

Case Study – Smart Factory

How for years, Beiersdorf has advanced the digitalization of production on the path to the intelligent factory – improving agility and flexibility

Beiersdorf

About Beiersdorf Shared Services

BSS – Beiersdorf Shared Services GmbH – was founded in April 2003 as a 100% subsidiary of Beiersdorf AG.

With over 400 employees worldwide, BSS is the strategic partner for IT and Accounting from Beiersdorf. The product range of BSS includes all services in the categories IT workplaces, server & infrastructure services, applications, software licenses, IT consulting, telecommunications and accounting services. Additionally, BSS develops the global IT strategy for Beiersdorf.

Industry 4.0 stands for the fourth industrial revolution, characterized by the horizontal and vertical integration of production systems and production resources. The goal is more flexible and cost-effective global manufacturing for customized production. To achieve this, Beiersdorf began laying the foundation years ago for a smart factory based on “simplicity” and “agility”. A Travelogue.



“In the beginning, it was a consolidation project to reduce the number of ERP implementations and in-house MES developments, and to standardize processes for all production sites,” remembers Cem Dedeoglu, Head of Global Processes & Application Solutions Supply Chain at Beiersdorf Shared Services GmbH, the IT partner of the world-renowned brand manufacturer. What emerged from this was an enduring relationship with many ideas leading to Industry 4.0.

Development of a Standard

In 2009, the connection of production facilities using in-house MES developments was very location-dependent, making it very expensive in terms of maintenance and development costs. Several employees per location were responsible for the operation of the various MES applications. Scaling across additional locations was not possible. This was the motivation to develop a production template that could be used for all factories worldwide. Because SAP ERP was already in use as the leading company software at this time, manufacturing solutions from SAP were studied. SAP Manufacturing and Intelligence (SAP MII), which had been added to the portfolio some years earlier, met all of the requirements to serve as the standard information interface.

In a Nutshell

Read in this reference

- SAP MII
- Vertical integration
- Real-time connections
- Industry 4.0 platform
- Customization
- Global rollout

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Vertical integration

In production and automation technology and IT, vertical integration represents the integration of various IT systems at different hierarchical levels (for example, the factor and sensor level, control level, production control level, manufacturing and execution level, corporate planning level) into a cohesive solution.

Source: Final report of the working group Industry 4.0, April 2013

Lighthammer as predecessor to SAP MII

When SAP acquired the American company Lighthammer in 2005, the goal was clear: The ERP company software was now to be directly connected to manufacturing operations, joining existing departments such as Finance, Marketing, Sales, Purchasing, Quality Management, and many others. As specialists in production data integration and pioneers in web-based visualization, with its product, Lighthammer had developed one of the first data hubs for production data. SAP MII technology (Manufacturing Integration and Intelligence) developed out of this. Trebing + Himstedt was already the exclusive Lighthammer Partner in the DACH region from 2000, making it one of the first SAP MII experts. Based on these years of project experience and a number of references in the pharmaceutical and chemical industry, Beiersdorf chose to cooperate with Trebing + Himstedt in 2010.

From ISO to IoT

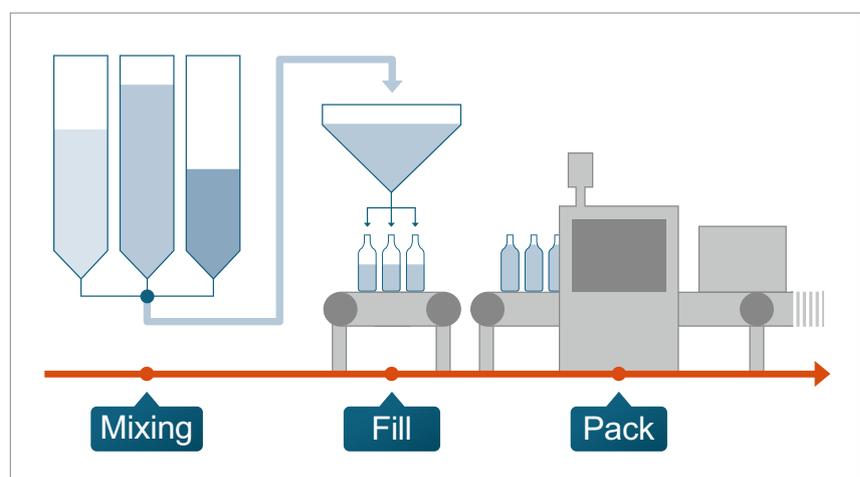
The necessary criteria and requirements were defined in preliminary workshops. In the first step, a decision was made to initially focus the project exclusively on vertical integration for the exchange of all master data (e.g. workplace, material master) and movement data (orders, bill of materials) and exchanging order-relevant replies. Web services were selected as the international standard technology and B2MML (Business to Manufacturing Markup Language) as the description language. B2MML is an XML implementation of the ANSI/ISA 95 family of standards (ISA-95), internationally known as ISO/IEC 62264. How correct the decision at that time was is underscored by the current development towards the "Internet of Things" (IoT), which can easily be carried forward with this standard architecture. In order to meet the validated requirements from Beiersdorf regarding the US Food and Drug Administration (FDA), at the outset, an audit was performed at the partner Trebing + Himstedt according to 21 CFR Part 11 (Electronic Records, Electronic Signature), in particular with the focus on electronic data management.

