Composites Become Material of Choice in Pollution Control Applications
One call to Composites One puts you in touch with a single source offering the broadest array of products from the industry’s top suppliers. It connects you with technical experts and local customer service reps helping you find the products you need for both traditional and emerging markets. It empowers you to become leaner, greener and more productive through hands-on training in Closed Mold and other more efficient processes. And it gives you access to back-up support and value-added services that can help drive new business growth.

That’s the power of one. Composites One.
Composites Become Material of Choice
Composites are the material of choice for pollution control systems and components, which typically operate in a highly corrosive environment. Fiber reinforced plastics (FRP) provide high corrosion resistance, a high strength-to-weight ratio and cost advantages versus stainless steel and other metals. 
By Richard Stewart

Composites Positioned for Higher Market Penetration
Wider adoption of composite materials in the built environment has long been the goal of the composite industry. However, a dearth of published performance criteria for composite structures has been a major roadblock to increasing market share, until now. 
By Jan Fletcher

Composites 2011 in Review
The true mark of a trade show’s success is take-away value—the amount of practical tips, informative news and insightful perspective attendees can apply when they return to their offices. Using that barometer, COMPOSITES 2011 was a triumph.

Online Exclusives
This year, the Composites Manufacturing blog was the official COMPOSITES 2011 Show Blog. Under the tab “COMPOSITES show,” you’ll find speaker interviews, educational session write-ups and the hottest topics from the show floor.

Cover Photo courtesy of Containment Solutions Inc., Conroe, Texas. For more information, visit ContainmentSolutions.com
I hope most of you were able to attend COMPOSITES 2011, held in Fort Lauderdale, Fla., February 2-4, because by all accounts it exceeded my expectations. Folks were upbeat and excited about seeing a rebound in our industry and a light at the end of the tunnel. The conference attendance matched attendance at COMPOSITES 2010 in Las Vegas with nearly 3,000 attendees—and that’s despite the horrible weather! Over 221 exhibitors were on hand (an increase of over 22 percent) from the prior year. It was a great conference in a beautiful and warm city. As I walked the show floor talking to exhibitors it was good to hear that they were seeing and talking to many attendees who were serious decision makers.

I want to say thank you to everyone in the industry—from exhibitors, ACMA staff and attendees—who made COMPOSITES 2011 a success.

Of particular significance was the keynote speaker, General Stanley McChrystal (USA-retired). General McChrystal is truly an American hero who walks the talk—a leader’s leader. His down to earth and practical ideas about leadership were real and easily apply to all of us in business. As I listened to him, I was impressed by his understanding of two things. First, he stressed how important it is to communicate across the command/organizational structure in order to ensure that everyone who has any part in the successful accomplishment of a task fully understands how and by whom it will be done. This applies equally to a military unit and a business organization. How well each of us communicates, and in turn encourage those within our companies to communicate effectively, in large part will determine the success or failure of our businesses.

The second topic he discussed was equally as important: the ability within an organization to move or distribute the decision-making authority down the organizational structure. In essence, he emphasized the importance of dispersing the decision-making process to the lowest responsible group, unit, or person. For a small business owner, this is a tough one. There is a natural tendency for an entrepreneur to make all the decisions and distribute no responsibility due to fear that the job won’t get done exactly the way the owner would do it. When this happens, the growth of the business is limited to the personal energies of the owner—and one tired owner at that! It is counter-intuitive not to release the authority for decision-making to someone else. Many small business owners know this and just can’t bring themselves to let go. The result is stunted growth.

As I continually downsized my company over the past three years to meet reduced demand for our swimming pools, the dispersion of decision-making was pretty simple—it all fell back onto me and my wife. I think the challenge for all of us going forward will be to selectively hire top-quality people who have the potential to assume increasing levels of responsibility and to give them not only those responsibilities over time, but the authority to affect decisions in the best interests of the company. By doing that I believe it enables the owners, like me, to focus on the business issues of profitability and growth with the assurance that the operational side of the business is secure at any level of revenue.

I wish all of you success and a profitable 2011!

Monty Felix
Alaglas Pools, ACMA President
monty@alaglass.com; 803-655-5000
CCP has the right material for your Composites application.

- **Epowia®** Vinyl Ester state-of-the-art resins offer outstanding resistance to acids, alkalis, solvents and other corrosive materials, even at elevated temperatures
- **OptiPLUS®** mold-making system is simply one of the fastest and easiest methods for fabricating thermoset and thermoforming molds available in the market today
- **ThermaCLEAN®** products provide greener solutions and have significant advantages over acetone in terms of emissions and fire safety
- **NuTack®-Blu** is a reactive tackifier used in closed molding that chemically reacts with resin, resulting in inter-laminar adhesion

NuTack®-Blu, Epowia®, OptiPLUS® and ThermaCLEAN® are registered trademarks of Composites & Polymers. ©2006
For industrial use and professional applications only. Consult the CCP Web site for complete product information.

www.ccponline.com  800-821-3590  Smart Start, Great Finish.
Collaboration Brings Big Benefits to Aerospace

Despite business areas being crippled by the effects of a down-trodden economy, the aerospace industry has seen a burst in technologies and employment growth. In particular, the aerospace manufacturing hub in the state of Ohio has had an upswing of activity due to the stimulus of projects that are geared towards creating a technological hotbed—composites among them. The Ohio Third Frontier Commission has funded projects through a program called the Wright Projects Program, which sponsors project collaborations between universities and businesses to breathe life back into the manufacturing arena in Ohio.

In a report from the Third Frontier Commission, Ohio Board of Regents Chancellor Eric Fingerhut describes how important the funding is to recipients as it sparks new growth in technology within Ohio. “The research conducted at Ohio’s colleges, universities and research institutions is vital to producing innovative products for the marketplace and developing new technologies in the state,” Fingerhut states. “Ohioans are consistently leading the way in creating new products and ideas to assist the growing technology industry and these awards are an important opportunity for us to invest in their ideas.”

The University of Dayton Research Institute (URDI), Renegade Materials, Goodrich and Owens Corning are joint recipients of the program’s funding and will create a multi-functional composite material at a brand new facility in Dayton’s aerospace hub. On the university side, Dr. Khalid Lafdi is the head of the team for Carbon Materials Research at URDI. With the funding from the Department of Defense, Lafdi has developed a nanotechnology called nano adaptive hybrid fabric (NAHF-XTM), nicknamed “fuzzy fiber”.

Dr. Khalid Lafdi is the head of the team for Carbon Materials Research at URDI. With the funding from the Department of Defense, Lafdi has developed a nanotechnology called nano adaptive hybrid fabric (NAHF-XTM), nicknamed “fuzzy fiber”.

The collaboration is utilizing an already established workforce to create high-end products. “We are taking composite materials from the university laboratory setting to an end-user environment,” Gray says. “The collaboration’s purpose is to create advanced materials and be the corridor for new job growth.”

In addition to the creation of a wider fuzzy fiber, the Wrights Program funded the building of a state-of-art facility to produce the fiber at a rate of 500 feet per day. According to Brian Rice, division head for Multi-Scale Composites and Polymers at URDI, the new facility will be the epicenter of Ohio’s aerospace hub and promote new ventures with businesses that are connected with the manufacturing industry. One area of focus is to produce a light weight material for an unmanned air vehicle (UAV). “We’d like to begin making smart structural materials for UAV’s that also serve as the plane’s communication, power and sensor systems. Not having to add
a battery or external sensors means less weight on the plane,” He says.

This collaboration is projected to create more jobs in Ohio which is one of the basic premises behind the funding. “We are positioning Ohio as a leader in the advanced technology field,” reported Lisa Patt-McDaniel, director of the Ohio Department of Development, during the announcement of the funding from the Wrights Program. “Our latest results show the program works and is making a difference in the lives of Ohioans as we continue to help bring Ohio and the rest of the country out of the clutches of one of the worst economic downturns in 70 years.”

Cindy Ferraino is a freelance writer based in Sewell, N.J.
To compete in the around-the-world Zero Race, a race designed to raise awareness for renewable energy, a vehicle must be able to travel substantial distances at road-worthy speeds propelled only by an electric motor. To do that, the vehicle must be extremely lightweight, meaning design teams often use seemingly unorthodox materials to build their cars. The team at the University of South Australia (one of four in the race) turned to Perth, Australia-based Ayres for its lightweight composite panels to use in the team’s car, a two-seater vehicle named Trev.

