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By Mary Beck
Welcome to 2015! I think this will be a great year for composites. In this edition of Composites Manufacturing magazine, we will see what Lucintel – one of ACMA’s affinity partners – has to say about the state of the industry. I know that they have done a great deal of work to bring us their report on page 18. I am sure that it will provide a lot of valuable insight.

As for my view of the industry, I think it is very bright. ACMA has been working hard to help develop new markets and build relationships. The effort has been intense, and the outcomes should be very beneficial to all of our members. We have begun a real deep dive into the government procurement arena. This effort involves ACMA staff and volunteers and is pointed at recent initiatives from technology, manufacturing, education and development agencies within the federal government. ACMA needs to be at the forefront of these efforts because as a group we can push our ideas further than we can individually. If you are not involved in a Composites Growth Initiative (CGI) committee, then you should consider joining one. Participation puts you at the front line of the conversation, helping shape the future of our industry.

The board of directors has undertaken a renewal of our Strategic Plan, which outlines a three-year blueprint for the association. The Strategic Planning Committee meets in conjunction with board meetings, but also conducts an extra meeting once a year to focus on the plan. We are currently discussing three of the basic missions of ACMA: composites growth, regulatory affairs and education. The board of directors will have a final plan for formal approval at our May meeting. I will have a more detailed review of the plan after it is approved.

My last point may seem to rehash old news, but it’s worth a revisit. CAMX – The Composites and Advanced Materials Exposition, was a huge success for ACMA, SAMPE and our whole industry. Countless hours went into planning and executing this new show. Now the challenge is to keep the momentum going and produce an even better show in Dallas in October. I assure you that the same folks who did such a great job in 2014 are hard at work, trying to out-do themselves for 2015. But they cannot do it alone: It is up to all of us to participate. You can do it by exhibiting, writing and presenting a paper, or simply attending the show in Dallas. Thanks in advance to those who participate. And thanks for your continued membership support.

Jay Merrell
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Mixing Organic Peroxides into Composite Materials

The mixing of organic peroxides (OPs) into unsaturated polyester resin (UPR) can make a critical difference between a good part and an increasing scrap rate. The key is in the order of mixing and reducing the possibility of reacting the OP before it gets into the UPR. As a rule of thumb, it’s best to add the OP last and mix it thoroughly. If only it were this simple.

Organic peroxides are added to UPRs with the intent of co-polymerizing the UPR with the reactive diluent (i.e. styrene) to make the UPR a liquid solution at ambient temperature. It is important to know that all OPs can be reacted in and out of a composite resin, and there are safety and health risks to using OP before and during a mixing operation.

There are two conditions for the use of OP in UPR – ambient and elevated temperatures. At the molecular level, at ambient cure temperatures the most common UPR contains a reactive metal complex, typically a cobalt-based system. The metal causes the decomposition of the organic peroxide to a free radical.

\[ \text{R-OOH} + \text{Co}^{2+} \rightarrow \text{RO}^\cdot + \text{OH}^- + \text{Co}^{3+} \]

The free radical of the peroxide, represented as RO•, is highly energetic and attacks sites in the UPR that are rich with electrons, the double bonds. In one scenario, the free radical can attach to one...
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The key to the manufacture of a thermoset composite is then having a good mix, which places the decomposing organic peroxide near the double bonds of the reactive monomer and UPR to have an efficient polymerization.

Safe mixing can be demonstrated using the example of an auto-cast application. The prepromoted UPR (containing materials ready to produce decomposition) is first mixed with reinforcements through the action of an auger or a static mixer to reach a level of thoroughly wet out reinforcement. This UPR matrix then continues to where the OP is introduced and also thoroughly augered in. The OP is but a small percentage of the final product (1 to 2.5 percent), and therefore this mixing step is critical to give the end composite the best physical properties.

The same order and attention to mixing seen in this “closed” system should be followed in an open-air process. The closed system is very safe, but in open application of peroxide there must be other precautions taken.

With open systems like spray-up laminating, the mixing of organic peroxide with a resin could happen with impingement of the peroxide into a stream of resin. If the stream of peroxide is not set correctly, it may not thoroughly mix into the stream of resin and cause hot spots on the part as well as expose workers to overspray containing raw peroxide. This is especially critical if the liquid OP is used in a heavily filled or highly viscous UPR.

In batch mixing of UPR with OP, as is done in pultrusion and cured-in-place pipe (CIPP), the most reactive organic peroxides used have decomposition temperatures near or below that of ambient/room temperature. Quick and thorough incorporation of the organic peroxide into the UPR requires a mixing vortex to stop the possibility of having a decomposing liquid sit on the surface of a resin batch. The decomposition products of organic peroxides can be flammable and, in the presence of a source of ignition, can have major consequences.

The use of some OPs that are solids at room temperature requires a special step of dissolving the OP before addition to the UPR. There are two major products used in pultrusion and CIPP that fit this category. During the dissolving process, the reaction of the OP begins immediately. The peroxide, di-(4-tertbutylcyclohexyl) peroxydicarbonate (commonly known as Perkadox 16) reacts in styrene at 32 F (0 C). At 68 F (20 C) the reaction is faster and the styrene starts to rapidly turn into polystyrene as the mixture is held at this temperature. If allowed to sit for over an hour, there may be full polymerization resulting in a great amount of heat and smoke generation.

The final note in finding the best mixing techniques is simply this: Ask if you are unsure of what is a good practice. Consult the material safety data sheets, and look for support from suppliers to achieve the best results.

The guest columnist for this issue’s “Best Practices” column is Anthony Bennett, technical development manager of thermoset products for AkzoNobel Polymer Chemicals, Organic Peroxides sBU. Email comments to anthony.bennett@akzonobel.com.
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Innovative ‘Infoshop’ Made from FRP

Travelers arriving and departing from the new bus transit center at Union Station in Washington, D.C., have no trouble locating the small information and shopping pavilion built to serve them. With its bright yellow walls, curving silver roof and double-ovoid shape, the FRP building, constructed by Compmillenia LLC of Washington, N.C., stands out from the surrounding concrete structures.

The District of Columbia decided in 2012 to consolidate the regional bus stops scattered throughout the city at the Beaux Arts-style Union Station. The space chosen for the bus transit center was a concrete slab that served as the parking lot entrance and walkway between the station and H Street. Studio Twenty Seven Architecture was tasked with transforming the space under a fast-track project with a modest budget and an eight-month schedule.

The firm based its design upon the metaphor of a Zen rock garden. The information and shopping pavilion – or infoshop – is reminiscent of rocks in a field. A wood and glass enclosure, suggesting a meditation porch, serves as a waiting area. There is also a restroom pavilion made with a recycled shipping container armature.

Photo Credits: Anice Hoachlander, Hoachlander/Davis Photography
The ovoid shape of the infoshop was the project’s biggest challenge. “We were exploring how we could achieve that form, and we approached it a couple of different ways,” says Todd Ray, FAIA, principal with Studio Twenty Seven Architecture. Using steel and CNC bending technologies was too expensive, and the structure would be too heavy for the slab. The second alternative — millwork interlocking skeletal frames to achieve curved surfaces — required too many trades working at one time on the 475-square-foot building.

The project contractor, Monarch Construction, suggested molded FRP for the structure, which is only partially covered by the space’s existing glass canopy. After investigating that approach, Studio Twenty Seven selected Compmillennia for the project. The composites manufacturer and boat builder had never worked on a building before, but did have years of expertise in constructing curved shapes.

