2014 Activities Report

METYX®
composites

STRENGTH. SUPPORT. SOLUTIONS.

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Executive Letter

Dear Customers, Colleagues, and Friends,

Landmark Year

We are proud to report that 2014 was another double-digit year of growth for METYX Composites®. We had a significant increase in orders from wind energy OEMs and an upturn in business from the South American composites market, both of which contributed to an increase in sales.

Challenges and Rewards

Our biggest challenge was also our greatest achievement this year, as we launched our most recent business division, METYX Composites Hungary, which will be fully operational by the first quarter of 2015. Cross-cultural teamwork was one of the essential elements required to begin manufacturing outside our home country for the first time. We were delighted, but not surprised, to see how well our team adapted and excelled at this undertaking. We look forward to sharing exciting news about METYX Composites Hungary as the year progresses.

Expanding Production

2014 was a year of machine capacity increases at our Manisa, Turkey facility, where we invested in NCF production and core material kitting machinery, including new 5-axis CNC machines.

Pioneering Projects

Some of the project descriptions in this Activities Report provide details about our involvement in the South American market. Especially noteworthy is our recent work with MVC of Brazil. We see many of their endeavors as industry-leading projects that are revolutionizing the world of composites in South America.

Successful Summit

We were also pleased with the outcome of our most recent Composites Summit in October 2014. Now in its fourth iteration, our Composites Summit has become the go-to event for high-performance composites in Turkey. METYX Fourth Composites Summit was attended by 200 participants from 15 different countries. Our team received wonderful feedback about the event, which has inspired us to organize an even larger Summit in 2016.

Giving Back

In addition to our business activities, we also focused on giving back to the community this year, as in years past. We donated time, energy, materials, and funding to outstanding causes that reflect our brand values – both in Turkey and beyond. Our team embraced these social responsibility projects as a way of thanking the special, dedicated people who strengthen our communities.

Looking Forward

We are highly enthusiastic about all the opportunities that 2015 holds for our business and yours. We thank you for your continued support and look forward to another momentous year of serving you.

Best regards,

Uğur Üstünel
Co-Director
METYX Composites

Tunç Üstünel
Co-Director
METYX Composites

Day 1 – Composites Conference

METYX Fourth Composites Summit A Dynamic, Interactive Event

Comprehensive Three-Day Event

METYX Composites organized and hosted its signature event, METYX Composites Summit, in İstanbul, Turkey, October 22-24, 2014, in conjunction with event sponsors: 3A Composites, Composite Integration, DowAksa, Duratek, Scott Bader, and Turkish Composites Manufacturers Association. The event took place at the Radisson Blu Hotel & Spa, İstanbul Tuzla.

Now in its fourth iteration, METYX Composites Summit is the most comprehensive event for high-performance composites in Turkey. The Summit brings together industry leaders from across the globe to present and discuss the most innovative approaches to producing high-tech composites. A total of over 200 participants, presenters, and sponsors represented 15 different countries at the event this year.

METYX Fourth Composites Summit was unique in terms of breadth of content across industries where high-end composites are employed: marine, automotive, transportation, wind energy, construction and architecture, infrastructure, sports and leisure, and others.

The format of this three-day event was a one-day composites conference followed by two days of practical training (RTM and infusion). Participants were able to attend one, two, or all three days. The event was designed to be appropriate for newcomers to composites as well as for those who required advanced techniques in order to maximize their results.

Composites Conference

During the Composites Conference, attendees learned from industry experts about the latest proven production techniques via presentation of case studies and best practices. The presenters this year were all world-renowned companies and institutions: Arkema (France), Composite Integration (UK), eCon Engineering Kft. (Hungary), METYX Composites (Turkey), Onuk-BG (Turkey), Sarp Yacht (Turkey), Turkish Aerospace Industries (Turkey), and Walder Mader AG (Switzerland). Sponsors also exhibited commitment to the Turkish composites industry by showcasing their expertise and offering guidance at tradeshow-style booths during the event.