Everything about the Trev is designed to increase fuel efficiency. A three-wheeled layout, with the passenger seat directly behind the driver, increases aerodynamics. And the single rear wheel simplifies suspension and transmission while reducing weight. The lithium polymer battery and electric motor also gives the vehicle the 155-mile range and 50-mile-per-hour speeds required for the Zero Race.

Ayrlite composite panels from Ayres, used primarily to fit out the interiors of high-performance marine vessels, feature a hardened aluminum honeycomb core with aluminum, decorative laminate or fiberglass faces. The panels meet fire safety and smoke toxicity standards and are up to 75 percent lighter than conventional materials used such as plywood, according to Ayres’ International Marketing Manager Wayne Beaton. They are also fully recyclable.

The Trev team chose the fiberglass-faced Ayres panels because along with being lightweight, they are also extremely strong and easy to work with using normal hand and power tools—important for a do-it-yourself team building a car in a university workshop. The team cut and folded the panels to create a rigid skeleton for the vehicle, including the floorboard and side and front panels. The completed tub weighed about 70 pounds and used five Ayrelite panels, which retail at approximately $435 each. The panels are also used in high-end racecars because of their impact resistant qualities: all V8 supercars (the Australian version of NASCAR) must have a two-inch Ayrelite honeycomb panel in the driver’s door.

Once the skeleton was complete, the Trev team added expanded polystyrene blocks, then carved them to form the aerodynamic shape needed to maximize the efficiency of the vehicle. Expanding polyurethane spray foam was used to smooth out the shape. The whole car, weighing approximately 120 pounds, was covered in fiberglass and painted.

According to Beaton, the Trev, and vehicles like it, are stretching the possibilities for composite panels. Ayres’ has traditionally focused on marine vessels, he says, but, “we see most of our growth coming from outside the marine industry.” The company has been exploring the use of its panels as a substrate for photovoltaic panels, since it would lessen the weight and thus the structural requirements for rooftop installations. It has also been developing a lightweight acoustic panel in addition to its line of honeycomb panels.

The move toward hybrid and electric vehicles, says Beaton, is good for Ayres and other composite manufacturers that can make cars lighter. Cars like the Trev aren’t likely to be mass-produced any time soon—the tiny vehicle probably couldn’t pass required crash tests—but Ayres’ panels are already being used in recreational vehicles. “As fuel becomes more expensive,” he says, “people are looking to make RVs much lighter.”

The ultra-lightweight Trev finished the Zero Race in Switzerland in February 2011. By the end of the race, it had been driven almost 19,000 miles. To participate in the Zero Race, the Trev team had to purchase enough renewable energy in Australia to power the vehicle—2.1 megawatt-hours, or the amount of energy produced by one of the country’s wind turbines in a single hour.

Allyson Wendt is a freelance designer based in Brattleboro, Vt.
Phil Archuletta has been in the sign business for 40 years. His company, P&M Signs, Inc., Mountainair, New Mexico, supplies signage nationally to the U.S. Forest Service and the U.S. Parks Service.

It was by complete chance, then, that this dyed-in-the-wool sign guy found himself in the composites business. Today, he holds a joint patent with the United States Forest Service for a composite product he calls Altree, which was selected late last year by the United Nations to be part of its display of innovative wood and paper products in Geneva, Switzerland.

In 1993, the forests of the desert southwest were being overrun with juniper, pinon and other small trees, increasing the risk of catastrophic wildfires and causing problems for Archuletta’s long-time customers at the U.S. Forest Service. An initiative came down from policymakers in Washington D.C., asking the agency with finding a way to get rid of the overgrowth and to find a use for the foliage.

“I was approached by the Forest Service to research other uses for the small diameter material,” Archuletta says. “I contacted the Forest Products Laboratory in Madison, Wis., who I’d worked with previously, and took the small materials to Madison, where we started to work in the lab.”

Archuletta knew that New Mexico natives had been using juniper as posts, primarily in fencing, since the Spanish settlers arrived several centuries ago, so it was only natural that his first idea was to turn the overgrowth into four-foot posts. With a $30,000 grant in hand, and a vision for juniper-derived composite posts that could be used in fencing throughout New Mexico’s state parks, Archuletta and Forest Lab researcher Jim Mills set to work.

“At first we ground up the material and mixed it with plaster and cement; we tried all kinds of different methods to develop a product out of it,” he explains. “We were frustrated, because nothing really looked promising. The materials weren’t holding together. The lab had a small extruder on hand, so we decided we were going to mix it with plastic and see what would come out.”

The result marked a turning point in the project. “We mixed the juniper with plastic, put it under the press and out came the most beautiful board you’ve ever seen in your life!” Archuletta says. “I said, ‘This is what we want, we want to make a plastic wood composite and sell it all over the place for all kinds of things.’”

Motivated by that success, the team began making prototypes of posts and installing them around the state park within New Mexico’s high country in order to test the product’s durability.

“It started disintegrating into chunks – the UV just totally ate it up,” he says. “We knew what we wanted to build, but we didn’t know what kind of plastic to put in it.”

It was back to the drawing board for the crew, whose work turned now to learning everything there was to know about all the varieties of plastics. With their first attempt – a polypropylene/wood blend – unable to withstand the harsh climate of the desert, it was a matter of trial and error until they stumbled upon a solution.

“We tested everything that was out there and eventually figured out that number two plastics taken from old milk jugs did the job,” Archuletta explains. “By taking milk jugs, grinding them up and mixing them with juniper and different wood, we had a start, but we realized fast that it was going to be really hard to turn the small diameter wood into saw dust, because it’s got a lot of bark on it.”

Rather than spend precious energy developing a system for efficiently turning the materials to a typical wood flour, they decided instead to test out a composite blend using the entire tree.

“We started testing what would happen if we were to mix the bark, the needles – the entire tree – with number two plastics, and it worked unbelievably well,” he says. “Once we figured that out, we decided that making a flat sheet or boards for signs out of it would be better than trying to make four-by-fours.”

“My material is manufactured under pressure, and all of these other materials that are available on the market are not made under pressure, so they have a lot of creep and swelling in them,” he says.
While he waits, Archuletta has contented himself with collecting recycled milk jugs from the community and using his on-site granulator to break them down to make a resin for mixing with juniper and pinyon. “My intent, once I get the funding, is to put a big processing plant in New Mexico or Oregon, then pass legislation to allow me to set up recycling centers in every city in the state,” he said. “It would clean up the forest, it would clean up the landfill, and it would put all that wasted material on the roads to guide people throughout the country.”

Paula Yoho is a freelance writer based in Cincinnati, Ohio.

The pressure comes after the wood materials, which are garnered from the entire tree, are mixed with recycled milk jugs that have been ground into chips. The combined material is blended and heated into a homogeneous, molten mixture then rapidly cooled while kept under extreme pressure. Then the finished product is tailored to the customers’ specifications.

In the years since first developing Altree, Archuletta has made it his mission to take the process and expand upon it. “I have been making prototypes and delivering all kinds of different signs to some of the forests,” Archuletta says.

While his sign shop still puts out product using traditional materials, Archuletta dedicates most of his time these days to drumming up capital to fund a full-scale Altree manufacturing facility. He partnered recently with Jeld-Wen Windows, Inc., in Klamath Falls, Ore., and hopes to eventually have the machinery and capacity to manufacture Altree products in large sheets. The new equipment will give his company the capacity to fulfill requests from the Forest Service and other groups to produce not only signs, but picnic tables, outhouses and “just about any kind of project they have going into the forest,” he says.

“I have a pilot plant in New Mexico developing the equipment, but I can only make a 10-inch board,” he says. “I’m working with the Jeld-Wen engineers to help make a bigger machine.”

While he waits, Archuletta has contented himself with collecting recycled milk jugs from the community and using his on-site granulator to break them down to make a resin for mixing with juniper and pinyon.

“My intent, once I get the funding, is to put a big processing plant in New Mexico or Oregon, then pass legislation to allow me to set up recycling centers in every city in the state,” he said. “It would clean up the forest, it would clean up the landfill, and it would put all that wasted material on the roads to guide people throughout the country.”

Paula Yoho is a freelance writer based in Cincinnati, Ohio.
Comprehensive Training Preps Students for Any Industry

The International Yacht Restoration School’s newly launched Composites Technology program offers students in-depth instruction in both theory and manufacturing technique, says Henry Elliot, an instructor at the school.

The innovative nine-month program began in September 2010, and is offered at the school’s Bristol, R.I. campus, Elliot says. The first class of students will graduate in 2011.

