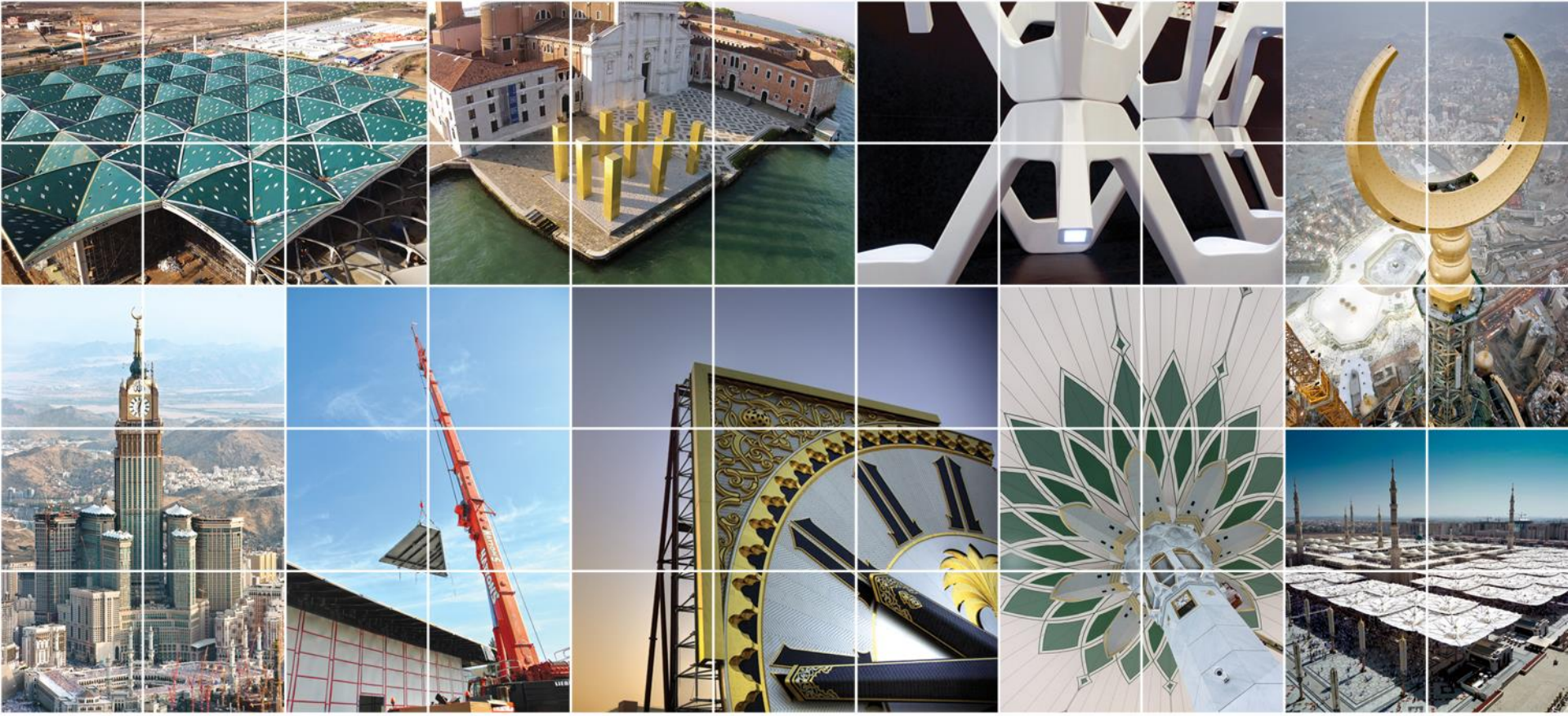
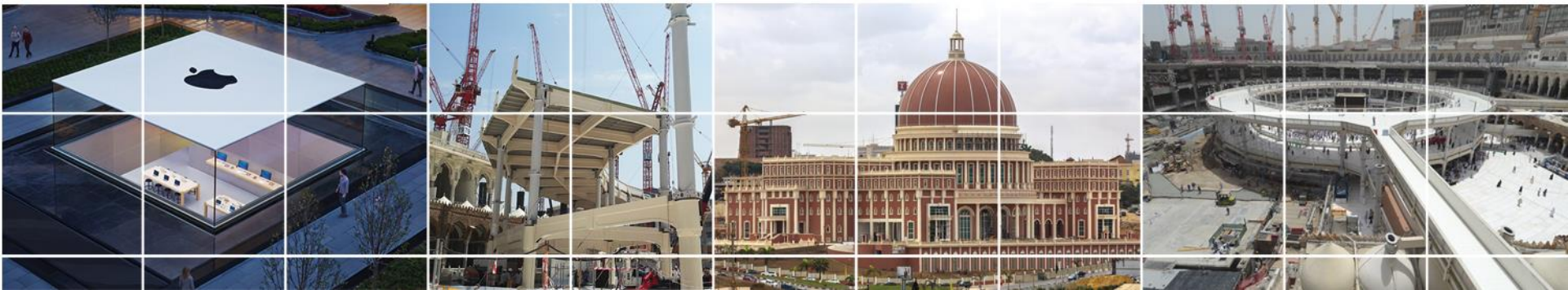


PREMIER
COMPOSITE TECHNOLOGIES

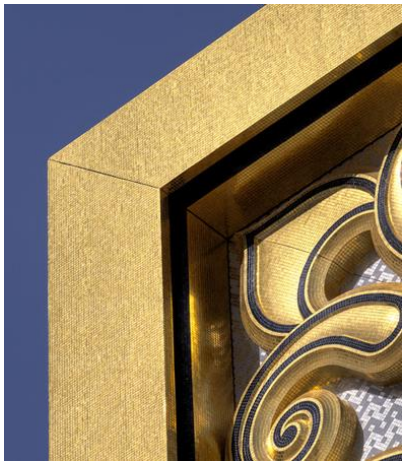
Company Profile



PREMIER
COMPOSITE TECHNOLOGIES

Company Information

Trade Name:	**Premier Composite Technologies LLC (PCT LLC)**
Legal Status:	Limited Liability Company incorporated in the Emirate of Dubai (UAE)
Establishment Date:	29 May 2006
Trade License Number:	581923
Tax Registration Number:	100020860100003
Registered Office Address:	Dubai Investments Park - P.O. Box 282777 - Dubai - UAE
Telephone No.:	+971 (0) 48868555
Fax No.:	+971 (0) 48868500
Website:	www.pct.ae
E-mail:	architecture@pct.ae
Managing Director:	Johannes Waimer
Contact Person:	Gabi Böhm - Principal Architect
E-mail address:	gabi@pct.ae



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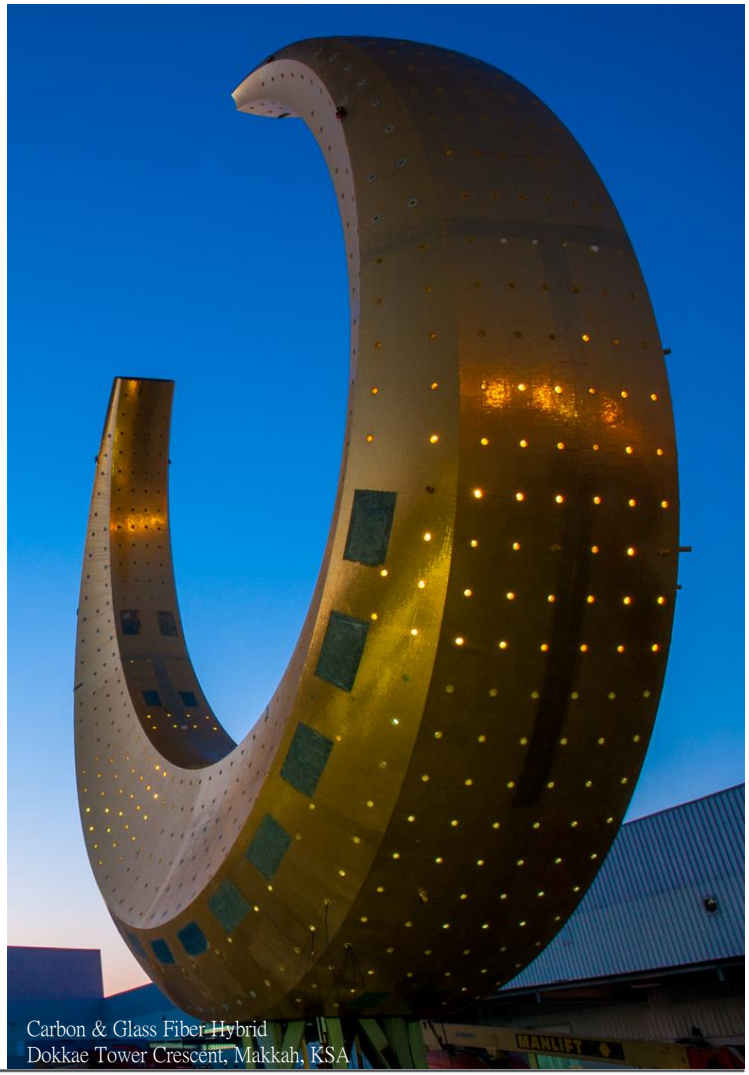
COMPOSITE TECHNOLOGIES

About Us

- **Premier Composite Technologies** (PCT) is a **leading global supplier and manufacturer of advanced composite components, PV, LED and Stone Works** for the Architectural Design, Marine, Rail, Aerospace and Automotive markets.
- Founded in 2006 by Managing Director Hannes Waimer with partners from UAE, KSA and Germany, PCT offers **unrivalled and internationally renowned expertise in Advanced Composites Construction**, with a focus on innovative, unique, tailor-made technical solutions.
- In its **over 25 years' experience** of manufacturing composite components the founding management team has undertaken the construction of a large number of projects globally covering a wide range of complex composite structures. Of these, 11 were **high profile architectural design projects** including the 60,000m2 composite tower cladding and clock faces for Saudi Arabia's "Dokaae Clock Tower" - the largest clock in the world.
- PCT offers **turn-key solutions** and has the capability to deliver complex projects as per **design, manufacture and complete installation**, including supportive steel structures.
- With its **headquarters based in Dubai**, UAE, the Company is ideally positioned to serve a truly global customer base. Facilities include **9 large manufacturing sites** in Dubai Investments Park.
- Following a tremendous growth, PCT currently proudly employs **over 1,900 people** in a multicultural environment, attracting the **best design expertise and manufacturing know-how** from all over the world.


Carbon & Glass Fiber Hybrid
Dokkae Tower Crescent, Makkah, KSA

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Service Range

PCT Architecture offers **turn-key solutions** and has the capability to deliver complex bespoke projects as per:

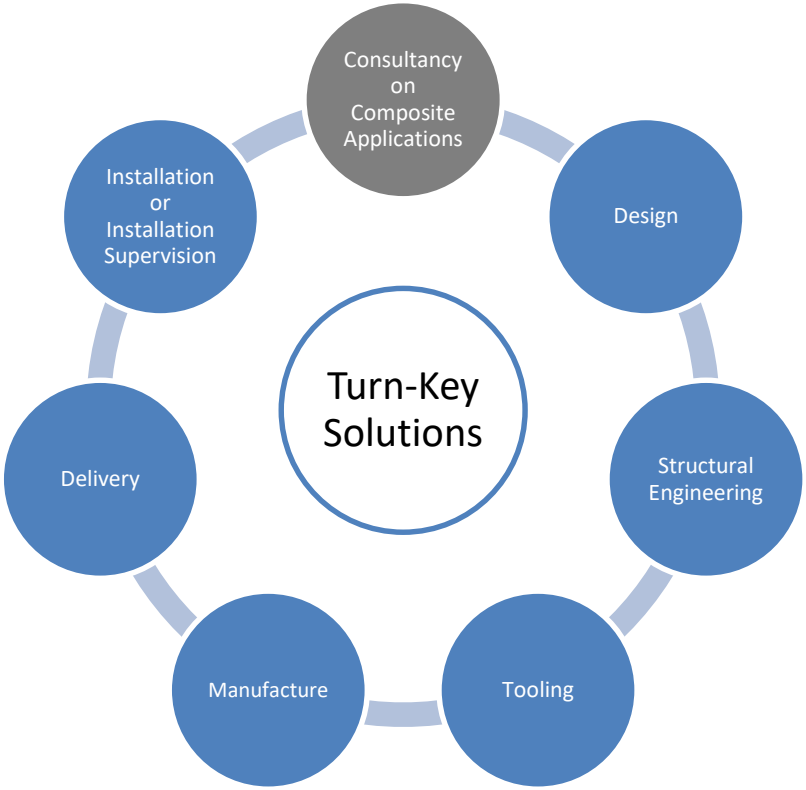
- **Consultancy on Composite Applications**
- **Design**
- **Structural Engineering**
- **Tooling (Moulds Manufacture)**
- **Manufacture**
- **Supply**
- **Delivery**
- **Installation / Installation Supervision**

Depending on the project's requirements PCT has also the capability to directly coordinate, integrate and supply:

- **Primary and Secondary Supportive Structures**
- **Metal Parts**
- **LED & PV Panels** (through PCT Green Energy Division)
- **Skylights**
- **Hydraulic / Electrical Operating Systems**
- **Other project-specific items**

Reducing the number of suppliers involved results in several benefits for the final Client.





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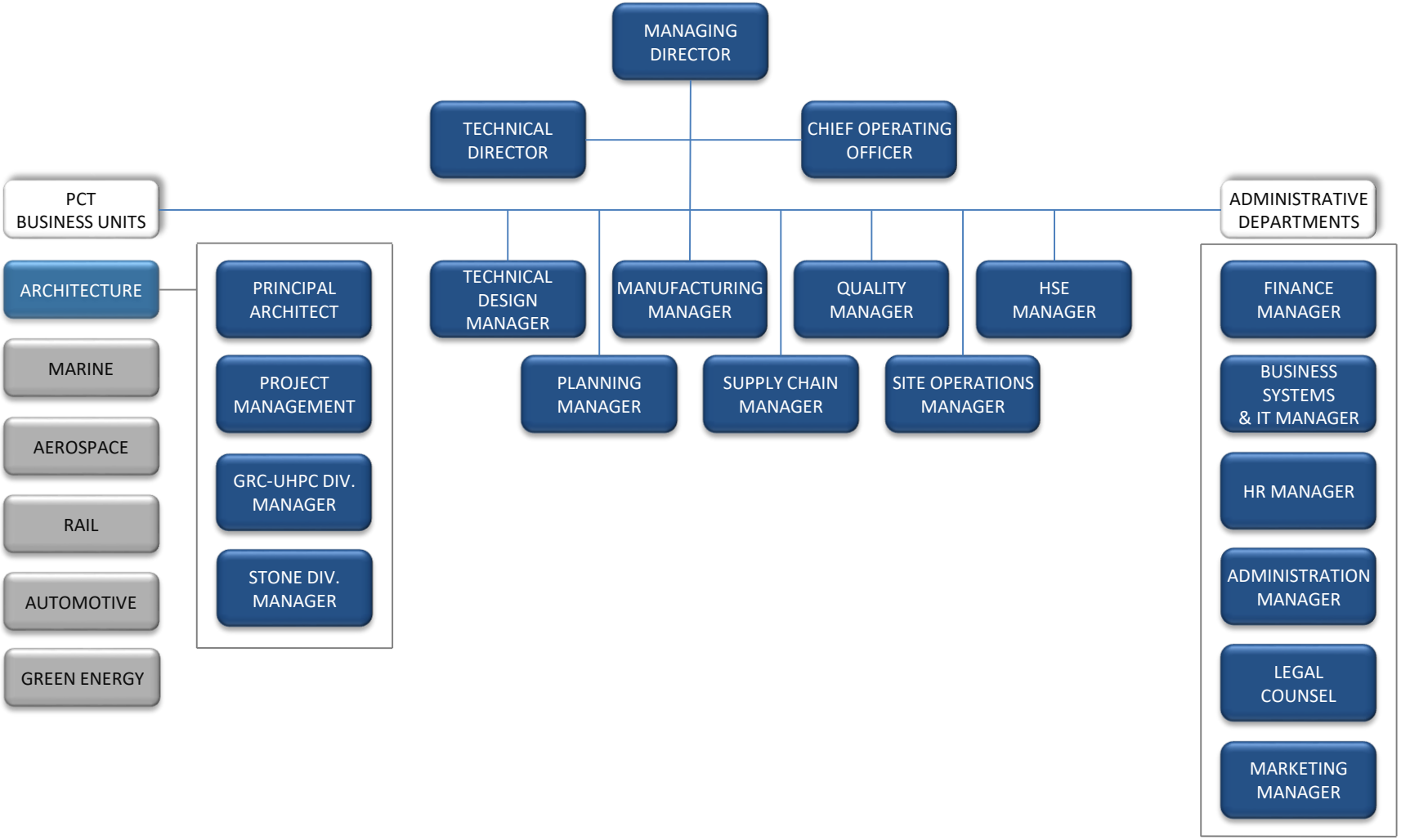
Organisation Structure



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Team

PCT can count on a multinational team of highly skilled and experienced professionals.

The strength of the PCT team is the capability of envisioning the Client's design ideas and goal to push boundaries in construction. This is a result of existing contacts to top architectural offices, an in-depth knowledge of composites and vast experience of the structural team in engineering complex composite structures.

With an average of 20-30 years experience, our key team members contribute with vast experience and technical knowledge to the delivery of our advanced composite components to our worldwide Clients.



