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FRP Molds Shape Olympic Diving Platforms
London Aquatic Center designer Zaha Hadid used a unique fiberglass solution to build stunning Olympic diving platforms. Find out how, online.

Love Your Racket, Win the Game
In the evolution of tennis, composite rackets are the newest need. Read about the varied styles and manufacturing techniques available to players—pro and amateurs alike.

The Facts and Figures
Industry Digest is weekly compilation of composites in the news worldwide. Read some facts that are sure to astound you!
President's Message

Membership and a New Fiscal Year

It's time to renew your ACMA membership. If you have already renewed – thank you! ACMA appreciates your dedication as we come together to build a stronger industry. If you haven't renewed, WE NEED YOU!

As a member, you should be proud of what your association is accomplishing. We're making great strides in regulations and composites advocacy, and our efforts with Congress are paying off. Our composites advocacy fund is growing, enabling us to reach members of Congress and support life cycle cost analysis (LCA) to be required by states when awarding contracts for federally funded infrastructure construction. The fund has also been instrumental in lobbying Congress to contact Health and Human Services and require them to release a proposed contract for the National Academy of Science review of the Report on Carcinogens (RoC) styrene listing and our continuing efforts to remove styrene from the RoC listing – these are just a few of the successes this fund is providing.

Our efforts with Composite Growth Initiatives (CGI) are also starting to show results. There have been more committees added in the last two years than ever before and existing committees have become more active. Thank you to all the committee chairs, co-chairs and committee members for your hard work and dedication. Whether it be codes and standards development or completing LCA for composites materials, our CGI committees are making great strides. All these areas are benefiting the composites industry and helping it grow as it competes against other materials that have been around longer than composites and have larger budgets to influence decision makers.

We have partnered with many academic institutions around the country to expand our audience and make our CCT courses better than ever to aid the growing work force. Recently ACMA teamed up with IYRS, a Rhode Island marine trades and technology school, for a three-day educational event. This is just one example of partnerships benefiting our industry. ICPA launched its consumer website, MasterCast.biz, to promote cast polymer and ICPA companies. All ICPA member companies are listed under the “find a vendor” section of the website, another member benefit.

As we approached our new fiscal year, the Strategic Planning Committee spent time reviewing the ACMA strategic plan to make sure it is still relevant, making changes to adapt to the shift in industry demand and to further develop areas that will help ACMA reach its goals. The industry is changing fast and we want to make sure ACMA is adapting as quickly to meet our member’s needs and aid this growing industry on its rise upward. You should expect to see some great changes as we move forward.

Thank you for being a member of this wonderful organization and your confidence in ACMA to represent you. I look forward to a promising year ahead.

Lori Luchak
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Personalized Attention. Customized Solutions. Exceptional Value.

You have release problems. We have proven Chemlease® release agents, backed by an entire team of industry-leading professionals who will put our experience to work for you.

Each year, we spend thousands of hours on the floors of composites shops, giving our technical and manufacturing experts unmatched insight into the toughest production challenges. This deep knowledge means we can customize solutions and recommend process changes for improved efficiency. We’ll also demonstrate product application techniques for maximum effectiveness.

Our products make it a solution. Our insight and attention make it a value.

ChemTrend.com
The AKOYA, an ultra-lightweight two-seat amphibious aircraft built by French aeronautical innovator LISA Airplanes, is made entirely from composites and aeronautical metallic alloys.

Carbon prepreg and carbon sandwich structures (carbon fiber reinforced polymer with a foam core) are used in all the weight-bearing primary structures, including the fuselage, wings and horizontal stabilizer, as well as other parts. To ensure all the composite parts perform well in water environments, LISA uses a special pre-impregnated resin made by Umeco’s Advance Composites Group (ACG), a layer of Kevlar to protect the area under the fuselage during water impact and external fiberglass layers to set the seal for optimal waterproofing. A glass composite material, produced with high glass transition temperature (Tg) and epoxy resin, is used to finish parts inside the cockpit.

“We chose these materials because they are lightweight – a constraint we have in light aviation – but mainly because we needed to design and produce extremely high-performance aeronautical shapes,” says Erick Herzberger, founder and CEO of LISA Airplanes. What’s more, thanks to LISA’s patented multi-access technology, the uniquely designed AKOYA can just as easily take off and land on water or snow as on a strip of land less than 220 yards long with no prior modification required. “The AKOYA is the first seaplane equipped with Seafoils that maintain good aeronautics in flight,” he says. The plane also has skis on the retractable landing gear.

**Engineering the AKOYA Skiplane**

The biggest problem the high-tech company based in LeBourget du Lac, France, had to overcome in designing the first airplane with hydrofoils was not to make the aircraft lighter, stronger or more stable, as one might expect. Herzberger says, “Our main challenge in designing the AKOYA was to place the engine at the back of the airplane on top of the vertical stabilizer.” The solution, once again, arose from using composite materials. “We had to place the engine where it would not interfere with water operations,” Herzberger says. “After several rounds of calculations, simulations, characterization of the materials and tests on samples and representative parts, the conclusion was that carbon composite (CFRP) was the best material to solve this structural design issue because it ensures the engine mount is strong enough to hold the weight. CFRP offers the best compromise between resistance and weight. This was the material to use to support the weight and stresses of the engine, the wings and the hydrofoils.”

The folding wing system with one rotation axis was another critical point where optimized composite materials and finishes made the final design possible. “The part that enables the rotation is fixed on composite structures that are glued on the fuselage,” the engineer says. “A specific distribution of the fibers of the fuselage enabled us to better distribute the stresses of the rotating part.”

All major components of the AKOYA are produced by aeronautical manufacturers in France, Italy, Germany and Austria. All the finishing for coverings is done by hand, making each AKOYA a customized aircraft.

In Herzberger’s opinion, there’s
still work to be done by the composites industry to improve materials and prepreg resins. For future aircraft designs he dreams of, he says he’d like to see more solutions for the interfaces between composite and metallic parts. Innovations that would enable future generations of lightweight, high-performance planes could come from either side of the Atlantic, as he believes that the composite market in the U.S. and in Europe are comparable.

Niche plane, niche market
“Our customers are private individuals who wish to make inconceivable trips to places that are hard to reach,” says Herzberger, a top level gliding competitor who has flown since he was 16 years old and logged more than 1,500 hours of flight time. “They enjoy the performance, the style and the design of the AKOYA.” Thanks to its folding wings, owners can park the skiplane inside their garage. But that is not what this amphibious aircraft is designed for. “With such a versatile aircraft, you can go fishing in Alaska’s most remote places. People can take off from the airfield close to their home in, let’s say, Georgia and land on the private beach of their waterfront villa in the Bahamas, and then travel back to Georgia in about 3–4 hours versus 13 hours with a commercial airline and multimodal transportation means,” he says.

Produced in a limited series, the AKOYA will be available in the U.S. next year. The AKOYA reaches speeds of 155 mph and can travel a minimum of 1,000 miles before refueling. The amphibious aircraft fulfills the S-LSA regulation (CS-LSA in Europe). At a price of $400,000, the AKOYA multi-access plane comes fully equipped, including maintenance and customized training in Chambery-Savoie, France, to obtain the license and to pilot AKOYA on water and snow.