“We used boat construction methods to build this architectural project,” says Jim Gardiner, Compmillennia’s general manager. It was a learning process for both companies as the design kept changing even as fabrication plans progressed.

The yellow wall panels of the infoshop feature a textured surface of dots and dashes, Morse code for song lyrics by Death Cab for Cutie: “Cause in my head there’s a Greyhound station/ Where I send my thoughts to far off destinations/ So they may have a chance of finding a place/ Where they’re far more suited than here.”

A local artisan routed the dots and dashes into medium density fiberboard (MDF) to form the wall pattern. Working under a limited production schedule — only 32 days — Compmillennia moved quickly from the patterned MDF to a production mold. Six routed panels, each 4 x 10 feet, were assembled and put together on Compmillennia’s 20 x 80-foot flat vacuum mold. Using a lofting process, workers cut out full-sized panel sections from heavy floor paper, then laid out the edges of each panel following the dimensions of the patterns.

The roof panels were manufactured using a clear gel coat, metallic silver gel coat, 1½-ounce chopped strand mat and two layers of 32-ounce, 0°/90° stitched biaxial fiberglass. Each section took a day to complete, although several smaller sections could be molded at the same time. Compmillennia also fabricated the individual supporting FRP ribs for the structure. As panels were completed, Gardiner’s crews began constructing the sections on a box steel ladder frame. They used fiberglass laminate clips to mate the end walls to the frames and to attach the curved silver roof panels. The two completed sections were fitted but not bonded together before being transported on trailers to the Union Station site.

Crews had a four- to six-hour window in the middle of the night to unload the two building sections and move them via rollers to their permanent location. Compmillennia employees came the next day to complete the assembly and join the two sections into one.

“I think the infoshop pavilion came out really well,” says Ray. “We had a very limited work area because the terminal and the walk areas could never be closed, so the notion of pre-fabrication was critical.” He says his firm would use composites again if the right project came along.

Gardiner believes that composites will be used for more building projects in the future: “The full scope of what you can do with it is limitless. It has great potential.”

Mary Lou Jay is a freelancer writer based in Timonium, Md. Email comments to mljay@comcast.net.

For more stories like this, visit CompositesManufacturingMagazine.com and check out the Architecture articles under the “Market Segments” tab.
Composites Help a Green Roof Grow

Greenery and gardens aren’t just found on the ground. Green roofs, which partially or completely cover a building with vegetation planted over a waterproofing membrane, exist all over the world, from the tops of small houses on remote islands to congested city skyscrapers. These roofs offer many benefits, especially for urban buildings such as the Gordon Persons Building in Montgomery, Ala.

As part of a renovation in early 2014, a green roof was installed on the Gordon Persons Building, which houses Alabama’s Department of Revenue. The underlying structure of most green roofs is often built with steel parts. But contractor J.J. Morley Enterprises Inc. opted to use composite beams and grating from Strongwell to complete the project.

Green roofs help to mitigate warm temperatures in cities because they absorb carbon dioxide and decrease the amount of dark rooftop space that would absorb heat. The roofs also reduce heating and cooling loads on a building by 50 to 90 percent by adding mass and thermal resistance and through evaporative cooling, respectively. In addition, green roofs absorb rainwater, reducing stormwater runoff by up to 75 percent.

The Gordon Persons Building’s roof features 26 separate planters, each in varying geometric shapes spread across six rooftop courtyards. A mix of perennial plants suited to Alabama’s climate were pre-grown in vegetation trays with a drainage layer made from 100 percent recycled high-density polyethylene and bio-degradable walls made of recycled paper products with 20 percent wax content. The vegetation trays were then placed on FRP beams and grating, which were inserted inside reinforced concrete planters on the courtyard floor.

Green roofs are typically assembled with stainless steel fasteners, nuts, bolts and washers without any welding, says Cliff Wyatt, Strongwell’s regional sales manager for the southeast United States. Steel had originally been specified for this job, but J.J. Morley decided that using a noncorrosive, lightweight material would be a better choice. Wyatt notes that several green roofs made with steel parts have rusted through within five years of their completion. “You’ve got all your dirt, plants, fertilizers and the water in there every day, and that’s just not conducive to steel,” he says.

Strongwell’s FRP materials offer stronger...
resistance against the elements than steel. Additionally, the composite materials are less than half the weight of steel, making it easier to install and move the gardens, if needed, for maintenance. Finally, the FRP structures offer life cycle and maintenance advantages. “A question we get a lot is, ‘How long does this material last?’” says Wyatt. “In this case, would 100 years be out of the realm of possibility? Probably not.” The Gordon Persons Building’s roof is classified as an extensive green roof, meaning it supports 10 to 25 pounds of vegetation per square foot and was designed to be virtually self-sustaining. The large built-in planters are waterproofed with a hot rubberized asphalt system. The Strongwell EXTREN® beams, a pultruded fiberglass-reinforced beam with a thermosetting polyester resin system, and 1 x 1 x 4-inch DURAGRATE® pultruded fiberglass molded gratings create a false bottom so the vegetation trays can be placed throughout the planters. “This reduces the weight in the planters, allows easy access for future planter waterproofing or drain maintenance and allows for simple landscape maintenance and replacement as needed,” says Mark Kelley, vice president of operations at J.J. Morley.

Wyatt says it only took about two weeks to get all of the beams and gratings laid down during the 14-month total renovation project. “The parts are all cut to size and all the holes are pre-drilled, so all [the installers] have to do is lay it out, bolt it together and lay the gratings on top,” he says. Kelley added that the J. J. Morley team was “very satisfied” with the ease of use and outcome of the composite materials. Composites are slowly but surely finding their way into more architectural projects. “I think [green roofs are] a growing market with a lot of potential,” Wyatt says.

Mary Beck is the communications coordinator at ACMA. Email comments to mbeck@acmanet.org.
Walmart wanted a greener truck. So, the multinational retailer teamed up with other companies to produce a concept vehicle and unveiled the resulting futuristic-looking tractor-trailer in 2014. It is the latest example of Walmart’s efforts to increase fleet fuel efficiency, something the company has boosted by 84 percent since 2005 on the way to its stated goal of doubling fuel efficiency by 2015.

Part of the advanced technology in the concept vehicle can be found in the trailer. Normally, these are constructed of aluminum, steel or plywood core fiberglass panels. Such trailers tip the scales at about 12,000 pounds, but the new trailer isn’t typical.

“The concept trailer panels were built almost exclusively with foam cores and carbon fiber,” says Wayne Durnin, vice president of sales and marketing at Fiber-Tech Industries. The Spokane, Ohio-based company supplied CFRP panels to trailer maker Great Dane of Savannah, Ga.

Durnin adds, “The one-piece fiberglass reinforced floor panel had been tested and approved with a 16,000-pound forklift rating. In combination with the one-piece CFRP sidewalls and roof panels, the new design saved almost 4,000 pounds compared to previous construction materials.”

Cutting the weight by a third had to be done without sacrificing the trailer’s weight-bearing capacity or interior volume. Those two parameters determine how much cargo can be carried in the trailer, which is constrained by government regulations to be a certain width, length, height and total weight when fully loaded.