Factory by visit Lord Norman Foster in November 2015







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Manpower

Resources - Personnel	Total
Management	25
Technical	248
Administrative	110
Total Staff	**383**
Supervisors	199
Workers (Skilled, Semi-Skilled, Labour)	1,240
Site Installation (including Supervisors)	164
Total Labour	**1,603**
Total Manpower	**1,986**

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Design and Engineering Capabilities

- Conceptual design
- Feasibility analysis
- Full 3D design and project coordination
- Structural analysis following the International rules and codes
- Method of statement for installation / maintenance

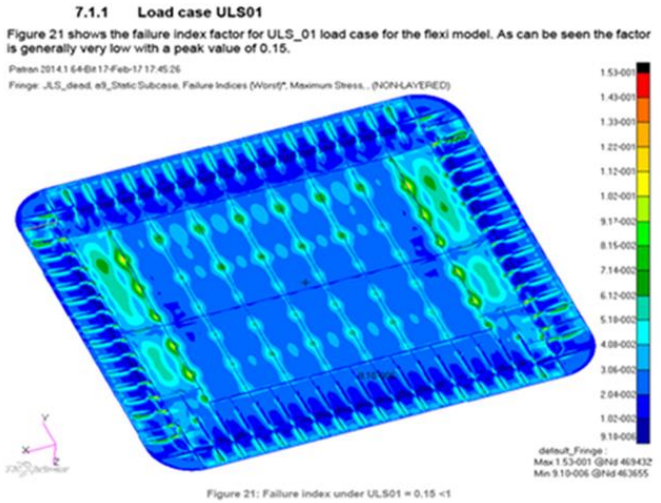
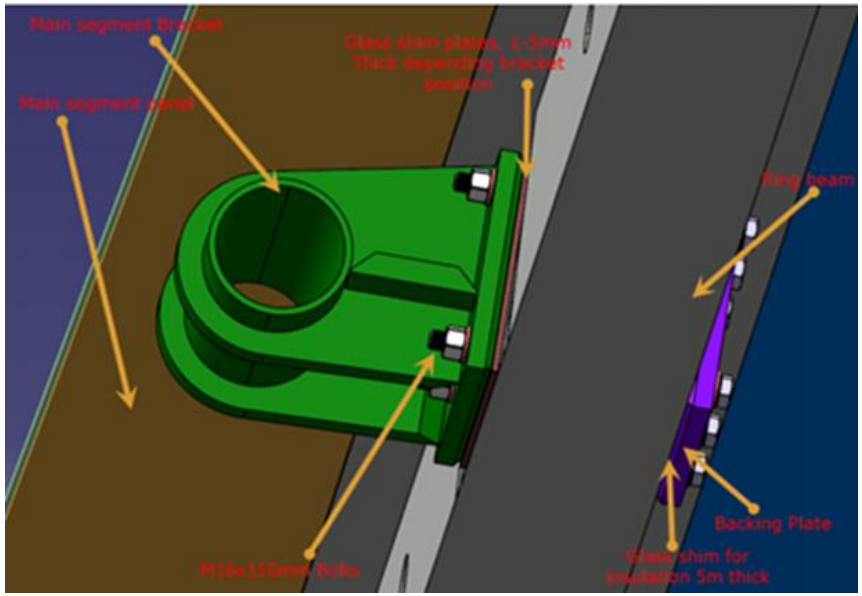
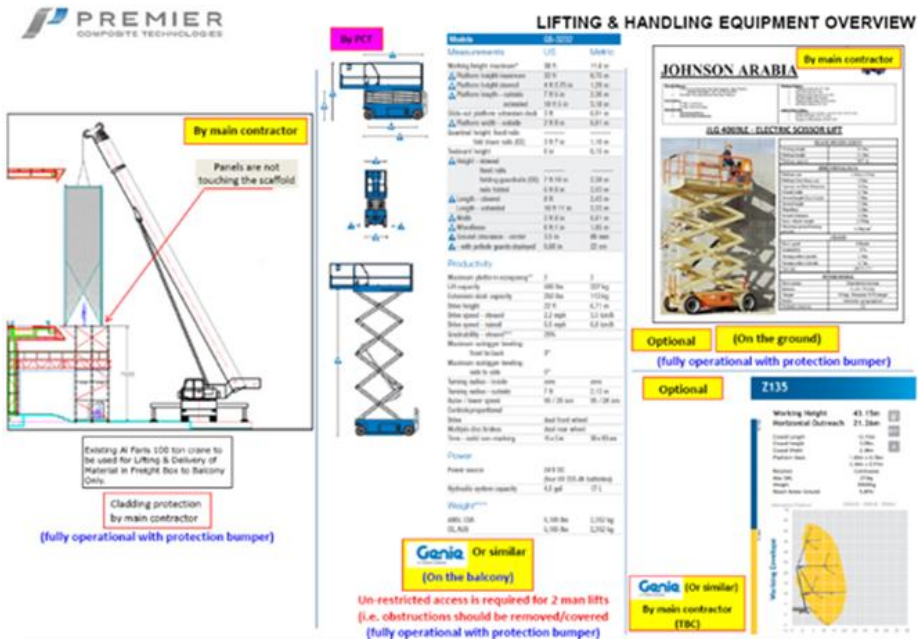


Figure 21: Failure index under ULS01 = 0.15 <1





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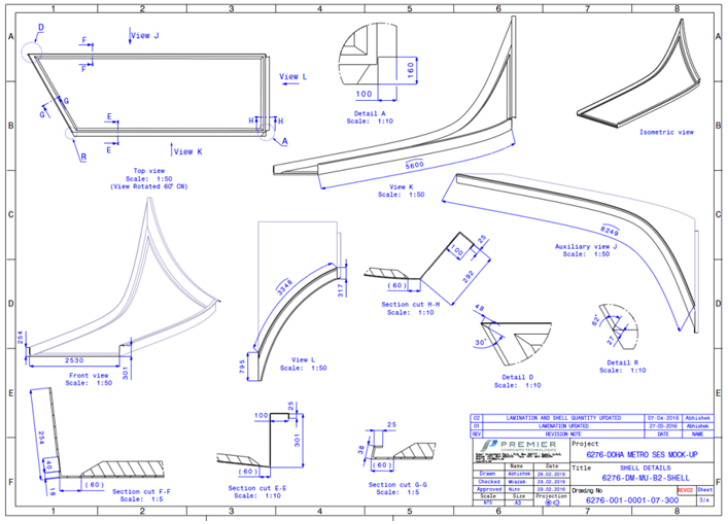
Design and Engineering Capabilities

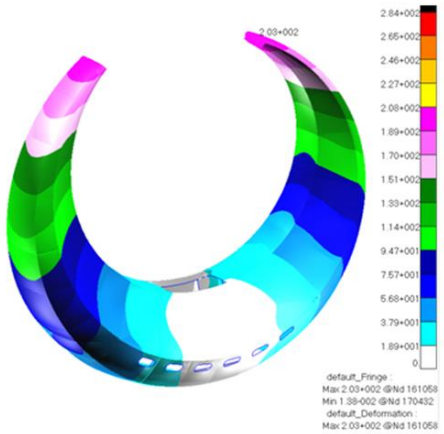
Structural Analysis, Composite Analysis, CAD and 3D Software:

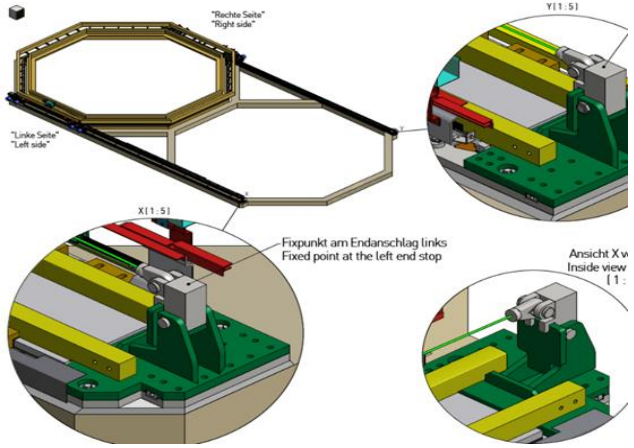
- Catia V5
- AutoCAD
- Rhino
- Revit
- Delcam
- Pronest
- MSC Nastran/Patran
- Matlab
- FibreSim
- Powermill











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Production Plant & Equipment

- PCT currently has 9 fully air conditioned manufacturing facilities located in Dubai Investments Park 2, Dubai, all of them within 6km radius, for an impressive overall production space of 58,000m^2.
- PCT Architecture facilities (highlighted in blue in the table below) are either fully dedicated or shared with other business units. The available production space gives PCT the capability to undertake multiple large projects in parallel. The capacity of the shop floor has been set-up to deliver the unprecedented quantity of 6000m^2 of FRP per month, a result PCT believe no other composite manufacturing company (either locally or globally) can currently compete with.
- The proximity to both Jebel Ali Port and Al Maktoum Airport are additional advantages.

Name	Destination	Area (m^2)	Year Started
PCT 1	**HQ / Tooling / Milling** / BU Marine	12,370	2008
PCT 2	BU Automotive / BU Aerospace	5,500	2015
PCT 3	**Finishes / Tile Application**	6,215	2006 / 2009
PCT 4	**Main Store** / BU Marine Aftersales	600	2009
PCT 5	BU Rail	3,820	2013
PCT 6	**BU Architecture Production/UHPC**	13,620	2013
PCT 7	**BU Architecture - 3D Stone Cutting**	5,260	2014
PCT 8	**Offices / General Stores**	3,490	2015
PCT 9	**BU Architecture - Assembly Plant**	8,200	2015



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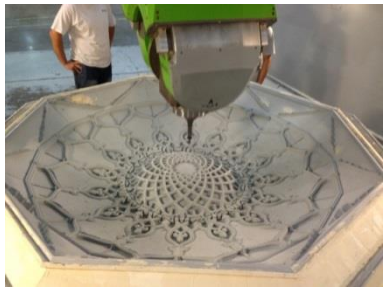
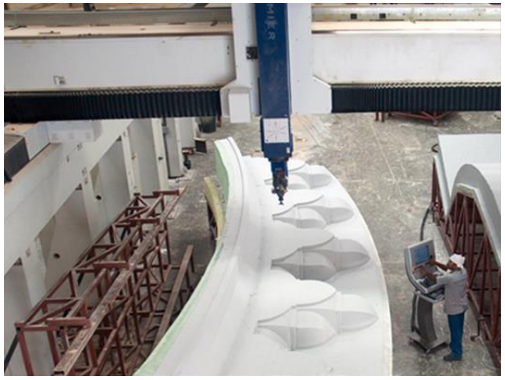
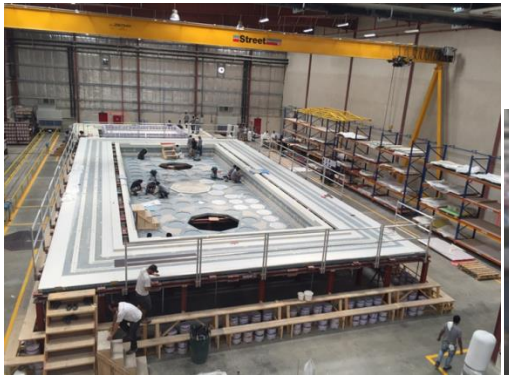
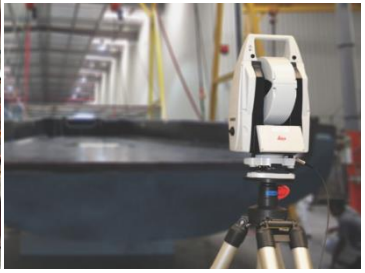
Production Plant & Equipment

- Aggressive investments in an unparalleled quantity of the most advanced equipment and machinery for production, R&D and QA/QC, along with new software and process implementation, has been one of the key factors for the success of PCT.

- The current production set-up, together with the size of the manufacturing plants, allows PCT to be in a position of competitive advantage in both the local and the global market. The proximity to both Jebel Ali Port and Al Maktoum Airport are additional advantages.

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Quality Management System

PCT believes that customer satisfaction and the achievement of our vision and mission are inextricably linked. A key success factor for achieving customer satisfaction are high quality standards whether it be in relation to designing product that meets stringent customer and regulatory requirements, maintaining the highest possible standards of product quality, delivering product on time or in our efforts to continuously improve our organisation.



PCT's Quality Management System is also supported by an experienced Quality team of over 60 people and advanced equipment such as three portable coordinate measurement machines (CMM) and a differential scanning calorimetry (DSC) machine which support us in delivering our vision.

- Leica Absolute Laser Tracker, Range: 150 m, Accuracy: 5 µm
- Romer Absolute Arm – 6 axis portable CMM, Range: 2.5 m, Accuracy: 3.8 µm
- DSC MachineGlass transition (tg) measurements.



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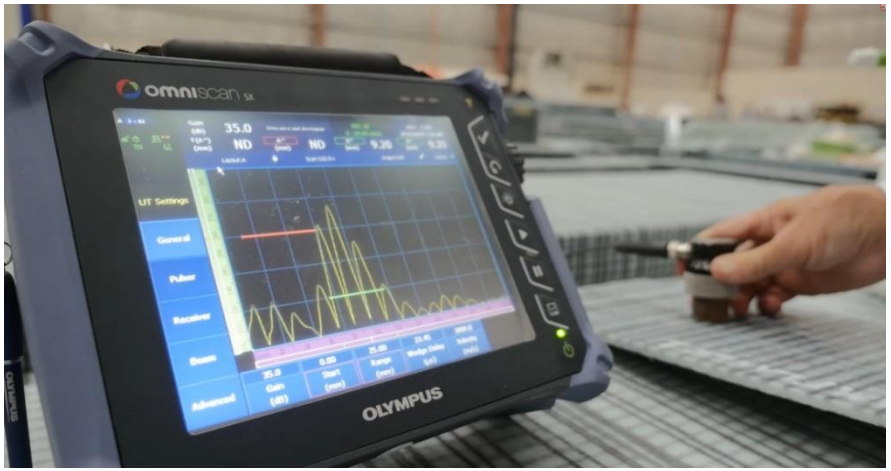
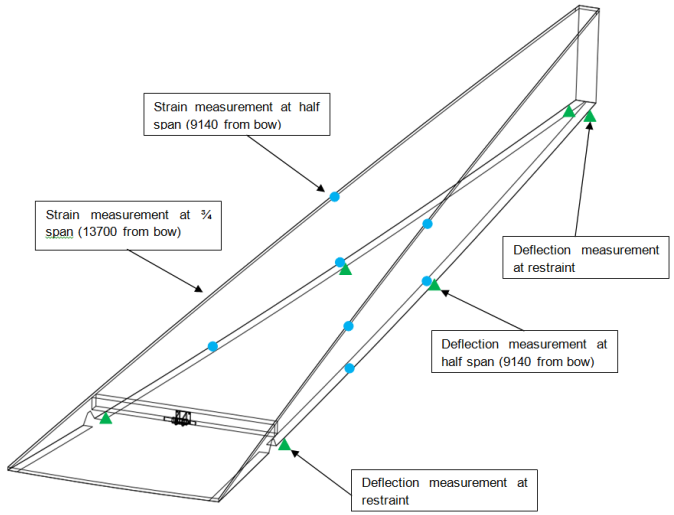
Quality Management System









Deflection and strain measurement locations

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Quality Management System

17th March 2019

Premier Composite Technologies Quality Policy Statement

Premier Composite Technologies is dedicated to the development of innovative, world class advanced composites structures within the architectural, rail and aerospace.

Premier Composite Technologies is a customer focused organization that is committed to achieving the highest levels of customer satisfaction through:

- Understanding and addressing the expectation of our customers, both internal and external.
- Complying with all applicable statutory, regulatory and industry requirements
- Providing innovate solutions which meet or exceed our customer's requirements
- Continuous measurement our performance for the improvement of the Quality management system.
- The development of our people.
- Maintenance of the International Quality Management Standard ISO9001, ISO22163 & AS/EN 9100
- Analysing risk and opportunities to prevent future failures.

Premier Composite Technologies believes that total involvement and commitment from every employee is required in order to achieve the highest possible levels of quality and customer satisfaction.

Premier Composite Technologies Quality Objectives

Premier Composite Technologies Quality Objectives are derived from the Quality Policy and are in line with the company's Vision and Mission.

Premier Composite Technologies Quality Objectives are as follows:

- Improve Customer Satisfaction
- Maintain On Time Delivery
- Maintain Certification to the ISO 9001:2015,ISO22163:2017 and AS/EN 9100:2016 standards
- Maintain a Zero Defect culture
- Achieve output of Production Schedule
- Adhere to Internal Audit Schedule

For more details please refer to management review meeting where the objectives are defined and reviewed for continued applicability at the Management Review in accordance with the Management Review Process.

At the process level, the Quality Objectives are used to derive Key Performance Indicators, which are reviewed on a regular basis in accordance with the Management Review Process with an emphasis on establishing continuous improvement action plans.

Hannes Waimer
Managing Director

Matthew Gorman
Quality Manager

Certificate

Standard	**ISO 9001:2015**
Certificate Registr. No.	**01 100 127771**
Certificate Holder:	**Premier Composite Technologies L.L.C.** P.O. Box – 282777, Dubai Investment Park, Dubai, United Arab Emirates.
Scope:	Design, Manufacture and Installation of Advanced Composite Structures for the Architectural Industry. Composite Repairs for Oil & Gas Industry
	Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.
Validity:	The certificate is valid from 2019-04-30 until 2022-04-29. First certification 2013

2019-05-05

TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

www.tuv.com

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Health, Safety and Environmental Policy

3rd December 2018

Corporate Health, Safety, Environment and Welfare Policy Statement

At Premier Composite Technologies LLC (PCT), we believe that true sustainability can only be achieved through the development and welfare of our people. No other asset in the Company contributes more to our business success and this reflects the importance that I have attached to the health, safety, environment and welfare of all employees and of all other persons who may be affected by our activities. Our primary goal in both our workplace and staff accommodation, is to ensure a healthy, injury and accident free environment.

This policy is based on PCT's Corporate Business Principles of **Leadership, Compliance, Organizational Participation and Continual Improvement**. Principles which are binding for all PCT employees with overall responsibility for Health, Safety, Environment and Welfare within Premier Composite Technologies LLC vested in me by virtue of my appointment as Managing Director.

By integrating Health and Safety, as well as Environment and Welfare, into the management of our business we commit to developing a strong, positive and safe culture that effectively reduces the likelihood of injuries, both in the workplace and in our staff accommodation; limits impacts to our business continuity and protects all our stakeholders' interests.

Employees at every level including management are responsible and accountable for PCT's overall Health, Safety, Environment and Welfare performance by working in compliance to the requirements of local and international HSE and Welfare legislation in the countries where we operate and with the safe work practices and procedures established by the Company.

Supervisors will be held accountable for the health, safety, environment and welfare of workers under their supervision and are required to ensure that all machinery and equipment are safe and that workers work in compliance with established safe work practices and procedures. All employees must receive adequate training in their specific tasks to protect their health, safety and welfare both in the workplace and in the staff accommodation.

Premier Composite Technologies HSE and Welfare objectives

- Zero Workplace Injuries and Occupational Diseases.
- Zero tolerance of injuries and Occupational Diseases in the workplace and staff accommodation.
- Promote safe and healthy working practices throughout the organization.t the organization.
- Enhance employee awareness and involvement in Health, Safety, Environment and Welfare program implementation. Of continuous improvement practices to facilitate in achieving the zero incident KPI target.
- Maintain a continued reduction of Environmental impacts
- Providing all staff the tools and facilities needed to prevent negative environmental impacts.
- Implementing effective pollution prevention and waste minimization programs to reduce, reuse, and recycle materials.
- Ensuring the reduction in use of raw materials and natural resources.
- Achieve Certification to the ISO 14001 Environmental Management and ISO 45001 Occupational Health and Safety Management Systems.
- Adhere to Audit Schedule

Through management leadership, employee participation and professional support, we have developed the PCT Health, Safety and Environmental Management System (HSE-MS) which is a commitment to the concepts of continuous improvement. The detailed arrangements for the PCT HSE-MS and procedures must support and comply with this policy statement.

