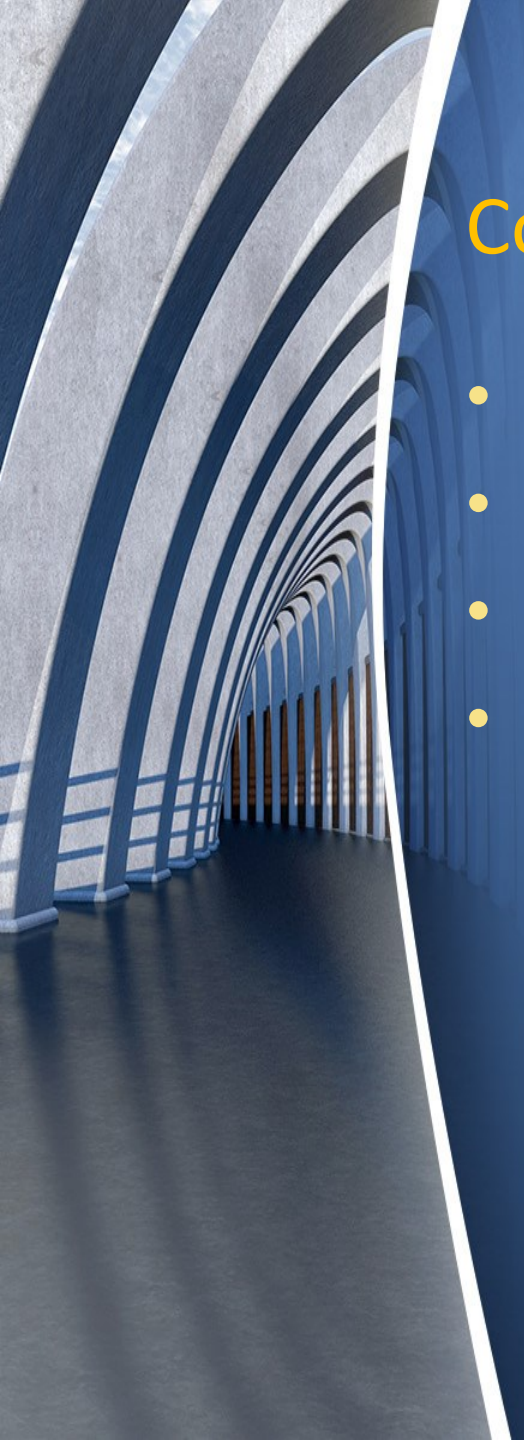
Job References of GRC & GRG Works

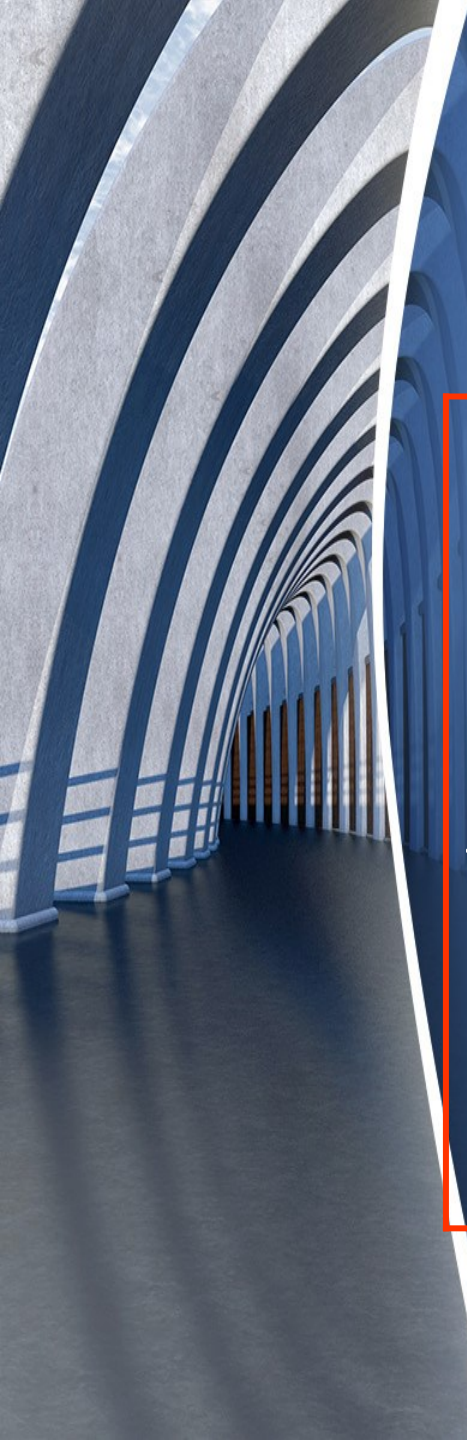
YEUNG'S fiberglass

楊 氏 玻 璃 纖 維 est. 1983



Contents

- COMPANY INTRODUCTION
- INTRODUCTION TO GRC
- DESIGN AND DRAWING
- CONCLUSION



COMPANY INTRODUCTION

- We are one of the renowned GRC/GRP/GRG product manufacturers and installers in Hong Kong for since 1983.
- An approved specialist contractors in the list of approved Suppliers of Materials and Specialist Contractors for Public Works under HKSAR Government since 1986.
- We have total confidence to believe that we can provide our best fiberglass products and service for client's unique need.

Certificate No: Q173

Accredited Certification International Limited
ACI ISO9001

This is to certify that the Quality Management System of

YEUNG'S FIBERGLASS COMPANY
楊氏玻璃纖維公司

Unit B, 22/F, CNT Tower, 338 Hennessy Road, Wan Chai, Hong Kong
香港灣仔軒尼詩道 338 號北海中心 22 樓 B 室
3/F., Victory Factory Building, 16 Wong Chuk Hang Road, Wong Chuk Hang, Hong Kong
香港黃竹坑黃竹坑道 16 號勝利工業大廈 3 樓

complies with the requirements of ISO 9001 : 2015 *quality management system standard, applicable to:*

Design, Supply and Install of Fiberglass / Glass Reinforced Polyester (G.R.P.) / Glass Reinforced Concrete (G.R.C.) / Glass Reinforced Gypsum (G.R.G.) Products for Architectural, Civil, Construction and Decorative Applications, with Provision of Associated Connection and Structural Element Design
設計、供應及安裝玻璃玻璃纖維強化塑料構件(G.R.P.)、玻璃纖維強化水泥構件(G.R.C.)或玻璃纖維強化石膏構件(G.R.G.)用作建造、土木、建築及裝修美化工程用途，其中包括連繫及結構上之設計

Signed for and on behalf of
ACCREDITED CERTIFICATION INTERNATIONAL LIMITED