For the concept trailer, there were other requirements as well. Importantly, the specifications for interior trailer volume dictated the walls be as thin as possible. Given the needed panel performance and requirement for cutting weight, Fiber-Tech engineers decided early on in the 3½-year project that the only solution was a ribbed foam core with carbon fiber. The strength of the resulting panels was such that the walls of the trailer were about half as thick as what they would have been with a traditional wood core and fiberglass approach, Durnin says.

Fiber-Tech has years of experience supplying panel materials to trailer manufacturers. The challenge was to come up with a manufacturing process that created full height (9 feet) and full length (53 feet) carbon fiber panels in a single step. The company’s engineering expertise and experience with similarly sized traditional fiberglass-wood core panels were vital in successfully devising an answer to that problem. The solution involved a combination of woven and stitched carbon fiber that laminated the foam core, which was about a half inch thick.

In addition to carbon fiber in the trailer, the truck also implemented a number of other advanced technologies. For instance, the tractor and the front of the trailer are shaped such that aerodynamic drag is cut by 20 percent, which leads to a 10 percent boost in fuel economy. The tractor engine is a hybrid, running either off of electric power, energy derived from a microturbine or a combination of both. The microturbine can run on natural gas or other fuels, burning these so cleanly that there’s no need for the exhaust treatment equipment found in conventional diesel engines. The concept engine also does not require heavy lubricants.

In evaluating the concept vehicle, it’s important to remember that increasing fuel efficiency is not simply a matter of getting more miles per gallon. The goal, instead, is to get goods where they need to go as efficiently as possible. Thus,
taking weight out of the trailer allows more cargo to be carried. Doing so does not necessarily increase the vehicle’s miles-per-gallon, as the total weight moving down the road remains the same. However, swapping trailer weight for cargo does make transport of goods more efficient.

This tradeoff illustrates the three efficiency goals that pertain to the trailer. “We want to fill it to capacity wherever possible. We want to drive the fewest miles and do that on the most efficient equipment,” says Elizabeth Fretheim, Walmart’s director of logistics sustainability. Walmart has a fleet of about 6,000 trucks, or tractor-trailer combinations, in the U.S. that log millions of miles annually delivering products. Hence, the potential impact of the concept vehicle is huge.

The key word is potential. Fretheim says the project’s various technologies are in different stages of market acceptance and regulatory approval. She expects them to eventually be implemented, although there may never be a commercially available product that includes all of the advanced features found in the concept truck. However, she says that part of the goal was to generate interest and buzz about what could be done. In that, the project succeeded, Fretheim says.

With regard to the carbon fiber composite technology, the concept trailer has shown what is possible. There has been some interest and new opportunities that have opened up as a result, according to Durnin. However, carbon fiber is more expensive than materials currently used in trailers. So, widespread commercial adoption will likely lag until the price comes down relative to the cost of alternatives.

That may happen, thanks in part, to other transportation segments. Cars face their own requirements to improve fuel efficiency, so high-end car makers are turning to carbon fiber to get the weight out and the miles-per-gallon up. Consequently, the demand for carbon fiber is growing, which is helping to boost production volumes, cut costs and drive up material usage.

As Durnin says, “As more and more products use carbon fiber, we suspect that the price of carbon fiber is going to be reduced to make it more competitive in other markets.”

Hank Hogan is a freelance writer based in Albuquerque, N.M. Email comments to hank@hanbhogan.com.
If you make consumer electronics and household appliances, function isn’t enough: Aesthetics are a top priority, too.

By Susan Keen Flynn
When a leading home appliance manufacturer recently tested shelves for a new line of refrigerators, the company ran into a glitch: The die-cast metal frames for the glass shelves were susceptible to corrosion. So Mar-Bal Inc., a compounding and molder of thermoset composite products based in Chagrin Falls, Ohio, worked with the appliance manufacturer to design and test an alternative. Mar-Bal supplied more than one million shelf frames made from THERMITAL™, a thermoset composite with a physical vapor deposition (PVD) finish that resembles metal.

“Our solution won out because inside refrigerators there’s condensation, and with condensation comes the potential for corrosion and rust,” says Ron Poff, manager of global marketing and brands for Mar-Bal. “Thermoset composites gave the customer the look and feel of die cast, but with the added benefit of corrosion resistance.”

Mar-Bal provides thermoset composite components for several consumer appliance brands, including Whirlpool, Maytag, KitchenAid, GE and Electrolux. “You can find a Mar-Bal manufactured component in anything in the kitchen or laundry room of a home,” says Marc Imbrogno, director of materials engineering for Mar-Bal. The company makes components that consumers see and touch every day, such as appliance handles, knobs, control panels, consoles and vent trim.

Composites make sense for household appliances for obvious reasons: They offer durability, low thermal conductivity and corrosion and chemical resistance. But appliances are just one area within the larger consumer products market where composites are gaining traction. Consumer products encompass anything that people buy for personal or household use, from necessities such as clothing to luxury items like boats and sports equipment. In addition to household appliances, composites are poised to take off in the consumer electronics marketplace, where early adopters are testing and beginning to introduce handheld devices, mobile phones, laptop computers and tablets comprising composite materials.

“Whether its household appliances or personal, digital gizmos, you’ll notice a move from metals to composites,” says Raj Mathur, Ph.D., vice president of technology and business development for PlastiComp, a supplier of long-fiber reinforced thermoplastics (LFT) based in Winona, Minn. “One reason for this is based on life cycle analysis. You can’t churn out consumer products in such large numbers in this globalized economy and use up all the resources involved in metals and metallic alloys, many of which are becoming rare.”

Surface Generation Ltd., a technology start-up based in the United Kingdom, has been investing in the consumer electronics market for the past three years. Rather than commit to one solution, the company designs and manufactures equipment to make products using composites, advanced plastics, metals and glass. CEO Ben Halford believes high-performance composites ultimately will win the lion’s share of business in consumer electronics. “That’s not to say it’s a done deal. There’s a fairly big scrap going on in the marketplace,” says Halford, whose company also works in the automotive and aerospace areas.

“The metallic guys aren’t going to take this lying down: They don’t want their lunch to be eaten. But I think it’s inevitable that continuous fiber reinforced [products] will be there in large part within the next two years.”

**Passing the ‘Oomph’ Test**

The main reason that consumer product manufacturers are turning to composites is for durability and lightweighting, says Mathur. But they’re also looking for the “oomph” factor, he adds. People want appliances and electronic devices that feel good to the touch and look stylish.

“When we touch something there is an immediate response,” says Poff. “When you’re making a product for a brand like GE or Electrolux, that first out-of-the-box experience is critical to brand identity.” Mar-Bal teamed with GE’s appliance division last year to create a new, ergonomic design for oven handles. (In September, GE sold its appliance division to Electrolux, also a Mar-Bal customer.) A repeated refrain from the client – and (In September, GE sold its appliance division to Electrolux, also a Mar-Bal customer.) A repeated refrain from the client – and common throughout the household appliance market – was the importance of haptics, or tactile sensations. “The density of thermoset composites – the heaviness of it – was critical,” says Poff. “You can get that from metals, too, but the problem with die cast on an oven is the transferability of heat. When I touch the handle, I’m going to get burned.”

Touch is equally important in the consumer electronics market, where PlastiComp is in preliminary discussions with companies seeking to replace metal components on computers and televisions. “The primary reason is lightweighting, but the second reason is tactile sensation,” says Mathur. “These composites feel good to the touch, especially if they have an over layer of a soft-touch plastic. And when you move into consumer luxury goods, the buzz is on the aerospace carbon fiber look.”