Hannes Waimer
Managing Director

Mark Fielder
Head HR/HSE/Welfare





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Completed Relevant Architecture Projects List

Project Name	Scope	Description	Client	Main Contractor	Consultants	Location	Started Year	Compl. Year
Sheikh Zayed Bin Sultan Al Nahyan Mosque	Wood Works	Interior Design package, Minbar, Imam's chair, Interior Niche panels and 44 Koran bookshelves, built from solid black American walnut with hand-cut and hand-laid Mother of Pearl and Silver inlay works.				Abu Dhabi UAE	2007	2008
Madinah Shading Umbrellas	FRP	250 composite arm cladding for shading umbrellas (25m x 25m), commissioned to shelter 106,000m^2 of the Madinah Haram Piazza.	SL-Rasch GmbH	SL-Rasch GmbH	SL-Rasch GmbH	Madinah KSA	2007	2010
Dokaae Tower Clock & Crescent	FRP FRP/CFRP Steel LED	250m upper tower cladding for the largest clock in the world (Ø 43m), covered with 98 million glass mosaic tiles and gold leaf and embedded with two million LED lights. Composite Crescent Ø 23m built from carbon and glass fibre, the largest crescent ever built.	Saudi Binladin Group (SBG)	Saudi Binladin Group (SBG)	SL Rasch Dar Al-Handasah	Makkah KSA	2008	2012
New National Assembly Hall	FRP LED	Dome Ø 44m, 150 advanced composite panels measuring 2.4 x 11.5 meters, height 23m.	Teixeira Duarte	Teixeira Duarte	Dar Al-Handasah	Luanda Angola	2012	2014
Haramain High Speed Railway	FRP Skylights	Madinah Station Composite Concourse 32 modules Roof cladding, built using a fire resistant composite of glass fibre and epoxy resin combined with lightweight foam core and finished with glass mosaic colored tiles (1,281 panels covering approx. 26,000m2 area). PCT scope included unique diamond shaped skylights incorporated in panels, perforated anodized suspended ceiling, fall arrest system, stars, capping and hopper, access hatch, signage etc.	Yapi Merkezi Construction and Industry Inc.	Yapi Merkezi Construction and Industry Inc.	Foster + Partners Buro Happold	Madinah KSA	2011	2015
Mobil Mataf Elevated Walkway	CFRP Steel LED	A 2 levels walkway with a width of 12 meters located 4m and 13m above ground. A total of 400 tons of carbon fibre composites, which makes it the largest carbon fibre reinforced structure in the world.	Saudi Binladin Group (SBG)	Saudi Binladin Group (SBG)	Dar Al-Handasah	Makkah KSA	2011	2015
Alves Café Roof Brow	CFRP	Carbon reinforced polymer roof brow with seamless joints finished on site after installation was completed.	Confidential	XL Construction	Foster + Partners	Cupertino California USA	2013	2014

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Completed Relevant Architecture Projects List

Project Name	Scope	Description	Client	Main Contractor	Consultants	Location	Started Year	Compl. Year
The Glass Lantern Roof	CFRP	Lightweight ultra-thin roof made of Carbon reinforced polymer panels, seamlessly joint on site, supported only by toughened laminated glass (by others) without connections other than structural silicone.	Confidential	Ganter	Foster + Partners Eckersley O'Callaghan (EOC)	Istanbul Tukey	2013	2014
Shamiyah Ceremonial Dome	FRP Marble Wood Steel Operating Mechanism	Movable Ceremonial Dome Ø 36m with mosaic and marble finishes to exterior and veneers, teak ornaments, Carrara Marble muqarnas and gilded profiles to interior, composite finial and crescent.	Saudi Binladin Group (SBG)	Saudi Binladin Group (SBG)	Dar Al-Handasah	Makkah KSA	2013	2016
Shamiyah Fixed Domes	FRP Marble Wood Steel	4 Fixed Domes Ø 16m with mosaic and marble finishes to exterior and veneers, teak ornaments, Carrara Marble muqarnas, gilded profiles and gemstone finishes to interior, composite finial and crescent.	Saudi Binladin Group (SBG)	Saudi Binladin Group (SBG)	Dar Al-Handasah	Makkah KSA	2013	2016
Sky Fly Dubai	FRP	Manufacture and Installation of structural FRP panels for the vertical wind tunnel.	Inflight Dubai	Arkiteknik	Inflight Dubai	Dubai UAE	2014	2016
Shamiyah Minarets Roofs	FRP LED Laser	Upper and lower composite pitched roofs, a 8.8 meter composite finial and crescent, LED and Laser system.	Saudi Binladin Group (SBG)	Saudi Binladin Group (SBG)	Dar Al-Handasah	Makkah KSA	2014	2016
U53 Umbrella	FRP Marble LED	Composite cladding, sandwich structure of carbon glass fiber epoxy resin laminate, finished with mosaic tiles. White Carrara marble ornamental cladding with 8 incorporated LED Lamps.	Leibherr- Intertrading AG	Leibherr- Intertrading AG	SL-Rasch GmbH	Makkah KSA	2015	2016
Specialty CFRP Structures	CFRP	Specialty Carbon Fiber Advanced Composite components for Roofing Systems and Soffits (confidential projects).	Confidential	Various	Various (Foster + Partners, Eckersley O'Callaghan (EOC), Integrated Design Associates, Woods Bagot, Callison RTKL)	Various	2014	2019

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Completed Relevant Architecture Projects List

Project Name	Scope	Description	Client	Main Contractor	Consultants	Location	Started Year	Compl. Year
Al Rayyan Palace Domes	FRP UHPC	Manufacture and installation of 3 FRP Domes finished with glass mosaic tiles and 1 UHPC perforated Dome for a private villa.	AL Huda Engineering Works	AL Huda Engineering Works	The Arab Architects	Al Rayyan Qatar	2015	2017
Bugatti Showroom Horseshoe Façade	FRP	Manufacture and installation of GFRP horseshoe façade feature finished with metallic paint for the new Bugatti showroom in Dubai.	Al Habtoor Motors	n.a.	Aracome Innerspace	Dubai UAE	2017	2017
Private Club House Abu Dhabi	FRP Steel	Design, Manufacture, Supply and Installation of FRP cladding and metal parts for Skylights covers.	SL-Rasch GmbH	SL-Rasch GmbH	SL-Rasch GmbH	Abu Dhabi UAE	2017	2017
Dubai Creek Harbour Shade Structures Mock-Up	FRP	Design, Manufacture, Supply and Installation of 3 FRP Lightweight Shelter Units Mock-Up (9 additional Units contracted)	The Lagoons Phase One LLC (Emaar)	n.a.	SWA Group	Dubai UAE	2017	2017
Specialty Ceiling for Retail Project	UHPC	Supply and Installation of specialty UHPC Ceiling.	Confidential	Shawmut Design & Construction	Ennead Architects LLP	Arizona US	2017	2018
Christian Dior Store at Dubai Mall	CFRP Marble	Design, Manufacture, Supply and Installation of CFRP Staircase and Marble Lamelle Façade.	Christian Dior Couture	DECO Emirates LLC	Oral Architects	Dubai UAE	2017	2018
Rixos Saadiyat Island Hotel	Marble	Manufacture, Supply and Installation of Stone Works	Mega Projeler	Mega Projeler	Arketipo Design	Abu Dhabi UAE	2017	2018
Alexander Mc Queen Interior	GRG UHPC	Manufacture Gypsum Panels and UHPC Panels for Alexander Mc Queen retail store at The Dubai Mall.	Alexander Mc Queen	DECO Emirates LLC		Dubai UAE	2018	2018
Dubai Creek Harbour Shade Structures	FRP	Design, Manufacture, Supply and Installation of 15 FRP Lightweight Shelter Units	The Lagoons Phase One LLC (Emaar)	n.a.	SWA Group	Dubai UAE	2018	2018
Private Villa	Marble	Manufacture, Supply and Installation of Stone Works	Shafa Al Nahdah Buildng. Cont.	Shafa Al Nahdah Buildng. Cont.	The Abitare	Dubai UAE	2017	2018

PREMIER
COMPOSITE TECHNOLOGIES

Completed Relevant Architecture Projects List

Project Name	Scope	Description	Client	Main Contractor	Consultants	Location	Started Year	Compl. Year
Al Garhoud Towers Mixed-Use Development Mashrabiya Screen	UHPC	Design, Manufacture, Supply and Installation of UHPC Panels for Mashrabiya Screen with specialist façade carrier system.	Hasabi Real Estate	BIC Contracting LLC	Innovative Engineering Consultants	Dubai UAE	2017	2019
Khalifa Bin Butti Al Muhairi Private Villa	Marble	Manufacture, Supply and Installation of Stone Works	Gemaco Interiors	Gemaco Interiors		Abu Dhabi UAE	2018	2019
Christian Dior Store Siam Paragon	Marble	Design, Manufacture and Supply and Installation Supervision of Marble Lamelle Façade.	Christian Dior Thailand	Permasteelisa Hong Kong Limited	Pure Creative International	Bangkok Thailand	2019	2019
Christian Dior Store Macau Venetian	Marble	Design, Manufacture and Supply and Installation Supervision of Marble Lamelle Façade.	Christian Dior	Legend (Macau) Interiors Decoration Limited	Pure Creative International	Macau China	2019	2019
Christian Dior Store IFC	Marble	Design, Manufacture and Supply and Installation Supervision of Marble Lamelle Façade.	Christian Dior Commercial (Shanghai) Co. Ltd	TBA	Pure Creative International	Shanghai China	2019	2019
Alexander Mc Queen Kuwait	GRG	Manufacture Gypsum Panels for Alexander Mc Queen retail store.	Alexander Mc Queen	DECO Emirates LLC		Kuwait City Kuwait	2019	2019

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COMPOSITE TECHNOLOGIES

Current Relevant Architecture Projects List

Project Name	Scope	Description	Client	Main Contractor	Consultants	Location	Started Year	Compl. Year
Mataf Ceiling	FRP/CFRP UHPC Agglomerates LED	Structural ceiling panel system, glass/carbon Hybrid, with an acoustic layer, decorative finishes in Ultra High-Performance Concrete (UHPC) and agglomerates (total area 170,000m²), including lighting package.	Saudi Binladin Group (SBG)	Saudi Binladin Group (SBG)	Dar Al-Handasah	Makkah KSA	2013	2020
Shamiyah PV Bridges and PV Roof Shooters	FRP UHPC Steel LED Marble PV	Photovoltaic system at roof shooters and photovoltaic cover for North Bridges including FRP, steel frame, lighting elements, UHPC components and marble finish.	Saudi Binladin Group (SBG)	Saudi Binladin Group (SBG)	Dar Al-Handasah	Makkah KSA	2014	2019
Expo 2020 UAE Pavilion Wings and Cladding	CFRP FRP	Design, Manufacture, Supply and Installation of CFRP structural wings, FRP cladding and steel substructure for cladding.	The National Media Council - Masdar	Arabtec Construction LLC	Calatrava International	Dubai UAE	2018	2020
Expo 2020 Sustainability Pavilion E-Trees, W-Tree and Canopy	CFRP FRP PV Steel	Engineering, design, manufacture, delivery and installation of 18 E-Trees, 1 W-Tree and Main Canopy including secondary steelworks and PV System.	Emaar	ASGC Construction LLC	Grimshaw International	Dubai UAE	2018	2020
Dubai Creek Harbour Marina Terminus	CFRP	Design, Manufacture, Supply and Installation of Marina Terminus CFRP Observation Deck at Dubai Creek Harbour by Emaar.	The Lagoons Phase One LLC (Emaar)	TBC	SWA Group	Dubai UAE	2018	2019

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COMPOSITE TECHNOLOGIES

Current Relevant Architecture Projects List

Project Name	Scope	Description	Client	Main Contractor	Consultants	Location	Started Year	Compl. Year
ENOC Futuristic Retail Fuel Station Canopy & PV System for Expo 2020	CFRP PV	Design, Manufacture and Supply and Installation of Roof Canopy, supporting structure, ETFE Cushions and PV System.	ENOC Retail LLC	TBC	Aedas	Dubai UAE	2019	2020
Specialty CFRP Structures	CFRP	Specialty Carbon Fiber Advanced Composite components for Roofing Systems and Soffits (confidential projects)	Confidential	Various	Various	Various	2019	2021
Christian Dior Store at Dubai Mall – Phase 3	Marble	Design, Manufacture, Supply and Installation of Marble Lamelle Façade.	Christian Dior Couture	DECO Emirates LLC	Oral Architects	Dubai UAE	2020	2020

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COMPOSITE TECHNOLOGIES

Advantages of Advanced Composites for Architecture

Ability to mould complex forms:

- ✓ New aesthetic possibilities - real double curved geometry - no facetted surfaces
- ✓ Geometrically more efficient solutions

Special surface finishes and effects:

- ✓ Ability to integrate special finishes and a very wide variety of unusual effects

Reduced mass:

- ✓ Easier, faster and more economic installation - smaller cranes required
- ✓ Ability to bring larger sections to site reducing assembly time and cost
- ✓ Less disruption during installation
- ✓ Reduction in size and cost of supporting structure, foundations, fixation brackets etc.
- ✓ Reduced energy in transportation to site

Increased panel sizes:

- ✓ Panel sizes only limited by transport constraints
- ✓ Less visible joints



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COMPOSITE TECHNOLOGIES

Advantages of Advanced Composites for Architecture

Offsite fabrication and modular construction:

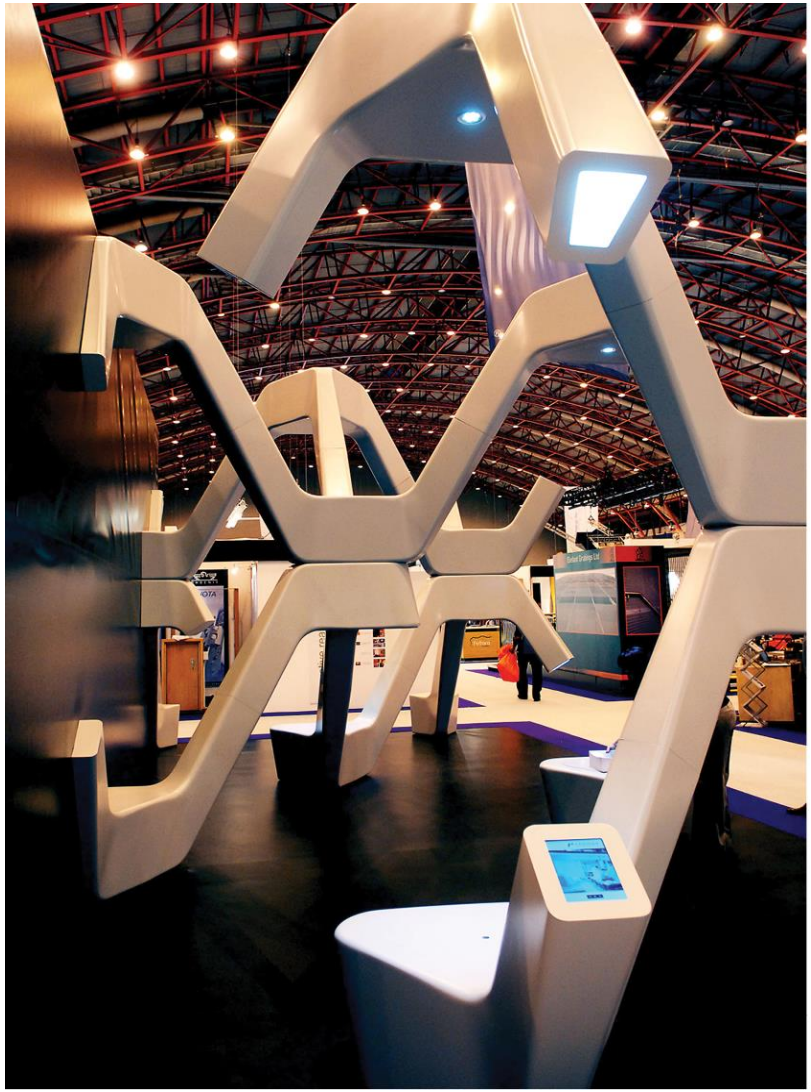
- ✓ Ability to automate and mechanise production
- ✓ Services can be factory fitted into the structure
- ✓ Better Quality Control
- ✓ Manufacture can take place concurrently with ground-works on site
- ✓ No scaffolding required - improved Health & Safety
- ✓ Reduced installation time and cost

Superior durability and longevity:

- ✓ Resistant to atmospheric degradation
- ✓ Reduction in maintenance requirements, through-life costs and disruption

Efficiency and environmental sustainability:

- ✓ Improved thermal insulation
- ✓ Possibility of lower embedded energy
- ✓ Possibility of recycling
- ✓ Possible use of natural fibres and resins



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COMPOSITES FOR ARCHITECTURE

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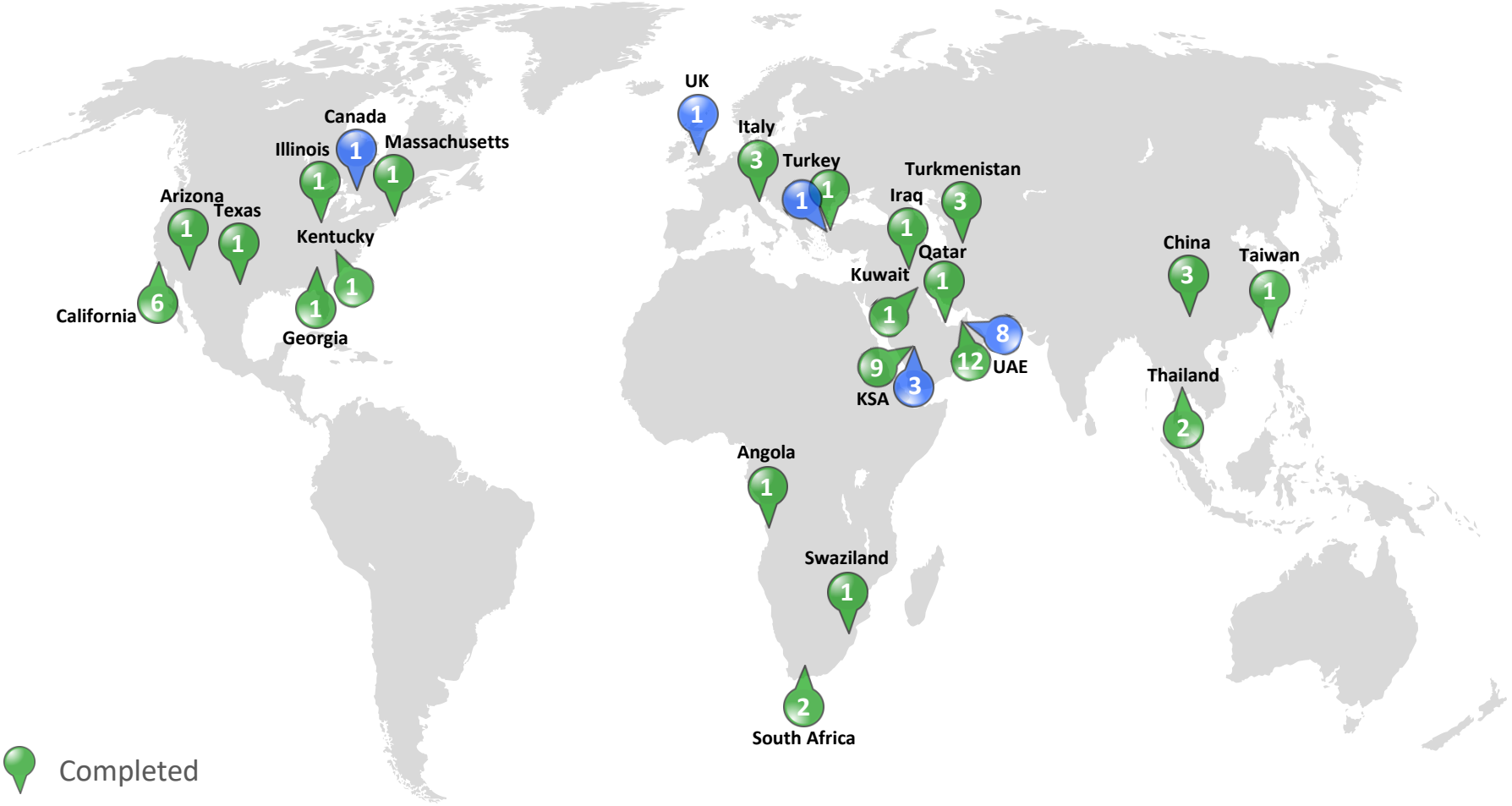
Manufactured in Dubai, delivered globally



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CFRP Roof for Alves Restaurant, California, US (2014)
1400 m2 roof area – seamless finished joints



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CFRP Roof for Alves Restaurant, California, US (2014)
1400 m2 roof area – seamless finished joints









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CFRP Roof for retail store, Istanbul, Turkey (2014)
100 m2 roof area – 10mx10m carbon roof, 53mm thick at the perimeter