Secretary　　Board Member

IAF　HKAS

Registered address: Unit 1901, Yen Sheng Centre, 64 Hoi Yuen Road, Kwun Tong, Kowloon, Hong Kong
Tel (852) 39778988 Fax (852) 2608 1940 Email:enquiry@aci-limited.com Website: www.aci-limited.com
Note: This certificate remains the property of Accredited Certification International Limited and shall be returned immediately upon request. In accordance with the ACI Regulations, the ACI undertakes no liability or responsibility for any management system outputs supplied in accordance with the requirements of this Certification Scheme. The accreditation logo indicates HKAS accreditation in respect of those activities of ACI covered under registration number HKCAS 011. Further clarifications regarding the scope of this certificate and the applicability of ISO 9001: 2015 requirements may be obtained by consulting the organization.

To check the validity of certificate, please call: (852) 39778988

Original Certification 5 April 2008　　Amendment 18 July 2019　　Expiry 5 April 2020

ISO 9001:2015
Certifications

Certificate No: E829

Accredited Certification International Limited
ACI ISO14001

This is to certify that the Environmental Management System of

YEUNG'S FIBERGLASS COMPANY
楊氏玻璃纖維公司

Unit B, 22/F, CNT Tower, 338 Hennessy Road, Wan Chai, Hong Kong
香港灣仔軒尼詩道 338 號北海中心 22 樓 B 室

complies with the requirements of ISO 14001 : 2015 *environmental management system standard, applicable to:*

Provision of management services associated with aspects of the planning, implementation, and administrative of the operations in Hong Kong Headquarter office
提供與香港總部辦公室規劃、實施和行政管理相關的管理服務

