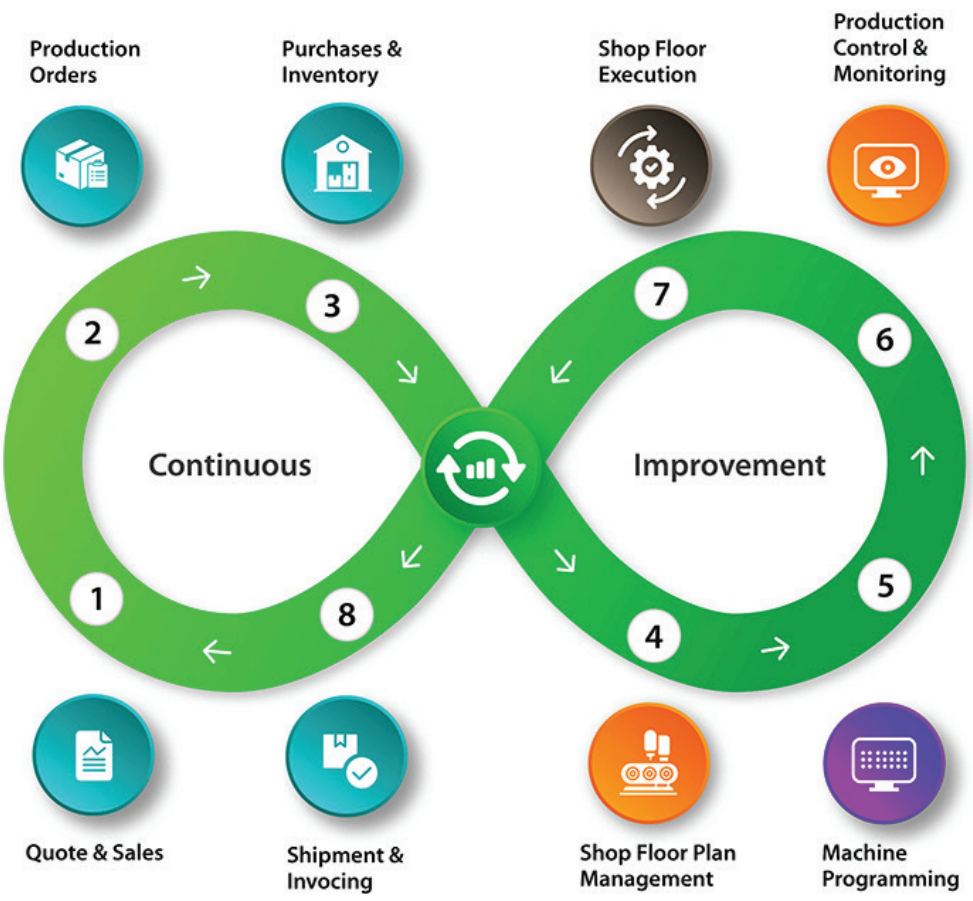
Bystronic

Optimizing End-to-End Metal Fabrication Processes with Innovative Software Solutions



Introduction

The metal fabrication industry is in the midst of a profound transformation, characterized by increasing demands for precision, efficiency, and cost-effectiveness. This white paper delves into the pivotal role of software solutions in managing the entire metal fabrication process, from initial quoting to the timely delivery of high-quality products. We emphasize the unique functions of each software module and their collaborative synergy in providing a holistic solution for sheet metal fabricators, ultimately resulting in a complete end-to-end fabrication solution.

The ability to optimize every facet of the fabrication process is critical. Sheet metal fabricators are confronted with growing demands for precision, efficiency, and cost-effectiveness, all while striving to meet tight delivery schedules. To thrive in this fiercely competitive environment, fabricators must turn to advanced software solutions to minimize waste, maximize productivity, and streamline operations.