Winner of 2014 Supreme Award for Structural Engineering Excellence

Content Courtesy: www.structuralawards.org

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CFRP Roof for retail store, Istanbul, Turkey (2014)
100 m2 roof area – 10mx10m carbon roof, 53mm thick at the perimeter



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CFRP Roof and Soffit for Steve Job's Theatre, California, US (2015-2016)



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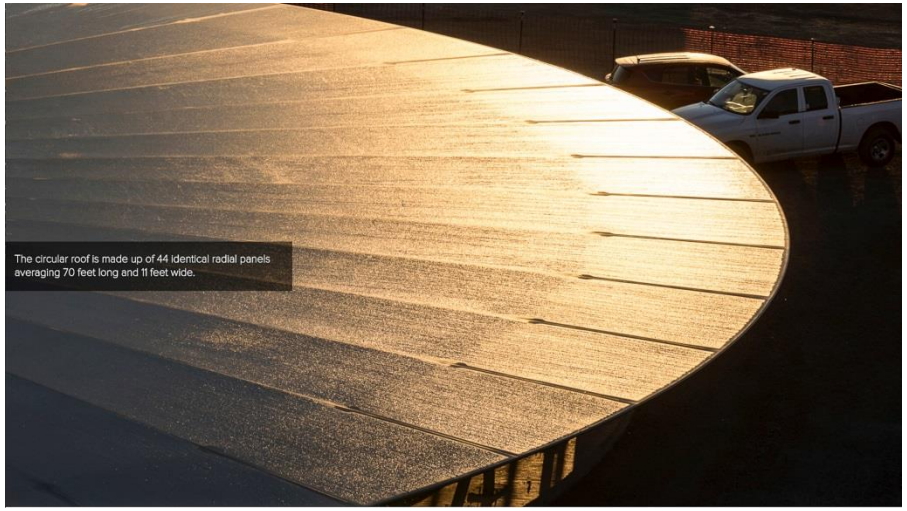
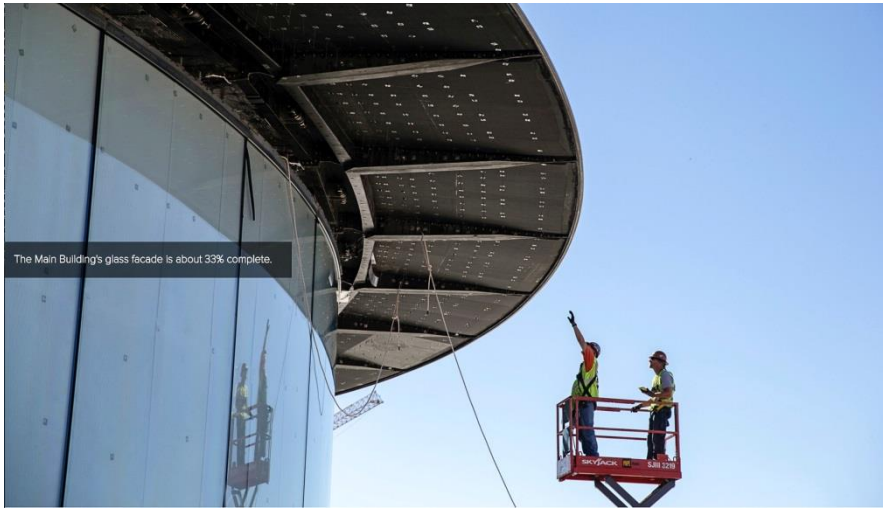
CFRP Roof and CFRP external Soffit for Steve Job's Theatre, California, US (2015-2016)
1828m2 roof area. Largest self-supportive carbon roof in the world; 400 m2 of Soffit area









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CFRP Roof and CFRP external Soffit for Steve Job's Theatre, California, US (2015-2016)
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CFRP Roof and CFRP Soffit for Retail Store, Kunming, China (2016)




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CFRP Solar Wings

One of the largest kinetic art installation in the world, consisting of 3-sided frame design (12 x 3m) as well as a complex moving mechanism to open and close the screens.

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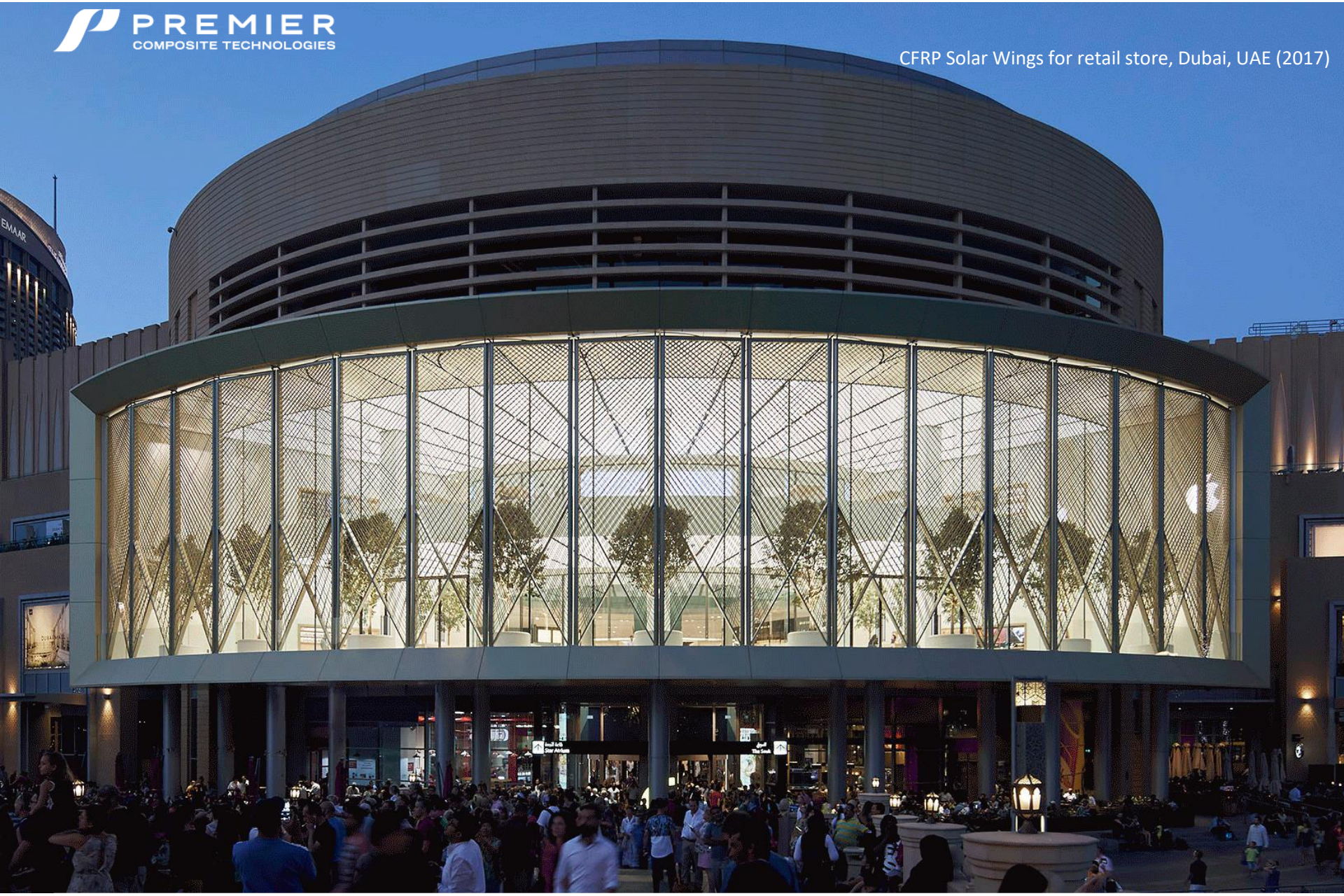
CFRP Solar Wings for retail store, Dubai, UAE (2017)



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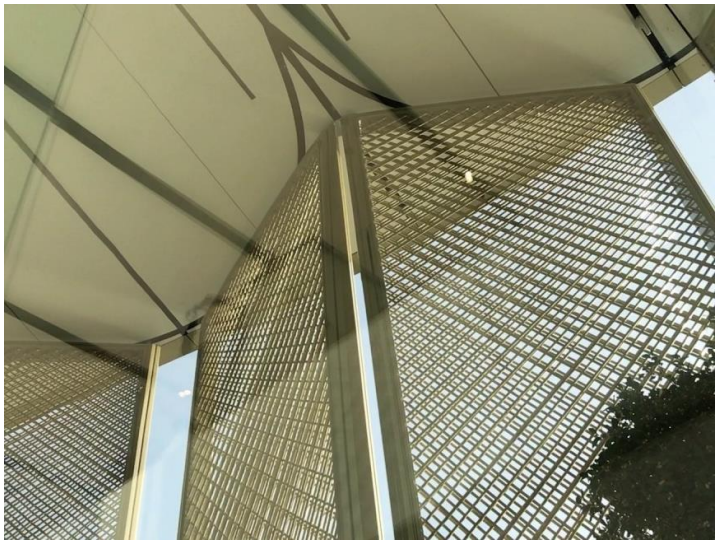
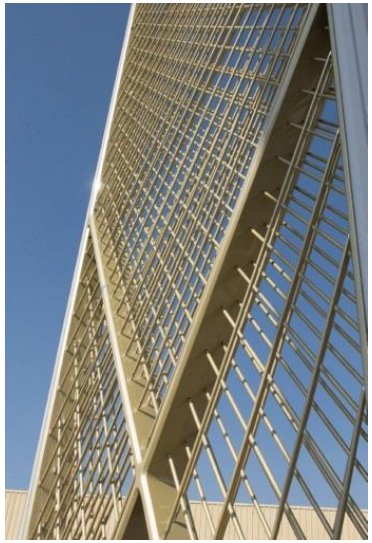
COMPOSITE TECHNOLOGIES

CFRP Solar Wings for retail store, Dubai, UAE (2017)
18 shading wings 12 x 3 meters, 648 m2 wing area
Largest kinetic art installation in the world











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COMPOSITE TECHNOLOGIES

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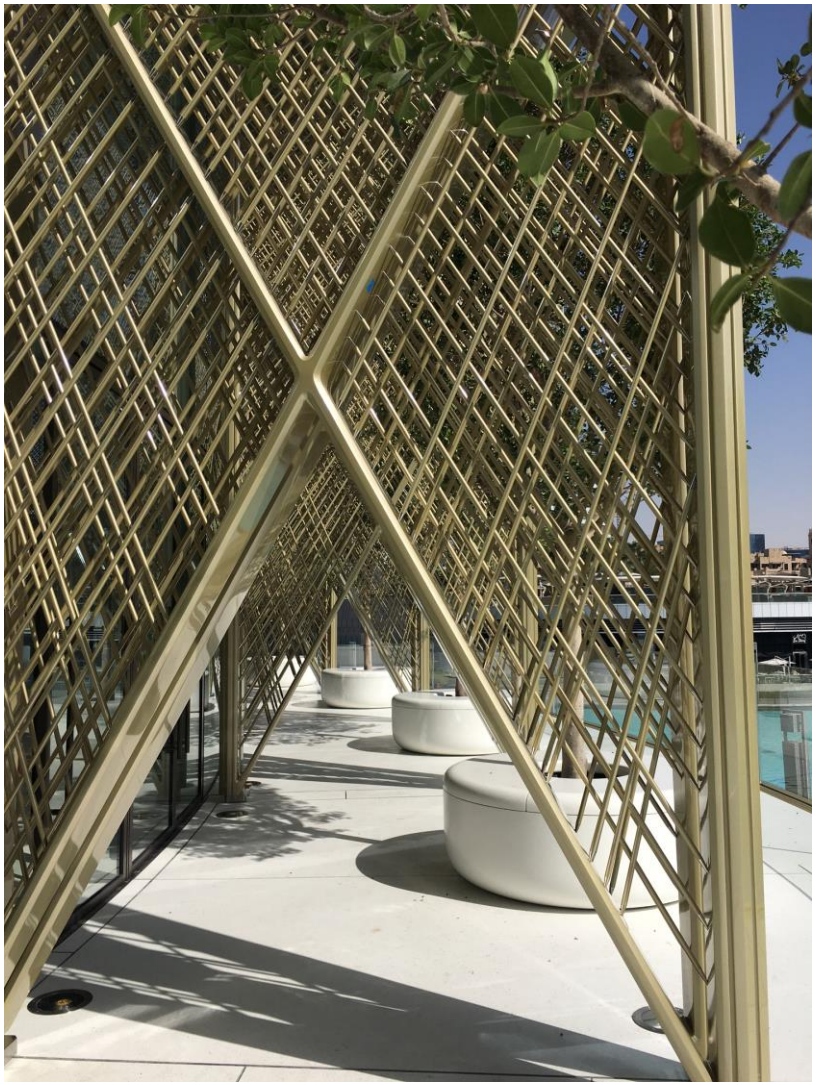

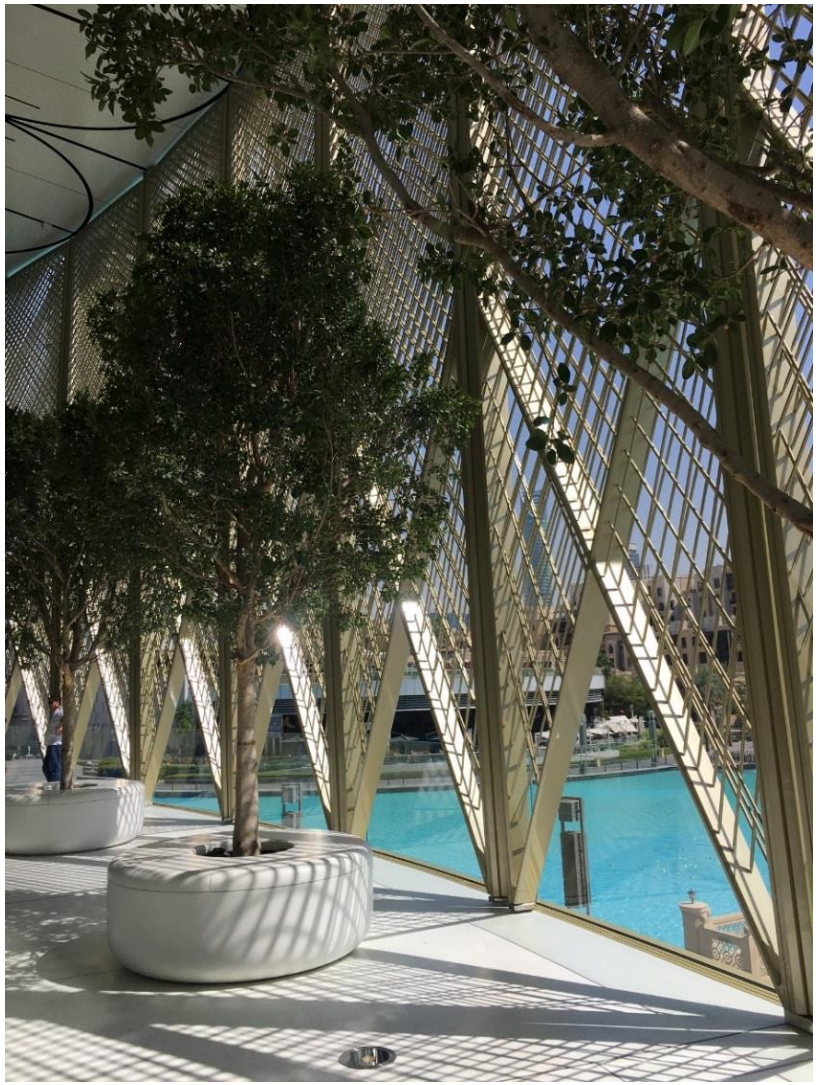

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CFRP Roof for Retail Store Chicago, Illinois, US (2017)



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CFRP Roof for Retail Store Chicago, Illinois, US (2017)



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CFRP Roof for Retail Store Chicago, Illinois, US (2017)



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CFRP Roof for Retail Store Chicago, Illinois, US (2017)

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Dubai Creek Harbour Shade Structures
Dubai, UAE

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Emaar – FRP Shade Structures at Dubai Creek Harbour by SWA



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Emaar – FRP Shade Structures at Dubai Creek Harbour by SWA



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Emaar – FRP Shade Structures at Dubai Creek Harbour





Emaar – FRP Shade Structures at Dubai Creek Harbour

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Expo 2020 UAE Pavilion
Dubai, UAE


BOB
8002622
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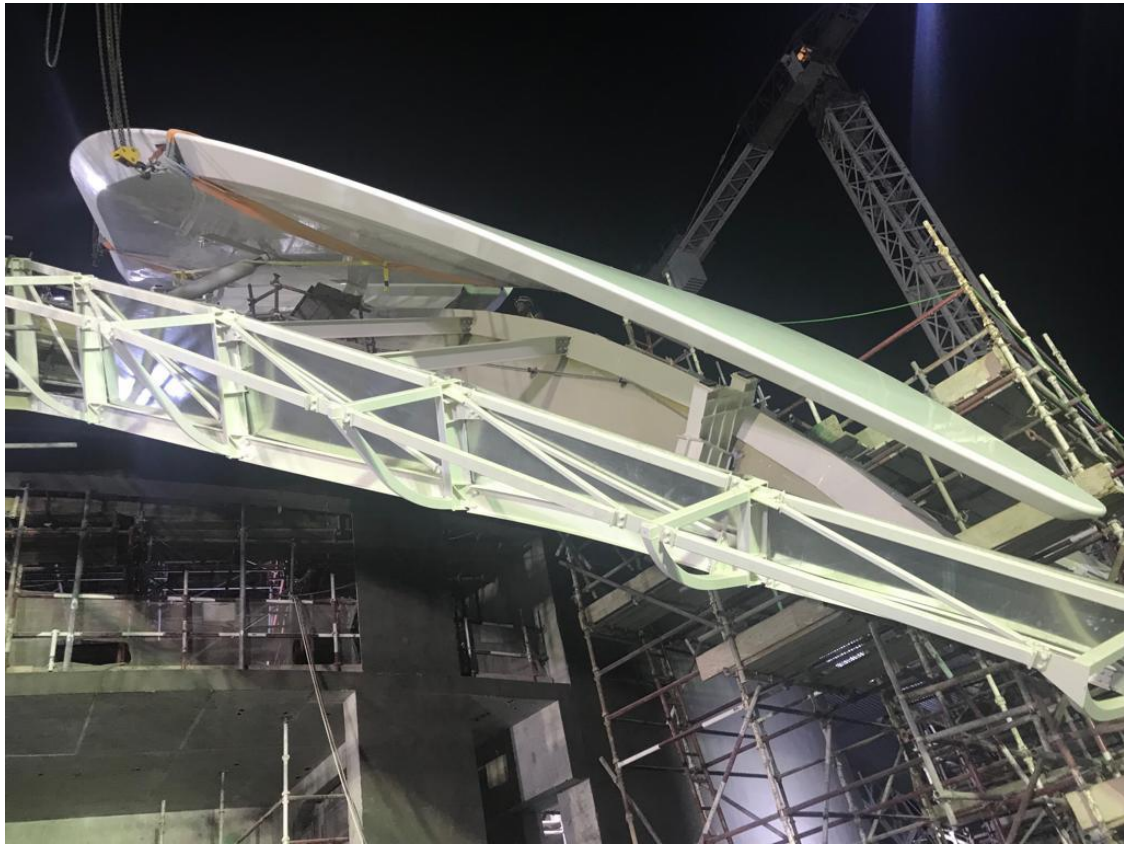
MANLIFT
SAFETY FIRST
THE KEY TO SAFETY IS IN YOUR HANDS





