

MIGRATING LEGACY CONTROL SYSTEMS

MAKING SURE THE BENEFITS OUTWEIGH THE COSTS

Glenn Johnson, *Editor*

Control system performance can have a significant impact on a plant's bottom line, and recent years have seen the emergence of new technologies that can greatly assist in further improving plant efficiency, performance, safety and business integration. But taking advantage of these new technologies will, in many cases, mean upgrading the existing DCS infrastructure.



Legacy distributed control systems (DCSs) often cannot meet present-day objectives of providing business information sharing, improved asset management and maintenance, lower energy consumption and better product quality, so many plant operators are considering migrating to a new DCS. However, before this can take place, there needs to be a financial and economic justification for doing so. The justification needs to compare the total cost of operation with the existing DCS, with the costs and benefits of a more modern system.

For plant managers, there needs to be sufficient grounds to go to the trouble and cost of replacing a working DCS.

Maintenance and the availability of spare parts are always significant considerations in a migration decision - components may be reaching the end of their useful life or failing excessively, and it may be becoming difficult or expensive to find replacement parts. It can also become more difficult over time to find personnel qualified to troubleshoot and repair older equipment and systems, especially as existing plant workers reach retirement age.

Excessive failure rates, difficulty in finding spare parts and lack of qualified expertise can all add up to increased downtime - a significant problem for any process plant.

Then there is the performance of the older DCS - it may not be living up to the requirements of today's standards of quality and energy efficiency. Newer systems allow more processes to be automated, enabling tighter control of existing processes and introducing new control capabilities that improve asset management, compliance and energy monitoring, as well as health and safety.

Most plants will have specific main motivations for migrating or replacing a DCS. Generally the motivations will include:

- Obsolescence - the high cost of maintaining older equipment
- End-of-life - the cost of replacing older equipment due to corrosion or age
- Futureproofing - locking in vendor support for a longer period
- Upgrading or replacing - modernising equipment for better performance or new capabilities
- Capacity - current systems are nearing their load capacity
- Improved UI - improving operator performance through better tools, alarm management and reporting
- Cost reduction - improving performance and lowering footprint
- New features - improved alarm management, operator effectiveness and asset management

- Multivendor support - being able to use 'best-of-breed' equipment that may not be possible with older proprietary systems
- Process data at the business level - improving decision-making and creating business agility

- Security - providing better integrated capabilities while reducing security risk

Migrating a DCS is going to represent significant cost to the business, so any plan to replace a system must provide an improved business value proposition - lower installed cost, lower life cycle cost and the ability to take advantage of new opportunities for improvement.

Risk and reward

The risk of failure grows exponentially as equipment ages - and the DCS is no exception. Compound this with the reduction in the availability of support, spares and expertise over time, and leaving a legacy DCS in place for too long may become a risk too great.

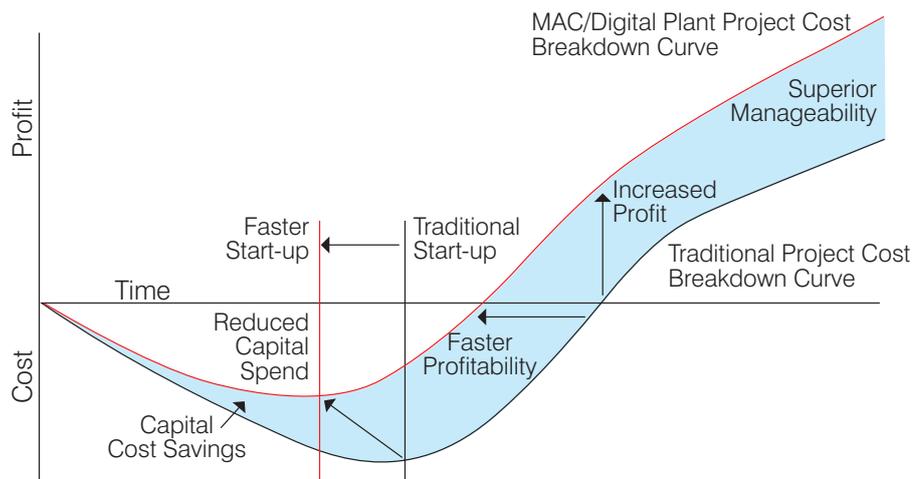
One question that needs to be asked is: what am I missing out on by continuing to support an outdated control system? Improvements in process performance, operator effectiveness, downtime and maintenance can all be limited by staying with an outdated DCS, but a well-planned and -executed migration to the latest technology provides opportunities for improvement in all these areas.

