ADVANCED FIBERGLASS INDUSTRIES

CUSTOM BUILDERS WITH COMPOSITE MATERIALS

ADVANCED FIBERGLASS INDUSTRIES DUBAI

www.afi.ae

ADVANCED FIBERGLASS INDUSTRIES IS A PROUD ISO 9001:2015 CERTIFIED COMPANY.

HSE

TÜVRheinland®
CERTIFIED

Management System
ISO 9001:2015

www.tuv.com
ID 9108639889

COMPANY INTRODUCTION

Established in 1997, our company leverages over 25 years of global knowledge and manufacturing experience in composite components. Our vision is to create lightweight components that deliver an unparalleled level of product quality while showcasing internationally renowned expertise in advanced composites construction. Operating across a diverse range of industry sectors, we have earned the distinction of being the preferred partner for clients, including international architects, military entities, and leading marine companies.

Based in Dubai, our headquarters boasts a 55,000 sq.ft facility in Alquoz 2, equipped with a highly skilled technical team and operators. Additionally, AFI maintains a separate 18,000 sq.ft warehouse in Umm al Quwain. On-site, we have a fully climate-controlled and safety-compliant cleanroom, a paint booth, a post-curing oven, and sandblasting facilities.

Our corporate team functions on-site and comprises design engineers, project managers, purchasing specialists, finance professionals, HR personnel, HSE (Health, Safety, and Environment) experts, and the marketing department.

We are confident that Advanced Fiberglass Industries is well-equipped to handle the manufacturing, repair, and supply of fiberglass-related products with expertise

Established	Clients	Employees
1997	+300	+140

AFI 's Mission and Vision

Mission

To be the preferred provider regionally, delivering turnkey composite structures for complex applications, whilst striving to create a global footprint.

Vision

To become the top provider for turnkey composite applications.

- Exploring all markets and pursuing new opportunities and innovations for composite materials
- Continue and exceed the highest levels of quality, delivery performance, value and integrity to our clients.

ISO Certificate

Certificate

Standard **ISO 9001:2015**

Certificate Registr. No. **01 100 1722566**

Certificate Holder: **Advanced Fiberglass Industries**
Plot No: 0365-0247,
PO Box-32278, Street # 35B,
Al Quoz Industrial Area,
Dubai,
United Arab Emirates

Scope: Manufacture of Fiberglass, GRP and Epoxy Composite Products

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: The certificate is valid from 2023-11-09 until 2026-11-08.
First certification 2017

2023-11-09

TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

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Fire Certificate

ESL

مختبر الإمارات للسلامة
EMIRATES SAFETY LABORATORY

ESLGlobal.com

CERTIFICATE OF CONFORMITY

Certificate number: **ESL-23-11569**

Issue: **01**

Pursuant to provisions of the Certification scheme on Global Conformity Certification of fire and life safety products (CS-GCC, scheme type 5), Emirates Safety Laboratory hereby grants this certificate of conformity to the product described below:

Glass Fibre-Reinforced Plastic (GFRP) panel as a product.
Glass Fibre-Reinforced Plastic (GFRP) panels in External Wall System / Assembly.

Placed on the market under the name or trade mark of:

Advenced Fiberglass Industry.
Street 35b, Al Quoz Second Industrial Area,
Dubai, United Arab Emirates (UAE).

Manufactured in the followieg location(s):

Advenced Fiberglass Industry.
Street 35b, Al Quoz Second Industrial Area,
Dubai, United Arab Emirates (UAE).

Complies with the requirements of the standard(s) as detailed below:

NFPA 285 - 2023 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.
EN 13501-1:2018 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.
ASTM D1929 - 23 Standard Test Method for Determining Ignition Temperature of Plastics.

The certificate was first issued on **30 November 2023** and remains valid under the condition that the Certificate Holder fulfils the requirements of the agreement on certification supervision no. **0163/ESL/GCC/2023.**

Signed for ESL	Tomasz Kiełbasa	30 November 2023	29 November 2026
	Certification Manager	Date of issue	Expiry date

This Certificate remains valid till date stated above, unless suspended, withdrawn or terminated. This certificate will not be valid if the manufacturer makes any changes affecting product conformity, which have not been notified to, and agreed in writing with ESL. This Certificate is an electronic document and shall not be reproduced (in any form) except in full. Certificate holder is under an obligation to make references to issued certificate only in conjunction with product(s) that conform to evaluated product construction. Prior to use of this certificate, please verify its validity in ESL directory.

Emirates Safety Laboratory (ESL)
240 Al Awir Road, Warsan 3, Mushrif, Dubai, United Arab Emirates
T: +971 4 520 1800, E: ask@eslglobal.com

IAF

Page 1 of 5

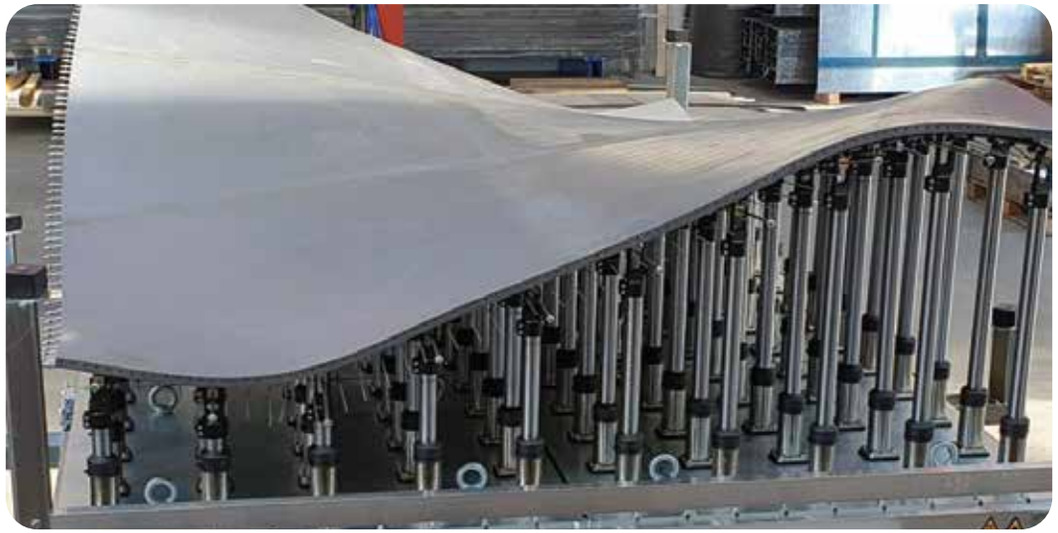
ESL

AFI’s Environmental and Sustainable Construction Methodology

Advanced Fiberglass Industries aspires to minimize its impact on our environment and maximize the effective use of resources. We strive to achieve this by increasing communication and awareness of our efforts in accordance with this policy and fostering responsible environmental behaviour amongst staff, visitors, and users at all level.

Adapa is built on the foundation of reusability, and AFI will continue to strive to incorporate this belief into everything that we do.

ADAPA



“AFI is currently a pioneer in the gulf region, utilizing an innovative and environmentally friendly technology called adaptive molding. This technology enables the production of highly complex fiber shapes with exceptional precision while minimizing waste”.

Our Facilities

AFI boasts an on-site, fully climate-controlled cleanroom, along with post-curing oven and sandblasting facilities. Our operations are situated in the United Arab Emirates, with two manufacturing units: a 55,000 square-foot facility in Al Quoz 2, Dubai and an additional 18,000 square-foot warehouse in Umm al Quwain.

CNC - KUKA ROBOT

KUKA provides the capability to seamlessly incorporate standardized systems and components into tailor-made production processes, accommodating up to 15 linear meters in length. AFI leverages advanced CNC machining techniques to create exceptionally precise plugs and molds for composite structures and components. This is made possible through the utilization of various composite mold-making materials, with the support of a flexible, rail-mounted KUKA robot.

CNC - Machine

- The utilization of FlexiCAM's 5-axis machining centers by AFI represents a groundbreaking technological advancement that has revolutionized the field of precision manufacturing. These machines offer remarkable precision, versatility, and efficiency, rendering them indispensable in the production of precise molds and plugs for composite components within industries such as aerospace, automotive, architecture, and others.
- AFI's adoption of FlexiCAM's 5-axis machining centers has revolutionized precision manufacturing, offering unparalleled accuracy and versatility. These machines are crucial for creating highly precise molds and plugs in industries such as aerospace, automotive, and architecture.

Specializations

Advanced Fiberglass Industries (AFI) is a UAE based supplier and manufacturer of advanced composite components for Architectural Design, Theming, Transportation and Military markets.

Architecture Exteriors

Automotive & Marine

Architectural Interiors

Military

Architectural Interiors

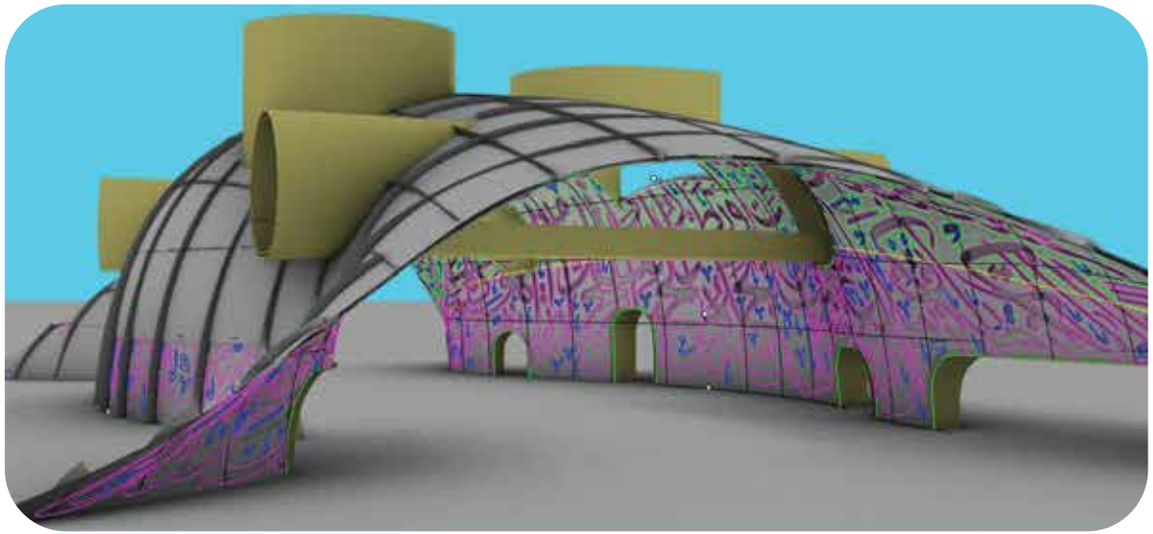
‘The wonders of the composite materials’

Evolute - Burj Khalifa

Switch Restaurant - Mirdif

Switch Restaurant - Dubai Mall

Museum of the Future Dubai, UAE



GRP Calligraphy Lobby Interior Panels

ASTM E-84 Class-A & EN13501-1 Class B

Total Area – 3200 m2

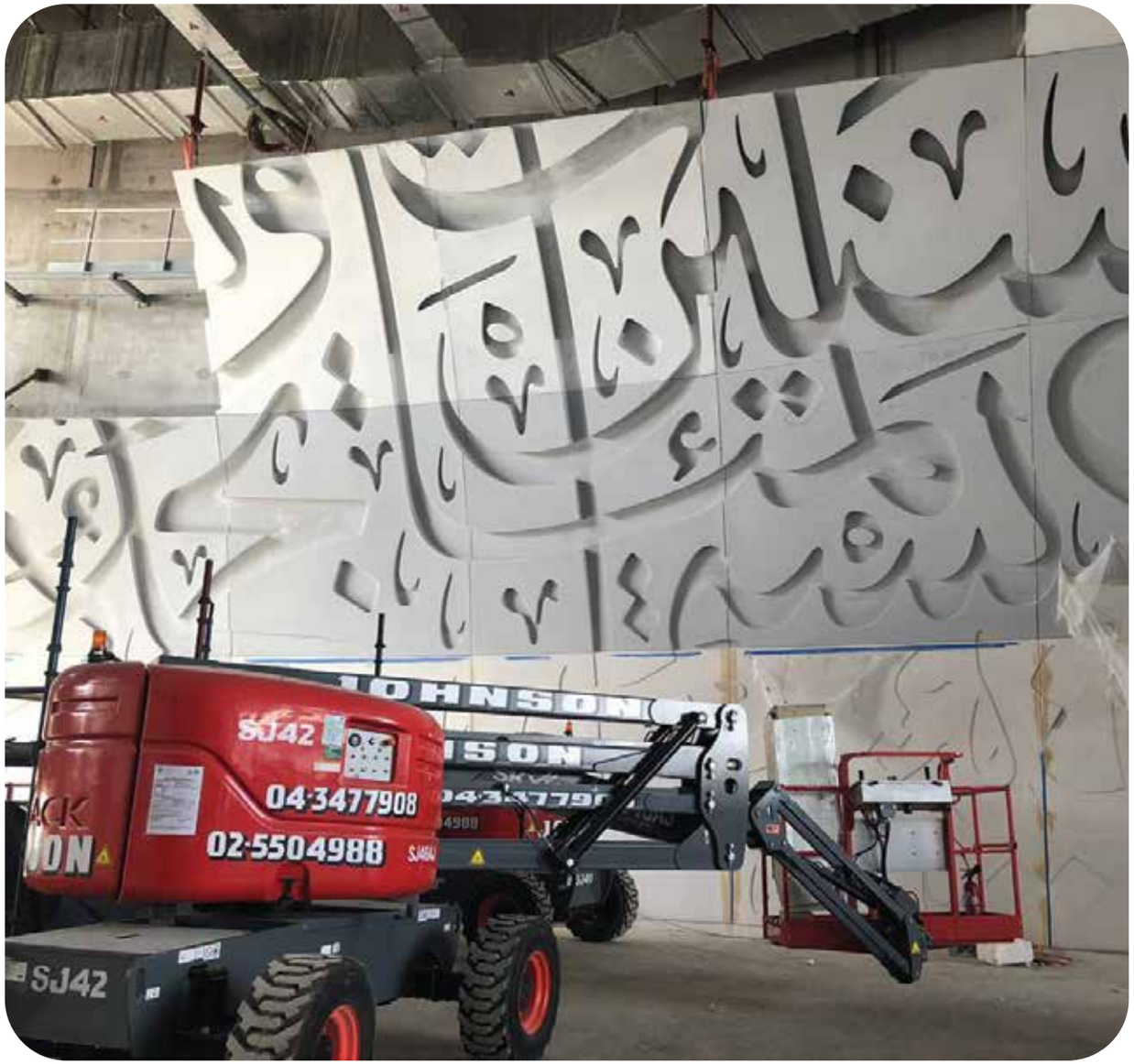
Panel Size – 3.5m x 3.5m

Total No.of Panels – 232 Nos

BIM played a large role in the process, from concept design to construction, and was used to produce all the drawings and in addition to Virtual Reality and real time rendering programs performed coordination and clash detection between all design and engineering disciplines.

