

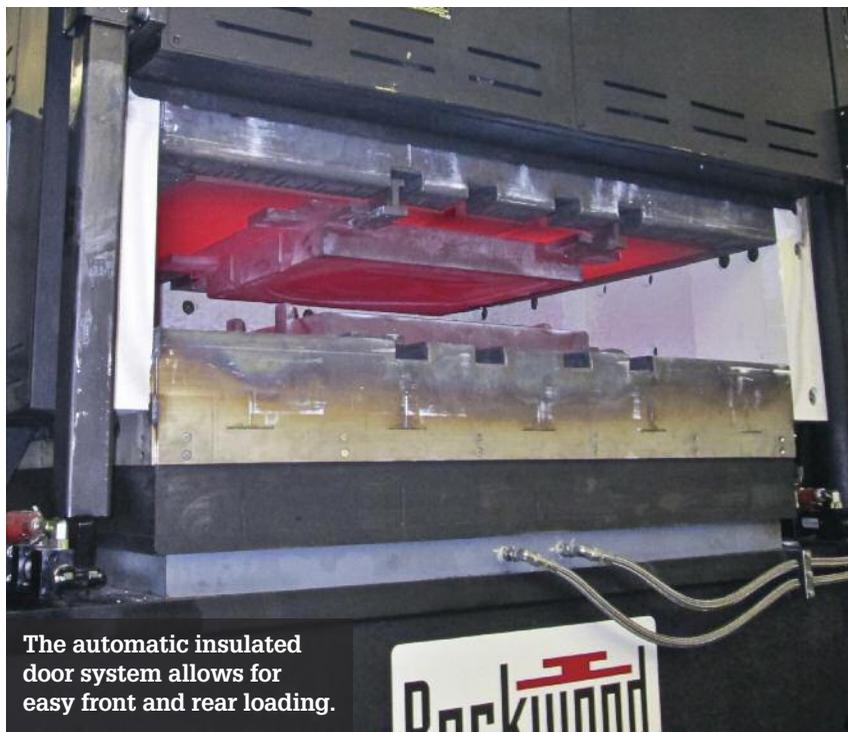
# Tailoring TECHNOLOGY

## Solutions-oriented collaboration helps aerospace manufacturer manage growth

**A**ggressive growth in the aerospace market means higher sales volumes for fabricators and equipment manufacturers—but the influx of new business also signals significant challenges for supply chains, according to AlixPartners' 2013 *Aerospace & Defense Industry Outlook*. With a 45 percent ramp-up in workload projected by 2017, the business advisory firm points to a growing risk of supply chain disruptions due to some suppliers' "limited expertise and modest engineering capabilities for implementing and sustaining programs especially in the detailed parts and aerostructures segments."

Two companies staying ahead of the curve are Beckwood Press Co. and Ducommun AeroStructures. Their ability to pool engineering expertise for intense collaboration on both retrofit and design-build projects for hydraulic hot forming presses could inspire other suppliers to follow their example.

"We've been monitoring the aerospace market for a long time and bulking up our capabilities in areas like hot forming and compression molding," says Ryan Pendleton, sales and marketing manager for Beckwood. The St. Louis-based company designs and builds hydraulic presses and automation systems engineered to customers' unique application requirements. In addition to aerospace and defense, the press builder serves the energy, oil and gas, automotive, construction and agriculture industries. "We've also shifted our approach



The automatic insulated door system allows for easy front and rear loading.

from that of a press builder to a solutions provider because we recognize that modern customers want a partner, not just a supplier. We are much more involved in the customer's upfront processes than we were even a decade ago."

### Avoiding turbulence

Like Beckwood, Ducommun AeroStructures, Coxsackie, N.Y., raises the stakes with innovative technology and specialized skill sets to handle escalating customer demands, particularly from the

commercial sector, which also is boosting requirements for titanium with newer, more sophisticated aircraft designs. The titanium and aluminum forming and assembly facility hot forms titanium parts for programs that include firewalls, nacelles, door surrounds, floor structures and longerons. The components are being produced for customers like Boeing and Sikorsky, as well as military defense applications. Boeing's *Current Market Outlook 2013-2032* forecast predicts a long-term demand for 35,280 new airplanes.

# Hydraulic Presses



Ducommun uses Beckwood's precision bed-to-ram parallelism for ultimate part repeatability.

Aerospace primes also are specifying a higher percentage of carbon fiber reinforced polymer for light weighting and greater fuel economy. Titanium shares the same thermal expansion rates as most composites, making it an ideal choice as a composite interface material. The Titanium Market Report estimates titanium use in the new Boeing 787 Dreamliner at 15 percent, 5 percent over steel. The report adds the uptick in requirements for composite design, construction and use, along with titanium's compatibility with composites, means a significant increase in the production of titanium parts.

"Our core competency is hot forming titanium," says Joshua Frank, manufacturing engineer for Ducommun. "We source commercially pure titanium as well as Ti 6-4 titanium which adds 6 percent aluminum and 4 percent vanadium for strength. The material comes in flat sheets which are cut into shapes on a waterjet. We're either forming a flat piece then contouring it or we're doing final forming on a preform part." Part sizes range from 2 in. by 2 in. up to 24 in. by

36 in. Ducommun also produces channel parts up to 8 ft. long. "Some channels, also called intercostals, receive a joggle on the end that will allow the part to fit smoothly with another channeled part," he says.

