By Greg Gorbach
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Customers Are Getting On Board with In-Plant SAP Solutions for Batch Manufacturing

Template-based, rapidly deployed batch solutions have become popular among SAP chemical industry customers. This is because these solutions provide an easy, predictable way to provide real-time batch execution that is closely integrated with ERP, but decoupled so that it doesn't need ERP in order to run. The latest enhancements, which include better integration, improved scalability, and more templates, make the offering even more compelling. As a result, the trend is likely to accelerate. To help process manufacturers get a better understanding of SAP's batch solutions, this report provides an overview and analysis of *SAP Manufacturing Integration and Intelligence Rapid-Deployment Solution for Batch Manufacturing*, together with some chemical industry user case stories.

This report examines the SAP MII Rapid- Deployment Solution (RDS) for Batch Manufacturing. For SAP customers who need real-time batch execution in the plant, but don't need full MES capabilities, these integrated solutions can be a quick and relatively low-cost way to improve performance.

Background

SAP has served process industries almost since its inception. Building on this experience, it developed business scenarios that can support all of a company's major business processes, and made them available as a set of preconfigured, industry specific Best Practices solutions which can be rapidly implemented out of the box at low cost and low risk. These best practices solutions include scenarios for batch management, in-process quality control, and process instructions via xml-sheets.

In today's challenging economic environment, batch manufacturers need to streamline their plant operations and maximize plant performance while controlling costs and managing the complexity of their IT infrastructure. Of course, they also need solutions that are plant-specific and decoupled from ERP.

To meet these needs, SAP enhanced their ERP batch manufacturing capabilities, extending them to the plant floor and allowing them to run independently from the existing ERP system. Following its Best Practices Methodology and leveraging the capabilities of SAP MII, SAP and its part-

ners Trebing & Himstedt, Ciber, and Systec & Services developed a new set of preconfigured industry specific best practices templates. Dubbed *SAP Manufacturing Integration and Intelligence Rapid Deployment Solution for Batch Manufacturing* , it provides a lightweight approach to batch manufacturing execution that is particularly suited to chemical and consumer product companies. (For additional information refer to the ARC report, *SAP MII Solutions for Batch Manufacturing Execution,* published in September 2010.) With RDS, content such as software, documentation, and templates can be downloaded from the SAP Service Market Place with proper authorization. SAP and its partners also offer implementation services together with software and templates as fixed scope, fixed price contracts as part of RDS.

SAP MII Product Enhancements – Web Services and Improved Integration

SAP MII 12.2 was released for general availability in 2011. This release of MII includes some important features aimed at improving the application development environment, and supporting enterprise scalability.

The most notable feature addition to 12.2 is the Manufacturing Data Objects (MDO) capability. This is a semantic modeling layer in MII that allows the developer to construct and manage data objects that can be browsed by MII or other applications. The synchronization of these objects with the underlying MII database is built in, with configuration boxes to manage data visibility and persistence. This capability adds an important organizational element to MII, but also facilitates re-use of engineering through web services. The same MDO objects built for an MII view can also be consumed by SAP Business Objects reports and dashboards - or even third party applications.

MII web services can now be published in the SAP Enterprise Service Repository. This allows other applications (SAP and non-SAP) to easily consume prebuilt views of data from the shop floor without writing custom interfaces.

The 12.2 release also included features that improve the integration to plant floor systems through the Plant Connectivity (PCo) software released in concert with this version. PCo is a .NET based infrastructure that comes with a family of Agents which leverage industry standard protocols for communicating to plant floor systems. New Agents that communicate using OLEDB facilitate communications to Microsoft based applications,

while the OPC family of Agents supports real time, historical and alarm/event communications to automation based systems. New Agents were also released for specific plant applications, using native APIs - inlcuding Aspen Technology IP21, GE Intelligent Platforms Proficy Historian, and Schneider Electric Vijeo Citect SCADA. A new Software Developer's Toolkit has also been made available to allow partners to author their own custom Agents. Centralized monitoring of PCo instances is also now available through MII 12.2.

New Rapid Deployment Capabilities

SAP Rapid Deployment Solutions (RDS) allow for easier, faster and more predictable consumption of SAP software. The solutions include templates for a given business problem and bundle SAP's standard products with "best practice" pre-configuration, services and enablement content at a fixed price. According to SAP, average time to value is less than 16 weeks.

SAP Rapid Deployment Solutions are not sold as stand-alone solutions. Integrations with other SAP solutions are built in. They are scalable and leave room for flexibility to consider additional customer requirements. Customers often expand their RDS in modular steps on top of the fixed scope to solve specific business problems.

More than fifty RDS offerings are already available today. One of them is the SAP Manufacturing Integration and Intelligence rapid-deployment solution for batch manufacturing (SAP MII RDS for batch manufacturing), which provides an integrated, plant-specific solution for manufacturing operations. It delivers prebuilt applications with simplified user interfaces, preconfigured business processes and content along with the basic configuration and sample master data in SAP ERP to support manufacturing execution and performance reporting in batch manufacturing industries.