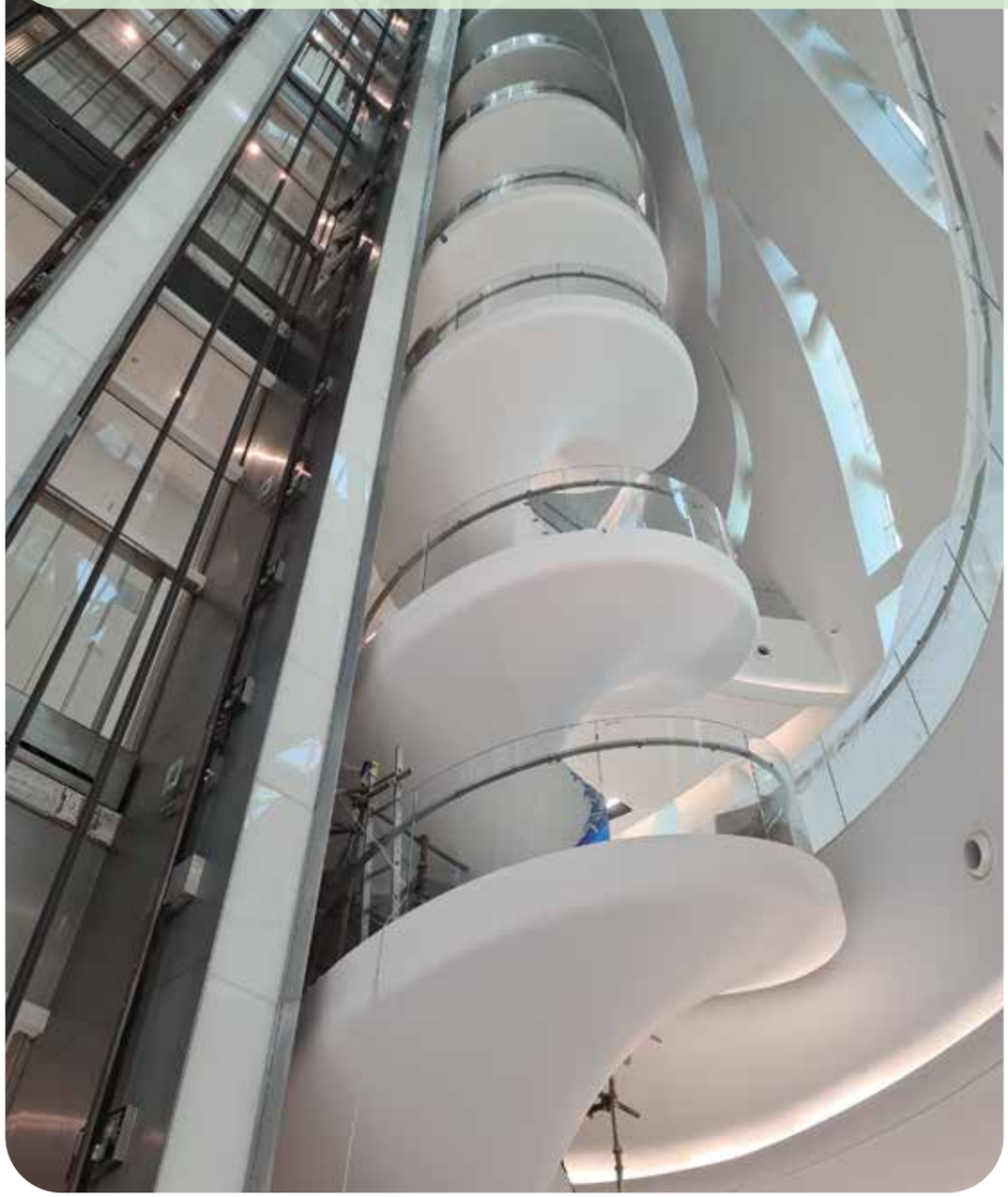
AFI's IRATA Level 2 installation team installed the panels on-site and

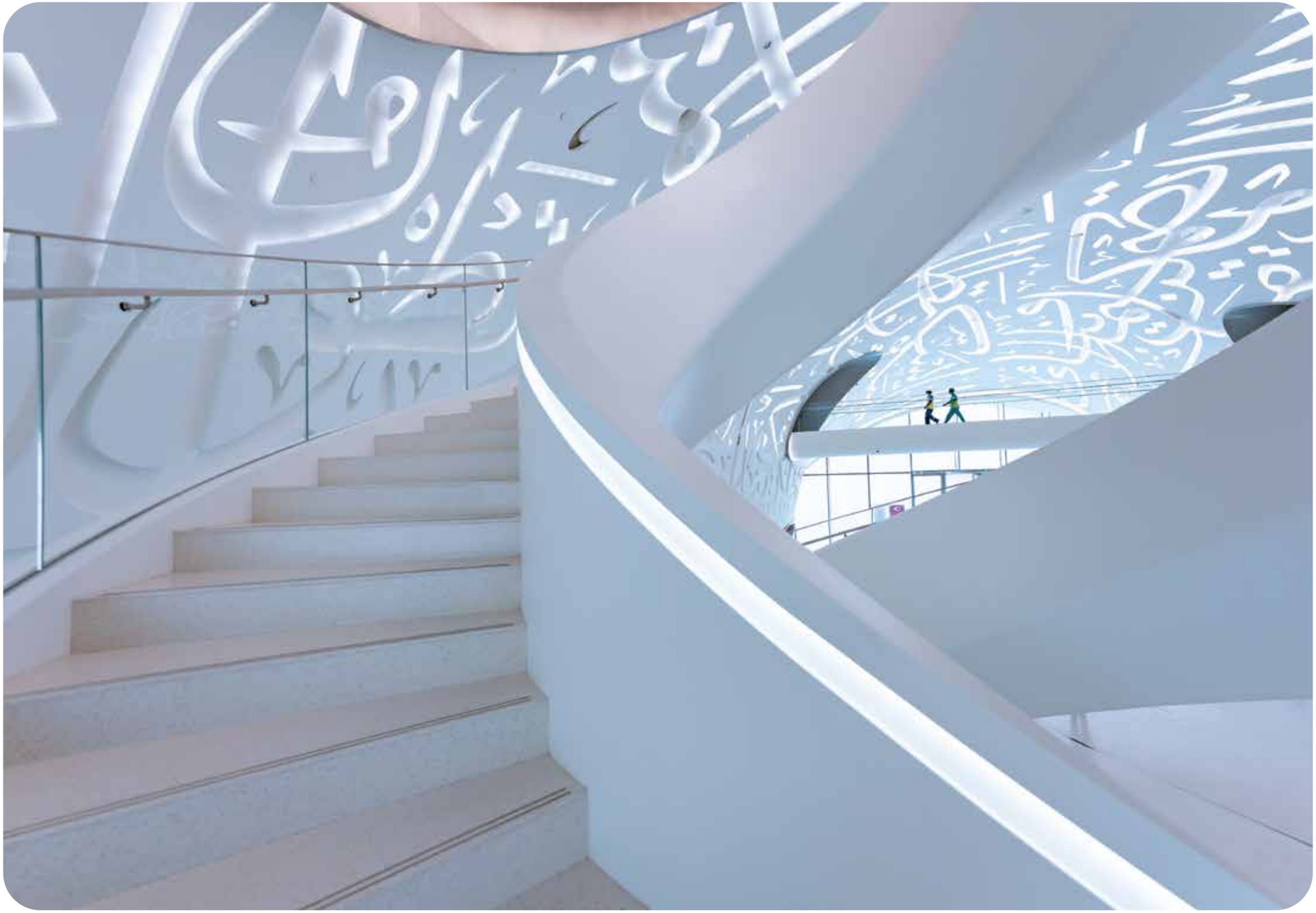
made seamless joints before final painting.

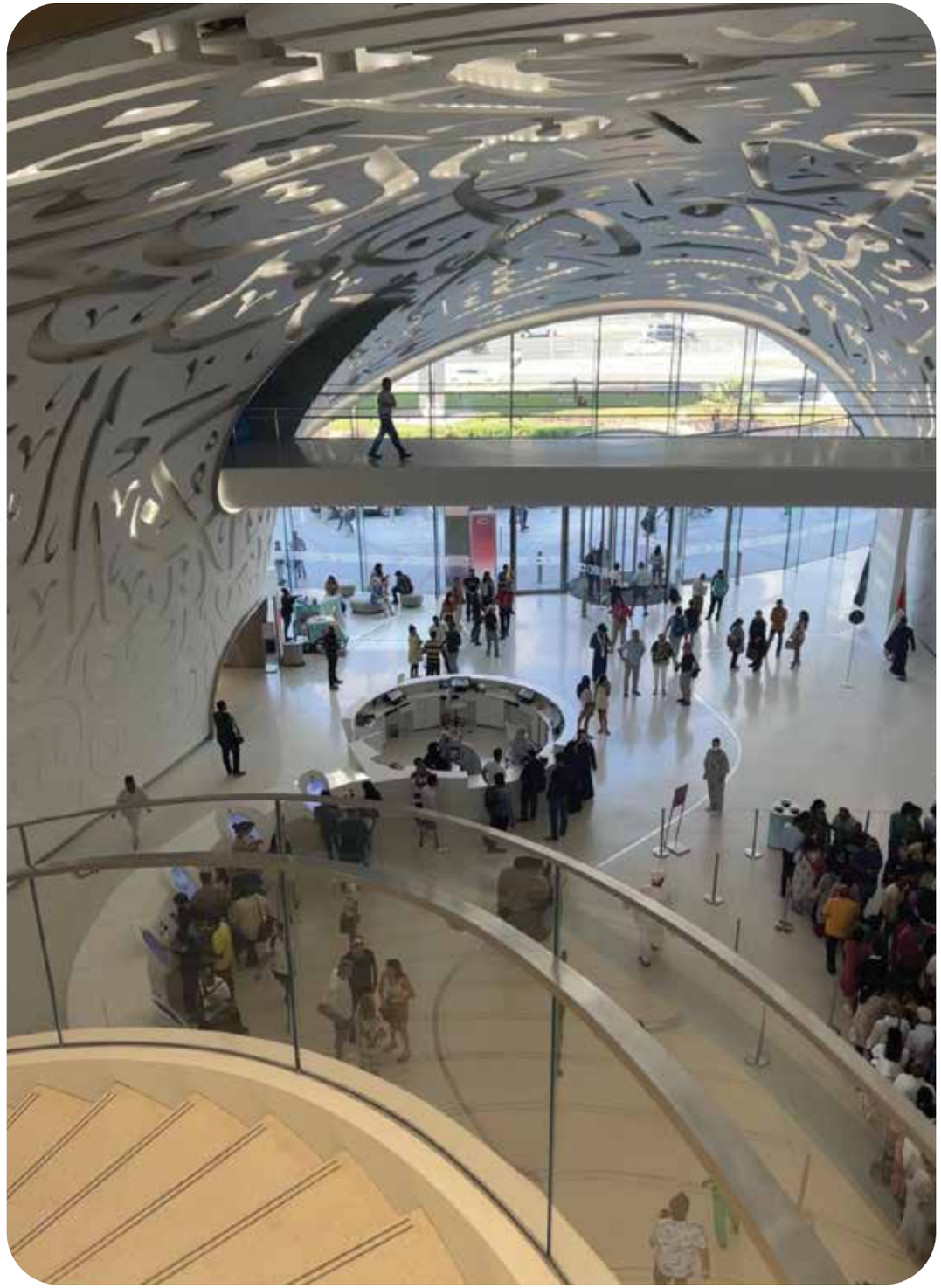


This double-helix spiral staircase was inspired by the human genome as a complimenting design that is timeless.

This absolutely astounding GRP Cladding was manufactured and installed by AFI in the Lobby as well as on levels 1 through 7.







Curved calligraphy panels, double helix stairs

AFI supplied 7,700 square meters of complex-curved, glass fiber/epoxy panels for the wall, ceiling and spiral staircase cladding in the Museum of the Future's lobby.

Source (all images) | Advanced Fiberglass Industries

Composites enable epic interior for Museum of the Future

For this one-of-a-kind lobby, AFI pioneered digital, reconfigurable molds to achieve organic-shaped, multifunctional panels and stairwell cladding.

By Ginger Gardiner / Senior Technical Editor

» The Museum of the Future (MOTF, Dubai, United Arab Emirates) is one of the most complex and challenging projects in modern architecture. Opened in February 2022, it is described as "the most beautiful building in the world" by His Highness Sheikh Mohammed bin Rashid Al Maktoum, who conceived the museum as an incubator for innovation and invention.

The museum features seven floors, each dedicated to a different exhibition space, as well as ongoing research and development (R&D) — for example, in sustainability, data science, health and well-being, bioengineering and other technologies that are not yet fully conceptualized.

CW wrote about the museum's multifunctional exterior in 2020 (see Learn More), but its interior lobby is also iconic and enabled by composites. DailyArt Magazine describes entering the spacious and impressive lobby as "an adventure." This unique experience is made possible by Dubai-based Advanced Fiberglass Industries (AFI), which was tasked with construction of the complete lobby façade, including the calligraphy-embedded ceiling and walls and cladding for its three spiral staircases, one of which extends up to the seventh floor. All told, the museum's interior consumes a total of 7,700 square meters of composites.

AFI also supplied 238 oval light structures for the parking decks. Like the exterior cladding, the interior panels feature Arabic calligraphy cutouts with inset LED lighting and also integrate sound dampening. They also are certified for fire resistance (FR) per ASTM E-84 class A and EN 13501 regulations — a challenge in itself.

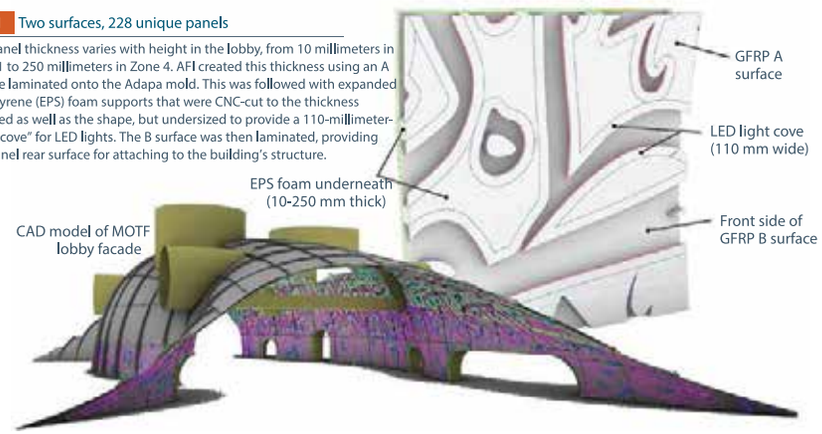
Key elements in overcoming these challenges include the use of Sicomin (Châteauneuf-les-Martigues, France) FR epoxy, Adapa's (Aalborg, Denmark) reusable, adaptive mold system (Learn More) and AFI's long history of developing innovative, cost-effective composite solutions for demanding projects.

Innovation in GFRP

Specializing in design and construction of composite components, AFI was established in Dubai in 1997 and has two production facilities of 55,000 and 15,000 square feet. "We can build to any specs and design requirements," says Majid Akram Chaudhry, general manager of AFI. The company's facilities feature a climate-controlled cleanroom, curing oven, paint booth, a CNC three-axis router and a KUKA (Augsburg, Germany) CNC seven-axis milling robot. The company primarily manufactures with hand layup and vacuum bagging, but also has developed these techniques for use with the Adapa mold system, discussed below.

FIG. 1 Two surfaces, 228 unique panels

The panel thickness varies with height in the lobby, from 10 millimeters in Zone 1 to 250 millimeters in Zone 4. AFI created this thickness using an A surface laminated onto the Adapa mold. This was followed with expanded polystyrene (EPS) foam supports that were CNC-cut to the thickness required as well as the shape, but undersized to provide a 110-millimeter-wide "cove" for LED lights. The B surface was then laminated, providing the panel rear surface for attaching to the building's structure.



AFI's operations are segmented into three specialties: military, automotive and architecture. Its innovation comes from decades of devising solutions for a range of composite components. For example, it has manufactured more than 1,000 glass fiber-reinforced polymer (GFRP) hoods for Dubai-based NIMR Automotive. "This is a 7-square-meter bonnet, which is bigger than that for a Hummer," says Chaudhry. "We work with NIMR to design products such as fenders, dashboards and consoles for military vehicles." AFI has also designed and built body panels, doors, dashboards, fenders and bumpers for concept and small-series production cars, trucks and recreational vehicles.

In architecture, AFI has built the 26-meter-diameter sphere atop the 15-story Ministry of Foreign Affairs building in Ashgabat, Turkmenistan, and 7,000 square meters of panels for the 75-meter-high dome for the Center of Islamic Civilization in Tashkent, Uzbekistan. AFI has also constructed curved restaurant interiors and spiral staircases, as well as unique structures such as the crushed granite gel-coated Evolutes sculpture by Karim Rashid, showcased in the Armani suite of the renowned Burj Khalifa hotel in Dubai (see p. 48 Post Cure column in CW's February 2022 issue).

Redesign with FR epoxy

The original design for the MOTF interiors specified use of an FR vinyl ester resin, explains Chaudhry, "but that was too heavy." Marc Denjean, export manager for Sicomin, had met AFI during an architecture and construction show in Dubai. "We introduced the idea of using an FR epoxy resin," he says, "which also offers almost no shrinkage, making construction and installation of these complex panels easier. However, the budget for the project was based on much cheaper resins." The increased cost was indeed an issue, admits Chaudhry, "but the epoxy also would enable cutting the weight of the panels by half. We also had ideas about how to save costs during manufacturing [see "Adaptive molds" p. 44]. So, we proposed this new epoxy-based design to Killa Design, and they approved the change." Killa Design is the local architecture studio in Dubai responsible for the MOTF design, including oversight of construction details.