Sandra Henderson is a freelance writer based in Denver, Colo. Email comments to sandrahenderson@mac.com.
Composites in Architecture: Perspectives on the AIA Conference

Over 17,000 architects and fabricators from around the country gathered to attend the American Institute of Architects (AIA) Conference at the Convention Center in Washington, D.C., May 17-19. Composites are a relative newcomer to the wood, glass, metal and concrete heavy U.S. architectural market. In order to bridge the gap between manufacturers and architectural end users, leaders at the American Composites Manufacturers Association (ACMA) Architectural Division organized its first booth at AIA to communicate material benefits to attendees.

Bill Kreysler, chair of the Architectural Division and president of Kreysler and Associates, American Canyon, Calif., believes that improved communication with the industry will ultimately be the catalyst to spearhead more composite architectural projects. “As building codes become more favorable to composite materials, it is clear that AIA was the place to be if we want to get the word out that composites are a viable and often better alternative to traditional materials,” says Kreysler.

“What also was clear was that if we intend to compete with wood, metal and concrete, we will need a more coordinated and well thought out approach.”

Since this was the first time exhibiting at AIA, the group used booth space offered by another ACMA member, Best Bath. Kreysler along with Michael Dobronos, president of Architectural Fiberglass Inc.; Charlie Wittman, president of Architectural Fiberglass Corp; Mike Stevens, service staff scientist at Ashland; John Sawayda, technical service at CCP; Nick Dembsey, professor at WPI; and Julie Yost, senior marketing lead at Owens Corning; joined Gary Multanen, president of Best Bath to advocate composite products to show attendees.

“Thanks to Gary, the Architectural Division has taken one more small but important step towards more aggressively marketing composites to the multi-trillion dollar construction industry.”

The Architectural Division, part of ACMA’s Composites Growth Initiative (CGI), is working to promote composites by educating end users and government officials about the advantages of composites as well as creating codes, standards and guidelines so engineers and specifiers will be able to use composites with more confidence. It is led by Bill Kreysler, president of Kreysler & Associates, and Nick Dembsey, Worcester Polytechnic Institute, and has 35 member companies who meet regularly to discuss current projects and new market development proposals.

The Architectural Division recently completed a guide specification that is currently being reviewed for approval by the Construction Specifiers Institute (CSI). The Institutes approval of the document is expected by August. The Architectural Division is also updating their Industry Guidelines, last printed in 1997. This document is expected to be finalized and printed in early 2013.

To learn more about the Architectural Division or to join a CGI Committee, contact Jonathan Roberts at jroberts@acmanet.org.
“Many of the composite projects completed by the ACMA members are already well known to the AIA attendees. Members have been featured in architectural magazines like the May 2012 issue of Architectural Products, a publication of the U.S. architectural market by Construction Business Media, which showcased the “Blue Bear” made by Kreysler in 2006 and the “Cascade FRP bus stops” in Orlando, Fla., created by Walter Geiger and Entech Creative in late 2011 and featured in the January/February 2012 issue.

Kreysler’s “Red Rabbit” sculpture was also the cover photo of May 2012 issue of The Construction Specifier, the Construction Specifications Institute’s official publication. These stories do much to increase composite knowledge in the architectural marketplace.

Communicating composites to architects

According to AIA attendees, architects today are more familiar with the uses for composite materials than a few years ago, but they aren’t avidly looking for new ways to use the products in new designs. “For the composite industry to get involved in markets like this one, ACMA and other composite companies need to start attending conferences where they can find customers and educate them about our products,” says Multanen. “We can’t sit and wait for them to come to our conference; they will need to learn from example first.”

The relationship between composites and the architectural market is still young, and, thanks to the advances made by the Architectural Division, there are many opportunities ahead. For example, next year the division would like to collaborate with composite companies to give architects a better idea of overall material advantages. “Many industry organizations sponsor pavilions where booths cluster to show common products. There were several composite manufacturers with booths scattered around the exhibit hall with less than ideal exposure,” says Kreysler. “If ACMA banded these exhibitors together along and sponsored a ‘composites pavilion’, there would be a greater impact and synergy.”

Angie McPherson is the communications coordinator at ACMA. Email comments to amcpherson@acmanet.org.

For more stories like this, visit compositesmanufacturingblog.com and search keyword “CGI.”
Changing Trends, Adaptive Education

Across the U.S., composites manufacturers like Frontier Pro in Banning, Calif., are having a difficult time hiring qualified composite technicians to help meet demanding marketplace needs. The steady rise of composite products in markets like wind, industrial, automotive and marine have opened many new job opportunities that are proving challenging to fill.

One of the many ways that American Composites Manufacturers Association (ACMA) members like Frontier Pro are alleviating the void in the workforce is by enrolling their employees in ACMA’s Composites Certified Technician (CCT) program to help educate their staff. “I can easily hire electrical technicians and mechanics off the street, but composites technicians are hard to find,” says Jack Wallace, wind turbine technical advisor at Frontier Pro. “Having a technical knowledge of composites is one of the most underrated and highly-sought skills for wind blade repair companies.”

One industry educational leader pushing the CCT program to the next level is ACMA academic member IYRS, a trade and technology school based in Rhode Island. The school established a composites training program in 2010 with the goal of producing skilled technicians provided with a wide range of career opportunities in six months using CCT curriculum and hands-on training.

Training programs like IYRS offer a solution for new employees interested in manufacturing composites and for employers that need immediate assistance. As a result, most IYRS graduates are hired within 30 days. “In order to meet the growing need for technicians, we designed our classes to accommodate a group of job seekers that may or may not have previous manufacturing experience,” says Clark Poston, director of student and industry relations at IYRS.

Poston has been with IYRS for over 15 years and has seen the school’s programs adapt to changing marine industry trends. In the midst of the recession, Poston realized that IYRS courses needed to follow the market trend to diversify and invested in the composites training program. Currently, the composites program is deliberately arranged to teach future technicians about applying composite technology to both marine and non-marine markets.

“One of the major industry trends we noticed is boat builders adapting their product lines to include parts for new markets,” says Poston. “They’re transferring boat technology into wind blade or automotive parts. For example, I know a boat manufacturer in Bristol, R.I., now making musical instruments with composites, too.”

IYRS students work on a variety of projects to prepare them for a career in any composites market. Some of the program’s recent accomplishments including the completion of small hydrofoil sailboats, three-wheel recumbent bikes, Formula Hybrid race car parts in collaboration with Dartmouth engineering students, and an electrically powered car with the Rhode Island School of Design.

Poston recognizes that it can be difficult for potential students to make plans in the current marketplace, as it’s difficult to save the time and money needed to invest in composite education, but he believes a minimal investment could achieve outstanding rewards. “The biggest challenge for the composite industry is making the initial investment in education. Our students take six months away from the job market and salary in order to receive hands-on training, but they walk away with a certification and the ability to build parts, which is what the industry really needs,” says Poston.

Poston also believes that programs like CCT and IYRS will grow with time. “CCT curriculum already offers valuable information for technicians, and I believe the value of the program will only increase. We based the curriculum for our Marine Systems program on certification from the American Boat and Yacht Council, which is now a recognized program in the marine industry. The more it became accepted, the more significant it was that our program was using those standards,” says Poston.