Signed for and on behalf of
ACCREDITED CERTIFICATION INTERNATIONAL LIMITED

Secretary　　Board Member

IAF　HKAS

Registered address: Unit 1901, Yen Sheng Centre, 64 Hoi Yuen Road, Kwun Tong, Kowloon, Hong Kong
Tel (852) 39778988 Fax (852) 2608 1940 Email:enquiry@aci-limited.com Website: www.aci-limited.com
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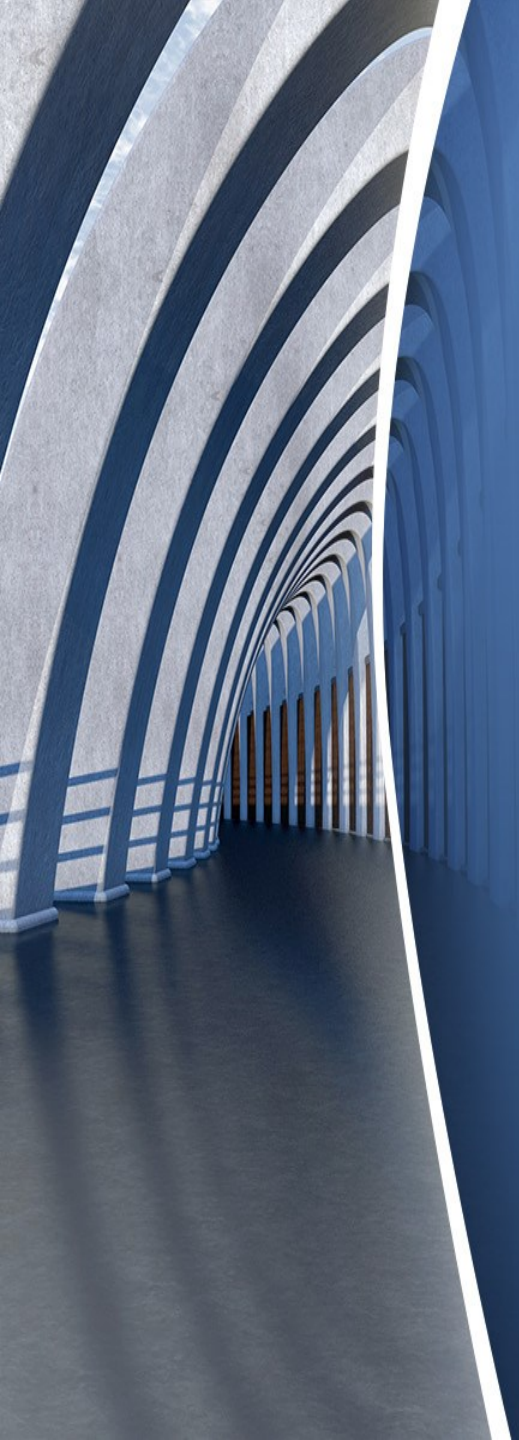
To check the validity of certificate, please call: (852) 39778988

Original Certification 21 April 2018　　Amendment 18 July 2019　　Expiry 21 April 2021

ISO 14001:2015
Certifications



Corporate Vision

During the next 10 years, we are striving to become the leading GRP supplier and specialist contractor in Hong Kong and Asia Market and an excellent company overall.