Composites Conference Highlights:

- Developments in Infusion Technology
- RTM Process and Tooling Strategies
- New Materials and Processes in Thermoplastic Composites
- Structural Use of Composites in Public Transport and New Solutions
- Case Studies for High-Tech Marine Composites
- Structural Analysis of Composites
- Use of RTM Process for Aerospace Structures
- Production Technologies of Railway Composites with FST Products

RTM School and Infusion Training

Both the RTM School and Infusion Training were led by METYX Composites' long-time partner, Composite Integration. UK-based Composite Integration is a world leader in the development of equipment for feeding resin directly into infusion processes.

The RTM School consisted of a mixture of theoretical and practical work covering the vacuum RTM process. Practical demonstrations of the process were interspersed with presentations illustrating the key process parameters, including tooling design and construction, materials, injection and vacuum equipment, and process control.

Infusion Training provided theoretical work as well as hands-on practice. Starting with the basic principles of vacuum-bag infusion, the presentations covered the main elements of the process, including materials options, bagging techniques, and process control.

RTM School and Infusion Training Highlights:

- Practical demonstrations and training in RTM and infusion
- The latest in RTM and resin infusion technology – invaluable for newcomers and experienced molders
- Theoretical training combined with practical demonstrations
- Process techniques and troubleshooting
- Case studies illustrating industrial applications
- Overview of mold design
- Overview of mold construction and mold building materials

All training sessions and workshops were videotaped to help facilitate attendee learning and retention long after the event. There were also no restrictions on attendees photographing and videotaping the event.

Company News

Day 2 – RTM School

Day 3 – Infusion Training

JEC Europe 2014

Trade Shows

METYX Composites was an exhibitor at the following trade shows in 2014:

- **JEC Europe 2014**
  (Paris, France)
  March 11-13

- **WindEnergy Hamburg 2014**
  (Hamburg, Germany)
  September 23-26

- **Composites Europe 2014**
  (Düsseldorf, Germany)
  October 7-9

- **CAMX 2014**
  (Orlando, FL, USA)
  October 14-16

- **Feiplar 2014**
  (São Paulo, Brazil)
  November 11-13

- **METS 2014**
  (Amsterdam, Holland)
  November 18-20

- **Wind Turbine Blade Manufacture 2014**
  (Düsseldorf, Germany)
  December 1-3

WindEnergy Hamburg 2014

Composites Europe 2014

Increasing Revenue with RTM SKIN Technology

MVC, a division of Empresas Artecola and Marcopolo, is a Brazilian leader in the development of solutions in engineering plastics. Two years ago, the company made strategic plans to increase its revenue 300 percent in the wind energy sector by 2015 and is on target to reach this goal. Part of that revenue came from supplying 300 complete sets of nacelles (body) and windmill spinners (nose) in 2014 for the construction of new wind farms in Brazil.

The company's robust growth in this sector is due to the development of a new technology for production of parts – RTM (Resin Transfer Molding) SKIN. This method replaces the infusion process and is ideal for large parts. In RTM SKIN, a silicone skin is used as a counter mold. The injection lines are in the counter mold, which is flexible, thereby making it possible to tightly compress the compound and ensure the high glass content required for wind energy parts. The vacuum is introduced into the injection lines without using hoses, peel-ply, breather fabric, or vacuum film. The elimination of this auxiliary material yields a more sustainable alternative that reduces costs and labor. A part that previously took eight hours to manufacture by the traditional infusion process now takes just one hour to manufacture with this new method.

METYX Composites supplies the specialty multiaxial reinforcements for the nacelles in this ambitious ongoing project and is honored to help MVC as they move toward their targeted revenue goal.

Composite Spinner

Alstom Offshore Wind Turbine

A Fresh Approach to Yacht Design

Named one of the world's 10 most influential living architects by Forbes magazine, Greg Lynn of Greg Lynn Yacht embarked on the GF42 trimaran project with the goal of making it a high-performance racing yacht that stands apart from all others in its design.