“As long as we, the institution, and ACMA, the association, can stay current with new techniques and new challenges, then the program will always be relevant and valuable. The more the industry adopts the certifications that ACMA provides, and it becomes a good solid standard and tool to measure by, it will serve the entire composites industry well.”

Angie McPherson is the communications coordinator at ACMA. Email comments to amcpherson@acmanet.org.

For more information about the IYRS program, visit www.iyrs.org.
Setting course to innovation.

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RECREATION
Cervélo Drives Cycling Technology

When selecting a high-performance bicycle, professional cyclists and amateur racing enthusiasts give a lot of weight to grams. Lighter bike frames mean easier hill climbs, which can make a difference in close competition. That’s why many North American competitors will use composite bikes in the 2012 Olympic Cycling events, taking place at five different London venues from July 28 to August 12.

But bike designers face a steep challenge: The lighter they make frames, the more they sacrifice stiffness, which riders need for improved safety, speed and handling. To serious cyclists, too heavy means slow, too light means unsafe and too stiff means uncomfortable.

Don Guichard and his engineering team turned that dilemma into innovation. At Vroomen White Design’s Project California research and development facility, the wholly owned engineering group of Toronto-based bike maker Cervélo, the team relied on composites to create what is now a celebrated product.

The Cervélo R5ca bike frame weighs only 675 grams (1.5 pounds) — less than a quart of water — yet yields higher pedaling efficiencies than nearly all frames weighing twice as much. One product review called the frame “a new pinnacle of performance and efficiency in the application of carbon composites to sports equipment.” Cycling publication Tour Magazine gave the Cervélo R5ca its highest rating ever for road bike frames.

“We couldn’t have done this without composites,” says Guichard, director of technology and manufacturing at Cervélo’s research and development facility. “The frame we built demonstrates the leap in performance available when carbon fibers are used to their best advantage.”

Testing and Optimizing for Performance

Optimizing a racing bicycle for ultimate performance isn’t simple, Guichard says, because the requirements to do so are numerous and often conflicting. For example, a lighter bike frame is generally more desirable, but to meet international racing safety criteria, a frame also must exhibit high strength and the ability to absorb energy from a head-on impact.

To reach a new standard in bike frame engineering, the Cervélo team realized it would need to use design and analysis tools, test the structure of a range of carbon fibers and pour its accumulated carbon-manufacturing experience into the project.

“We felt that by choosing the right fiber and direction in different areas, we could uniquely take advantage of carbon material,” Guichard says. “The right fiber orientation and cross-section design was going to be critical. Those factors enable rides to be relatively comfortable compared to other kinds of frames.”

Engineers began with Cervélo’s Squoval (square oval) concept for a road bike, which moves material away from the frame’s center plane, yielding greater stiffness with less material. They input the model of the initial frame into a preprocessor tool, which created a rough finite element (FE) analysis grid that kick-started design ideas. The tool also enabled engineers to analyze tube shapes and material lay-up under various loads.

The team then conducted another FE analysis, inputting preliminary results into the modeling software to create a more detailed shell model of the frame. It also performed a ply-by-ply analysis of more than 300 individual carbon patterns.

“Many higher-end bike frames include carbon, but the key to the R5ca’s design is the use of highly tailored composite fiber architecture,” Guichard says. The fiber architecture is mainly carbon/epoxy prepreg (typically 80 g/m²) made with 6K MR60 intermediate-modulus carbon fiber supplied by Newport Adhesives and Composites Inc. Because
pitch-based fibers generally provide better stiffness than PAN-based fibers, the team specified pitch-based YSH60A carbon fiber from Nippon Graphite Fiber Corp. in a few critical areas, such as the sides of the down tube, to increase lateral stiffness.

Next came performance testing. Guichard says most bike lab tests don’t reflect reality and make incorrect assumptions about where each tube on a bike frame carries the most load during certain ride conditions. So, his team conducted more than 15 rigorous strength and stiffness tests, including some that were custom-designed to represent actual cycling conditions. Some of the tests also took into account different riding styles such as vigorous “out of the saddle” pedaling, which puts strain on the bike’s chain stays, down tube and bottom bracket.

The bottom bracket, which puts significant load on the rear of the frame, was redesigned with a wider stance and larger tube diameters to help maximize stiffness. Also, the new bottom bracket design included bulkhead walls in the part’s interior, enabling the outer surfaces to be thinner.

“The result is a frame that is lighter than any other production frame yet is rock solid in pedaling stiffness, cornering and handling,” Guichard says. The R5ca is the stiffest-performing frame Cervélo has ever made, yet the company was able to reduce the weight by 25 percent while still meeting or exceeding all strength requirements, he says.

Using Experience as a Pedal
Guichard says Cervélo’s R5ca bike frame, which won a 2012 Award for Composites Excellence (ACE) Award for Most Creative Application at the ACMA’s COMPOSITES 2012, has significantly advanced cycling technology, thanks to composites and composite design. He also says the project lays the groundwork for future bike frames the company can develop.

“As any composites professional knows, over time the features and technologies of any successful product trickle down to other products,” Guichard says. “Our experience testing and developing the R5ca can help Cervélo improve the overall performance of future frames and bicycles. We continually aim to improve performance, and composite materials are helping us push the limit of what we can accomplish.”

Darin Painter is a freelance writer based in Cleveland, Ohio. Email comments to darin@writingmatters.com.
Bamboo Bridge Defies Weight

Last year, as a junior mechanical engineering student at Brigham Young University (BYU), Alex Stiles, and two of his classmates, Steve Gardner and Roger Smith, took home second prize in the Society for the Advancement of Material and Process Engineering (SAMPE) Bridge Contest. This March, Stiles, who has since transferred to the Illinois Institute of Technology, was also honored with Cali Bamboo’s Project of the Month prize.

Before the competition, Stiles had worked with bamboo to build a laminate cardboard desk. He was impressed by its strength and began investigating its use for other applications. He applied for a university research grant to research creating a commercially viable natural fiber composite, which he received.

According to Stiles, bamboo is a promising material for a number of reasons. It’s plentiful and easy to grow. It’s also strong, recognizable to consumers as “green” and at $0.25 to $1 a pound, the raw material is competitive with fiberglass and much cheaper than carbon.

Bamboo hasn’t been researched as much as other natural fibers for composites, in part because its fibers are difficult to extract, Stiles says. That was one of the biggest challenges his team faced in creating the bamboo composite for its bridge. The strongest parts of any plant are its cellulose fibers he explains, and it was those fibers the team extracted to create its composite.

Stiles started with bamboo matting made by Cali Bamboo, which he tore apart and processed with an alkaline treatment. He machine-rolled the strips using a rolling mill, then washed them to separate them into fiber bundles.

“That’s really as far treated as I wanted to get them,” Stiles says. “There’s some research that shows that if you chemically process bamboo to the point where you end up with just pure cellulose, the fibers are actually weaker.”

To maximize the strength of the beams for the bridge, he used a hand roller to align the fibers unidirectionally in aluminum sheet-metal molds, a process he describes as very time consuming and labor-intensive.

