


Age is no issue

Evolution of automation systems to improve return on assets

Mark W. Taft



"Naturally, ABB's first priority is to look after its installed base and provide a cohesive evolution path to its new technology while simultaneously preserving the investment of its clients. It is a tough balancing act to follow, and one that has never been undertaken on such a large scale by any automation system supplier, but ARC¹⁾ believes that ABB is performing this task at a level that exceeds the industry norm." says Larry O'Brien, ARC's Research Director for Process Industries, when commenting on ABB's control system evolution strategies.

Recent investments in "greenfield" plants with state-of-the-art technologies have primarily been directed towards facilities located in the developing world. To remain competitive the "brownfield" manufacturing sites of North America and Europe must significantly improve their ROA (return-on assets).

Nurturing brown fields for green bucks
This challenging global environment is driving the owners of "brown field" plants to search for competitive advantages in the extended use of automation. Several strategies can be adopted:

- **Reduce unplanned downtime.** The ARC Advisory Group has estimated this to represent two to five percent of current production.
- **Implement reliability centered maintenance techniques** to reduce costs and optimize maintenance practices. The maintenance budget in a typical chemical plant is estimated to be two thirds of net profit. According to a US Federal Energy Management Program Report, savings in the double-digit percentage

range can be gained through improved maintenance techniques in such plants.

- **Increase personnel productivity.** Providing real-time access to relevant information facilitates empowered decision-making and action, enabling cost and productivity advantages, which is vital to the business process improvements necessary to achieve greater ROA.

Integration failed in the past

In the last decade, billions of dollars were spent on new ERP (enterprise resource planning) systems. The intent was to integrate the business world with the manufacturing process. In most cases the basic ERP implementation projects overwhelmed the organization and integration was never realized. Further business process improvements and the implementation of best-in-class processes require close integration of plant floor automation with business systems. A renewed attempt to harness the substantial improvement available through information integration will drive automation investments over the next decade.

Aging workforce

A massive turn-over of intellectual talent in process manufacturing plants is projected in the next 5-10 years. There is an urgent need to capture that experience and knowledge and make it available via the automation and information management systems to the operations, engineering, and maintenance personnel of the future. Much data is already being collected via the applications running in the existing automation and peripheral systems on the plant floor. However, it is not accessible as knowledge in an integrated, contextual fashion to those people who need it, when they need it.

Aging automation infrastructure

Morgan Stanley estimates the value of installed automation systems in process manufacturing facilities that have reached the end of their lifecycle to be \$65 billion. Plant floor installations are a collection of aging, disparate and loosely or non-connected sys-

Footnote

¹⁾ ARC DCS Worldwide Outlook, September 2005

tems. These “closed” systems are a barrier to integration. Manufacturers require a migration plan to help them remain competitive. At issue is the massive investment that has been made, both intellectual and capital. Automation users understand the need to balance the benefits of modernization with the requirement to achieve highest possible return on existing investment. Many migration solutions require extensive rework, automation application redevelopment and disruptive “rip and replace” of existing system content just to return functionality to current levels of performance. This approach sacrifices the experience and knowledge automation owners have accumulated in their applications. So how can these companies upgrade their systems while preserving this knowledge?

The answer is automation evolution!

Evolution vs. migration

ABB’s Industrial^{IT} System 800xA Extended Automation software facilitates the addition and integration of the new capabilities to prior generation automation systems. ABB’s pledge of “evolution through enhancement” ensures that new advances in automation systems technologies strengthen, rather than compromise prior automation investments. Automation system evolution is a process of simple, gradual advancement to a highly integrated, extended automation environment. The task of merging disparate control system families into a cohesive modern automation system, while preserving customer investments, has

been a formidable challenge, which has led to the development of System 800xA.

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System 800xA extends the reach of traditional automation systems beyond process control, to achieve the productivity gains necessary for manufacturers to succeed in today’s business. This scope is accessible from a single user interface that presents information and provides interaction in a context appropriate to each user’s responsibility. Extended Automation objects created within System 800xA provide a foundation for the efficient development and continuous improvement

of production applications with a predictability unattainable by other automation offerings.

The system’s architecture is built upon ABB’s patented Aspect ObjectTM technology²⁾. Aspect Objects relate plant data (aspects) such as I/O definitions, engineering drawings, graphics, trends, etc., to specific plant assets (objects). This unique architecture lets customer-owners integrate best-in-

class products, applications and services from ABB and Industrial^{IT} certified supplier-partners with existing automation installations – regardless of the original system’s origin – to create an extended automation environment. The 800xA system supports total plant management and control, removing the barriers of traditional distributed control systems.

Evolutionary customer benefits

Whether a customer-owner’s original system nameplate says Advant, DCI, Freelance, INFI 90, Master, Melody, MOD 300, Satt, Symphony, or that of a competitor, it can and should be used as the foundation on which to build a System 800xA installation **1**. This evolutionary approach offers many fundamental deliverables to ABB’s customer-owners.

By combining new System 800xA applications supporting asset optimization, information and production management and ERP integration with existing systems, new productivity potential may be achieved.

The reuse of intellectual investments in existing systems via direct re-hosting of applications, or via application translation tools and services reduces risk, and shortens implementation schedules and “switch-over” time. Engineering efforts focus on improvement rather than recreating functionality that already exists.

Footnote

²⁾ See also ABB Review 1/2002 pages 6–13.