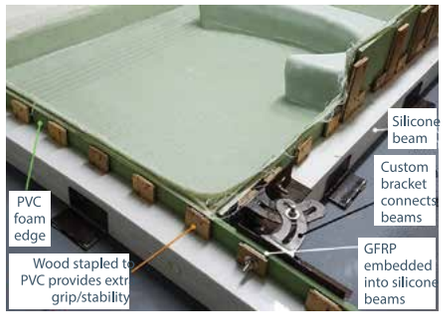
AFI applied two Sicomin epoxy systems, both using intumescent technology as well as FR additives, though not based on aluminum trihydroxide. "The technology that we used allows much higher FR content and performance in order to meet the requirements of the ASTM E-84 and EN13501 regulations demanded by this project," explains Denjean. "The main fire resistance was achieved by using SGi 128 bio-based FR epoxy gel coat. The second tier of protection was SR 1122 FR hand-laminating resin, which has a low viscosity of 500 millipoise at 25°C — about half that of a conventional FR epoxy hand lamination resin."

AFI used this system with a laminating machine to wet out 800-gsm glass fiber quadraxial fabric from Metyx Composites (Istanbul, Turkey) that was then applied to the Adapa molding system using a small team of laminators. For Sicomin, one challenge was to modify the epoxy hardener formulation to be slow-reacting for making such large panels.

"The laminators needed sufficient pot life before gelling, but then sometimes, the laminators needed to go faster for smaller panels," notes Denjean. "So, we had to make a fast and a slow hardener for the laminating resin and then also be able to mix these for an intermediate gel time, in order to accommodate AFI's production needs. We customized this for them, and it took some months to set up, because we had to test these different systems, qualify them and »

1 CNC-cut foam placeholders were laid onto the curved Adapa mold to produce the panel's A surface that visitors see.

3 CNC-cut EPS foam supports were bonded onto the cured A surface laminate and coated with a light GFRP laminate.



2 Close-up of the system used to mold flanges on all four panel edges.

4 The final B surface laminate was applied on day three and room-temp cured, followed by a final heated post-cure.

5 Completed panels — with finished A surface (top) and B surface (bottom) — were demolded and shipped to the MOTF site for installation.

6 Finished panels were bolted to each other and to the steel brackets attached to the building structure.

7 Panel joints (clearly visible here) were filled with FR epoxy adhesive, overlaminated and ground smooth before the final coat of paint was applied and LED lights were installed.

fire-test them. After this was completed, however, production ran very quickly." The project used roughly 130 metric tonnes of resin, which Sicomin delivered in six months.

"It's a minimum 7-millimeter-thick laminate all over the lobby because that was the criteria for the Class A fire rating certification," explains Chaudhry.

Denjean notes that fire resistance testing is always a big challenge because requirements such as ASTM E-84 and EN13501 are so difficult to meet. "At Sicomin, we make our own test panels for the materials testing in fire test labs," he says. "But our customers must build test parts just as they would for the project and also in the factory where the actual parts will be produced. They then must get passing results on three consecutive tests." Sicomin and Metyx provided assistance to AFI throughout fire testing. The panels that AFI prepared were tested at Thomas Bell-Wright Construction Testing Laboratory in Dubai and passed all FR requirements.

Affordability via adaptive molds

Because the cost of the panels using epoxy was so much greater than the original budget, the team at AFI needed a very efficient method to fabricate the 228 interior wall panels. Each panel was unique due to the complex curved surfaces of the lobby's walls and ceiling. "We had seen the Adapa mold system being used to produce glass fiber-reinforced concrete [GRC] panels for the Kuwait International Airport project," says Chaudhry. "We got in touch with the founder of Adapa, Christian Raun, and he came to Dubai to discuss our idea to use his system for molding the GFRP panels for the museum lobby."

Adapa's adaptive mold system is based on multipoint forming, a technology that basically works like the plastic toy that forms the shape of your hand when you press into its myriad pins. Instead of plastic pins, Adapa uses a bed of actuated metal cylinders, each topped with a powerful magnet and controlled digitally using sophisticated 3D software. For composites, molding takes place on a surface membrane that integrates a ferromagnetic layer as well as a silicone membrane. This provides a smooth interpolation between the cylinder points, and a vacuum-tight surface for molding at temperatures up to 200°C. The Adapa software uses the part's CAD file to create the production files for how the pins should be actuated to produce the mold surface of the part. Once these production files are transferred to the mold system, the operator pushes a button and the actuated pins are raised and lowered to form the 3D curved surface in roughly three minutes. Thus, reconfiguring the mold between panels is fast and relatively easy. Once a panel is cured, the mold can be flattened to help demold the panel.

For AFI, this was revolutionary. Instead of building 228 separate molds — which would have required CNC machining a foam plug and then laminating the mold from that plug for each »

panel — AFI would use three D300 3.6- x 3.6-meter reconfigurable Adapa molds. This approach not only enabled massive cost savings, but also eliminated the need for large amounts of space for mold storage and panel production. AFI was able to mold all of the panels in a production room of less than 100 square meters. AFI was also the first company to use the Adapa system for molding GFRP panels in the Middle East (Learn More).

"We did make some customizations," says Sooraj Pullur, AFI's head of engineering. "This included extra [actuator] rods so that we could avoid some minor waves that were occurring with our GFRP panels versus how it was designed for GRC — basically smoothing out the gaps between actuators. And we added more magnets under the molding surface to solve some issues that we had with the silicone membrane rising during vacuum molding."

Additional actuators for higher resolution and stronger magnets for vacuum forming/molding are now standard within Adapa's product family for composites. "The team also had to devise a release agent system that worked with both the epoxy resin and the silicone membrane molding surface," adds Denjean, "but the Adapa system was robust and easy to use." It also allowed AFI to use epoxy resin and still meet the project's budget.

"We also worked with Adapa to develop silicone barriers for making the flanges on all four edges of each panel," explains Pullur. These flanges were used to attach the panels to each other and were key to maintaining joint accuracy during installation. The silicone barriers — which appear as white beams in Step 1 (p. 44) — were held in place by eight to nine metallic L-brackets via the magnets under the molding surface. For thicker panels (in Zones 3 and 4, explained below), explains Pullur, "we used a 10-millimeter-thick PVC foam core [green color] as an extension because the silicone barrier height was insufficient to create the flanges needed. Due to this PVC core's taller height, we inserted some rectangular pieces of GFRP into the silicone barriers to serve as a guide." The latter can be seen in Step 2 (p. 44), behind thin pieces of wood stapled to the PVC core to provide extra grip/stability for this connection.

Challenging calligraphy

The calligraphy on the MOTF's interior lobby is an integral part of its design, declaring His Highness Sheikh Mohammed's vision and posing a challenge to all people everywhere: *"We might not live for hundreds of years, but the products of our creativity can leave a legacy long after we are gone. The future belongs to those who can imagine it, design it and execute it. The future does not wait. The future can be designed and built today."*

For AFI, these words posed a key challenge during design and construction of the interior's composite panels. "These Arabic letters had to be very precise, including the dots [called diacritical marks] and nothing could be changed," explains Chaudhry, "with a maximum tolerance of 1 to 2 millimeters." »

The depth of the letters also changed with the height of the lobby, to remain legible to visitors, even as the walls and ceiling extend further away. AFI divided this height and letter depth into four zones. Zone 1 is up to 3.5 meters high, where the depth of the calligraphy letters is only 10 millimeters. That depth increases to 40 millimeters in Zone 2, to 150 millimeters in Zone 3 and to 250 millimeters in Zone 4. "From Zone 3 onwards, LED lights would be installed into the curves of the letters," notes Pullur. "So, there had to be a cavity to install these, and we also had to incorporate acoustic insulation to prevent echoing in the lobby, but without affecting the smooth, curved design."

AFI's concept was to use two surfaces. The A surface would face out toward the building's visitors and form the curvature of the lobby, while the B surface would attach to the building's internal structure. The A surface was formed by a gel-coated GRFP skin laid onto the silicone surface of a curved Adapa mold, but was omitted in certain areas to form a kind of negative space to represent the "cutout" calligraphy letters. In these areas, CNC-cut pieces of expanded polystyrene (EPS) foam were used as placeholders and later removed.

After the A surface was laminated, a second set of CNC-cut EPS foam was bonded to it, providing the structure between the calligraphy cutouts and the required panel thickness for each zone. The B surface was then laminated across these EPS foam supports, which were undersized from the A surface laminate to create a 180-millimeter-wide "cove" in which to install the LED lights. After the panels were demolded, acoustic insulation was then installed (by a different contractor) in the recesses created for the calligraphy letters.

Pullur describes the manufacturing steps: "We used our CNC machines to cut the foam placeholders and panel supports as per the CAD model. On the first day, we used Adapa's software to shape the mold surface, laid the foam placeholders and applied the FR gel coat. The lamination was then made in three stages. On the first day, we laminated the A surface. On the second day, we bonded the CNC-cut foam supports onto the A surface layer and then applied a light laminate on top. On the last day, we applied the B surface laminate." The epoxy resin was room-temperature cured overnight after each lamination, and then heaters were used to apply a final post-cure. AFI's humidity- and temperature-controlled laminating room was well-organized for this panel production, which was completed in 12 months.

"There was some trial and error to find the right methodology for the least time and cost," says Chaudhry. "It was basically one month of R&D with a lot of brainstorming. But it allowed us to meet the design and budget requirements and win the job after competing with several other competitors from around the world." All of the panels were manufactured at AFI's production facility and then transported to the MOTF site for installation.

"Installation was also a challenge," says AFI installation manager, Patrik Gajdosik. "We wanted each and every joint between panels to be seamless, so we came up with an idea to form a small V section so there would be no hairline joints visible. First, we installed steel brackets to the building's wall and ceiling structure, and then attached the panels to each other and to the bracket system. Next, we filled the V gaps using fire-retardant epoxy adhesive and overlaminated them, followed by grinding the panel surface smooth and final painting. The lobby panels had to have a white matte finish and a tolerance of only a few millimeters over a 2,800-square-meter surface." AFI achieved this — a 3D scan of the completed interior lobby showed the surface maintained a tolerance of ±2 millimeters. "When you go into the lobby now," notes Gajdosik, "it looks like one continuous structure."

Greatest challenge, future growth

The schedule for AFI's work on the MOTF lobby was initially planned for 18 months, says Chaudhry, "but it was extended due to COVID and ended up at almost three years." Although the whole project was challenging, there were definitely aspects that stood out for AFI. "The calligraphy itself was something that many people said wouldn't be done out of GFRP but would instead be some other material," he notes. "That indeed was a challenge, and especially to achieve it with cost efficiency. But it has all passed Killa Design's inspection and satisfied all finish and quality requirements. The final result is a testament to what composites can do. However, I would say it wouldn't have been possible without the Adapa molding system, because if it had to be done traditionally, the cost would have been more than doubled."

"To me, it was a great project because of how AFI managed it," says Denjean. He notes this was the first project for Sicomin's low-viscosity FR laminating resin, "but now we have sold it into other projects in Dubai and Saudi Arabia, including a 200,000-square-meter project in Mecca. "We see continued growth for composites in architecture in this region," he adds.

Chaudhry agrees. "We never say no to a challenge," he says. "We turn problems into feasible solutions." CW

LEARN MORE

Read this article online | short.compositesworld.com/MOTFinterior

Read about this museum's composite exterior facade| short.compositesworld.com/MOTF

See *CW*'s video of the Adapa system and Adapa's image gallery | short.compositesworld.com/Adapavid and short.compositesworld.com/Adapaimages

ABOUT THE AUTHOR

CW senior technical editor Ginger Gardiner has an engineering/materials background and more than 20 years of experience in the composites industry. ginger@compositesworld.com

SIDEBAR

Spiral staircase cladding

Thanks to its performance on the lobby's interior cladding, AFI was also awarded the job of cladding three spiral staircases in the lobby. One spanned the full seven levels of the building. The other two were intertwined in a DNA-like shape, one terminating at the second floor and the other reaching to the third floor. All three staircases use a load-carrying spine made from steel (white structure in Step 7, p. 45) while the stair treads and risers were finished with traditional flooring materials. Composites provide cladding for the steel structure and form the inner banister for the double-helix staircases, as well as a seat for the glass panel outer banister for all three stairways.

Although this cladding was similar to that for the walls and ceiling — comprising multiple panels and made with the same materials — it was not made using the Adapa system.

"These panels were made with traditional molds," says Chaudhry. "We CNC milled plugs using our seven-axis KUKA robotic system and then laminated the molds. We then molded the panels and joined them on site at the museum. We used two sets of molds in the two DNA spirals because each had a different pitch and radius. Each set of molds produced five panels (Fig. 2). We used 10 molds in total and made 56 cladding panels. We altered the length as necessary to cover the steel and fit the path."

For the seven-story stairs, AFI again used two sets of molds to achieve the A and B curvature (Fig. 2). The parts from each mold set complete the repeated spiral and totaled 300 panels.

AFI ensured all the cladding panels would cover the steel structure by using a scanned 3D model of the steel spines. "We then modeled all of the panels," says Pullur. "The steel forms the curvature of the stairs, and we redesigned the staircase model to enable the same curvature, so that we would not have to make more molds."

Chaudhry adds that this approach worked well, allowing AFI to again save money. "We did not want to make a separate mold for each panel because that would have added too much cost. We were able to design the panels to repeat, with that slight modification on the model, so that we kept the molds to a minimum."

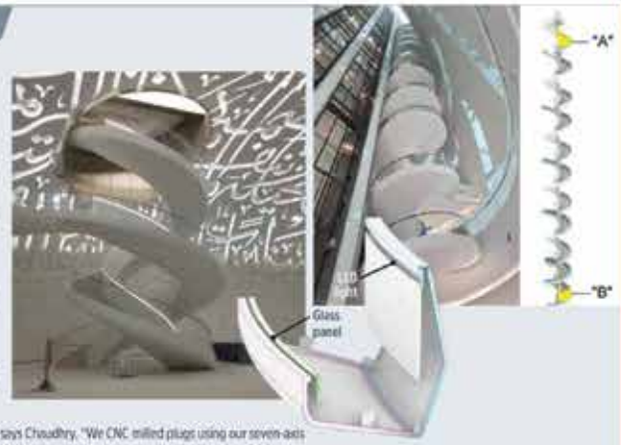
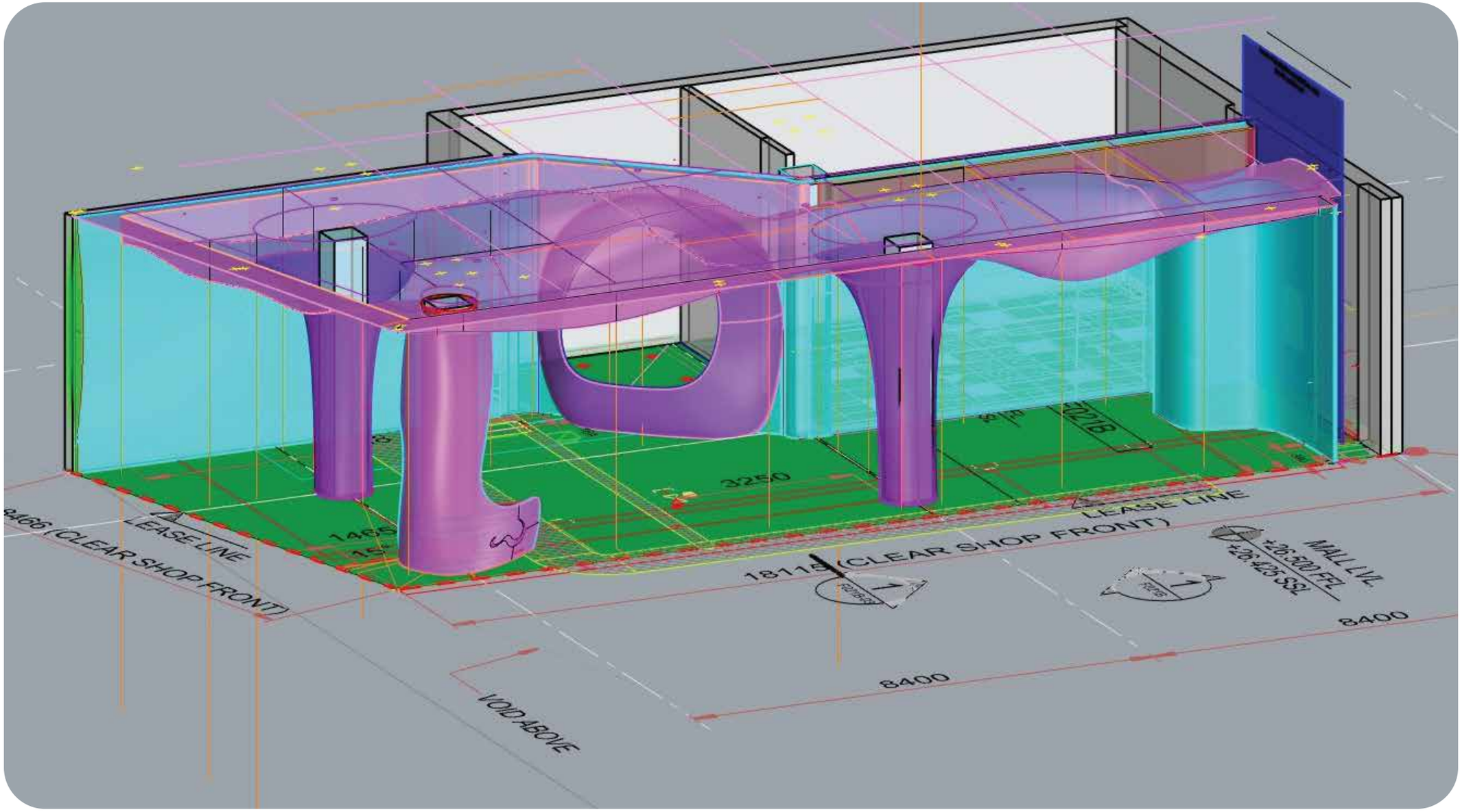


FIG. 2 Multiple parts per mold set

AFI minimized the molds required to clad the twin "DNA" stairs and the seven-story staircase beside the lobby's elevators. For the DNA stairs (left), AFI used two sets of molds, each producing five parts that provide cladding for the steel spine and form the LED-lit inner banister as well as a seat for the glass panel outer banister. For the seven-story stairs (right), AFI used one set of molds each for the "A" and "B" curvatures to create 300 panels total.

