Progress 2013: INDUSTRY

The Herald Dispatch’s annual Progress Editions take a look at our Tri-State economy and business community. Today’s sections focus on education and industry. Other topics will be examined over the next three Sundays.

Advances at Robert C. Byrd Institute

On the cutting-edge of 3D printing, design

Story by Ben Fields / The Herald Dispatch

Inside this Section

Refinery poised for success

The past year was one of the best years ever at Marathon’s Catlettsburg Refining complex. / 31

Blenko is back, bigger and better

Blenko is finally reaching the light at the end of the tunnel after filing for bankruptcy. / 51

Plenty of projects for steel

Two Huntington steel producers provide a good pulse for the overall economy. / 1J

Below: Design Engineer Ronald Cabezar explains the process of the Z Corporation 450 3D Color Printer at the Robert C. Byrd Institute in Huntington.

Left: A finished print from the Z Corporation 450 3D Color Printer is shown at the Robert C. Byrd Institute in Huntington.

Photos by Sholten Singer

The Herald Dispatch

‘Oh yeah, this is Buck Rogers stuff, but it’s real,’ Cabezar said.

“This is a design we did for [J.H. Fletcher & Co.],” Cabezar said, picking up the model of a tracked piece of mining equipment.

Basically, the process takes decades — if not centuries — of design work and dumps it on its head.

Design Engineer Ronald Cabezar said the process saves customers looking to design equipment uncounted hours in time and uncounted dollars in research.

“Normally, you would have to build (a design), test it and if it wasn’t right, scrap it and start again,” Cabezar said. “In short, you are saving the developer time by printing a design they can hold and look at and analyze. We want to give the customer something they can actually use.”

If changes need to be made, a developer can simply tweak their plan — typically called a CAD (computer-aided design) — and put it into the system again, instead of completely redesigning a working prototype.

Aside from Fletcher, in recent years the RCBI has helped INGK Spark Plug Manufacturing USA create a variety of fixtures used in the company’s automated assembly of oxygen sensors; Alfaard Solar USA with producing prototype automotive fuel filter housings; and First Impression Patterns in producing a variety of casting patterns, among other companies.

The system is also used for reverse engineering — that is, looking at a finished product and figuring out how to recreate it.
Way we make things will never be the same

Today we are witnessing some of the most important advances in the "Third Industrial Revolution," and I'm proud to say that the Robert C. Byrd Institute for Advanced Flexible Manufacturing (RCBF) is in the forefront of that dramatic transformation.

When historians talk about the "Industrial Revolution," they refer to the era in the late 18th century when making things by hand gave way to producing them with steam- or water-powered machines. In the early 20th century, automation paved the way for Henry Ford's revolution in manufacturing when he devised the moving assembly line, ushering in the era of mass production. Now manufacturing is being revolutionized a third time. The way we make things will never be the same.

This new revolution is the result of an unprecedented technological convergence that's bringing together sophisticated computer software, amazing new materials and innovative processes such as Additive Manufacturing (AM). Using AM technology, an object can be designed on a computer and then "printed" on a 3D printer. The 3D printing that's revolutionizing manufacturing has nothing to do with the traditional printing that gives us books, magazines and newspapers. Nor does it have anything to do with 3D movies. It's something entirely different.

A digitized design of an item is fed into a 3D printer, which then uses that design to create a solid object by building successive layers of material. The 3D printer can run unattended and operate virtually anywhere — on a factory floor, in an office or even in your own garage. (With the price of 3D printers falling rapidly, that home use is just around the corner.)

In the beginning, 3D printers were primarily used to produce prototypes of new products, doing so far faster and cheaper than having a prototype machined by hand. But already 3D printers are being used in low-volume production runs, and their potential seems virtually limitless. In the future, 3D printers could be used to produce spare parts for all manner of products, meaning it no longer would be necessary to keep huge inventories of such parts on hand. Instead, you would simply call up a digital file of the part you need and then print it.

At RCF, we've been using 3D printing since 1990. RCF serves as an innovative catalyst for economic development by providing manufacturers, entrepreneurs and workers access to the 21st century skills and equipment they need to compete in today's global marketplace. Our Advanced Manufacturing Technology Centers in Huntington, Charleston, Bridgeport and Rocket Center (near Kearny in the state's East Panhandle) offer leased time on state-of-the-market, computer-controlled manufacturing equipment and a wide variety of technical training, as well as workforce development and quality implementation initiatives. Our Bridgeport facility is a national center of excellence for composite materials.

Given our long-standing determination to be on the leading edge of manufacturing technology, it was inevitable that we would venture into additive manufacturing. Since we installed our first 3D printer, dozens of clients have used our Design Works lab and our 3D printers in Huntington and Charleston to take their ideas to reality. Using the computers in our Design Labs, they can start with something as simple as a rough sketch on the back of an envelope and turn it into a three-dimensional computer model. That model can then be fed into a 3D printer to print the desired object.

Now RCFB has taken a huge, important step in the Additive manufacturing revolution.

Photo credit: Ben Singer/THE HERALD-DISPATCH

"PEOPLE TEND TO THINK MANUFACTURING IS DEAD. In high school, kids are told by their counselors that there is nothing there, and, as a result, manufacturers can’t find people to fill needed jobs. RCFB is here to demonstrate to companies that YOU CAN MANUFACTURE to their rigorous standards." James Casto, associate director of public information for Robert C. Byrd Institute

Above: Design Engineer Ronald Cabaser demonstrates the design process it takes before sending a digital file to the 2 Corporation 450 3D Color Printer at the Robert C. Byrd Institute for Advanced Manufacturing. RCFB has three of these 3D Color Printers.

3D printing

*Continued from 11*

Cabaser said a company can bring a part that might not exist anymore to the institute and they can figure out how to recreate it and build a physical model through the printer.

