

V Technical Textiles, Inc. maps out material and data flows to improve operational processes



Company	Sector	Size	Location
V Technical Textiles, Inc.	Conductive textiles for the electronics industry	Less than 100 employees	Newark, New York

At a glance

- Faced with increasing demand, V Technical Textiles, Inc. (VTT) discovered that its existing shop-floor, production, and inventory processes were limiting its ability to grow. To address that barrier, VTT's leadership began exploring strategies to facilitate continued growth, which included Industry 4.0 solutions, and decided to work with [Rochester Institute of Technology's \(RIT\) Industry 4.0 Transition Assistance Program](#).
- After a preliminary discussion, RIT suggested conducting a material and information flow analysis to characterize the company's current state in order to identify opportunities to better leverage digital technologies.
- Material and information flow analysis uses intuitive diagrams to depict an entire process or workflow, showing the who, what, when, and where across a business's operations. The analysis pinpointed areas within VTT's business and manufacturing processes that affect robustness, throughput, and productivity.
- The flow analysis also proved valuable for defining key performance indicators (KPIs), and allowing VTT's leadership to prioritize those that are most important to meeting the company's business goals.
- The analysis of VTT's operations uncovered the degree to which its business processes were manual and disconnected. This led RIT to recommend implementation of an enterprise resource planning (ERP) system to better synchronize and automate manufacturing-process planning and execution.

Company

V Technical Textiles, Inc. (VTT) manufactures an array of products that require conductive textiles, a class of fabric woven with different materials to support electronic applications. A full-service design, cut, and sew manufacturer, VTT's product range encompasses portable radiofrequency (RF) shielding enclosures, curtains, pouches, bags, and specialized clothing. The company's customers include contractors for the U.S. Department of Defense, such as satellite developers and manufacturers of high-tech communications equipment.

Business challenge

Due to growing demand, VTT had outgrown its existing manufacturing and business processes. The company's leaderships engaged RIT's Industry 4.0 Program to find opportunities for improvement. At that time, the firm's production data were manually entered into paper "job packets" and spreadsheets to record manufacturing status, track inventory use, schedule tasks, and track customer quotes and orders. A separate software system (Intuit QuickBooks) was used for finance and purchasing activities. Most of the shop-floor records were paper-based, which is both time-consuming to manage and prone to errors.

VTT's leadership reached out to RIT because they sought to improve the consistency and timing of manufacturing processes and enhance information flow between the production floor and business processes. They also wanted to identify KPIs to drive overall business improvement and find an effective way to calculate them on a timely basis.

The Industry 4.0 solution: An enterprise resource planning (ERP) system

An ERP system is a sophisticated digital software platform for overseeing day-to-day manufacturing operations. By synchronizing data and processes across an organization, an ERP system can eliminate redundancy, uphold data integrity, and provide a level of automation of administrative processes. ERP systems have evolved into an indispensable operations management tool for the manufacturing enterprise. An ERP system is the centerpiece of digital manufacturing and is a prerequisite for scaling Industry 4.0 solutions across operations.

An ERP can support a variety of activities, including the following:

- customer relationship management
- work-order management and tracking
- accounting
- procurement
- inventory and supply-chain management
- risk mitigation
- compliance

"Recognizing the need to modernize our business processes, we faced the challenge of determining how to begin. Thankfully, the RIT engineers provided the clarity and confidence we required to evaluate digital tools to facilitate this transformative journey."

Gretchen Reed, Project Manager, V Technical Textiles, Inc.

Why implement an enterprise resource planning (ERP) system?

- **Integrated information:** An ERP system can gather an organization's information from across all departments and consolidates it into a single source. This makes it easier to share consistent, accurate, and timely data regardless of business size.
- **Increased productivity:** It can automate support and operational work flows to improve accuracy and reduce time. Stakeholders within a company can access key information when they need it to support timely and data-informed decision-making.
- **Automated reporting and planning:** An ERP system can facilitate on-the-spot data analysis and automatically generate more timely and accurate reports—all without the intervention of an information technology expert. This can help analysts identify root causes, develop solutions quickly, and discover emerging opportunities.

Approach

In order to find opportunities for improving VTT's shop-floor and business processes, the RIT team conducted a material and information flow analysis. This careful examination of VTT's processes entailed exploratory interviews and more in-depth discussions with process owners to understand the challenges they encountered in order to pinpoint any recurring themes. RIT also closely observed and documented material and information flows in and between VTT's administrative, business support, and shop-floor processes.