Rollout and Project Management

Only three years after the kick-off, the rollout of the developed production templates was completed in all six of Beiersdorf's European companies, including Poland, Spain and the main plants in Germany. With the S95 integration layer based on SAP MII, some locations received a real-time connection with SAP ERP for the first time. In other plants, the existing in-house MES developments were completely replaced. Even though they were able to keep the rollout phase extremely short, it was possible to integrate a great deal of experience for the further development of the templates.

MES along the process chain for the smart factory

Source: Trebing & Himstedt
Prozeßautomation GmbH & Co. KG



During the European rollout, the extent of the changes to the requirements per location called for was first underestimated. As a result, the decision was made to differentiate the changes as either “template change” or “local change”. If changes were required for several locations, these were made directly to the template.



Based on this experience, the initial production template would be created differently today: not as a greenfield template for a factory, but rather, as is typical for an agile process, it would begin with a small factory as a pilot, from which the template for additional locations would be developed. Nevertheless, it was possible to drastically reduce the operating costs in comparison to the existing in-house developments. For Trebing + Himstedt, it became clear that such a project cannot be implemented by project managers alone. Due to the many parallel projects, a higher-level program manager function was crucial, which was established concomitantly. The program manager is also the contact person for the Beiersdorf Support department, which served the systems after the conclusion of the project. The global rollout in Mexico, South America, USA and Asia should be completed by 2017. With the new Beiersdorf location in Mexico, which supplies both growing local markets and the US market, the concept was applied to a “greenfield” plant for the first time.

“One must also consider whether a customer will soon demand individual packaging or even customer-specific ingredients.”

Cem Dedeoglu
Head of Global Processes
& Application Solutions
Supply Chain at Beiersdorf
Shared Services GmbH



Information superhighway between SAP MII and ERP

One of the most important extensions to the production templates involved improving performance. The more manufacturing operations were connected and data transferred, the more it became apparent that work needed to be done on the communications architecture. In addition to the need to transfer master data, a requirement also developed to cover real-time scenarios with SAP MII down to the sub-second range. To accommodate this, a decision was made to “build a data superhighway”. This means that there are two productive SAP MII systems. One is responsible for the distribution of master data down to the machine level, and the other time-critical real-time data. “You can imagine it like a truck lane for the master data and a Ferrari lane for the time-critical data,” explains Dedeoglu the chosen communications structure.

With the increase in performance and the high availability, it was also possible to improve the agility of short-term reactions to requirements. Where initially a two-day worklist was required, it is now only half a day. That means more flexibility for customers.

Production Template at Beiersdorf

At the begin of the 21th century the Beierdorfs Production Centers at Europe had a highly complex process landscape and large number of different processes.

This resulted in high maintenance costs, long duration times for launching new functions, no uniform transparency and no flexibility between the productions centers.

In order to overcome these drawbacks led to uniform and binding procedures worldwide and standardized systems and processes. The production template included the basic set of standardized systems and processes, which are available at each Rollout.

The goal is an easy and full deployment of same planning, reporting, sales and supply chain systems for every production centers. The advantages are speed up for access new functions, speed up in decision making due to wide applicability, lower Maintenance cost, Accuracy and comparability due to standardized processes, Best practice globally leveraged and flexibility of resources and of organizational structures.

The digital factory

With complete vertical integration based upon the flexible platform and data hub SAP MII, since 2009, Beiersdorf has created the ideal conditions for a smart factory, which can be flexibly adapted to new customer and production requirements.

At Beiersdorf, the rule is now that all new department requirements must first be examined to determine if they can be quickly and inexpensively implemented based on the platform MII. With the help of this platform, various flagship projects for the digitalization of the smart factory have already been implemented. For example, in 2013 with electronic loading ramp control, the loading of trucks was monitored directly in ERP in real-time. With this, a traffic light for forklift drivers is switched to red to prevent exceeding the load weight. In 2014, together with Trebing + Himstedt and based on SAP MII, a labor time tracking system was implemented using the SAP HR interface, which is now available globally for plants and was immediately used in Mexico. This eliminated the need for a separate labor time software system. In addition to the cost advantage, with SAP MII, there is a touch-based interface.



In 2015, the challenge in a special joint workshop with the production sites was to define the requirements and conditions for Industry 4.0. There, the factory managers clearly expressed that they wished for even more “worker-focused” IT support in the smart factory. In particular, this means more transparency on the shop floor, flexibility and the meeting of individual needs, and mobile applications. To achieve this, it is necessary to continue to advance the standardization of communications formats. But technologically as well, an upgrade must be made to the new release SAP MII 15. Individual views will be then possible, in particular through the SAP Self Service Composition Environment (SAP SSCE) available there. On the application side, there are also many ideas for the future which should be implemented with a smart factory. Number one on the list is the traceability of products across distribution channels. For example, if products destined for the drug store appear at a discounter or on the Internet, it would be possible to determine the channels through which they flowed. To further reduce maintenance costs while simultaneously improving machine availability, Beiersdorf Shared Services will increase its involvement with predictive maintenance.

“But customization does not end with requirements for production facilities. One must also consider whether a customer will soon demand individual packaging or even customer-specific ingredients,” says Dedeoglu, considering the future.

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