"I've done some work in the boat industry over the past couple of years, and while it's very sophisticated in terms of analysis and construction, it's very backwards in terms of design," said Lynn. Working with a team of experts in yacht design, structural engineering, and computational fluid dynamics (CFD), Lynn set out to make some significant changes.

The GF42 racing trimaran is unique in many ways. One of the most distinctive aspects of its design is that styling, commonsense assumption, and precedent were used initially and then verified through a CFD environment. Aerodynamic analysis was used to examine flows across the sails, and hydrodynamic analysis was implemented to show how the trimaran would move through the water. This digital analysis strongly influenced the design of the trimaran.

The use of cutting-edge software helped facilitate optimal communication of Lynn's design to the boat builder, Westerly Marine. In addition to producing traditional mockups, the software enabled him to create photorealistic visuals, which made the process faster and much less expensive. The design workflow was also greatly improved with the use of this technology. It allowed Lynn to cast shadows, change the lighting, and view reflections on his design while seeing the results in real time rather than by building a physical model.

The GF42 is 100 percent carbon fiber construction. METYX Composites supplied 300 gsm unidirectional carbon, 300 gsm carbon cloth, and 300 gsm +/-45 biaxial for this innovative trimaran. The advantageous strength-to-weight ratio of the carbon fiber helped keep the hull of the boat lightweight. The interior, consisting of a king bed, two twin beds, a seat, a galley, a head, and 10 shelves, weighs less than 80 pounds.

"Everyone from the sailing industry who's seen the GF42 has been shocked at just how different it is," remarked Lynn. The finished trimaran will be hitting the water in early 2015 with high performance to match its groundbreaking design.

> "Everyone from the sailing industry who's seen the GF42 has been shocked at just at how different it is."
>
> *— Greg Lynn, Gren Lynn Yachts*

Marine


GF42


GF42


GF42

All photos courtesy of Steve Lee/Westerly Marine.

Enviro400 Driver Area and Stairs

Transportation

Success with METYCORE MAX™

In 2014, Alexander Dennis Limited, the UK's leading bus and coach manufacturer, launched the new model of their successful Enviro400 double decker bus.

Their GRP parts supplier, Polkima, was involved in the design and production of internal GRP components, including the staircase leading to the upper deck. With close cooperation between Alexander Dennis and Polkima engineers, a design suitable for production in LRTM was achieved. This was not an easy task, as it had never been done before and still remains an industry first. The staircase also incorporates an air duct to deliver hot air from a heater housed within it to the top deck.

The steps also needed to be reinforced with a suitable, high-performance core material. "METYCORE MAX proved to be the best solution," stated Anthony Gallia, Founder, Polkima Glass Reinforced Plastics. "METYCORE was already the reinforcement of choice for the part, and combining it with METYCORE MAX on the steps resulted in a part that satisfied the design criteria and also proved to be more controllable in production than conventional core materials," concluded Mr. Gallia.