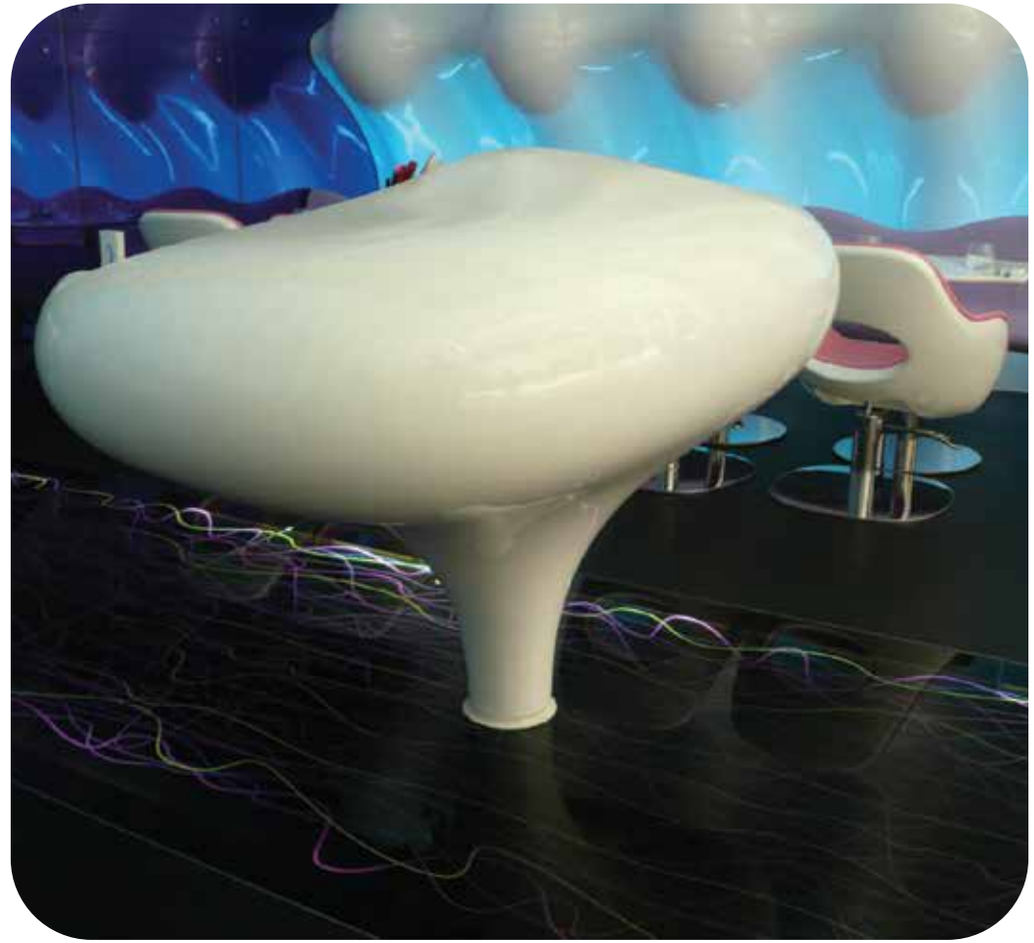
GRP Structures for Complete Interiors - Switch Restaurant Designed by Karim Rashid, Mirdiff City Center, Dubai, UAE



Another high quality “plug and play” solutions. AFI recently completed the manufacturing the ceiling components, hostess desk, blob and columns.

The use of composites helps to get more fluidity in shapes and styles. Composites are unique due to their customized characteristics

GRP Structures for Complete Interiors - Switch Restaurant Designed by Karim Rashid, Dubai Mall, UAE



The design produces a captivating interplay of texture, light, and shadow, reminiscent of the desert's sand dunes. It offers a distinctive atmosphere characterized by symmetry and equilibrium, enveloping the guests entirely.

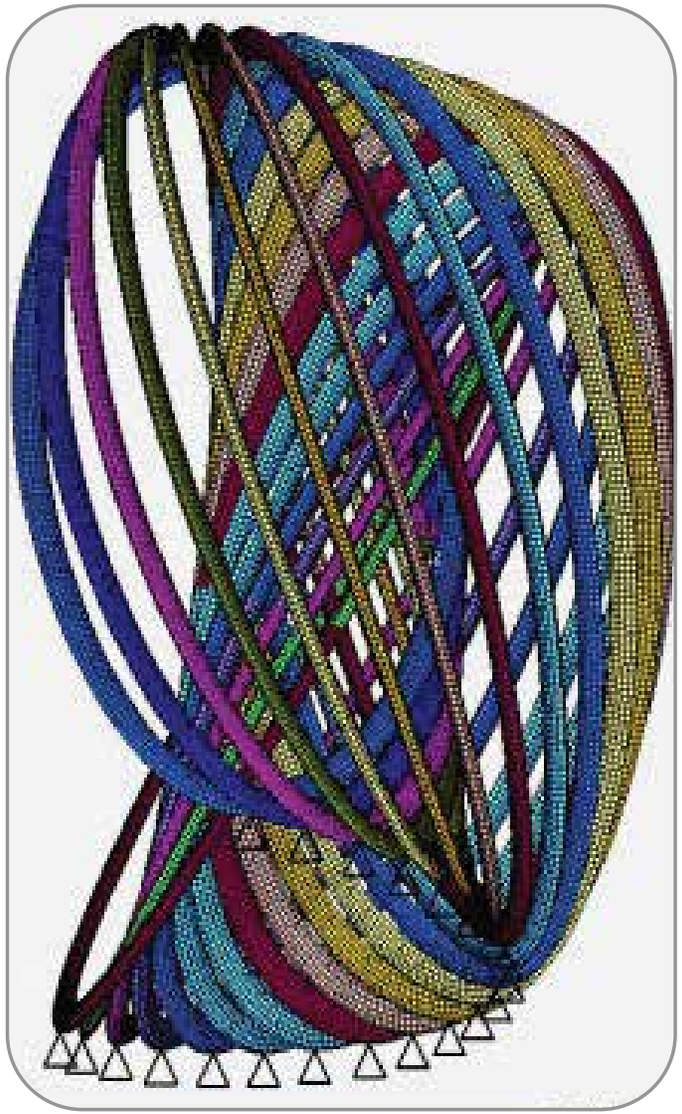
Carbon Fiber Fins at DIFC Gate Village Entrance

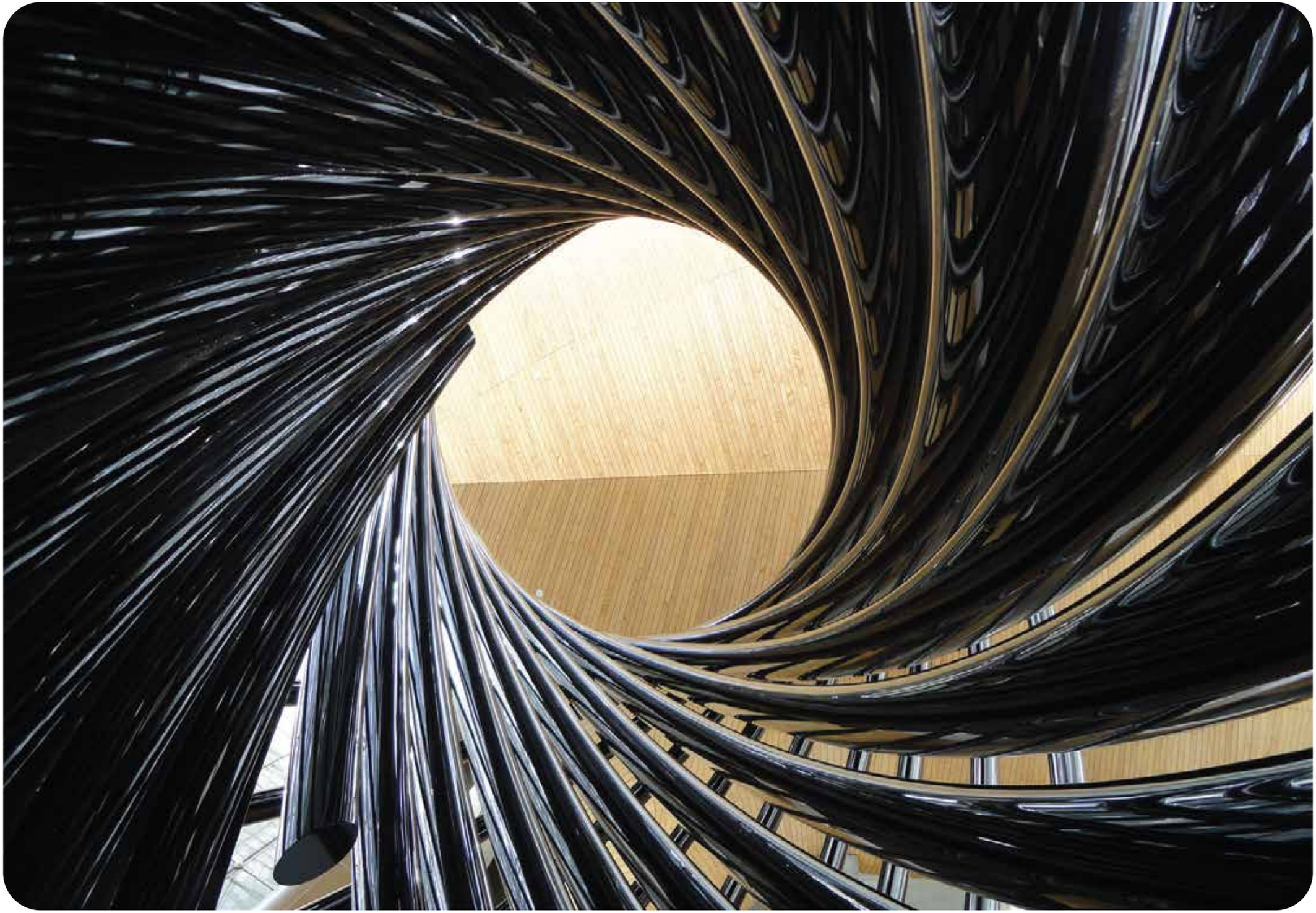
INTERIOR

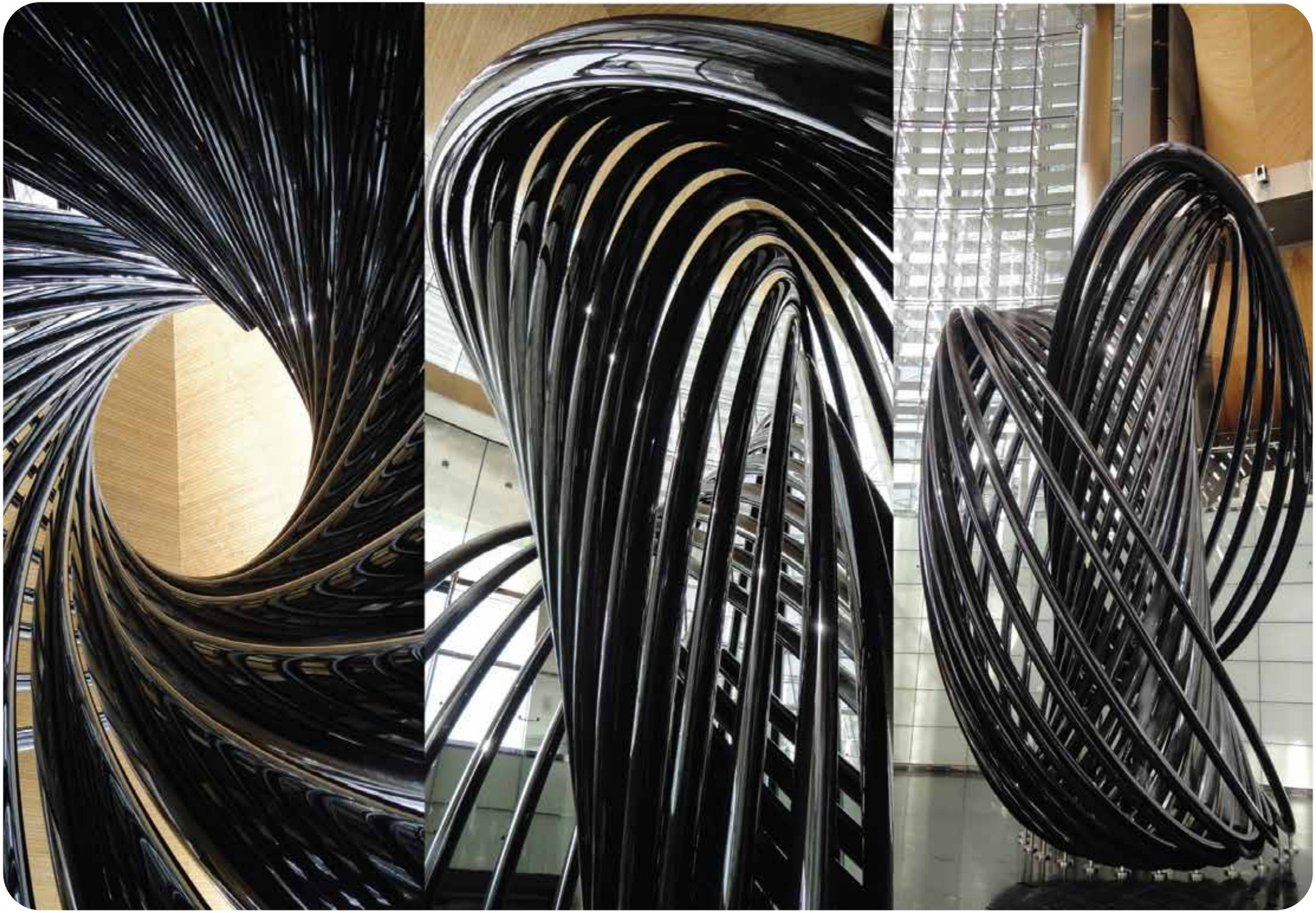
GRP Designer Panels for Imam Bukhari Mosque, Samarkand, Uzbekistan

Samarkand - Memorial Complex " Imam Al-Bukhariy " in the Samarkand Region

Carbon Fiber Evolute Located at Burj Khalifa, Dubai, UAE

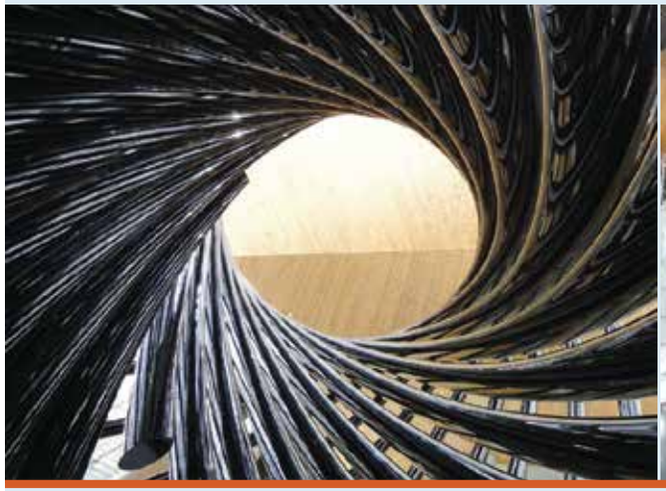






Post Cure

Highlighting the behind-the-scenes of composites manufacturing



Source (all images) | Advanced Fiberglass Industries

CFRP as an enabling medium: Clever construction, innovative finish

"Evolutes" is a 7-meter-tall sculpture made from carbon fiber-reinforced polymer (CFRP) composite featured in the iconic Burj Khalifa hotel (Dubai, United Arab Emirates). Conceived by internationally renowned designer Karim Rashid as a single continuous tube with 21 interlocked loops, the elliptical cross-sectioned composite structures were manufactured in two halves and then joined to appear seamless by Advanced Fiberglass Industries (AFI, Dubai, UAE) using biaxial carbon fiber fabric (XC 411) and clear epoxy resin with ground natural stones to create a uniquely intriguing, highly-reflective surface.