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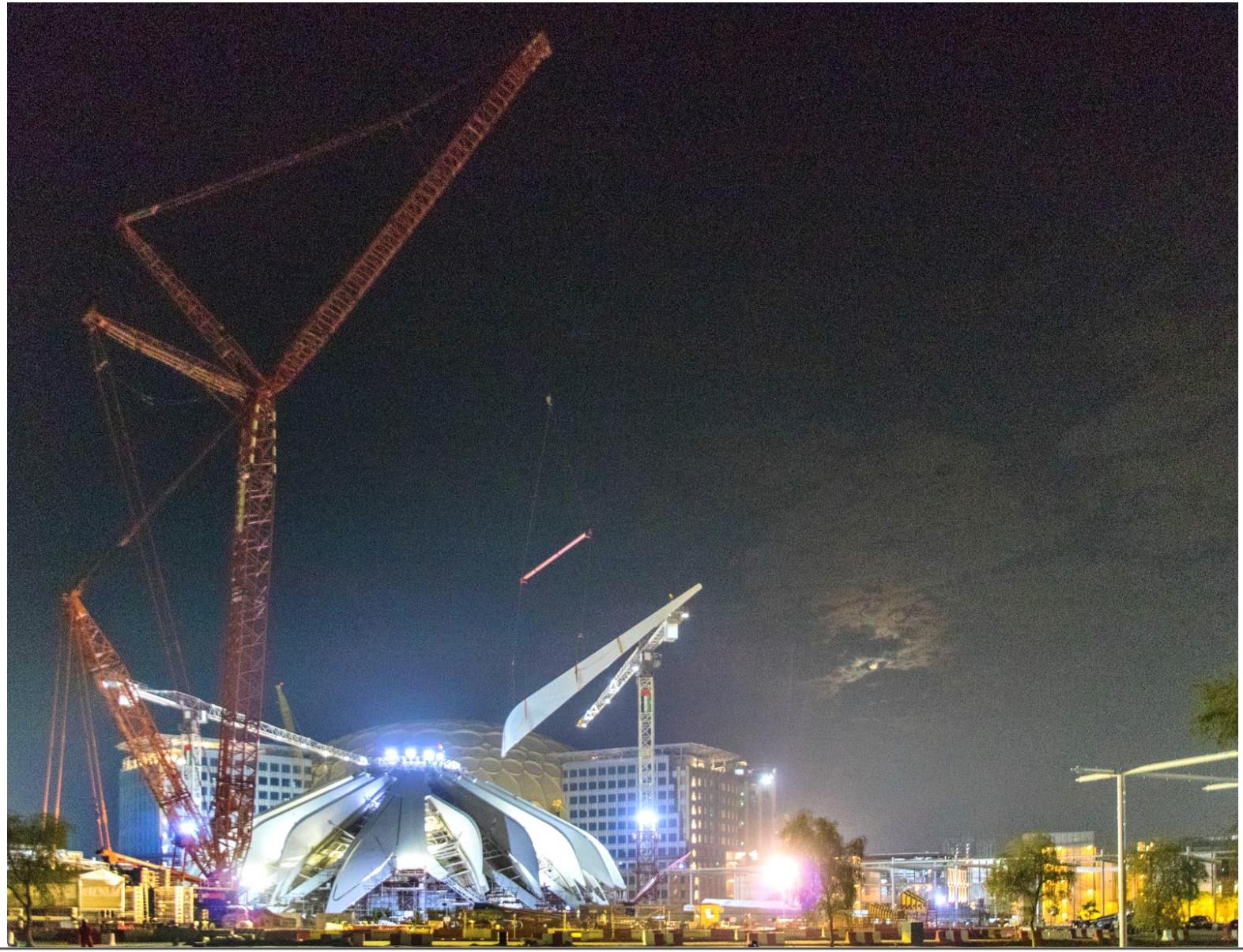

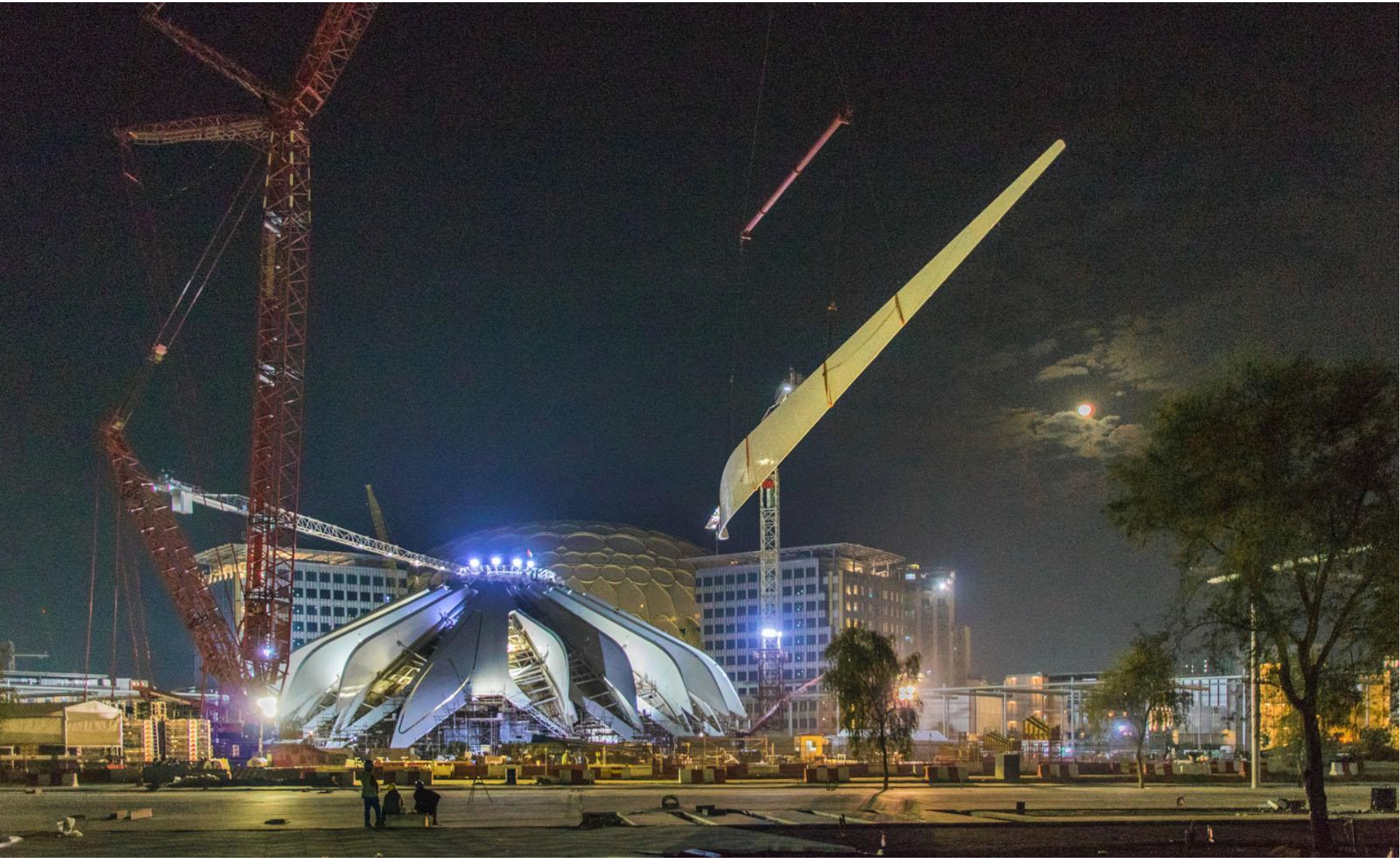

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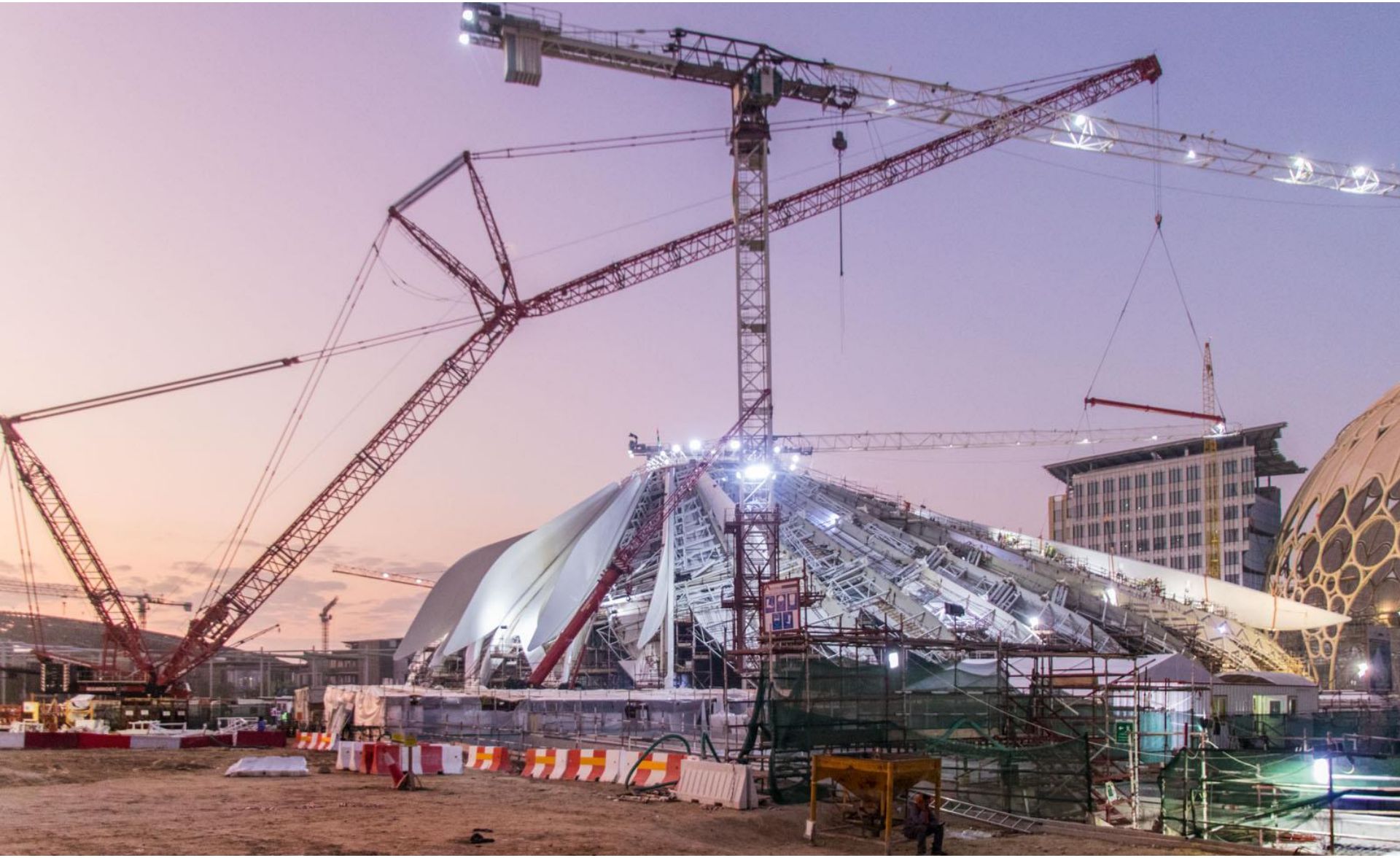



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Expo 2020 Sustainability Pavilion
Dubai, UAE



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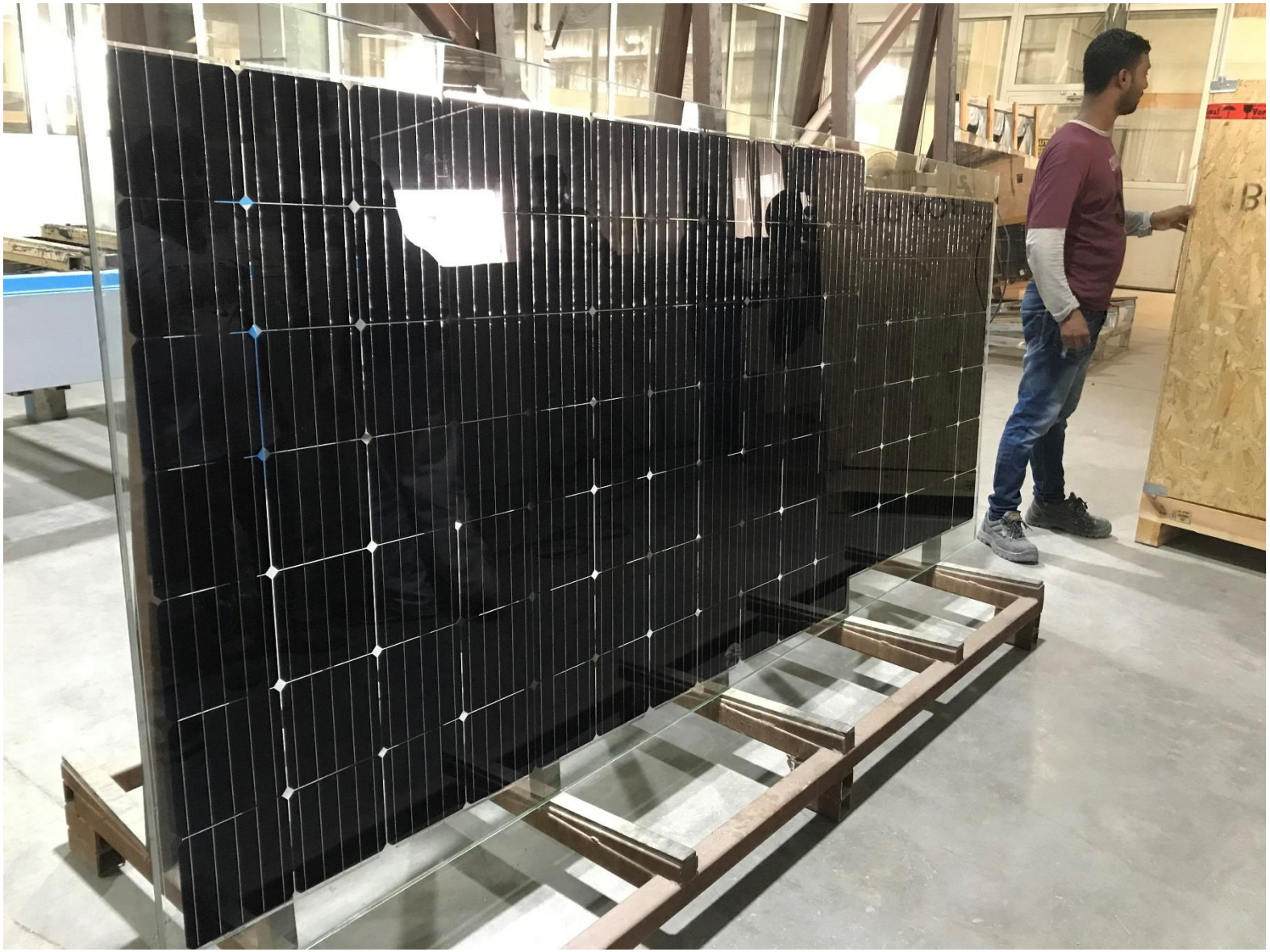





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Dubai Creek Harbour Marina Terminus (Dubai, UAE)

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ENOC Petrol Station of the Future (Dubai, UAE)