1 An 800xA evolution builds on existing architecture



2 ORLEN is Central Europe’s largest refiner of crude oil and ethylene



Capital productivity

System 800xA Process Portal supports standard displays, faceplates and operating philosophies from prior generation “Operator Station” products to maintain a familiar operations environment. The knowledge that operators, engineers, and maintenance personnel have gained through use of their existing system will provide a foundation for improvement. Training can be focused on learning new capabilities of the system.

The reuse of intellectual investments in existing systems via direct re-hosting of applications, or via application translation tools and services reduces risk, and shortens implementation schedules and “switch-over” time.

By evolving an automation installation in a step-wise fashion customer-owners address their business needs in a time-frame appropriate to their investment appetite. For example, the addition of Asset Optimization capability to an existing installation provides the opportunity to mine the intelligence of existing HART field devices to implement asset monitors. The asset monitors facilitate a move in maintenance strategies to a reliability centered approach. The new software runs in concert with the existing in-

stallation and provides the foundation for the addition of other System 800xA capabilities.

ABB’s tested and proven evolution project execution services and procedures ensure low-risk, cost-efficient and predictable results for every evolution step. Detailed evolution planning services provide a well thought out execution plan for predictable performance throughout the step-by-step evolution program.

ABB’s product life-cycle support policy provides predictable support for installed products, and a commitment to provide functional replacement products to keep the plant running. This policy allows customer-owners to evolve their system in a step-wise fashion with the confidence that the foundation will be supported, and available for production over the planned evolution period.

Project briefs

When Molson Brewery in Canada, needed to expand and upgrade their 20 year old Network 90 system, Everest Automation helped them evaluate all options. Molson chose to extend their existing system by adding System 800xA Process Portal because of the many benefits it offered, such as personalized workspaces and views that provide better visibility into their process, remote device configuration capability and continued use of their original system investment.

According to system integrator Joe Sollazzo, this solution “allowed Mol-

son to seamlessly and effortlessly connect Process Portal to the existing system, and have operators view the old system as well as the new, on one common platform – a very real investment savings.”

PKN ORLEN is Central Europe’s largest refiner of crude oil and ethylene.

ORLEN’s first blending control and optimization system was successfully commissioned in 1998. Adding new controllers and operator stations to the existing MOD 300 system extended the DCS. On-line and off-line optimization and planning functions were valuable extensions.

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“ABB systems protect our investment very well. There are many examples in the company where we started from a very small, single node and then migrated to huge control systems. This is a good example of step-by-step evolution. The ABB system is well suited to this approach,” said ORLEN’s Manager of Process Automation, Waldemar Nagórko. “We achieved all our targets with our ABB control system upgrade; optimal use of more components, optimized costs, elimination of re-blends, very good

3 Tissue-making machine



4 Alunorte plant in Brazil



prediction and control of more product properties resulting in reduced production costs and reduced give-aways.”

CMPC Tissue SA is a leading participant in the pulp & paper market active in over 50 countries on five continents. To meet its ongoing goal of constantly improving efficiency by utilizing the most advanced control technologies, the company recently upgraded its more than ten year old control system in the Talagante mill located in Chile.

CMPC's Talagante mill had been operating successfully with an ABB Master system. CMPC decided to reduce maintenance costs by combining a new mill expansion with the evolution of the existing system. Cost was further reduced by the re-use of existing applications. The mill expansion was directly integrated with the existing systems via evolution to System 800xA.

“ABB's Investment 'enhancement through evolution' control system upgrade strategy gave us the possibility of maintaining, or 'porting-over' a whole engineering process, rather than having to start over,” says Sr. Reinaldo Uribe, Project Manager

of CMPC Tissue's Puente Alto Mill. “We never have the opportunity to change everything at once. The ability to make incremental improvements over time is very important. This is the way you protect your investment and your company. From the beginning, ABB has met all our requirements.”

Incremental additions and functional extensions have delivered dramatic productivity improvements for ABB automation customers, while building upon the value of the baseline capital and intellectual investment they made in their original systems.

Alunorte, in the Pará state in Brazil, is presently one of the five largest alumina refineries in the world ⁴. It began its production with two lines in 1995, utilizing ABB's Master technology. When a third line was added in 2003, the Master technology was evolved to fully integrate with an Advant control system for all lines.

Alunorte further enhanced its automation by adding System 800xA when it began its second and latest expansion project. The Extended Automation system utilizes fieldbus communications (both Profibus and Foundation Fieldbus), as well as ABB's Real Time Production Intelligence (Real-TPI) software. This expansion will allow Alunorte to produce up to 99 percent of the operational time, slashing downtime to just one percent making the plant the largest, most efficient alumina production facility in the world when installation is completed in 2006.

“The ABB system has helped Alunorte reach production goals since start-up. If the DCS can give you good data, you can change the data into information. If you have the power of information you can change everything, but you need the right tool to make the change. Alunorte drives for improvement and ABB is one of the most important partners in our efforts to increase of production capacity,” said Jorge Aldi, Process & System Development Manager, Alunorte.

Conclusion

As illustrated above, incremental additions and functional extensions have delivered dramatic productivity improvements for ABB automation customers, while building upon the value of the baseline capital and intellectual investment they made in their original systems. Planning is a key component to a successful step-wise evolution program ⁵. That's where a collaborative effort between ABB and customer-owners to map out the best strategies will help to minimize production losses, and maximize the benefit of each increment of the program. ABB's overall goal is to mitigate risk, while extracting maximum value from our customer-owners' automation system investments.

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⁵ Evolution architecture.