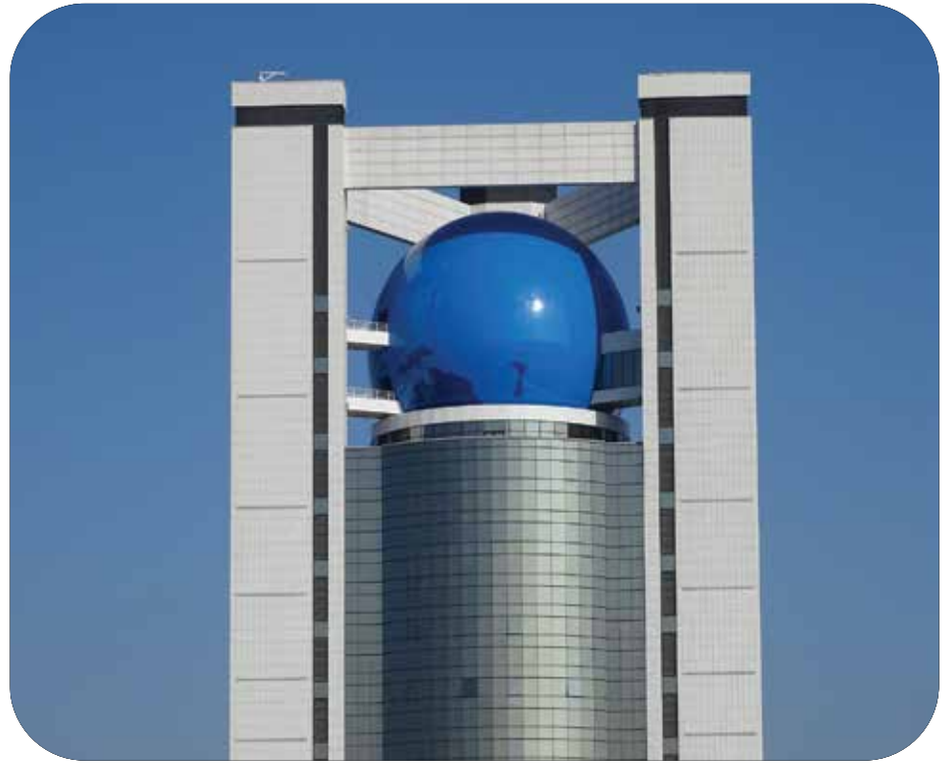
Show us what you have!

The CompositesWorld team wants to feature your composite part, manufacturing process or facility in next month's issue.

Send an image and caption to CW Associate Editor Hannah Mason at hmason@composites-world.com, or connect with us on social media.

@CompositesWorld CompositesWorld @CompositesWrld @CompositesWorld CompositesWorld

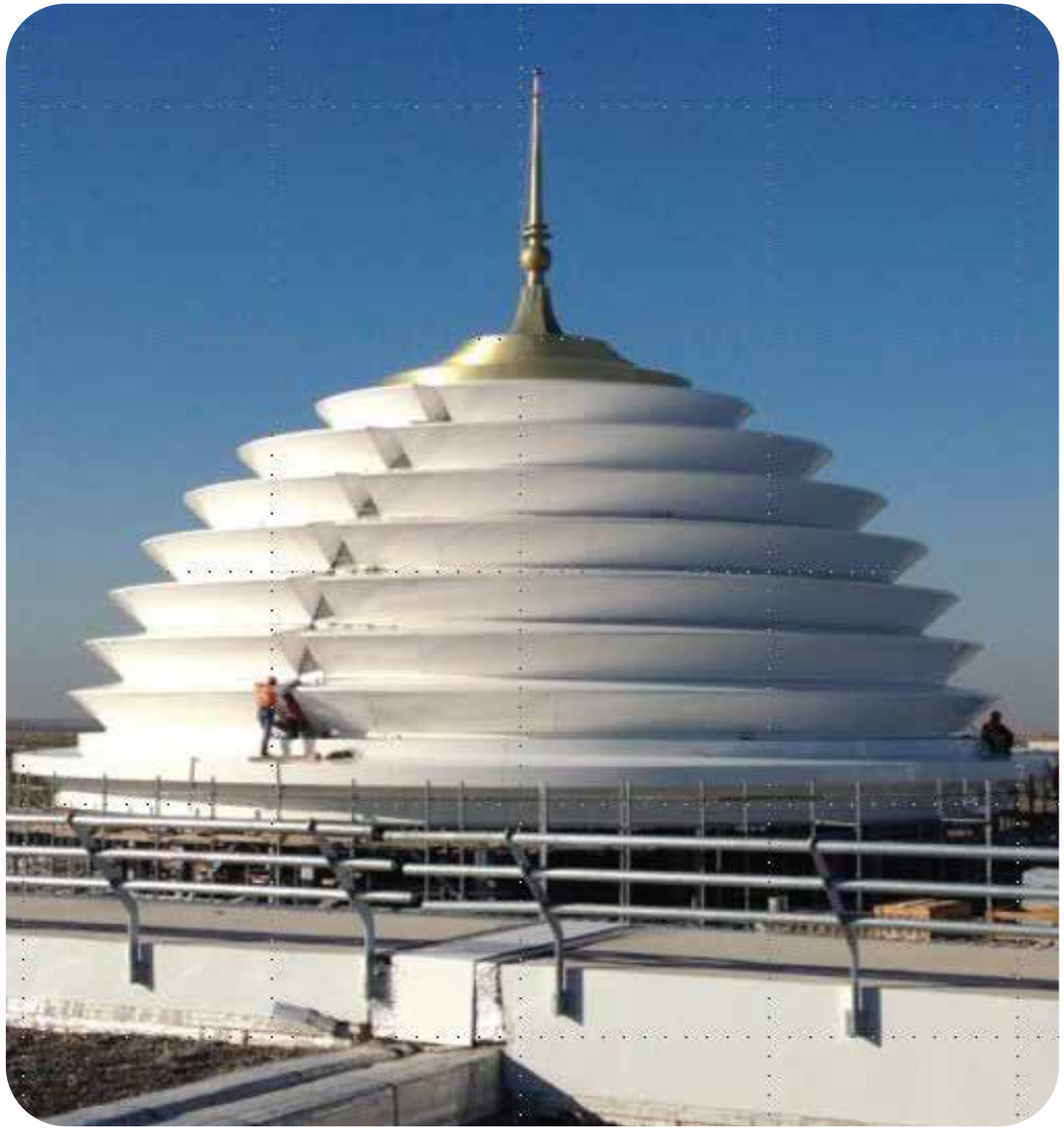
External Facade



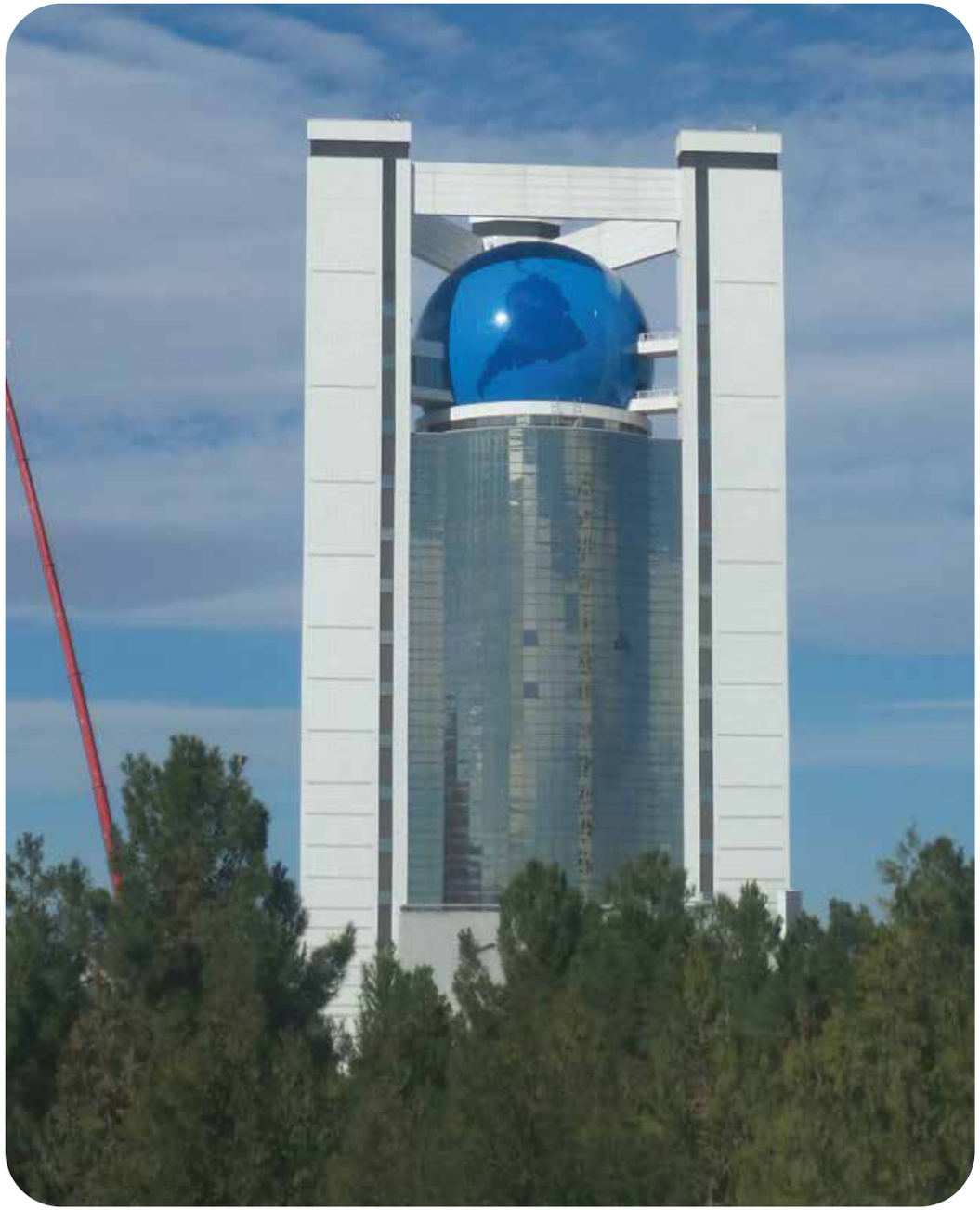
Dome - Congress Centre Turkmenistan

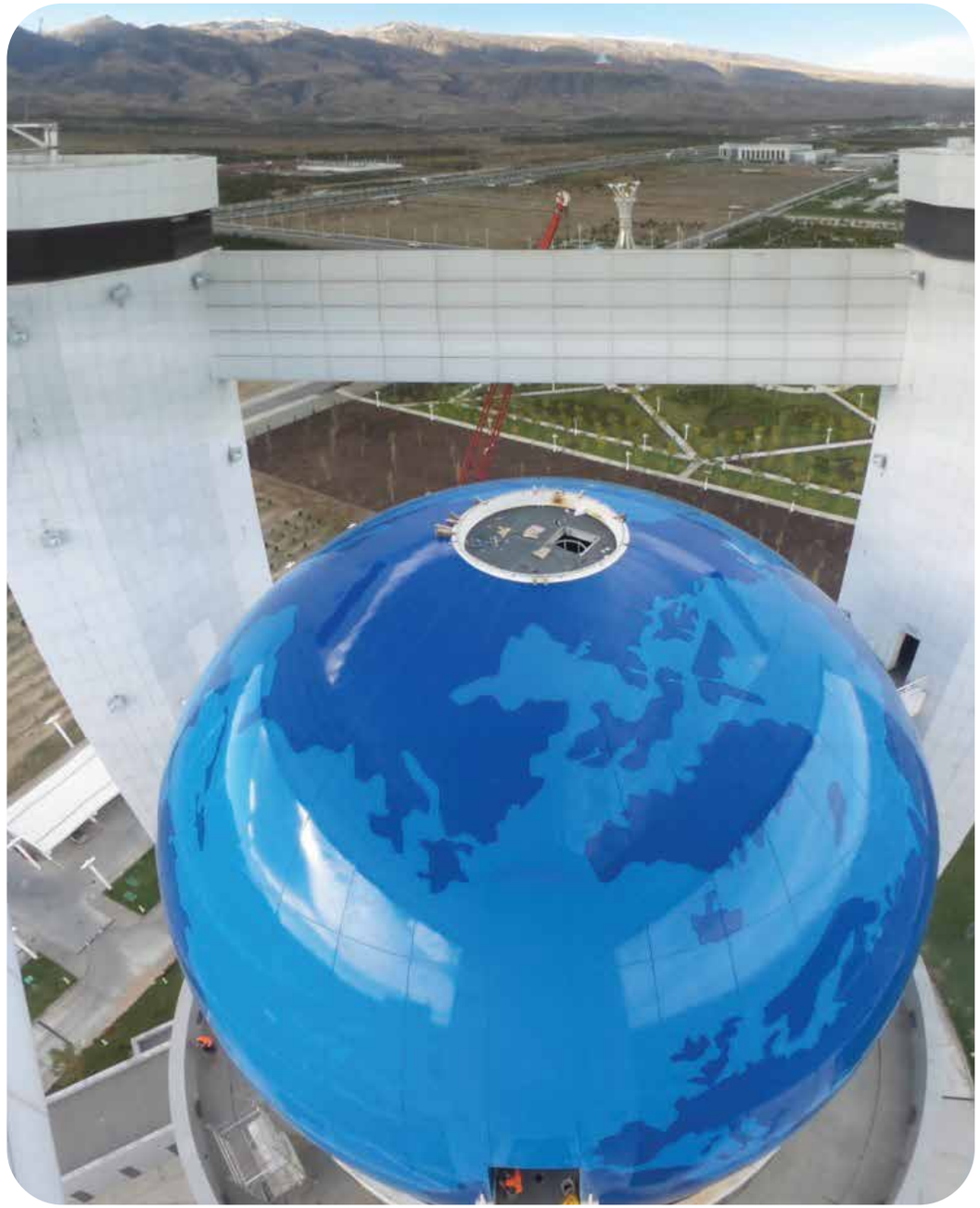
Bouygues Batiment International Constructions selected AFI to carry out a prestigious project which included the designing, manufacturing, and installation of a Dome for the 'Ancient Palace in the beautiful capital of Turkmenistan, Ashgabat as part of the refurbishment of the palace. AFI once again provided in client with a complete solution and a turn-key product.

