's requirements for Life Cycle Information. A database was developed to track status of all affected documents and register information throughout the project. This database is linked to StatoilHydro's STID for electronic information exchange.

The work processes and database tools for LCI updates were developed during the project, ensuring a high-quality, on-time LCI delivery with tremendous cost savings compared to traditional LCI deliveries.