

The text 'LIXIL Case Study' is overlaid on a photograph of a factory floor. The background shows industrial machinery, including a robotic arm and various pipes and structures, with a blue and white color palette.

Challenge

To standardize its global manufacturing systems, LIXIL needed a Manufacturing Execution System (MES) that would comply with a wide variety of site requirements, enable quick, efficient development and deployment, and offer functionality on a global scale.

Solution

LIXIL decided to implement Dassault Systèmes' DELMIA Apriso, a solution that would make it possible to apply LIXIL's production know-how to the new system, replicate the look and feel of the existing systems, and ensure compatibility across the globe.

Benefits

Serving as the MES phase of the company's integrated manufacturing control system, DELMIA Apriso enables uniform manufacturing execution without sacrificing any of LIXIL's know-how in on-site manufacturing. In addition, LIXIL is now able to have a clear real-time view of company wide inventory across several sites.

LIXIL GROWTH DEMANDS OVERHAUL AND STANDARDIZATION OF SUPPLY CHAIN MANAGEMENT AND PRODUCTION SYSTEMS

LIXIL Group makes pioneering water and housing products such as baths, kitchens, toilets, showers and faucets, doors and windows, interiors, and exteriors. Today, it is a global enterprise with about 75,000 employees in more than 150 countries worldwide, having expanded internationally by acquiring some of the most trusted names in the industry, including GROHE and American Standard. LIXIL Corporation, born in 2011 through a merger of five of Japan's most successful building materials and housing companies, draws on the Japanese heritage to create world-leading technology and innovation to make high quality products that transform homes.

After integrating into LIXIL, the five constituent companies kept using their individual, separate SCM and production systems. In 2014, however, LIXIL launched a project to begin overhauling and integrating its domestic mission critical system and laying the groundwork for future optimization—a process that involves standardizing and consolidating operations in anticipation of new business and unification across the company's global structure. Knowing that it would need a world-standard system for effective global management and an integrated system for optimal business performance, LIXIL is using the project to replace many of the separate systems throughout the corporate organization—which number into the thousands—with a new set of roughly 16 new categories of systems. "We knew the project would be a company-wide initiative, stretching into every corner of operations," explains Fumiyouki Itou, Senior Manager, Logistics Procurement System Department SOR System Division IT Function. "In the Supply Chain Management (SCM) area, for example, we built the effort around the concept of creating a system platform that would let us standardize business across the housing, materials, and building segments and deploy our SCM business processes right away—global elements, too." The company laid out clear objectives: standardizing and patterning product-specific business in the three segments, integrating its MES, and coordinating demand predictions with production and purchasing plans to help prevent against stockouts and reduced inventory levels.

CHOOSING DELMIA APRISO, A SOLUTION WITH A GREAT DEGREE OF FREEDOM AND GLOBAL REACH

LIXIL's supply chain is an enormous system of high-mix, low-volume production. Whenever an order comes in, the company quickly ships the necessary items to meet the customer's needs. Production follows several different formats—Made to Stock (MTS), Assemble to Order (ATO), Made to Order (MTO), and Engineered to Order (ETO)—and operates on a massive scale. LIXIL processes roughly 270,000 orders daily, produces tens of millions of items, produces ten million individual parts, and has 40 plants in Japan (as of March 2019).

"We produce and ship so many items from so many plants, and the five individual companies had used different setups and different methods for all their manufacturing processes prior to the merger," explains Hideharu Tamaki, the director of the SC Systems Division in the Information Systems Unit.

"The systems were all over the place, too, decentralized on client servers and End User Computing (EUC). It was a disjointed assemblage of pieces, all in black boxes. To pull everything together into an integrated whole, we took the 'To Be' approach. Basically, we focused on the ideal objective and worked backward to iron out the project. The best way of making that ideal a reality, we decided, was to use consumer packaged goods—resources that would let us keep our platform in place over the course of future system maintenance." With the Information Systems Division getting smaller, the company also knew that system maintenance would eventually be impossible without standardization. Consumer packaged goods presented the best approach to unifying processes and best practices, which included elements like standardizing systems with the same functions and establishing common development languages.



"It was the perfect fit for LIXIL: the right global functionality, the right flexibility and integrity for a wide array of products, production methods, and sites, and the right customizability for different screen designs."

- Hideharu Tamaki, Senior Manager, IT Strategy Dept. LIXIL Housing Technology JAPAN Conc, and IT Function LHT IT

LIXIL wanted a packaged MES / MOM solution that would also be compatible with a diverse mix of on-site requirements, conducive to quick, agile development and deployment, and easy to deploy on a global scale. In its search for a MES solution that would fit the bill, LIXIL eventually decided on Dassault Systèmes' DELMIA Apriso. Why DELMIA Apriso? LIXIL attributes the choice to the solution's excellent degree of freedom and global-support capabilities. LIXIL's lineup includes plenty of products that involve the same building materials but completely different production methods, which means that the corresponding systems need a considerable degree of freedom. Seeing as how that brand of versatility helps the company differentiate itself from the competition, LIXIL was looking for a solution with room for quite a bit of from-scratch development. "In our RFP, we laid out lots of different requirements. The flexibility to comply with on-site variability, for example, was key. With that, we started asking providers if they'd be able to meet our needs," says group leader Yukihiro Yamafuji of the Manager, Metal SOR Renovation office SOR System Division IT Function. DELMIA Apriso checked the right boxes. We knew that, with the solution, we'd be able to patch over any holes in the package with stuff we could create from scratch. It made for easy, effective combinations ready-to-go resources and from-scratch additions."