When shopping for household appliances, consumers add a third criteria to the list – sound. “Noise is a very important aspect,” says Poff. “You want to reduce the decibel level of that appliance, and the acoustic value of reducing the overall noise is there with thermoset composites.”
Mar-Bal investigated the acoustic performance of composites for one of its customers, the blender manufacturer Vitamix. Mar-Bal performed acoustic chamber testing, comparing thermosets to acrylonitrile butadiene styrene (ABS) thermoplastics. The company presented its findings in a white paper that identified the sources of blender noise and discussed how bulk molding compound could help lower contributing frequencies and blender noise levels. “We won business by showcasing the difference between materials,” says Poff. “For any countertop blender, a six or seven decibel difference is significant.”

**Meeting Many Needs**

PlastiComp wrapped up a development project with a consumer electronics company that highlights the complex requirements of some applications. PlastiComp created technologies and tools so the company could replace die-cast magnesium in mobile phone brackets with LFT composites. “This was more than just metal substitution for added stiffness and strength,” says Mathur. “There was an emphasis not only on mechanical properties, but the bracket also had to have certain electrical characteristics.”

The bracket’s extensive list of requirements included the following:

- Stiffness equivalent to magnesium
- Weight lighter than magnesium
- Extremely thin profiles – less than one millimeter thick
- A complex shape
- Electrical properties, including electromagnetic (EMI) shielding and antenna reception

“That’s a challenging role for any composite to fulfill,” admits Mathur. He says that long-fiber reinforced thermoplastics form a skeletal network that increases the structure of the part, giving it the requisite stiffness. PlastiComp utilized carbon fiber because it’s electrically conductive, which in turn meets the need for EMI shielding. The company hit targets for surface resistivity through the use of specific additives and nanofillers it declined to disclose.

PlastiComp conducted structural analysis and mold flow analysis, tweaking the design as needed. It took into account numerous considerations: What is the best gate location for injection molding? What fiber orientation is optimal? Is the orientation in line with the stresses induced in the bracket? The project required the team at PlastiComp to carefully consider material selection, tool design and the manufacturing process.

“Most people concentrate on one or the other,” says Mathur. “But it’s essential to integrate all three.”

PlastiComp transferred the technologies and tools to the consumer electronics company, which can now produce millions of brackets via injection molding. “We demonstrated that you can satisfy seemingly opposing needs by combining mechanical and electrical properties,” says Mathur. “That’s something the wider industry should keep in mind.”

**Selling Ideas, Building Partnerships**

It’s important to note that while PlastiComp is primarily a materials supplier, it did not provide any of its LFT composite compounds to the consumer electronics manufacturer. “We were paid simply to do development work,” says Eric Wollan, business development manager for PlastiComp. “We told them how to produce the brackets, and they took that knowledge back internally.” And that’s OK with PlastiComp and other companies trying to help composites gain a foothold in the market.

“Right now, the composites industry – the materials suppliers, processing companies and equipment manufacturers – are going through the very painful education phase for the early adopters,” says Halford. Surface Generation is working hand-in-hand with customers on a few projects, including laptop computers and tablets. Though the company is tight-lipped about the details, Halford shared some of the big-picture challenges.

Most laptop computers, for example, are made of four exterior panels – one on top displaying the company logo, one around the screen, one around the keyboard and one at the base. “We’re now seeing some fairly serious attempts from the main players to shift to a structural enclosure,” says Halford. “But what we haven’t seen yet is a full composite design. The pain associated with that is incredible because the volumes are huge and the yields the companies demand are astronomical. Even a very small amount of scrap is hideous when you’re making 200,000 of something per month.”

Tablet production faces a similar challenge, trying to “make a hollowed out pumpkin, then stuff it with electronics,” says Halford. Composites can offer the solution, integrating the electronics into the structure. “The big value added with composites is not necessarily the material itself; it’s what you can do in one hit,” says Halford. “Can you take a 50-step process and shrink it to eight? If you can think differently, fuse things together and over mold electronics, then all sorts of things become cheaper and faster.”

Even though composites usage in household appliances is not new, customer education remains a priority in that niche,
too. Mar-Bal holds “knowledge share events,” bringing several employees to key accounts to position composites as a substitute material. The company spends a couple of hours with the client’s design engineers, product engineers, the quality team, purchasing staff and others. “The goal is to raise awareness of the benefits of composites because many people don’t really know what they are,” says Poff.

These knowledge share events are the prelude to solid partnerships with customers. It’s important to get in on the ground floor and offer advice on design and processes. “Our job is to interface with the customer – to understand their needs – then balance that with the capabilities of thermoset composite materials and processes,” says Imbrogno. For example, by being involved early Mar-Bal can inform a client if a surface or geometry can’t be molded reliably or if a unique color or look requires post-mold finishing.

“I think consumer products is one of the more challenging sectors of thermoset technology,” says Imbrogno. “We’re talking about high-output injection molding with multiple cavities and lights-out automation, while producing a part that’s near perfect.” The pressure to produce complex appliances and electronics that must look great and feel good is compounded by the urgency within the industry to churn out newer, better items at breakneck speed. “It’s so different from aerospace or automotive,” says Halford. “You talk to an auto guy who says they need something quickly, and you just smile and say, ‘Yes, of course.’ But that’s not quickly. The consumer electronics world will redefine your understanding of scale and speed.”

Mathur of PlastiComp concurs. Their customers demand short development cycles – typically eight months or less depending on the complexity of the part and how long it takes to make the tool. The development cycle for the mobile phone bracket was only four months. That’s a rigorous schedule for one company, which is why Halford of Surface Generation says partnering is paramount to future success in the marketplace.

“To work on something new, you must collaborate, even if you are competitors,” he says. “Consumer electronics companies will not single-source from a supplier, so I need my peer group to be successful. We need three or four viable material suppliers, processing suppliers and molding houses out there who are credible to ignite the touchpaper.” With a capable supply chain working together and generating excitement in the marketplace, products will follow. Halford says big players in the consumer electronics industry will release an initial wave of composite-based products this year. Then those companies and followers will work out the kinks inevitable in new products and market second-generation products throughout 2016. Halford expects thermoplastic consumer electronics “will settle down into normalcy” by 2017.

In the meantime, there’s a lot of work to be done by composites industry professionals. For those up to the task, Halford offers this cautionary advice: “Strap in, hold your breath and delete any assumptions you may have.” The upside? He says, “The rewards are definitely there.”

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

What Will Drive Composites Growth in 2015?

By Dr. Sanjay Mazumdar
One of the best ways to judge an industry’s vitality is to look at end product demand. For composites, the picture is promising: Demand for end products, ranging from bath tubs and golf clubs to rebar and roof panels, reached $21.2 billion in 2014. Such demand, in turn, leads to a healthy composite materials market.

The U.S. composite materials market grew by 6.3 percent last year to reach $8.2 billion in value and 5.5 billion pounds in terms of annual shipment. Looking ahead, key economic indicators and market dynamics suggest that in 2015, the U.S. composite materials market will grow 4.9 percent to reach 5.8 billion pounds of annual shipment. Dominating the materials market are glass fiber in the reinforcement segment and polyester resin in the resin segment.