Mission Statement

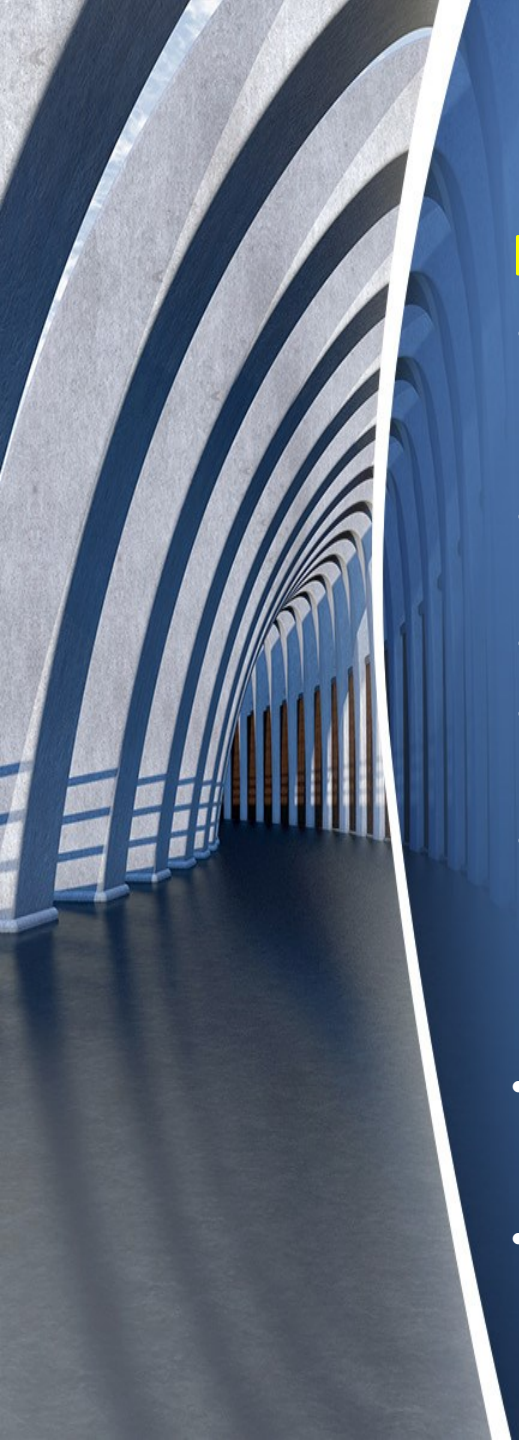
Yeung‘s Fiberglass Company is to manufacture goods that meet or exceed the customer specifications and deliver them on time. Since our beginning in 1983 we have done our best to live up to this ideal by continuous improvement.
Our mission at is to utilize our expertise in composite products to provide the absolute best value as measured by quality, cost, delivery, time and innovation.

Value

To put our Customers always at the first place.
To strength our business through development and research of people.
To enhance productivity by upgrading system and process.
To provide more innovative ideas to the final user.

INTRODUCTION TO GRC

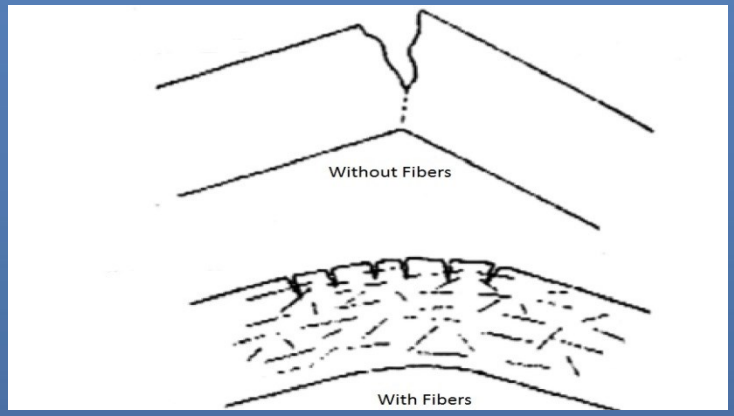
- Concrete containing a hydraulic cement, water , aggregate, and discontinuous discrete fibers is called fiber reinforced concrete.
- Fibers can be in form of steel fiber, glass fiber, natural fiber , synthetic fiber.