“My having a good time with this,” says Elliot. “I’m a maker/builder. For the last 40 years, I’ve been making composite things, and it’s rewarding to pass the art onto the next generation. Hopefully, these guys will learn the right way to do things.”

“It’s the most comprehensive curriculum available,” says Robert Lacovara, who wrote the curriculum for the course. He is former technical director of the American Composites Manufacturers Association (ACMA) and founder of Convergent Composites, in Perkasie, Penn.

“Others mostly concentrate on a particular arena — for example, they concentrate on the marine industry, looking at open-molding processing in reference to that industry. The scope of this training goes from basic low-tech, all the way through to advanced composites,” says Lacovara.

“This program is absolutely unique, from the standpoint that it vertically integrates all the skills needed to move forward in the emerging composites industry,” says Lacovara. He created the industry’s first fiberglass shop technology program, which was a precursor to ACMA’s Certified Composites Technician (CCT) program.

“My hope is the materials and processes will prove applicable across the whole industry. These skills could also work in wind energy, aerospace, or in any one of those specific industries. There’s a lot of specific training — enough to get your foot in the door and be reasonably competitive.”

Henry Elliot, Instructor
International Yacht Restoration School, Bristol, R.I.

“The idea is to take the students through all the composite material processes: Thermoplastic Kelvin cures, starting from open molding, investigation and closed molding of various kinds,” says Elliot. “By the time we get done, we’ll have gone through all the common materials and processes from general to advanced composites.”

Graduates will be able to both build and repair boats, says Elliot. “My hope is the materials and processes will prove applicable across the whole industry. These skills could also work in wind energy, aerospace or in any one of those specific industries. There’s a lot of specific training — enough to get your foot in the door and be reasonably competitive,” Elliot says.

Students will be trained on a CNC machine, too. “That’s a first, as far as I know, in a graduate program — that level and scope of training,” says Lacovara.

Clark Poston, director for student and industry relations for IYRS, says the school’s composites’ programs “are coached in an environment that mimics the industry they will be employed in,” he says. “The goal is to have a graduate of the program job-ready.”

“The big thing for us is we don’t get pigeonholed into one industry,” says Poston. “The school’s training can be applied in the aeronautical and automobile sectors and the manufacture of wind blades. We feel like we’re well placed in the greater industry. Grads will have grand opportunities across multiple composite industries.”

“The program is not limited to training for building yachts,” says
Richard O’Meara, president of Core Composites, Inc., a division of ROM Development Corporation, located in Newport, R.I. O’Meara serves on the curriculum board for the school. He says the same skill set can be transferable to other composites industries. “Bristol has been and is becoming a fantastic area for composites, in that there is support for building businesses,” says O’Meara.

“Recently, MouldCAM moved in from Australia with a large CNC tooling shop in the same complex.” That’s an additional benefit to the students, he says, since MouldCAM’s facility is close by the Bristol campus. “You can literally walk across the street from the school and get a job.”

O’Meara says that in the past, those working in actual composite manufacturing, “kind of drifted around until they floated into what they were good at.”

“What’s cool about Bob [Lacovara] is that he ran production for Viking Yacht Company in the early 1980s, so he was familiar with what was actually happening on the composite shop floor, both back then and now. Bob saw the need to have people trained in advanced composite processes such as infusion, prepreg and CNC mold building. So, he was excited to be invited to actually write the curriculum,” says O’Meara.

“TYRS offers hands-on as well as classroom training. They saw composites as a growth market. They’re extremely forward thinking in this, because I believe the days of boat building in the old way are coming to an end — open molding is coming to an end,” says O’Meara. “The next generation of composite students picked this industry to be trained into, and they’ll fall in love with what they build.”

Paul Park and Sam Carnahan work on the Stagepoint 17 outboard powerboat, which has been built by IYRS students in the Composites Technology program. The Stagepoint tooling is on loan to the school by Sound Boatworks of Westbrook, Connecticut.

Jan Fletcher is a freelance writer based in Spokane, Wash.

Industry
Segments

Looking for a way to improve your Heating Processes?

We recognize your heating process is unique... let us build you an oven specifically tailored to it.

Name your process ... we can handle them all:

- Aluminum Aging
- Annealing
- Curing
- Drying
- Pre-Heating
- Stress-Relieving
- Heat Expanding or Shrinking

Standard and custom ovens (ambient - 1250°F) as large or small as you need them, and available with a wide variety of options.

Put our nearly 70 years of industrial oven experience to work for you.

Precision Quincy ... Your choice for innovation, quality and value.
Composites Aid in Aquatic Maneuverability
by designing a model in 3D and extracting the patterns to claves for this process. A 10-ft. diameter model is used can be pulled from the mold. The company uses two au-

Patterns for the lay-up. We streamlined this process which from that model in the CNC routing process. "Tradition-

So it will flow into the right places in the material. The sec-
grees to cure it. "The first hour is used to soften the resin about an hour at 180 degrees and another hour at 250 de-

Material, which Silveira says makes for a straightforward,
the company used prepreg and five layers of carbon fiber

production with carbon fiber have been the main reason for
that. That’s why we turned to making it out of carbon

Besides weight, the rider doesn’t have the control they need. “It is very difficult to reduce vibrations in skis, which are essentially core sandwich constructions subjected to flexural loads, without adding parasitic mass or compromising stiffness and strength.” Determined to find a solution, he began looking for a partner to make the carbon composite skis.

Friends of Caiazzo who used Wagner’s skis brought Wagner to his attention. “As soon as I called him up, I knew Pete not only understands ski design but also how advanced materials technologies could improve ski performance,” says Caiazzo. Wagner ran a series of tests to determine the mechanical properties of the Countervail material then plugged it into his design algorithms. On his blog, Wagner reports the benefit of the composite material comes in its makeup. “Countervail consists of a thin viscoelastic polymer cloth with fine strands of carbon fiber woven along its length in a sinusoidal or serpentine pattern. Because the stiff carbon creates a two-dimensional pattern, it provides strength in both flex and torsional axes. The harsh reactive stiffness of the carbon is moderated by the viscoelastic fibers.

As a result, you get a ‘light, strong, whippy but self-damping structural layer without the fatigue, bending or delamination problems common with metal skis,” he says.

Over a period of two years, Wagner’s crew built the skis using a sandwich construction through a wet lay-up process, took to the slopes and altered several prototypes. Finally the team had a sleek carbon-composite ski, effectively giving his ultra-high performing lightweight skis the desirable smooth feel and stability with substantially reduced chatter.

“The Countervail kits in Wagner skis are a carbon fiber, so there are cost implications,” says Caiazzo. Wagner skis start at around $1,800 whereas others range from between $300 to $600. However, Wagner says they still have an upper hand. “We are a small but really nimble high-end manufacturer. We’re not discouraged by more expensive, more exotic materials and are willing to spend more time on product development,” he says.

“While most of our skis are made with FRP or aluminum alloy, these products create a ski with a damper feel than standard carbon fiber. Thus, we began offering an upgrade to the Countervail carbon composite on all his designs for almost a year.”

Sandra Henderson is a freelance writer based in Denver, Colo.
Composites Become Material of Choice

Pollution control applications benefit from tough composites
By Richard Stewart

Composites are the material of choice for pollution control systems and components, which typically operate in a highly corrosive environment. Fiber reinforced plastics (FRP) provide high corrosion resistance, a high strength-to-weight ratio and cost advantages versus stainless steel and high nickel alloys also used in these applications.

A range of industries use FRP materials in systems that remove toxic gases and particulates from exhaust smoke and treat contaminated water and chemicals. Limestone slurries and chemical solutions used to reduce air pollution are abrasive and cause corrosion in metal components, making composites a perfect solution. Pollution control technology requires corrosion-resistant “scrubber” tanks and vessels (some over 100 feet in diameter), stacks, chimney liners, packing support systems, ductwork and piping.
Coal-fired power plants, a key target of the Clean Air Act, are required to install flue gas desulfurization (FGD) technology, which is highly efficient at removing sulfur dioxide (SO₂). When coal is burned, the sulfur in it combines with oxygen to form SO₂, which must be cleaned or scrubbed before leaving the smokestack. Wet FGD, the most common process, uses an aqueous mixture of lime or limestone to spray the flue gas prior to discharge.