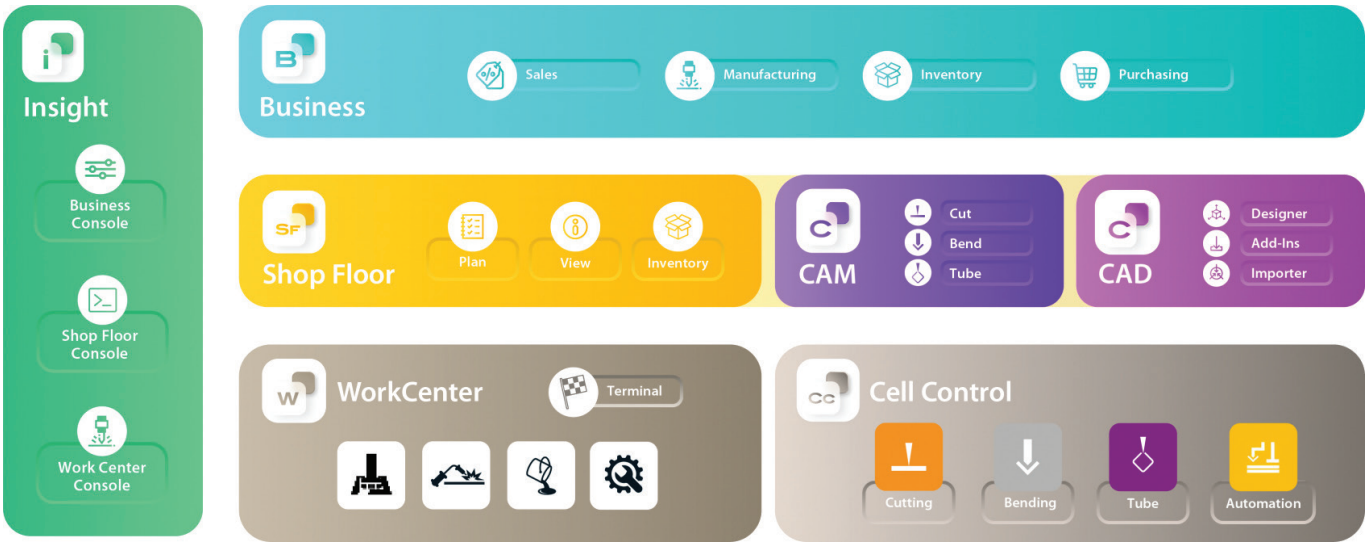
ERP: The Foundation of Efficiency

At the heart of every efficient metal fabrication process lies an effective Enterprise Resource Planning (ERP) system. ERP serves as the backbone of the operation, unifying various business aspects into a single, integrated platform. It acts as the central hub for information and decision-making, ensuring that data flows seamlessly between different departments.

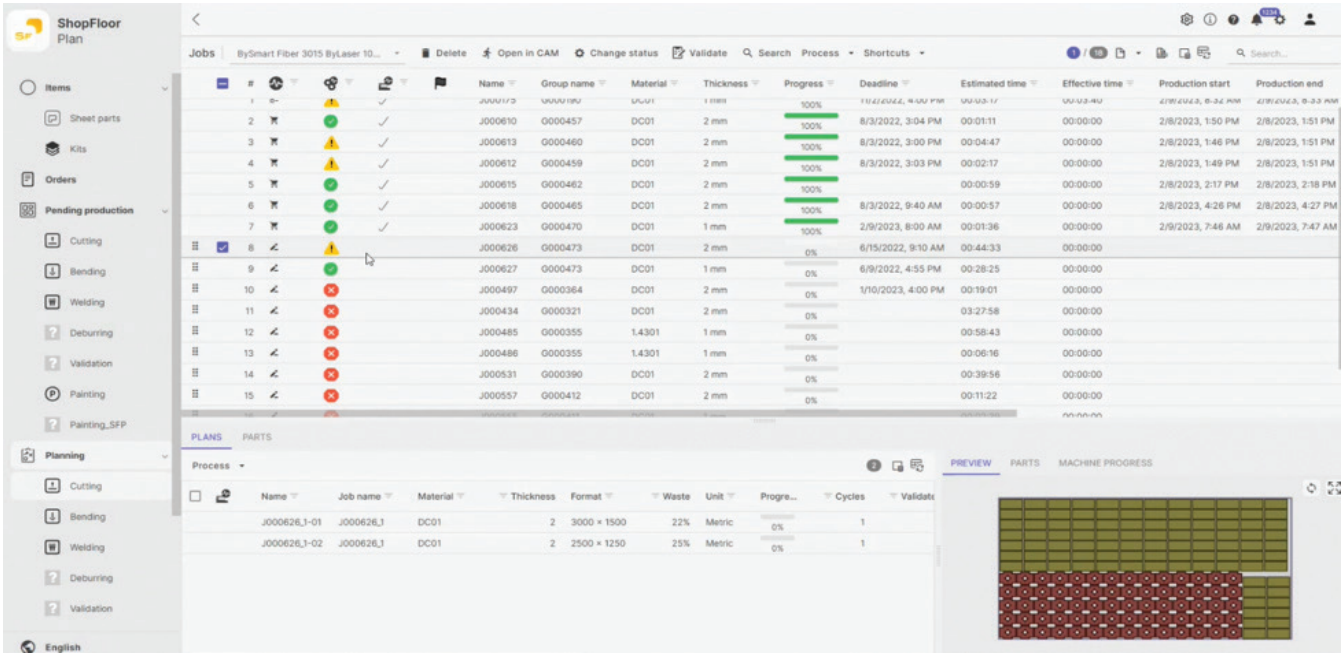
- Material Management: ERP software plays a crucial role in material management. It tracks inventory levels, manages material orders, and optimizes the allocation of resources. This ensures that fabricators have the right materials available when needed, eliminating costly delays caused by material shortages.