Enviro400

Breakthrough Architecture

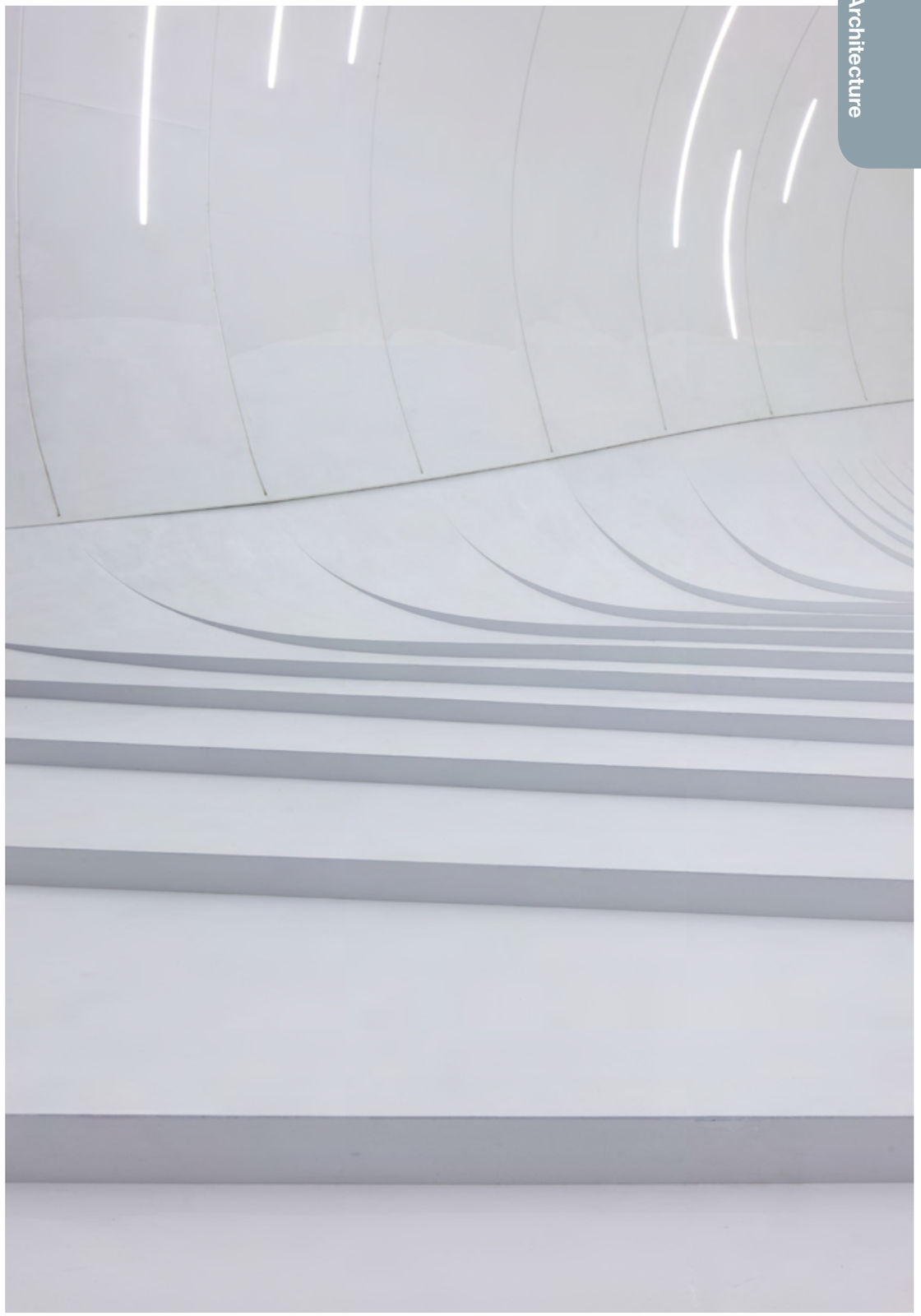
The Heydar Aliyev Center is a 619,000-square-foot internationally acclaimed architectural masterpiece in Baku, Azerbaijan. The Center, with its innovative, cutting-edge design, has become the signature landmark of modern-day Baku. The structure's distinctive architecture eschews sharp angles in favor of flowing, curved shapes. In fact, not a single straight line was used in the Center's design. The Heydar Aliyev Center houses a museum, conference hall, and gallery hall. It plays an integral role in the intellectual life and redevelopment of Baku.

Sazcılar Otomotiv of Bursa, Turkey was the contractor hired to build the highly complex stair structure in the Heydar Aliyev Center. One of the main reasons Sazcılar was chosen is that it has a wide range of application knowledge and extensive experience in materials, fabrication methods, and systems for combining composites with other materials. With four main production facilities and a staff of 530 people, Sazcılar Otomotiv has been providing customers in various industries with state-of-the-art composites solutions since 1987. The company's main production areas include: automotive, railway, bus, truck, construction, and architecture.