Most of the coal-fired power plants in the U.S. are 30 to 40 years old and have been upgraded to meet emissions regulations, according to the American Society of Mechanical Engineers (ASME), which reports that some 1,400 coal-fired power plants are operating in the U.S. Since 2004, roughly 130 scrubbers have been installed at coal-fired power plants in the U.S., with the average installation requiring about two years to complete, relates the ASME.

Producing FRP pollution control components for coal-burning power plants is keeping companies like Kenway Corp., Augusta, Maine, busy to the point that the company is expanding its shop and hiring employees. “Business is booming,” relates Ken Priest, president. “We have a lot of work going into 2012, primarily scrubber systems and associated pipes and ductwork for the power industry. Kenway uses a variety of FRP processes in the shop, including filament winding, vacuum infusion and open molding. Tanks up to 14 feet in diameter are wound in the shop. Corrosion-resistant piping, 2 to 54 inches in diameter, is the company’s primary pollution control product, relates Priest. Most pipes are made to custom specs with flanges and attachments, he notes. The company also uses some advanced vacuum infusion technology to produce thick laminates using vinyl ester resin. One product, a 1,200-pound FRP hatch cover measuring 5.4 inches thick and 66.5 inches in diameter for an FGD installation, won an ACE Award for Technical Innovation in a Corrosion Application at COMPOSITES 2009 in Tampa, Fla. It was produced using a special process which provides a long resin flow time, cure on demand and slow exotherm development during cure in thick laminates, avoiding hot spots and stress fractures. Nitrooxide-mediated, controlled radical polymerization in temperature-controlled closed molds enable the process, which greatly reduces production costs of thick laminates, says Kenway.

Most of the corrosion-resistant piping produced by Kenway features abrasion resistant technology on the inner layers. Silica carbide is added to the resin, which is used to saturate the glass fibers on the interior of the pipes. Aluminum oxide is also used. The abrasion-resistant liners range from 3/16 inches to 3/8 inches thick, says Priest. Pollution control systems have gotten larger in recent years and require more advanced technology in the composite work, he observes. “In applications where we’re using infusion, we’re looking much more closely at the fiber architecture and orientation to produce components that provide the strength and wear resistance needed. We’re really engineering these components to create better value for our customers,” adds Priest.

RL Industries, Inc., Fairfield, Ohio, specializes in internal decking, support grids and structural internals for wet FGD scrubber systems, using open molding and vacuum infusion processing. Filament-wound storage tanks and pressure vessels up to 30 feet in diameter are also produced in RL Industries’ ASME-accredited shop. Brian Linnemann, engineering manager, observes that the biggest consumers of composites in pollution control are coal-fired power plants for wet flue gas desulphurization equipment. Others include the mining, chemical, steel and concrete industries. “Reinforced plastics are well suited to that corrosive environment. They are a much better option than metals,” he relates. Composites outperform metals in these applications because they provide better resistance to the chlorides and fluorides in the abrasive

Transported aboard a barge to the jobsite, this 26′ ID ductwork was manufactured for a flue gas desulfurization (FGD) project.

FRP scrubber hoods, like this one produced by Ershigs for an FGD project in Georgia, provide needed corrosive resistance in pollution control applications.

Flue gas desulfurization (FGD) recycle piping manifolds are made for one Ohio project.
slurries typically used in scrubbers that can cause severe corrosion in metal. “Properly engineered and fabricated correctly, they’ll last longer than metals in these applications. They are the most corrosion resistant, have the best mechanical properties and hold up better,” adds Linnemann, noting that E glass, E-CR glass and vinyl ester resins are most commonly used.

“The components we produce for coal-fired power plants use very high strength, directional laminates that are used in modular design that simplify installation and lessen the amount of field work required by our customers,” he explains. A large percentage of the tanks and vessels fabricated by RL Industries are of dual-laminate construction with a thermoplastic lining, notes Linnemann. The liner is made from fabric-backed fluoropolymer sheet, which is sleeved onto the filament winder, and the laminate is built up around it, he explains.

The industry leader in FGD systems is Ershigs, headquartered in Bellingham, Washington. The most common type of pollution control equipment produced by Ershigs is wet FGD scrubber systems with standard spray towers, according to Chaun Trenary, VP Sales & Marketing. Ershigs is one of only a handful of companies capable of doing field winding of large scrubber tanks and vessels. Sizing is based on the gas flow of the system. The largest wet FGD scrubber built by the company was 119 feet in diameter and about 70 feet tall – a Chiyoda CT-121 jet bubbling reactor.

Most processors limit their filament winding to the shop rather than investing in the large winding equipment needed for field production, which requires the equipment to be trucked to the site and assembled inside a temporary building. An enclosure is needed to control the production environment. The winders used are a carousel-type, vertical winder. Chimney liners can be wound vertically or horizontally in the field, notes Trenary. Typically, continuous strand E glass or ECR glass is used with vinyl ester resin along with a corrosion barrier of chopped strand E glass or chopped ECR glass mat.

“Because of the scrubber efficiency requirements, especially in the spray towers, the spray zones have shrunk, creating an impingement situation where the limestone slurry is shooting onto the spray header below it,” he explains. The higher volumes of abrasive slurry showering down on the piping in these designs can reduce the FRP material’s service life. “We actually did a generation change on our abrasion resistant piping to address it. That’s the biggest change we’ve been affected by in recent years.”

Richard Stewart is a freelance writer based in Tampa, Fla.
A long-standing roadblock to greater market share for composites is destined for demolition.

Wider adoption of composite materials in the built environment has long been the goal of the composites industry. However, a dearth of published performance criteria for composite structures has been a major roadblock to increasing market share, says Tom Dobbins, chief staff executive for the American Composites Manufacturers Association (ACMA).

“The completion of a three-year program to publish pre-standards for load and resistance factor design (LRFD) for pultruded fiber-reinforced polymer (FRP) products marks the beginning of a new era in the composites industry,” he says. “When the adoption process of the pre-standards is complete, composites will achieve a much higher level of acceptance.”

If pultruded products are going to be competitive in the marketplace, engineers and designers need LRFD standards, states John Busel, director of ACMA’s Composites Growth Initiative (CGI). The initiative aims to expand the use of composites in a wide range of markets.

“If I’m a structural engineer, and I have a project to build, like a cooling tower in a nuclear power plant,” says Busel, “and I can choose to make it out of non-corrosive materials instead of wood or steel, what tells me how to design with composites? Until now, I had to refer to individual pultruder guidelines based on older design methodology called allowable stress design.”

LRFD Pre-standards Initiative

At the launch of the LRFD pre-standards initiative, Busel posed a question to ACMA members in the July 2006 issue of Composites Manufacturing magazine: “Can we demonstrate to a bridge engineer that a new bridge deck made from composites will last more than 60 years?”

The answer to that question will soon be a hard-fought-for YES, following the association’s $1.4 million investment in the pre-standards initiative. “This is one of the association’s signature accomplishments in the last 20 years,” says Dobbins. “Particularly, in market development, I see it as a signal of future success to other segments in the composite industry.”

“Our competition came together, because they recognized the importance of competitors working together to open markets, which they can only do in an association,” says...
Dobbins. “It’s a banner for our industry on how we can work together to grow markets — to increase from one percent of the market, to two percent, and then five percent and 20 percent.”

“This pre-standard is shovel-ready,” says Busel. “Now that the pre-standards have been published, the next step is already underway. The American Society of Civil Engineers (ASCE) Standards Committee is going to take it and make it an official standard. They’re going right to ballot because ASCE feels the pre-standard is polished and in good shape,” he says.

**What is LRFD?**
Load and resistance factor design (LRFD) refers to a design methodology that makes use of load and resistance factors based on the known variability of applied loads and materials. Structural engineers use LRFD because it is widely becoming a preferred method for design, replacing other methods such as Allowable Stress Design. LRFD is also referred to as reliability-based design—the direction all civil engineering design codes are moving.

**Why do we need it?**
Composites are now generally recognized as excellent materials in many construction and civil infrastructure applications. Attractive qualities include strength and stiffness, durability, high corrosion resistance and lightweight.

However, the lack of consensus on a design standard is a significant constraint to the use and growth of composites in structural applications. A design standard is a tool used to guide engineers and architects in the process of selecting the right material for performing structural tasks in civil applications. Most engineers and architects are taught steel, concrete and sometimes wood design, but for most, composites are a foreign concept. It is because of this lack of exposure that civil and structural engineers and architects select more familiar materials.