Stiles mixed the unidirectional mats with an epoxy resin the lab kept up. But found the mats would break apart in a traditional wet lay-up. Most unidirectional mats come pre-impregnated, but because Stiles had fashioned his own, he had to improvise. To make his own prepreg, he mixed a slow cure resin with the unidirectional mats and stuck the mixture in a compression molder at 180°F for five minutes.

“That accelerated the cure time of the resin to the point where it became a very sticky mat of unidirectional fibers — in other words, a homebrewed prepreg,” Stiles says. “I used those to stack up the layers that I needed to make the bridge.”

He let it cure for a day, followed by a post-cure in a 110°F oven for another day to ensure the composite’s strength. Demolding, he says, was easier said than done. Though he waxed the mold, he couldn’t include a draft angle because he was making a square beam, which made the process more difficult.

In competition, the bridge held 1,658 pounds, more than 1,000 times its own weight. It placed second to a bamboo-plywood bridge made by a team from the University of Delaware, which held 3,346 pounds and beat a kenaf-fiber bridge from the University of Washington, which held 1,137 pounds.

“Considering both of the other winning universities have incredible composites programs and even offer composites degrees, which BYU does not, our bridge certainly held its own,” Stiles says.

“After the competition, I knew how to consistently produce bamboo fibers using alkaline treatment, and I knew that the fibers were strong enough without any additional treatment to be useful in a polymeric composite,” he says. “Now the creation of easier-to-use forms of bamboo fiber has become the goal of my research.” Despite weaknesses such as a tendency to absorb water and variable strength, there is a lot of potential for bamboo composites, such as cabinetry and surfboards.

Jamie Hartford is a freelance writer based in Los Angeles. Email comments to jhartford@gmail.com.
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Swifter, Higher, Stronger
Composites aid athletes in 2012 Olympic Summer Games

By Angie McPherson and Melinda Skea

The 2012 Summer Olympic Games, taking place in London, from July 27 to August 12, will feature 302 competitive events in 26 sports. The Olympic sports today are much different than they were in Greece in 8th century B.C., thanks in part to the advances in material sports equipment technology. Athletes from around the world are able to push harder, go longer and set new records. Here are just a few ways you’ll see composites:
Track and Field
Pole Vault: (8/4 – 8/10)
The U.S. Olympic pole vaulting team uses tall (10 to 17.5 feet long) fiberglass and carbon fiber flexible poles to jump nearly 20 feet in the air. Manufacturers use e-glass or s-glass, then add different fibers (often carbon) to give the poles unique characteristics. The crossbars, which are used to measure the distance jumped, in both the pole vault and the high jump events, are pultruded fiberglass rods.

Javelin: (8/7 – 8/11)
Olympic javelin tips must be made of wood or metal. Some companies are coating metal alloys with carbon fiber to reduce vibration. Many new javelins are replacing wood with carbon fiber shafts.

Discus: (Women 8/3 – 8/4, Men 8/6 – 8/7)
In ancient Greece, the discus was likely made from stone or metals. Today, competitive discuses are made of rubber, wood or composites. The materials used in the manufacture of the discus are important as they balance the weight distribution. Many experienced discus throwers use fiberglass or carbon fiber side plates.

Arrows: Olympic archers typically use aluminum or carbon fiber arrows. Most competitors use carbon fiber arrows, typically manufactured using pultrusion, which can cost approximately $1,000 each.

Gymnastics
Parallel Bars: (8/7)
The parallel bars is a men’s only event. Originally the bars were made from wood. To limit the number of splinters, and to increase durability, most bars are now made from FRP composites. The construction of these bars is imperative to the gymnastics routine. U.S. competitor Sam Mikulak secured his 2012 Olympics bid on parallel bars, despite the fact the bars were not secured to the steel frame, which hindered his performance and emphasized the benefits of composites.

Archery (7/27 – 8/3)
Bows:
The only bow permitted for the Olympic archery event is the modern recurve bow. The recurve bow uses carbon fiber and occasionally fiberglass in several parts, including the riser (the handle) and the flexible planks above and below the riser, also known as limbs.
Uneven Bars: (8/6)
The uneven bars is a women’s only gymnastics event, which developed into the modern uneven bars after the first World Championship for women’s gymnastics in 1934 introduced asymmetrical adjusting of the traditional men’s parallel bars. Similar to the parallel bars, the original uneven bars were made from wood bars and a steel frame. The 2012 Olympics in London announced they are using fiberglass uneven bars with a wooden veneer. The two bars sit on a metal frame.

Field Hockey (7/29-8/11)
The most critical piece of gear for a field hockey player is the stick. An athlete needs one that is light-weight and provides power, both of which a composite stick made of fiberglass, carbon, aramid and Kevlar allow. A higher amount of carbon gives rigidity and power whereas fiberglass ensures flexibility and ball control. Expect to see a mix of each as you watch the men’s and women’s teams compete – in particular as you cheer on the Women’s U.S. team, favored to take the gold after winning the 2011 Pan Am Games.

Rowing (7/28-8/4)
FRP composite rowing shells began replacing wooden frameworks in the 1970s. The German company VEB Yachtwerft Berlin began mass producing a fiberglass shell, which aided Eastern Bloc countries in winning the majority of Olympic gold medals. In preparation for the London Games, the Dutch Olympic Team collaborated with DMS to create a lighter, stiffer, carbon-reinforced eight-man rowing boat. The increased stiffness of the hull, due to the carbon fiber fabric, reduces the energy loss of each stroke, increasing speed. It also deforms less in the water, allowing the team to maintain speed and push toward gold.

Cycling
Road (7/28-8/1)
A road racing bicycle is the closest competitive frame to what you envision when you hear the word “bike.” It is designed either with a horizontal top tube, which provides the most comfort and stability, or a sloping top tube, which provides a lower center of gravity and gives quicker handling. See page 10 to read the latest composite impact on this sport.

Track (8/2-8/7)
Track bikes are designed for optimal use inside a velodrome or outdoor track. Unlike road bikes, a track bike
models led the way for alternative materials. Today, BMX bikes feature lightweight titanium or magnesium frames, weighing as little as 16 pounds, and utilize composites in components such as pedals – and most recently the wheels – to decrease the overall weight.

**Mountain Bike (8/11-8/12)**
Mountain biking is brutal on the limbs and on the bike. Competitors race around a set number of laps across challenging and rugged terrain (fallen trees are the norm), usually around 25-30 miles for men and 20-25 for women. Composites are becoming increasingly popular among manufacturers because they are lighter weight and up to 12 times stronger than steel.

**Tennis (7/28-8/5)**
The rackets Olympic athletes will use have come a long way since the 1870s when they were made from wood glued into variations of the now popular key-hole shape. Later, manufacturers adopted metal alloys and FRP frames and today pro rackets are made from carbon fiber – referred to as graphite in the sports industry – that provides greater stiffness and strength. Visit CM Online to read more on the variety of composite rackets.

is a fixed-gear bike, meaning it has a single gear, no freewheel and no brakes. In competition a rigid frame is more important than light weight. Today, carbon fiber is the most commonly used material for the frame as well as the fork and handlebars.

Read about latest cycling breakthroughs like IsoTruss technology at CM Online, search keyword “bike fibers.”

