Features

Buildings with Bravado ......................................................12
Composites in architecture are no longer relegated to columns and cornices. Industry professionals are designing and fabricating awe-inspiring exteriors for houses, museums, university laboratories and more.
By Susan Keen Flynn

Meaningful Marketing Messages .................................17
Standing apart from the competition requires carefully crafted marketing messages that employ the concept of contrast: Show customers the difference between what is and what could be if they partner with your company.
By Kevin J. McArdle

As Good as New .................................................................20
Composites may be strong, but they are not indestructible. With more applications hitting the land, sea and skies, composites repair is becoming increasingly important. Learn how skilled repair technicians use high-tech tools and processes to return damaged composites to their original state.
By Patrice Aylward

Industry Leaders Discuss the Future ............................24
More than 60 composites professionals, analysts, OEMs and end users converged in April at ACMA’s Composites Executive Forum. Take a sneak peek at what these innovators discussed.
By Susan Keen Flynn
A Message From the ACMA Chair

Our Events Have Impact

AMCA continues to be on the forefront of educational opportunities for the composites industry. In April, the association sponsored the Composites Executive Forum in Washington, D.C. More than 60 industry executives interacted with leaders from several influential organizations, including the Environmental Protection Agency, the National Association of Manufacturers, the Department of Energy and the Department of Transportation. It was a great display of the breadth of prominent people that we, as an industry, have access to. The last day was spent visiting representatives on Capitol Hill. (For a recap of the Composites Executive Forum, read the article on page 24.)

More great ACMA events are on the way. It’s less than six months to CAMX – The Composites and Advanced Materials Expo, and there is a real excitement in the air. A partnership between ACMA and SAMPE, the show will feature more than 500 exhibitors representing all aspects of the composites industry – resins, reinforcements, processing technologies and more. If you’re considering exhibiting, there is still time to reserve a booth. Contact Sean Nodland at snodland@acmanet.org or 703-682-1673.

Another highlight of CAMX is the educational programs. There will be more than 250 sessions, covering everything from technical topics to business strategies. For more information on the educational tracks, exhibits and other aspects of CAMX, visit the show website at theCAMX.org.

And now it may come as no surprise that I’m asking for your help – again. While our efforts to promote ACMA membership have been successful during the past year or so, we need to add more members. Based on our estimates, ACMA members represent only 20 to 25 percent of the composites industry. So what do we need to do? If you know a business that should be a member of ACMA, send the name and contact information to Paul Hirsh, ACMA’s vice president of membership, at phirsh@acmanet.org or call 703-682-1665.

As ACMA continues to grow membership, we increase our level of influence with regulators in Washington, D.C. It also helps shine a brighter light on composites as a great material choice for new applications. I thank you for your ongoing membership.

Jay Merrell
Norplex-Micarta
ACMA Chairman of the Board
jmerrell@idicomposites.com
Multiaxials Enable Blended Wing Aircraft

For a small company, VX Aerospace of Morgantown, N.C., thinks big – as big as major aerospace manufacturers. Thanks to advances in computer-aided design (CAD), CNC machining and composite materials, the gap in capabilities between the “big boys” like Boeing and Northrop Grumman and small aerospace companies such as VX Aerospace is narrowing, says Robert Skillen, CEO of VX Aerospace. “Little companies can do interesting things now that you used to think could only happen at large companies,” he says.

VX Aerospace’s latest development is the VX-1 KittyHawk™ aircraft, a “blended wing” aircraft that combines the fuselage and wings and resembles a manta ray. According to the company, the design – which incorporates Chomorat’s C-PLY™ carbon multiaxial product – allows for more useable space inside the aircraft, greater payload capacity, better structural efficiency and better durability.

The VX-1 KittyHawk is the first aircraft to incorporate C-PLY, which has been used in the automotive industry, most notably for fenders on the Audi RS3 Sportback. The non-crimp fabric is comprised of unidirectional layers that are mechanically sewn together. It can have plies with a tow spreading process resulting in thicknesses as low as 75 gsm (grams per square meter) and can make very shallow angles (between ± 20 and ± 30 degrees).

For small businesses doing aerospace grade work, C-PLY is a “game changer,” says Skillen, especially because it allows for shallow angles without automatic tape placement. This, in turn, saves the company “hundreds of thousands – if not millions of dollars – in investment, which is beyond the reach of a small business,” he says. VX Aerospace got in on the ground floor with the new C-PLY material by partnering with Chomorat as a test manufacturer for the past several years.

VX Aerospace began developing the VX-1 KittyHawk in 2012 after the U.S. Marines retired the H-46 model helicopter, for which it had manufactured parts. Skillen began casting around for a new product. Inspired by blended wing military aircraft and other airliners, he turned his eye to a blended wing aircraft for the light and unmanned aircraft markets.

Skillen designed the VX-1 KittyHawk using CAD – yet another tool he says has closed the gap between small and large aerospace companies. “Twenty years ago, if you had to do CAD modeling to a millionth of an inch or something, the only people that could do that were large companies and it cost hundreds of thousands, if not more,” he says. “Now I operate a $3,700 CAD program that does fantastic surface modeling.”

Last October, Skillen brought the aircraft idea to North Carolina State University, where it was quickly selected by Lars Soltmann, a postdoctoral student, for his thesis project on the performance prediction and evaluation of the KittyHawk. After Soltmann’s computational fluid dynamics and wind tunnel testing showed promising results, VX Aerospace developed a 6 x 7-foot quarter-scale prototype, which was displayed at JEC Europe in March.

Skillen didn’t want to invest in high-temperature tooling for
The concept car was built through a collaboration between several companies, including CCP Composites, Hutchinson, Total RC, Atotech and Bostik.

Look to CCP Composites for all your sustainable solutions.

For more information, visit www ccpcompositesus com

For industrial use and professional application only. Consult the CCP Composites US website for complete product information.
the prototype, so the tools were direct-machined out of 39-pound density tooling plastic. C-PLY was then laid up in molds, vacuum infused with epoxy and cured at room temperature for 24 hours. (Production versions will use high-temperature tooling and C-PLY fabrics with Cytec MTM® 45-1 prepregs.)

As a result of its blended wing design, the VX-1 KittyHawk has only six basic airframe parts – a top skin, bottom skin and four ribs. Once the initial cure is complete, the parts are assembled using the bottom skin tool as the assembly fixture and Hysol® EA 9359.3™ adhesive. The entire airframe is then post-cured for approximately 16 hours.

Earlier this year, VX Aerospace assembled the second subscale VX-1 KittyHawk, which will undergo flight testing at NC State this spring. Afterward, the company will make any necessary design changes and prepare to produce either subscale models for the unmanned aircraft market (possibly for collecting agricultural science data) or full-scale aircraft for the manned market.

