Introduction to Manufacturing

Epicor's Kinetic software was designed with decades of manufacturing industry insights.
When using Epicor Kinetic, manufacturers leverage Epicor's extensive knowledge and experience in the industry.

Take this introductory course to learn the basics of manufacturing. We'll review some key industry terms and look at a high-level manufacturing process flow. Then we'll wrap up with a brief review of the topic.

Select a button to get started!

Objectives

- Terminology
- Process Flow
- Review

Terminology

A manufacturing business uses components, parts or raw materials to make a finished good. These finished goods, which can be anything from a steel rod to a car engine to a vaccine, can be sold directly to consumers through a distribution channel or to other manufacturing businesses that use them for making a different product.

Epicor has a large number of manufacturing customers that use Epicor for Manufacturing to help them run their businesses.

Manufacturers are a key part in the supply chain. The supply chain is the entire process of making and selling commercial goods. It also represents the steps it takes to get the product or service from its original state – as a raw material – to the supplier, the manufacturer, distributor, retailer, and finally to the customer.

Manufacturers sometimes make products and store them in their warehouses until they are ordered. This is a build ahead methodology called make-to-stock. Alternately, a manufacturer can make products specifically to fulfill a confirmed order. This approach is called make-to-order, and in many cases the ordered product is customized, meeting the design requirements of the customer. Some manufacturers offer both, where some products are made to stock, and others are made to order. This is called mixed-mode.

Whether a manufacturer is producing thousands of the same part or they are creating a custom part just one time for one customer, they begin by developing a detailed plan. In Epicor for Manufacturing, this is called the method of manufacturing, or method.

The method consists of all the information required to build the part. It includes all the purchased and manufactured materials needed as well as the sequence of operations required to build the final product. The list of materials is known as the bill of material (BOM), and the list of operations is called the routing or bill of operations (BOO).

Part designs change all the time, and it is customary for a manufacturer to create new versions, or revisions, whenever they make a change to a material or to a process. To implement changes, product designers create an engineering change order, or E-C-O. This helps the engineers track and manage the alteration, the date it was made, and the engineer who made it.

To make a product, manufacturers need tools, equipment, machines, and machine operators. These are called resources. A resource can be defined as a physical piece of equipment (for example, a punch press, drill, sewing machine, and so on); a fixture, tool or gauge that is required to produce components; or an employee (for example, setters, drillers, painters, and so on).

Each resource has its own capacity, the amount it can produce in a certain time. For example, in a clothing shop, one machine operator can run an embroidery machine with a single sewing head – meaning he can make one hat every 10 minutes. The same operator could also run a different machine with 10 sewing heads, which makes 10 hats in 15 minutes. The different machines have different costs associated with using them and take different times to set up. All this information is vital when determining a job schedule and must be considered by the person making the schedule.

Operations define the processes that the company uses to manufacture the product. These are tasks like welding, cutting, painting, stamping, and so on. When the engineers determine the method of manufacture for a part, they indicate how the operations will interact with each other and the order in which they should be run. Resources, resource groups, and operations are all at the heart of estimating job costs, which include the burden cost, or overhead expense associated with the process, and labor cost, which is the cost of the time spent working on the job.

When work on a job is complete, the finished goods often go through a quality assurance process to ensure that they meet certain standards. Depending on the product, manufacturers may test or inspect each item produced, or they may choose to take a close look at only a percentage of the overall quantity produced. Any parts or items that are deemed to be noncompliant are either returned to production to be fixed or scrapped.

Finished goods are either shipped to the customer or distributor or possibly stored in inventory until they are needed.

These are some highlights, but there's much more to manufacturing. To help you out, these terms and a handful more are available and attached to this course.

Select the Process Flow button to see an overview of the Quote to Cash process for manufacturers.

Process Flow

Manufacturing is more than making products. Manufacturers engineer plans for products, purchase raw materials, maintain their inventory, and pay their suppliers. They must be able to identify opportunities, create quotes, convert those quotes to orders, produce products, deliver the products, invoice customers, and receive payments.

Over the next several minutes, we'll look at the manufacturing process at a high level. Note that we won't look at the system or detail that process within the flow. We also won't look at the setup for suppliers, parts, customers, and so on. This assumes that those are already in place.

To better illustrate the process, we'll use a fictional manufacturer – Epicor Manufacturing – and follow a single product, a kayak, through the process.

As with many other businesses, the sales process begins with a quote. The quote tracks communications with a customer for a potential sale.

If the customer wants a standard part, the process is simple. The quote holds the details of how many parts the customer needs, when they need them, and their prices. However, if the customer wants a custom part, the quote does much more.

