Main Automation Contractor (MAC) — Targets Long-Term Control System Access

Best practices in engineering, procurement, and construction (EPC) — automated system contracting for critical hydrocarbon assets

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Executive summary

The Main Automation Contractor (MAC) is the single, responsible contractor who works as a partner with the end user and manages the life cycle of the oil and gas operations automation solution. The MAC oversees the team of all suppliers and brings to the project both technology skills and real-world experience in integrating multiple systems—all vital in achieving the complete automation solution in an efficient and effective manner.

The MAC is highly responsive to the end user's vision, standards and choices; it embraces the 'big picture' view—targeting an automation solution that serves across the enterprise, for the long-term. Involving the MAC early in the project enforces reviews and approvals from all active suppliers and providers and assures appropriate compliance and certifications. The MAC applies best practices throughout engineering and design; testing and installation; start-up and maintenance—assuring each phase is ready to evolve to the next.

As a result, the MAC-managed project yields a finely-tuned solution targeting operational and business success. In the process, the end user typically sees a 10 to 15 percent reduction in project costs and increased return on project investment.

Two case studies are presented, each describing the comprehensive oil and gas control solution targeted, the responsibilities taken on by Schneider Electric as project MAC, and the wide-ranging benefits delivered by the solution. For more than 25 years, Schneider Electric's real-time automation control and information management solutions have enabled safe, secure and sustainable energy operations while optimizing business processes and profitability.

Significant cost savings via MAC-managed projects
Introduction

Today, oil and gas operators deal with considerable tasks in designing, developing, and implementing critical infrastructures. Exacting regulations and industry standards, demanding project schedules, continuously updated technology, and constraining budgets combine to make successful project completion a challenge.

Value can be provided by a MAC, who orchestrates the EPC tasks of implementing an advanced technology oil and gas process control system. With early involvement of an experienced MAC, the final automated system is fully integrated, meets appropriate standards, and is capable of making vital operational data available in real-time across the enterprise—enabling smarter decisions for safe, secure, and cost-effective operations. In this paper, we’ll include examples of automated process control system projects successfully completed using the MAC approach.
Making permanent savings through best practices in engineering, procurement, and construction
What is a MAC project?

Simply, the MAC manages the life cycle of the automated process control system project, including phases targeting:

- Requirements (including security)
- Design and construction
- Testing
- Release
- Site acceptance
- Warranty, support, and maintenance services
- Project management

As the single responsible contractor, the MAC operates as a partner with the end user and oversees a team of suppliers, fostering cooperation and understanding of overall project goals. The MAC assumes the risk for meeting project schedule and budget.
Why the MAC approach?

Increasing significance of technology — to remain agile in the increasingly complex energy market, oil and gas companies must automate vital functions such as collecting operational measurements, controlling critical infrastructure processes, and analyzing information for business insight. Working with a central automation expert who can integrate multiple applications required for accurate and reliable automation is an efficient alternative to relying on specialized vendors located worldwide.

Reduced margins — today’s markets are changing and business is much more competitive. Operators see pressure from all stakeholders to reduce operating costs.

Need for reliable skills and expertise — staffing with in-house experts is expensive. In addition, staff retirees take with them thorough and intimate knowledge of their employer’s specific operations and process control.

Targeted configuration — the MAC brings real-world experience to deliver a specific solution that can meet the end user’s exclusive automated system needs.

There is a reduction of 10 to 15 percent in costs when the end user involves the automation contractor early in the project execution.
Benefits of a MAC approach

Reduction of cost and time — according to Frost and Sullivan, there is a reduction of 10 to 15 percent in costs when the end user involves the automation contractor early in the project execution. MAC-managed projects significantly reduce the time the end user spends dealing with multiple EPC firms and software vendors. Streamlined efforts reduce change orders and miscommunications — and controls costs.

End user has control over the solution — the automation vendor is highly motivated and substantially more responsive to the end user’s vision, standards, and choices. The partner MAC ensures that the automation system is consistent with the client’s vision as defined in the FEED (front-end engineering and design).

Finely tuned solution — the MAC evaluates all systems and installations, minimizing integration problems and assuring compliance to applicable standards, certifications, and guidelines.

Ultimate operational and business success — dedicated and effective communication and planning between the end user and the experienced MAC partner results in an infrastructure that serves long-term goals, through scalability and extensibility.

High return on project investment — the MAC project increases ultimate profits through reduced implementation costs, faster commissioning, and facilitated adaptations to meet future requirements.

In summary, MAC-managed project investments are returned quickly, through:

- Reduced project costs
- Pre-start up tests that reduce commissioning problems or failure
- Earlier go-live date
- Precisely configured solution for targeted performance
- Post-service support
MAC best practices

In the current automation market where major companies commoditize SCADA products, the MAC, instead, takes the ‘big picture’ view—embracing all phases of implementation and targeting a comprehensive monitoring and control solution that serves oil and gas companies from the field to the boardroom.

MAC value chain

The MAC oversees all phases of the automated control infrastructure life cycle, including engineering and design, procurement of systems, Factory Acceptance Test (FAT), installation and commissioning, Site Acceptance Test (SAT), start-up, and maintenance. Working as a partner with the end-user, the MAC assures each phase is ready to evolve to the next, adding value throughout the project; see Figure 1, above.
MAC best practices (continued)

Enterprise-wide utilization

The MAC’s solution approach visualizes the long-term, flexible infrastructure rather than adopting a one-project focus. The resulting comprehensive automation solution serves the entire enterprise, integrating field devices and Remote Terminal Units (RTUs), supervisory control and data acquisition (SCADA), data analysis and process control applications, and advanced data management applications; see Figure 2, above. Each application runs on proven operating systems, yielding validated data, and offers built-in redundancy and security for reliable performance.
MAC best practices (continued)

State-of-the-art security

The MAC will be knowledgeable of the security consequences of deploying control systems or applications from different vendors in the same environment. MAC experience with vendor-specific guidelines adds tremendous value in reducing cyber security risks for the end user’s project.