**BMX (8/8-8/10)**
The bulky design of early bicycle motocross (BMX) could not perform on modern sloping ramps and street courses. So, early riders began to boost the performance of their bikes with modifications. These do-it-yourself
Building the Olympic Village
London 2012 is being heralded for building the most sustainable Olympic Village of all time. A shortage of steel in the area helped to increase the use of other materials, resulting in a design that is 75 percent lighter in steel than traditional stadiums. In addition to the main stadium, all of the temporary Olympic stadiums (like the volleyball court photographed above) were required to use recyclable materials. Plastics and composites were used in a number of applications to build the Aquatic Center near Stratford Gate and others.

London Aquatic Center
The London Aquatic Center designed by architect Zaha Hadid, uses FRP pool grating and a channel rail system manufactured by thermoplastic and composite company Quadrant Plastics, based in Lenzburg, Switzerland. In total, there are 1,395 feet of composite grating around the pool area. The Aquatic Center also has six curved concrete diving boards that were constructed onsite in glass fiber reinforced (GFRP) molds manufactured in Production Glassfibre’s factory in Altham. The GFRP molds will be reused as playground equipment. Read more about it at CM Online.

Angie McPherson is the communications coordinator at ACMA. Melinda Skea is the assistant director of communications at ACMA. Email comments to communications@acmanet.org.
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Three years ago, Composites Manufacturing magazine launched the B.E.S.T. recognition program, spotlighting some of the Bright, Energetic, Skilled, Trailblazers in our industry. This year, we recognize 11 amazing professionals, all nominated by readers for their contributions to composites. The winners profiled here include professors, researchers, managers and custom fabricators. They advance cutting-edge technology, supply innovative materials and manufacture state-of-the-art products. Some are industry veterans, while others represent the future of composites. They all are dedicated to and passionate about the industry.

Jake Axel
Hometown: New Rochelle, N.Y.
Alma Mater: Brandeis University
Age: 32
Hobby: Reading about business and investing

Jake Axel is the third generation of his family to run AXEL Plastics in Woodside, N.Y. His grandfather founded the company in 1941, and his father began working there in 1974. Axel, who recalls running around the factory as a kid, worked at the family business during the summers and joined full time in 2002.

The company serves the plastic and rubber industries designing, manufacturing and marketing innovative mold release agents, process aid additives, mold cleaners and sealants.

Axel began a two-year training program at AXEL Plastics after graduating from Brandeis University. He worked in every department, from manufacturing to customer service and accounting. “A lot of next-generation employees get put into family businesses without a good understanding of its operations,” he says. “The training provided me insight into what we do and how we do it.”

Axel was named vice president in 2004 and he took over as president in 2009. “We spend a lot of time thinking about where the industry is going and how to make products more efficient,” says Axel, who earned an MBA from Columbia University in 2011.

The young executive is concerned about the industry as a whole, too. He is very involved with ACMA, serving on the Executive Committee of the Board of Directors, as membership chairman of the Pultrusion Industry Council, co-chair of the Communications Committee, and in other capacities. Axel and his wife have a baby daughter, they will soon be moving to Connecticut.
Dave Denny
Hometown: Peru, Ind.
Alma Mater: Southwestern University
Age: 67
Hobbies: Gardening and fishing

Dave Denny began working in composites in 1970, and with the exception of a two-year stint in the steel industry, he’s been there ever since. His introduction to composites was with Rockwell International, when it bought the automotive division of Molded Fiber Glass Companies (MFG) and he joined the operations team.

“When I got into composites, you didn’t have robots and SMC was just coming into its own,” says Denny. “You saw great room for improvements and areas of dynamic change.” He worked primarily on Ford L-series trucks. “New technology and processes were going to a major customer — Ford,” recalls Denny. “It was an interesting, hard-working time.”

In 1978, Denny joined Premix Inc., where he served in many roles until the company was sold in 1994. Among the highlights of his career at Premix, Denny established a development center to expand the use of SMC in automotive and launched a structural thermoset bumper beam facility to replace steel General Motors products.

Denny has worked with all 16 MFG entities. Under his guidance, the company grew approximately 400 percent.

In 1995, Denny moved to MFG in Ashtabula, Ohio, as executive vice president and COO. Under his guidance, the company grew approximately 400 percent. He has worked with all 16 MFG entities, helping to launch two wind blade facilities and a wind turbine component operation.

Throughout his career Denny made time to give back to the community. He helped bring a symphony to Lancaster, Ohio, and served on boards for banks, hospitals and churches. Denny, who lives in a golf community in Pinehurst, N.C., will retire at the end of this year. “I have so many interests there will be no problem filling my time,” says the industry veteran. He enjoys gardening, fishing and showing off his Corvette in a local car club. Denny also dotes on his four daughters and five grandchildren.

Larry Dickinson
Hometown: Hickory, N.C.
Alma Mater: North Carolina State University
Age: 45
Hobby: Mountain biking

Every male member of his father’s family — four uncles and seven cousins — owns a business or did before retirement. “I think the entrepreneurial streak is in my blood,” he says.

Dickinson earned bachelor’s and master’s degrees in textile and mechanical engineering. He received a doctorate in applied science with a concentration in polymers from the College of William & Mary. Through the years, he has worked in a variety of settings. “I’ve had a very blessed career at large companies, small businesses and national labs,” says Dickinson.

Highlights include working at NASA, overseeing product development at startup company 3TEX Inc., and acting as manager of engineering and technology at Martin Marietta Composites. In 2005, he founded 3F LLC in Raleigh, N.C., which develops and commercializes new structural fiber materials. It’s currently applying proprietary chemistry to natural fiber — such as kenaf or hemp — to replace fiberglass in fiber-reinforced plastics. 3F plans to sell the natural fiber to companies who make everything from bathtubs to boat hulls, lightweight car parts, construction materials and other structural FRP applications.

“It’s great to work on a product idea to not only make money, but also make a difference; a product that we really believe will help change the world,” says Dickinson. 3F is close to supplying prototype materials to a couple of early-adopting customers.

Dickinson’s passion for his business comes naturally: Every male member of his father’s family — four uncles and seven cousins — owns a business or did before retirement. “I think the entrepreneurial streak is in my blood,” he says.
Dana Greenwood  
**Hometown:** New Orleans, La.  
**Education:** U.S. Navy  
**Age:** 55  
**Hobbies:** Boating and motorcycles

In his twenties, Dana Greenwood spent six years in the U.S. Navy in an advanced electronics program focused on weapons systems. “It’s ironic,” says Greenwood, now president of Sybo Composites in St. Augustine, Fla. “My job was to blow up stuff. Now I work on ballistics and explosion protection.”

Greenwood has more than 30 years of experience in composites manufacturing, much of it in the marine segment. He was introduced to boat manufacturing at Regal Marine, and then moved to Luhrs Corporation, where he got involved in design, engineering and prototyping. In 1991, Greenwood worked for Consolidated Yacht Corporation and helped build a 176-foot carbon fiber mast — the world’s largest at the time. He also built a two-man fiberglass barrel that a couple successfully rode over the Niagara Falls.

Greenwood helped build a 176-foot carbon fiber mast — the world’s largest at the time. He also built a two-man fiberglass barrel that a couple successfully rode over Niagara Falls.

