

Scaling Production Capacity With Software Driven Automation

[White Paper](#)

Manufacturing has reached an inflection point. Demand for electronics products is exploding while at the same time we're experiencing a labor shortage crisis. This imbalance makes it very difficult for companies to fulfill customer orders using traditional assembly approaches which rely heavily on human operators. Finding a strategic, long-term solution that fundamentally changes the factory processes requires an exploration of new, more modern approaches. The answer lies in automation.

Automation itself has seen significant innovations. It is going from a hardware-first to a software-first approach bringing with it the benefit of flexibility. In this paper, we'll review a case study showing how software driven automation was used to help a manufacturer resolve challenges they faced and scale up production by making copies of the first line to quickly deploy additional new lines.



Case study

A global leader in single cup coffee makers was struggling to maintain a workforce with enough operators to assemble the number of units needed to meet growing demand. As part of the assembly process, the components of the coffee maker's shower head needed to be put together.



The assembly of the shower head was challenging. Proper assembly required the components to be precisely aligned during the assembly process. Human operators struggled to perform the assembly with proper alignment and that was resulting in a high number of defects being discovered further down the assembly line. Making matters worse, the manufacturer was struggling with absenteeism which made it difficult to know how many workers would be available for any given shift. Due to unpredictable staffing and a high defect rate, the manufacturer was experiencing inconsistent output and was looking to leverage automation as a solution to bring stability and enable scaling.

Challenges faced

Labor shortage making it difficult to scale



High defect rate



High variance on number of units produced per shift



Software Driven Automation

Brightware™



To address the challenge that the coffee maker manufacturer was facing, the Bright Machines team used their Brightware software platform to configure modular robotic cells along with material feeding and conveying systems to implement software driven automation capable of assembling the coffee maker's shower head subassembly. Specifically, the microfactory consisted of three stations which together performed the necessary pick and place and screwdriving operations.

