People, Processes and Products

Stating the Case for Advanced Manufacturing

By Tom Schuman

Indiana's economic history includes a clear distinction in the transformation from the agricultural age to the manufacturing era. While most acknowledge that the 21st century – on a national and global basis – is transitioning to the information or knowledge economy, manufacturing is not going away.

Scott Whitlock is president of Fishers-based Flexware Innovation and one of Indiana's strongest advanced manufacturing advocates. He says the life sciences and the research and development that accompany it are fine, "but let's make it (the products that go along with the new industries) too."

Manufacturers who want to be part of the change realize that business as usual won't cut it. Al Novick, vice president of marketing intelligence & support for Rolls-Royce, puts it simply: "If you don't change, you won't survive."

Ted Fiock is president of Anderson Tool & Engineering Company. The workers in the employee-owned company see the headlines about the manufacturing companies and jobs that are disappearing. In regard to change, he says, "Either we do that or we're not here."

Scott Whitlock of Flexware Innovation traces his early interesting in manufacturing to growing up in Connersville and seeing the impact of the Ford (now Visteon) plant on the community.

Helping these companies and others is John Sullivan, director of Purdue's Center for Advanced Manufacturing. Asked to define the "advanced" portion of that term, he referred to Gov. Mitch Daniels' statement at this spring's fourth Indiana Advanced Manufacturing Summit. The governor, after talking to a number of manufacturers, claimed, "Their idea of advanced is anybody who is still in business."

Main components

In reality, Sullivan describes advanced manufacturing as advanced processes (how we build things) and advanced products (what we build). The third key component in order to turn the processes into products is people.

"The education and workforce development skills required for workers in manufacturing in Indiana have gone up tremendously. There are no longer low-skill, high-pay jobs," Sullivan emphasizes. "It's across a much broader range than typically looked at. In the past, you may have been talking about your lowest paid employees. Now, it needs to be much more across the board. And if we don't have skilled workers, the state will suffer."

Anderson Tool & Engineering has had little difficulty getting its people to adjust. One of its advantages is that it became an ESOP (a company with an employee stock ownership plan) more than 10 years ago.

"There's a cultural difference. Everybody has got a stake in the pie," Fiock offers. "We don't have to convince people of a lot of things. They are receptive to change."

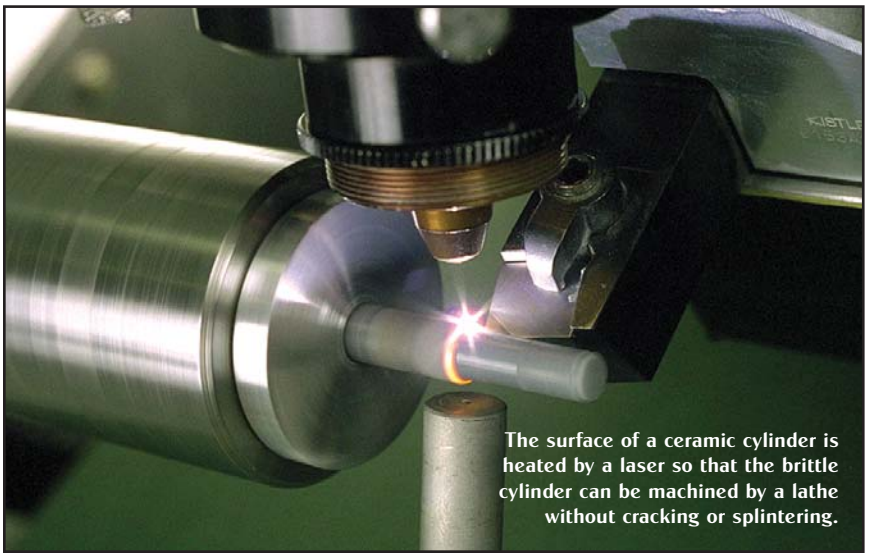
At the time of this interview, the company was undergoing a restructuring of its facility, including the layout and material flow. The primary goal was to improve employee efficiency. It's been made possible by talking with machine operators and listening to their suggestions.