The preconfigured, role-specific applications delivered with SAP MII RDS for batch manufacturing cover the following areas:

- Manufacturing operations cockpits
- Manufacturing order list
- Material identification
- Work instruction
- Quality control
- Production confirmation

- Shift book
- Monitoring and logging
- Manufacturing performance.

It is built on SAP Best Practices for Chemicals to provide a fast and comfortable way of setting up the solution. The business scenario starts in SAP ERP by creating transactional data, e.g. process orders and inspection lots, and is continued in SAP MII. Results from the shop floor are transferred back to SAP ERP where applicable.

Customers Embrace SAP MII for Batch Manufacturing

According to SAP, more and more SAP Chemicals and Consumer Products customers who want to better align their production plants with changing business requirements and market needs have begun to use *SAP MII for Batch Manufacturing*. The decoupled, plant-specific, integrated manufacturing execution solution that is available even if ERP is not, with a mechanism to provide central data storage and maintenance in SAP ERP, is well suited to their needs. It allows them to leverage existing investments in SAP ERP as well as automation systems, and it uses SAP MII pre-built, standards-compliant SAP ERP and shop floor connectivity.

The SAP MII Rapid Deployment Solution for batch manufacturing helps customers and partners accelerate implementation and reduce project costs and effort while retaining the modeling flexibility inherent with SAP Manufacturing Integration and Intelligence solutions. It has been designed to provide plants with a lean, "smart" approach to support core manufacturing processes.

The following sections feature customer stories that illustrate the power of SAP's MII Batch Execution solution approach.

FMC BioPolymer Uses SAP MII Batch Execution to Support Plant Expansion

With more than 60 years of experience, FMC BioPolymer is a leader in harnessing renewable resources to create ingredients and technical product solutions for the food, personal care, pharmaceutical and biomedical markets. FMC BioPolymer is one of three divisions in FMC Corporation, a leading diversified chemical company. It is a global company, based in the US, with strong presence around the world.

FMC's Haugesund, Norway, manufacturing facility urgently needed to replace their 1995 vintage MES system, which had been retired. Production personnel were burdened with lots of manual entry and double entry of manufacturing and quality data, resulting in gaps in recorded information and data of questionable quality. Users had to access several systems in order to retrieve and analyze production and quality information and report key performance metrics (KPIs).

FMC's IT environment is a centralized SAP ERP and Microsoft Sharepoint. At Haugesund, there is an OSI PI server, WSS (Sharepoint) server, and an ABB DCS.

Early in 2011, FMC began to work with TCS and SAP to address their situation. TCS personnel spent one week on-site at Haugesund developing a preliminary set of development requirements. They then spent a week at the FMC headquarters in Philadelphia, gathering and refining requirements associated with the business systems themselves. The team returned to Haugesund to refine goals and expectations, and then passed the development requirements to a team of TCS developers in India.

The idea was to implement SAP MII, integrated with SAP R/3 and OSI PI, to replace the missing production processes and quality functionality provided by the previous MES system. But FMC also wanted to establish a system architecture that would support ongoing expansion and improvements at the Haugesund plant, because they envisioned a major expansion of the plant and a significant upgrade of plant equipment.

By June 2011 TCS was ready to roll out a template-based manufacturing-floor connectivity solution built around the SAP MII Rapid Deployment solution for batch manufacturing. Following the implementation, role-based dashboards enable different FMC employees to gain the insights they need. Senior executives can use their dashboards to view manufacturing output and quality KPIs at a glance. Operators in the plant can use their dashboards to see process temperatures, material viscosities, and more. SAP MII enabled real-time information flows that make it possible for process engineers and business decision makers to pull up reports that reflect up-to-the-minute data about the manufacturing environment– a dramatic improvement from the earlier system, where information might have been four to five days old.

Using the batch templates, FMC was able to expand the SAP PI-PP/QM functionality beyond the existing blender level to include the incorporation batches and Algenic Acid top off. In addition, they replaced the home-grown electronic logbook as well as local spreadsheets and databases used for environmental reporting. According to Shaun Gordon, Senior Project Manager, FMC Corporation, "The templates provided sixty percent of everything we needed, and a framework to develop the rest."

TCS used the batch manufacturing templates provided by SAP as a basis for developing additional new MII templates for FMC. With these templates, FMC has a blueprint that it can use to deploy similar upgrades in other manufacturing plants around the world. As FMC integrates more of its manufacturing plant floors with its corporate business systems, it will increasingly leverage the information and infrastructure to operate more efficiently and with greater agility and responsiveness.