Three years ago, Greenwood founded Sybo Composites with partner Stuart La Haise. The company designs, engineers and manufactures advanced composites structures for a variety of industries, including marine, wind energy and military. La Haise praises Greenwood for “coming up with common sense solutions for everyday manufacturing challenges.” For instance, Greenwood constructed a 10-foot-long autoclave out of a propane tank to process panels for one project.

Greenwood has worked on countless boats through the decades. But perhaps the most memorable is a philanthropic project he completed with Sybo for Floating Doctors, a group of volunteer physicians who strive to improve health care and reduce disease in the developing world. A few years ago, Floating Doctors purchased a large sailboat that needed repair. Sybo Composites fixed the boat and trained the crew on composites repair.

After 30 years in the industry, composites continue to intrigue him. “There’s so much mental energy going into composites today. It’s mind boggling,” he says.

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Serge Labesque  
**Hometown:** Marciac, France  
**Education:** University of Toulouse  
**Age:** 61  
**Hobby:** Beekeeping

For nearly 30 years, Serge Labesque has been part of a team at Kreysler & Associates, American Canyon, Calif., creating a wide range of innovative architectural and industrial applications. Recent projects range from a 51-foot-tall composite paintbrush sculpture installed in Philadelphia to the ceiling and wall panels of Stanford University’s Bing Concert Hall, slated for its first public performance in January.

“Serge’s unique combination of intellect, education in math and physics, and remarkable skill as a craftsman has made the work we do possible,” says Bill Kreysler, founder of Kreysler & Associates. Labesque deflects the praise, attributing the company’s success to a great blend of creative and technical staff under Kreysler’s tutelage. “I don’t think any one of us isolated would be able to produce the things we have,” says Labesque, director of custom fabrication at Kreysler & Associates.

The French native studied math and physics at the University of Toulouse before attending the French Meteorological Society and working as a meteorologist for seven years. Labesque moved to the United States in 1979 and served as assistant to Ron Owen, a renowned builder of wooden racing shells. Then he worked for Performance Sailcraft, rising to head of the woodworking shop. When Kreysler started his company in 1982, Labesque joined him to build fiberglass sailboats. “I got gradually involved, first making a few molds and then learning the materials and processes along the way,” recalls Labesque.

Thirty years later, composites continue to intrigue him. “The industry is vibrant and wide open,” says Labesque. “There is so much mental energy going into composites today. It’s mind boggling.”

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In the mid 1980s, Ellen Lackey left her small hometown of Forest, Miss., and moved three hours north to Oxford to study engineering as an undergraduate student at the University of Mississippi – and she’s lived there ever since. Lackey earned a bachelor’s degree, master’s degree and doctorate degree in engineering science from the university. She’s served as a professor of engineering at Ole Miss since 1995 and is the director of the Composite Materials Research Group (CMRG).

Lackey’s interest in composites was sparked as a graduate student. “There’s such a broad range of applications with so many different challenges,” says Lackey. “With so many problems to solve, it keeps things interesting.” The University of Mississippi’s CMRG conducts pultrusion and composite material characterization and manufacturing research.

While Lackey enjoys researching the pultrusion process, she’s also passionate about teaching students; receiving seven teaching awards in 18 years.

During her 18 years in research, Lackey has worked on numerous innovative projects. She has studied the use of natural fibers for pultrusion, developed and tested composite materials for destroyer hull structures for the U.S. Navy and worked with ACMA’s Pultrusion Industry Council to develop an LRFD design manual and perform ASTM testing.

While Lackey enjoys research, she’s also passionate about teaching students. She has received seven teaching awards, including the 1999 Society of Automotive Engineers Ralph Teetor Award for Engineering Educators and the 2007 University of Mississippi School of Engineering Teaching Award.

“It’s definitely seen a progression of knowledge and interest in composites,” says Lackey. “We’ve gone from students asking, ‘What is a composite?’ to people now interested in how to use composites in engineering design work.’ That interest will continue to build, she says, as more materials and manufacturing processes become more efficient.

Vikas Mehta (right) with his father Nick at family-owned Technick Products

It’s no surprise that Vikas Mehta joined the family company in 2006: He grew up there. His parents, Nick and Amy, started Technick Products in 1985 in the garage of their New Jersey home. Nearly 30 years later, it is a growing chemical company in South Plainfield, N.J., that supplies formulated additive solutions to the composites, polymers and coatings industry.

Mehta spent his summers working in Technick Products’ lab alongside his father, a chemist, or performing administrative accounting functions for his mother. “I had great teachers with my parents — my dad from a technical side and my mom from operations,” says Mehta. “I got the best of both worlds.” He graduated from the University of Pittsburgh in 2002 with a bachelor of science in business administration.

Upon graduation, Mehta worked at the accounting firm PricewaterhouseCoopers and became a Certified Public Accountant. “It may sound strange, but I had a passion for accounting,” says Mehta. However, in 2006, Mehta returned to the family business full time.

“I was looking for more challenges at work,” he says. “I liked the direction that Technick Products was headed in.” Mehta handles business and product development. He helped the company develop non-halogenated flame retardants. “We have formulated some unique fire retardant products utilizing nano-technology for the thermoset composites, thermoplastics and coating industries,” he says. “In composites, specifically with pultrusion, SMC, BMC and hand lay-up.”

Mehta, who lives in Jersey City, is engaged to be married in August. He and his fiancée, Roma Patel, enjoy traveling.

“I liked the direction that Technick Products was headed in,” says Mehta, who helped the company develop a new line of non-halogenated flame retardants.

Stefan Pastine

Hometown: Highland, Md.
Alma Mater: College of Charleston
Age: 33
Hobby: Soccer

As a chemist, Stefan Pastine has always been interested in responsive materials — ones that can change from one property to another. He is a recipient of the 2010 R&D 100 Award for a chemical-on-demand technology using microcapsules that release liquid when light shines on them. Pastine developed the technology as a National Institutes of Health post-doctoral fellow at University of California, Berkeley.

Three years ago, Pastine turned his attention to composites. “Thermosetting plastics are not recyclable,” says Pastine, who earned a bachelor’s degree in chemistry from the College of Charleston and a Ph.D. in organic chemistry from Columbia University. “I started looking at the problem. How do you re-engineer non-recyclable plastics and make them recyclable?”

Pastine founded ConNora Technologies in San Francisco and spearheaded the development of Recyclamine technology, which fuels a new class of epoxy hardening agents that enable manufacturers to make fully recyclable products. “We have specially-engineered hardener molecules that can be used with any epoxy resin to create an epoxy thermoset,” says Pastine, chief technology officer of ConNora. “The process is easy enough that it should be able to be carried out with specialized equipment by manufacturers on site.”

ConNora is taking slow, deliberate steps to market Recyclamine. While the technology is not yet available in commercial quantities, ConNora is currently demonstrating it to interested companies. Pastine shows how a surfboard made from resins can be recycled and the fiberglass turned into a surfboard fin.

“I believe in our mission,” says Pastine. “Recycling can be a valuable source for raw materials.”

Pastine founded ConNora Technologies and spearheaded the development of Recyclamine technology, which fuels a new class of epoxy hardening agents that enable fully recyclable composites.