Sazcılar Otomotiv successfully delivered the highest quality work, meeting all deadlines despite being given a very tight schedule for building the composite structure. METYX Composites supported Sazcılar by providing the PET foam and specialty non-crimp reinforcements that the unique structure required.

> "We are thrilled to have been selected as one of the suppliers for this exceptional project. It gives our team great pride to have contributed to the construction of a structure that has been widely recognized for its architectural significance."
>
> *– Bahattin Şendoğan, Sales Team Leader, METYX Composites*

Architecture



Stair Structure in the Heydar Aliyev Center

Composites Revolutionize Construction

MVC, a Brazilian company internationally recognized for its innovation in the engineering plastics segment, has developed a groundbreaking technology called Wall System, which is revolutionizing the construction industry in Brazil.

Wall System is a technology that uses composite profiles (produced by means of the pultrusion process) and sandwich-type panels made of fiberglass-reinforced composite sheets with special composite cores. Wall System delivers significant advantages over the traditional building process, including: greater construction speed; increased durability, strength, and flexibility; excellent thermal and acoustic performance; improved fire resistance; a cleaner work environment; and zero waste.

Since 2004, MVC has had the approval of Caixa Econômica Federal (the bank responsible for financing affordable housing in Brazil) for the application of Wall System in Brazil's housing sector. In addition to applying it in the construction of houses, MVC extended usage of the system to schools and daycare centers. In 2013 alone, more than 100,000 square meters of houses and schools were constructed in Brazil using Wall System.

The advantages of this progressive technology have been proven in real-world applications since the project's inception over a decade ago. As an example of the product's performance, in 2011-2012, 35 schools in 12 municipalities in the state of Alagoas, Brazil were destroyed by heavy rains and rebuilt in record time using Wall System. The system facilitated the rapid return of students to classrooms that met high standards of comfort, quality, and safety.

METYX Composites supplied the RTM reinforcement, METYCORE, for the Wall System in the construction of numerous Brazilian schools in 2014. METYCORE consists of an engineered core sandwiched between two layers of chopped strand mat, which helps the resin traverse the laminate with maximum speed and precision, making it ideal for large-scale projects like Wall System.

> "METYX Composites is proud to be a supplier to MVC as they expand operations to meet the demand for this innovative product, which has proved capable of helping entire communities of people in need of housing and schools."
>
> *– Uğur Üstünel, Co-Director, METYX Composites*

Construction

School Constructed with Wall System

Sponsorships

MSSK Water Polo Team

New Turkish Water Polo Team Makes History

In 2011, when Uğur Üstünel, Co-Director of METYX Composites, first came to Manisa, Turkey, the site of METYX Composites' new manufacturing facility, he noticed an absence of organized watersports activities in this city of more than one million inhabitants. Üstünel has been involved in the water polo community in İstanbul for over 20 years. He played for the Turkish national team during his youth and later served as Director of National Teams in the Turkish Water Polo Federation. With his strong background as a player and an organizer, he set out to make watersports more prominent in Manisa.

The goal was to foster the development of water polo and swimming in Manisa by starting a youth-centric watersports club, which would include a water polo team. Forming the team was a challenge because there were no water polo players in the community at the time. Drawing upon his water polo experience and his new ties to the city of Manisa, Üstünel asked family members and close friends to join him in founding Manisa Su Sporları Kulübü (MSSK), The Manisa Watersports Club, in 2012. He then invited former teammates throughout the country to become the initial players on Manisa's new water polo team.

The MSSK water polo team began training at local pools. It was an unusual group in that some members were active water polo players while others, including Üstünel himself, had not played the sport competitively in years. The team trained together for a solid year. They competed for the first time in the third division of Turkey and managed to win that division's 2012 championship.

In 2013, a number of younger but equally talented players joined the team, which competed in Turkey's second division and won the championship – a second consecutive division victory for the team.

