

Factory of the Future: Another Day in the Life in 2022

by Michael Glessner and Nick Ward

Smart factories, enabled by digital technologies and concepts, may not be as futuristic as you think. More and more companies are seeing real business value from initiatives related to augmented and mixed reality, overall equipment effectiveness, product lifecycle intelligence, and robotic process automation.

Need inspiration to get started? Here's our vision of the factory of the future, and the people and processes that will be impacted.

Two years ago, we published an article about [The Factory of the Future: A Day in the Life of a Plant Manager in 2020](#), which introduced our vision for what the factory of the future could look like. Now that two years have passed, it's time to revisit Bill and his team at Stuart Sprockets to see how they have continued to improve their operations.

6:20 AM

Bill sips from his tall mug of coffee as he squeezes through the turnstiles on his way to his office in the Stuart Sprockets plant. Bill always feels pride walking into the plant where he had spent his whole career, starting as a maintenance technician over 20 years prior. Bill rose quickly through the ranks at Stuart, and in his current role as Senior Director of Development/Operations, he is responsible for the design and production of all the products that are produced in the facility. Bill has long held a reputation as a visionary when it comes to implementing digital technology to drive steady improvement in his plant's results, and consequently, his plant had become a kind of staging ground for experimenting with big new ideas.

Bill has always found something magical about walking on the shop floor in the calm minutes before production begins for the day. He soaks in the sights for a few more seconds before switching on his mixed reality smart safety glasses and scanning the floor. Real-time results on several key performance indicators and other metrics overlay his field of vision, allowing him to quickly spot process issues.

In recent years, Bill has invested in a mixed reality system, and now all associates wear a pair of smart safety glasses daily. Through this program, Bill unlocked immense value by making real-time data and information available to everyone, along with many benefits including improved data-based decision making, faster training of new associates, and giving everyone the tools to be a problem solver.

As Bill's eyes scan across Machining Center #1, across the aisle he notices some particularly good numbers. "Morning Bill!" comes a cheerful voice from behind a floating green 9 from the quality metric on Bill's display. It's Christine—the plant's maintenance manager. When Bill joins her (after crossing the aisle in a designated crosswalk), Christine highlights the results from the previous night's run on that equipment. It's a new record output for a single shift.

"Good stuff Christine," Bill says. For the past five plus years, Bill and Christine have integrated more and more of their plant's equipment into their Internet of Things (IoT) platform. They started by simply collecting data and using it to draw conclusions on production runs that had already happened (much like what they were doing right now). Eventually, they used the data along with a machine learning algorithm to predict when machine components would break down. Additionally, in the past year, Christine's team has started to use the data to optimize the production settings of their machines to reduce scrap. The model has grown to be more and more sophisticated, taking into account factors like ambient temperature and humidity, the variable properties of raw materials, and which operators are running the machines. As the pilot for the program, Machining Center #1 has shown very promising results. They have plans to roll this program out to the rest of the factory over the next year.

7:10 AM

Much can be said about emerging technologies, but there is still no substitute for people being co-located to solve problems. For that reason, Bill considers the daily production meeting to be a critical part of every day. Stepping into the designated corner on the shop floor, Bill scans the walls with his smart safety glasses. The walls are set up to be overlaid with the production results from the previous day, including trends and production alerts. Bill has arrived a few minutes late, and the stamping department manager, Jose, is giving his daily report. The centerpiece of the report is a single metric—overall equipment effectiveness (OEE).

OEE is a single metric that factors in the availability, performance and quality of a plant. OEE is not a new concept—it originally came out of the total productive maintenance systems that began in Japan in the 1960s. However, it never really caught on at Stuart until recently. As it essentially reports how effectively a manufacturing facility is utilized, Bill has found that OEE is a great way to measure the improvements that his multifaceted smart factory initiatives have made in his plant's bottom line.

OEE is now calculated daily for each department, and for the plant as a whole. Bill sees it mostly as a metric for self-improvement. There is little to be gained by comparing the raw numbers across departments or plants, but Bill expects each of his managers to improve their department's OEE each quarter. He has seen his plant's OEE creep up over 80% in recent years, which he considers to be approaching

world class, but he knows there is still much work to do to get there. After the meeting's conclusion, Bill mingles with his managers for a few minutes before heading back to his office for his next meeting.

11:15 AM

In order to build strong connections with his people, Bill tries to eat lunch each day with a different group within his team. Today he is hoping to sit with some members of his [product lifecycle intelligence](#) (PLI) task force. He is presenting the exciting results of their work to the CEO in two weeks and wants to check in on how things are coming along. He sees several PLI team members at their usual table in the corner of the cafeteria and slides into an unoccupied seat.

