

Toolbox.com Expert Guide to ERP-Based Automated Workflows in Manufacturing

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Executive Summary

Recently, Ziff Davis surveyed its Toolbox.com community about the use of automated workflows, particularly as they might be implemented through an Enterprise Resource Planning (ERP) system in a manufacturing environment. The responses were quite limited, most likely because:

- Many businesses still aren't taking advantage of powerful workflow automation tools emerging in modern ERP systems;
- Automated workflows have only recently matured to a point where any organization, regardless of niche or vertical, can easily leverage the software, and/or;
- Many businesses still aren't organized in ways that lend themselves to implementation of ERP-based workflows.

This isn't a criticism of manufacturing businesses and the ways in which they handle hand-offs and project management issues between groups. Rather, it's a heads up for organizations that aren't yet using software to break down silos and enhance/automate business processes: If your organization hasn't streamlined, automated, and refined the interactions between groups from procurement to sales to quality assurance, your competitors will be very soon. And the potential benefits of this shift are considerable, both in terms of improved productivity and cost savings.

This paper, then, is an introduction to workflow automation that can now take place right within a modern ERP system. It will explore implementation, best practices, and specific benefits to manufacturers.

ERP in Manufacturing Today

Current Enterprise Resource Planning (ERP) systems evolved from Inventory Control systems in the 1960s. Evolving into Material Requirements Planning (MRP) systems in the 1970s and Manufacturing Resource Planning systems the next decade, these were some of the earliest computing applications used in private industry. MRP systems were complex, custom pieces of software essential to the growth of large-scale manufacturing and quickly became indispensable to decision-makers looking to increase efficiency and adopt modern approaches to just-in-time production and logistics around the assembly and distribution of goods.

Fast-forward to today and ERP systems have taken quantum leaps to become management tools deployed across all vertical markets, in manufacturing and service sectors, and in businesses ranging from SMBs to the largest international conglomerates. In manufacturing, ERP is more important than ever with companies competing on a global playing field, coordinating resources, logistics, supply chains, staffing, and finance across borders, time zones, and cultures.

In fact, as manufacturers seek every possible competitive edge, shaving costs from every transaction and bringing products to market faster and at greater scale, ERP is no longer a luxury enjoyed by businesses that can afford massive customized systems. Rather, it's a critical tool that is increasingly fueled by advances in cloud computing to become more cost effective, improve collaboration, and deliver powerful insights to high-level decision makers and employees on the ground alike. With the ability to access ERP data anywhere they have an Internet connection, employees at all levels across all lines of business are using modern ERP systems to make both day-to-day tactical decisions and long-term strategic adjustments in manufacturing processes.

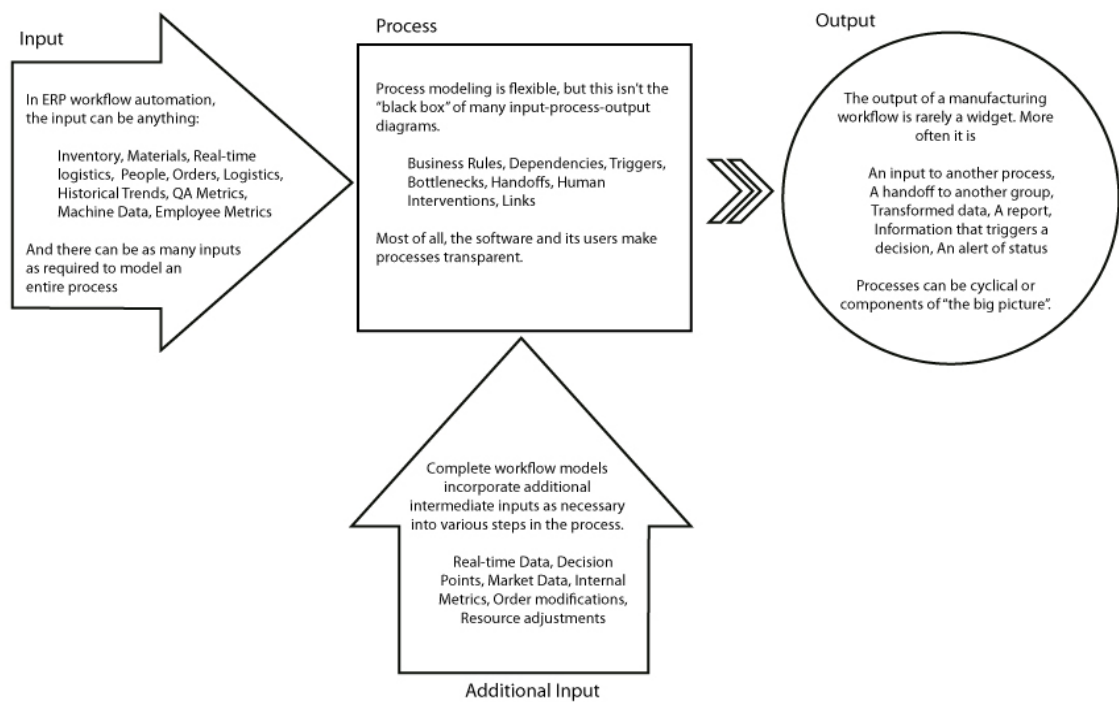
ERP systems are now relatively ubiquitous among manufacturers with countless vendors offering generalized solutions, customizable products with a variety of modular add-in features, and niche products directed at specific manufacturing markets. What isn't universal, however, is the presence of elegant, automated workflows that take the guesswork out of planning and decision-making. Relatively few vendors are offering robust solutions that leverage business intelligence, real-time data, and defined business rules that let manufacturers focus on strategic initiatives rather than more mundane operations.