For custom parts, the manufacturing engineers develop the method of manufacturing for the part. The method includes the operations and materials required to build the part – In this case, a kayak made in a custom pink color.

Then engineers create a change order for the part and create a unique plan to manufacture it. The bill of operations includes four steps to make the kayak: Mold, Cut, Assemble, and Pack. The bill of materials includes polyethylene powder, the seatback, and the paddle.

All this information is used to determine the cost for making the kayak and is brought into the quote calculations to determine the estimated unit cost. After working up final prices, the quote is ready to send to the customer.

Once the customer accepts the quote, it is converted to a sales order. This completes the sales process.

Another aspect of the sales process is the Available to Promise functionality, which helps determine when an order can be fulfilled. The system checks when parts and materials are available based on a quantity or a date, comparing the supply to the demand. It's a great planning tool because it works for both purchased and manufactured parts, allowing the sales rep to provide a more accurate delivery date to the customer.

The manufacturer cannot make the kayak without materials, so the next step is to run a process to compare the demand for materials from forecasts, master production schedules and sales orders with the available supply.

For example, the kayak ordered is watermelon pink and requires a special color of polyethylene plastic pellets for the molding process. These may need to be ordered if the manufacturer does not stock them.
The system calculates and suggests a purchase quantity for the polyethylene plastic pellets and also suggests adding a job to the schedule to make the kayak. The production manager can confirm these choices, creating both a purchase order and a job.

About purchase orders and buying . . . Epicor Kinetic includes special functionality to allow buyers to compare the different suppliers who can provide materials and parts. The system maintains attribute details about each supplier and collects rating data on their performance. Important factors, such as past reliability, quality, pricing, and delivery times can play a factor in the supplier that the buyer ultimately selects.

Once the supplier fulfills the order, Epicor Manufacturing receives the order into the warehouse. Receiving compares the quantities on the suppliers packing list with what they actually received and notes any differences. Sometimes, depending on the part or material received, receiving will send the material to the quality control group to make sure it meets standards.

When materials are received against a purchase order, the accounts payable group at Epicor Manufacturing is alerted to pay the supplier's invoice. They want to keep the account in good standing.

On the production floor, the job schedule determines when the kayak will be made. This depends on many factors, including the availability of materials, the job's due date, and the availability of the resources needed to complete the operations on the job.

The resources for the first operation include the worker who will run the injection molding machine and the molding machine itself. Other operations will require a cutter, an assembler to place the seat back, and a packer who will package the finished kayak with a paddle.

The people who work on the kayak track their time on each operation and the number of parts they produce. They use the Manufacturing Execution System as a quick way to clock in and out, enter data, move material from inventory, and report quality assurance issues.

Once the kayak is complete, the shipping department will create a packing slip for the sales order, release it, and ship it out to the customer.

When the kayak is shipped, the accounts receivable group invoices the shipment using any customer specific billing and pricing parameters. Once the customer sends payment for the invoice, they receive the cash and enter the payment into the system.

This seems like the end of the process, but – just in case things don't go perfectly, Epicor Kinetic boasts a robust return process. If a customer needs to return a purchase, customer service representatives can quickly enter a return material authorization, or RMA. The RMA tracks the customer, the returned material, the reason for the return, and the status of the returned parts. The RMA information is shared with receiving, inspection, billing, and order processing, to ensure that the customer is taken care of and the issue is resolved.

Then the cycle starts again, with a new customer, a new item, and – perhaps even a new manufacturing process.

Continue to the review section for a summary of the terminology and process flow topics, or select one of the topics to watch it again.

Review

Over the last few minutes, you learned key terms for the manufacturing industry… and walked through the quote to cash process.

You saw that manufacturers begin by identifying opportunities with potential customers, then work with those customers to develop a quote that outlines the quantities, dates, and costs for the order.

When the customer accepts the quote, they submit a Sales Order. After receiving the order manufacturers make a plan and produce the product.

The manufacturer delivers the product, and they invoice the customer. And to finish it off, they receive the payment from the customer to complete the quote to cash process.

About Epicor

Epicor Software Corporation drives business growth. We provide flexible, industry-specific software that is designed around the needs of our manufacturing, distribution, retail, and service industry customers. More than 40 years of experience with our customers' unique business processes and operational requirements is built into every solution—in the cloud, hosted, or on premises. With a deep understanding of your industry, Epicor solutions spur growth while managing complexity. The result is powerful solutions that free your resources so you can grow your business. For more information, connect with Epicor or visit www.epicor.com.

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