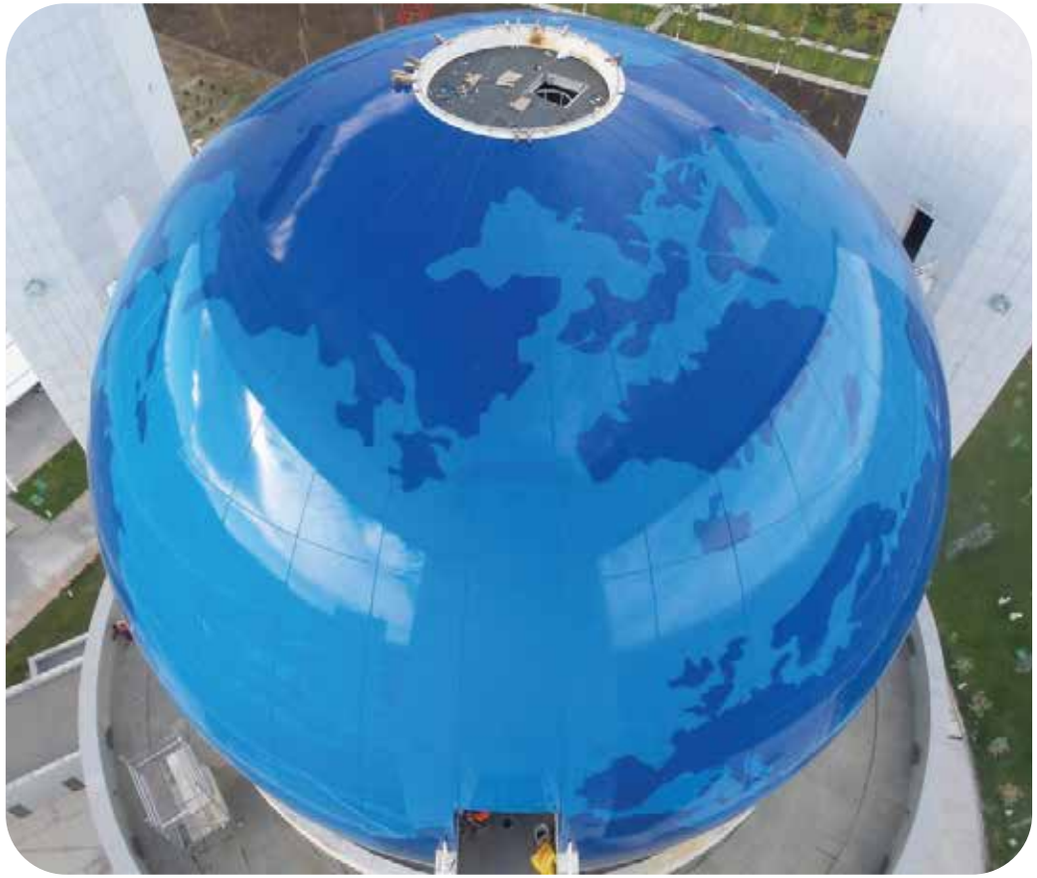
Composite domes are exceptionally durable, lightweight, and self-supporting structures.



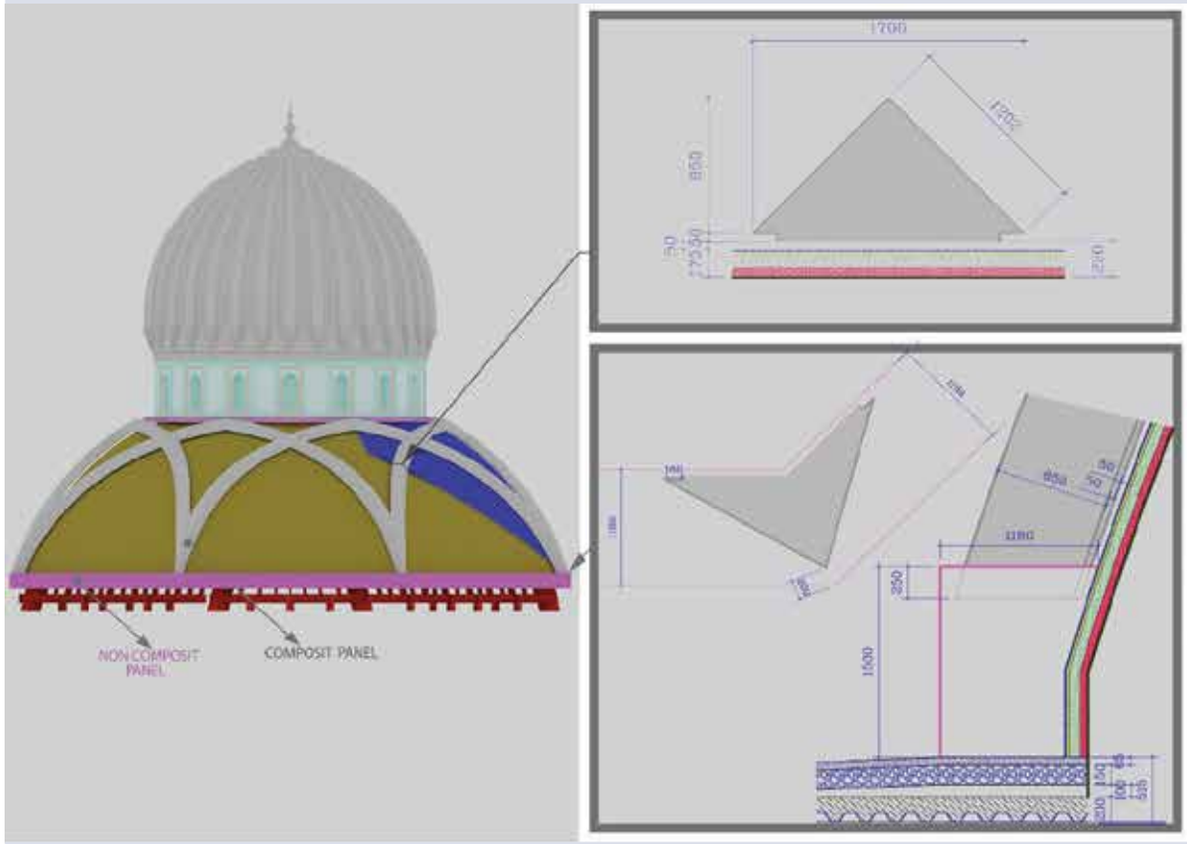
Sphere Built and Installed at MINAFF in Ashgabat





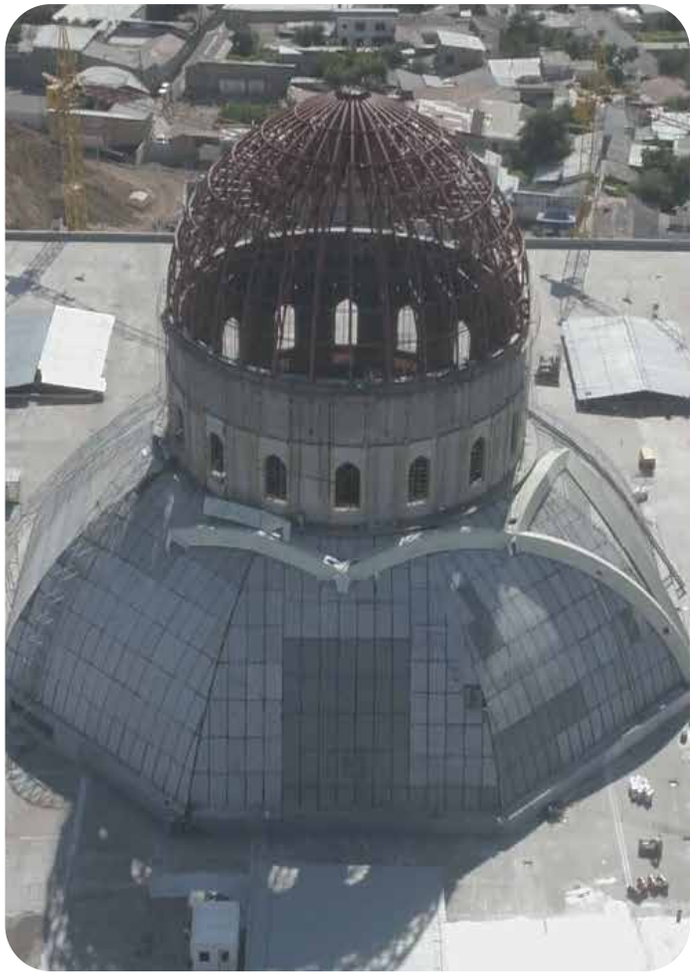


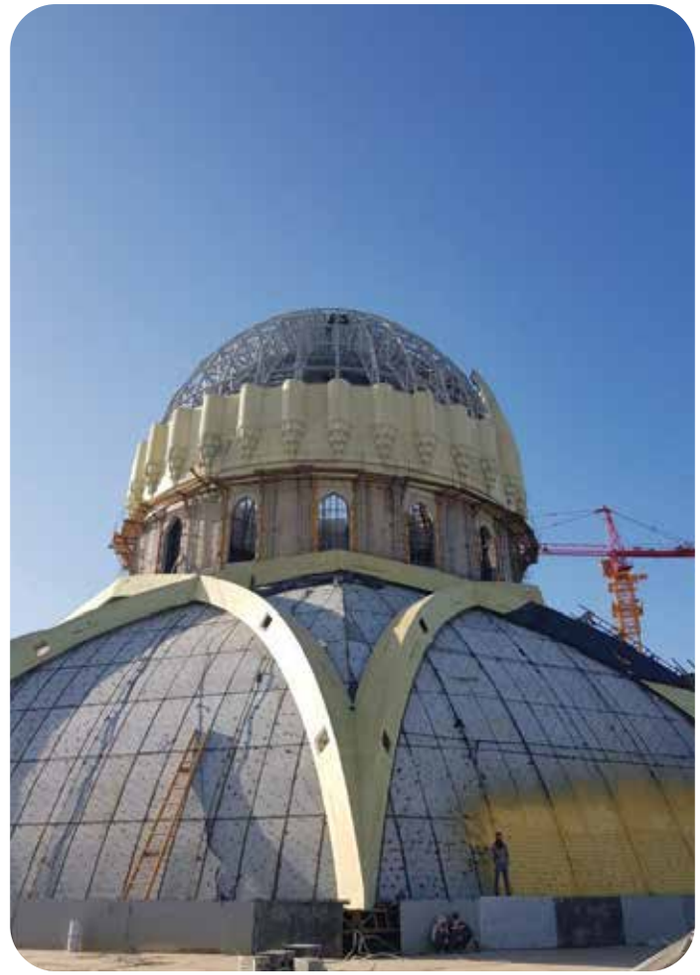
Domes & Arches - At Islamic Center for Civilization, Tashkent, Uzbekistan



This architectural exterior facade became feasible thanks to the distinctive attributes of composite materials. The panels were designed to be lightweight, facilitating a swift and uncomplicated on-site installation process.

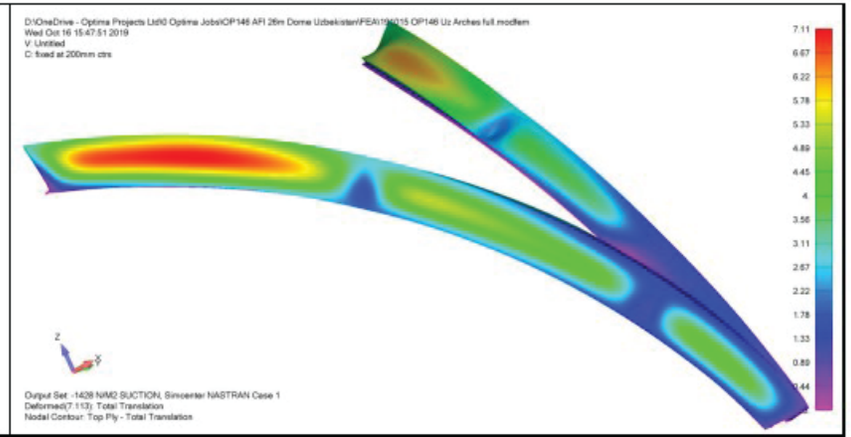
They were constructed using epoxy resin composites with a thermoplastic structural core.





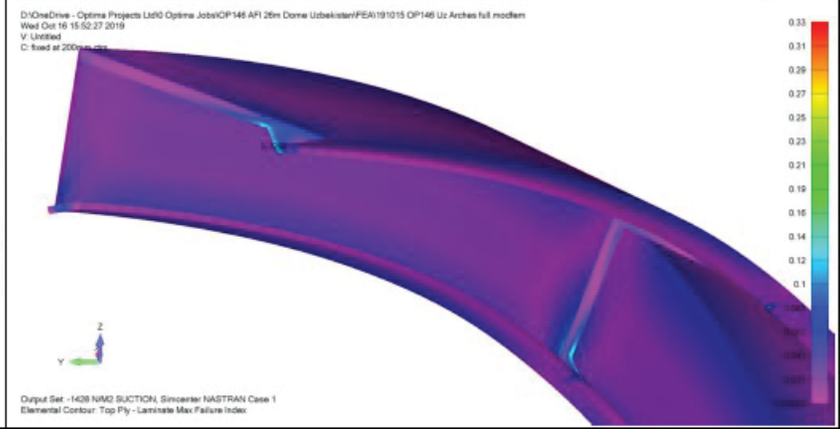
Resultant Deflection

Max 7.1mm



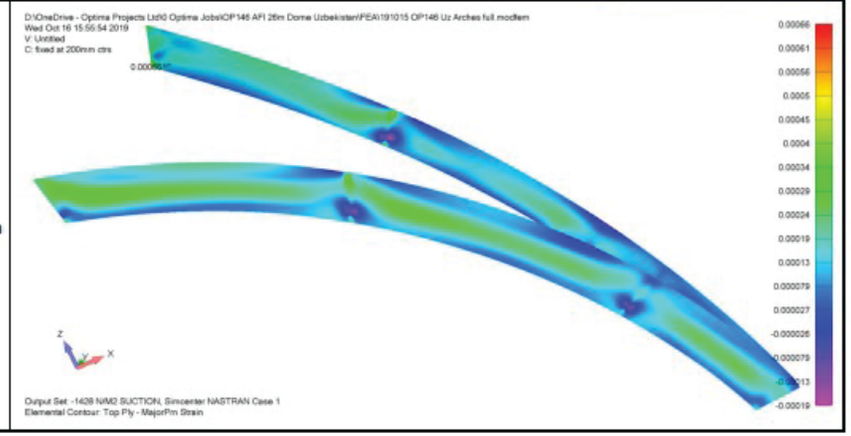
Failure Indices max 0.33

Generally FIs are low and the max value occurs at the end of the model, which in reality will be joined to the next arch section giving additional support in this area.