Perhaps what excites Skillen the most is that the added space inside the aircraft opens up the door to use compressed natural gas (CNG) as aviation fuel. “[CNG] is 40 percent cleaner and one-third the cost of aviation fuel,” says Skillen. “We’re hopeful that in the future we’ll be able to develop an aircraft that elegantly incorporates compressed natural gas.”

Melissa Haley O’Leary is a freelance writer based in Cleveland. Email comments to mxh144@case.edu.

For more stories like this, visit compositesmanufacturingblog.com and click on the tab marked “aerospace.”
Use PRO-SET Epoxy to create strong, lightweight composites that can withstand the harshest environments. PRO-SET Epoxies for laminating, tooling, infusion and assembly meet your highest goals in composite performance.

prosetepoxy.com  |  888-377-6738
In the wide open spaces of north-central Wyoming, communities in Big Horn County suffered from an unreliable source of ground water. The useable water supply was located nearly 20 miles away, leaving the rural area vulnerable to service interruptions in the event of a water main break. That’s just what happened in 1996, when an underground pipeline connecting several communities broke and cut off water service for days.

To remedy the problem, the Big Horn Regional Joint Powers Board (BHRJPB), which oversees the area’s infrastructure, installed a 15-mile pipeline to collect, treat and distribute ground water to surrounding communities. Because the region is home to harsh climates, extreme temperature changes and corrosive soil, the BHRJPB selected GFRP piping: It holds up in severe conditions and

GFRP water main pipes were lined up on a 15-mile stretch in north-central Wyoming prior to installation.
is strong enough to last for years without breaking.

FLOWTITE™ 18-inch diameter fiberglass pipe was used for the project, saving the BHRJPB nearly $2 million in construction, energy and long-term maintenance costs. The interconnected water system – known as the Northern Supply Pipeline – protects residents from service interruptions, provides water to areas without domestic water supply and decreases the dependence on a surface water supply system.

According to John Joyce, director of the BHRJPB, four pipe materials were originally considered for this project: polyvinyl chloride (PVC), high-density polyethylene (HDPE), ductile iron (DIP) and DuPont Teflon® tape-wrapped steel pipe. A study by an engineering firm revealed that all of them had limitations, including high corrosion potential, additional maintenance costs and low pressure ratings.

“That’s when the BHRJPB started exploring other alternatives and where FLOWTITE’s fiberglass pipe better fit the application,” says Jeff LeBlanc, engineering manager at Thompson Pipe Group, the current manufacturer of FLOWTITE™ in North America.

FLOWTITE is corrosion resistant and can handle fluids at elevated temperatures. In addition, the GFRP piping can accommodate water pressures exceeding 200 pounds per square inch (psi), in part because of its special inner resin lining. It allows the water to flow freely without lowering the pressure rating. Other pipe materials are unable to handle high water pressure, therefore requiring a pumping station to help increase pressure. Eliminating the pumping station saved the joint powers board $250,000 in construction costs.

Timely delivery proved to be the main challenge on this project, says LeBlanc, who worked with the previous manufacturer of FLOWTITE on the Northern Supply Pipeline. The pipes were manufactured using filament winding at the company’s plant near Baton Rouge, La. They were shipped in 40-foot sections – nearly 1,200 pieces – from Louisiana to Wyoming on open deck trucks. Once in Wyoming, sections of pipe were spread out along the 15-mile line and assembled. The installation took approximately five months and did not disturb any residents, since it occurred on the outskirts of towns.

Terin Bufford is the communications coordinator at ACMA. Email comments to tbufford@acmanet.org.

For more stories like this, visit compositesmanufacturingblog.com and click the tab marked “infrastructure.”
Composite Creatures Adorn One-of-a-Kind Carousel

As the weather heats up, children and adults alike can experience a unique attraction in Boston – the Greenway Carousel. The carousel is a lively addition to the Rose F. Kennedy Greenway, a mile-and-a-half stretch of contemporary parks in the heart of the city. Opened last August, the Greenway Carousel takes center stage across from Boston’s iconic Faneuil Hall and features eclectic animals fabricated from glass fiber-reinforced polymer.

The Rose F. Kennedy Greenway Conservancy, steward of the parks, enlisted the help of local elementary school students, encouraging them to draw pictures of animals they would like to see on the new carousel. More than 175 drawings were submitted. “Much to our surprise the children started drawing pictures of local animals of the land, sea and air,” says Charlie McCabe, director of public relations for the Rose F. Kennedy Greenway Conservancy.

Working with Jeff Briggs, owner of Briggs Design and lead sculptor on the project, the conservancy picked 14 characters: a sea turtle, cod, lobster, peregrine falcon, grasshopper, harbor seal, squirrel, rabbit, fox, skunk, whale, barn owl, sea serpent and a set of butterflies.

Briggs has been designing carousels for more than three decades and always uses fiberglass with a polyester resin matrix for his pieces.

The Greenway Carousel in Boston features 14 fiberglass animals native to New England. One of them is a lobster, shown left in production with sculptor Jeff Briggs and installed on the completed carousel.
Safe, **Green** Acetone Replacement

As we approach our sixth decade in the marketplace, U.S. Polychemical Corp. is proud to announce the availability of our Polychem Acrastrip line.

**Polychem Acrastrip** is a safe, green alternative for all your cleaning needs within the composite industry.

U.S. Polychemical has partnered with the EPA's Design for the Environment ("DfE") program to promote the use of products with improved environmental and human health characteristics.

**Polychem Acrastrip** is non-flammable, biodegradable, has no HAPS and is re-usable. Designed as a solvent and acetone replacement product, it will effectively clean, flush and strip uncured or cured polyester, vinyl ester, epoxy resins, as well as adhesives and coatings.

In addition to our Acrastrip line Polychem has introduced "**Bio-Lock**" a revolutionary way to eliminate grinding and sanding for secondary bonding!

Feel free to contact us at www.uspoly.com or 1-800-431-2072

"**Recognized for safer chemistry**"

www.epa.gov/dfe/

---

“**It is a remarkably strong, energy-absorbing material, yet extremely lightweight and ideal for use in these figures,**” says Briggs. Sam Vita, owner of Creating Designs and Fabrication Inc., based in Bohemia, N.Y., fabricated the GFRP animals using hand layup.

Design and fabrication on this meticulous project took three years. One of the challenges was ensuring the distinctive animals fit prescribed dimensions: Each one had to be approximately 54 inches long, 36 inches high and 14 inches wide.

“When designing a character that is long and narrow, such as the codfish, the only option was to curl the tail above or below its body to fill the allowable dimensions,” says Briggs.