- Accurate Quoting: ERP systems facilitate the generation of accurate quotes by centralizing material requirements, part information, and delivery dates. By disseminating bill of materials and machine routings based on design files, ERP systems empower fabricators to calculate costs with precision. This accuracy is vital for winning competitive bids and maintaining profitability.

- Streamlined Front-End Processes: One of the primary benefits of ERP is the streamlining of front-end processes. From quote generation to order processing, ERP ensures efficient handling of customer requests and reduces the risk of bottlenecks. Quick turnaround times become the norm, setting the stage for a seamless fabrication journey.



Adapt to ever-changing and unpredictable market challenges, and make business decisions with more comprehensive and centralized data, by digitalizing your business from quote to delivery.



Streamline your workflow: MES evaluates the machine availability and the part status in real time and makes scheduling adjustments to all other parts requiring the same processes and machines.

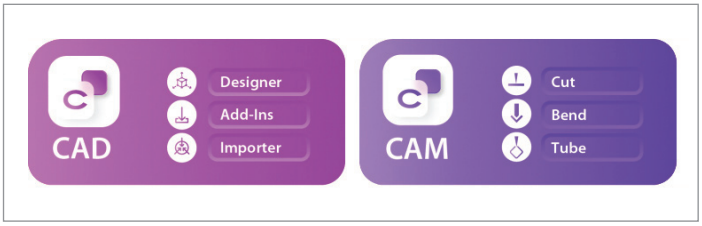
MES: Real-Time Control and Monitoring
Manufacturing Execution Systems (MES) are the engines of real-time control and monitoring in metal fabrication. These systems are the operational heart of the shop floor, ensuring that every facet of the fabrication process operates in harmony.

- Real-Time Scheduling: MES excels at real-time scheduling, adapting to changing demands and machine availability on the fly. It activates production jobs, prepares materials, and generates machine programs, all while factoring in real-time data. This ensures that fabricators meet delivery commitments with agility.

- Handling Hot Jobs Efficiently: In the fast-paced world of metal fabrication, hot jobs—urgent orders that require immediate processing—can disrupt existing schedules. MES, however, handles hot jobs with ease. It adjusts all other jobs, recalculates completion dates based on process times, and ensures that hot orders are processed promptly, maintaining customer satisfaction.

- Enhancing Machine Availability: MES software provides real-time insights into machine availability and performance. It allows fabricators to optimize machine usage, running multiple shifts and weekends with minimal supervision. The result is consistent machine availability and optimal production efficiency.

CAD/CAM: Precision in Design and Manufacturing
Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM) software are the artistic and precision tools in the metal fabricator's toolbox.



These software modules bridge the gap between design and fabrication, ensuring that the final product matches design specifications perfectly

- Design Precision: CAD software allows fabricators to create intricate part designs with precision. Whether it is intricate curves or complex geometries, CAD enables designers to craft components with meticulous accuracy. This precision is essential for ensuring that the end-product aligns with the intended design.

- Generating Machine Programs: CAM software takes CAD designs and translates them into machine-specific programs. These programs guide cutting, bending, and welding processes with the utmost precision. CAM software ensures that the design intent is faithfully executed on the shop floor.

- Seamless Design-to-Fabrication: The integration of CAD/CAM with other software modules, such as ERP and MES, ensures a seamless transition from design to fabrication. Data flows effortlessly from the design phase to the production floor, reducing the risk of errors and miscommunication. This integration is crucial for achieving a complete end-to-end fabrication solution.

The End-to-End Fabrication Process

From the moment a customer submits a request for a quote to the delivery of the finished product, the metal fabrication process is a complex web of interconnected stages. Each software module plays a specific role at various points along this journey, contributing to a streamlined and efficient workflow. ERP's ability to generate accurate quotes based on material requirements and part information sets the stage for a successful project. CAD/CAM ensures that design specifications are faithfully translated into these quotes, and MES starts scheduling production even before the job is won.