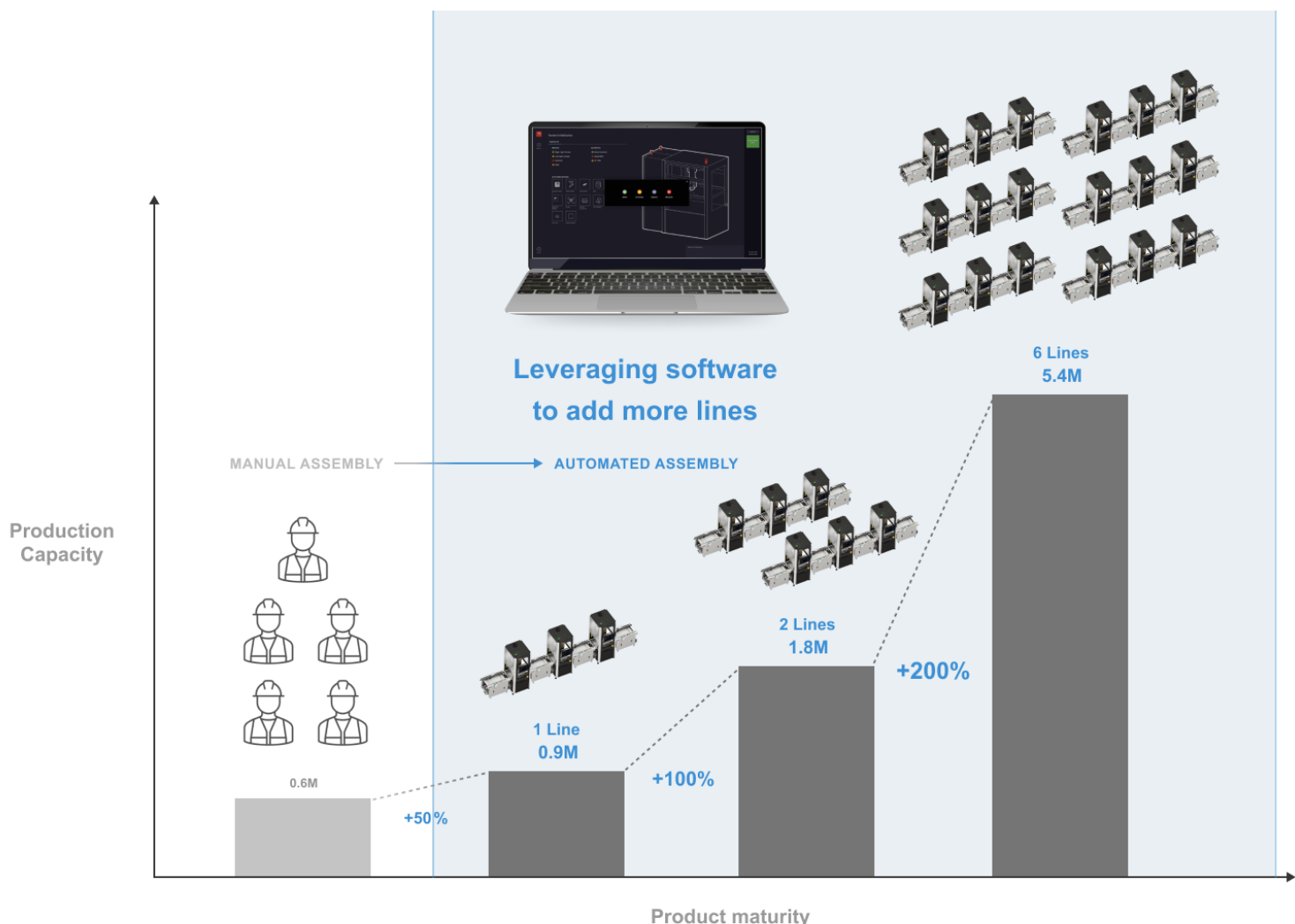
Station 1 used machine vision to guide a robotic arm to pick and place two plastic components, properly aligned them, and screwed them together. Stations 2 and 3 performed additional screwdriving operations on the plastic components, using advanced techniques to control the angle insertion and torque applied. The microfactory provided a stable process which increased throughput, from 120 units per hour to 180 units per hour, while also improving quality going from a 60% yield to a 98% yield. The number of human operators required per shift was reduced from 5 to 0.5, eliminating an entire shift and providing the flexibility to use the extra shift to handle things like seasonal demands and unexpected demand surges.

Bright Machines Microfactory



Scaling up capacity

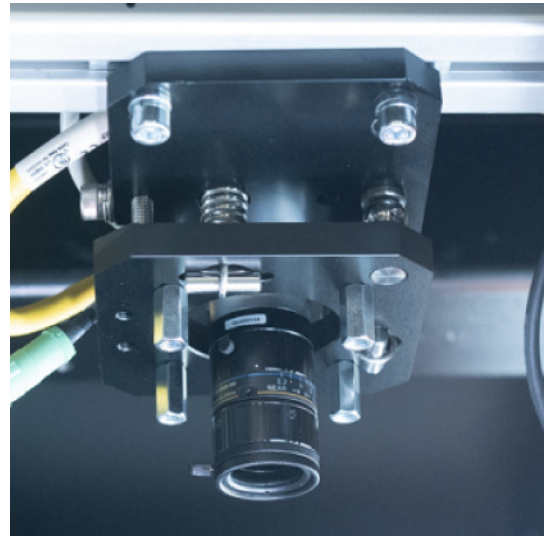
The coffee maker manufacturer was originally using five human operators to put together the shower head subassemblies. The five human operators could make 120 units per hour so when running two shifts could make 0.6M units per year. Using a Bright Machines Microfactory, one line could produce 180 units per hour which led to a 50% increase in capacity resulting in 0.9M units per year. Not only was the capacity increased but the output was also much more reliable as they were no longer plagued with the absenteeism and product defect issues which they had been experiencing with their manual assembly process. In a second phase of automation deployment, another Bright Machines Microfactory line was added. Since microfactories are built using standard hardware modules and because they are configured using software, the copy exact line could be deployed very quickly leveraging the same Brightware production recipe used on the first line. With the second line added, the capacity doubled to 1.8M units per year. With growing demand for their coffee maker, the manufacturer needed to keep scaling up capacity and therefore added four more lines. Again, these lines could be deployed quickly using the same copy exact approach. With six lines, the manufacturer had access to capacity enabling them to build 5.4M units per year.