One character was particularly tricky to create: “The falcon really pushed the parameters of the carousel art to the nth degree,” says Briggs. “The piece takes up all of the available – or ‘primary’ – space.” To ensure it fit, Briggs created a model of the falcon prior to making the finished product. First he built a 1:10 scale mock box of the available space, then he constructed the model falcon pieces inside the box. After completing this scaled-down version, Briggs made a full-sized box and assembled the GFRP falcon inside it.

The Greenway Carousel, which includes seating for 36, is New England’s most accessible merry-go-round for people with physical or auditory disabilities, according to McCabe. For example, Briggs designed the seal to support individuals with back ailments. The conservancy partnered with a non-profit organization called the Institute for Human Centered Design to ensure the carousel accommodates people with a variety of disabilities.

Carousels and Carvings, a Marion, Ohio, company, built the carousel frame (including the motor, turntable and flooring). In addition to the animals, Briggs made all of the other decorative elements, including the central housing walls and panels at the top of the carousel. Nearly all of the $3 million project, including surrounding landscaping, was funded by private donations.

The Greenway Carousel is a big draw to the Rose F. Kennedy Greenway. According to the conservancy, 853,000 people visited the parks in 2013, up 20 percent from the previous year. “With a carousel it’s obvious that people enjoy it,” says Briggs. “Everyone, all ages, turns into a seven-year old, and it’s just a delight to witness.”

Terin Bufford is the communications coordinator at ACMA. Email comments to tbufford@acmanet.org.

For more stories like this, visit compositesmanufacturingblog.com and click the tab marked “sports & rec.”
David Riebe knows architecture. And he knows composites, too. After earning a master’s degree in architecture, he spent most of the 1990s practicing with several firms. In 1998, he began a 12-year stint teaching design, theory and technology at Rensselaer Polytechnic Institute. In 2010, he left academia to join the composites industry, becoming a partner at Windsor Fiberglass Inc., a fabrication shop in Burgaw, N.C.

The career leap was not a stretch. “A lot of teaching dealt with emerging technologies and transitioning from a design-oriented practice to a fabrication-oriented interest,” says Riebe. He has combined his knowledge of both fields to create a line of semi-customizable composite cladding in partnership with Jefferson Ellinger, associate professor of architecture at the University of North Carolina at Charlotte and founding partner of E/Ye Design, an architecture firm based in Jackson, Wyo.

The marriage of architecture and composites is not new. But the use of glass fiber-reinforced polymer within buildings has been limited. “So far, composites have been largely pigeonholed within architecture to columns, cupolas, cornices and other decorative elements,” says Riebe. “There’s a real chance to bridge cutting-edge design with cutting-edge materials.” He and Ellinger hope the fiberglass cladding they have developed and installed on three buildings so far will help push the envelope of composites usage in construction.

They are not alone in their quest to push composites to the forefront in the architecture industry. “The market potential is so huge it makes the marine market look like a pinprick,” says Bill Kreysler, president of Kreysler & Associates Inc., American Canyon, Calif., and chair of ACMA’s Architectural Division. The custom fabrication shop has spent more than two decades designing, Architects are adding composite exteriors to buildings for a striking effect, plus functionality.

By Susan Keen Flynn
engineering and manufacturing composite products for architectural projects ranging from cathedrals to concert halls. “I keep telling my friends on the material side – resins and fiberglass – that if we can get a little help introducing our products to the construction industry, the potential is mind-boggling,” says Kreysler.

If you think that’s an exaggeration, consider three recent design-build projects that have placed composites front and center – literally. The San Francisco Museum of Modern Art, the Gilday residence in Wyoming and the Georgia Institute of Technology’s net-zero laboratory all feature FRP facades. The exterior of these buildings are both visually striking and functional thanks to the teamwork of composites companies, architects and general contractors.

■ Soaring High Into the Sky

The Project: The San Francisco Museum of Modern Art
The Players: Snøhetta and EHDD (architecture firms), Webcor Builders (general contractor), Enclos (a façade engineering company), Kreysler & Associates

The San Francisco Museum of Modern Art (SFMOMA) is undergoing a major expansion, joining a new 235,000-square-foot addition to its existing building. The expansion will provide nearly six times as much public space as the current building and double the museum’s capacity to display art. The SFMOMA collection includes thousands of pieces, ranging from expressionist paintings to installation architecture. When the building re-opens in 2016, its new exterior may make the largest artistic statement of all, with eye-catching FRP cladding panels on the east façade.

Kreysler & Associates is fabricating 700 “rain screen” panels which will cover and help waterproof the 10-story building. When fastened to the aluminum frame, the panels will create a rippling horizontal texture reminiscent of the nearby waters of the San Francisco Bay. The SFMOMA expansion is the largest use of FRP cladding on a multistory building in North America, according to Kreysler.

The panels are made from recyclable expanded polystyrene (EPS) foam molds that are milled by a CNC hotwire machine for rough shape and by a five-axis CNC router to create the final double-curved surface. No two panels are alike: Most are 5½ feet wide with lengths varying from six to 30 feet. The skin thickness is only 3/16th of an inch. “Every panel had to be designed and engineered individually to make sure it fit properly onto the aluminum frame behind it,” says Kreysler.

Kreysler & Associates teamed with Snøhetta during the research and development phase of the project to explore different techniques, textures and finishes. “While the construction industry has trended toward flat, thin façades, we wanted to explore a panel that could accommodate curvature and allow us to create a variety of visual effects by using the depth of the panel,” says Samuel Brissette, a designer with Snøhetta. “The lightness, durability and custom-tailored finishes were what attracted us to FRP.”

The panels are more than just aesthetically pleasing; they perform structurally, too. The building features a cantilever on one side. By using FRP, Snøhetta could maximize the span without using additional steel. Also, the rippling of the panels helps stabilize them and
significantly reduces the need for reinforcing the metal support frame. “We saved the museum over a million pounds of steel,” says Kreysler.

Kreysler & Associates is fabricating three to four panels daily and expects to be finished by September, when Webcor Builders will begin installation. Matt Rossie, vice president of Webcor, anticipates a smooth installation. “The dramatic difference in weight between FRP and glass fiber-reinforced concrete (GFRC) will certainly have an impact, as will the strength and resiliency of the FRP panels,” he says.

Enhancing Energy Efficiency
The Project: The Gilday Residence
The Players: Gilday Architects, E/Ye Design, G.E. Johnson Construction Co. (general contractor), Windsor Fiberglass

When the owner of Gilday Architects in Jackson, Wyo., designed her personal residence, she reached out to E/Ye Design to design FRP cladding for the 2,500-square-foot home. The architect, Peggy Gilday, had seen a small studio the architecture firm had created – its first cladding collaboration with Windsor Fiberglass – and was impressed.

