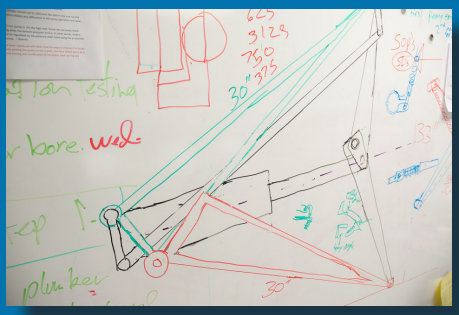
# From Idea to Design to Manufacturing to Market

## Manufacturing Extension Partnership's Role in Innovation



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*National Institute of Standards and Technology*

There are many obstacles to overcome when moving an idea from conception to the commercial marketplace. Challenges exist that can derail innovation at every step along the way: ideation, market research, design, prototyping, manufacturing, identifying suppliers, financing development expenses, marketing and product rollout. On top of that, the single step likely to yield the highest economic benefit to the region – manufacturing the product locally – is often neglected. When manufacturing leaves the region or the nation, an opportunity for capturing value and creating jobs is missed.

The Hollings Manufacturing Extension Partnership (MEP) helps accelerate technological innovation in U.S. manufacturers. MEP is a program of the U.S. Department of Commerce's National Institute of Standards and Technology (NIST) and is located in all 50 states and Puerto Rico. MEP is a public/private partnership that works with small and mid-sized U.S. manufacturers to help them create and retain jobs, increase profits, and save time and money. The nationwide network provides a variety of services, from innovation strategies to process improvements to green manufacturing. MEP also works with partners at the state and federal levels on programs postitioning manufacturers to develop new customers, expand into new markets and create new products.

The following four U.S. manufacturers leveraged MEP services to effectively and profitably accelerate their innovation. Their stories cover the gamut from designing an idea on a napkin, prototyping new technologies, to manufacturing a product that reaches the marketplace.

## CreatiVasc Medical LLC

CreatiVasc Medical LLC, located in Greenville, South Carolina, manufacturers devices that help reduce or eliminate complications associated with vascular access – operations designed to connect patients with kidney failures to dialysis machines. The company has a singular focus to create, mature and commercialize intuitive medical devices that bring novel solutions to the growing population that suffers from End Stage Renal Disease.

CreatiVasc had the idea and vision for a completely new technology to help address problems in accessing the bloodstream of a patient undergoing dialysis. For help making the vision a reality, CEO Steve Johnson approached the South Carolina Manufacturing Extension Partnership (SC MEP). When Steve met SCMEP Manufacturing Specialist Larry Jolly in a restaurant, their conversation centered on a napkin. It was there that Johnson sketched out composite applications the design would use to improve vascular access through a "fistula finder," a component which would add a visual dimension for technicians searching for the proper access point in a patient's vein. Larry said it was possible, and the SC MEP team designed the prototype, found manufacturing partners and located funding for the innovation project. The Appalachian Regional Commission (ARC) provided funding through its programs awarding grants and contracts to state and local agencies, as well as governmental entities, to directly impact Appalachian economic development. SC MEP also assisted with business development and support, specifically supply-chain development and raw materials resources.

Less than eight weeks after receiving the ARC grant, CreatiVasc's idea went from the napkin sketches to eight working prototypes. A vascular surgery team at Greenville Hospital System evaluated the prototypes and, from their feedback, CreatiVasc created the "ideal" prototype. The company conducted preliminary testing at Clemson University with the objectives of identifying possible implant techniques and assessing the prototypes' ability to provide the additional visual signal indicating where the fistula was located. Based on the testing results, CreatiVasc took the information about the product function, working prototypes, materials-of-construction and evaluation input to the U.S. Food and Drug Administration (FDA). The FDA responded with an approved 510(k) regulatory path for the new device. CreatiVasc anticipates that it will begin the required FDA testing before the end of 2011 and the device could be market ready by the end of 2012. The development of a FDA-approved medical device takes many years after the initial design of a concept. CreatiVasc, however, is moving quickly through the innovation stages thanks to the support of SC MEP. This is just one example of how MEP stimulates innovation in small companies with big ideas.