The analysis led to a detailed, visual representation of VTT's operations that uncovered barriers and opportunities concerning the flow of material and information across the organization. Diagrams were used to visualize these flows in order to display how critical information was generated, collected, stored, and managed. RIT used the results of the study to build a future-state scenario for VTT, which included a series of recommendations to improve the consistency, visibility, and timeliness of information flows

RIT's next step was to select relevant KPIs that VTT could use to measure progress towards overall operational improvement goals. An important consideration during this process was to link the KPIs to the future-state material and information flow analysis to ensure that they could be accurately calculated on a timely basis.

Project results

The results of RIT's material and information analysis presented VTT with a new, more detailed view of the company's operations. So much so, that VTT's leadership added five new business processes to the seven they had originally identified. The analysis revealed that effectively managing the data flow between these core business processes was quite demanding and that existing procedures were inadequate. In addition to the flow of data between processes, some concern was also expressed over the management of inventory of silver-coated fabric, a critical component of VTT's product.



Often, non-value-added processes are difficult to address because they aren't always apparent. Material and information flow analysis is an effective method for recognizing these operational inefficiencies. Equally important, this analysis sheds light on gaps in process documentation and information capture, whether at the macro-level, like a key operational process, or at the micro-level, like a single task in a workflow. For example, VTT was unable to accurately track actual job hours logged against a job, or how much raw material was been consumed. The information flow analysis uncovers such missing steps in a clear, visual way.

Using the results of the flow analysis, RIT recommended the following steps to improve VTT's overall process efficiency, consistency, and traceability:

- Eliminate generation of low-value data at individual work centers that is not used by subsequent work centers or required by business processes.
- Track important work center performance metrics system using an enterprise resource planning (ERP) system and automate where possible.
- Create an order-variance process to verify the actual shop-floor performance at each work center with the quoted labor and material volumes, by work order. Track job profitability and quote accuracy. Create a new process to improve quote accuracy, if warranted.
- Develop a capacity-utilization and planning process to better balance the workforce with future order volume and to reduce reliance on overtime usage.
- Track lead conversions to improve competitiveness of quotes.
- Set up automated inventory management processes using warehouse management system (WMS) software.

RIT's next goal was to define KPIs that aligned with VTT's near-term business-growth objectives while continuing to meet all customer expectations concerning cost, quality, and lead time. There are hundreds of different KPIs that are typically used in manufacturing. It's important to select KPIs that are measurable, directly related to business objectives, and that provide an actionable path to manage or improve them. In line with the targeted improvement areas, the following KPIs were selected by VTT from a list of candidate KPIs selected by RIT:

KPI 1 - Capacity Utilization: To provide feedback on work-order scheduling and resource forecasting effectiveness.

KPI 2 - Order Variance: To improve quote accuracy and profitability by validating labor and materials for completed work orders.

KPI 3 - Lead Conversion Rate: To manage resource effectiveness in converting leads into orders.

The three newly defined KPIs allowed VTT to track valuable process data and improve the management of workflows and shop-floor processes. The company manually calculated these new KPIs over the prior year to better understand their baseline performance and provide context going forward. The findings created confidence in the selected KPIs and proved their value as improvement drivers. RIT recommended that VTT consider implementing an ERP system to facilitate KPI calculation and tracking, and to ultimately realize more efficient processes and documentation.


ERP implementation has the potential to open a new level of visibility, traceability, and planning for VTT's complex production process for conductive textiles; and to drive efficiency while reducing cost and lead time. For example, VTT's process relies on multiple specialized work centers. An ERP system would allow VTT's managers to better balance labor resources across all of them to avoid bottlenecks and improve labor efficiency. An ERP would also allow VTT to automate several manual tasks to free up staff time for more value-added activities. Overall, the system would offer a more real-time, data-driven picture of VTT's operations, from orders and inventory to resource planning and shipping. It would allow the company to shorten fulfillment time for the highly customized orders it delivers to clients like the National Aeronautics and Space Administration (NASA).

Next steps

VTT deemed the selection and implementation of ERP capabilities, such as centralized and automatic data storage and exchange, as essential to streamlining data management and fostering greater overall efficiency. In partnership with the RIT team, a follow-on project was launched to provide the firm with technical assistance to evaluate different ERP-software options to find a best-fit product for VTT. Findings from the initial project will be converted into system requirements and compared against features offered by candidate ERP platforms. This will inform a shortlist of relevant ERP vendors to contact for price quotes and product demonstrations to find the right solution.



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