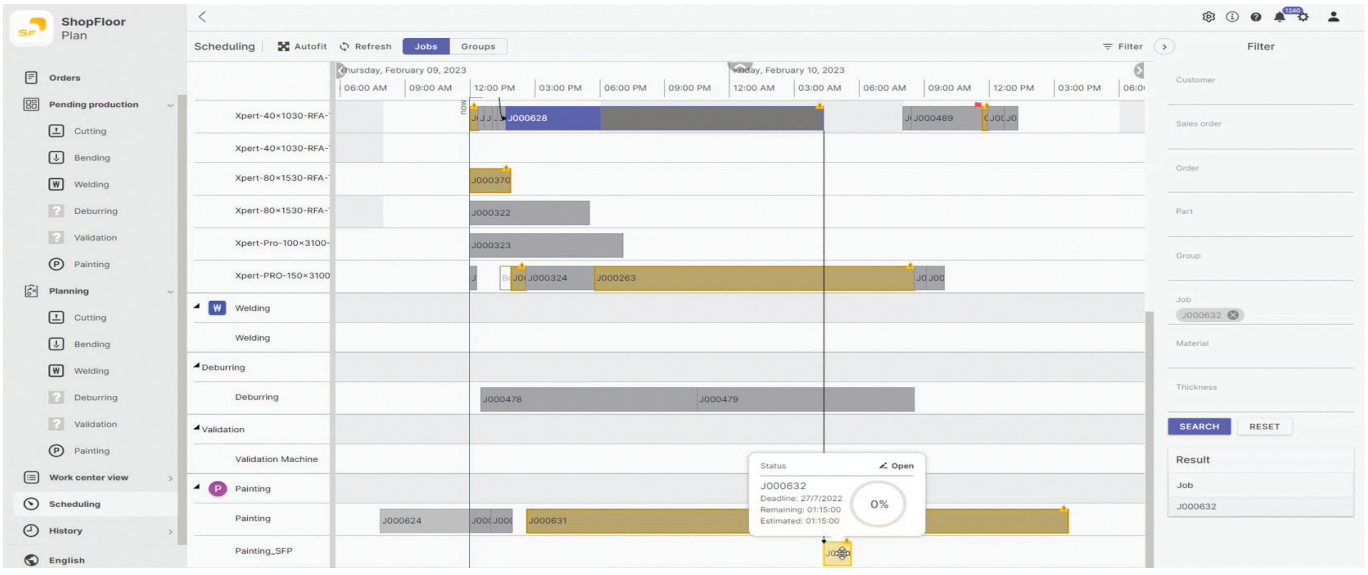
Once a bid is successful, MES takes the reins, managing real-time scheduling and adjustments. It adapts to hot jobs and optimizes machine availability, ensuring that the shop floor remains agile and responsive. ERP's Material Requirements Planning (MRP) system and MES collaborate to ensure that materials are available when needed.

Material handling automation systems streamline material flow, eliminating bottlenecks. The high-volume output of high-power fiber lasers is managed efficiently through MES, while automation in bending and welding ensures that fabricators can keep up with production demands.

Throughout the entire process, managers maintain transparency by monitoring production in real-time. MES and ERP systems provide traceability and verify process times at each step, ensuring that the fabrication process stays on track.

Digitalizing the Front-End Order Process

Efficiency gains at the front-end of the fabrication process are instrumental in reducing total order turnaround time. Software solutions enable fabricators to handle quotes, order entry, and planning swiftly and accurately, setting a strong foundation for the entire process. The transition to digital order management eliminates inefficiencies associated with paper-based processes. Fabricators



Manage your entire 'end-to-end production process: MES software enables companies to plan, monitor and track all steps within the manufacturing workflow for any given order. It greatly enhanced the ability of manufacturers to dynamically respond to changes in orders and workflow capacities while maintaining production schedules.

can bid farewell to lost documents and the time-consuming task of searching through physical paperwork. Customers can submit orders electronically, reducing the reliance on paper-based forms. Electronic documentation, including order details, purchase orders, invoices, and shipping labels, streamlines document management and accessibility. Comprehensive reporting and analytics capabilities provided by digital solutions enable businesses to generate reports on order status, inventory levels, machine KPIs, and other critical metrics. These digital reports are easily shareable, reducing the need for physical copies and enhancing decision-making.