FMC has already seen an increase in productivity and efficiency through improved processes - such as automated goods issues against process orders without manual intervention – and a dramatic increase in the utilization of the ERP system instead of spreadsheets or other methods. "The week we went live, the number of material documents created in our SAP ERP system for Haugesund rose by 400%" said Gordon. "This demonstrated that the data being captured was more concise at any given time giving Haugesund a very real-time picture of how the plant was operating."

Dunn Edwards Connects their Plant Systems and Business Systems

Since 1925 Dunn-Edwards Corporation has been the leading manufacturer and supplier of architectural and industrial coatings in the southwestern United States. The firm provides a complete line of paints and painting supplies to professionals and quality-conscious consumers.

The company planned a new 336,000 square-foot manufacturing plant that would be more efficient than existing plants. Where possible, liquids would be directly piped in, and powders picked and staged in sequence. Instead of the old batch ticket and paper-based order system used in existing plants, Dunn Edwards wanted to put in place a system where the business system, the batch system and the controls are all integrated so it could operate more effectively. This required linking business functions

like production planning and order fulfillment with plant control systems and production equipment. They also wanted an easy-to-use interface for plant operators and paint makers.

Dunn-Edwards was already using the SAP ERP application as its enterprise solution, and the fact that SAP MII came with prebuilt templates and connectors enabling quick configuration was instrumental in selecting the SAP MII Batch solution. It also directly affected their selection of their rollout partner, SEAL Consulting Inc. Dunn Edwards had learned that SAP MII would provide the functionality they needed for the plant systems and machine interfaces for the operators, and it would also work well with the business software.

Dunn Edwards wanted information to move smoothly and in a bidirectional manner between SAP ERP and the plant systems. For example, when the plant produces a batch of paint, quality control chemists need real-time visibility a variety of data to evaluate the batch. With SAP MII, data that affects or is impacted by manufacturing – information on orders, materials, equipment status, costs, quality, yield, and so on – is visible in real time.

This means workers on the floor and supervisors and managers up the line get visibility into events as they happen. Equally important, these metrics flow to SAP ERP, so executives can see and measure the business against the same information. And they now get the information without the need for a small army of people to gather, input, and update it.

According to Darlene Mitchell, VP and CIO at Dunn Edwards, implementation had to be fast. "We had a very aggressive timeline dictated by the business," Mitchell says. "We had nine months from the time we broke ground on the property, which was just a shell, to get the plant fully operational. We had to implement a solution in parallel with the installation of plant equipment and control devices for manufacturing."

Getting the new facility up and running on time resulted in a big boost to both capacity and productivity. Says Mitchell, "With our old facilities, it would take three to four people six to eight hours to produce a 3,000-gallon batch of paint. With the new plant, we have multiple production lines. Each line can produce 12,000 gallons of paint with two employees in two to four hours. This is a dramatic improvement in terms of the resources required to produce a batch of paint."

SAP MII was implemented quickly and within budget, and now gives Dunn Edwards the visibility they need into production orders. It provides automated feedback of plant data like materials consumed, labor expended, and so on. "The old plants had poor visibility into production status," Mitchell explains. "You would literally run around the plant to find a paint maker to determine batch status. Quality control chemists would not know when a batch was finished and available for evaluation. With SAP MII, we have eliminated paper-based processes and have provided real-time visibility. Our increased capacity and productivity gains would have been impossible without SAP MII."

Recommendations

- SAP customers who need real-time batch execution in the plant, but don't need full MES capabilities, should definitely consider SAP MII Solutions for Batch Manufacturing Execution.

- Work with one of SAP's System Integration partners, such as Trebing & Himstedt, Ciber and Systec & Services, TCS or SEAL, who is familiar with the SAP Rapid Deployment Solutions approach. You should expect to be able to implement a template-based solution covering up to sixty to eighty percent or more of your requirements for a fixed price, and also have a framework for the remaining work.

- Depending on your particular circumstances, other RDS packages such as Global Batch Traceability, ERP for Manufacturing Industries, Product Life Cycle for the Process Industries, Energy Management, and the Visual Enterprise, should also be considered.

- Your implementation partner should be able to use the templates as a starting point to develop new, proprietary templates that you own and can re-use. Be sure to negotiate this up front.

ABOUT THE AUTHOR:

As ARC's Vice President for Collaborative Manufacturing and Architecture**, Greg Gorbach** is a thought leader in Collaborative Manufacturing and provides clients in a number of manufacturing vertical markets with strategic advice in dealing with boundary-crossing business processes. Greg's primary areas of focus are Collaborative Manufacturing, Sustainable Manufacturing, Production Management, Business Process Management, Manufacturing Intelligence, and the synchronization of plant systems with CRM, ERP, PLM, Supply Chain and other business systems. He brings over twenty years of hands-on experience to ARC, with direct experience within manufacturing organizations, as well as extensive experience with suppliers to manufacturers.

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