

Standard Work for High Mix Low Volume Manufacturing



BUSINESS PROBLEM

The thermoset composite industry currently faces rapid demand growth. Because the lamination process for TSC components in high-mix low-volume operations is highly manual, this demand surge will require a substantial increase in skilled labor forces which risks straining existing capacity and undermining quality; a challenge currently faced by Re:Build Composite Resources. Under these conditions, a major problem becomes how the business can systematically scale and up-skill its labor force to meet escalating demand while preserving product quality and improving overall efficiency.

DATA SOURCES

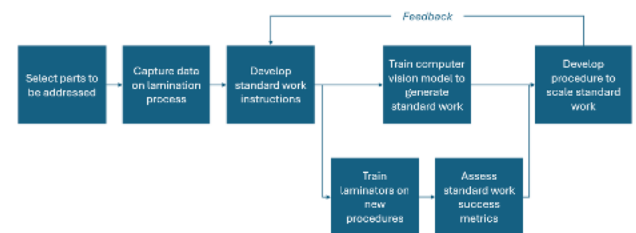
We had production data available from CR's Job Boss ERP system including material and labor costs, revenue, production volume, and time logs. We also had access to a spreadsheet the quality department used to track scrapped parts. In addition, we manually observed processes and captured videos that served as a baseline dataset for the cycle times and the current state.

Data Types and Format

Production data spreadsheets, videos of processes, notes from operator interviews.

APPROACH

We investigated the efficacy of formalizing best practices through standard work at scale. We aimed to develop a prioritization process to identify addressable parts and a robust framework for efficiently deploying standard work methodologies that can facilitate more effective training, reduce variability, minimize scrap, and improve productivity for high-mix low-volume operations.



IMPACT

Standard work at Composite Resources significantly improved quality and production consistency for a selected pilot part. For this part, work instructions for a new "best-known" process helped decrease the scrap rate by over 50% from previous months, while production volume simultaneously increased. For Part B, designing a one-piece flow schedule has prepared CR to increase throughput to meet growing customer demand in 2025. Beyond immediate gains, the thesis presents a framework for scaling standard work across the business' portfolio by prioritizing part groupings according to business impact—focusing on high-cost or high-volume parts. The proposed frameworks for standard work implementation and scaling position CR for demand expansion while maintaining or even improving quality and efficiency.

DRIVERS

The business and thermoset composites market as a whole are growing. This has created the need to implement methods to help scale the labor force and production volume while still continuing to improve quality.

BARRIERS

Batched tracking of parts was a barrier to our project. Parts involved in our project were tracked, moved, and inspected in quantities of around 30 pieces. This practice impacted our ability to perform root cause analysis for defects at the operator and part level. Additionally, due to customer constraints, production for the second part addressed was paused until the start of 2025 which prevented implementation of the one-piece flow schedule.

ENABLERS

The culture at CR was a major enabler for our project; everyone from plant floor operators up to the GM was open to new ways of doing things and wanted to improve processes which allowed for support of my project. The lamination department leadership team was also key to implementing and sustaining proposed process changes. Finally, my managers and the IT team at CR made onboarding seamless from day one.

ACTIONS



Training and auditing were the most significant actions we took to implement our solution. We held a group training for all operators to introduce the new process and work instructions. We selected an experienced operator to lead the training and ensured leadership was present to communicate buy-in. We then set up process audits led by department leadership to ensure that process changes were sustained.

INNOVATION

We explored the use of computer vision to automate time-study analyses. This would serve as a tool to expedite the development of standard work instructions. However, our research found the current state and cost of computer vision software solutions were not applicable to CR's operation.

IMPROVEMENT

Standard work instructions helped reduce the monthly scrap rate from an average of greater than 20% to less than 5% for the first pilot part. The solution also contributed to an over 70% increase in monthly shipped volume to that same customer. We could not implement the one-piece flow schedule for the second pilot part, however simulations show it is likely to improve daily production volume and consistency.

BEST PRACTICES

Start with prioritization. Developing standard work consumes time from engineers so it is critical to make sure such efforts are directed to the parts that will have the greatest business impact. Further, when developing new processes, start by building a relationship with operators and understanding why they do things a certain way before suggesting any changes. Often, operators are the best source for process improvement opportunities.

OTHER APPLICATIONS

Our standard work frameworks could be applied in other high-mix low-volume operations by following the prioritization matrix presented in our research.