



Machining

Why Adaptability Is Key for Essential Manufacturing During the COVID-19 Pandemic

Holly B. Martin | May 05, 2020

Over the past few weeks, manufacturing companies have switched to producing ventilators and masks to help medical facilities dealing with a severe equipment shortage. Making complex devices like ventilators is no simple maneuver, of course, so what does it take to be adaptable in the face of a crisis?

The COVID-19 pandemic has created major challenges for every industry around the globe, and it has exposed the vulnerabilities in the nation's supply chain and its risky reliance on other countries.

When states such as New York projected a critical need for ventilators to treat COVID-19 patients, the supply chain for ventilator components—and the ability to manufacture new parts—fell far short of the demand.

Meanwhile, hospitals and nursing homes reported that supplies of *personal protective equipment (PPE)*—such as gowns, face shields and masks—were rapidly depleted.

In response to these critical demands, *manufacturing companies leapt to fill the gaps*. Many U.S. machine shops have since committed to change over their manufacturing processes and equipment to produce parts and components for ventilators, PPE and other essential equipment.

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Keith Mudge

Vice President of Sales for the Americas, Kennametal

What does it take for a manufacturing shop to swiftly pivot to meet a new market demand? Keith Mudge, vice president of sales for the Americas at Kennametal, notes that general engineering job shops are already very accustomed to changing components to manufacture whatever comes at them, so they tend to be flexible and able to make the required changes fairly quickly.

Rebuilding Injection Molding Capacity

When it comes to producing parts on a massive scale, the solution isn't always obvious, notes Jason Ray, CEO and co-founder of Paperless Parts.

Many of Ray's additive manufacturing customers have developed new designs for personal protective equipment and masks, but because of their relatively slow output rates, 3D printers can only offer a stop-gap solution for local or short-term PPE needs.

"Additive manufacturing is a great technology, but when you need to produce 18 million face shields in 20 days, you're not going to do it with the current capabilities in 3D-printing, which can produce a couple hundred shields a day per printer, at best," Ray says.

By contrast, injection molds can make 250,000 shields a day, according to Ray.

"Right now, we don't have a broad capability to produce the huge molds that we need in order to spit out tens of thousands or hundreds of thousands of PPE components," he says.

But 3D-printing technology may be one possible solution for creating new injection molds, Ray notes.

The Department of Energy's Manufacturing Demonstration Facility at Oak Ridge National Laboratory (ORNL) is using additive manufacturing to create tooling that businesses will use in injection molding of tubes for COVID-19 test kits.

Engineers at ORNL are producing metal molds on 3D printers in just days that would otherwise take months to create with traditional manufacturing methods. Industry partners will use these metal molds to mass-produce test tubes on their injection molding equipment, filling the molds with liquid plastic to produce 20 to 30 test tubes every 10 seconds.

"Our ability to move fast and create injection molds and get them set up, and shoot those molds, is critical to being able to ramp up production at a massive scale," Ray says.

Shops that are used to high-volume manufacturing, making the same part over and over, or making specialized equipment, might find the transition a little more challenging, he adds.

"Many of our customers want to be a part of the solution, so they're trying to take existing equipment and retool in order to go into medical manufacturing or other essential manufacturing," Mudge says.

Communication, Flexibility and Automation in Manufacturing

Jason Ray, CEO and co-founder of Paperless Parts, a Boston-based software startup focused on the

manufacturing sector, reckons the current broken supply chain can present a good opportunity for shops looking to break into new markets.

Ray stresses that to successfully pivot, shops must improve their communications with potential customers by making their technical capabilities clear on their websites and by letting industry players know they are actively looking for new business.

He also emphasizes the importance of understanding opportunity cost and the need to respond quickly.

"Suppose you have a large OEM that's buying parts for making ventilators with some of their supply chain coming from China and now they can't get those components," he says.

"With an assembly line sitting still waiting for a part, even if that part costs only \$1, that could be tens of thousands of dollars of lost productivity," he adds. "That's what people are experiencing right now on the buyer side of the table, and that's what shops can take advantage of."

Ray counsels shops to let buyers know that they can deliver parts quickly—say, just the first 50 components—so production isn't stalled waiting for a full order.

"Communicating those things to potential buyers is crucial, because every minute that goes by is costing them money," he says.

In this high-pressure climate, a shop that wants to bid on a job for ventilator parts needs answers from its suppliers fast.

"A lot of shops forget that this is a partnership that you're establishing with that quote," Ray says. "If it takes five days to respond to a quote, how can they expect that you're going to be able to return those parts in a timely fashion?"

Help for Shops Looking to Switch Gears to Essential Manufacturers

Shops looking to switch gears to provide parts for essential manufacturing can find help in a number of places.

Since the start of the pandemic and the call for ventilators and other essential equipment, Kennametal has established a new ***Online Sales and Application Support page*** through which the company has been able to help many shops pivot to manufacturing ventilator parts, as well as a few injection molds (see sidebar).

"If a shop is making a complete conversion from producing one component to something they haven't made before, our advanced solution engineers can help with the whole process to provide a complete solution," Mudge says.

Customers can upload part prints to the portal and get fast feedback and prioritized support for essential manufacturing projects.

Mudge says he is most successful when helping customers switch when he can form a collaborative team with them—not just applying the tools, but also making sure that they have the part quality, cycle time and the overall costs that will allow them to breach profitability levels.

"Once we have a good understanding of the job criteria, we can develop their process, select the tooling, provide the application ranges, the speeds and the feeds, and deliver a complete package back to the customer, who can take it and go right into production," he adds.

Achieving Positive Results from a Pivot to Essential Manufacturing

Mudge points to one customer that achieved positive results from a manufacturing pivot.

The company in question produced automotive components and wanted to start manufacturing ventilator components, and so asked for help with putting together machining solutions.

"We were able to quickly pull together a team from across our advanced engineering solutions, project engineering, manufacturing and product engineers, and work collaboratively to get a recommended solution to the customer in 24 hours," Mudge says.

"Then, once they agreed to the approach, we were able to supply several tools for the job, including both customs and standard end mills, shipping them to the customer within a week, and they're making parts now," he adds.

Mudge says he is really proud of the speed with which his customers have responded to the nation's critical need for medical parts.

"Our employees are super excited and proud to be supporting these efforts at pivoting manufacturing to support the COVID-19 fight," he says.

What steps have you taken to adapt to these challenging times? What unique situations have you faced?

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