The Untapped Potential of Automated Workflows

Like ERP, the concept of the workflow began in manufacturing. Early in the 20th century, workflows were applied to optimizing assembly lines, ensuring that no part of the line became a bottleneck to production for lack of resources or input components. Later in the century, workflows began to focus on improving quality and speeding time to market. Again, fast-forwarding to today, automated workflows have the potential to let humans use their innate creativity, sense of judgment, and intuition at critical points in business processes while

powerful information systems take care of data-intensive tasks. These can include:

- Automatic ordering of materials based on current or anticipated manufacturing rates and demand for finished goods
- Real-time reporting and distribution of analytic dashboards to decision-makers
- Order tracking and logistics management
- Accounts payable and receivable management
- Development of on-demand or custom manufacturing capabilities



Workflow automation, however, goes far beyond automatically ordering more widget components based on historical trends in widget sales. Modern ERP software that includes workflow capabilities allows organizations to model all aspects of the processes and procedures that drive manufacturing capabilities as well as business operations. The beauty of this approach is that companies can dramatically improve their processes (and their bottom lines) through the use of the software. Specifically, workflow modeling allows organizations to:

- Capture metrics and provide reports on the effectiveness of overall processes and individual steps in the processes
- Identify dependencies and bottlenecks that can be streamlined or eliminated
- Improve accountability and help lines of business take ownership for their processes and

contributions

- Analyze sequences and steps and determine optimizations with real data, what-if scenarios, and/or A/B testing
- See the "big picture" and improve flows of information, resources, materials, etc., between lines of business.

Exploring Workflows

Workflows are nothing new in manufacturing since the formal science of operations research (which includes the study of workflows) began with the study of manufacturing processes. Neither are they new in other verticals where they took off during the CQI (continuous quality improvement) movement of the 1980's. In fact, virtually any process can be modeled with workflows. However, a specific example that follows illustrates the power of workflow automation particularly well in very concrete terms.

An example of custom-order manufacturing

Consumers now expect that when they order items online, they will be able to customize at least some elements, whether that involves choosing custom graphics or wood types on a guitar, selecting processors and other components on a computer, or buying a new car and selecting colors and interior options. In a traditional manufacturing scenario, this would generate a nearly untenable degree of confusion at almost every phase of manufacturing. A well-designed workflow, though, would make the process efficient and straight-forward (note that this is one way that the process could be managed using electric guitars as an example; many other workflows could be designed and automated around any custom manufacturing process):

1. Customers place orders for customized guitars directly through the manufacturer's website as well as through brick and mortar musical instrument stores and online resellers.
2. Orders are sent in batch nightly from the online resellers and as they are received from instrument dealers.
3. Orders are automatically aggregated nightly and the ERP system determines inventory requirements for customizable components. These requirements are compared against inventory on-hand and available inventory from suppliers whose own ERP systems are linked to that of the guitar manufacturer.
4. Necessary components to support a week's worth of guitar assembly are automatically ordered from suppliers based on actual orders, historical/seasonal trends, and defined rules for acceptable delivery times.