A pultruded LRFD standard will increase the acceptance of composites in structural applications and create new markets for composites materials. An LRFD standard will also significantly increase the speed of acceptance by structural design engineers and encourage universities with engineering curriculums to add courses on designing with pultruded FRP composites. Teaching structural engineering students to design with FRP composites while in college will advance the use of FRP composites significantly in the future.
Importance of Standards

These standards will help protect every architect and engineer that works with pultruded products, says Dan Witcher, chair of the ACMA LRFD committee, and chief structural engineer for Strongwell Corporation in Bristol, Va. “Primarily, the way materials get into the real world is through building codes,” says Witcher. “Every architect has to have design guides for putting composite materials into buildings. Until recently, there were no design standards that had gone through the peer-reviewed process of accreditation standards.”

The American National Standards Institute (ANSI) is the primary standards contractor with the American Society of Civil Engineers. Witcher says ANSI will take the pre-standards to the ASCE balloting committee, and that committee may take from a year to 18 months to go through this ANSI process.

Busel says he learned the importance of standards when he worked in the aerospace industry. “It’s a valuable tool for undergrads as well as graduate-level engineers. It will foster a new crop of engineers, who will hopefully reside in the composite industry.”

Witcher says universities, colleges and architects will also use the design standards to teach the benefits of pultruded fiber-reinforced polymer composites. A natural outgrowth of the LRFD pre-standards will be the commercial development and distribution of structural software for composites. “In other materials, there is design software. That’s a big general benefit,” says Witcher.

Dustin Troutman, director of Marketing and Product Development at Creative Pultrusions, Inc., in Altoona, Penn., and chairman of ACMA’s Pultrusion Industry Council (PIC) says he’s hoping that when ASCE publishes the standards, engineers will more readily accept pultruded products, because it will be much easier for engineers to design with confidence. In the past, pultruded products have been perceived as “art and a little bit of black magic,” says Troutman. He anticipates the sacrificial effort on the part of association members to obtain pre-standards will give pultruded composites the credibility needed for much greater market penetration.

A crucial issue for the growth of composites is responsiveness to liability concerns, says Busel. “Engineers and designers want to know how it’s going to perform. It’s the same as a doctor that gets hit with a malpractice suit and loses his livelihood. There’s a fair amount of educational investment that can go down the tube. Life-safety issues — those are not taken lightly. Standards are expected to alleviate these concerns,” he says.

Witcher agrees. “It removes some of the risk and lowers the liability for practicing engineers and architects.”

The next phase, once the ASCE adopts LRFD standards, will be promoting the standards as an industry at the collegiate level, says Troutman. “We understand textbooks need to be written, and over the next three years, we’ll be changing from the technical phase to the marketing and promotion phase,” he says.

Producing the pre-standards is the culmination of a long process. “The PIC, a specialty business market industry group of ACMA focused on the pultrusion industry, and ACMA started work with the SPI Composites Institute in the late 1990s,” says Witcher. “An initial $160,000 contract to review studies and research data was completed in the late 1990s, and then a lull followed while there was a reorganization in the industry.”

In 2006, the project picked up steam after suppliers, vendors and manufacturers caught the vision, says Witcher. “Everyone realized the need. There were a lot of different contributors. Some gave $75,000, others gave smaller amounts. It was a big effort throughout the industry.”
However, since pultruded products can be custom designed to meet specific building requirements, they are much like cookie recipes, says Busel. “Everyone’s taste different. Everyone will claim theirs is better. This industry is a tight industry. What I put into my design gives me an edge over everybody else. It allows for innovation.”

Busel says the existing state of affairs has been a burden on composite manufacturers because they must generate data for every custom-made product to populate those equations that calculate LRFD.

“A lot of testing wasn’t always in the same format, and that made it a little more challenging,” says Troutman. “This manual is going to help the standards structural market. Those pultrusions are going to have to meet minimum regulations. Whether they are from the U.S., Mexico, India or China, they will have to abide by the same rules. At times, the quality has been questionable. This standard is going to put everyone on the same playing field, and hopefully it will be enforced.”

Looking Ahead

“ACMA and PIC saw the necessity to figure out the needs for the composites industry. No one else did it. The members sacrificed their funds to create this document,” says Busel. That monumental effort represented not only a large investment, but a significant leap of faith, too. “This was not a simple thing to develop,” says Witcher. “Everyone rolled up their sleeves and did the work, and now this standard will continue to be kept evergreen. ASCE will publish these standards and it will be sold from their bookstore.”

“Going forward, because of the efforts of ACMA members to achieve this goal, composite materials will be more highly regarded as a construction material,” says Witcher. “That’s the biggest marketing boost that our materials will see.”

“We look forward to a time when composite materials are an integral part of every building constructed in the U.S., because of LRFD standards..."
LRFD Standard Outline
An LRFD standard will give composites credibility as a structural material, a performance criteria for design, specification and installation, as well as reduction of liability and will become an exposure tool for teaching composites in engineering schools and increase market acceptance. Below is the submitted outline:

Chapter 1. General Provisions
Chapter 2. Design Requirements
Chapter 3. Design of Tension Members
Chapter 4. Design of Compression Members
Chapter 5. Design of Members for Flexure and Shear
Chapter 6. Design of Members Under Combined Forces and Torsion
Chapter 7. Design of Plates and Built-Up Members
Chapter 8. Design of Bolted Connections

For more information on the LRFD pre-standard, visit www.acmanet.org/resources/LRFD.cfm

implemented as a result of this project,” said ACMA President Monty Felix. “Ultimately, the American public will benefit from the increased use of reliable, durable composite materials in their homes and workplace.”

Jan Fletcher is a freelancer based in Spokane, Wash.
COMPOSITES 2011
In Review
This year’s show proves there’s a promising future for forward-thinking firms

The true mark of a trade show’s success is take-away value—the amount of practical tips, informative news and insightful perspectives attendees can apply when they return to their offices.

Using that barometer, COMPOSITES 2011 was a triumph. Composites professionals representing the industry’s full range of market segments came with specific missions, and thanks to the event’s wide variety of education, networking and new products on display, they left Fort Lauderdale, Fla., with money-making solutions and applicable ideas.

Now that the conference is in the rear-view mirror, here are six things COMPOSITES 2011 revealed to us; keep them in mind as the industry moves into the future:

**The industry’s diversity is dynamic.** The recent recession meant that many companies entered new markets and diversified their product lines. COMPOSITES 2011 was a show filled with niches and new opportunities—wind energy, infrastructure/corrosion, international business and many other growth markets.

**The future looks promising for forward-thinking firms.** Norman Timmins, vice president of consulting for Lucintel, spoke during a General Session about how last year began a rebound for several segments of the industry. He reported that the global composite market reached $17.7 billion in 2010, an increase of 10.3 percent from the previous year. The global composite materials market is forecasted to grow 7.8 percent this year, he said.

**Companies that embrace “green” practices and offer “green” products are positioned for growth.** In 2007, Crane Composites didn’t have a “green” strategy, nor did it track any data needed to estimate how much money it could save by becoming more energy-efficient and environmentally friendly. Today, the company’s multifaceted environmental initiative will save the company $1.8 million by 2012, said Julie Keith, vice president of customer care for the Channahon, Ill.-based composite manufacturer, during “Lowering the Operations Environment Footprint,” one of many green-focused educational sessions at COMPOSITES 2011. Crane Composites has also reduced VOC emissions by 95 percent, scrap by 36 percent and landfill waste by 6 million pounds.

“There are plenty of practical ways for a company of any size to do what’s right for the environment while also saving money and building a better culture,” Keith told attendees. “The key is to develop a roadmap, establish goals that can be measured, tackle projects and celebrate your success. Trust me—if we can do it, anyone can.”

**The industry’s innovation is in full force.** Fort Lauderdale was the place to be for composites professionals needing to discover important products, trends and technologies in the industry. A total of 221 exhibitors displayed and explained the industry’s complete range of products and services, including many that were featured on the show floor’s Main Stage and in live demonstrations.

Innovation was also part of futurist Daniel Burrus’s General Session presentation on how technological, social and business trends are converging—and what that means to composites industry firms. In addition, the Owens Corning Composites App Challenge also showcased the industry’s quest for constant improvement.

The Awards Luncheon at COMPOSITES 2011 featured ACE and Pinnacle award winners, among other awards, that celebrated the industry’s innovation (see page 28 for a listing of winners.)