Riebe and Ellinger introduced their line of composite cladding to fill a void in the market: They wanted to offer a mass-produced, economical option for high-end architects (who typically create one-off solutions) and general contractors. They also wanted to create a product that reduces energy loss in a building. “Taking advantage of the properties of fiberglass material, we can create a dimensional façade that increases the thermal performance of the building,” says Ellinger.

Their cladding is a customizable shingled system that regulates environmental exchanges at the façade through precise geometric undulations. The tiles allow the structure to “breathe,” as a typical façade does, yet become thermally activated as wind speed increases. Riebe and Ellinger work with architects to develop new surface geometries for the tiles, then produce a premanufactured cladding system.

“It bridges service and product,” says Riebe. “We think there’s a market for high-end architects who don’t want to choose from a certain brick style or be limited by what’s on the market. They can redesign their own geometry for a tile that is completely novel, and we will provide a turnkey solution.”

He and Ellinger design, test and fit the tiles using computer modeling software prior to fabrication. Once the CAD modeling is complete, all tooling is done in-house at Windsor Fiberglass. The tiles are open molded, using hand layup, to apply the fiberglass and a fire-retardant polyester resin.

The first use of the cladding system was the small studio, built in 2011. Windsor Fiberglass fabricated more than 475 white tiles, measuring 12 x 18 x 4 inches, from six unique molds. Ellinger says there were “six standardized parts, but infinite possibilities for the aesthetics of the project” because they could be reconfigured for different effects. However, he admits, this project lacked the hoped-for economies of scale.

While working on the Gilday residence, Riebe and Ellinger studied hard costs: They considered the cost of tooling versus part production and analyzed the optimal size tile for maximizing economy of labor, materials, shipping and installation. They decided to design one primary panel to bring down the price point.

Windsor Fiberglass made 142 main panels that are 6 feet long, 2½ feet wide and 4 inches deep. The company
also designed corner molds and fenestration panels. “Our focus was on developing a more holistic cladding system where we could incorporate the corners and window surrounds as part of that design,” says Ellinger.

The tiles were screwed onto a plywood substrate covered with DuPont™ Tyvek® house wrap. The installation, completed in 2012, took only three days. Riebe and Ellinger have since worked on a third project, an industrial building in Charlotte, N.C. With each undertaking, they hope to fine-tune the process. “The material costs are in line with typical architectural products,” says Ellinger. “The difference is if we can economize the cost of the molding and aggregate that across several panels, it can become a product that can compete with existing solutions for relatively high-end buildings.”

Letting in the Light

The Project: Georgia Tech’s Net-Zero Lab
The Players: HDR Inc. (architecture firm), Gilbane Building Co. (general contractor), Kalwall Corporation (composites manufacturer), Kistler-McDougall Corporation (aluminum composites fabricator)

The adage “practice what you preach” is exemplified in a new building on the campus of the Georgia Institute of Technology. Last year, the Atlanta university unveiled its 45,000-square-foot Carbon-Neutral Energy Solutions Laboratory (C-NES) housing several energy research efforts. While professors and students develop technologies inside the facility to reduce the earth’s carbon footprint, the laboratory itself is designed as a net-zero building – one that produces as much on-site energy as it consumes.

That’s no easy task: Labs can use up to 10 times more energy than most office buildings, according to HDR. The architecture firm and Gilbane Building Co. focused on three main areas for energy savings: power, the building envelope and lighting. A photovoltaic array, which covers the roof and wraps around the laboratory, produces power. That array acts as an envelope for three sides of the facility. The north-facing side is clad in glass and translucent panels, supplied by Kalwall®. The building takes advantage of daylighting, ambient lighting and task lighting.

“One of the most important features when you are producing a net-zero building is reducing your carbon footprint and energy load,” says Amy Keller, principal with Kalwall Corporation, Manchester, N.H. “Daylighting is a very important part of this equation.” Kalwall provided 144 translucent daylighting panels, totaling 5,390 square feet, to cover the 30-foot north facing façade. This creates a daylight atrium that spreads light into the building. “The prismatic effect of the translucent product pushes light deep within the space,” says Keller.

Another benefit of the translucent panels is their U-factor value, which is the measure of heat loss in a building element. A lower value indicates better thermal insulation. The panels on the net-zero lab have a .14 U-factor value. By comparison, most window U-factor values range from .25 to 1.25, according to the U.S. Environmental Protection Agency’s ENERGY STAR program.

In addition to being energy efficient, Kalwall’s panels are
Insider Advice: Architects & Contractors Speak Up

Two architects and a general contractor shared what companies in our industry can do to increase the use of composites in architectural applications:

“There is a lot of room in the building industry for composites to find a foothold, but it’s going to take some big changes to understand the relationship between architecture and composites. I would like to see more research and understanding on how composites can be used in structural elements. There’s a lot of work to be done there.”

– Jefferson Ellinger
Founding Partner of E/Ye Design, an architecture firm

“The more composite companies can do to get involved in a project in the early stages, the better chance there is to have this material become intrinsic to the project.”

– Giancarlo Valle
Designer for Snøhetta, an architecture firm

“As with any materials, highlighting the advantages in relation to the application is key. Composite companies would be well served by not only explaining the strengths of the materials, but also the impact those materials have on other elements of the project. For example, lower weight means reduced structural requirements.”

– Matt Rossie
Vice President of Webcor Builders, general contractor

fire and impact resistant. The composite sandwich panels are 2¾ or 4 inches thick. They are formed by permanently bonding specially-formulated fiberglass reinforced translucent faces to a grid core constructed of interlocked, extruded structural aluminum or thermally-broken composite I-beams. The panel’s insulating properties are further enhanced by adding increased densities of either translucent spun glass “batts” (fibers) or aerogel.

With so much attention on sustainable design, more projects like Georgia Tech’s net-zero lab are sure to be on the horizon. “The future looks bright for composite sandwich panels because daylighting has become integral to successful designs,” says Kurt Kistler of Kistler-McDougall Corp., the official distributor of Kalwall panels in Georgia. “Without daylight, many minimum standards cannot be met.”

Attracting the Attention of Architects

While these three projects highlight the potential of composites, industry pros recognize that breaking into the architecture market isn’t easy. So how do you grab the attention of architects? The consensus is to pick partners that understand materials.

“There are firms with material sensibilities that are not stuck on ‘doing it my way,’” says Riebe. “They get incredible and new results in coordination with some of the best engineers and construction companies out there.” If you bind yourself with progressive architects, he adds, you’re likely to find business opportunities.

Kreysler concurs. “Architects who take the time to understand materials are more likely to be better clients,” he says. “There’s a real interest in composites on the part of younger, more forward-thinking architects. They are always looking for something new and unique. And fiberglass represents a material that offers design flexibility not available in conventional materials.”