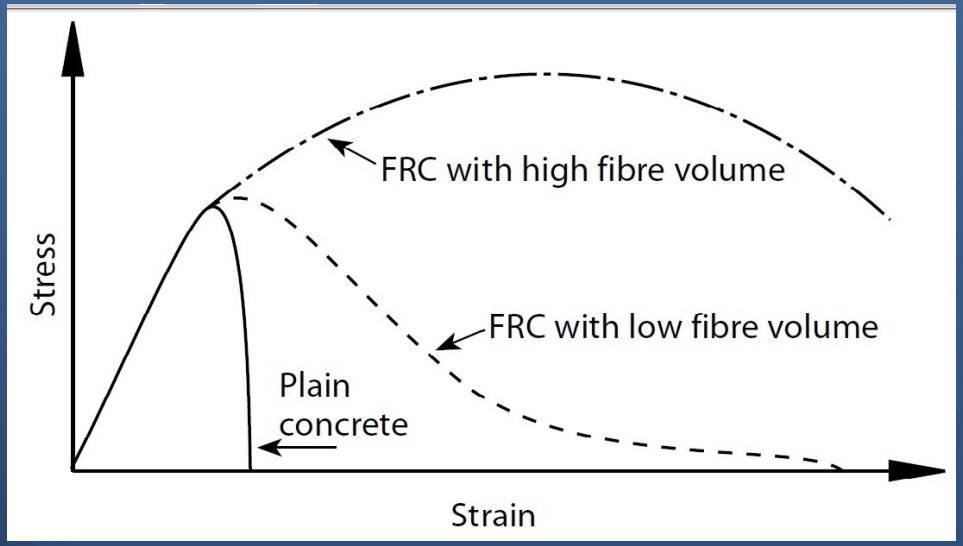
Benefits of GRC

- Main role of fibers is to bridge the cracks that develop in concrete and increase the ductility of concrete elements.
- Improvement on Post-Cracking behavior of concrete
- Imparts more resistance to Impact load
- controls plastic shrinkage cracking and drying shrinkage cracking
- Lowers the permeability of concrete matrix and thus reduce the bleeding of water

- Toughness is ability of a material to absorb energy and plastically deform without fracturing.
- It can also be defined as resistance to fracture of a material when stressed.



Source: P.K. Mehta and P.J.M. Monteiro, Concrete: Microstructure, Properties, and Materials, Third Edition, Fourth Reprint 2011



Reference: Cement & Concrete Institute
http://www.cnci.org.za

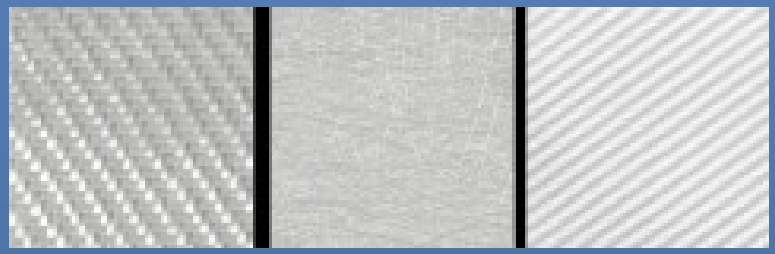
Comparison of Mix Proportion between Plain Concrete and Fiber Reinforced Concrete

Material	Plain concrete	Fiber reinforced concrete
Cement	446	519
Water (W/C=0.45)	201	234
Fine aggregate	854	761
Coarse aggregate	682	608
Fibers (2% by volume)	--	157

The 14-days flexural strength, 8 Mpa, of the fiber reinforced was about 20% higher than that of plai concrete.

Source: Adapted from Hanna, A.N., PCA Report RD 049.01P, Portland cement Association, Skokie, IL, 1977

What is GRP?