**Regulatory issues remain critical.** COMPOSITES 2011 included a variety of education on styrene and other regulatory issues. One well-attended session, “Styrene Cancer Assessment: Science, Policy, Communications and Management” provided updates on new science regarding the carcinogenic potential of styrene and on the status of the ongoing regulatory reviews and industry efforts to encourage use of good science and sound policy. Participants learned how to use ACMA’s styrene communications products to effectively communicate to employees and community members on sensitive topics such as styrene concerns and how to reduce the likelihood of tort or insurance problems that may result from an inaccurate cancer listing (turn to page 23 for more information.)

**Leadership and change go hand in hand.** Keynote speaker Stanley McChrystal, retired Four-Star Army General and former Commander of U.S. and International Forces in Afghanistan, shared three main points about leaders and leadership. As leaders, he said, we must actually solve problems. We must change, because talking about change is easy, but implementing it is not. And we must be able to build relationships with those we lead—we must not forget that there is a very real human factor when it comes to leading people in war, in the factory or anywhere in between.

To follow-up on these and other conference events, including presentations, visit www.acmashow.org.

Next year, COMPOSITES returns to Las Vegas. The conference is slated for Feb. 21-23 at Mandalay Bay, site of COMPOSITES 2010.
Training Key to Composite Industry’s Future

Commercial aircraft experience lightning strikes on average every 10,000 hours, according to a presentation developed by Lou Dorworth, chief technical instructor for Abaris Training Resources. It’s no wonder, then, that repairing composites ranging from aircraft to wind turbine blades is a priority. Scott Beckwith, president of BTG Composites, led the seminar “Training the Next Generation of Composites Repair Engineers” for Dorworth, who was unable to attend the educational session as part of “Taking Composites to a Higher Level”.

Prior to covering the importance of repairs, Beckwith mentioned the common types of damage to composites. These include minor scratches and dings, as well as damage to the inner and outer layers, to the sandwich area and throughout the structure.

“The goal of composite repair is to reinstall and rebuild the fiber load path through the structure,” said Beckwith. “The ideal repair would match the original properties. But there are typically trade-offs.” He talked about the pros and cons of common repair methods, including bolted doubler, co-bonded doubler, stepped co-bonded and tapered-scarf co-bonded repairs.

Training composites repair engineers for the future is critical. “Larger and more complex composite primary structures are today’s big challenge,” said Beckwith. “Innovative repair techniques and methodologies will need to be explored.”

Firms Now Have USDA-Certified Way to Promote “Green” Products

Until now, many composites firms that offer products that include a percentage of biological or renewable agricultural materials have relied on their own marketing strategies to promote their green initiatives.

That’s about to change, announced Ron Buckhalt, manager of the BioPreferred Program at the United States Department of Agriculture (USDA). During an educational session at COMPOSITES, he unveiled details about a new consumer label that will certify biobased products and help firms promote them.

Under the voluntary labeling program, biobased products that meet the BioPreferred requirement—25 percent of biobased material based on molecular weight—will carry a distinctive label for easier identification by government, businesses and consumers.

“This is about increasing the amount of environmentally friendly content and new-carbon products in the marketplace,” Buckhalt said. “This new program is designed to empower the consumer to take into account that a product or package contains a verified amount of renewable biological ingredients.”

Attendees were eager to apply for the USDA-backed labeling program, which will be between $600-800 to apply. The program is scheduled to launch by the beginning of March.

To read more about the label program, including details about eligibility and certification, visit www.biopreferred.gov.
A report sits on the desk of Department of Health and Human Services Secretary Kathleen Sebelius, and her decision about it will send ripple effects throughout the composites industry.

The report is about styrene, a topic that was questioned, explained, dissected and vilified perhaps more than any other at COMPOSITES 2011. In various education sessions, technical papers and water-cooler conversations in Fort Lauderdale, composites industry members are essentially trying to do two things—(1) make sure Sebelius, her staff, lawmakers, lobbyists and other public officials become as educated as possible about styrene data, and (2) prepare communication that will proactively soothe potential backlash from employees and the public.

The education session “Styrene Cancer Assessment: Science, Policy, Communications and Management” tackled the issue from multiple angles. It provided updates on new science regarding the carcinogenic potential of styrene, as well as the status of the ongoing industry efforts to encourage use of good science and sound policy.

**Details from the Education Session**

George Cruzan, Ph.D., of ToxWorks presented a recap of a wide range of recent human and animal (rat and mice) studies that find little or no statistically significant evidence that styrene exposure causes cancer in humans.

Multiple organizations across the globe, including the European Union and a renowned epidemiology panel, have done studies and concluded that styrene is not likely to cause cancer in humans. “Those determinations unfortunately contradict what the NTP seems bent on believing and publishing,” Cruzan said. He explained several material flaws in the NTP review process, including lack of full consideration of the data, lack of peer review of critical findings by NTP’s styrene panel and lack of timely consideration of scientific input from the styrene industry.

John Schweitzer, senior director of Government Affairs for ACMA spoke about ACMA’s current advocacy efforts. The association’s Risk Communications Program can help industry members reassure employees and plant neighbors regarding styrene health risk.

“I recently had a face-to-face meeting with a senior White House official that went very well,” Schweitzer reported. “It was our first meeting with someone that high up in the White House, and we feel like we’re getting important people engaged on our behalf.”

“That advocacy effort must be supported by composites firms themselves,” said Mark Walton, principal of Strategic Communications Consulting. Walton offered specific tips about how companies can deliver proactive messages to staff and community members, including this insight:

- Create a public relations plan for each facility and be prepared for “triggering events” such as safety certification permit renewals and employee safety questions. “When you get questions, address them quickly, promptly and fairly,” Walton said. “Always tell the truth, and remember a mantra of the crisis communication world: Reassure first, and educate second.”
- Monitor media and community sentiments through social media tools.
- Invite local leaders and media members on plant tours.
- Show good stewardship and earn goodwill by reducing emissions, addressing environmental concerns and keep safety datasheets updated.
- Try to get workers to become advocates for the company by focusing on clarity, authenticity and access in your messages.
- Use ACMA’s resources, including a worker handout, a workplace poster, common questions and answers about styrene, a video on styrene facts and more.

**We Need 1,000!**

Attendees united in ACMA’s advocacy effort to keep styrene from being listed on the National Toxicology Program’s (NTP) Report on Carcinogens (RoC) by each signing a letter asking the government to reassess its decision and “get it right.” Join ACMA’s goal to reach 1,000 letters, which it will deliver to Washington D.C., by contacting Jonathan Roberts at jroberts@acmanet.org.
Marine App Makes First Wave

When Scott Lewit studied the new fleet of U.S. Naval rigid hull, inflatable boats back in 2008, he uncovered a number of significant inefficiencies. Like wave impact. And seat systems. And the plain old weight of the boat. He also knew he could do something to improve all that.

So Lewit, president of Structural Composites Inc., Melbourne, Fla., started to break down the structures of these boats—referred to more widely as RHIBs—used as combatant crafts that employ tough, lightweight fiber systems combined with carbon-fiber and preform-framing technologies in order to make them lighter, safer and more fuel-efficient.

More than three years later, the changes are nothing short of remarkable.

Lewit and Structural Composites recently received a $245,000 grant through the Florida Research Commercialization Matching Grant Program.

Lewit said he opted for low-section framing, which allows for lower cost and less weight than a traditional sandwich boat; a membrane structure that absorbs the weight of waves and has no hard spots that might otherwise cause the boat to break; and a Sharkskin coating that uses a modified truck-bed liner as the skin of the boat.

The results? Lewit trimmed the weight of the current RHIBs from 1,200 pounds to 482—shaving away nearly 60 percent of the weight. Because of that, the boats are also burning less fuel. “We were definitely excited,” Lewit said. “Now, we’ve got to build it.”

That opportunity will arrive soon enough. Lewit and Structural Composites recently received a $245,000 grant through the Florida Research Commercialization Matching Grant Program, one of only 13 companies across the state to receive any money at all. “The preliminary design is almost finished now and will be finalized in November,” Lewit said. We’ll build it in March and April next year, and then the Navy will evaluate it for another year from that point. “Our mission,” he said, “is to get it out and get it deployed.”

Renewable Energy

Untapped Application Possibilities of Natural Fibers

Within the “green” movement is a desire to use natural fibers within composite products. However studies have shown that despite their benefits, natural fibers struggle in two areas. But why do those negatives often outweigh some glaring advantages of a 7 billion pound industry? “Natural Fibers for Composites 101: When, Why and How to Replace Fiberglass with Kenaf/Jute/Flax,” presented by Larry Dickinson, president of 3F, addressed these sometimes frustrating issues.