Strains

Max tensile strain = 0.07%



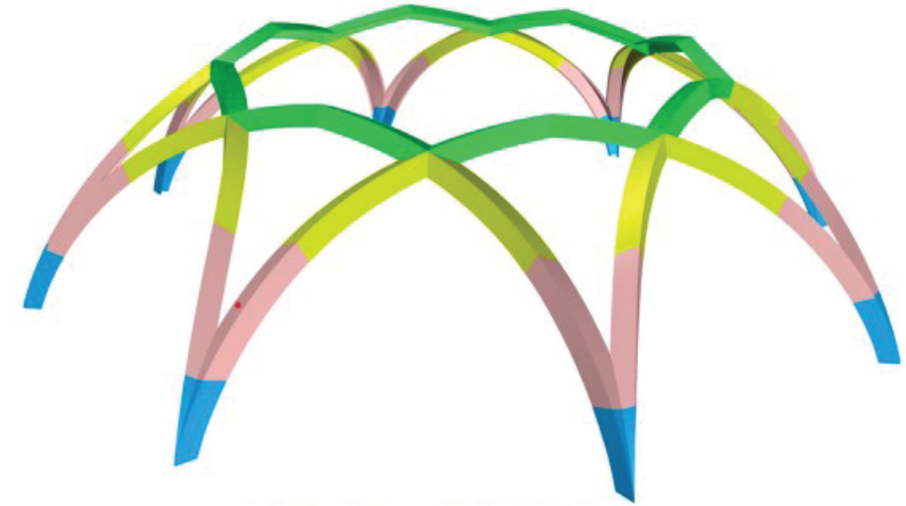
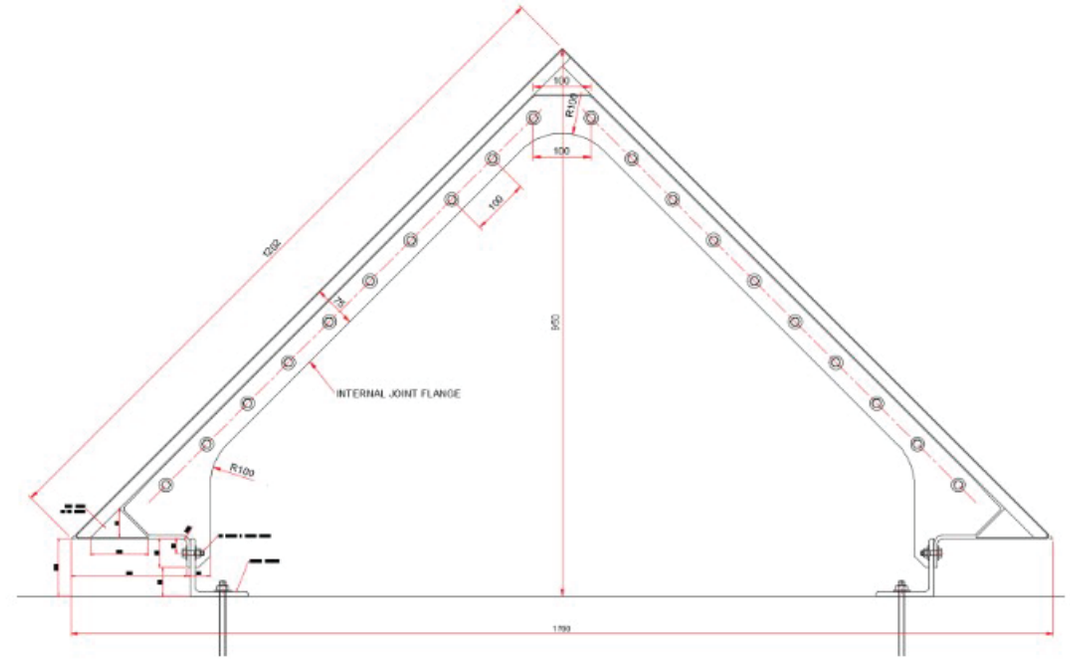


Figure 1 – Geometry of all arch sections



24m Diameter Dome, Mashrabiya, Turret, Cornices- Turkmenistan

Ancient Palace Turkmenistan

From large domes to carbon fiber sculptures, racing cars to restaurants interiors, Dubai-based Advanced Fiberglass Industries is a leader in the use of composites in manufacturing.

Algeria Pavilion - Expo 2020 Site

Carbon Fiber Fins at DIFC Gate Village Entrance

EXTERIOR

Muraba - GRP Shuttering Moulds/ GRP Form Works for Concrete Structure

Military

Products

-Telescoping Mast Assemblies

-Antennas

-Carbon Stiffening Structure

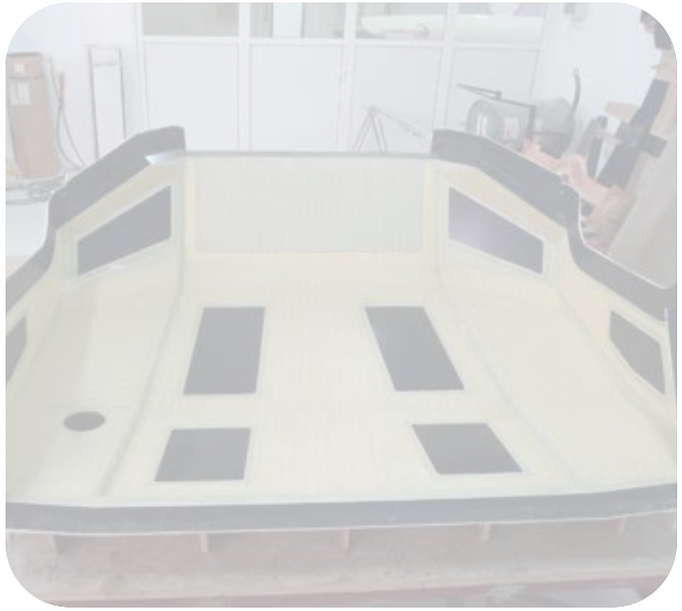
-Military Vehicles Drive Shafts

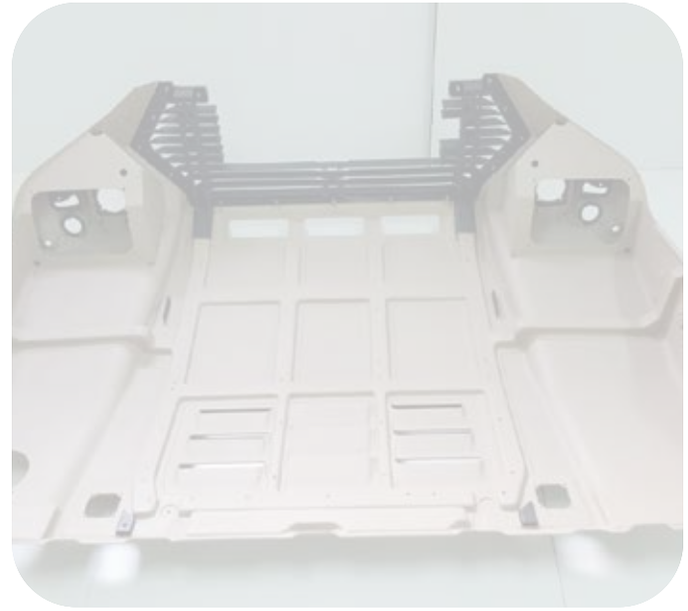
-Tactical Hand Guards and Scopes

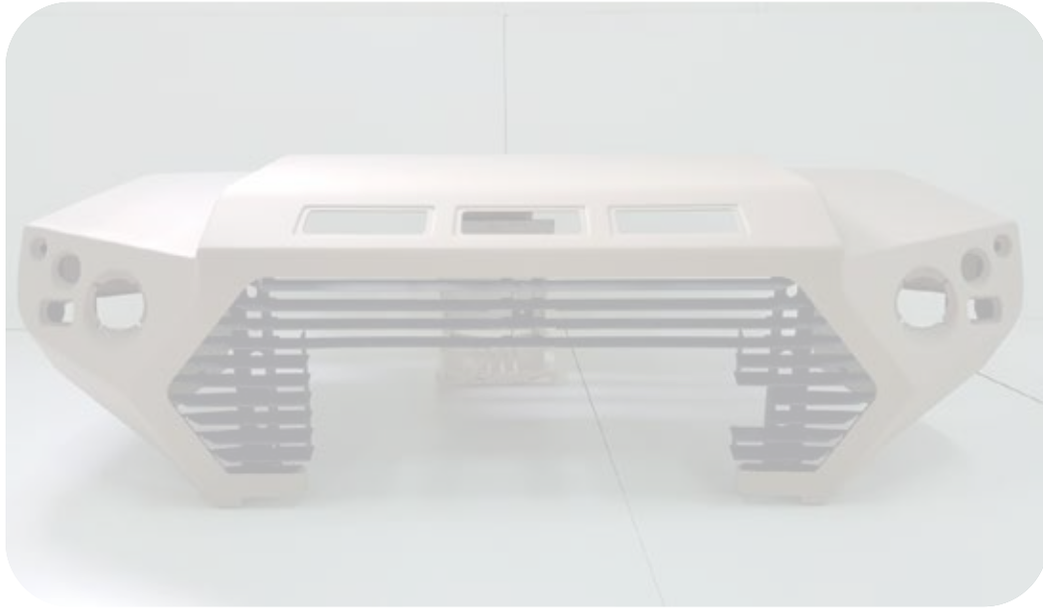
-Bonnets, Vehicle parts/Door Trims, etc.

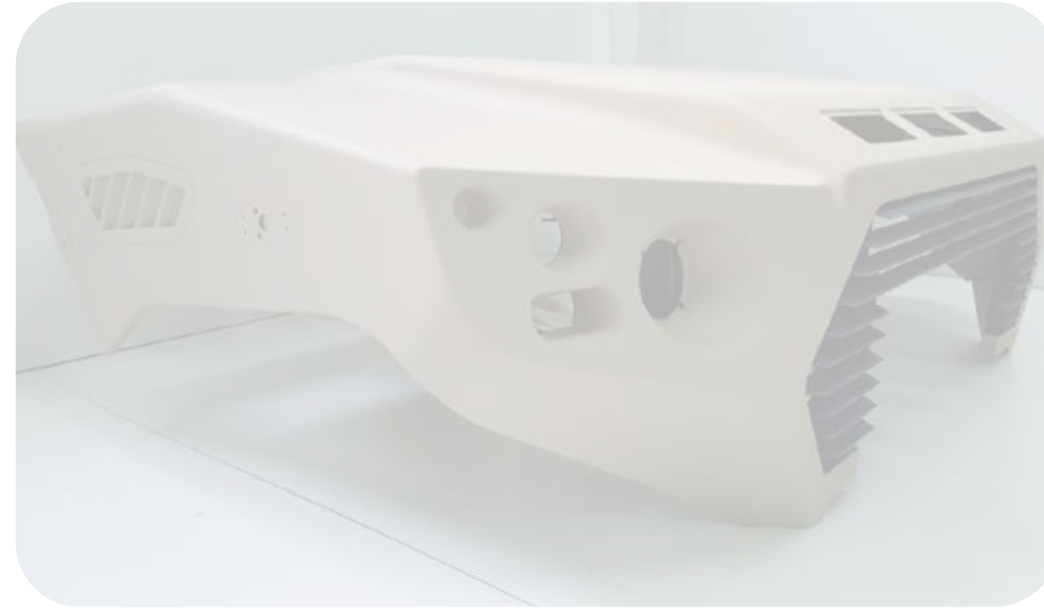
Due to the sensitivity of our work, we are unable to display images

Due to the sensitive nature of our work, we cannot display images









Aerospace

Composite Drone parts

Fuselage

Aileron

Nose

Ruddervators

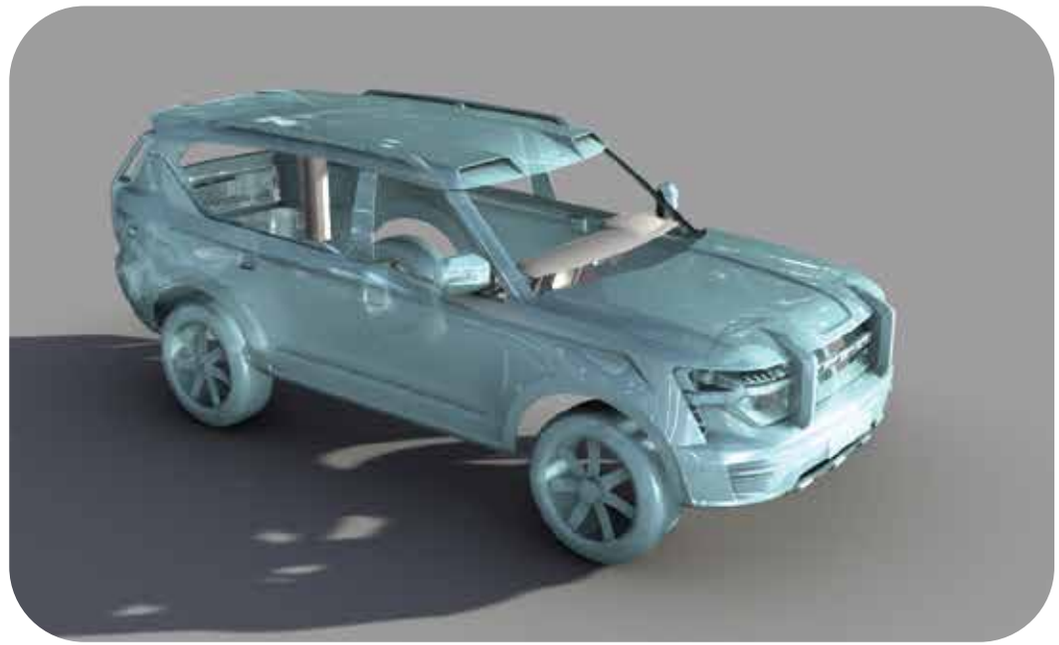
Control surfaces

Automotive

“In the automotive sector, apart from the evident advantages of employing carbon fiber composites for enhanced safety and comfort, there's a direct link to a significant boost in performance. Carbon fiber, being five times lighter than steel, leads to a noticeable reduction in vehicle weight.”

Shaali - N360

Ghiath Vehicles Complete Body Panels Built for WMotors



GRP Camper with Insulated Sandwich Panels

Stingray (Bat Mobile) - Warner Bros World

Marine

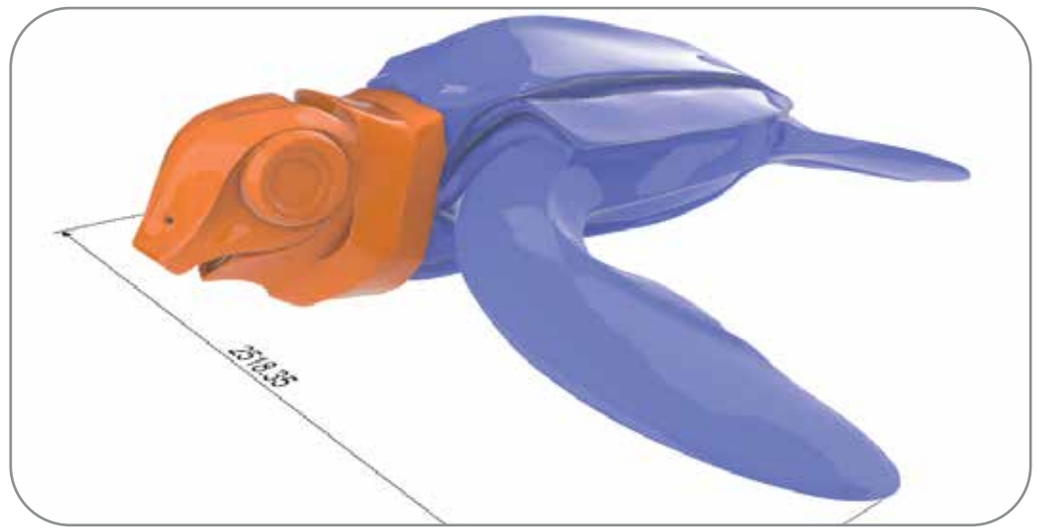
“Utilizing carbon fiber results in a significantly lighter vessel, leading to increased speed, reduced fuel consumption, the potential for smaller engines, and a significantly more efficient watercraft.”

CATAMARAN - Plug & Mould works (Hull & Deck) for 25mtr Catamaran

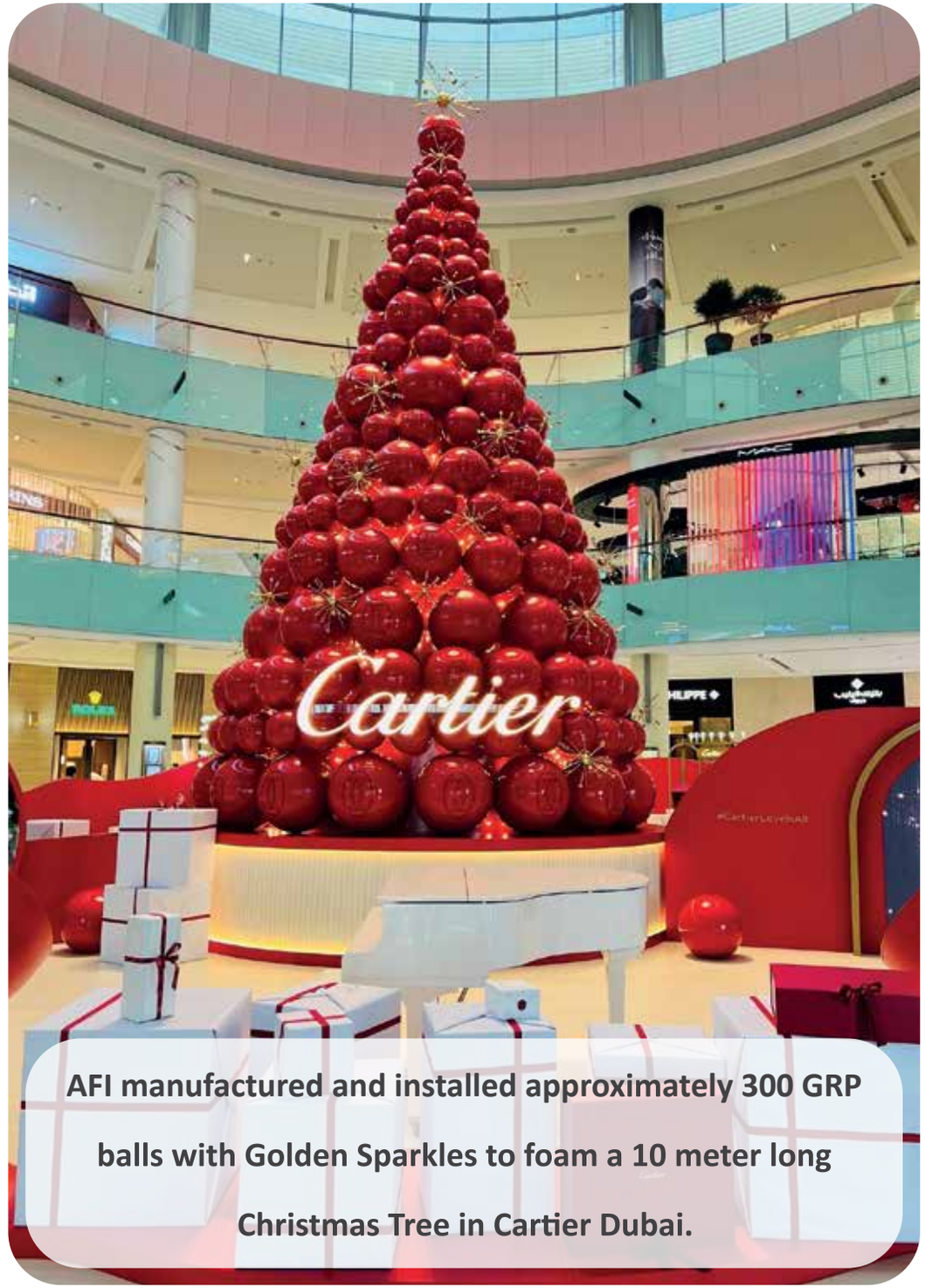
Theme Park

Backed up by the most advanced technology available, we are always ready to serve. In this era of rapid change, new challenges arise every day and AFI is uniquely equipped to deal with them.