5. Customers and stores are automatically informed via email about expected build and delivery times based on internal capacity, inventory, and requested shipping speed; customers are automatically updated if calculated times change.
6. Assembly of individual orders are automatically assigned round-robin to available luthiers when all components are available and specifications are delivered via email to the assigned luthier.
7. Luthiers log when the build is complete and final inspection and setup is automatically assigned to an available technician. The technician logs any problems and adjustments that must be completed by a luthier are reassigned to the original builder who is notified via a high-priority email.
8. When the guitar is ready to ship, the technician indicates that the build is finalized in the ERP system.
9. Shipping and receiving is notified and receives shipping labels via email, along with the specs, location, and serial number of the guitar. The customer or store is notified automatically via email when the guitar ships.
10. Delivery notification from the courier is automatically entered in the ERP system via a link to the courier's logistics system.
11. For customers who purchased the guitar through the manufacturer's website or an online reseller, an email with a satisfaction survey is automatically emailed within 10 days of delivery. Brick and mortar resellers are prompted via email to follow up with the customer directly and enter feedback electronically.
12. Customer feedback closes the workflow.

Clearly, the number of automated steps within this workflow that are handled by a comprehensive ERP system would require substantial human time and introduce many opportunities for mistakes and oversights, especially as manufacturing volume scaled seasonally. At any number of steps, management or internal quality teams at the guitar manufacturer could receive metrics and other reports about:

- Luthier quality and productivity
- Customer volume
- Popular options

- Supply chain problems

Each of these metrics (and many others) lends themselves to strategic decision-making about future models, options, and popular configurations to keep in-stock for immediate shipment.

Other examples

The case above is only one simplified example of ways in which automated workflows could dramatically improve manufacturing processes and solve a significant logistical and resourcing problem (custom manufacturing). Other examples include:

- Raw materials manufacturing in which internal capacity could be automatically adjusted based on new contracts with suppliers or the availability of, for instance, low-cost Eastern white pine instead of birch for the production of common whitewood lumber.
- Airplane manufacturing where production cycles can extend for months or even years and require coordination of global networks of raw materials, components, assembly lines, final assembly facilities, and customers.
- Jewelry manufacturing in which materials costs can vary widely over time and supply chains can be affected by issues ranging from conflict to international cartels and speculative markets.

Which workflows should be automated?

The short answer is “all of them”. This isn’t to say that human intervention and decision-making can be eliminated. But by building workflows into ERP systems and finding appropriate elements to automate, decision-makers can:

- Measure performance
- Receive data to inform process improvement
- Evaluate dependencies and identify bottlenecks
- Reduce inventory and manage capacity

Leaving workflows out of ERP systems means that they may represent documented processes but it becomes much harder to determine if they are well-designed, particularly at scale.

Are there processes that *should not* be automated?

Conversely, the short answer is “no”. Virtually every process can benefit from a virtual taskmaster or micromanager of sorts, prompting users to action at appropriate times. The best ERP software can be as intrusive or as subtle as needed for any given process or organization, but even the simplest implementation can give critical insight into project status, product

availability, potential challenges, etc.

ERP as a Catalyst for Change

ERP is continuously evolving, not just in terms of the technology, available integrations, and novel tools, but also in the way that manufacturers are using ERP systems. ERP systems are transforming approaches to manufacturing and, with integrated workflow capabilities, are swiftly becoming Business Process Management Systems (BPMS).

While BPMS is more frequently associated with service industries, the ability to optimize both business and manufacturing processes within manufacturing ERP systems presents important opportunities for manufacturers. Building automated workflows requires significant internal dialog about processes and provides the tools to evaluate those processes. Organizations open to change and continuous improvement will find even the process of creating the workflows to be informative. Implementing and refining the workflows and leveraging automation capabilities has catalyzed real change, measurable savings, improved time to market, and better customer service for many businesses that have taken advantage of the latest workflow tools in modern ERP systems.

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Chris is a writer, educator, consultant, and technologist, focused on the effective use of web and mobile technologies for large businesses. In particular, his wide range of experience in education and training, marketing and SEO, data analytics, and web-based voice and video have left him with unique perspectives across several verticals. Chris has done everything from teaching high school math to analyzing clinical drug trial data to heading up US operations for an Indian startup.

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