However, he is certain that remedies are on the horizon. Remedies that will ultimately do what every composite company seeks to accomplish, namely develop a better quality product and reduce costs.

“There is a big appeal for natural fiber, “says Dickinson. “It’s renewable, has a lower density, is recyclable, is cheaper than synthetic materials and has a greater specific strength, meaning the strength-to-density ratio is incredible.” According to the Department of Energy (DOE) natural fibers could reduce vehicle weight 50 percent.

Among the most promising and well known materials in the natural fibers world are flax, jute, kenaf and hemp. Other materials like banana, pineapple and coconut shells have yet untapped potential. “These products may seem strange but as a composite manufacturer you need to look at how the fiber works in the end product, not the fiber itself. 90 percent of the time, bio-products have a higher stiffness over strength ratio than FRP—and this is a design driven industry!” he says.

Yet, barriers remain. Barriers like the lack of a technology push, lack of market pull due to uncertainty in changing federal regulations, quality and consistency issues (the fibers can’t be processed affordably in the U.S.), lack of supply—it’s a growing industry in Europe, Asia and Canada but remains illegal or unknown within the U.S.—and the two wild cards: moisture absorption and interface of the fiber and resin. “Mother nature made natural fibers to suck up water, which unfortunately affects the interface properties within composite applications. So far, many of the remedies companies have tried don’t completely solve the problem,” says Dickinson.

However, he is certain that remedies are on the horizon. Remedies that will ultimately do what every composite company seeks to accomplish, namely develop a better quality product and reduce costs. One point for Mother Nature.
Partnership with Academia Benefits Composites

Academia and industry can have more in common than you think. In fact, according to professors Rudolph Seracino, North Carolina State University; Antonio DeLuca, University of Miami; and David Dittenbar, West Virginia University, the two seemingly opposite groups can form mutually beneficial relationships, especially when industry companies can approach groupings of universities like the team’s Center for Integration of Composites into Infrastructure (CiCi), which focuses on accelerating the adoption of composites into infrastructure applications.

The three professors addressed the opportunities—and opportunity costs—related to university and industry partnership in the session “University-Industry Partnerships: From Research to Practice”.

Many attendees came because they didn’t understand the benefits or even how to start a partnership. Fortunately, with perks like technology and applications information exchange, access to peer reviewed research, state-of-the-art equipment and facilities as well as access to a network of faculty and students (future employee pool) the collaboration is a win-win situation. “There are National Science Foundation (NSF) grants that require industry participation. And when industry does participate, they gain access to a testing service, the possibility of a tax deduction through grant donations and a student focused on their product,” says Seracino. “The tip is to look for an institution that is IAS accredited and accepted by the ICC (International Code Council). At places like CiCi, we will direct you to the university within the group that can best meet your needs.”

“One of the largest concerns companies in general have, not just the composites industry, is the Intellectual Property right that the university would have based on technology it develops,” says Seracino. “But universities are willing to work with companies and in the end it’s never as big of an issue.” Among the successful co-ops, Dittenbar named ocean thermal energy conversion system (OTEC) fatigue testing and the development of modular housing and composite pavement panels. “The goal for us is to have peer reviewed material and develop code writing,” says Deluca. “On the other side, the benefits to industry can be innumerable.”
**Hall of Fame Inductees**

Don Abel (photo left), national operations manager at ZCL Composites, and Charles Dore (photo right), technical director of Cinnabar Florida Inc. and president of Abate Fire Technologies, were elected to ACMA’s Hall of Fame by Best Bath Systems’ Gary Multanen (photo middle.) To be eligible, inductees must have attained distinction among his/her peers through their efforts, involvement and accomplishments in the composites industry and its associations.

**Lifetime Achievement Award**

Richard Morrison, president and CEO of Molded Fiber Glass, received ACMA’s Lifetime Achievement award for his long-standing industry and association leadership. To be considered for the Lifetime Achievement award, nominees must have been involved in the composites industry for at least 20 years and must have made a significant and lasting contribution.

**President’s Award**

Steve Walling, chairman of the board and CEO of Plasticolors Inc., was this year’s President’s Award recipient because of his dedicated focus and ability to help develop and refine ACMA’s strategic goals.

**Outstanding Volunteer**

Marcy Offner, marketing manager at Composites One, received the ACMA Volunteer award for her various rolls including convention committee chair and participating in the newly formed ACMA Marketing Committee.

**President’s Award**

Steve Walling, CEO of Plasticolors Inc. (right) received the President’s Award from ACMA’s Monty Felix (left).
“We are at the base of a mountain of not just change, but transformation.”
Daniel Burrus, founder and CEO of Burrus Research
“Using Innovation and Trends to Drive Growth”

“Mother nature-made natural fibers suck up water, which unfortunately affects the interface properties.”
Larry Dickinson, president of 3F
“Natural Fibers for Composites 101: When, Why and How to Replace Fiberglass with Kenaf/Jute/Flax”

“Always tell the truth, and remember a mantra of the crisis communication world: Reassure first, and educate second.”
Mark Walton
principal of Strategic Communications Consulting
“Lowering the Operations Environment Footprint”

“We need to understand the limitations of composites, and prepare our responses accordingly.”
John Busel, director of ACMA’s CCI
“Why Composites?”

“We are at the base of a mountain of not just change, but transformation.”
Daniel Burrus, founder and CEO of Burrus Research
“Using Innovation and Trends to Drive Growth”

“Larger and more complex composite primary structures are today’s big challenge.”
Scott Beckwith, president of BTG Composites
“Taking Composites to a Higher Level”

“This new program is designed to empower the consumer to take into account that a product or package contains a verified amount of renewable biological ingredients.”
Ron Buckhalt, manager of BioPreferred Program at USDA

Excerpts taken from COMPOSITES 2011 sessions. To read more on these and others, visit compositesmanufacturingblog.com and click on “COMPOSITES Show”.

Subscriptions:
Subscribe for free at cmmagazine.org
Awards for Composites Excellence (ACE) Winners

**Best of Show**
Composite Cargo Tanker with DuraShield Continuity Capability, Corrosion Companies Inc, Washougal, Wash.

**Composites Sustainability**

**Equipment Innovation**
Multi-Directional (MD) Reinforcement System, MD Fibertech Corporation, Sausalito, Calif.

**Infinite Possibility for Market Growth**
Lightweight Glass Made Type 4 CNG Cylinder, GASTANK SWEDEN, Pitea, Sweden

**Innovation in Green Composites**
Sustainable Composites for Water and Sewer Applications, 3B-the Fiberglass Company, Battice, Belgium

**Most Creative Application**
RAZR Hawk Driver featuring Forged Composite, Callaway Golf Company, Carlsbad, Calif.

**Process Innovation**
Acell Monolithic Composite Process, Italpresse / Acell USA, Punta Gorda, Fla.
Technical Paper Winners
Over fifty final papers, each offering state of the art, in-depth looks into processes, applications and materials, were reviewed by a committee, which were narrowed down to the best of five categories. Kristin Thunhorst, 3M Company, won Best Overall Technical Paper for The Effect of Nanosilica Matrix Modification on the Improvement of Pultrusion & Properties of Pultruded Epoxy Carbon Fiber Composite. Winners in each of the following categories were presented plaques:

**Design and Engineering**
An Investigation of Pin Bearing Strength on Composite Materials
By Dustin Troutman, Creative Pultrusions

**Green**
PHBV/Oak Wood Flour Engineered Biobased Composites: Tensile Properties and Water Absorption Behavior
By Wil Srubar, Stanford University

**Manufacturing and Processes**
The Effect of Bonding Fixture Heat Source on Bond-Line Read-Through Severity
By Kedzie Fernholz, Ford Motor Company

**Materials**
Mechanism of E-Glass Corrosion Using SEM/EDX
By Kevin Spoo, Owens Corning

**Pultrusion**
The Effect of Nanosilica Matrix Modification on the Improvement of Pultrusion & Properties of Pultruded Epoxy Carbon Fiber Composite
By Kristin Thunhorst, 3M Company

All technical papers are maintained in an electronic library and can be found at www.acmashow.org

To read more on COMPOSITES 2011 education sessions, awards and networking opportunities, visit www.acmashow.org
New Pre-Standard for Pultruded FRP Composites Will Expand Markets

Recently published pre-standards for pultruded fiber reinforced polymer (FRP) will allow them to compete on a level playing field with other construction materials like concrete, steel, wood and aluminum. Performance criteria for design, specification and installation will help to expand markets and grow the composites industry. This $1.4 million program, funded through ACMA, has been under development for 3 years. Contact ACMA’s John Busel at jbusel@acmanet.org for more information.