Tara Storage

Hometown: Beavercreek, Ohio
Alma Mater: University of Dayton
Age: 30
Hobby: Distance running

Tara Storage was raised near the Wright-Patterson Air Force Base in Dayton, Ohio. She became interested in aerospace while visiting the base and its museum with her father, a mechanical engineer. Today, she works as a materials research engineer there in the Materials and Manufacturing Directorate of the Air Force Research Laboratory.

“It’s a really exciting time to work in aerospace,” says Storage, who earned a bachelor’s degree in chemical engineering and a master’s degree in materials engineering, both from the University of Dayton. “We’ve seen an increase in composite use on the military and commercial side.”

Storage’s team performed material kinetic, viscosity and process modeling case studies to assist in mitigating fabrication risks of large structures.

During her eight years at the lab, Storage has worked on several collaborative projects. One is the Non-Autoclave Manufacturing Technology Program, a joint program funded by the Defense Advanced Research Projects Agency and led by a Boeing team from St. Louis. Under the guidance of the Air Force, the five-year-project — which wrapped up this summer — developed out-of-autoclave manufacturing technology of prepregs for primary structures, such as wing skins, fuselages and large spars. Storage’s team performed material kinetic, viscosity and process modeling case studies to assist in mitigating fabrication risks of large structures.

“My group adds the science and engineering piece to difficult processing or fabrication issues,” says Storage. Most recently, her work has focused on incorporating modeling and simulation into all areas of composites, including fabrication, processing and manufacturing.

In January, Storage competed in the Olympic Trials Marathon with her twin sister. It was only the second marathon for the collegiate cross country runner and track and field champion. “That was a wonderful learning experience,” she says.

To submit your nominees for the 2013 B.E.S.T., visit the ACMA booth at COMPOSITES in Orlando, January 29-31, 2013.
Ed Wesson

Hometown: Mobile, Ala.
Alma Mater: University of South Alabama
Age: 53
Hobbies: Fishing; relaxing at the beach

Wesson got a job with an airplane engine manufacturer. Clients included aircraft companies such as Cessna, Piper and Beech, all of which were moving into composites usage. Although Wesson worked on engines, he was intrigued by composites.

After graduating from college, Wesson landed a full-time job with the airplane engine company in Mobile, Ala. “I was the young guy, so I got to look into anything new and different,” he says. In addition to corporate clients, he drifted into the military side of business and worked alongside people making airframes for remotely-powered vehicles. He learned how to build cowlings and wings.

Wesson followed his passion for motorcycle racing and, shifting industries, headed the motorcycle test department at the Harley-Davidson Motor Company.

During the 1990s, Wesson followed his passion for motorcycle racing and shifted industries. He headed the motorcycle test department at the Harley-Davidson Motor Company and also worked at Buell Motorcycle Company, which did a lot of composite work.

Wesson opted to return home to Mobile in 2000 and landed a job as engineering manager with Non Metallic Resources Inc. It was subsequently acquired by RPS Composites. While there, Wesson helped launch one of the largest vacuum infusion facilities for making panels for industrial applications. He worked on huge composite structures, including beams for scrubber structures weighing hundreds of thousands of pounds.

This past spring, Wesson joined supplier AOC Resins as a corrosion and infrastructure specialist. After three decades in the industry, he remains excited about composites. “I’m optimistic and think we can do anything,” says Wesson. “My motto has always been to lead the market, not follow it.”

Susan Keen Flynn is a freelance writer based in Cleveland. Email comments to sflynn@keenconcepts.net.
The National Toxicology Program (NTP) released the 12th Report on Carcinogens (RoC) just over a year ago on June 10, 2011, with styrene listed as a “reasonably anticipated” carcinogen. In a press conference held to announce release of the report, the NTP staff carefully acknowledged that they were uncertain anyone is actually at risk of cancer, but encouraged Americans to be aware of the listings. The release of the RoC generated ample media coverage, including on the front page of the New York Times.

Americans are now aware of the styrene RoC listing, and with this awareness the industry is seeing the predictable consequences. Many trial attorney websites now feature “styrene toxic tort” as major practice areas. Business owners report significant increases in cost for liability and workers compensation insurance policies, while other plant managers report increased turnover among new workers. Many company owners, unsure how this will impact the long term public perception and regulatory environment, are delaying plant and employment expansion.

Americans will continue to need styrene-based composite products; for example, underground gasoline storage tanks to protect the environment, wind turbine blades and nacelles to reduce dependence on foreign oil, bridge beams and rebar to decrease costs and increase sustainability of infrastructure and ballistic panels to protect our troops. But the question is: where will the products be made? ACMA believes the fear about styrene caused by the RoC is unwarranted and will potentially move composites manufacturing and the associated jobs to other countries.

Advocacy efforts

Immediately after the release of the 12th RoC, ACMA and its industry partners shifted from trying to prevent a poorly informed classification to working to limit the damage and, ultimately, have it repealed. The styrene industry group SIRC filed suit in federal court, seeking to have the RoC styrene listing overturned, claiming that Secretary Sebelius’ actions were “arbitrary, capricious and contrary to law.” SIRC argued that in making her listing decision, the Secretary relied on internal memoranda that misstated, mischaracterized and omitted information that was relevant to the Secretary’s decision; that the NTP did not follow its own procedures in recommending that the Secretary list styrene in the RoC; and that the listing criteria applied by the Secretary and NTP to styrene are contrary to law because they allow for the listing of a substance based on mere suspicion or the possibility that the substance is a human carcinogen; finally, that these standards are contrary to the statutory direction of Congress.

ACMA also aggressively pursued this indictment of NTP in Congress. As a result of hundreds of contacts by ACMA members and association staff with Congressional offices, in December 2011 Congress ordered HHS to commission a National Academy of Sciences peer review of the RoC styrene listing decision. Also, three House committees held hearings to examine the science behind the RoC listing and the impact to smaller companies, at which ACMA members testified. At the request of House committee staff, ACMA and its partners also prepared draft legislation aimed at reforming the RoC process to employ sound science and policy.

The industry carefully managed a media offensive. ACMA members hosted plant tours for their elected officials to highlight styrene safety and the unwarranted adverse impacts of the RoC. The result is likely to be the offshoring of manufacturing jobs, with no offsetting public health benefit.