RCFB has four manufacturing technology centers with locations in Bridgeport and Rocket Center in addition to Huntington and Charleston.

The four centers serve all of West Virginia, along with parts of Kentucky, Ohio, Pennsylvania and Maryland, though the individual has also sent technical letters to other states across the country.

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"I think the people who are making equipment out there which need older equipment or machines. A company can bring the part in, and RCFB can figure out how to recreate equipment through the printer. There are some products that simply can’t be made today, but, with these new innovations, anyone can make a part in industrial and medical supplies — like replacement limbs or hip joints that can be replaced in a patient rather than mass-produced.

Casto pointed out that the technology is open to anyone, not just company or college program. "Maybe you don’t have a digital file worked on," Casto said. "Maybe it’s a takeout with a brightness or a shade on the back of an envelope. You can come here and we can work with you."
CATLETTSBURG REFINERY POISED FOR SUCCESS

The refinery, which processes 233,000 barrels of oil per day, has a gasoline market that stretches from Pittsburgh to Paducah, Ky., and from Columbus, Ohio, to Knoxville, Tenn. It employs 800 workers plus another 600 to 700 contract workers per day. Photo courtesy of Marathon

CATLETTSBURG, Ky. — 2012 was one of the best years ever at Marathon’s Catlettsburg Refining complex, and the next two years could be even better, said Jim Cantrell, the plant’s division manager.

“We had our best safety record ever last year,” Cantrell said. “We were in the top 10 percent in the industry for safety performance. We have our most successful financial performance in 2012. The Kentucky Association of Manufacturers voted Catlettsburg Refining as Kentucky’s Manufacturer of the Year for 2012. ‘I’ve never seen the future brighter than today,’ Cantrell said.

NAME: Ronald Cabacar
Design engineer, Robert C. Byrd Institute for Advanced Manufacturing
HOW DID YOU GET IN YOUR CAREER? Joined Orion Mechanics before 2004, transportation specialist with CDS Air Freight from 2004-2007, engineering department supervisor at McSwain’s Inc. in South Point before joining RBGI.

FIRST JOB: Residential and commercial construction for Castlekopa Construction Co., connecting and installing mechanical parts at the Subic Shipyard in the Philippines.

FAMILY: Wife, two Children.

FAVORITE BOOK: “The Lord of the Rings.”

HOBBIES: Tennis, cycling.

RCBI
Continued from 21

by joining a key player in a major federal initiative that’s establishing the nation’s first Additive Manufacturing Innovation Institute. The purpose of this new program is to accelerate the development, integration, evaluation and exploitation of additive manufacturing technology for commercial applications. With that goal in mind, the program’s more than 60 partners will conduct extensive outreach to business for the open exchange of additive manufacturing information, design tools, shared manufacturing equipment options, demonstrations, process improvement and energy/cost efficiency.

This extraordinary opportunity also involves two West Virginia companies, RBGI Composites Systems, Inc., Bridgeport and Technologies Research Laboratory in Triadelphia. The new federal initiative is designed to connect industry, universities, community colleges, federal agencies and others in an effort aimed at improving manufacturing innovation and fostering economic growth—a model very similar to RBGI’s mission for the past 20 years. However, in this instance the partners will work to introduce additive manufacturing technologies to as many manufacturers as possible across our state.

Training is another key component of this new program. Utilizing its statewide Advanced Manufacturing Technology Centers and skilled instructors, RBGI will leverage its extensive educational and training programs to provide degree and certification programs, workplace skills and on-the-job training materials to address the manufacturing workforce need.

RCBI is also participating in the development of “cradle to career” additive manufacturing educational programs for STEM students K-12 through colleges.

This is an enormous opportunity for West Virginia to create new jobs, expand the innovative manufacturing strength of our country and enhance the future of our citizens. It underscores our capability to innovate and the ability of our workforce to prepare for today’s more technological workplace.

Today’s new and emerging technologies such as additive manufacturing are rewriting the book on manufacturing. And RBGI is playing an essential role in the book’s newest chapters.

KEY PLAYER: RONALD CABACAR

The Marathon refinery along the Big Sandy River south of Catlettsburg processes 233,000 barrels of oil per day and employs 800 workers plus another 600 to 700 contract workers per day. Photo courtesy of Marathon

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A top priority at State Electric is to add value to our customer’s services and operations through the solutions we offer. Looking for a total solutions provider? Choose State Electric Supply Company as your total electrical solution.

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Please see REFRENY/41

† The refinery, which processes 233,000 barrels of oil per day, has a gasoline market that stretches from Pittsburgh to Paducah, Ky., and from Columbus, Ohio, to Knoxville, Tenn. It employs 800 workers plus another 600 to 700 contract workers per day. Cantrell said the number of contract workers will be expanding in 2013 and 2014.

Catlettsburg Refining is well positioned to benefit from the crude oil brought up from the Utica and Marcellus fields. The refinery is in planning stages of a multimillion dollar expansion project based on the Utica Fracturenator that will provide feedstock at lower costs to the refinery.

‘It’s an exciting opportunity,’ he said.

Over the past decade, the refinery has changed crude oil. Cantrell said in 2001, the majority of the crude oil was from foreign sources. Now the majority of the crude oil refined there comes from domestic sources and Canadian crude. The refinery also refined oil sands from the Keystone XL pipeline that is proposed from Canada to Cushing, Okla., he said.

Complete detailed engineering for the new processing unit should be finished in March, and construction could start in June near the Big Sandy River at the south end of the plant. It is scheduled to come on line by late 2014, Cantrell said. It would be capable of refining 35,000 barrels of product per day, he said.

The refinery is capable of refining about 1,000 barrels per day of the materials coming from the Utica and Marcellus fields, he said.