About 10 years ago, Stuart Sprockets invested in an enterprise-wide product lifecycle management (PLM) system to capture product data from the early stages of sales and design through manufacturing and customers in the field. Then, one year ago, after attending a consulting training seminar on data analytics, one of Bill's managers came back with an exciting idea. He knew that with years of product design and change order data in the PLM, they were sitting on a potential treasure trove of actionable insights that could be unlocked by employing data science techniques. They launched a PLI initiative based on the concepts presented in the training session, and set up a task force to study how they could put the data to use.

The PLI task force started slowly. As a pilot project, they decided to try to optimize the lead time for product change orders. They pulled 10 years of change over and workflow data from the PLM system and used it to build a model designed to optimize lead time. They performed historical diagnostics and gained some unexpected insights, including: "If the month a change order is initiated is Nov or Dec, it takes 60% longer," and "If there is an international resource assigned to any task, it takes 70-80% longer." These insights were fed to the product engineering management team to help aid with their work scheduling.

Next, the team amended the model to predict how long change orders would take based on the characteristics of the change and the resources that had been assigned to it. Over the past four months, the PLI team has been validating the results of their predictive model by comparing predictions with how long the change orders actually took. While the preliminary results are very promising (they currently see a correlation of around 0.7 between the model and reality), they are gaining additional insights and tweaking the model to make it even better. The expected end results include faster product development times and more accurate line scheduling.

The next steps are twofold: first, they are working with IT to embed predictive analytics results in the PLM system so that change owners can see predicted lead times before creating change orders. And at the same time, they are working on making the model prescriptive. Bill's vision is that in the future, the system will recommend the optimal resources when creating a change order.

Satisfied with what he hears from the PLI team (and his excellent Chile con Carne and baked potato), Bill steers the conversation topic away from work and towards the increasingly hopeless prospects of the local football team. Bill is confident that his upcoming presentation to the CEO will go well, and assuming it does, he plans to institutionalize this new capability by transforming the task force into a department during the next budget funding cycle.

3:20 PM

Walking back towards his desk, Bill notices a flashing red production alert in his smart safety glasses above a machining center two aisles over. He can see that the supervisor has been alerted, and that maintenance and engineering support are on their way. With confidence that the issue is handled, he continues towards his desk.

As Bill steps into the main plant office on his way to his desk, he reflects on how different the space looks compared a decade ago. What was once a room packed from wall to wall with tight rows of cubicles, is now mostly open with some desks and many shared workspaces. The transition started when Bill's predecessor as plant manager ordered most manufacturing managers to relocate to the shop floor, so they would spend more time problem solving and engaging with their team members.

However, since Bill embraced the potential to automate administrative tasks very early on, this effort has yielded the biggest impact. As a maintenance technician in his early days, Bill was on the front lines of the automation of the plant's manufacturing processes. He installed countless robots which proved capable of producing parts at lower cost and higher quality level, while enabling workers to focus on problem solving instead of loading parts. Bill knew that these same principles would also apply to administrative tasks, and several years ago engaged a business partner to help him study what could be done. The team identified the most repetitive and rote parts of administrative roles—like purchasing and line scheduling—and began to streamline them. Several tasks were automated using a robotic process automation (RPA) toolset, which freed workers to spend their time on more critical activities like problem solving, new product introductions and design transfers.

Bill knows from his maintenance days that automation is not a cure-all. The key is simplifying processes before automating, while being mindful in the design of human-computer interfaces. Additionally, great care must be taken in selecting which processes to automate—in order to minimize the risk that removing the human element from a process may lead to a loss in creativity. However, the results have spoken for themselves. Administrative headcount has dropped by 15% since the beginning of the RPA journey, and workers in affected roles reported higher job satisfaction because they could spend more of their time on creative problem solving as opposed to repetitive clicks in a system.

5:30 PM

Bill makes a few final touches to the monthly presentation that he had been working on all week and sends it off to the CEO. He is proud of the strides his plant has made in the past two years, particularly in embracing technological advances in smart connected manufacturing and data analytics.

Bill packs up his things and heads to the parking lot, destined for his daughter's final soccer game of the season. He knows that as one of the leaders of Stuart's transition to a fully digital manufacturer, he needs to continually evaluate new and emerging technologies to stay in front of the competition. In a digital world, Stuart cannot continue to rely on traditional manufacturing methods to compete and win in the market, and it is the responsibility of leaders like Bill to [guide the team through the digital wilderness](#).

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