The top three market segments in 2014 were transportation, construction and pipe and tank. These segments represented 69 percent of total volume. Demand in the U.S. composites market is expected to reach $12 billion by 2020 with a compound annual growth rate (CAGR) of 6.6 percent. Recovery in the wind energy market, as well as continuing growth in the transportation/automotive, aerospace and construction sectors, are likely to stimulate the composites market through 2020 and beyond. By 2020, approximately 65 percent of U.S. composites growth by value is expected to be driven by the aerospace, transportation and construction industries.

Extending the look globally, the U.S. is the second largest market for composites worldwide after China in terms of volume consumption. In 2013, the U.S. ranked No. 1 in per capita composite materials consumption with approximately 16 pounds, followed by Germany with approximately 8.6 pounds. Comparatively, per capita composites consumption in China was 4.8 pounds – the highest among BRIC countries (Brazil, Russia, India and China).

To understand how and why composites can gain market share, it’s important to take a closer look at some key market segments.

**Automotive/Transportation**

In 2014, the U.S. automotive/transportation industry grew for the fifth consecutive year. Auto sales were projected to reach 16.5 million units, and light-duty vehicle production in North America was projected to grow by 5.6 percent. Growth in demand can be attributed to the easy availability of credit at low interest rates, increasing consumer confidence and the introduction of fuel-efficient vehicles.

Demand for composites in the U.S. automotive industry grew by 6.3 percent in 2014 due to increasing use of fiberglass...
Composites in interior, exterior and underbody applications as well as the higher use of carbon fiber composites in high-performance vehicles. Last year, SGL Automotive Carbon Fibers announced plans to triple its manufacturing capacity of carbon fiber by early 2015. At present, SGL has the capacity to produce 3,000 tons of carbon fiber.

Industry regulations, such as the Corporate Average Fuel Economy (CAFE) standard in the United States and the European Union Automotive Fuel Economy policy, present a challenge to automotive OEMs: They are charged with increasing fuel efficiency and reducing the carbon footprint. The past few years have seen rapid developments in lightweighting efforts to meet those requirements. With aluminum, high-strength steel, magnesium and composites emerging as the front runners in lightweighting, it remains unclear which material combination will dominate the auto industry.

Composite materials offer significant benefits to automakers. The use of carbon fiber reduces vehicle weight and, as result, increases fuel efficiency and lowers carbon dioxide emissions. However, carbon fiber comes with a price penalty. Strategic alliances – such as those between GM and Teijin, Ford and DowAksa, and Daimler AG and Toray Industries Inc. – are focused on incorporating carbon fiber in mass production vehicles.

Overall, market penetration of composites within automotive seems to follow a similar path as the early-adapting aerospace industry. Over time, aerospace has built significant confidence in composites technology, and next-generation aircraft now have about 50 percent composites content. With increasing lightweighting requirements, the auto industry will likely witness similar confidence in composites: The structures of the next-generation car models may reach 10 to 20 percent composites content in next 20 years.

Within aerospace, composite materials demand grew by 10.7 percent in 2014. Composites provide numerous advantages in this segment: They are lightweight with higher strength than competing materials, which results in improved fuel efficiency, an increase in passenger carrying capacity, low emissions and low maintenance costs.

Composite material consumption has increased significantly in the commercial aerospace sector, from 5 to 6 percent in the 1990s to more than 50 percent in today’s advanced aircraft.
programs, such as the Boeing 787 and Airbus 350. Composites usage will continue to grow because of increased production of advanced aircraft models. With more people flying, the demand for commercial aircraft will subsequently increase. Furthermore, there’s been an escalation in production to fill the huge pile of order backlogs (notably within the Boeing 737 and Airbus 320 families of aircraft), which also accelerates demand for composite materials.

**Construction**

The main impetus for growth in the construction industry is housing starts, which grew 5.3 percent in 2014. Another contributing factor is government allocation of funds for retrofitting old infrastructures, especially bridges and roads. Within construction, composites demand registered 4.9 percent growth in 2014. This market continues to be the second largest (after transportation) for composite materials by volume.

While construction is a sizable market, composites penetration is very low compared to other materials. However, composites are found in numerous applications, including grating, rebar, handrails, structural profiles, utility poles and bridges.

The future is bright for this market, in part, because the United States will need to invest significantly in the repair and maintenance of its old infrastructure. For example, there are 147,870 deficient bridges requiring repair. According to Federal Highway Administration estimates, the U.S. needs to invest $20.5 billion annually to eliminate deficient bridges, whereas only $12.8 billion is currently being spent by the federal government. A partnering of raw material suppliers and parts fabricators to educate state departments of transportation and other stakeholders would likely create significant demand for composites.
Pipe & Tank

The pipe and tank market promises solid growth opportunities, considering significant demand from various end application industries, such as oil and gas, retail fuel, water/waste water and sewage. Increasing shale gas exploration activities and the expanding offshore oil and gas industry contribute to the rise of composites usage in the pipe and tank market.

The demand for composite materials within this market grew 5.2 percent in 2014. Low-cost natural gas gives pace to the development of new chemical facilities along with the expansion of older ones for chemical processing. That, in turn, creates demand for FRP pipes. Some chemical companies are shifting their production bases to areas where there is a huge reserve of shale gas, which also increases demand for FRP pipes.

The U.S. government and private players are expected to invest more to set up new pipelines to transport crude oil and gas. Plastic and polymer resin manufacturers also are setting up manufacturing plants in new shale gas areas for the development of low-cost feedstock, such as propane and ethane. There are many applications in the oil and gas industry, including gratings, risers, tethers, drill pipes, glass-reinforced epoxy pipes and frac balls and plugs.

Renewable Energy

Wind energy is another segment where composites are a great fit. With ever-increasing blade lengths and boosts in the megawatt capacity of turbines, the use of lightweight materials has subsequently increased. Composite materials offer significant weight reduction and increased blade stiffness, which in turn raises the level of energy output. In addition, the burgeoning offshore wind market compels blade manufacturers to use advanced materials that can reduce system weight without compromising mechanical properties.

The government’s renewable energy incentives, such as the Production Tax Credit (PTC) policy, impact the development of wind energy in the United States. The PTC expired in 2013, but U.S. legislation extended the term for availing PTC benefits until 2015. Wind farms will be eligible to derive optimum benefits of the extended PTC on projects begun in 2013 and whose construction will take subsequent years to complete.

As the figure above shows, when PTC benefits are extended, wind installations rise. Conversely, the removal or expiration of PTC policies have resulted in a decline in new capacity installations.

Industry Innovations

Although composite materials have successfully penetrated various market segments, continuous innovations are required to address arising needs. Industry leaders are developing new resins, fibers, compounds, nano-materials, bioplastics and so on. Technology suppliers also are developing new technologies for rapid production, low energy consumption and low wastage of raw materials.

Lightweighting and cost reduction are two trends that permeate the industry. Innovation mega trends also are affecting individual sectors of the composites industry, including fibers, resins, composites technology and end-use applications:

Fiber Innovations: Significant innovation is expected in future development of low-cost carbon fibers for automotive, wind energy and industrial applications. Low-cost alternative precursors such as textile polyacrylonitrile (PAN), lignin and polyolefin also are being considered. In addition, there is a focus on reducing energy cost.

Within the GFRP market, suppliers are developing high-performance glass fibers to meet higher mechanical and chemical requirements. Finally, a growing focus on green materials provides momentum to the development of high-strength natural fibers that could ultimately increase penetration in automotive, construction and other industries.