HHS wants Americans to be aware of the styrene RoC listing. But the question is: where will the products be made? ACMA believes the fear about styrene caused by the RoC is unwarranted and will potentially move composites manufacturing and the associated jobs to other countries.
## NTP Findings vs. Science Experts

<table>
<thead>
<tr>
<th>What NTP Says:</th>
<th>What Experts Say:</th>
</tr>
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<tbody>
<tr>
<td>Evidence for cancer from styrene in humans is from occupational studies showing increased risks for leukemia and lymphoma.</td>
<td>There is no coherent evidence that styrene exposure increases risk from cancers or other causes of death (Collin’s update on study of U.S. Workers, 2012). When considering human evidence as a whole, there are no consistent associations between styrene exposure and any specific cancer (Gradient Corp., 2012).</td>
</tr>
<tr>
<td>Evidence for increased risk of cancer in the pancreas or esophagus among some styrene workers.</td>
<td>There is no clear or consistent evidence for a causal link between specific cancer mortality and exposure to styrene (Danish EPA, 2011). The available scientific evidence is not sufficient to conclude that styrene causes lymphoma, leukemia or other cancers (Dr. Elizabeth Delzell, University of Alabama, author of a study cited by NTP, 2009). An association with esophageal cancer was evident in two U.S. studies of reinforced plastic workers, but not in the European studies of such workers, or in studies of other groups of styrene exposed workers. Results for other cancers show no consistent patterns and the occasional positive findings are probably due to chance (Boffetta Blue Ribbon Panel, 2009). There is no clear and consistent evidence for a causal link between specific cancer mortality and exposure to styrene (European Chemical Regulatory Authorities, 2007).</td>
</tr>
<tr>
<td>Styrene caused lung tumors in several strains of mice.</td>
<td>Metabolites generated by enzymes found at high levels in mice but not humans are a key event mediating the styrene-induced mouse lung tumors (Cruzan’s Report of Studies with Modified Mice, 2012). Since the metabolism and metabolic products of styrene are different in mice, rats and humans due to the different effects of the enzyme active in each species, it should be expected that styrene toxicity is different in mice, rats and humans as well (Gradient Corp., 2012).</td>
</tr>
<tr>
<td>DNA damage found in white blood cells of styrene exposed workers. In laboratory animals and humans, styrene is converted to styrene oxide, which causes DNA damage and has been found in the blood of styrene exposed workers.</td>
<td>The detection of styrene oxide-DNA adducts in styrene-exposed workers indicates that humans can metabolize styrene to some extent, but they do so markedly less than rodents. Furthermore, in rodents this metabolism does not produce the cancers that NTP suggests as the basis for human cancer risk (Gradient Corp., 2012). Following styrene exposure, rats and mice form damaged DNA similar to that found in humans. Although DNA damage levels are higher in rats, no excess cancer incidence has been detected in rats. Agents known or suspected to cause the human cancers linked to styrene are believed to act through immune deregulation rather than through DNA damage (Boffetta Blue Ribbon Panel, 2009).</td>
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### Charging forward for change

The scientific evidence continues to argue against NTP’s review process. For example, a recent update of a large study of composite industry workers with relatively high exposure to styrene failed to find any link between styrene exposure and cancer. And recent weight-of-evidence review of the styrene data, conducted independently by the Danish EPA and researchers at Cambridge, Mass.-based Gradient Corp., both concluded the data does not support a cancer concern for styrene.

After some prodding by industry and Congressional offices, NTP recently sent the National Academy of Science (NAS) a charter for the peer review. But not surprisingly the charter tries to steer NAS away from important (and embarrassing) questions about the RoC and the styrene review. The March and April 2012 House hearings helped set the stage for legislative reform of the RoC program, but much work remains to educate Congressional offices and develop sufficient support for legislative action.

The remainder of 2012 will see the industry continue work in Congress to ensure that the NAS peer review is effective in examining both styrene’s cancer potential and the validity of the overall RoC program. ACMA will expand efforts with other trade groups to develop support for legislative reform and SIRC’s legal action will make its way through the court’s calendar, with a decision by the judge expected by year’s end.

In the meantime, the industry can be heartened by the outpouring of Congressional and media attention to the flaws of the RoC program, and look forward to a successful resolution of this issue.

John Schweitzer is ACMA’s senior director of government affairs. Email comments to jschweitzer@acmanet.org.
200 for $20
Volta Volare GT4 hybrid plane can fly 200 miles on $20 of gasoline.

9,497
The number of pounds held by composite bridge deck at SAMPE’s Bridge Building Competition.

40,000
The hours Emirates Team New Zealand spent on composite yacht components.

1,781
carbon fiber parts held together with 179 metallic fittings on the James Webb Telescope.

8.2 billion
ACMA member Lucintel predicts global thermoplastic composite market will reach $8.2 billion by 2017.

$200,000
Robert C. Byrd Institute receives a grant to support composite technology outreach.

These statistics are compiled from Composites Manufacturing’s weekly e-newsletter, Industry Digest. Our weekly e-newsletter compiles composites news worldwide. To subscribe, email subscriptions@acmanet.org.
ACMA continues to make significant progress on our advocacy efforts protecting the use of styrene. As readers know, the National Toxicology Program (NTP) listed styrene in its most recent Report on Carcinogens (RoC), despite compelling opposing arguments. Unlike the industries that conceded after their product was listed, ACMA continues to work to remove styrene from the RoC.

This year ACMA worked with members of Congress to fund a study by the National Academy of Sciences (NAS) to review the process NTP uses to classify carcinogens. The NAS has criticized the process in the past and is expected to do so again.

Despite the fact that there are many issues vying for the attention of Congress, your association has been effective in convincing Congress to hold two hearings and a roundtable discussion on styrene with the House Science, Small Business, and Energy & Commerce Committees. These hearings have built a record against the NTP and raised awareness of our industry on Capitol Hill. They have also generated significant press in policy newsletters that reinforce the importance of the issue. To read the latest update, turn to page 26.

Our success is a result of smart staff work, dedicated members who educate their members of Congress and the Composites Advocacy Fund. ACMA’s dues and programs do not generate enough revenue to do all the work necessary to be effective on Capitol Hill. For this reason, we reach out to the industry through the Composites Advocacy Fund. There is still much work to be done, so if your company is a member of ACMA and contributed to the fund when it renewed its membership, thank you.

If your company is not a member or didn’t contribute during renewal, you will receive a letter from ACMA requesting a contribution. Please think about how devastating a law suit or escalating insurance could be on your company and make a contribution to the fund. The seeds of success have been sown and are germinating. If everyone contributes we will succeed!

Tom Dobbins, CAE

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Chemical Processing Scores Big with Attendees
ACMA welcomed 165 attendees to the first-ever Chemical Processing Symposium, held May 23 and 24 in Houston. Strong signs of economic recovery and a re-bounding chemical processing sector brought increased interest in composites among end users. ACMA met the needs of these engineers and end-users with an impressive line-up of speakers like leading chemical companies that shared best practices and addressed the use of FRP. The education was, “thoughtfully and nicely formatted from conception to construction and all the way through inspection,” says one symposium attendee.

Equally important to the success of the event was the quality of speakers and “overall diversity in speakers’ backgrounds,” says another attendee. This particular line-up of presenters was unique in that rather than fiberglass manufacturers talking about composites, the speakers included companies such as DuPont, Dow Chemical Company, Albemarle and consultants with 20+ years in the chemical processing industry. Strong attendance, quality presentations and a sold out exhibit hall made this the not-to-be-missed event of spring 2012.

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Romeoville, Ill.
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Manchester, N.H.
Nantong Power Plastic & Rubber Co., Ltd.
Nantong Jiangsu, China
Shem Tanner
Columbia, S.C.
Zhenjiang Yuda Composite Materials Co., LTD
Jiangsu, China

New CCTs
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Mike Beverly, CCT-WBR, CCT-CM
Danville, Va.
Ashutosh Bhogle, CCT-VIP
Aberdeen, S.D.
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Confounded Composites! See if you can find the differences in these two pictures.

The 2012 Summer Olympic Games taking place in London, July 27 to August 12, will feature 302 competitive events in 26 sports. Read how composites will be featured in the Games, turn to page 14.