NIBS Creates Advanced Materials Database

The National Institute of Building Sciences is overseeing the establishment of an Advanced Materials Database. Coordinated by the Advanced and High Performance Materials Council (AMC), it encourages the understanding and use of high-performance and advanced materials for construction. The database will provide detailed statistics and information, allowing engineers, architects and scientists to readily compare different materials, provide a forum of communication between member organizations and prevent the duplication of effort. Beginning January 2011, the Database began to accept submissions of new materials drawn from the Department of Homeland Security’s Infrastructure Protection and Disaster Management Division as well as contributing institutions. For more information, visit AMC’s website (www.advancedmaterialscouncil.org/) or contact ACMA’s John Busel at jbusel@acmanet.org for more information.
ACMA Moving Composites Forward

ACMA continues to serve the composites industry in so many ways. We just brought 3000 industry leaders together at the COMPOSITES 2011 conference to connect, learn, and grow. The response was terrific! The proceeds from COMPOSITES will be used to support ACMA’s advocacy, education, and market growth initiatives—we have a lot going on in each area. For example, we consistently educate members of Congress and the Administration on the flawed scientific review done by the NTP and continue to make significant progress, have the Corrosion Control and Infrastructure (CCI) and Green Composites conferences coming up and recently completed our $1.3 million Load Resistance Factor Design (LRFD) pre-standard. Now we will focus on providing critical data to enable designers to understand the variety of advantages composites offer over other materials. The continued support of ACMA’s members makes all of this possible and we thank you!

Tom Dobbins, CAE

New Members

- Matt Arrant, CCT-VIP
  Happy Valley, Ore.
- Lucas Bedard, CCT
  Grand Forks, N.D.
- Lowell Bedard, CCT
  Grand Forks, N.D.
- David Bell, CCT
  Auburn, Wash.
- Kenneth Blood, CTVIP
  New Sharon, Maine
- Randy Bond, CCT
  Airdrome, Okla.
- Albert Bourbeau, CCT
  Sprunger, Okla.
- Eric Brown, CTVIP
  Aberdeen, S.D.
- Lynn Carlson, CTVIP
  Happy Valley, Ore.
- Christie Caron, CTVIP
  Brunswick, Maine
- Dawn Caron, CTVIP
  Brunswick, Maine
- Terry Carter, CCT
  Mississauga, Ontario, Canada
- Dana Chamberlain, CTVIP
  Brunswick, Maine
- Sonam Chopel, CCT
  Mississauga, Ontario, Canada
- Dana Cochrane, CTVIP
  Brunswick, Maine
- Jimmy De Leon, CCT
  Spokane, Wash.
- Garrett Dee, CTVIP
  Jay, Maine
- Eric Doyle, CTVIP
  Happy Valley, Ore.
- Crystal Dutton, CTVIP
  Brunswick, Maine
- James Fehr, CCT
  Grand Forks, N.D.
- Bob Fox, CTVIP
  Portland, Ore.
- James Geelhoed, CCT
  Saint Paul, Minn.
- Timothy Gionet, CTVIP
  Brunswick, Maine
- Niccolo Grande, CTVIP
  Aberdeen, S.D.
- Alden Hall, CCT
  Grand Forks, N.D.
- Nick Hess, CTVIP
  Happy Valley, Ore.
- Aaron Hollowell, CTVIP
  Happy Valley, Ore.
- Ryan Moss, CCT-VIP
  Happy Valley, Ore.
- Huong Hu, CCT
  Mississauga, Ontario, Canada
- Tyson Huckins, CTVIP
  Happy Valley, Ore.
- Steven Hulst, CCT
  Grand Forks, N.D.
- Justin Inglis, CTVIP
  Happy Valley, Ore.
- Michael Johnson, CCT-M
  Port Townsend, Wash.
- Chad Jorgenson, CTVIP
  Aberdeen, S.D.
- Carl Jungberg, CCT
  Grand Forks, N.D.
- Jay Kearney, CTVIP
  Aberdeen, S.D.
- David Kline, CTVIP
  Aurora, Colo.
- Mark Larlee, CTVIP
  Brunswick, Maine
- Jared Larsen, CCT
  Grand Forks, N.D.
- William Law, CCT
  Mississauga, Ontario, Canada
- Justin Lindner, CTVIP
  Aberdeen, S.D.
- Alex Luchak, CTVIP
  Happy Valley, Ore.
- Biswajit Maraj, CCT
  Mississauga, Ontario, Canada
- Ryan McDermott, CTVIP
  Brunswick, Maine
- Paul Miller, CCT
  Grand Forks, N.D.
- William Miller, CTVIP
  Brunswick, Maine
- Nicholas Palladino, CTVIP
  Brunswick, Maine
- Mike Paye, CTVIP
  Aberdeen, S.D.
- Kathleen Phillips, CTVIP
  Spartanburg, S.C.
- Lisa Powell Beaver, CCT
  Grand Forks, N.D.
- Lisa Rachwal, CCT-SS
  King of Prussia, Pa.
- Nathan Rankin, CCT
  Gillett, Wis.
- Ilie Rastoaia, CTVIP
  Mississauga, Ontario, Canada
- Clarence Sankar, CCT
  Mississauga, Ontario, Canada
- Eric Meyer, CTVIP
  Jason Schreiber, CCT
  Ardmore, Okla.
- Travis Sexton, CTVIP
  Aberdeen, S.D.
- Jeremy Steely, CCT-CP
  Tucson, Ariz.
- Jeremy Swan, CTVIP
  Happy Valley, Ore.
- Kiet Ta, CCT
  Mississauga, Ontario, Canada
- James Thomas, CCT
  Goderich, Ontario, Canada
- Daniel Voeller, CCT
  Grand Forks, N.D.
- Phillip Wells, CTVIP
  Wilton, Maine
- Jimmy Whitener, CCT
  Ardmore, Okla.
- Jake Worley, CTVIP
  Happy Valley, Ore.

Composites Manufacturing 31
Confounded Composites!

Take a second look and see if you can find the differences in these two pictures.

Despite near-blizzard conditions and thousands of cancelled and delayed flights in much of the U.S., nearly 3,000 unique participants attended COMPOSITES 2011 in Ft. Lauderdale, Fla. A burgeoning optimism for the industry was obvious on the exhibit hall floor as 221 exhibitors—a 22 percent increase from 2010—offered new solutions and applications for expanding markets.

To read more about it, turn to page 20.
You don’t have to sacrifice performance to go “green”

Ashland Distribution makes it easy for you!

Get the products, processes and technology you need to improve productivity, meet emissions standards and reduce waste with cost-competitive “green” solutions:

- **Sprayomer®** elastomers featuring reusable, net shape, spray-on infusion bag technology to enhance your closed molding operation
- **ACRASTRIP®** composite resin remover, the only DfE Division of U.S. EPA-endorsed cleaning solvent for thermoset resin systems that is non-flammable and HAP-free and a 100% replacement for acetone.
- **Envirez®** resin, a performance enhancing, bio-based resin system using renewable resources for open and closed molding applications.
- **Polymat®** pre-formable, closed mold reinforcement, offers glass reinforcement that easily conforms to complex shapes.

And, the Ashland “Green” Connection, can help determine closed molding options for you, by developing and implementing solutions through our technology partners:

- **SR Composites**: specializing in processes and apparatus for production VARTM molding
- **JHM Technologies**: specializing in LRTM training schools, RTM equipment, molds and consulting
- **New Boston RTM**: specializing in RTM tooling and production
- **Scott & Fyfe, Ltd.**: specializing in innovative textiles and technology

Call Ashland Distribution today at 1.800.531.7106 or e-mail us at greenconnection@ashland.com

Ashland Distribution has been providing access to the composites industry’s leading suppliers for more than 20 years, assisting with resin, gelcoat, reinforcement, catalyst, core, adhesive and other product and business support needs. We are committed to long-term partnerships, offering a highly experienced support team, advanced inventory management systems, ISO certification and the most comprehensive North American distribution service network in the industry.
Mark Your Calendar!

FEBRUARY 21–23, 2012
MANDALAY BAY, LAS VEGAS, NV

www.acmashow.org