Modern DCS technology also supports the latest in networking and wireless systems, expanding the reach of the control system into areas that could not be accessed by the legacy system. Essential asset monitoring (EAM), energy conservation measures (ECM) and health, safety and environment (HS&E) capabilities can now all be integrated and supported with a modern DCS.

Have a vision

The fact is a new DCS will offer new opportunities, so the justification for a migration will be helped along if you have a vision of where the plant could be if those new opportunities can be taken advantage of. Take stock of the capabilities of the current system and determine where its weaknesses and inefficiencies are, then compare that with the improvements available to existing processes that might be possible by upgrading.

Then consider the additional opportunities that newer technology presents. Can the current system be expanded at low cost through wireless technologies, enabling new forms of monitoring such as EAM, ECM and HS&E? Can the current system effectively integrate with business systems to provide



the information the business needs to make informed decisions?

It helps to have a vision of where the plant control system might be in the next few years and the benefits a migration will provide to your organisation.

Explain your vision

The initial step is to get buy-in from the plant management that will approve the project. The opportunity to improve process performance, plant reliability, maintenance, energy consumption and HS&E by modernising should be explained to the plant management, maintenance manager, reliability engineer, HS&E officer and project/turnaround manager. Investment in a new DCS can be justified on the basis of improved efficiencies and reduced downtime, as well as the potential for lower maintenance cost, lower energy consumption and improved HS&E, through the new technical opportunities presented by newer technology.

Migration strategy

A well-planned and -implemented DCS migration should enable your organisation to migrate the legacy platform at your own pace, allowing new equipment and software to be easily integrated with the old system. A structured approach will allow the system to be migrated subsystem-by-subsystem, minimising downtime and impact on day-to-day operations, and minimising those elements of the migration that will require downtime.

FEED is the key

The key to a successful migration involves effective front end engineering design (FEED), driving the bulk of the migration planning into the initial stages of the project. To derive the true business benefit of a new technology, proper planning must take place. As well as proposing a design and migration strategy, the FEED should be able to provide a rela-

tively accurate estimate of business benefit and costs (within 10%), including a detailed functional scope, a detailed project execution plan and a detailed procurement plan. Having a well-defined scope will provide a more accurate estimate, lower contingency and lower overall project costs.

The FEED can also include the required economic justification, including the expected process and business returns on investment.

The effort and upfront cost of the FEED can deliver major financial benefits because it is work that would otherwise be done in the first 10-25% of the project and helps reduce the risk of problems later on in the project, by providing early identification of problem areas and changes that need to be made to resolve them.

Zero downtime migration

Because of its cost to the business, downtime should be reduced to as close to zero as possible.

The money saved by keeping downtime as low as possible is significant, whether it is during a scheduled maintenance outage or during an outage specifically planned for DCS cutover, but of course the ideal situation is to achieve a hot cutover, in which the new system seamlessly takes over from the old system with no need for process interruptions.

Hot cutover, however, does need careful planning and sequencing. For example, simple loops such as indication-only measurements can be cut over first, enabling the team to adapt to the new system in a low-risk environment. Migrating one loop at a time makes hot cutovers more manageable than commissioning an entire unit after a shutdown or turnaround, and minimising shutdown periods for critical instruments and safety systems reduces costs.

Effective communication is also important, so that all personnel are aware of

work being performed, and so that safe procedures are followed at all times.

Hot cutover does not make sense in all situations, and migration during scheduled turnarounds is more common in practice.

Preserving valuable assets

It should be remembered that not all parts of a legacy DCS need to be replaced, and so, when assessing suppliers, find one with the flexibility to offer solutions that allow you to preserve assets worth keeping. The embedded knowledge in these systems, accrued over the system lifetime, have ensured that your system has performed the fundamental job it was purchased to do. Any new system to be implemented must offer a compelling value proposition over the old system. It should also preserve the intellectual capital of the old system to the degree that it makes sense to do so.

Use an experienced partner

Key to the success of a DCS migration is not just the choice of system, but in partnering with an organisation with experience and understanding of the complete migration process, and that can demonstrate effective, proven migration strategies. As end-user organisations are facing an ever-reducing experience base in-house, and an increasing range of responsibilities, it is important that the partner organisation is able to provide a complete array of services to assist the migration process.

Your chosen partner should be able to provide a full suite of services, from consulting services and FEED, to project implementation, after-sales service and training. Look for a supplier with strong experience, not only in its DCS product, but also in field instrumentation, control valves, fieldbus, networking and wireless implementation.