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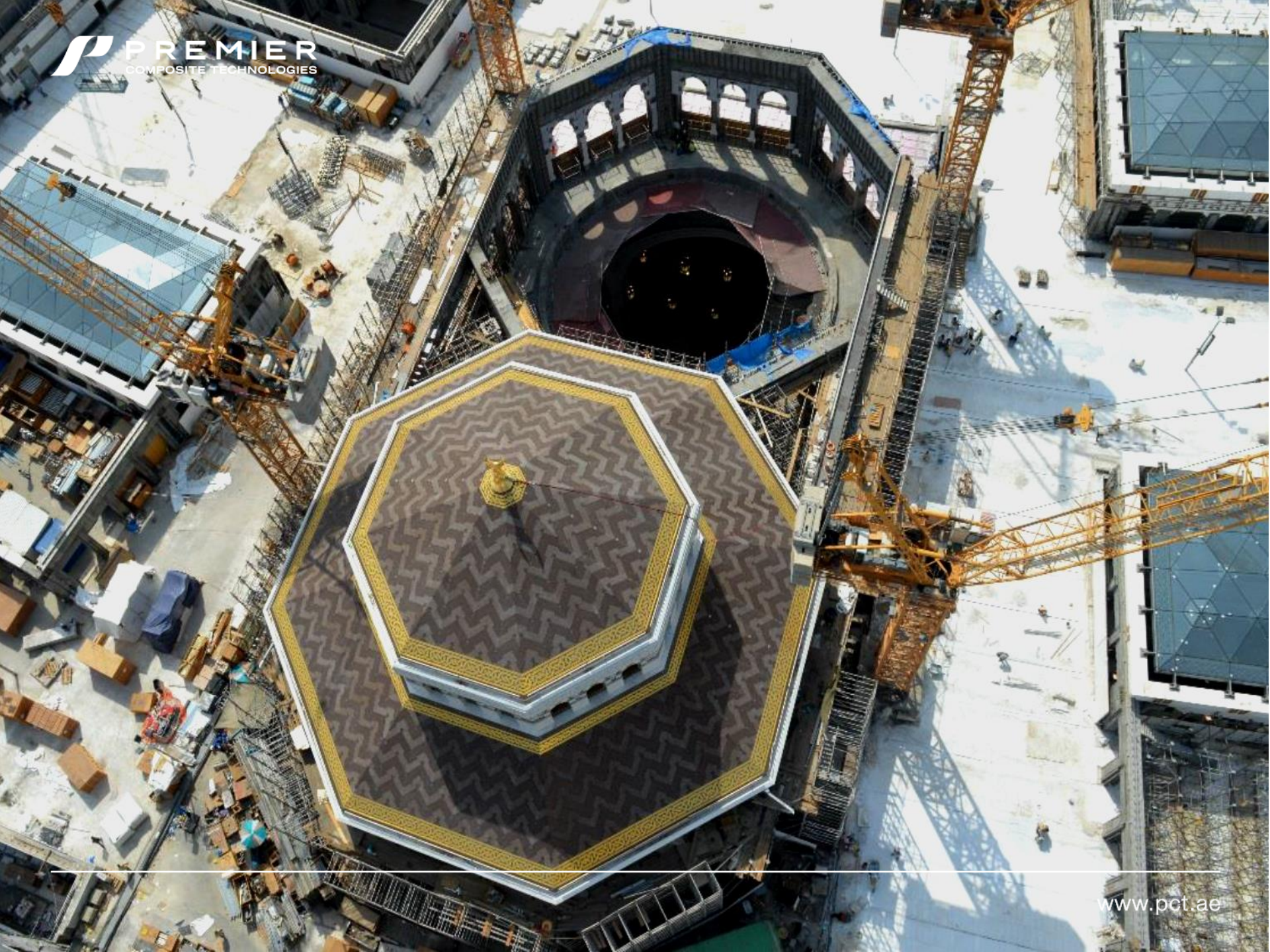
Shamiya Expansion Domes and Minarets, Makkah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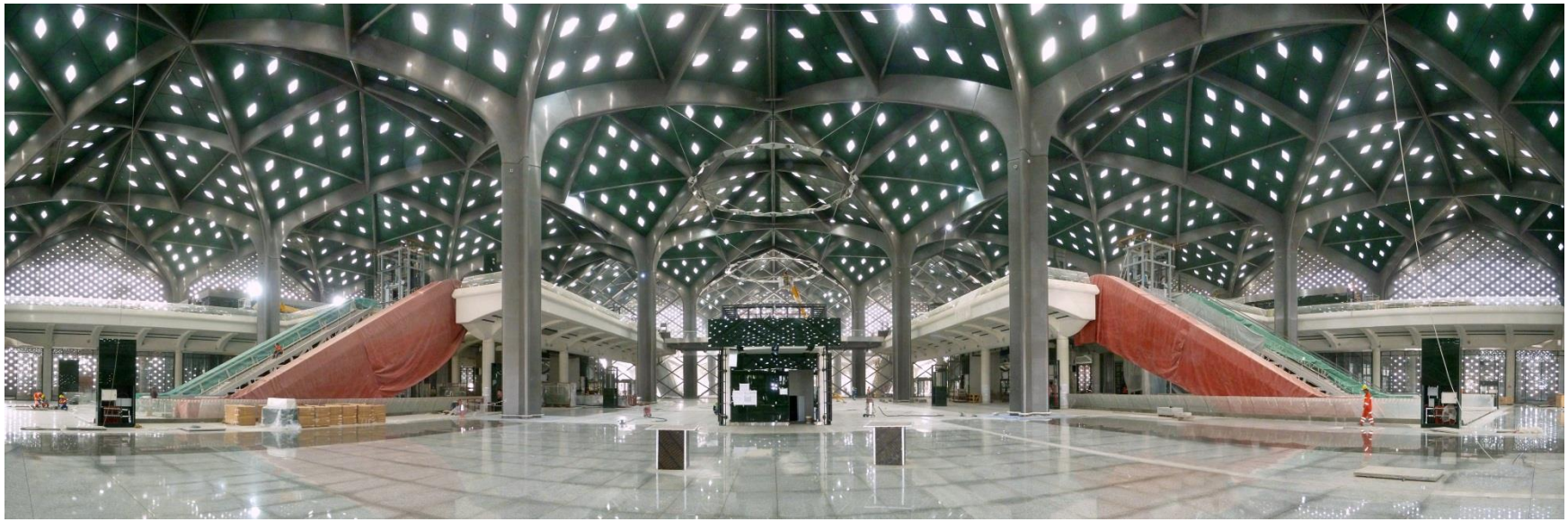
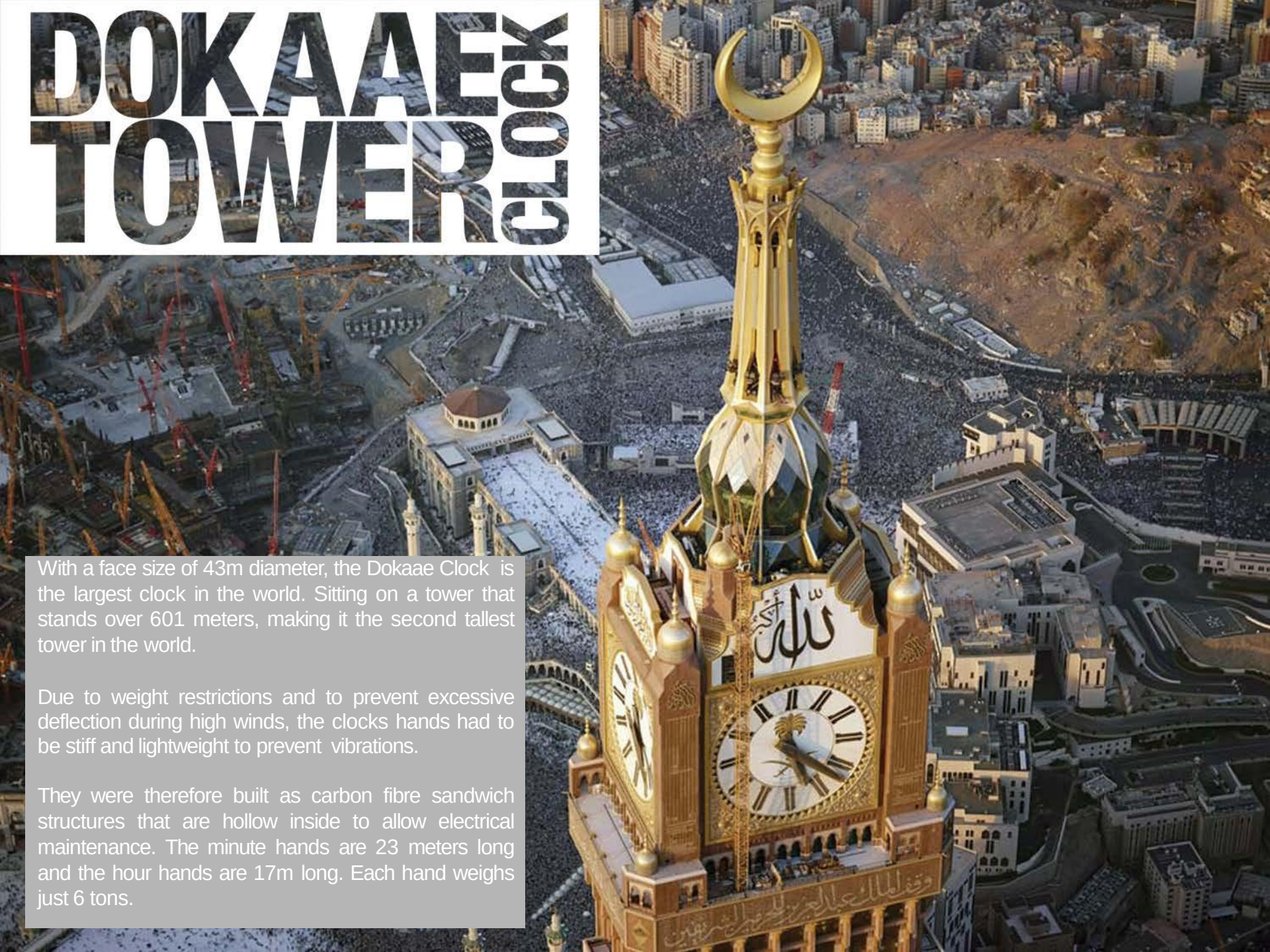
HARAMAIN
STATION
ROOF





DOKAAE TOWER CLOCK



With a face size of 43m diameter, the Dokaae Clock is the largest clock in the world. Sitting on a tower that stands over 601 meters, making it the second tallest tower in the world.

Due to weight restrictions and to prevent excessive deflection during high winds, the clocks hands had to be stiff and lightweight to prevent vibrations.

They were therefore built as carbon fibre sandwich structures that are hollow inside to allow electrical maintenance. The minute hands are 23 meters long and the hour hands are 17m long. Each hand weighs just 6 tons.

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DOKAAE CLOCK TOWER

www.pct.ae

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LARGEST CLOCK IN THE WORLD



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Clock Tower Project, Mekka
Upper 250m Clock tower
4 biggest clocks in the world
Biggest crescent in the world




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DOKAAE TOWER CRESENT



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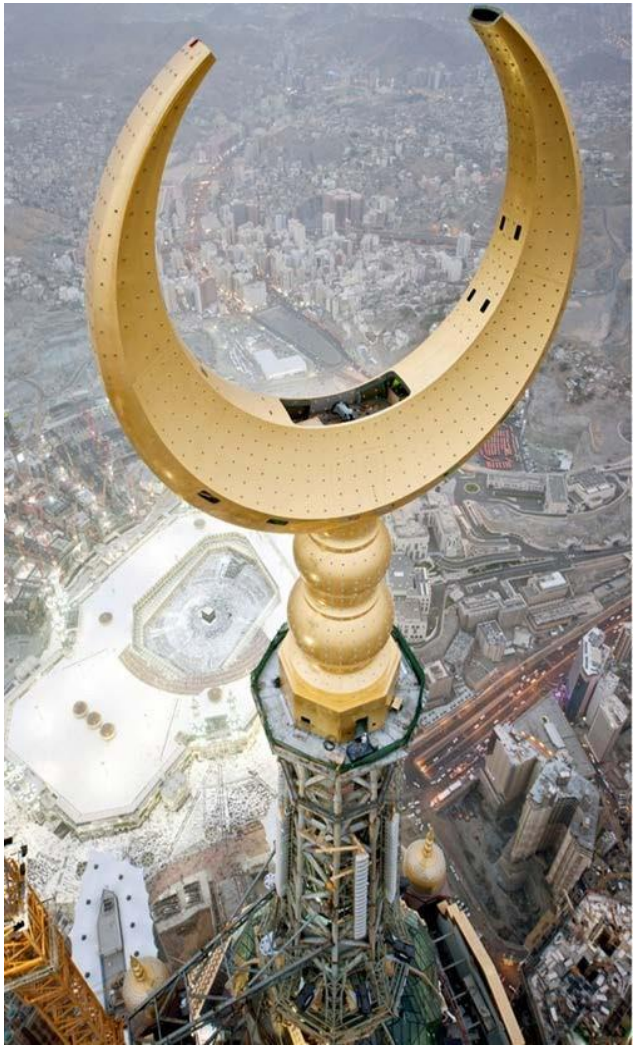

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Al Rayyan Domes, Al Rayyan, Qatar



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New Assembly Hall Dome, Angola

PCT has successfully installed the New Assembly Hall in Angola in less than six weeks inclusive of all touch-up works.

The dome consists of 150 advanced composite panels, with a diameter of 42 meters and a height of approximately 23 meters, measuring 2.4 x 11.5 meters and a total composite area of 4,100m^2.

The dome manufacturing duration was estimated between 16 to 20 weeks. All the prefabricated panels were shipped to Luanda and assembled in record time averaging 130-150m^2 of watertight dome cladding (or six panels) per day. This brings the total installed surface to an average of 800-900m^2 per week.

The dome is finished with terracotta coloured glass mosaic tiles and the white projected ribs are lit up by LED fittings to illuminate the decorative elements externally during the night overlooking the majestic Angolan Capital city of Luanda.

The composite dome is PCT's largest built dome to date and first in Angola and will form the visual centerpiece of the new National Assembly Hall.











DAY 01



DAY 02



DAY 03



DAY 04



DAY 05



DAY 06

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COMPOSITE TECHNOLOGIES









GRC / UHPC Facility

PCT has a dedicated factory facility measuring 14,000m^2 floor space for the purpose of UHPC production. The facility is located 1.5km from PCT's Head Quarters in Dubai Investments Park.



GRC / UHPC Facility

PCT has a state of the art fully automated dry blending and batching plant for ultra high performance concrete. The plant is capable of blending and batching up to 120 tons of material per day.

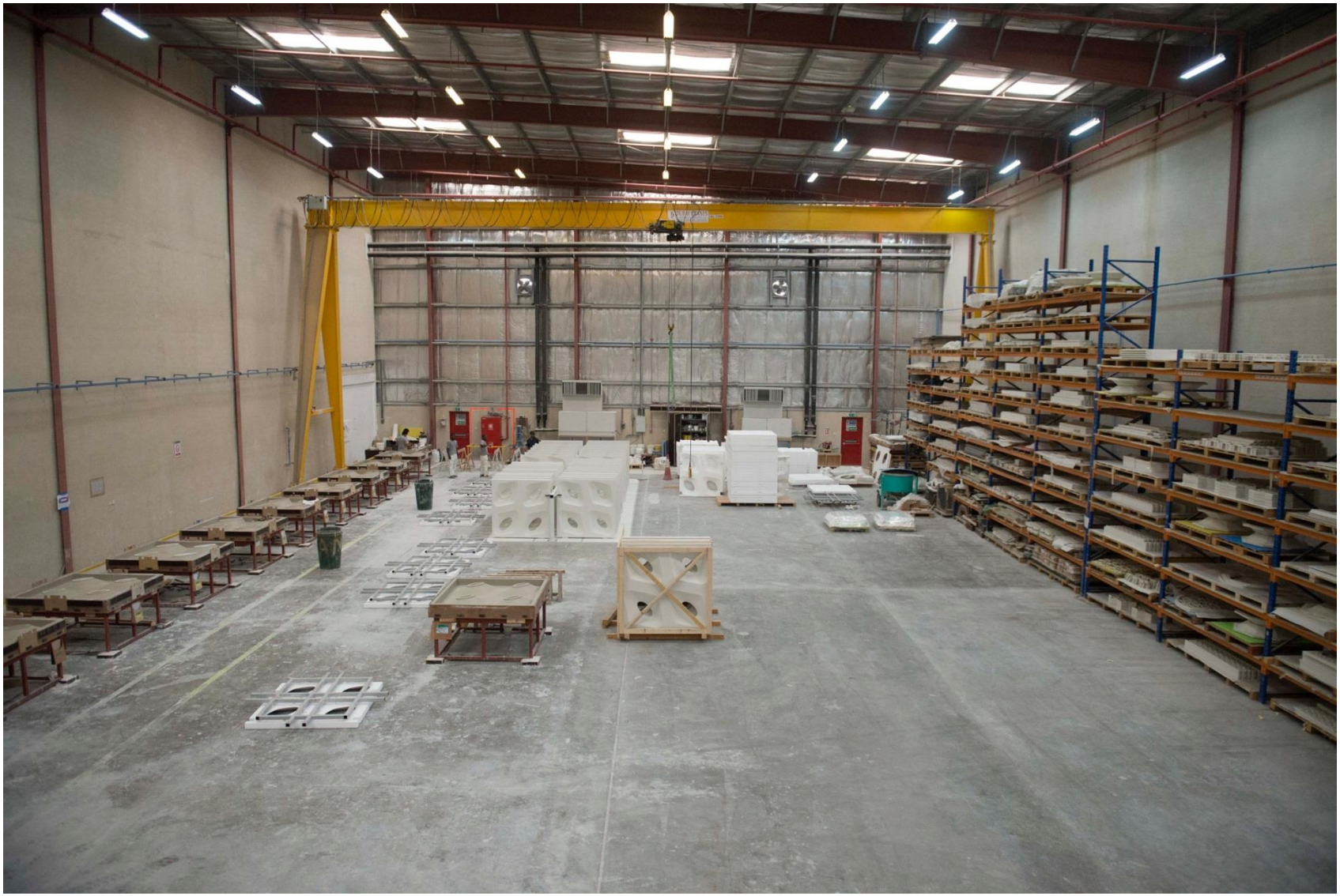




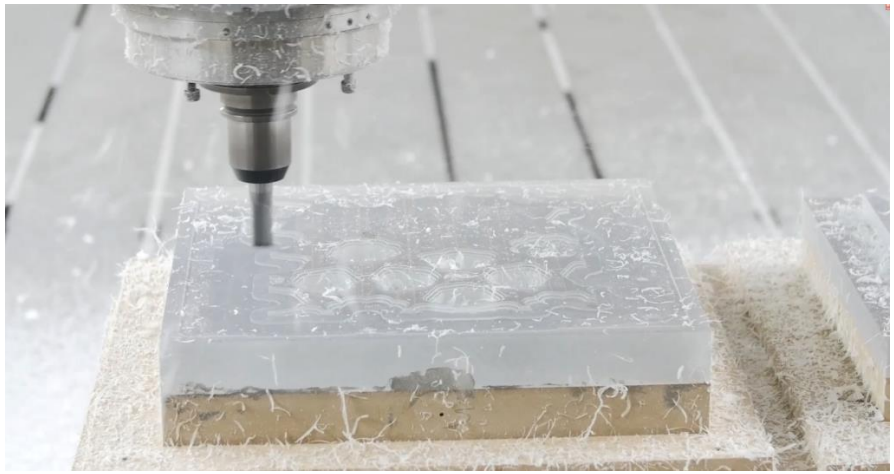
GRC / UHPC Facility



GRC / UHPC Facility



UHPC Production









UHPC Production









UHPC Production



UHPC/GRC Production

While the GRC is still in a wet state, the Structural frame will be replaced into the pre-jigged location with the flex and gravity anchors resting on the back surface of the GRC. At the connection points, the GRC will be scratched up and a GRC “pad” will be sprayed over each anchor. Each pad will be compacted to ensure it is homogeneous with the GRC. The panel will be covered and sealed with polythene and allowed to cure.



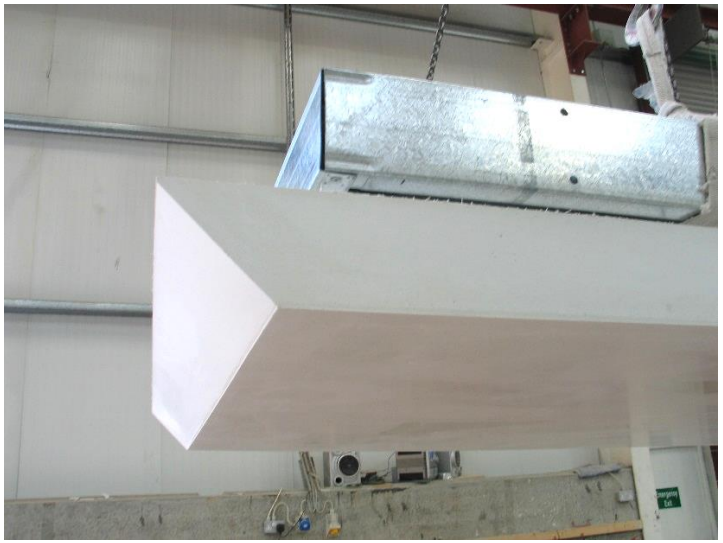




De-moulding

- When the GRC panel is sufficiently cured (next day) the mould sides will be removed and the panel will be lifted from the mould using a gantry crane.
- The panel will be carefully lifted to an adjustable support frame and placed face down in the frame ensuring the face is fully supported.
- The frame will be un-bolted from the flex and gravity anchors.
- Plastic spacers will be placed over the anchors to support the insulation.
- Precut rigid insulation boards will then be pushed down over the anchors to rest on the spacers.
- The insulation boards will be taped over the joints
- Next a rubberized EPDM layer will be placed over the anchors. The EPDM will have extra width flaps hanging over the edge to allow for later connection during the installation process and ensure air tightness.
- The penetrations of the anchors through the EPDM will be sealed using a bituminous mastic.
- The structural frame will be replaced and re-bolted.





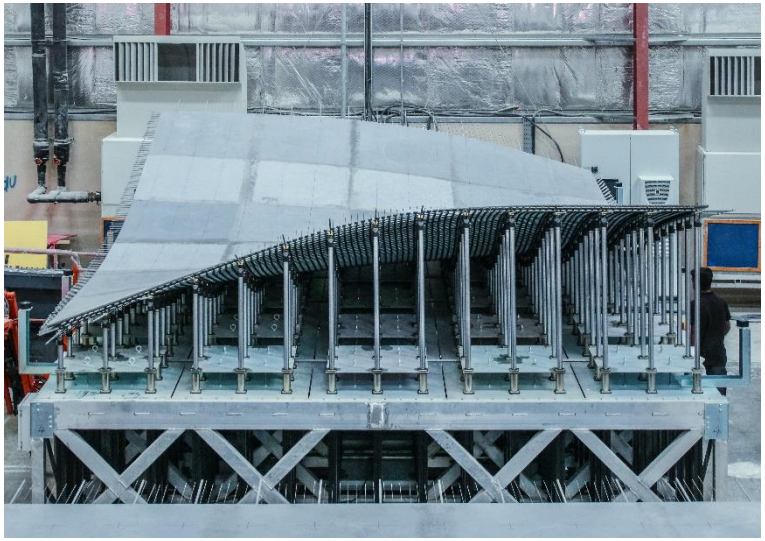
PCT Flex Mould

PCT uses sustainable electro-mechanically driven flexible moulds for 2D and 3D and compound curved surfaces.