Susan Keen Flynn is managing editor of Composites Manufacturing magazine. Email comments to sflynn@keenconcepts.net.

Taking Composites to New Heights

Several years ago, the large-scale use of FRP cladding on buildings such as the San Francisco Museum of Modern Art would not have been possible. Two formidable challenges stood in the way – material limitations in the International Building Code (IBC) and the National Fire Protection Association’s 285 test. To read our exclusive online article about overcoming those challenges, visit compositesmanufacturingblog.com and click on “Online Exclusives.”
With thousands of companies in the composites industry, competitive pressure is commonplace. Some companies try to outmuscle others by slashing prices to secure contracts. As an added challenge, large customers – such as major aerospace and automotive manufacturers – take advantage of this increased competition and their large-scale buying power to dictate lower prices, thereby squeezing margins and stifling profits.

In this survival-of-the-fittest business landscape, you need to set yourself apart from competitors by making it crystal clear why customers should choose you. One of the best places to start creating this competitive advantage is through your sales and marketing channels, including websites, social media, marketing collateral, proposals and request-for-quote (RFQ) responses. You need to develop meaningful marketing messages. If not, you may end up in a position of undifferentiated powerlessness, with your customer handing you a list of prices in a boilerplate Excel spreadsheet.

If you take a look at the marketing messages of many composites manufacturers and suppliers, there’s usually plenty of room for improvement – and results. How many times have you seen this on a website, brochure or even in a sales presentation?

“XYZ Composites is a leading manufacturer of engineered composite and fiberglass products offering complete design and prototyping services, as well as mold making and technical support.”

This is the kind of messaging that your customers tune out because it’s not particularly compelling or relevant to their particular situation. So what do you need to make your marketing and sales messages more relevant to your customers? And how can you make sure these messages inspire action, not just lukewarm interest?

One answer lies in a concept called “contrast.” Contrast is created by the difference between what is and what could be, by the gap between your customer’s present situation and their future situation, once it’s been changed by your products or services. This is where your value to customers lies.

To illustrate this idea, let’s look at the original messaging above and transform it using the power of contrast. What if XYZ Composites used this message instead?

“Are you struggling with increased production costs, schedule delays and missed delivery dates? If you’re overlooking critical design for manufacturability requirements when you create new product concepts, these three problems may become your reality. Experienced engineers at XYZ Composites will work closely with you to correct potential design issues before they cause problems. We’ll help you reduce your fiberglass component design costs, create more robust products and achieve improved schedule performance with your customers.”

To compete in today’s crowded marketplace, companies need to create CONTRAST.

By Kevin J. McArdle

Meaningful Marketing Messages
In this example, the contrast lies in the difference between what is (increased product costs, schedule delays and missed delivery dates) and what could be (reduced design costs, more robust products and improved schedule performance).

Contrast creates value by showing customers how their world would be better with you in it. This value gives you an edge over the competition – one that has nothing to do with lower prices. Without contrast, there is no value. There is no perceived difference, and customers won’t understand what you’re offering above and beyond other composites companies.

Here’s another example to help you get a better feel for how to apply contrast to your business:

Before:
“XYZ Composites has the engineering experience and expertise to deliver fiberglass products that meet or exceed specifications on time and within budget – every time.”

After:
“As industry lead times get shorter and shorter, are you falling behind, incurring design changes that cost you money and delay your production runs? What if you had a single point of contact committed to providing feedback on fiberglass composites design and costs within hours? With our ‘Ask an Expert’ service, you’ll have access to a dedicated engineer who will answer your design questions within four hours to help shorten your design cycles and create a more predictable production schedule.”

In the reworked message, XYZ Composites establishes its value to customers by pitting costly design changes
Beyond Marketing: Words of Wisdom for Sustained Business Success

Sage business advice need not be long-winded. Check out these pointers – nearly all of which are tweet-worthy – from members of the ACMA Board of Directors. When asked about the best business advice they ever received, many offered answers that fell into one category – people.

and production delays against shortened design cycles and a more predictable production schedule. Using messaging like this, XYZ’s customers clearly understand the difference between what they’re currently experiencing and what they could be experiencing. And they know what company can make a difference: XYZ Composites.

Contrast not only creates value; it also creates urgency. By bringing customers’ issues to the forefront – in this example, rising costs and unpredictable production schedules – contrast helps the buyer see why it’s important to choose XYZ Composites now. Using contrast in marketing messages inspires action in customers, which translates to closing more contracts quickly.

Waging a competitive war based on price isn’t sustainable for any business, and it’s too risky to leave these decisions up to networking or friendly relationships. Contrast is a powerful technique that creates value around your products and services, giving customers a reason to choose your company. It helps ensure a flow of new customers at profitable prices and drives consistent revenue that will sustain your business now and into the future.

Kevin J. McArdle is the founder of McArdle Business Advisors, a regular columnist with Composites Manufacturing magazine and the author of The Six Deadly Marketing Mistakes – and How to Fix Them. For additional resources on moving your business forward, visit McArdleBusinessAdvisors.com.

Industry News & Innovations

Companies in the composites industry set themselves apart from competitors with more than well-crafted marketing messages: They are innovators, introducing new solutions and applications to the marketplace. ACMA keeps you up-to-date on the latest news with the weekly e-newsletter Industry Digest. Subscribe at at acmanet.org/e-newsletters.

Business Advice from the ACMA Board

Composites Manufacturing magazine asked ACMA’s Board of Directors two questions:

- What is the best business management advice you ever received?
- What business management strategy have you successfully implemented at your company?

The responses were insightful – and abundant! We were unable to fit them all in the magazine. Go to compositemanufacturingblog.com and click on “Online Exclusives” for more answers. You’ll glimpse an inside view of several industry-leading companies.
While composites are strong and durable, they are not immune to damage. Composite parts on everything from boat hulls to wind turbines can be impaired through collisions, lightning strikes, environmental exposure and other causes. In addition, as parts age fatigue may also be a factor. With applications for advanced composites ever increasing, so too is the demand for repair services and experts.

While the basic principles of repair have not changed much recently, the size and complexity of the repairs have. For example, last December a team of Boeing engineers and technicians repaired an Ethiopian Airlines 787 Dreamliner that was damaged extensively by fire. It was the first major repair to an airliner made largely from carbon fiber-reinforced polymer. In the wind market, technicians are challenged to perform maintenance on increasingly larger wind blades, some as long as 250 feet.

The repair of advanced composite parts follows a standard series of steps: damage assessment/inspection, preparation, repair, curing, final inspection and finishing. But in the field, each damaged part poses unique requirements based on the type of composite material and the manner and extent of the damage. Each repair requires its own solution that must be uniquely engineered, particularly if the structural integrity of the part has been compromised.