A KEY IS TO APPLY AND UTILIZE ACCUMULATED PRODUCTION KNOW-HOW

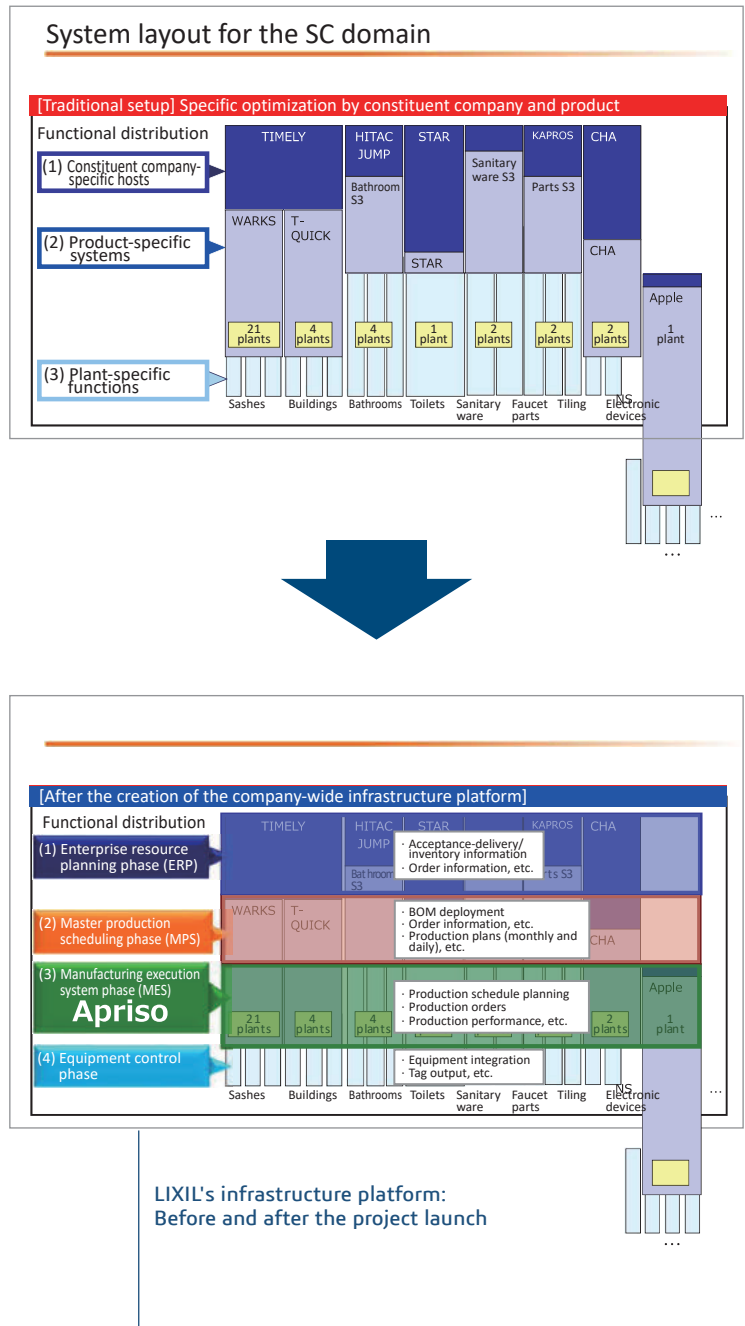
A completely standard and configurable MES solution can handle standard items like toilets and faucets, but products involving lots of custom-made articles require the solution to be also flexible enough to allow for custom requirements while maintaining a path forward. Kitchen and bathroom units fall into that category: virtually every unit has its own individual specifications, as customers head to showrooms to combine a host of different components into one-of-a-kind setups. LIXIL has to make every last piece of each custom-designed unit a reality, a process where its production know-how (best practices) come into play.

That expertise ranges across four different dimensions: real-time capabilities, on-site flexibility, performance and quality management, and inventory management. Given the specificity of all the on-site requirements and the nebulous nature of the qualities at hand, not all MES software solutions that are ridged simply lack the elements necessary to cover everything. "Real-time capabilities mean getting a good understanding of site conditions in real time and issuing orders accordingly. We need that timeliness in our orders—which we manage with down-to-the-second precision," says Ito. "On-site flexibility is another big part of the picture. We need to be able to integrate with different run-to-run systems for our audio systems, handheld terminals, PLCs, and other products. The interface needs to be easy for on-site personnel to use, of course, and our round-the-clock production operations require non-stop support. Then there's performance and quality management, which we do by the manufacturing process," he continues, "and inventory management, which has to be pretty sophisticated for certain products and sites."