The system rapidly delivers any curved/double-curved mould surface prepared using Rhino 3D.

The casting/shaping of panels from GRC/UHPC is like any other mould, but for the placement of materials, indicated by a 3D laser projector. The Flex Mould system controlled by the user-friendly HMI is able to obtain its shape and return to level position within minutes.







PCT Flex Mould

Full sized panels can be produced using the Flexible mould system. The coordinate information from the 3D rhino model will be used to set the geometry of the table. A laser projection system will set the perimeter of the panel on the table. This will be done to an accuracy of tolerance of 1mm. PCT have a casting area of more than 180 m2 of flexible moulds.

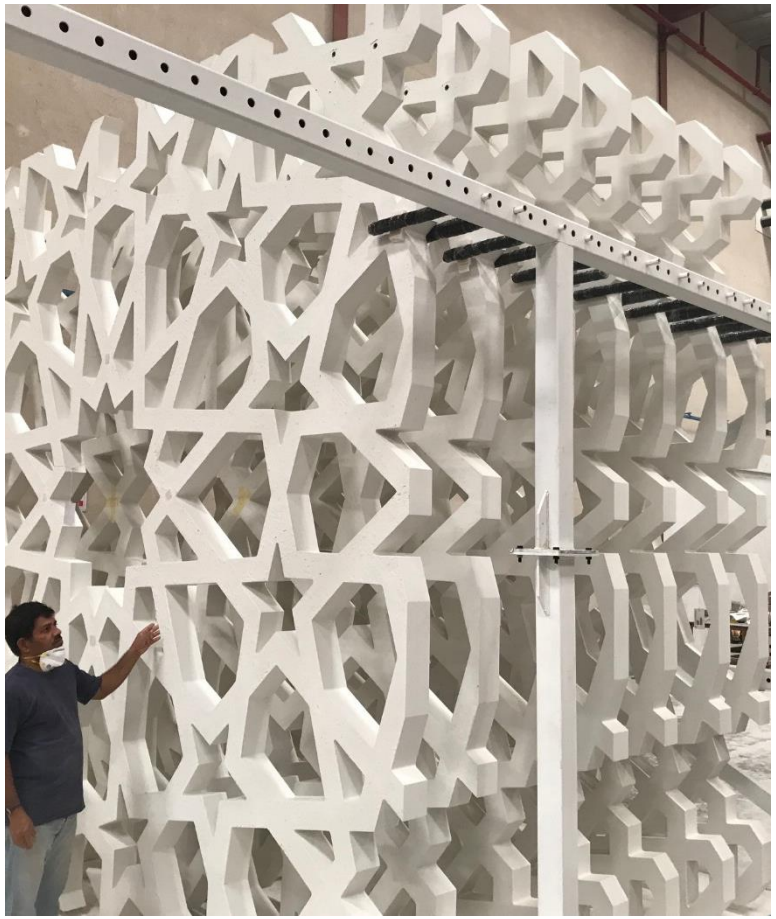


Finishing



Finishing





Packing & Transportation









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COMPOSITE TECHNOLOGIES

Ductal® Stretching the Performance and Durability of Concrete

Ductal is made from portland cement, silica fume (a byproduct of electric arc furnaces), silica flour, silica sand, water, and polycarboxolate high-range water reducers (superplasticizers) that help cement flow; Lafarge adds metal or polyvinyl alcohol fibers to provide structure. “All the materials in Ductal are standard products,” said Vic Perry, vice president and general manager at Lafarge North America. “It’s how we select them and put them together that makes Ductal work.” Lafarge controls the size, geometry, and orientation of all the materials “at the micro level,” in Perry’s words, to create a very dense matrix that can be formed into intricate shapes while maintaining its performance.



Ductal® Stretching the Performance and Durability of Concrete

According to Perry, Ductal's compressive strength is ten times higher than that of normal concrete, and its flexural strength is three to four times higher; he also says it has lower permeability and the same abrasion resistance as the highest-quality granite. With such low permeability, chlorides and water that degrade normal concrete have almost no effect on Ductal. At a test site along the Maine coast, samples of Ductal have been inundated with seawater twice a day and exposed to freeze-thaw cycles since 2006. A normal 3,000 psi concrete lasts only one year in these conditions, according to Perry, but the Ductal sample still has the same square edges, with virtually no chloride penetration or degradation. Based on the company's calculations, he estimates Ductal's lifespan to be a staggering 1,000 years.



AN1000

STRENGTH

• Compressive	120 MPa	(17,000 psi)
• Flexural	15 MPa	(2,200 psi)
• Youngs Modulus (E)	45 GPa	(6,500 ksi)
• Direct Tension	5 MPa	(725 psi)

DURABILITY

• Freeze/thaw (after 300 cycles)	100%
• Salt-scaling (loss of residue)	<0.013 lb/ft^2
• HRT cycles	100%
• Abrasion (relative volume loss index)	1.7
• Oxygen permeability	<10^{-9} ft^2
• Carbonation depth	< 0.02 in.

OTHER PROPERTIES

• Density	2.2 – 2.4 S.G.
• Capillary porosity	<1%
• Total porosity	3 – 6%
• Post cure shrinkage	<10^{-5}

THERMAL PROPERTIES

Heat transfer, insulating properties and thermal expansion coefficient are similar to normal concrete. For fire rated structures, the Ductal® AF formula is available and provides fire performance similar to normal concrete.

MOLDING

The fineness of Ductal® raw materials and fluidity of the mix facilitates the ability to replicate the micro-texture of the form surface or special mold textures.

COLOURS

Grey or light grey; liquid or powder pigments may be added to achieve a variety of solid or blended colours.

Disclaimer: The values indicated above depend on the product characteristics, experimentation method, raw materials, formulae, manufacturing procedures and equipment used; all of which may vary. This data sheet provides no guarantee or commitment that the values set forth above will be achieved in any particular application of Ductal®. Ductal® is a registered trademark and may not be used without permission. The ultra-high performance material that is Ductal® and its various components are protected by various patents and may not be used except pursuant to the terms of a license agreement with the patent holder.

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Toll free: 1-866-238-2825 • www.imagineductal.com

Post Consumer

LAFARGE

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GRC / UHPC Projects

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Structural Perforated UHPC Dome

Structural Perforated UHPC Dome



Structural Perforated UHPC Dome



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Structural Perforated UHPC Dome



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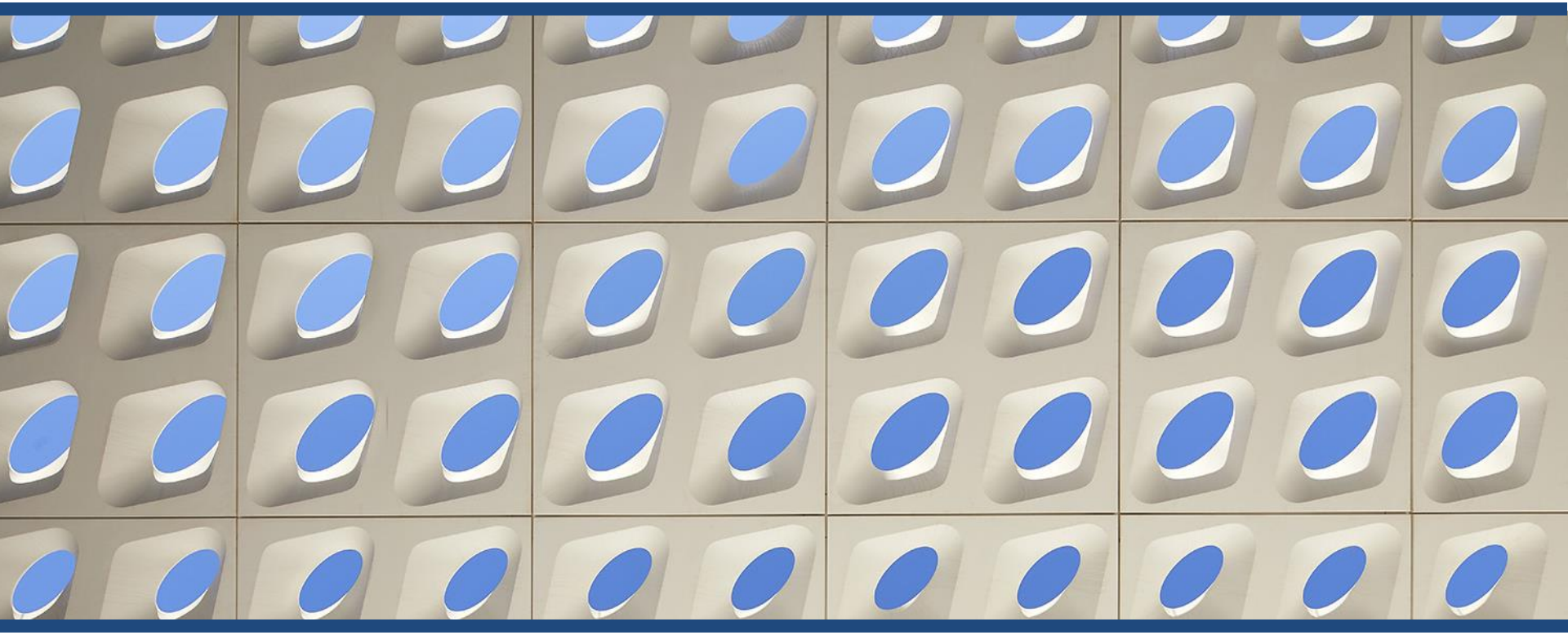


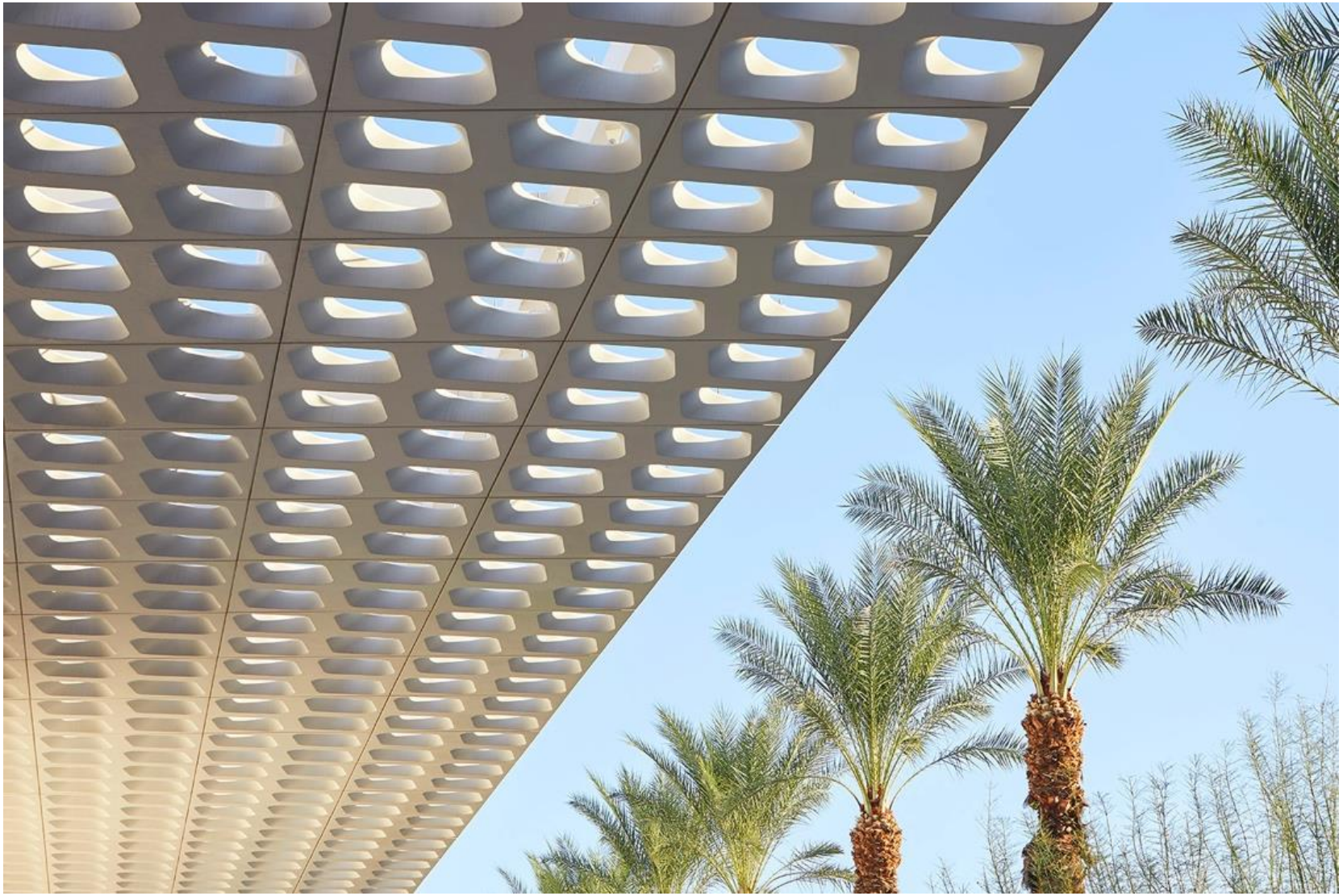
UHPC Ceiling Trellis

UHPC Ceiling Trellis





UHPC Ceiling Trellis



UHPC Ceiling Trellis



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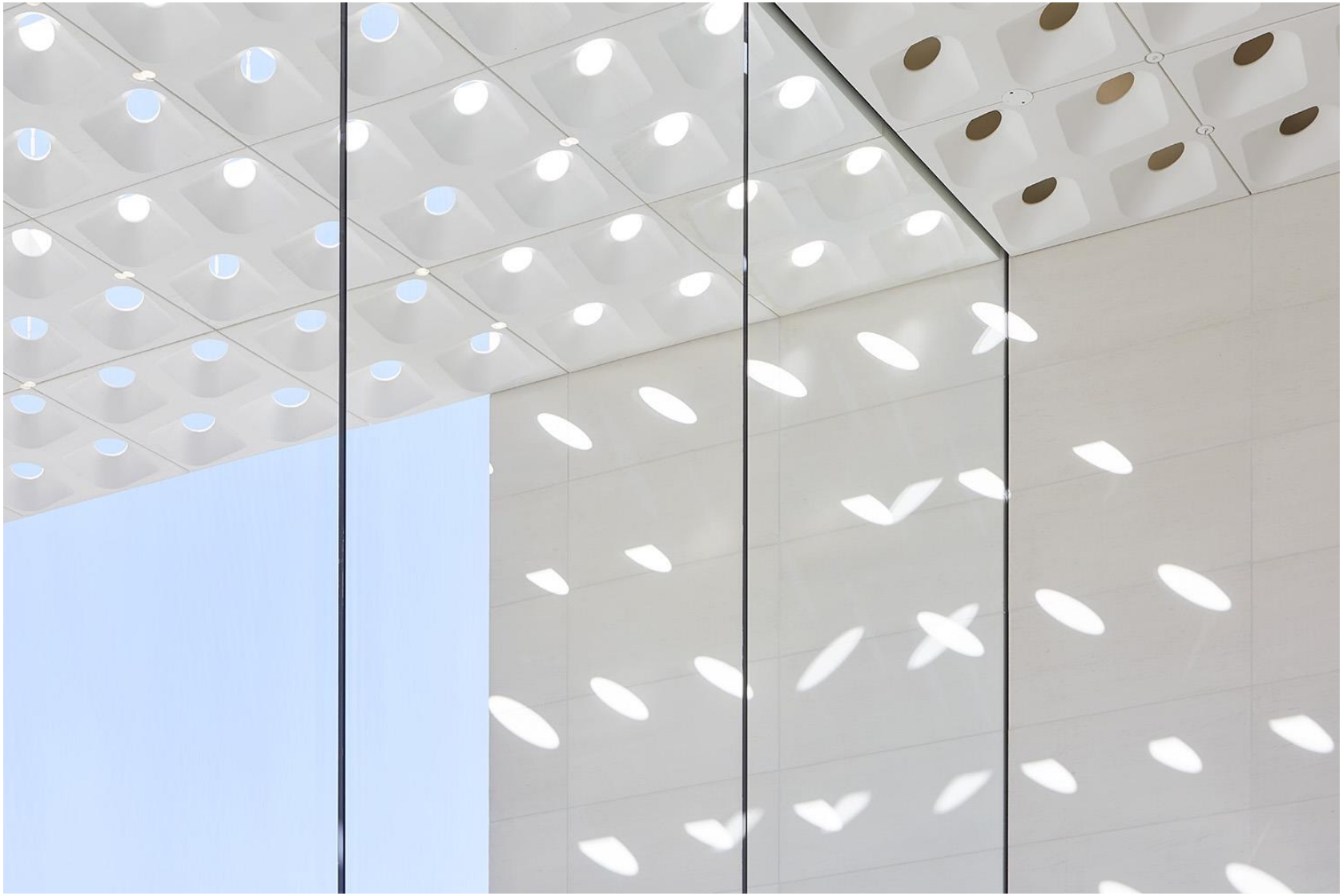