By its third year, MSSK was training younger players and helping them move up to the senior-level team. The team's success had generated a lot of buzz in the water polo community, which attracted players from different parts of Turkey. Among the new players were the captain of the national team and three of his teammates, who left their club to become part of the MSSK team and mission.

In 2014, MSSK was in the first division in Turkey. The team qualified for the playoffs and finished in fourth place in the country. This was the only time in Turkish water polo history that a recently founded team had managed to climb into the first division in just three years and finish in fourth place!

The club's future plans include building an Olympic-sized pool in Manisa to help train youth. As part of its mission, MSSK aims to develop Olympic athletes (both men and women) to represent Manisa in watersports.

As a founder and sponsor of this club, METYX Composites firmly believes the mission of MSSK is attainable and that the sky is the limit for this new team. "A keen focus on the right vision and values combined with dedication and training will help us achieve our goals," commented Üstünel. "We are proud to bring water polo to Manisa and could not be more pleased with MSSK's achievements to date," concluded Üstünel.

Renovated Classroom Brings Hope

ZİÇEV is a foundation for the training and protection of children with mental disabilities. Its primary mission is to provide education, rehabilitation, and care for the mentally handicapped, helping them to take full advantage of opportunities under the current law. The organization offers a wide range of services to assist this population in developing job skills, gaining employment, and becoming self-sufficient, productive individuals.

Originally established in Ankara in 1982, today the organization has 14 branches and 300 staff members who assist over 2000 individuals and their families. One of these branches is in Manisa, Turkey, the location of METYX Composites' new manufacturing facility.

Since 2013, the Manisa branch of the foundation has operated a 50-bedroom nursing and rehabilitation center for children. The projects there have been supported by several sponsors that have renovated the classrooms, dining halls, medical facility, and sports center. To assist this dedicated organization in its tireless efforts, METYX Composites sponsored the complete renovation of a classroom, providing all necessary equipment and infrastructure.

"The ZİÇEV foundation needs ongoing support. We encourage our partners and clients to contact us or ZİÇEV directly to help assist those in need," urged Mr. Üstünel.

"ZİÇEV has been making a difference in the quality of life for people with disabilities every day. METYX Composites commends their work and their leadership, which serves as an example of the positive impact we can make on our communities."

– Erol Üstünel, Honorary President, METYX Composites

ZİÇEV Classroom

Hidroist

Fuel Cell Car

İstanbul University's Hidroist team, founded in 2011, has been working on hydrogen-powered vehicles with the purpose of exploring renewable fuel sources. The team's vehicle is powered by hydrogen fuel cell technology, which produces only water as waste and does not pollute the environment.

The Hidroist team has been successfully competing in The Tübitak (The Scientific and Technological Research Council of Turkey) Alternative Energy Car Race since 2012. In this year's race, held in August 2014 in Körfez, Turkey, the Hidroist team took first place for efficiency in the category of hydrogen-powered vehicles.

METYX Composites provided the Hidroist team with foam and vacuum consumables (peel ply, flow mesh, and breather) for their latest vehicle. This material was used in the construction of the vehicle's chassis. METYX Composites is proud of the Hidroist team's accomplishments in the research and development of new vehicle technologies using renewable fuels.

Solar Car

The İstanbul Technical University (İTU) Solar Car Team builds high-tech solar cars to explore ways of reducing carbon emissions. They have designed and built seven cars to date. The team's latest vehicle, Arıba VII, recently competed in the prestigious Tübitak Formula G Solar Powered Car Races, securing second place.

As a platinum sponsor of this vehicle, METYX Composites produced the team's molds and the car's carbon fiber shell and chassis. "METYX Composites congratulates the İTU Solar Car Team on their accomplishments and exploration, which help to raise awareness for alternative fuel sources," commented Uğur Üstünel, Co-Director, METYX Composites.

Ariba VII

Photo courtesy of Polkima.

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