## The Wedge Group

The Wedge Group is the husband and wife team of Bryan and Laurella Bergeron located in Des Allemands, Lousiana. This start-up company worked with the MEP of Louisiana's (MEPOL's) Polymer Division on its flagship product – the Wedge Cup. The Wedge Cup is a patented product is sold to the health care industry in the U.S. and internationally. The Wedge Cup solves a common problem, helping patients that are unable to tilt their heads back when drinking from a cup, often resulting in a battle against spilling on themselves.

Bryan witnessed this struggle firsthand through his older brother who has spinal meningitis. After speaking with various doctors about the problem, Bryan decided to make a prototype of a cup with a wedge inside the cylinder angled toward the bottom, resulting in the contents of the cup being completely drained at a 60 degree tilt. Bergeron contacted MEPOL's Polymer Services Project Director, Rebecca Scherff, for assistance in designing and building prototypes of the cup. Working with a third party provider and MEPOL manufacturing client Christian Plastics, the Wedge Cup went through multiple design modifications before discovering the final design. Throughout the design process, MEPOL built 36 parts for the Wedge Cup and settled in on six parts for the final design. Once completed, MEPOL tapped into Tech Tooling to create the cavity molds needed for manufacturing the cup.

Through a Small and Emerging Business Development grant, Tech Tooling created four molds for the outer cup body with handle, the inner cup liner, the lid with spout and the slide and thumb tab. Tech Tooling made 150 cups to showcase at the Department of Veterans Affairs' National Speech-Language Pathology Conference in association with the American Speech-Language-Hearing Association (VA-ASHA) in April 2009. At the conference, the company garnered more than 100 leads and handed out cups for further marketing tests. Attendees commented on the superior design of the Wedge Cup, not only for the unique design and the 60 degree tilt factor, but also because the cup improved the flow of thicker liquids commonly given to disabled patients. The cup effectively helped people with permanent disabilities or those with temporary ailments such as a sprained shoulder or a broken neck.

Since the VA-ASHA conference, several major teaching universities requested to add Wedge Cups to their curriculums. Thanks to the success of the conference, The Wedge Group contacted over 4,000 Speech and Language therapists plus a number of contacts with major teaching universities and foreign attendees that would likely not have been reached otherwise.

The Wedge Group has seen an increase of 303% in cup sales over the previous year. The company continues to find new outlets for the product through third party distributors, catalog and direct internet marketing. MEPOL helped the Wedge Group find the partners and opportunities for building a strong company around one great idea. This story shows how MEP's public/private partnerships in local communities serve as a foundation of successful innovation acceleration.

## 3C Cattle Feeders

3C Cattle Feeders located in Mill Creek, Oklahoma has been in the livestock business for more than 30 years. In that time, the company developed state-of-the-art cattle feeders that are efficient, effective, and economical, while meeting the high standards of commercial livestock owners. The newest feeders are more accurate and quieter than any other product on the market. The feeders are also completely enclosed, preventing feed from falling on the truck bed, and they include exclusive features like sight holes and digital counters. Custom feeders are also available to satisfy special requirements.

The company currently employs about a dozen people at its manufacturing facility in the tiny community of Millcreek. Bear Runyan operates this successful small business producing top-quality commercial livestock feeders with a sterling reputation in the agricultural community for quality and design. A few years ago, Bear realized the industry was starting to catch up with him. He sought a way to once again distance himself from the field, retain his market share, and eventually grow his business. For help, he turned to Kay Watson, a manufacturing extension agent with the Oklahoma Manufacturing Alliance, the NIST-MEP network affiliate for Oklahoma. Bear and Kay previously worked together on several projects and enjoyed a solid relationship built on years of successful ventures. Together, Kay, Bear and the leadership of 3C Cattle Feeders discussed opportunities to enhance their current product line. A longstanding problem never addressed in the industry is that wild hogs and other animals scavenging food from traditional feeders are spreading disease while poaching food. Though it occurred frequently, livestock owners learned to live with the situation. "Ranchers don't realize the amount of feed that is lost. It's such a common problem, but can really add up financially," Bear said. Kay and Shea Pilgreen, an applications engineer with the Oklahoma Manufacturing Alliance worked with the Oklahoma State University New Product Development Center, a program of the Oklahoma Manufacturing Alliance, to look at solving the problem.

