

Building and Delivering Cryogenic Equipment for Today's Customer

A Special Manufacturing in America Report from Technifab Products

By Chris Hebb

Lean manufacturing (or “Muda”), what is sometimes called making obvious what matters by eliminating everything else, has been an important emphasis for all manufacturing firms for years. But in today's world, customer-centric is increasingly important since a firm's reputation is driven by outside factors like social media and Internet firm ratings.

The term customer-centric is often used to describe marketing or Customer Relationship Management (CRM) systems. At the core, this means delivering what the customer needs and wants rather than just selling a product. It can also mean delivering products and services that are more tailored to the customer's specific situation.

Making the same product repeatedly and in large quantities was originally conceived to gain economies of scale, spreading out the fixed and capital costs to reduce the cost of a product or service. But in today's environment, what is really needed is creating economies of scope; gaining efficiency and variety to deliver the product and service the customer wants and needs.

Meeting customer requirements in today's increasingly complex world isn't getting any simpler. A 2012 IDC Manufacturing Insights (*idc.com*) trends survey presented at the 2012 World Manufacturing Forum noted the current “make to stock” production model saw the largest category decrease (from 21% to 9%) over the next five years, while “engineering to order” and “assembly to order” categories should have the largest gains.

Some large firms have approached customer-centric or customized products by sharing centralized functions or buying companies, then using the same sales force (and other functions) to deliver what the customer needs. While this has some advantages, it can create organizational complexity and still may not address lean manufacturing with the layers that are still between the customer and the manufac-

turing operation.

Smaller firms, often lean by necessity, may take a different approach by using advances in technology to expand upon the products and services they offer. Technifab has been facing the challenge of meeting complex customer requirements and needs with a three pronged approach.



The Arktek is being used to deliver much needed vaccines to remote villages in Africa.
Photo courtesy Intellectual Ventures

Partnerships

Technifab will partner with its customers to develop the products and services they need. When Intellectual Ventures Laboratories approached Technifab about commercializing their patented prototype, we helped them build an insulated container to strengthen and extend vaccination services in developing countries. This passive vaccine storage device, the Arktek, is designed to keep vaccines at appropriate temperatures for 35 days with repeat vaccine retrievals and no need for electricity, even in the hottest climates of Africa and Asia. The Arktek required cryogenic equipment manufacturing expertise to build the prototype and produce the final product, which is now being used to deliver much needed vaccines to remote villages in Africa.

In another case Technifab was approached even earlier, with basically a sketch of a cryogenic cooling device for

a sophisticated laboratory instrument on a napkin. After working with the inventor to develop the prototype, he then sold it to a lab equipment manufacturer that asked Technifab to make it into a product that could be built consistently so they could put it inside their commercial laboratory product.

Use of Information Technology

Building a variety of products and variations can add complexity to a manufacturing operation, but the use of databases and information technology allows custom configuration information to be available within seconds to the people who need it. It also gives the manufacturing organization a means to codify Technifab proprietary knowledge and reuse that experience and knowledge with other products.

Technifab's Data Management System (DMS) is an internal information system that allows detailed electronic tracking and verification of materials and products from the initial quote, through the manufacturing process, delivery, and beyond. DMS, which would be called an enterprise resource planning (ERP) system by many, not only assists with management but assists Technifab to meet detailed customer requirements that can be requested by the customer or by standards organizations. It makes procedures and product details readily available to the proper people so they can reliably and consistently make a wide variety of products that have been custom configured for a particular customer's needs.

For example, a customer ordering a vacuum jacketed piping system may require sections of pipe that are similar, yet different, to pieces built for others. An effective information technology system can assist in configuring the product at the layout stage for the cryogenic system manufacturer. Finding similar products to reduce drawing time and matching up pre-built components can reduce the lay-



Technifab's data management system includes terminals in the manufacturing area to provide information and input for workers.



Technifab's IT system is integrated throughout the entire production workflow, from when the product is received through final shipment.

out and build time. It can be an effective way to leverage research and development, which of course is still needed.

The customer specified cryogenic system might also include other components like a gas vent or phase separator to make sure that the equipment at the end (or 'use point') receives pure cryogenic liquid without gas. Pipe, gas vents, and phase separators (which may use electronic controls), while looking very different, are all vacuum insulated and made of stainless steel, which requires many of the same manufacturing techniques. The process of taking a purchase order description and turning it into a buildable product, especially for customer-specific products, is complex and can be fraught with errors if done incorrectly. Having flexible design and bill-of-material templates based on previous experiences can ensure the product can be manufactured, performs, and is reliable when built.

Meeting ASME requirements for pressure vessels and pipe also requires material traceability, numerous inspections while being built, and records that are kept for seven years after the product is made. It adds additional complexity that some customers may require and other customers are unwilling to pay for. Information technology can help a manufacturing operation meet ASME requirements and deliver the documentation to prove it, yet be flexible enough to not include the additional steps if unneeded.

Internalizing Key Manufacturing Operations

Buying some components from others is a part of every operation. But new, more flexible manufacturing machinery and technologies has allowed smaller firms to make things in smaller volumes economically and with more precision. Computerized Numerical Control (CNC) machines are nothing new, but their improved integration with Computer Aided Design (CAD) programs and Computer-Aided Manufacturing (CAM), along with lower equipment prices and increased availability, make them an important addition for small-to-medium sized enterprises. When integrated with an inventory control system they can form the basis of an effective just-in-time system that allows additional flexibility to meet customer needs and requirements. These technologies also allow easier scalability for projects that start off small since the task can be repeated consistently to produce larger volumes. 3D printing, discussed elsewhere in this issue, can offer additional flexibility.

Exactifab, a new division of Technifab that provides CNC machined components, represents a new opportunity. Because other firms were not able to meet Technifab's needs for professional machining services (quality, just-in-time delivery that is dependable and has responsive customer service), the Exactifab division was created in 2014. Using the experience developed by supplying products to Tech-

nifab, it has now grown into its own facility to provide the same level of quality and service to other firms in addition to Technifab.

Manufacturing tooling is also considered a product with Technifab being the customer. Tooling goes through an engineering release system that includes usage documentation and prints of the tooling. Even if the tooling is used at a subcontractor, Technifab tracks and maintains it to minimize surprises in outside machined parts.

Meeting the Challenge

The challenge for all firms, whether large or small, is making and delivering those products and services in a quick and cost efficient manner. Early industrialists believed that building the same product in high volume was the best way for firms to become successful and be profitable. But in many cases that is not what the customer wants and needs, they are looking for the best product for their situation. And after all, that is why manufacturing firms are here in the first place — to build and deliver products that help the customer perform their job in the best way possible. ■

Chris Hebb is responsible for Marketing at Technifab Products, Inc. in Brazil, Indiana. He can be reached at ChrisHebb@Technifab.com.