Resin Innovations: More new product launches in resin will focus on shorter cure time (in the range of one to two minutes) for mass volume applications. Momentive and Huntsman have developed epoxy resin systems with short cycle times for high
The ‘Push and Pull’ of Composites Growth

There are thousands of composites applications with good track records. The penetration level of composites in each application differs according to performance requirements, functional requirements and other factors. Lucintel has identified two distinct strategic viewpoints – push and pull strategies – that can help the composites industry grow. In marketing, push strategies involve taking products directly to customers, while pull strategies motivate customers to actively seek out products.

Push and Pull Strategies for Driving Composites Growth

**Push Strategy**

*Civil Engineering*

*Oil & Gas*

*Medical*

1. Educate OEMs and government agencies, such as DOTs and DOEs
2. Participate in seminars, conferences, and trade shows
3. Organize workshops and join efforts with concerned parties and customers
4. Lobbying and publishing articles in magazines

**Pull Strategy**

*Aerospace*

*Automotive*

*Wind Energy*

1. Several demand pull factors are creating opportunities for composites
2. Address many areas, such as reduction in materials cost, manufacturing process with low cycle time and high layup rate, etc. to leverage demand pull

Pressure resin transfer molding (HP-RTM) and compression molding. In the wind energy segment, resins are being developed with optimum gel time for long wind blades. Throughout the industry, low-cost and high-strength nano-resins will gain traction in future applications, and bio resins are on the uptick to meet growing environmental concerns.

**Technology Innovations:** Lucintel expects significant innovation mega trends in composite technologies targeting faster cycle times, better product quality, lower capital and lower processing costs. A major technology challenge is to achieve the targeted one- to two-minute cycle time for mass volume automotive applications. That should be addressed in the near future with the advent of technologies such as HP-RTM, compression molding, carbon fiber reinforced thermoplastics (CFRTP), pressure press and forged composites.

Another trend is the development of processes with the combined capabilities of automated fiber placement (AFP) and automated tape laying (ATL) for reduction in capital cost and improved throughput. In addition, recycling techniques for carbon composites are advancing, thereby strengthening life cycle robustness. Finally, notable efforts are expected in the development of better weaving techniques for carbon fiber, addressing the challenge of lower compressive strength for wind blade applications.

**Application Innovations:** Enhanced applications abound in nearly every segment of the composites industry. Within the automotive industry, the push to create lighter vehicles has led automakers such as BMW, Mercedes, Ford and GM to incorporate carbon composites in mass volume cars. In the wind energy, there is a growing trend toward developing one-piece and modular wind blade technology.

Several innovation mega trends are occurring in aerospace. More carbon composite and nano composite applications will emerge. The Boeing 787 and Airbus 350XWB have incorporated significant composites in structural parts (about 50 percent by weight). Lockheed Martin has committed to replacing approximately 100 composite or metal components with carbon nano-reinforced polymers (CNRP) throughout the F-35’s airframe. CNRP offers up to 30 percent weight reduction at one tenth of the cost of CFRP and has a strength that is several times higher. The aerospace industry also is moving toward more ATL and AFP processes to increase throughput.

**Looking Ahead**

The aforementioned innovations are likely to address the unmet needs of composite materials and will help to make composites a material of choice in many segments. Prudent investments should yield long-term growth in the marketplace.

Dr. Sanjay Mazumdar is CEO of Lucintel, a global market research and management consulting firm. Email comments to sanjay.mazumdar@lucintel.com.
Additive manufacturing is building its way into more projects, on the shop floor and at home.

By Mary Beck

The word “manufacturing” may bring to mind images of factories housing huge machines in an assembly line creating one item thousands of times. But in the past decade, the rise of 3-D printing has brought manufacturing into homes and small businesses, allowing users to bring to life on a desktop any item they can dream up with a CAD program. Composites companies are jumping into the field, too, by 3-D printing items with reinforced fibers.
With additive manufacturing, material is placed layer by layer, producing a stair-step effect.

A Brief History of 3-D

While the term “3-D printing” permeates the press, it was originally coined by MIT to describe polymer-based desktop models. 3-D printing falls under the larger umbrella of additive manufacturing, the industry term for all applications of technology that use a process of joining materials to make objects from 3-D model data, usually layer upon layer. Additive manufacturing only uses what material is needed, in contrast to subtractive manufacturing, which involves cutting parts away from a larger chunk of material to create the desired final product.

Excitement surrounding additive manufacturing has spiked in the last two years, but early equipment and materials have existed since the 1980s. Chuck Hull of 3D Systems Corporation invented a process known as stereolithography in 1984, in which layers are added by curing photopolymers with UV lasers. He also developed the STL (STereoLithography) file format widely used by 3-D printing software as well as digital slicing and infill strategies common to many processes.

A 3-D printer creates an object by following the STL file’s instructions to lay down successive layers of liquid, powder, paper or sheet material in a series of cross sections. These layers correspond to the virtual cross sections from the CAD model and are joined or automatically fused to finish the object. The material enters an extruder via a funnel where the material is heated to its melting point and pressed together to form a homogeneous liquid. The printer head extrudes the melted material along the paths in the STL file on the X and Y axes before moving up one step along the Z axis.

A variety of materials can be used in additive manufacturing processes, including metals, polymers and fibers. Discontinuous strands of carbon fiber or fiberglass are most frequently used to reinforce plastics in 3-D printing processes across every market sector, including automotive, aerospace, tooling, medicine and infrastructure. These reinforcements deliver the strength of composites with less material in less time and can be designed and prototyped from one desktop.

Additive manufacturing technologies originally were applied in product development, data visualization, rapid prototyping and specialized manufacturing, but applications have expanded quickly since the early 2000s. In 2005, the open-source RepRap and Fab@Home desktop 3-D printer projects established a hobbyist and home-use market. Now, instead of going to a store to buy an object made in a factory by injection molding, such as a funnel, a person might instead print it at home from a downloaded 3-D model.

Adam Clark, general manager at Tangible Solutions, knows firsthand how useful printing at home can be. “I make toys for my son all the time. I don’t think I’ve bought him a new toy in more than a year,” says Clark, adding that he even created a custom leg to replace one broken off of his son’s toy soldier.

Clark, who presented a session on additive manufacturing at CAMX 2014, thinks that the rising popularity of 3-D printing can be attributed to its commercialization and commoditization, making markets more consumer-driven. “Everyone can be a maker now,” he says. “Everyone’s got ideas about something, and now it’s actually realistic for someone to not have any engineering experience whatsoever, but still be able to print an idea and show it to people.”

Processes and Production Considerations

The overall process to 3-D print an object can be reduced to the basic steps of creating a CAD file, converting it to STL, transferring the STL file to the machine, preparing the machine, waiting for the item to print, then removing it and completing any post-processing by hand. This may be simple enough to do at home, but there are still numerous considerations to make before a manufacturer can begin printing.

The ease or difficulty of additive manufacturing varies for each project, says Chad Duty, group leader of Oak Ridge National Laboratory’s Deposition Science & Technology Manufacturing Demonstration Facility, who led a pre-conference tutorial on additive manufacturing at CAMX 2014. Off the bat, the manufacturer must make several decisions before the CAD file is created, including choosing the best machines and materials for the project that are compatible with one of many different additive manufacturing processes.