Initial designs were promising and helped secure a Small Business Innovation Research (SBIR) grant. SBIR funds helped improve the design and gave the team an opportunity to create a marketing plan for the high-tech feeder.

3C Cattle Feeder's innovative high-tech feeder is now in production showing encouraging initial sales. The product boosted the company's potential future sales beyond expectations and has led the company to expand into a larger location in Mill Creek, thanks to the help of the Oklahoma Manufacturing Alliance. Again, this story shows how MEP works with small manufacturers around the country through every stage of innovation.

## Bogert Group

The Bogert Group, located in Pasco, Washington, is a small company that manufactured replacement parts for the private aviation industry, an industry that didn't show potential for much growth. Founder and President Richard Bogert attended a Lean 101 Seminar held by Impact Washington, the Washington state MEP affiliate. After the seminar, he met Patric Sazama from Impact Washington and asked for Patric's help in growing his small company. Impact Washington quickly jumped in to assist The Bogert Group with strategic planning, process flow, R&D, and market research in understanding and filling gaps that existed in the marketplace.

Richard, always proactive about finding and defining potential market opportunities, became aware of a problem facing the military. Armored Humvees, weighing 17,200 pounds, were too heavy for a standard jack to lift, particularly in unstable terrain like that in Iraq and Afghanistan. The jacks would often collapse while soldiers were attempting to fix the Humvees in battle, or worse, would not properly work leaving soldiers stranded until help could come. Upon becoming aware of the problem, Richard developed a working prototype of a new tire jack in less than a week, shipping the prototype for review while the paint was still drying. The prototype easily defeated the competition in deployment speed and ease of use. The Bogert Group received funding from MilTech, a Department of Defense partnership intermediary, to facilitate technology transfer between the military and the private sector. The Bogert Jack, as it is now known, allows a single person to safely lift a Humvee in under three minutes. The jack is now used extensively in Iraq and sold directly to the military and through procurement channels. As a result of Impact Washington's assistance, this small company's business grew over 400% because the company filled a gap in a new market. Bogert's sales increased from $0.5 million in 2006 to $1.5 million in 2007, $5 million in 2008, and then $17 million in 2009.

The Bogert Group received much notoriety for their efforts in their innovative design in protecting U.S. soldiers. Bogert was named the Association of Washington Business' 2008 Small Manufacturer of the Year, Manufacturer of the Year at the 2009 SmartMap Manufacturing Expo, first runner up to Seattle's Business Magazine's medium sized companies 2010 Manufacturer of the Year Award, and recently received a Manufacturing Innovation award from the Association of Washington Businesses.

Through working with Impact Washington, Richard saw growth opportunities for his company that he didn't think was possible. The MEP not only provides strategies for finding new growth opportunities but sees the entire project through from prototype design to success in the marketplace.

These stories are a sample of the success U.S. manufacturers are experiencing when they turn to their local MEP affiliate to accelerate innovation. Innovation is at the core of what MEP does. Manufacturers that accelerate innovation are far more successful and realize greater opportunities to participate in the global economy. The nationwide network has over 1,300 technical experts – located in every state – serving as trusted business advisors, focused on solving manufacturers' challenges and identifying opportunities for growth through product and process innovation.

For more information, visit www.nist.gov/mep and join the conversation on MEP's blog *Manufacturing Innovation* at nistmep.blogs.govdelivery.com.