

## Ask the Experts

# Avoiding the Pains of Systems Integration

**My plant is considering integrating a manufacturing execution system (MES) with an existing distributed control systems (DCS). Such an integration has had a history plagued with problems. How can I alleviate my concerns about integrating my existing batch processes and what are some of the associated benefits of integration?**

Since MES implementations have indeed had a history plagued with many integrations pains, these are important questions to consider when implementing such a solution. While standards such as ISA-S88 and ISA-S95 provide a framework for batch automation and integration of enterprise and control systems, many decisions are still required. By taking the time to analyze the integration needs and the business processes, the developed solution can be one where the costs and risks have been appropriately weighed against the benefits.

When integrating an existing DCS with an MES, there are several factors to consider. A few of them will be explored here:

**Functionality that already exists within the control system.** This should be compared to the functionality required by business goals of integration to determine the minimum requirements for the MES under evaluation. Most DCS have an integrated batch engine that manages the execution of recipes within the control system and an integrated historian for acquiring and storing batch data associated with those recipes. Since the DCS handles these functions well, the requirement for the MES is ease of integration. Existing DCS procedures, unit procedures and operations should be easily integrated with the new functions provided by the MES. It is important to ensure that the steps of the recipe executing in the MES are synchronized with those running in the DCS. Assess any tools that exist for making this effort as intuitive as possible.

**Communications technology and standards.** Interoperability with other systems needs to be considered. It is important to consider systems compliant with standards for open communication that can also be easily integrated with existing infrastructure. Support for web services, a service-oriented architecture, and the use of XML schemas, such as ISA-S95's business-to-manufacturing markup language (B2MML), should be included in the evaluation. This will make it easier for seamless transfer of necessary historical and real-time data between the two systems. It is also important to know the MES' system architecture. A zero-client or thin-client architecture can provide for a favorable reduction in maintenance support and validation effort, which should be valued when considering different systems.

**Proven Implementations.** One final consideration should be a review of successful implementations of the combined solutions under evaluation. This evaluation should include not only the system itself, but also the capabilities and experiences of the organization that would design and implement the solution.

### Exploring the benefits in highly regulated industries

Even after the benefits of process control and batch automation have been realized in a facility, there are many operational improvement opportunities that are available via MES implement-



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ation. Particularly in the pharmaceutical and biotech niche, in addition to the required batch documentation, there are manual set-up, cleaning, and maintenance activities that require documentation to show that such activities have been properly completed. These activities are required for the release of particular batches. There is an opportunity to automate some of these paper-based steps as well as capture information one time electronically vs. using paper as a means of capturing and transferring data.

**Document handling.** Using workflow capabilities of some MES solutions, the review and approval processes for both master and batch documents can be managed electronically, thus eliminating "sneaker net," or people hand-carrying documents. No longer is it necessary to spend time walking around to review, locate, retrieve, deliver or approve a document. Authorized personnel can execute work instructions without physically passing or splitting documents. A paperless electronic solution eliminates the need for scanning, microfiling or storing paper documents.

**Operational improvements.** The number of verifications and reviews required per document can be reduced, since the system checks that data are entered within range and confirms that all data fields, signatures and calculations are complete and valid. Ultimately, there is an improvement in right-first-time metrics for initial document completion and final document review. Coupled with the capabilities of reviewing by exception and report rendering tailored for a type of reviewer, the time and effort required for document review is greatly reduced. Since online error checking occurs during lot execution, rework of documents for error correction is greatly reduced.

Data entry tasks can be reduced or eliminated. If the MES solution is also integrated with an enterprise resource planning (ERP) system, the manual tasks of entering start or end times and performing inventory consumption or receipt transactions can be eliminated. Also, manually entering data on paper that already exist in the control system, which are then used in the record, spreadsheets or other systems, can be eliminated. Since all of the lot data are now available in real time, less effort is spent tracking down data in other systems or from the paper documents. This is relevant for effectively managing investigations, ongoing monitoring of the process, and improving process understanding.

In addition to minimizing document-related deviations, an integrated solution can be used to address other types of deviations. By following instructions in the field, being able to pull up a standard operating procedure (SOP) or diagram, and tying data from the DCS back to the MES, some operator-error-related incidents could be eliminated. Since any of these deviations, as well as other inadvertent entry errors, can lead to material or product losses, integrating the batch data with the batch record can reduce these losses. Also, using equipment tracking states in an MES solution can be used to eliminate the need for separate logs, and allow accurate viewing and using the status during lot execution.