Most 3-D printers, especially hobbyist and consumer-oriented models, use fused deposition modeling, a special application of plastic extrusion. Duty says electron beam melting – a powder bed fusion technique – and direct laser metal sintering are two other popular options.

Properties such as layer thickness and support materials must also be considered before designing the object. Layer thickness affects the finished product’s resolution, accuracy and surface finish. Duty says that thinner layers are better and produce less of a “stair-step” effect in between. Any section of the design that abruptly hangs out from the rest requires a support material during printing, which could be powder, liquid or sacrificial deposit.

Where the process can get tricky is during post-processing, which involves removing any support material and sanding edges. “Sometimes [the support material] is powder that you can easily blow away, or sometimes it’s a brittle plastic that you have to...
physically break out,” says Duty. “If you’re making a part that’s really complex and you’ve got really tight corners that you need to get material out of, that becomes a challenge.”

Sanding the material may be needed, but Duty says that, again, it depends on the purpose of the part and the reasons post-processing is needed. “If [the reason] is not cosmetic, you only have to machine or finish the areas that have functionality,” he clarifies. “If you want it to be a cosmetic appearance, you pretty much have to do any exterior surface, and it can be time consuming.”

Additive manufacturing may not be well suited to certain projects. “There’s still a sticker shock,” Clark says. “People have a misconception that 3-D printing is extremely cheap, but not everything is that way.” Many who work with additive manufacturing processes note that there is a sweet spot where it’s most effective – creating complex parts in lower quantities. The more complex (or less solid) the object is, the faster and cheaper it can be made through additive manufacturing instead of subtractive manufacturing techniques, because the complete part will be created at once instead of having to remove and dispose of many different sized sections from a large slab of material.

Slower speeds and a discontinuous production process stand in the way of printing objects in larger quantities. “If you’re making 4 million parts this year, it’s really hard to do that with additive just because of the throughputs,” says Duty. “The machines aren’t available, and they don’t deposit [material] that fast.” Careful examination of the benefits and drawbacks is needed for each part or project.

Applications Forge Ahead

Although there are challenges to additive manufacturing, the potential is too good to pass up for many markets. Architects in Amsterdam are printing an entire house from bioplastics and a resin made with 80 percent vegetable oil. Additive manufacturing is taking off in the medical field as well. Louisiana Tech University is fabricating custom medical implants that biodegrade and release antibacterial and chemotherapeutic compounds. Likewise, the Auburn University College of Veterinary Medicine is among the first veterinary programs in the U.S. to use 3-D printing and models to prepare for complicated surgeries by modeling parts of the body that will undergo surgery.

While much of additive manufacturing is currently focused in metal, its presence is growing in the composites industry. Stratasys uses 3-D printing techniques to build complex molds and mandrels for carbon fiber layups with water-soluble materials, so after the carbon fiber part is finished on the mold, the mold can simply be washed away. Two other groundbreaking applications include lightweight micro-composites developed by the U.S. Army Research Laboratory that soldiers can use to 3-D print devices as needed and the
first functional 3-D printed car built by Local Motors and Oak Ridge National Laboratory. (To read an article about the car, visit CompositesManufacturingMagazine.com and click on the Automotive link under the Market Segments tab.)

Perhaps the most exciting recent innovation in composite applications is MarkForged’s MarkOne, the first and only 3-D printer that prints continuous carbon fiber strands. Other composite 3-D printers use chopped or discontinuous carbon fibers, which are not as strong as the continuous strands of carbon fiber, fiberglass, Kevlar, nylon and polylactic acid that the MarkOne can print.

Parts printed on the MarkOne can be as large as 12 x 6¼ x 6¼ inches and are designed to be stronger than 6061-T6 grade aluminum by weight and up to a third of the strength of carbon fiber composites, according to the company. Manufacturers can make parts on the MarkOne more cheaply than traditional methods because the printer’s blend of thermoplastics immediately hardens during printing without vacuum bagging, post-curing or wasting material.

Greg Mark, CEO of MarkForged, thinks his company’s product has the potential to expand the use of composites in additive manufacturing. “You can take carbon fiber and sell it at a reasonable rate… so it [becomes] attainable to a much wider engineering audience,” Mark says.

Also appealing to a wider engineering audience is the printer’s accompanying software. With it, users can simply run an algorithm to add a sandwich panel to their design, instead of requiring the user to understand sandwich panels and build the panels into the design themselves. “You can spend more time designing and engineering and less time having to figure out tooling,” says Mark. “It gets you your prototype or your final product much, much faster.”

Duty drove home how 3-D printing can speed up a project with custom parts with an anecdote shared during his CAMX tutorial. He described how Oak Ridge used additive manufacturing to help create a custom tool for the Cherry Point, N.C., Fleet Readiness Center in less than a week and for a few thousand dollars, a stark contrast from the four months and $50,000 that would have been required to obtain the tool through traditional processes.

Though additive manufacturing is not a silver bullet for all manufacturing projects, its massive potential in all markets and commercial appeal are changing the face of manufacturing and redefining what is possible to create. Looking ahead, Clark is particularly excited about bringing 3-D printers into outer space and what that could mean for both the future of space travel and 3-D printing itself. “I think people are starting to associate 2-D drawings with theory and 3-D printed parts with reality,” he says. “Additive is getting a lot of hype. A lot of that is deserved, though it is probably a little over-hyped in certain areas,” muses Duty. “But I would say that additive is here to stay.”

Mary Beck is the communications coordinator at ACMA. Email comments to mbeck@acmanet.org.
Perhaps it’s a sign of increasing globalization, but ACMA’s recent regulatory work has taken a distinct international flavor. Our first globally sourced opportunity came by way of our boatbuilding colleagues, who called to tell us the Environmental Protection Agency (EPA) was planning to prohibit the use of HFC-134a, widely used as a propellant for polyurethane foam flotation systems in boats and for insulated panels in refrigerated trailers.

Montreal

The EPA’s planned action is part of its program under the Montreal Protocol, a 1987 treaty designed to phase out the production of HFC-134a and other hydrofluorocarbons (HFCs) that contribute to the destruction of the stratospheric ozone layer that shields the earth’s surface from harmful ultraviolet radiation.

HFCs are also potent heat trapping gases, and the EPA wants to prohibit or strictly limit the use of these compounds both to protect stratospheric ozone and to reduce climate change. But the agency recently proposed to eliminate use of HFC-134a by Jan. 1, 2017, much too soon to allow composites manufacturers to identify and fully qualify workable replacements.

In comments recently submitted to the EPA, ACMA argued our industry’s use of HFC-134a has the net effect of reducing the emission of climate warming gases because of the fuel savings accrued from the use of lighter and better insulated trailers. The association asked the agency to delay phase-out of this important substance until 2020.

Stockholm

Another call reached ACMA’s international switchboard from the U.N.’s Persistent Organic Pollutant Review Committee (POPRC). Convened under the 2001 Stockholm Convention, another international treaty, the POPRC identifies toxic substances that may accumulate in the environment, evaluates the availability of feasible alternatives, and then for each substance recommends either a complete phase-out, a limited ban, or, if there are no alternatives, no action.

The POPRC’s July 2014 risk assessment report for pentachlorophenol (PCP), a toxic and environmentally persistent substance widely used in the U.S. and Canada for the preservation of wood utility poles and railroad ties, included a lengthy evaluation of materials that may serve as useful replacement for treated wood in these applications. Unfortunately, the POPRC’s discussion on composite utility poles contained several critical misstatements.