Carbon Fiber Turtle - Sea World Abu Dhabi



GRP Christmas Ball Tree



AFI manufactured and installed approximately 300 GRP balls with Golden Sparkles to foam a 10 meter long Christmas Tree in Cartier Dubai.

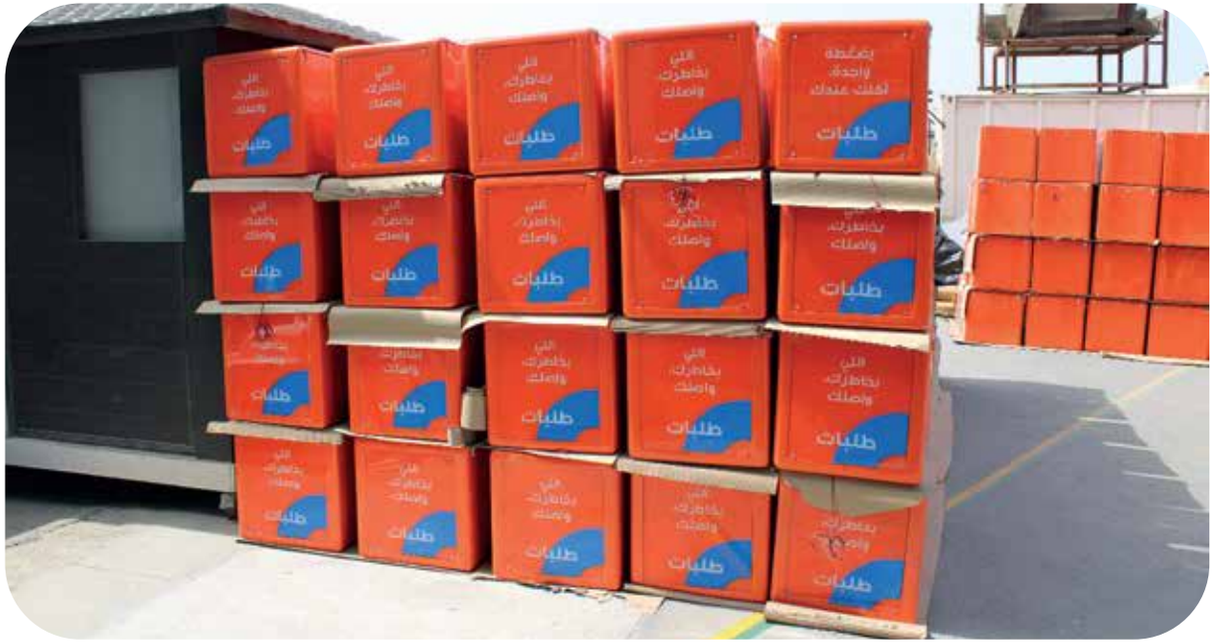
TV Stand - 86 Inch Customized TV Stand Made Out of Fiberglass

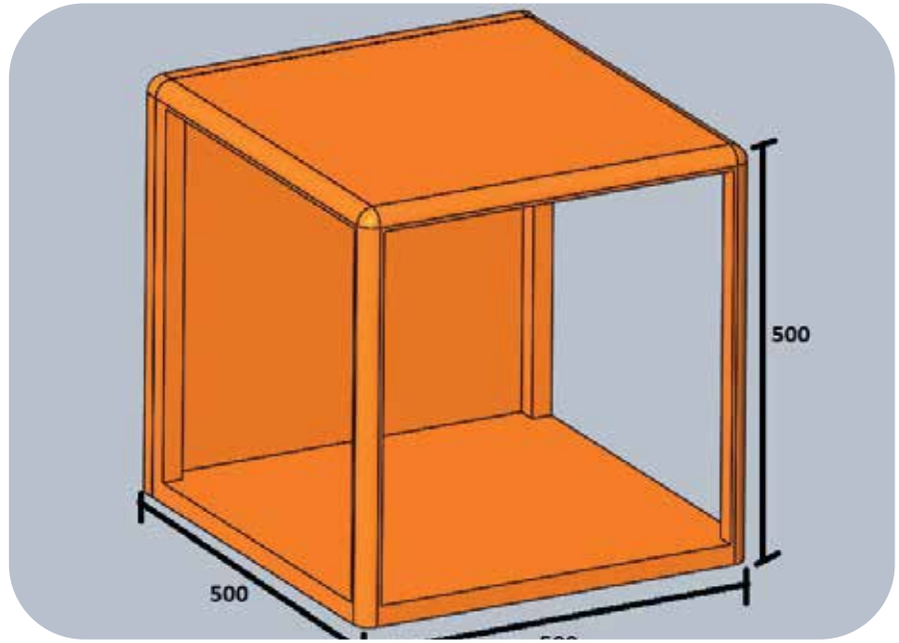
Rocking Chair

CNC Milling Works

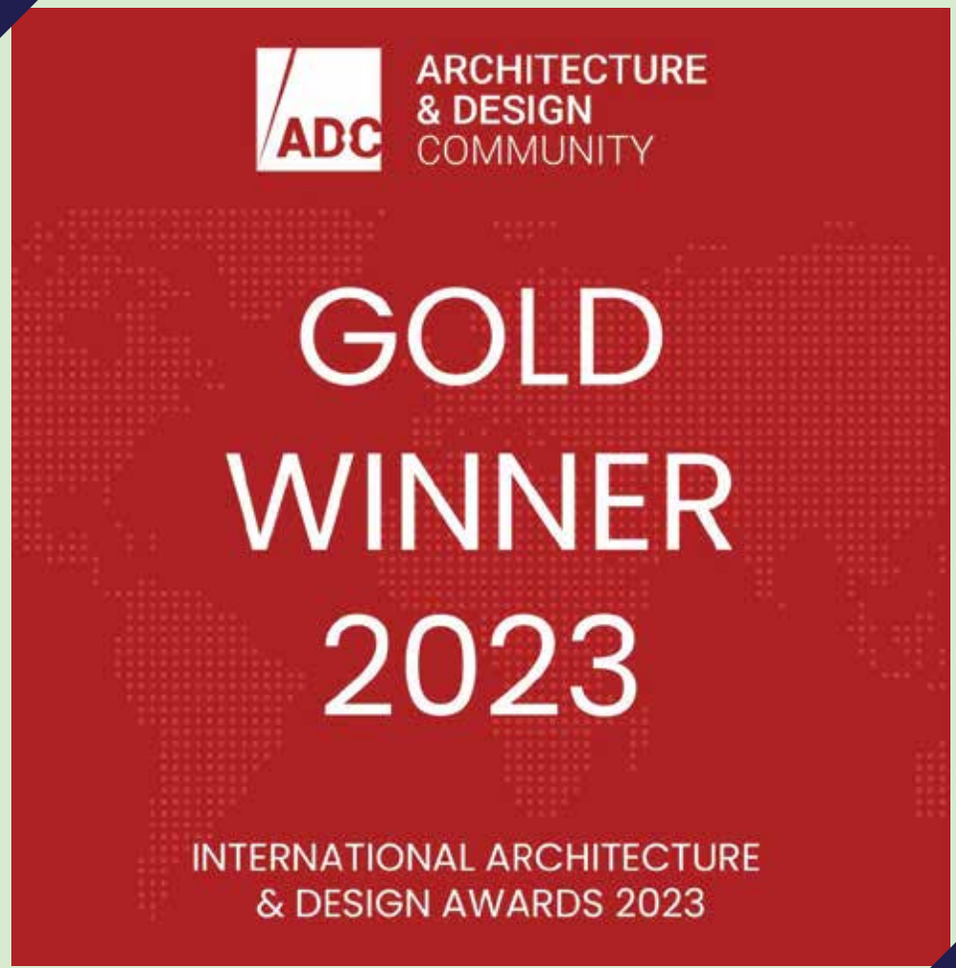

JN-M-004-01

IMPROVISATION - DURING COVID 19 (2020-2021) by manufacturing over 40,000 units within 24 months





Awards


ADC
ARCHITECTURE
& DESIGN
COMMUNITY
GOLD
WINNER
2023
INTERNATIONAL ARCHITECTURE
& DESIGN AWARDS 2023


ADC
ARCHITECTURE
& DESIGN
COMMUNITY
AWARD CERTIFICATE
INTERNATIONAL ARCHITECTURE & DESIGN AWARDS 2023
GOLD WINNER
Public Space Interiors Built / Professional Category
Museum of the future interior GRP lobby
Killa Designs
Advanced Fiberglass Industry
od-c.org
2023
Ronald Hall
RONALD HALL
Head of International Competitions

Recommendation

bam
higgs & hill

BAM Higgs & Hill LLC
Museum of the Future

P.O. Box 25685, Dubai, U.A.E
Telephone +971 4 392 7277, Fax +971 4 392 7729
Email: middle-east@bamInternational.com

LETTER OF RECOMMENDATION

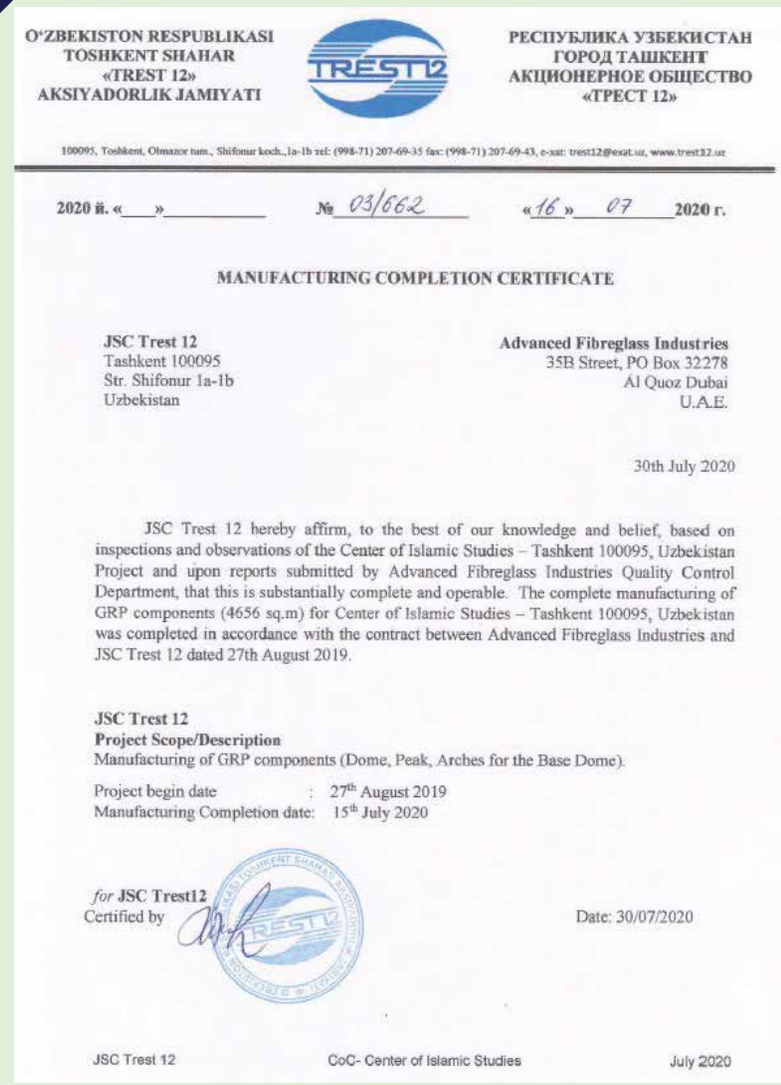
16/09/2020

To Whomsoever It May Concern

ADVANCED FIBREGLASS INDUSTRIES (referred as AFI) is a subcontractor to **BAM HIGS & HILL LLC** on a prominent project "Museum of the Future" in Dubai. The work included manufacturing & installation of GRP Oval Lights, Lobby Calligraphy & Spiral Staircase which is a total of **7700 Sq.m** (approx). All the works of AFI is in strict accordance with project specification & Dubai Municipality guidelines. AFI performed the work on this project in a professional manner. AFI's way of dealing with any issues be it manufacturing or coordination with site engineers were commendable. The work was adequately staffed, supervised and we look forward to the opportunity to work with AFI on the future projects. Currently the AFI team is ongoing with the installation of the scope mentioned above.

For BAM HIGGS & HILL LLC

بام هيجز اند هيل ذ.م.م
bam
P.O.Box 25685 Dubai-U.A.E
BAM Higgs & Hill LLC



O'ZBEKISTON RESPUBLIKASI
TOSHKENT SHAHAR
«TREST 12»
AKSIYADORLIK JAMIYATI

TREST12

РЕСПУБЛИКА УЗБЕКИСТАН
ГОРОД ТАШКЕНТ
АКЦИОНЕРНОЕ ОБЩЕСТВО
«ТРЕСТ 12»

100095, Toshkent, Olmazor tum., Shifonur koch.,1a-1b tel: (998-71) 207-69-35 fax: (998-71) 207-69-43, e-xat: trest12@exat.uz, www.trest12.uz

2020 й. «___» _____ № 03/662 «16» 07 2020 г.

MANUFACTURING COMPLETION CERTIFICATE

JSC Trest 12
Tashkent 100095
Str. Shifonur 1a-1b
Uzbekistan

Advanced Fibreglass Industries
35B Street, PO Box 32278
Al Quoz Dubai
U.A.E.

30th July 2020

JSC Trest 12 hereby affirm, to the best of our knowledge and belief, based on inspections and observations of the Center of Islamic Studies – Tashkent 100095, Uzbekistan Project and upon reports submitted by Advanced Fibreglass Industries Quality Control Department, that this is substantially complete and operable. The complete manufacturing of GRP components (4656 sq.m) for Center of Islamic Studies – Tashkent 100095, Uzbekistan was completed in accordance with the contract between Advanced Fibreglass Industries and JSC Trest 12 dated 27th August 2019.

JSC Trest 12
Project Scope/Description
Manufacturing of GRP components (Dome, Peak, Arches for the Base Dome).

Project begin date : 27th August 2019
Manufacturing Completion date: 15th July 2020

for **JSC Trest12**
Certified by

Date: 30/07/2020

JSC Trest 12 CoC- Center of Islamic Studies July 2020

HSE Policy

- Strict compliance with PPE

- Designated HSE Officer

- First Aid equipment’s

- Designated fire marshals / fighters

- Preinstalled fire system as per DCD standard

- Chemical spillage policy to be followed strictly

CONTACT US

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Dubai, UAE.

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www.afi.ae

+971 4 3403905