Benefits are both tangible and creditable

By committing to a power optimization program that allows documentation of energy usage and savings, a pipeline operator reduces electricity consumption and associated costs and emissions. This approach not only reduces bottom-line expenses, it also generates carbon credits that can be sold or traded on the open market per industry and/or government regulations or applied to help meet overall carbon footprint limits – and reap the marketing benefits of being a ‘green’ organization and an environmental steward.
Examples of MAC expertise at work

Following are two case studies reflecting the value of the MAC in providing both technology and the experience needed to successfully manage a multi-disciplinary project.

Case study 1: updated, central control of offshore oil and gas wellhead towers

A leading company in oil and gas production owns concessions for two of the world’s largest offshore oil fields, located off the coast of the Middle East. The unmanned oils and gas wellhead towers in these fields, 63 in all, had been supervised by radio telemetry systems. Yet, the costs of spare parts to maintain the aging equipment of these systems, and limited expansion potential due to the aging technology employed, undermined the availability, security, and reliability of these control systems and field operations.

The company sought a cost-effective, advanced technology control system that would facilitate safe and efficient operation of its upstream infrastructure. The full solution required multiple technologies and cooperative engineering—including the supply and installation of solar power units, remote terminal units (RTUs), digital radio communication, and a third-party Distributed Control System. The company chose to take advantage of Schneider Electric’s extensive experience in comprehensive development of automated systems and named the firm as project MAC.

Schneider Electric is upgrading and installing a state-of-the-art OASyS DNA SCADA at the control centers of the two platforms to support multi-protocol telemetry communications. It is interfacing the SCADA with a Distributed Control System (DCS) for process control and with an offline engineering workstation at the company’s headquarters.

Schneider Electric provides overall management and responsibility for the project from its local corporate office in the U.A.E., coordinating the entire automation process through engineering and design, sub-contracting third-party systems, FAT, SAT, commissioning, start-up, and post-project maintenance. This approach assures that each component of the integrated solution is tested and ready for system go-live, minimizing project re-work, time, and costs.
Case study 1: updated, central control of offshore oil and gas wellhead towers (continued)

The solution being created with Schneider Electric as the MAC will provide:

- The flexibility and scalability needed to serve at least 15 years of the company’s extraction operation
- High integration capabilities with third-party protocols and systems
- Common technology applied across both fields, making resource utilization and production efficient
- The highest level of security for the oil company’s assets
- Optimized operations that support cleaner energy and a safer environment
Case study 2: Centralized control and management of oil and electric processes

An oil exploration company operating in the Amazon district of Latin America produces approximately 62 million barrels of crude oil per year. This production amounts to a daily average of more than 170,000 barrels.

The company looked to improve cost efficiency and reliability of the internal electrical power generation and distribution operations that supply its oil exploration and production activities—guaranteeing continuous power supply where and when needed. It also aimed to optimize crude oil extraction, transportation, and production processes; implement security enhancements; and control impacts on its operating environment in the Amazon region.

The company selected Schneider Electric for a single-face solution for preliminary and detailed engineering, development of an OASyS SCADA system, implementation and testing, and operational start-up. Schneider Electric managed SCADA interface with applications operating among electric substations, generation centers, production wells, and crude oil production stations:

- The Life of Well Information System, collecting well data for the real-time analysis and control to maximize production while extending the well’s useful life
- Schneider Electric’s real-time Distribution Management System (DMS) for efficient electric operation
- Automatic Generation Control System (AGC) and Economy Dispatching (ED) for a continuous and nearly instantaneous balance between power generation supply and load demand
- Schneider Electric’s ArcFM™ Geographic Information System (GIS) for anytime access to the infrastructure geodatabase.
Case study 2: Centralized control and management of oil and electric processes (continued)

The turnkey system delivers real-time assets data and enables the company to automate and centralize supervision and control of both oil production and electric generation and distribution operations through a single, main control center.

The turnkey system also incorporates remote terminal units (RTUs) and a backup control center to guarantee uninterrupted operation. Further, it has been integrated with a communication system that delivers 99.99 percent accuracy of information transfer from the SCADA—and it can be integrated with the legacy system. Also as part of the overall solution, Schneider Electric managed the construction and equipping of the new building housing the Main Control Center.

Through Schneider Electric’s MAC management, a solution was created to satisfy both short- and long-term company goals:

- Providing a unique and highly integrated multi-utility solution to efficiently manage electric and oil activity
- Optimize production and well life of the system’s 110 wells
- Gain real-time accounting control and custody of oil produced across the company’s 35 facilities
- Automate operation of the company’s seven electric generation plants—including dispatching activities, post-dispatching, and operative programming—from the main control center, through the AGC and DMS
- Improve security
- Access real-time information and historical data by region
- Improve current and future planning capacity resulting in better business decision-making
Conclusion

MAC in a nutshell:

- Oil and gas operators utilize the MAC to make certain the best technology is utilized and best practices are applied.

- The MAC approach delivers a comprehensive solution that automates operations for both short- and long-term effectiveness.

- The MAC approach streamlines business processes for efficiency and profitability.

- Schneider Electric brings vital experience as a MAC in full-scope automation projects that integrate state-of-the-art hydrocarbon industry systems and support improved operations, revenue and sustainability.

With MAC, the end user typically sees a 10 to 15 percent reduction in project costs.