In response, ACMA sent the POPRC information and references supporting the proven benefits and performance of composite utility poles and argued they are a feasible replacement for treated wood poles. A PCP phase-out recommended by the U.N. group may tip the large U.S. utility pole market in the direction of composites.

Rio de Janeiro

OSHA’s major 2012 update to its Hazard Communications System (HCS) is designed to harmonize U.S. requirements with the Globally Harmonized System of Classification and Labelling of Chemicals, developed by the Inter-Organization Program for Sound Management of Chemicals, a U.N. program created under a treaty signed at the 1992 Conference on Environment and Development in Rio de Janeiro.

We can debate the public welfare value of global harmonization and further question whether OSHA’s 2012 HCS contributes to it, but whatever its value, OSHA’s new regulation requires chemical importers, manufacturers, formulators (companies producing mixtures, like many paints and coatings, and unsaturated polyester resin), distributors and users to change over to an entirely new system for characterizing and communicating chemical hazard and safety information.

HCS-2012 requires suppliers to provide compliant new labels and safety data sheets for hazardous substances by July 1, 2015. (Users of chemicals — “employers” in OSHA’s vernacular — were required to train employees on the new label and SDS formats by December 2013.) For the most part, to properly characterize hazards on their own, SDS chemical manufacturers and formulators will rely on hazard characterizations provided by their suppliers via updated SDS. But formulators are not likely to receive updated SDS from their suppliers until just before the July 1 deadline for issuance of their own updated SDS.

To get composites material suppliers out of this catch-22, ACMA worked with a large coalition to delay the HCS-2012 compliance deadline for product labels and SDS. In its response to this effort, OSHA agreed that companies relying on suppliers for hazard information could continue to comply with the old 1994-HCS, as long as they were making good faith efforts to obtain HCS-2012-compliant information from suppliers and had written plans for updating labels and SDS when the information was obtained.

Information about ACMA’s portfolio of international (and U.S.) regulatory activity is available at acmanet.org/advocacy.

John Schweitzer is vice president of government affairs for ACMA. Email comments to jschweitzer@acmanet.org.
Seeking Nominations for the ACMA Board

Do you know someone who would be a good fit for the ACMA Board? Let us know! Please contact Tom Dobbins at t.dobbins@acmanet.org to nominate a new ACMA board member. The Board commitment is for three years and requires attendance at three board meetings each year. Joining the ACMA board enables executives to take an active role in helping to shape the future of ACMA and the composites industry.

Manufacturers Need Infrastructure Investment

A recent National Association of Manufacturers report reveals manufacturers’ competitiveness is at stake due to a lack of investment in our nation’s aging infrastructure. The report argues that a long-term investment is needed to increase jobs, grow GDP, provide a $3 return on investment for every $1 invested in infrastructure and provide Americans an increase in take-home pay after taxes. Composites manufacturers will take this message to their elected representatives during ACMA’s National Policy Summit, April 14-15 in Washington, D.C. For more information, visit acmanet.org/meetings.

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Recycling Committee Charts the Future

ACMA’s Green Composites Council – Recycling Committee is currently working on a project to develop a White Paper on the future of composites recycling and the role the composites industry should play to solve this problem. The Recycling Committee recognizes that future business could be dependent on materials that are recyclable and that the composites industry supply chain needs to work together to chart a path for success. To learn more about the White Paper or to join the GCC Recycling Committee, contact John Busel at j.busel@acmanet.org.

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

Industry Calendar of Events

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

January 20-21
Road Mapping the Future of Composites
Washington, D.C.

February 2-6
ACMA presents at World of Concrete
Las Vegas, Nev.

March 3-5
ACMA presents at the Lightweighting Summit
Detroit, Mich.

March 23-27
ACMA presents and exhibits at The International Plastics Showcase (NPE)
Orlando, Fla.

April 14-15
ACMA National Policy Summit
Washington, D.C.

April 23-25
ACMA presents at the ASCE Structures Congress
Portland, Ore.
Providing Building Products to the Federal Government

The General Services Administration (GSA) is considering the adoption of LEEDv4 as the “green code” to apply to all of the 9,600 federal buildings it manages. LEEDv4 discourages the use of building materials made using chemicals like styrene that are found on various toxic “red lists,” even if there are no exposures and no health risks associated with use of those materials in a building. The GSA is planning a public listening session to hear feedback from stakeholders such as manufacturers and suppliers of building components and materials. This session will be a good opportunity for ACMA members to encourage the GSA to focus on actual risk. ACMA would also like to educate the GSA that discouraging the use of products manufactured using many of the “red-listed” substances like styrene could actually result in the construction of buildings that are less sustainable. For more information, contact John Schweitzer at jschweitzer@acmanet.org.

ACMA Seeks Reduced Tariffs for Many Composite Products

At the invitation of the U.S. Trade Representative, ACMA is collecting nominations from industry members for a list of “environmental goods” that will qualify for reduced import and export tariffs under a World Trade Organization program. An initiative of the Obama Administration, the reduced tariffs should promote the global trade of products used to clean up or prevent pollution, including many composite products such as wind turbine blades, utility poles and water/wastewater treatment components. More information can be found on ACMA’s Government Affairs Blog at acmanet.org/advocacy/government-affairs-blog.
Green roofs can reduce heating and cooling loads on a building by 50 to 90 percent. Read about what makes composites the ideal material to support green roofs on page 10.

Most in-home 3-D printers use fused deposition modeling, a special application of plastic extrusion, but there are more than 16 types of additive manufacturing processes. To learn more about additive manufacturing, turn to page 24.

Technology research firm Gartner anticipates more than 1.9 billion mobile phones will be sold in 2015. Imagine what that could mean for manufacturers developing composite brackets for the phones! Companies in the consumer electronics market tell their stories on page 14.

More than 90,000 people pass through Union Station’s doors daily. Those traveling by bus from Washington, D.C.’s transportation hub may visit the new information and shopping pavilion, made from molded FRP. Read about the design, fabrication and installation on page 8.

Since 2007, Walmart has delivered 830 million more cases while driving 300 million fewer miles in its efforts to double fuel efficiency. As part of its strategy, the multinational retailer developed a concept tractor-trailer that’s nearly 4,000 pounds lighter than typical trucks. The article on page 12 provides an in-depth look at the vehicle.
CCP Composites is a global leader for thermoset composites. The company specializes in the development and production of unsaturated polyester resins, vinyl ester resins, gel coats and derivatives.

Present on four continents with manufacturing, commercial and R&D facilities, CCP Composites provides its customers with innovative and sustainable solutions, supported by its three centers of expertise in France, Korea, and the United States. Throughout its value chain, the company combines eco-design, quality and progress while protecting the environment, as a responsible company pioneering innovation.

For further technical & product information, visit www.ccpcompositesus.com
Please share with the entire Wisconsin Oven staff how satisfied Sewah Studios is with our new oven. Your product has exceeded our expectations in every way. I can now understand why Wisconsin Oven is said to be the best industrial oven manufacturer in the country. The grant procedures made this project a little out of the norm; however everything went on schedule and as planned; I attribute that to the fine folks at Wisconsin Oven. Again thank you and we look forward to working with you in the very near future.

Bradford Smith, President