Controlling Front-End Processing Times
Efficient management of "soft" processing times is essential for accurately measuring turnaround times. Fabricators must consider all aspects of the process, including order entry, production planning, engineering, and programming.

Accurate measurement of turnaround time requires a holistic view that encompasses both hard and soft processing times. This approach provides fabricators with a precise understanding of where improvements can be made to enhance efficiency. A comprehensive analysis of total cycle time at each stage of the order process is crucial. Fabricators should assess cycle times to identify areas contributing to overall costs and turnaround times. By streamlining processes, they can reduce cycle times and enhance competitiveness.

Managing Orders and Planning
The integration of ERP and MES software systems streamlines incoming orders and facilitates agile responses to changing production requirements. This seamless integration ensures that orders are efficiently processed from inception to completion. MES software, such as Bystronic's 'BySoft Shop Floor,' provides fabricators with the ability to plan, monitor, and track all active jobs and machine workloads. This agility allows managers to respond promptly to shifts in production requirements, ensuring on-time delivery.

Efficiency in the order cycle is essential for maintaining competitiveness. Digitalization and automation technologies enable fabricators to reduce order entry times into ERP systems, allocate raw materials efficiently, and streamline engineering and programming processes, ultimately reducing order cycle times.

Analyzing in Real-Time
MES software provides fabricators with the ability to analyze data in real-time. This analysis includes job requirements, production workflows, and machine performance. Real-time data enables fabricators to make informed decisions promptly. MES identifies estimated start and finish times for each operation based on machine workloads and job requirements. It also flags delays and allows for flexible responses to changes in orders or priorities. This adaptability ensures that production workflows remain optimized. Real-time data from each machine provides actual runtime for comparison to target times for each job. MES adjusts job completion dates in real-time and monitors machine performance. Re-routing of jobs to alternate machines is done on-the-fly to maintain optimal production schedules.

Digitalizing your business from 'end-to-end' provides better service for your customers.

Maintaining Machine Cycle Time
Efficient material automation is the key to maintaining machine cycle times. Timely material handling ensures that machines remain productive. Without well-organized material automation systems, investments in faster machines may not yield the desired cost-effectiveness. While newer machines offer enhanced productivity, their efficiency relies on efficient material handling. Material automation ensures that materials are readily available as orders are transmitted to machines. This approach minimizes non-productive waiting times, optimizing machine cycle times.

Reducing Total Order Turnaround Time
The combined impact of digitalization and automation is significant in reducing non-value manufacturing

time and total processing times. These technologies streamline processes, enhance efficiency, and contribute to faster order turnaround times. Efficiency gains at the front-end of the fabrication process are instrumental in reducing total order turnaround time. Software solutions enable fabricators to handle quotes, order entry, and planning swiftly and accurately, setting a strong foundation for the entire process.

Summary

Achieving efficiency and competitiveness in today's fast-paced metal fabrication industry requires a holistic approach that leverages advanced software solutions. The collaborative power of Enterprise Resource Planning (ERP), Manufacturing Execution System (MES), and Computer-Aided Design/ Computer-Aided Manufacturing (CAD/CAM) creates a comprehensive and efficient solution for sheet metal fabricators.

The end-to-end fabrication process, from initial quoting to product delivery, benefits from the contributions of each software module. ERP forms the foundation of efficiency, MES provides real-time control and monitoring, and CAD/CAM ensures precision in design and manufacturing. Together, they enable fabricators to navigate the complexities of the industry with agility and accuracy, resulting in a complete end-to-end fabrication solution.

As the metal fabrication industry continues to evolve, software solutions will remain at the forefront of innovation. Fabricators who embrace these technologies and focus on streamlining their processes will not only survive but thrive in an increasingly competitive landscape. The future of metal fabrication is digital, automated, and efficient.

About the Author

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About Bystronic Inc.

Bystronic is a worldwide supplier of high-quality laser cutting systems, press brakes, automation and software for the economical processing of sheet metal and tubes. Bystronic stands for reliability, high-performance innovation, an outstanding price-performance ratio, and user-friendly operation. The focus is on the automation of the complete material and data flow of the sheet metal cutting and bending process chain. The company's Headquarters for the Americas is located in Hoffman Estates, IL. Offices are also located in Toronto, Canada, Monterrey, Mexico, and Colombo, Brazil.

For more information on Bystronic Inc., visit **www.bystronicusa.com**, or to contact by e-mail, **sales.us@bystronic.com**