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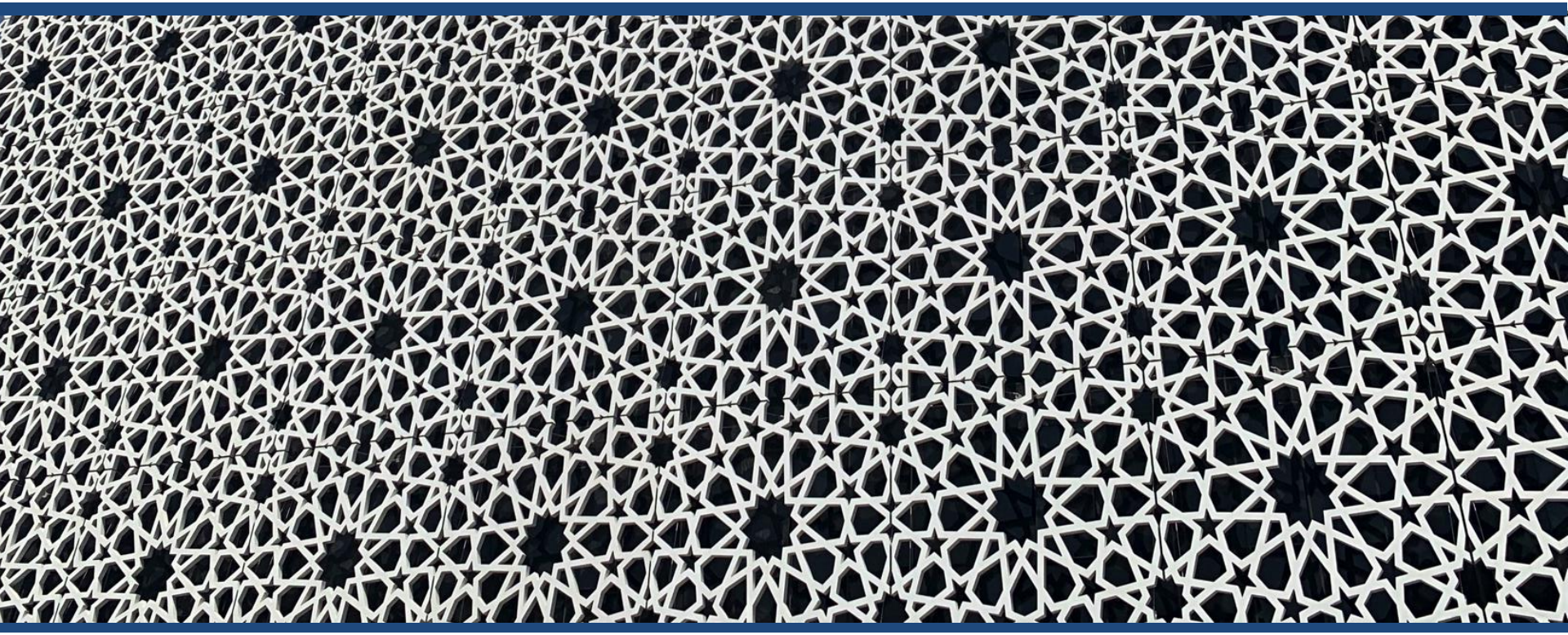
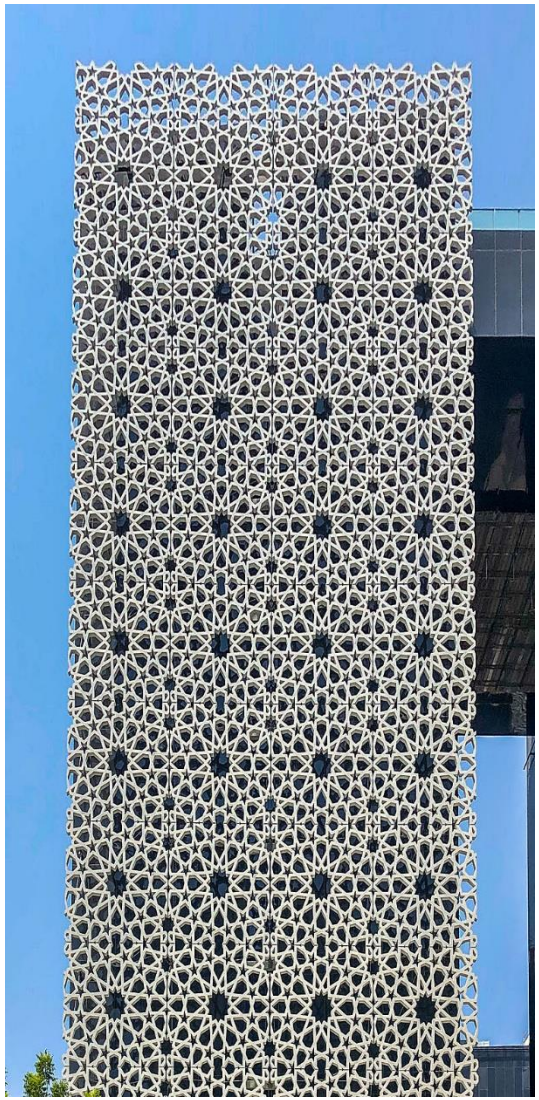
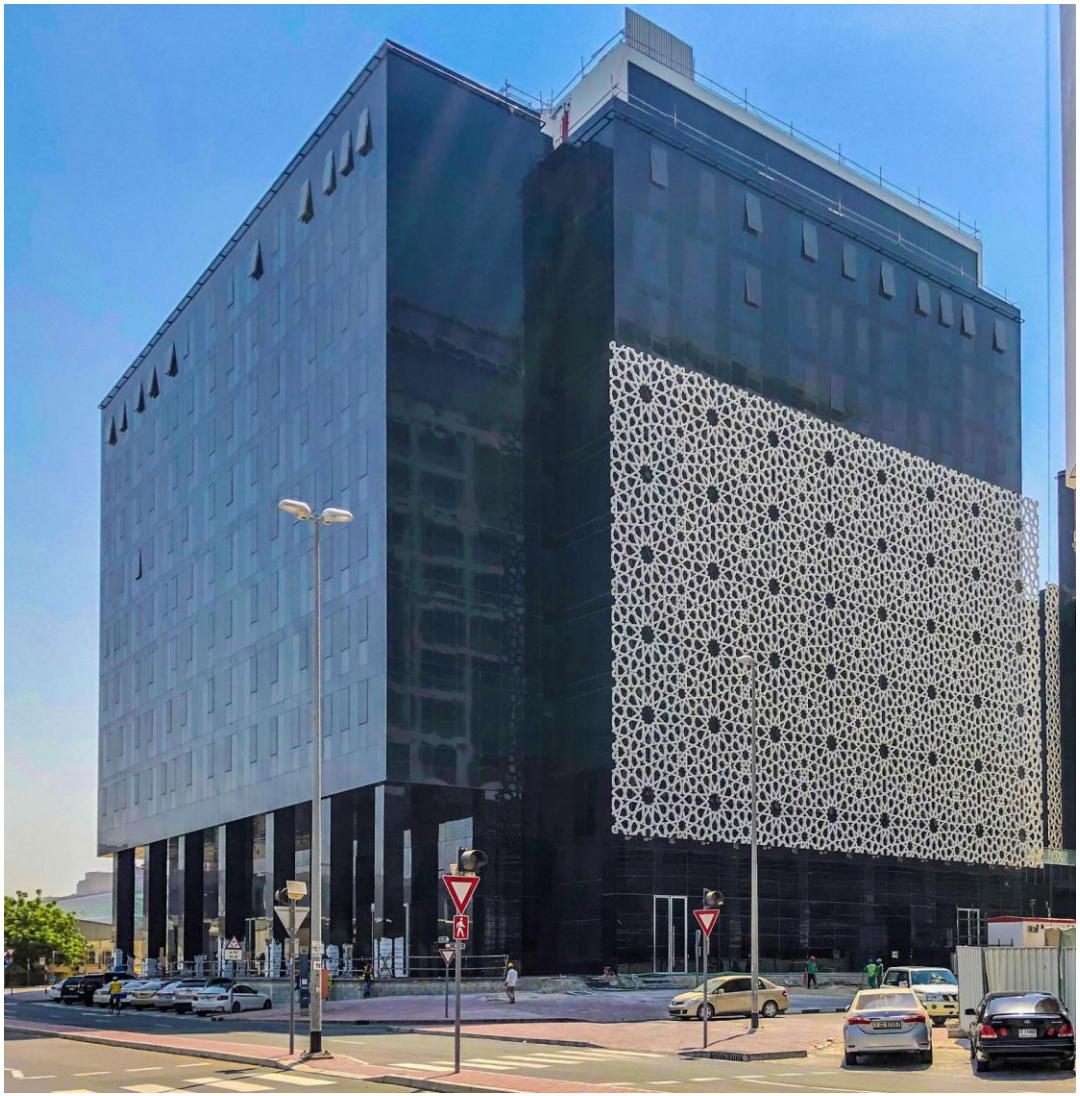


UHPC Mashrabiya Screens for Al Garhoud Mixed Use Development

UHPC Mashrabiya Screens





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UHPC Mashrabiya Screens



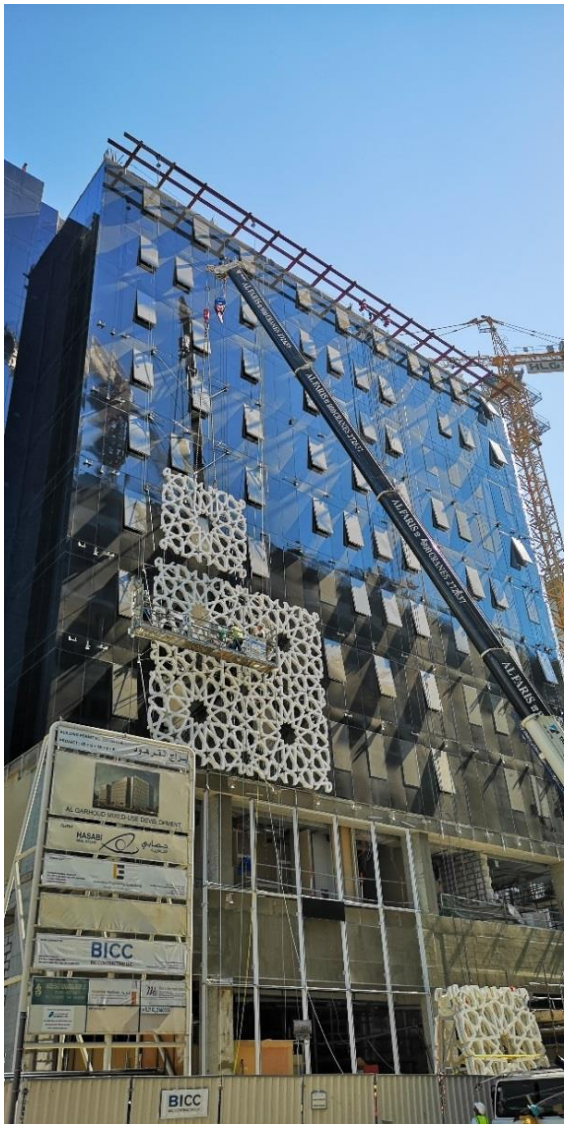






UHPC Mashrabiya Screens





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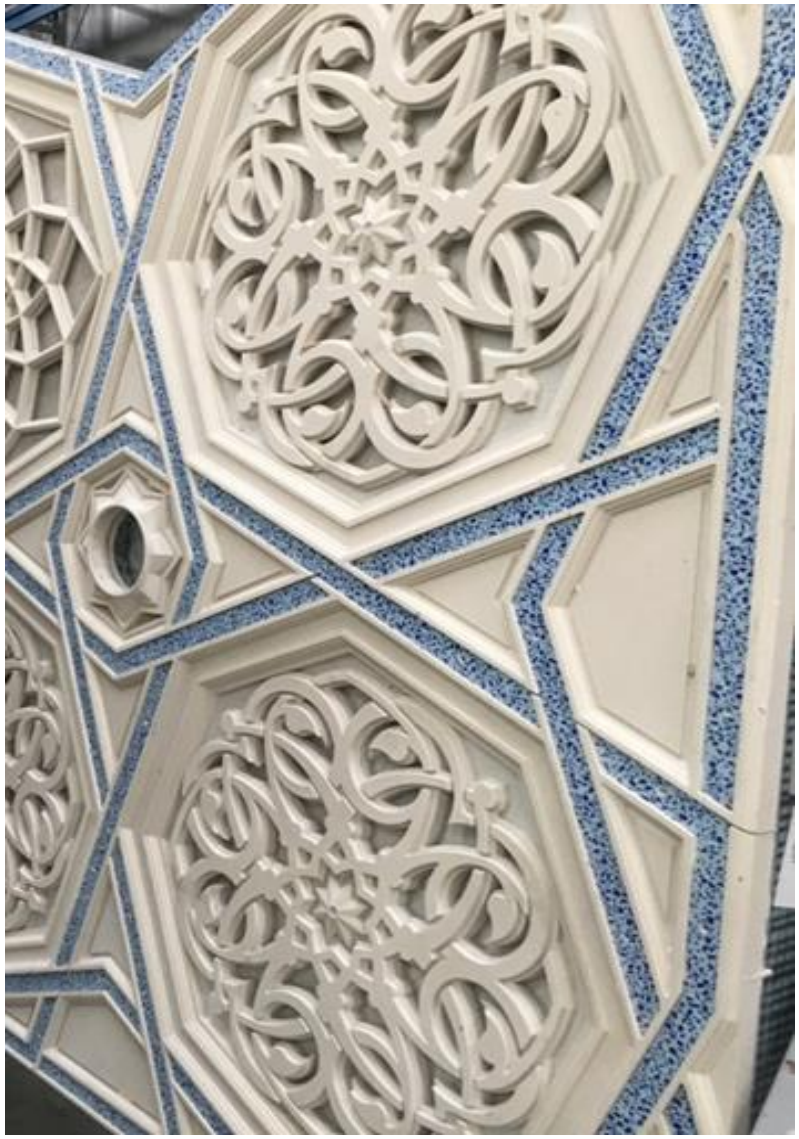
Mataf Ceiling

Mataf Ceiling





Mataf Ceiling



Mataf Ceiling



Mataf Ceiling



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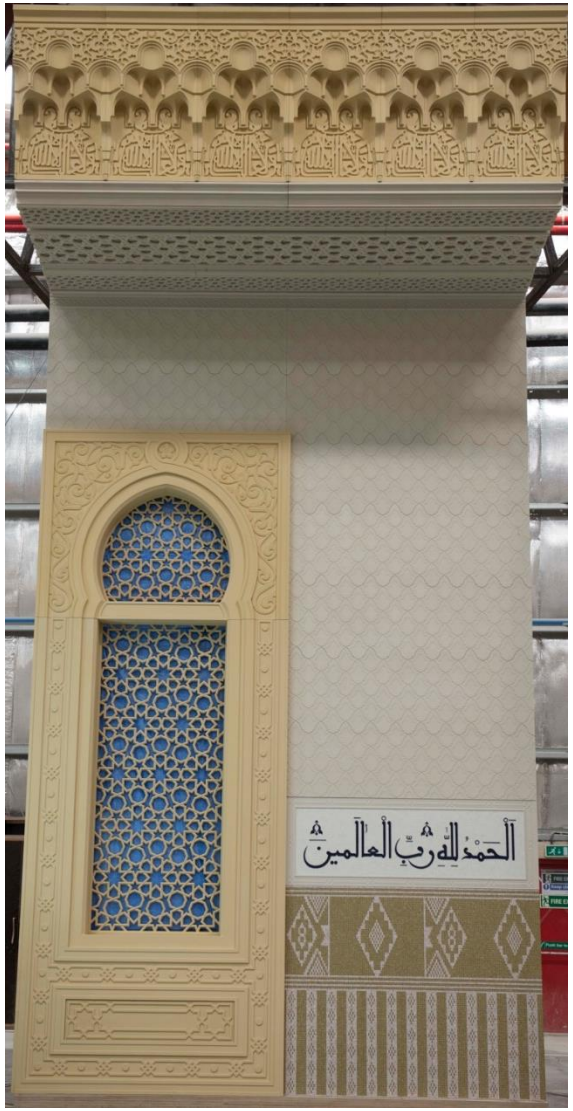
Senegal Mosque Mock-Up

Senegal Mosque Mock-Up





Senegal Mosque Mock-Up



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UHPC Prototyping

UHPC Prototyping







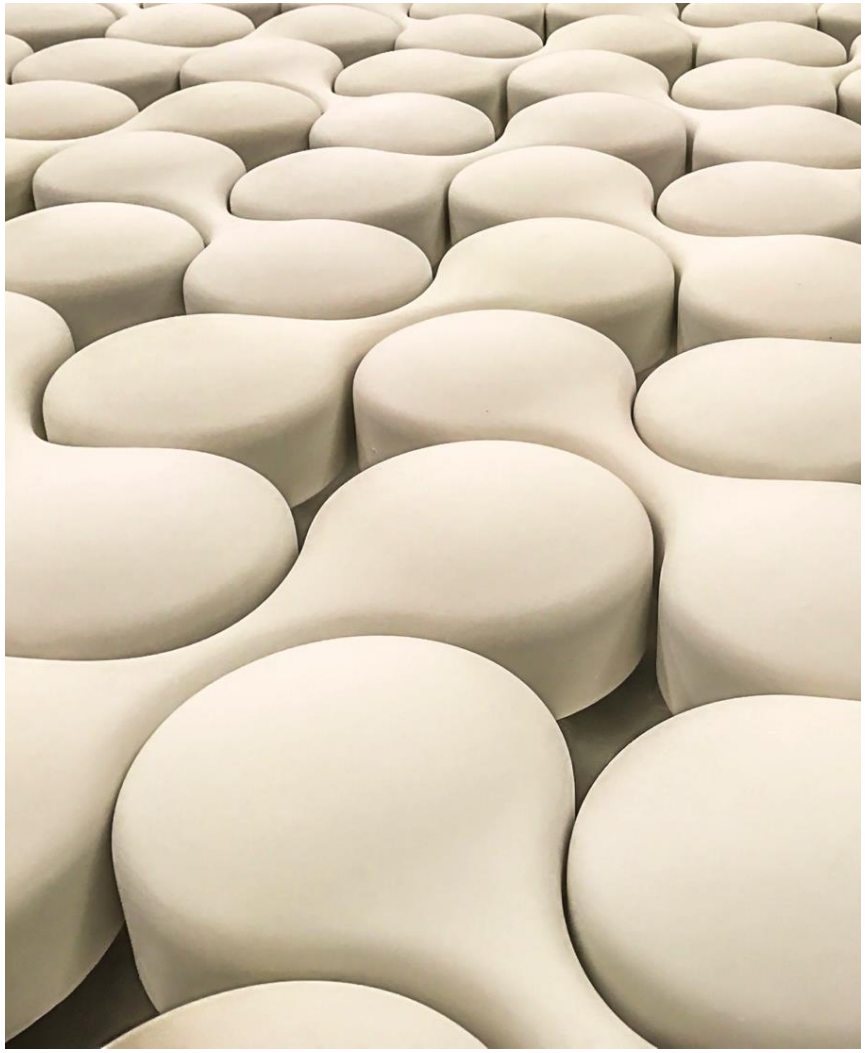


UHPC Prototyping



UHPC Prototyping





UHPC Prototyping





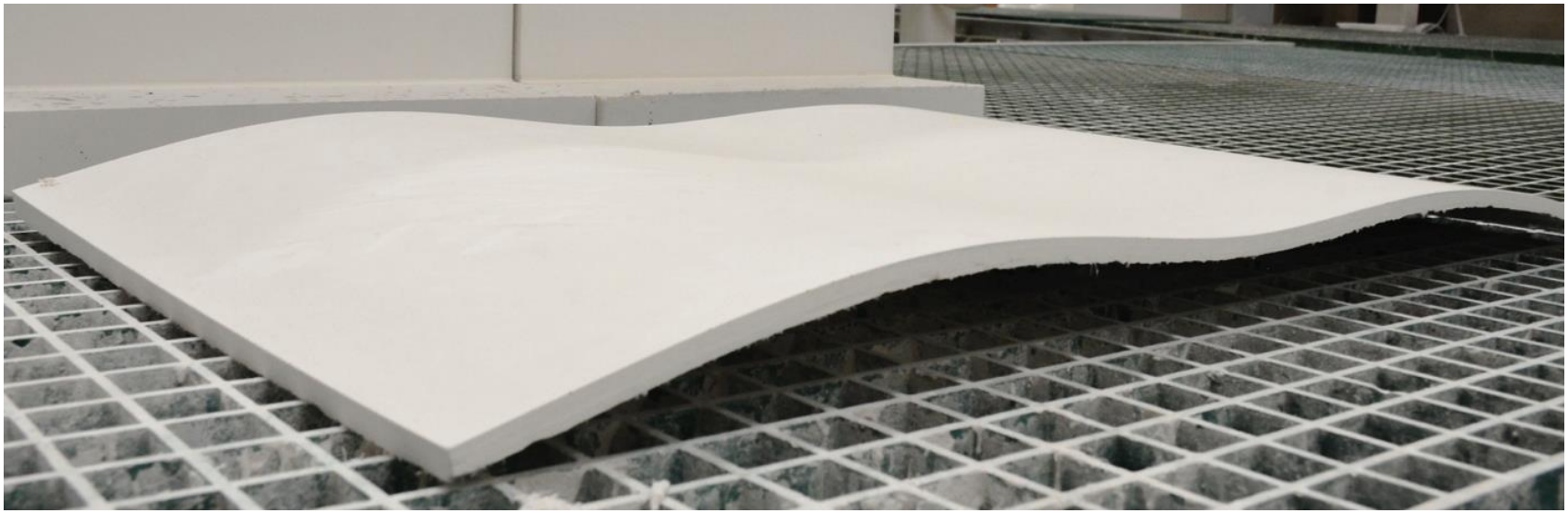
UHPC Prototyping





UHPC Prototyping







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