DELMIA Apriso sits right between off the shelf and being highly configurable to support unique requirements. That made it the ideal tool for applying LIXIL's production know-how as is, without having to make any sacrifices or modifications. Another key feature of the solution is the flexibility of its screen layouts, which users have considerable control over. LIXIL could replicate the look and feel of its existing best practices, develop its setup quickly, and deploy the results with a sense of speed.

USING INFORMATION FROM DELMIA APRISO TO VISUALIZE INVENTORY ON AN INTEGRATED, COMPANY-WIDE BASIS

The project team then set to downsizing LIXIL's sizable assortment of over 100 different product-specific business variations to around 10% of its original scale. Once that consolidated base of business patterns started taking shape, they got to work on an integrated production management system to align with the new setup. LIXIL's systems in the supply-chain domain used to operate separately on its constituent companies' hosts; each separate host had multiple systems, varying by the product, and each system had different functions, varying by the plant. Every system was optimized on an individual basis for the corresponding company or product. In transitioning to a new integrated management system, LIXIL arranged its existing systems into a hierarchical



structure: the Enterprise Resource Planning (ERP) phase, Master Production Scheduling (MPS) phase, MES phase, and equipment control phase (see the accompanying illustration). "The equipment control phase involves tasks like equipment coordination and tag output, which means that no two products can share the same arrangement, but other phases are consistent across the entire lineup—there are no product-specific elements," Tamaki explains. "ERP, for example, is for payments, inventory, and order information, while MPS covers the deployment of Bills of Materials (BOM), supply-demand planning, and production planning on the daily and monthly levels. That's all the same. The MES, which involves production schedule-planning orders, production orders, production performance, and more, is where we can achieve some differentiation. DELMIA Apriso let us do that, making it possible to adapt our MES to our different lines of business."

After implementing DELMIA Apriso at its first plant in July 2015, the company has since rolled the solution out to eight more plants and laid out plans to continue the deployment effort at other production sites. Using the solution's standard models, the company has created many of its own functions; the framework for inventory management and inventory valuation, for example, are information-gathering infrastructures with roots in the DELMIA Apriso foundation. "LIXIL is a manufacturer, so we need to have a solid grasp of how materials and products are moving. Where do you locate all that movement? It's not in the planning phase; you have to go deeper, into the execution phase, and monitor the real performance information as it changes," Ito explains. "DELMIA Apriso is our platform for meeting that need. When you connect the solution on the execution phase to our ERP phase, the accounting division can also get a clear picture of performance using ERP without any difficulty. That makes it easy to implement the MES through our standardization approach no matter what kind of site we're dealing with, even places with limited inventory-management functions." The accounting division, which had always collected its information from individual local sources piece by piece, can now leverage the solution into a powerful, comprehensive information-gathering tool—one that reinforces the legitimacy of the company's accounting reports and financial statements through the benefits of uniform consolidation.

USING DELMIA APRISO AS A CORE MES MODEL AND STANDARDIZING GLOBAL MANUFACTURING SYSTEMS

LIXIL is also looking into implementing Dassault Systèmes DELMIA Ortems scheduler, which could pair with DELMIA Apriso to enable real-time modifications to production-schedule planning in the execution phase. For Tamaki, real-time versatility is an invaluable asset. "Say a facility just stops working all of a sudden. If you're using a consumer packaged system, you have to run batch processes that can take anywhere from half a day to a full day," he says. "LIXIL doesn't have the luxury to shut things down for that long, considering how many quick-delivery products we offer. When we run into something like that, we have to send people straight to the production floor and

cancel the existing orders. DELMIA Ortems would eliminate the need to go to the point of production, which would streamline the whole schedule-modification process and boost overall productivity."

Looking ahead, LIXIL will be able to monitor its inventory on a company-wide basis as the relevant inventory information converges into a more centralized framework with the accounting division as the primary hub. The processes of formulating plans and issuing site orders will run more smoothly, too, as personnel will be able to link information and reflect trends from one plan to the next more effectively. Higher-precision planning, a natural offshoot of those improvements, will allow LIXIL to present its customers with accurate turnaround estimates and better quality performance—which the company sees as vital ingredients to improvements in customer satisfaction. "DELMIA Apriso is a core model for the global MES framework of the future," Yamafuji says. "We want to see where it can take us. As operating systems change and the technological infrastructure evolves, we hope DELMIA Apriso keeps on functioning as a cutting-edge platform. Ten years from now, I'm hoping that we'll be looking back on our decision to go with DELMIA Apriso as the right move at the right time."

Through its implementation project, LIXIL is hoping to overhaul its domestic mission critical system, standardize its global manufacturing systems, and take its global management structure to the next level of sophistication. The company continues to train its sights on exploring possibilities and growing its business activities with a sense of responsibility, always striving to provide well-conceived products and designs—thoroughly rooted in the consumer perspective—that can make life more comfortable and fulfilling for people around the world.

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