When Ducommun needed to add press capacity, it chose to first refurbish an existing press with a new heated platen design concept developed in collaboration with its sister facility in Parsons, Kan. Looking to partner with a press builder that had the right engineering capabilities, a recommendation from Ducommun AeroStructures—Parsons brought Beckwood into the company's line of sight. The facility had previous work experience with Beckwood and felt the press manufacturer would be a good fit for the N.Y. plant.

"We weren't getting even heat distribution across the platen, a condition that was causing us to experience failure on larger parts," says Frank. "The ability to precisely control temperature is critical when you are hot forming titanium." Higher ductility allows aluminum to be cold formed or stretched without introducing heat to the

process. Titanium is less malleable at room temperature. Hot forming allows Ducommun to create complex parts from the alloy without failure. Heating the material also reduces springback.

## Teamwork

"We've produced a number of presses featuring multiple zone-heated platens for temperature uniformity," says Pendleton. "This, and our track record for engineering equipment to the needs of our customers, gave us the specific experience Ducommun needed for this project."

Pendleton says the company has built a considerable knowledge base by manufacturing custom hydraulic presses for a variety of industries and applications. "Each project is a collaboration with the customer to reach an end design that is best suited to their specific application needs," he says. Ducommun offered valuable input on the platen design, including their recommendations for the type of platen material used. This material preference was based on their first-hand experience with regard to which



platen types were most successful at forming their parts.”

The platens, which had to withstand heat up to 1,600 degrees Fahrenheit as well as pressure, were molded out of Duraloy’s proprietary T63W in a rectangular shape and built with nine individual temperature control zones per platen. This configuration allows for simple adjustment if a zone falls above or below the temperature set point. “We were able to achieve even distribution of heat across our die,” says Frank. “Tests demonstrated the platen was able to hold tonnage and temperature without deviating plus or minus 25 degrees.”

With the retrofitted press up and running, the expanding company found it still needed additional press capacity. Growth projections justified a new press. “Beckwood was really supportive during the retrofit and they were very cost competitive compared to other companies we looked at,” says Frank. Ducommun’s subsequent two-year collaboration with Beckwood resulted in a November 2013 delivery of a 75-ton custom hydraulic hot forming press



equipped with zoned platens and other unique features.

Because Ducommun superheats titanium up to 1,500 degrees Fahrenheit, it wanted a door system that would open vertically to provide access for tool and part loading and unloading yet maintain accurate temperatures inside the forming chamber. “The doors also have the ability to cam outward, away from the press, cre-

ating a gap between the doors and the press,” Pendleton says. “This movement prevents the doors from rubbing during opening and closing, allowing for a tight seal and maximum heat containment.”

Special silica-based hardboard was used to insulate the doors and the bottom of the platen to keep heat from entering the press frame. Chiller plates also were used. “We knew we needed to separate the heated area from the press frame,” Pendleton says. “If the frame were constantly heating up and cooling down it could put undue stress on the structure. This door system was another example of how our engineering team was able to leverage Ducommun’s experience and their engineering staff’s insights to help create the best solution.”

### Maximizing efficiency

Beckwood’s proprietary Active Leveling Control System was used to minimize the effects of off-center loading. The system uses a closed-loop control to monitor all four corners of the press ram, maintaining a 0.002 in. tolerance corner to corner. The

# Hydraulic Presses

press is able to intelligently, automatically maintain precise bed-to-ram parallelism. "It's something we haven't used before so we're excited about having the technology," says Frank. "The feature will give us an advantage if we are dealing with part geometry that causes the load to be slightly off-center."

Integrated recipe functionality saves job parameters for each part developed. "The ability to control press speed also was critical for us since part requirements often dictate slow initiation of the forming process," Frank says. "We're able to precisely control pressing speed through the HMI down to 0.25 in. per minute."

Beckwood's service and support made it possible for Ducommun to hit the ground running following press delivery. "Testing demonstrated the press was producing parts that met our engineering specifications," he says. Prior to installation, test parts were checked against a tool made in the exact shape of the part. If the part fits the tool, and satisfies the customer's engineering re-

quirement, then Ducommun engineers know the part is good. Test parts were a perfect fit each time, Frank says. "The Beckwood technician that set up the press went above and beyond, taking care of a lot of things on his own," he adds. "We're a 24/7 shop, weekends included. We have a large output and we work to make as many parts as we can while maintaining quality. When a customer calls and says they need parts, we have to meet deadlines."

The new hydraulic hot forming press has already produced more than 100 parts. Able to run nearly 60 percent of Ducommun's dies, the press also has the flexibility

to run larger jobs that typically require its larger press while still being able to handle small- and medium-sized work. "Part quality and repeatability have been excellent so far," says Frank. "The biggest gain of course is that by adding this press we now have the available time and capacity to make the parts our customers need." **FFJ**

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**With Beckwood's press technology,  
Ducommun hot forms parts for  
both military and commercial  
programs.**

A Beckwood press is more than a machine. Each one is a custom-engineered solution. Each one is designed to address a specific customer's needs. Consequently, that is why you will find no two Beckwood hydraulic presses are alike - unless you need them to be.

To demonstrate how our experience can help solve the manufacturing challenges you face, we have collected a few select client stories on our website illustrating how Beckwood presses have shaped manufacturing operations across the globe.



Explore these case studies and see what the companies who use Beckwood hydraulic presses have to say on our website at [www.beckwoodpress.com/stories](http://www.beckwoodpress.com/stories)

Check out hundreds of our custom, application specific presses at [www.beckwoodpress.com/press](http://www.beckwoodpress.com/press)

Facing a challenge in your manufacturing operation? We'd love to hear about it and show you how we may be able to help. [info@beckwoodpress.com](mailto:info@beckwoodpress.com) or 636.680.5795



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