As Good As New

Composite repair is an art, relying on high-tech tools and processes – in the hands of skilled technicians – to extend product life.

By Patrice Aylward
Step One: Damage Assessment/Inspection

Since the repair’s design is driven primarily by the type of damage incurred, proper assessment and inspection is critical. Beyond a preliminary visual inspection, there are a range of nondestructive inspection techniques available in the repair technician’s tool kit.

Manual audio sonic testing, or “tap testing,” is the most straightforward method to detect voids, degradation and delaminations in a composite structure. Tap testing used to be as simple as taking out a coin or tap hammer and listening for a change in tone where the laminate is damaged or has delaminated from the core material. Now repair technicians use digital tap hammers to more accurately identify and measure the damaged area. Along with ultrasonic A-scan methods to determine the depth and size of damage, these are the workhorses of inspection.

Louis Dorworth, division manager of direct services for Abaris Training Resources Inc., a provider of composites repair training, notes that repair technicians are increasingly using higher-tech methods for inspection. “Thermal imaging (thermography) is performed with infrared cameras to measure different levels of heat transfer, indicating where defects within the composite part are located,” he says. “More sophisticated, yes, but environmental factors can affect heat transfer, making thermography just one more tool in the repair technician’s toolbox.”

Abaris also teaches the use of laser shearography as a diagnostic tool. “Using a camera, an interferometric image of the part’s micro-surface is taken in an unloaded state,” says Dorworth. “The part is then exposed to loading with heat or weight or vacuum, and the image is compared. Information about the differences between the two photos is extracted, revealing surface strains associated with subsurface defects, anomalies and damage to the internal structure – as minute as one nanometer.”

Inspection of damage to wind turbines poses a unique challenge: height. “We have high-powered camera lenses to photograph the blades from the ground,” says Gary Kanaby, director of sales for MFG Energy Services. “We are just now seeing the use of remote drones with attached cameras for inspection – a much less expensive approach than raising platforms or using technicians on ropes.” Drone cameras can regularly track the progress of minor dings or cracks, enabling owners to make informed decisions on when to make a repair.

With detailed inspection information in hand, the technician or engineer drafts a repair plan. “This is a critical step,” says John Busel, vice president of ACMA’s Composites Growth Initiative. “The plan must take into account the loads and how this repair will provide continuity to the original structure. Understanding the materials, cure temperatures and rates are all factors in a successful repair.”

Step Two: Preparation

Removing the damaged material and debris from the compromised part may require the technician to cut out or grind out the various layers of laminate plies and inside core. During preparation, the technician also confirms the composite and core material, determines whether the repair is in a critical, highly loaded section and confirms the axis of the unidirectional, bidirectional or multiaxial fibers or fabrics.

Sophisticated preparation technology currently in use, particularly for aerospace composites repairs, includes computer-controlled milling for removal of damage and laser pretreatment to enhance the surface for bonding of the repair. The benefits of these more automated tools include improved consistency, removal of the least laminate necessary, accurate tapering to accept the new laminate plies or prepreg composite fiber materials and less opportunity for human error, as well as the opportunity to integrate the automated inspection, preparation and repair tools to form a manufacturing repair cell.
Step Three: Repair

Repairs should replicate the original laminate and core, matching the original strength, stiffness and weight. If the damage is extensive, reaching through the outer ply and into the structure, then the core and outer skin need to be addressed. In the most challenging scenario, damage to the inner skin plies, structure and outer skin plies require repair.

“The Lamborghini promise is to ensure that the carbon fiber repair is 100 percent the same quality as the original part,” says Casper Steenberg, head of composite repair for the high-end automaker. Lamborghini’s team of repair specialists – called “flying doctors” – travel to dealerships to assess damage and perform repairs. The company modeled its flying doctor program after a similar strategy used by Boeing, says Steenberg. “The aircraft manufacturer has been working with traveling specialists for some time and has developed a system for execution of carbon fiber repair work using extremely compact equipment,” he says.

Some repairs first require the core to be rebuilt matching the specifications from the original core, such as balsa or foam in the case of wind turbine blades. “We use foam in prescored sheets to make it easy to pack anywhere from 100 x 100 millimeters to several square meters for a major repair,” says Kanaby. The core is later vacuum packed to ensure a complete bond.

The decision to use wet layup or a prepreg repair for the skin depends on the composite material and the original part design. Matching the direction of the composite fibers to each ply of the original design is most critical to duplicating the fiber axial load capability in the structure.

According to Henry Elliot, an instructor at the IYRS School of Technology and Trades, wet layups for skin repair remain the most common method for laminate skin marine applications. “We do see prepregs being used more often now for racing boat repair,” says Elliot. “But prepreg must be used in an environment where temperature, humidity and contaminants can be controlled.”

With wind turbine repair, the environment dictates wet layup. “Prepregs require storage in a cool place to control curing. Since wind turbine repair usually takes place outside in warm weather, we use wet layups 99 percent of the time,” says Kanaby. “Fibers are oriented at 45 degrees in one direction and 45 degrees in the opposite direction for biaxial strength for the skins while unidirectional is used in the structure.”

Dorworth summarizes the complex process of making and bonding repairs: “Once the edges of the damaged part have been tapered or scarfed to accept the repair, a series of replacement plies are cut to size. The fiber material is wetted with a laminating resin that will bond...
to the existing structure. Alternately, prepreg material, which is already pre-impregnated with just enough resin to bind the fibers together, will require an adhesive interface to bond the laminate. Systematically orienting the direction of the fibers in each repair ply to match the original axis of the corresponding original ply ensures the repair can efficiently transfer loads back into the structure.”

Remaining Steps

Once a composite part is repaired, it is cured, inspected and finished. Though these processes are essentially the same ones used for initial fabrication of parts, they are critical. “The curing step is incredibly important,” says Busel. “Without curing, the repair is garbage: Just think of using a glue to paste two things together that never really bond.”

Finishing the part can be as simple as sanding and cleaning to sealing and painting with epoxy- or polyurethane-based coatings. For aircraft and wind turbines, conductive coatings that provide lightning strike protection are likely required.

Trained Technicians

The effectiveness of repairs depends on the skilled hands of technicians. In the past, composites repair technicians learned through trial-and-error or on-the-job training, says Dorworth. Composites manufacturers assigned repairs to their most skilled personnel. But now they recognize the importance of training dedicated composites repair technicians. Aerospace companies, including Boeing and Airbus, have led the way in repair technology and training. “Many aerospace OEMs are actively sharing best practices with other users of advanced composites,” says Dorworth.

He adds that the most popular course offered at Abaris is Advanced Composite Structures: Fabrication & Damage Repair Phase I. ACMA offers the Certified Composites Technician – Wind Blade Repair (CCT-WBR) to meet growing demand for training technicians in servicing and repairing wind turbines. To date, more than 100 people have earned the certification. (For more information on the CCT program, email Caitlin Felker at cfelker@acmanet.org.)