New computer-controlled equipment has been integrated into the manufacturing process. Top equipment operators were placed in training positions, teaching employees who had spent their careers working on manual machines and quickly bringing them up to speed.

It's not always the people on the shop floor who must be convinced of change, according to Whitlock. If Indiana is to adapt its processes, enhance the skills of its people and produce superior products, it will take a strong presence at the top.

"A lot of it is a leadership issue, a stewardship issue," he claims. "If a plant gets shut down or goes to China or Mexico, leadership will be OK financially. Workers who rely on that job for their livelihood, however, don't have that golden parachute."

Flexware, founded in 1996, offers manufacturers information technology and



The surface of a ceramic cylinder is heated by a laser so that the brittle cylinder can be machined by a lathe without cracking or splintering.

John Sullivan of Purdue's Center for Advanced Manufacturing discusses the efforts to develop a biochip used to more effectively detect food contamination.

automation assistance, as well as continuous improvement consulting. Whitlock lists genealogy (product tracking), marking, labeling and execution systems among the major areas of emphasis.

"Part of our mission statement is to serve and guide willing organizations," he stresses. "I walk away from some of my appointments and say, 'Wow, that's a company that really gets it.' I walk away from others (shaking his head)."

Giving company leaders the benefit of the doubt in some cases, Whitlock does factor in the general reluctance to accept change. "They've tried banging their head against the wall, and all they get is a bloody forehead. I want people to realize there at least 1,000 people around the world waiting for their job every week."

Purdue role

If there is a home for taking manufacturing to the next level within the state, one must first look to Purdue and its developing Center for Advanced Manufacturing (CAM). It will eventually have a place in the e-Enterprise Center in the university's blossoming Discovery Park, where the focus of interdisciplinary research will allow it to combine efforts with other Purdue initiatives. It is already working closely with the highly successful Technical Assistance Program (TAP) that has paired Purdue professors and students with needy companies for nearly 20 years.

Sullivan explains the difference between the two endeavors and how CAM is taking manufacturing assistance to the next level.

"We're working together. There are daily e-mails going back and forth," he says. "TAP is set up for Purdue people to get in and take a quick look at things. Sometimes they find that it's going to take six months. There's really a continuum of projects – from two days to two months to two years to 20 years."

TAP is geared for the short-term efforts and CAM for the longer processes. Sullivan would like to see the state help by filling a role in the middle (more on that later). The three prerequisites for CAM involvement, he says, are a "good idea, good people and a strategy for continued funding." CAM had funded approximately 20 projects as of early July.

Sullivan describes several of the projects. One involves a pair of Purdue-affiliate companies.

BioVitesse has acquired and licensed intellectual property from Purdue in the effort to detect and identify live bacteria in a short time span. This replaces a traditional petri dish method that could take several days in order to determine if bacteria was present. The implications are huge for the biotechnology and pharmaceutical industries, as well as food and drinking water safety.

A small biochip was needed to turn the idea from concept to reality. Sullivan went to Lite Machines, a Purdue Research Park company that specializes in manufacturing mico-size, radio-controlled helicopters. They brought the precision injection expertise needed to help produce the biochip.

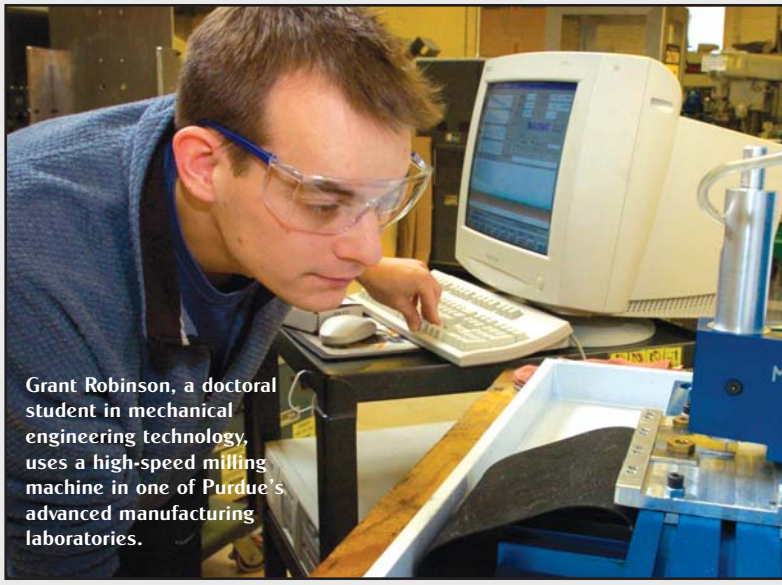
Two of the state's strategic clusters of development are life sciences and advanced manufacturing. "We want to tie in with the work BioCrossroads is doing. We can not only discover it in Indiana, but discover it and manufacture it in Indiana," Sullivan states. "One of my jobs is matchmaker."