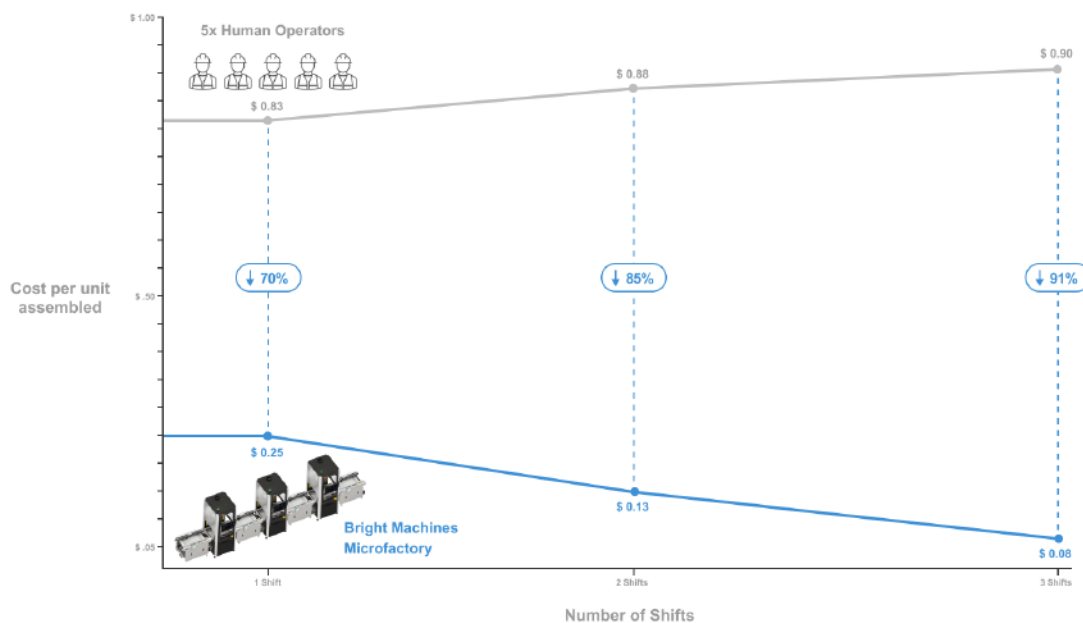
Other benefits

Stabilizing production output and enabling the ability to scale up capacity to meet growing demand were the main reasons why the coffee maker manufacturer sought to automate the shower head subassembly process. However, there were other benefits that were gained with the new automated lines.

First, the automated lines had built in machine vision. The machine vision was used to perform the precise alignment of the components during the assembly process which helped reduce the defect rate; however, machine vision was also used to perform inspection which further reduced the defect rate as it ensured success at each step of the process.



Second, the staffing required was greatly reduced with the new automated line. With the previous manual assembly approach, it took five operators per shift. Since operators on the second and third shifts were paid a premium, the cost per unit produced increased as more shifts were added. However, the same Bright Machines Microfactory could be used across all three shifts resulting in a lower cost per unit produced as more shifts were added.



Software driven automation is a powerful new approach to solving for today's challenges on the assembly line. The flexibility to quickly configure modular hardware enables fast deployment of the first line which can then be leveraged to do a copy exact creating more lines as needed to satisfy product demand. In addition to providing the scalability required, software driven automation is a great tool to improve product quality and to become more cost competitive.