“We are now seeing community colleges and other training organizations offering composite-related repair curriculum,” says Dorworth. “It’s been 25 years in the making, but best practices are evolving around many industries, with aerospace technologies leading the way.”

Patrice Aylward is a communications consultant based in Cleveland. Email comments to paylward@aol.com.
Washington, D.C., is known as a city of movers and shakers. Its reputation did not disappoint more than 60 attendees at ACMA’s first Composites Executive Forum, held April 1-3 in the nation’s capital. “The breadth of talent that came together was amazing,” said Scott Balogh, president and CEO of Mar-Bal in Chagrin Falls, Ohio. “As fabricators we like to solve problems and there were a lot of people from different industries here – whether automotive, energy or infrastructure – who identified areas of opportunity for us.”

The Composites Executive Forum was a veritable “who’s who” of industry leaders, analysts, OEMs and end users. Dr. Sanjay Mazumdar kick started the event, providing a positive outlook on the composites industry. The CEO of Lucintel, a global research and management consulting firm, forecasts the materials market will grow 5.2 percent this year to reach $25.5 billion, while the end product market will hit $72 billion. A panel discussion of end users echoed Mazumdar’s optimism. Jay Baron, president of the not-for-profit Center for Automotive Research shared insight on the auto market. “I have never seen the doors as open as they are now to industries such as yours,” he said. “Automakers are looking for ideas, and they don’t have enough engineers to research all the options.” The big question is how to lightweight vehicles, thereby improving fuel consumption and reducing carbon dioxide emissions.

The wind energy market also is looking to composites companies for solutions, said Stephen B. Johnson with GE Power & Water. Approximately 750,000 tons of composite wind blades are produced annually. But, as blades get longer, challenges arise. The cost of carbon fiber remains high. In addition, manufacturers are seeking ways to...
automate the labor-intensive blade-making process.

Politicians also made an appearance at the Composites Executive Forum. Ed Gillespie, the 2014 Virginia senate candidate and former counselor to President George W. Bush, shared thoughts at a dinner on the mid-term elections and his hopes for the nation. “We can still be a country where the next generation does better than the one before,” said Gillespie.

At breakfast the following morning, Senator Lindsey Graham (R-SC) talked about the importance of advanced manufacturing and a strong workforce. “If you’ve been unemployed for more than a year, chances are you need a new work skill,” he said. “I want to tie job training to unemployment benefits to get people back into the workforce.”

Before heading to Capitol Hill to visit congressional representatives, attendees looked ahead to the next Composites Executive Forum, which will be held in Washington, D.C., in April 2016. “I will bring more of the key MVP team leaders to the next one,” said Tom Hedger, president of Magnum Venus Plastech, Knoxville, Tenn., and chairman of ACMA’s Political Action Committee. “It’s a tremendous opportunity to get a 30,000-foot view of the industry and how our customers’ markets operate.”
3 Reasons to Renew Your Membership: Resources, Networking and Education

It is time to renew your membership in ACMA. (It is always time to join!) There are some recent accomplishments that highlight the value that ACMA brings to your company.

As a result of significant work by your association, the Department of Energy has announced funding for a $70 million Clean Energy Manufacturing Innovation Institute for Composites Materials and Structures. This institute will be a tremendous resource to the industry, providing the research and development necessary to open markets and develop the automotive, wind and pressure vessel markets, as well as others. ACMA is at the table working to assure that all segments of the industry will benefit from the institute.

Last month your association hosted its first Composites Executive Forum. It highlights the best of what ACMA does. We brought engaging speakers together to share insights on new markets and gave participants the opportunity to make contacts with the speakers and each other. It has led to new business opportunities for many of the participants. If you were unable to attend, make sure you check out our recap on page 24 and review the report from the conference available at acmanet.org. And look for other valuable information to support your business while you are on our website!

April was CCT Month. ACMA promoted the Certified Composites Technician program with free webinars on vacuum infusion and open molding and by highlighting current CCT technicians in the newly-formed CCT newsletter. We also offered a CCT-I course at Skagit Valley Community College – the first on the west coast and the first with double-digit attendance. More than 1,500 individuals have earned their CCT designation: If you aren’t one of them, we encourage you sign up today. To watch the webinars or get more information on the CCT program, visit acmanet.org/cct.

Finally, we’re introducing a revamped CM Online this spring. Composites Manufacturing magazine’s website will continue to bring you Industry Digest and CM Interviews, plus make it simple to access articles by market, topic and more. To update your user profile and subscribe to all our great publications, visit https://myacma.acmanet.org.

ACMA gives you more reasons to join and more value in renewing your membership.

Tom Dobbins, CAE
ACMA President
Our Products Make Your Products Better!
Better Products. Increased Sales.

Two Great Solutions. One Great Equipment Provider.

Patriot Chop/Wetout
The MVP Patriot™ Chop/Wetout system delivers unprecedented precision, power, versatility and rugged construction for long lasting use, Rapid Access Design (RAD) for easy maintenance, and reliable performance.

- 7:1 or 15:1 ratios available
- Highly Accurate Patriot Technology
- Increased Efficiency
- Improved Product Quality
- Modular Versatility

The Talon Gun Series
MVP’s Talon Gun Series is engineered to improve your bottom line and provide peace of mind. These spray guns are lightweight and comfortable for improved productivity and they ensure a consistent desired flow. Their long lasting, durable quality and dependability means fewer delays on the job. The MVP Talon Gun Series are available in the following configurations:

- Internal or External Mix
- Chopper
- Gelcoat
- Wet-Out
- Pour
- Patented, Non-atomized Fluid Impingement (FIT)

Contact us today to learn how we can serve you.

Magnum Venus Products

CUSTOMER FOCUSED. PRODUCT DRIVEN.
865.321.8806 •.mvpind.com • sales@mvpind.com
You Built This!
Now Work With ACMA to Build It Better!
Your company is critical to your community and your products make our lives better every day. Our national leaders need to know your story. Visit ACMAnet.org/CompositesAdvocacy to learn more.


Longer-life Highways will Boost Composites Usage
ACMA is back in Congress this year to promote the design and construction of infrastructure components based on consideration of life-cycle costs. After an educational campaign by ACMA and other stakeholders, in 2012 Congress included in a 2-year funding authorization a requirement for state transportation departments to consider life-cycle costs when selecting bids for construction of highway bridges. Composites-reinforced bridge decks and other structures can last much longer than those made from traditional materials and need little maintenance, but can cost slightly more to install. The composites industry is asking Congress to use the 2014 highway authorization as an opportunity to strengthen the life-cycle costing requirements by requiring states to provide opportunities for public participation in awarding highway construction contracts.