A second project involves working with the hardwood lumbermen's association and the wood products industry. Cutting tools for lumber can't be cooled the way they are in the metal industry (pouring liquid over them). But Purdue professors are using cooled air to remove errant wood chips and improve the speed and effectiveness of the tools. Those attributes are essential for a wood products industry struggling against international competition.

Broad outreach is the goal. Sullivan says he interacted with approximately 400 companies during the past year, visiting about 100 of those. The Advanced Manufacturing Summit at Purdue attracted nearly 400 participants. The 2006 version will take place on May 23. CAM conducted one regional summit in New Albany and has a second one planned for the South Bend/Elkhart area on October 6.

Aerospace alignment

Another method of bringing companies together is through



Grant Robinson, a doctoral student in mechanical engineering technology, uses a high-speed milling machine in one of Purdue's advanced manufacturing laboratories.

strategic clusters. An initiative off to a good start is the Indiana Aerospace Advanced Manufacturing Alliance. Sullivan credits Rolls-Royce with getting the ball rolling. He says the networking itself is invaluable, with Rolls-Royce looking for additional benefits for the aerospace industry in the state.

Novick explains, "We wanted to bring together aerospace-capable manufacturing companies (some are doing aerospace now, others are capable of it) to collectively pursue government-type funding. It gives us a broader base of state companies to work with and gives these companies visibility to other OEMs (original equipment manufacturers)."

Twelve to 14 "foundation organizations" have signed agreements to work together. They include Rolls-Royce, Purdue, Notre Dame and companies such as Smith Aerospace in Terre Haute, MKM Machine in Jeffersonville, Praxair in Speedway and Alco in Lafayette. Talks are ongoing with Rose-Hulman, the Crane Naval Surface Warfare Center and others.

The next phase is to incorporate small, disadvantaged, women- and minority-owned companies. As a government contractor, Rolls-Royce must work with such firms. It wants those companies to be based in Indiana, where the Indianapolis Rolls-Royce manufacturing site is the company's largest in the world outside of the United Kingdom.

"We're capable of understanding the government process; it works quite well for us," Novick reports. "A lot of other companies don't have the resources, the capability, the background to do this. We want to take their ideas and help them grow them. The (alliance members) have agreed to work together to create ideas and concepts, and identify needs in basic or applied technology."

Ohio has a similar group, but it is focused strictly on propulsion. The Indiana effort is broader based.

"Indiana is a player in the aerospace industry. We have a good base to do the manufacturing of components, and Purdue is a major element in all this," Novick summarizes. "It all comes back to manufacturing. We want to be more productive with some of the materials we presently use. We're always looking for things lighter weight, new technologies in manufacturing and composites."

Telling the story

Purdue and CAM may be one source of information and expertise. Whitlock and others, however, are creating a complementary piece with development of www.indianamanufacturing.com and Manufacturing Appreciation Week, conducted for the first time earlier this year in conjunction with the Purdue summit.

Whitlock traces his passion for manufacturing back to growing up in Connersville, where the Ford plant (now Visteon) was, and is, by far the dominating employer. He saw firsthand the important role a company can play in a community. Steve Wallen, general manager of Indiana Mills Manufacturing in Westfield, approached Whitlock with the idea of what they could do to give manufacturing a boost.

"You have to credit Steve with the original idea. We came across Georgia's Manufacturing Appreciation Week and said, 'What are we going to do about the other 51 weeks?' " Whitlock recalls. "The main purpose is to overhaul the image of Indiana manufacturing. We hope to create a buzz, have a fun site for people to go to."

