

# Solving Reshoring Challenges: Utilizing PDMS for Faster Ramp-Up



**For decades**, companies expanded on a global scale and took advantage of the benefits of a multi-national supply chain. Manufacturing could be moved closer to raw materials, or near sources of cheap labor. However, the COVID-19 pandemic completely crashed the global supply chain and some industries are still struggling to recover. A June 23<sup>rd</sup> article on Assembly Magazine's website cited a Thomas survey which reported 64% of manufacturers are likely to reshore production to North America. Since then, we have seen this trend first hand with manufacturers choosing stability and reshoring critical component and sub-assembly production from areas that were struggling to meet their demand.

However, there are challenges to reshoring these projects with tight budgets, strict timelines, and lack of resources. At Tutelar Technologies, our Ujigami Product Directed Manufacturing Software (PDMS) is the solution to these challenges and has allowed our customers to remain flexible while achieving faster ramp-up.

Tutelar recently assisted the world's largest producer of residential and commercial gasoline engines in shifting the production of their most complex commercial engine from overseas to the Southeastern United States. Previously, it wasn't believed that complex commercial engines could be manufactured in the US with competitive pricing and quality. The complexity and variation of these engines presented an important quality challenge: ensuring that the correct setup, components, and process sequences are executed for each part model and options, regardless of scheduling mix. A key decision was made to implement Ujigami's next generation plant-floor manufacturing software solution to drive the success of these conflicting requirements.

During the planning stages of the project while our customer developed a new control plan, process flow, and work instructions for these new assembly lines, Tutelar was there to assist by providing industry best-practices and consulting experience. The configurable nature of the Ujigami PDMS software meant that while the customer focused on the engineering involved, the Tutelar team worked cooperatively to configure the power and intelligence of Ujigami. This synchronous timeline made it possible to launch this new commercial engine assembly line with full active controls from Day 1.

The PDMS implementation truly shined on this reshoring project during the test build and ramp-up phases. With so many moving parts and model variations to develop processes for, there were inevitably a number of changes made throughout the test building stage. However, with the flexibility of Ujigami, those changes were able to be immediately implemented as soon as they were discovered – right on the manufacturing floor. Subsequent test builds did not require training and re-training the operators, Ujigami simply controls the process with the new updates to exact specifications every time. The customer was incredibly impressed and was able to shorten their ramp-up period significantly as the operator learning curve was significantly

reduced, all while Ujigami actively controls mistake-proofing and quality. This was perhaps the largest ROI and greatest impact for the project.

---

*“Subsequent test builds did not require training and re-training the operators, Ujigami simply controls the process with the new updates to exact specifications every time.”*

---

The core piece of Ujigami that was critical to the success of this high-mix commercial engine project was the active control and mistake-proofing of the process. This customer’s normal production methodologies are very high volume “pick and place” assembly lines with little variation and little control. However, the complexity of these commercial engines necessitated a highly controlled process involving ethernet connected torque tools, a controlled conveyor, part selection + verification, testing control, and more. Ujigami’s intelligence and control provides zero defect manufacturing at the process level, for instance: a typical station begins with an RFID reader scanning the pallet as the engine enters the station. From this RFID tag, Ujigami calculates all requirements and work instructions for this specific model and begins to walk the operator through the process. As critical torque steps occur, Ujigami enables the

power tool to power on, selects the correct Pset recipe-and displays an image of the specific bolt to torque on the operator screen. If the torque meets specifications, then Ujigami automatically advances to the next step. However, if torque is higher or lower than spec, Ujigami enforces the control plan for this specific bolt; for example, the customer may allow a limited number of retries, or may flag a supervisor for inspection and rework. In addition to this specific process control, Ujigami's knowledge of the entire assembly process allows mistake-proofing between stations. If an incomplete engine is manually bypassed through a station and appears at the next station, Ujigami will notify the operator that previous tasks are incomplete and not allow further work to be done to the engine. Furthermore, if a defect is applied or a critical task fails at a station, it is virtually tagged and automatically redirected to repair at the next possible spur. This advanced logic and control is-critical to the success of the project and enabled the decision to reshore the engine models.

---

*"The rapid ramp-up, mistake-proofing and control, and on-demand scheduling from MES were critical to achieving production goals and provides a rapid ROI for this commercial engine project."*

---

A final requirement for this reshoring project was for the new assembly line to incorporate on-demand scheduling and production, in order to lower inventory levels and shorten delivery time. This customer had not previously used such a strategy, and so leaned on the expertise of Tutelar and the Ujigami system to provide the framework and control to make it successful. Ujigami interfaces with this customer's ERP system to pull the latest BOM data and production orders every 24 hours. The operator at station 1 works from the Ujigami schedule, and scans a finished good number which Ujigami assigns to a pallet – immediately Ujigami calculates every task, part, and process that needs to be completed across the assembly line to create the required finished good. An ERP transaction is performed to backflush the part number into WIP, and once completed the part is backflushed as finished good inventory, ready to ship. This on demand scheduling like all facets of Ujigami is flexible by nature. Very recently, this customer changed the way they wanted to schedule their sub-assemblies, and Ujigami was able to be reconfigured to adapt to this change in process out-of-the-box without further programming or investment. This is a great example of how Ujigami ensures success on Day 1, while still being flexible to adapt to future demands.

Overall, the resulting success of this project has been a paradigm shift for the industry and has positioned this customer well ahead of the reshoring trend. The rapid ramp-up, mistake-proofing and control, and on-demand scheduling from MES were critical to achieving production goals and provides a rapid ROI for this commercial engine project. Even under the current strains on our industry, Ujigami customers like this one continue to add workstations and new capability because they understand how important an MES investment is to their production and success.

Tutelar has provided cutting-edge plant-floor software solutions to the manufacturing and distribution industries for over 15 years, and even in this changing global manufacturing landscape we look forward to continued success with our customers as they leverage our Industry 4.0 technology to solve their assembly challenges. To find out how our Ujigami system can bring the highest levels of quality, performance, and efficiency to your facility, contact us at [sales@watchover.us](mailto:sales@watchover.us) or visit our website.