Architectural Division Hosts Annual Meeting and Dinner
Architectural Division will host a meeting and annual dinner at the Chicago Yacht Club on June 24. ACMA member companies who make architectural composites are invited to participate in this meeting and dinner as guests and are encouraged to RSVP as soon as possible by emailing Andrew Huber at ahuber@acmanet.org. The 4,500-square-foot Composites Pavilion will feature the booths of 38 ACMA members and demonstrate how composites allow architects and designers to create fascinating and economical designs.
Transportation Structures Council to Present at the International Bridge Conference

ACMA’s Transportation Structures Council (TSC) has organized a special technical workshop for the International Bridge Conference this June in Pittsburgh. The TSC has conducted technical workshops at the conference for 14 straight years to educate the industry on composites advancements in the infrastructure marketplace. Over the years, presentations have been given on the use of bridge decks, pedestrian bridges, rebar, concrete strengthening systems, marine piling, girders and other specialty applications. This year’s workshop details recent bridge installations, including high occupancy, large, historic and movable bridges in the U.S., Canada and Europe.

New User Portal Helps ACMA Members Maximize their Benefits

Our new user portal enables ACMA members to easily access their member benefits and maintain their personal information. To set up a personal account, members should visit myacma.acmanet.org/nf/Account/New. If you have any questions, please contact the Membership Department at 703-525-0511 or membership@acmanet.org.

Proudly Display Your ACMA Membership!

Let everyone know you’re a proud ACMA member by displaying the ACMA member logo on your website. It’s easy! Go to the Member Resources page on our website (acmanet.org/member-resources) and click on “Display the ACMA Member Logo” on the left side of the page.

Nominate Your Peers for ACMA Membership Awards

Each year ACMA recognizes leaders with three prestigious awards:
- The Outstanding Volunteer Award
- The Lifetime Achievement Award
- The Composites Hall of Fame Award

Recognizing exceptional people who have made the composites industry great is a core goal of the Member Awards Program. Visit acmanet.org/other-areas/award-programs today to nominate someone you have worked with directly or whose work sets the standard for recognition in the industry. The awards will be presented at CAMX – The Composites and Advanced Materials Expo, held Oct. 13-16 in Orlando, Fla.
ACMA Calendar of Events

June 2-5, 2014
ACMA exhibits @ SAMPE Seattle 2014
Seattle

June 8-12, 2014
ACMA exhibits @ International Bridge Conference Pittsburgh

June 26-28, 2014
ACMA exhibits @ American Institute of Architects Convention Chicago

October 13-16, 2014
CAMX – The Composites and Advanced Materials Expo Orlando, Fla.

For more information regarding ACMA’s upcoming events and education, visit acmanet.org/meetings.

May 2-3, 2014
CCT-Instructor Course Anacortes, Wash.

May 5-8, 2014
ACMA presents and exhibits @ WINDPOWER Las Vegas

Advertisers Index

Advertiser Page
American Elements................................. BC
AOC Resins........................................... 29
CCP Composites................................. 5
Composites One ............................. IFC
Elliott Company of Indianapolis, Inc. ........ 8
Gougeon Brothers, Inc. ....................... 7
JRL Ventures, Inc. ................................. 6
Kreysler & Associates ......................... 6
M.V.P. Magnum Venus Plastech................. 27
Master Bond ........................................... 32
Mektech Composites ......................... 26
Nexeo Solutions .............................. IBC
REXCO Mold Care Products............... 32
Saertex USA ........................................... 3
Sartomer USA, LLC ......................... 9
The R.J. Marshall Company ................. 25
Thermwood Corporation ..................... 22
US Polychemical .......................... 11

BC=Back Cover
IFC=Inside Front Cover
IBC=Inside Back Cover

Washington State Convention Center
Seattle, Washington
Conference: June 2-5, 2014 | Exhibits: June 3-4, 2014
www.SampeTechSeattle.org

UNRIVALED, REVITALIZED, POWERFUL AND SIGNIFICANT
Unrivaled history, revitalized exhibit hall, powerful audience and a significant market ensure that SAMPE Tech in Seattle is poised to see attendance records in 2014. Join us in Seattle to celebrate the growth of SAMPE Tech from a small gathering into a powerful platform that drives business all year long.

Conference programs at SAMPE Tech deliver comprehensive education on immersive topics related to the manufacture, development, and application of advanced materials. This event will also feature a special “conference within a conference” on the subject of textiles.

At SAMPE Tech you will:
• Receive the best training available in the industry
• Meet with 200 exhibiting companies
• Gain exposure to today’s M&P innovators
• Form new partnerships and improve existing relationships
• Participate in dynamic panels headed by today’s leaders

Visit www.SampeTechSeattle.org for event details. Or, contact Priscilla Heredia at priscilla@sampe.org or +1.626.331.0616, ext. 610.
Introducing a new super industry event - produced by ACMA and SAMPE - that connects and advances all aspects of the world’s composites and advanced materials communities.

With 8,500 expected attendees, 500+ exhibitors, 250 technical and business conference sessions, cutting edge technology and innovation, product displays and demonstrations, plus the largest industry marketplace, CAMX is the must-attend industry event in the U.S.

Call for Abstracts - Due April 4
New Members

Bridgerland Applied Technology College
Logan, Utah

Fiberglass Fabricators, Inc.
Smithfield, R.I.

Johns Manville - Headquarters
Denver, Colo.

Ladbor Technologies Pte. Ltd.
Republic of Singapore

MacLean Power Systems
Sweetwater, Tenn.

Nucap Industries, Inc.
Toronto, Ontario, Canada

Sawyer Industrial Plastics, Inc.
West Monroe, La.

TA Composites
Sicamous, British Columbia, Canada

University of North Carolina at Charlotte
Charlotte, N.C.

Waco Boom Company
Waco, Texas

Waco Composites
Waco, Texas

For more information on becoming a member of ACMA, email membership@acmanet.org or call 703-682-1665.

New CCTs Online: The Certified Composites Technician (CCT) program is the industry’s gold standard for composites training. For a list of the newest CCTs, visit compositesmanufacturing blog.com and click the tab marked “training/education.”

Enroll Now!

Train for Tomorrow • Certify for Success

CCT Benefits for Companies
- Increased productivity
- Lower production costs
- More skilled, forward-looking workforce

CCT Benefits for Individuals
- Documentation of professional expertise
- Industry-wide recognition of skills
- Enhanced career opportunities

Certifications Areas
- Cast Polymer
- Compression Molding
- Corrosion
- Light Resin Transfer Molding
- Open Molding
- Solid Surface
- Vacuum Infusion
- Wind Blade Repair
- CCT Instructor

www.acmanet.org/cct