The plan is to tell the stories of Indiana manufacturers through words, photos and videos. Manufacturing week will be expanded with the goal of conducting activities across the state.

Sullivan categorizes himself as a "big fan" of the initiative. "We need to show people what manufacturing is like now – bright, clean and quiet (in many cases). We say manufacturing is different. We need to show high school students and counselors how it is different."

Whitlock says he would like nothing better than for Gov. Daniels to repeat and support the phrase on the home page of the web site: "What if Indiana was the global center for manufacturing, leadership, innovation, vision?"

Assistance required

Sullivan says there is a major role for both federal agencies and the state. He was making his fifth recent trip to Washington in July to seek federal opportunities for CAM and the state. While there, he meets with various national manufacturing associations and agencies such as the Department of Defense, National Science Foundation and others.

Closer to home, the General Assembly did not approve Purdue's Advancing Indiana Manufacturing (AIM) proposal that would have allocated state funding to support CAM. But Sullivan and others continue to work with the governor's office and the Indiana Economic Development Corporation.

"A major step would be to have the state engaged in the AIM initiative," he contends. "The state could fit into the middle category of projects from six months to a year. TAP could do the shorter-term projects, and Purdue (and CAM) work on the longer-term research."

For the first time, there is an assistant secretary of commerce for manufacturing at the federal level. A similar position at the state level would be most welcome.

"Do we need a state level person?" Sullivan asks.

A seed grant from Purdue's Center for Advanced Manufacturing allows professor Rado Gazo to work on developing new cooling technologies for cutting blades.

"Frankly, I think we do, to line up as best we can with the federal programs. I think we need a state manufacturing czar."

Whitlock point out that "you can't legislate attitude changes." Subsidies or abatements aren't the answer either. A big help, he says, would be assistance in finding great manufacturing leaders who could be left in place for an extended period.

"The governor, legislators, associations can provide leadership, and be sure to not guide or steer Indiana away from its roots. There's no doubt manufacturing is going through the same changes as agriculture, although it won't shrink (in size) like that. But if manufacturing has to consolidate, why not have it here? Let's make our plants the best there are."

Whitlock doesn't consider himself a statesmen on the issue, but he does sense some urgency. "Wall Street and consumers are always demanding lower prices. There are a greater number of companies on a burning platform every day, and if they don't put the fire out …"

To help reach the long-term advances – which Sullivan says include progress in laser manufacturing, nanocomposites and microscale manufacturing, among others – he believes that a manufacturing facility will be necessary as part of Discovery Park.

Bottom line

Why is all of this so important? Among the statistics disseminated at the Purdue summit were the following:

- More than 30% of Indiana's gross domestic product is directly attributable to manufacturing jobs
- More than a third of all taxes are paid directly by manufacturing concerns
- Manufacturing jobs pay 33% more than the average wage in the state

Anderson Tool & Engineering's Fiock says it's not easy to keep up. Despite his team's progressive attitude toward change, several lean years during the economic downturn have the company playing catch-up. Financial support is critical to securing the equipment needed to keep pace with competitors.

"The dollar for technology today goes much farther. The advances in machine tool technology have been by leaps and bounds," he declares. "You can invest a lot less money and get a lot more machine. Technologically, we're years behind."

Those within the industry understand its ongoing importance, but there is a lack of comprehension from people on the outside, he believes. It's a public relations problem that will take a concerted effort to combat.

"All you hear in the press is that manufacturing has lost X number of jobs. That's been going on since the 1970s," Fiock states. "The numbers are going down because manufacturing is advancing. Companies are doing more with less. That's what getting more efficient is all about.

"I don't know how to get the point across to the masses of people. Manufacturing is not doom and gloom. It's not dying out. Everyone has kind of written manufacturing off. If manufacturing does go away, which it won't, we would be in a world of hurt."

INFORMATION LINK

Resources: John Sullivan, Purdue Center for Advanced Manufacturing, at (765) 494-1279 or http://fred.e-enterprise.purdue.edu/wps/portal/_s.155/10969

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