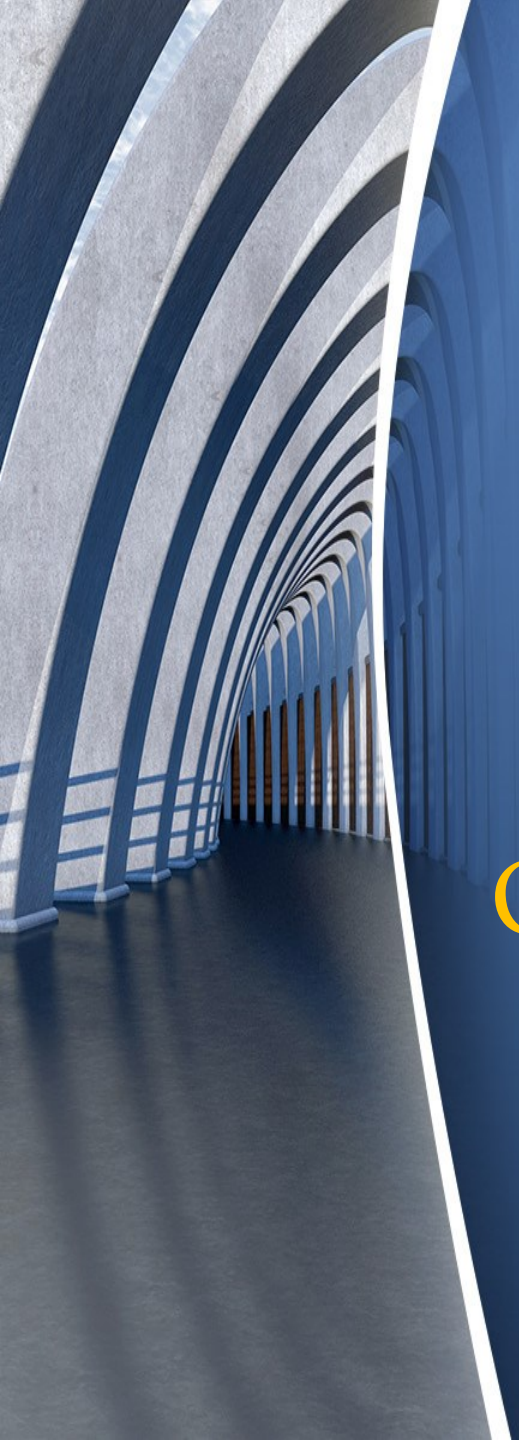


Glass-reinforced plastic (GRP), also known as glass fiber-reinforced plastic (GFRP), is a fiber reinforced polymer made of a plastic matrix reinforced by fine fibers of glass.

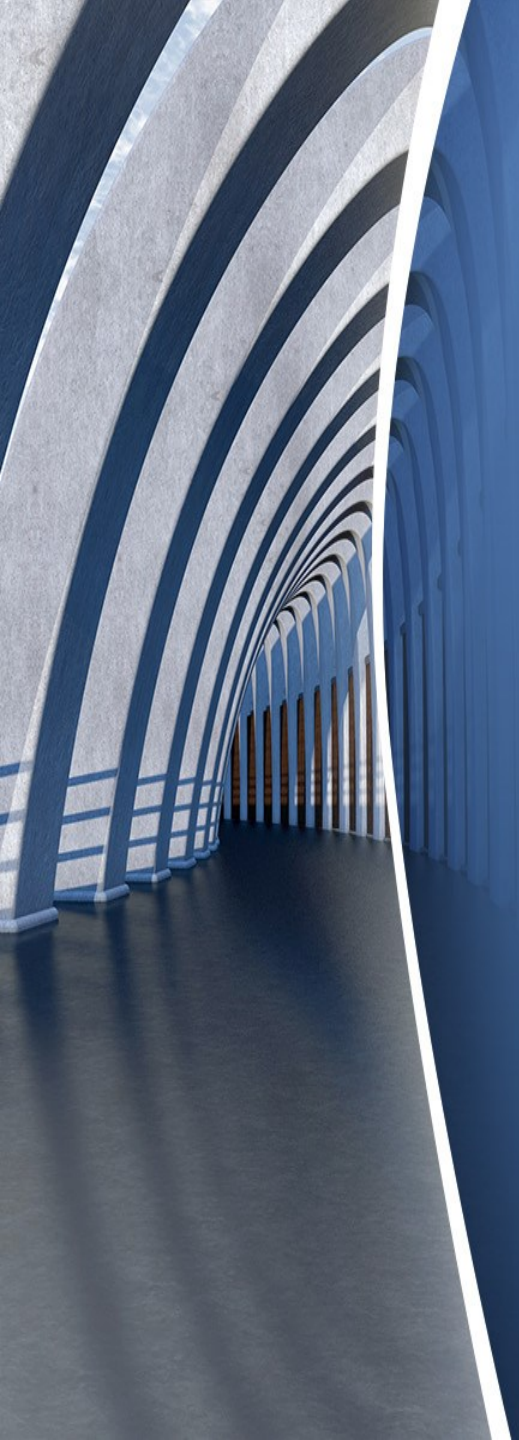
- GRP is composed of strands of glass. Each individual glass fibre is very fine with a small diameter, and they are woven to form a flexible fabric.
- The fabric is normally placed in a mould, for instance a mould for a canoe and polyester resin is added, followed by a catalyst (to speed up the reaction). The process is repeated so that there are many layers of fibre glass and resin and allowed to dry/cure.
- The resulting material is strong and light.

GLASS REINFORCED GYPSUM – GRG

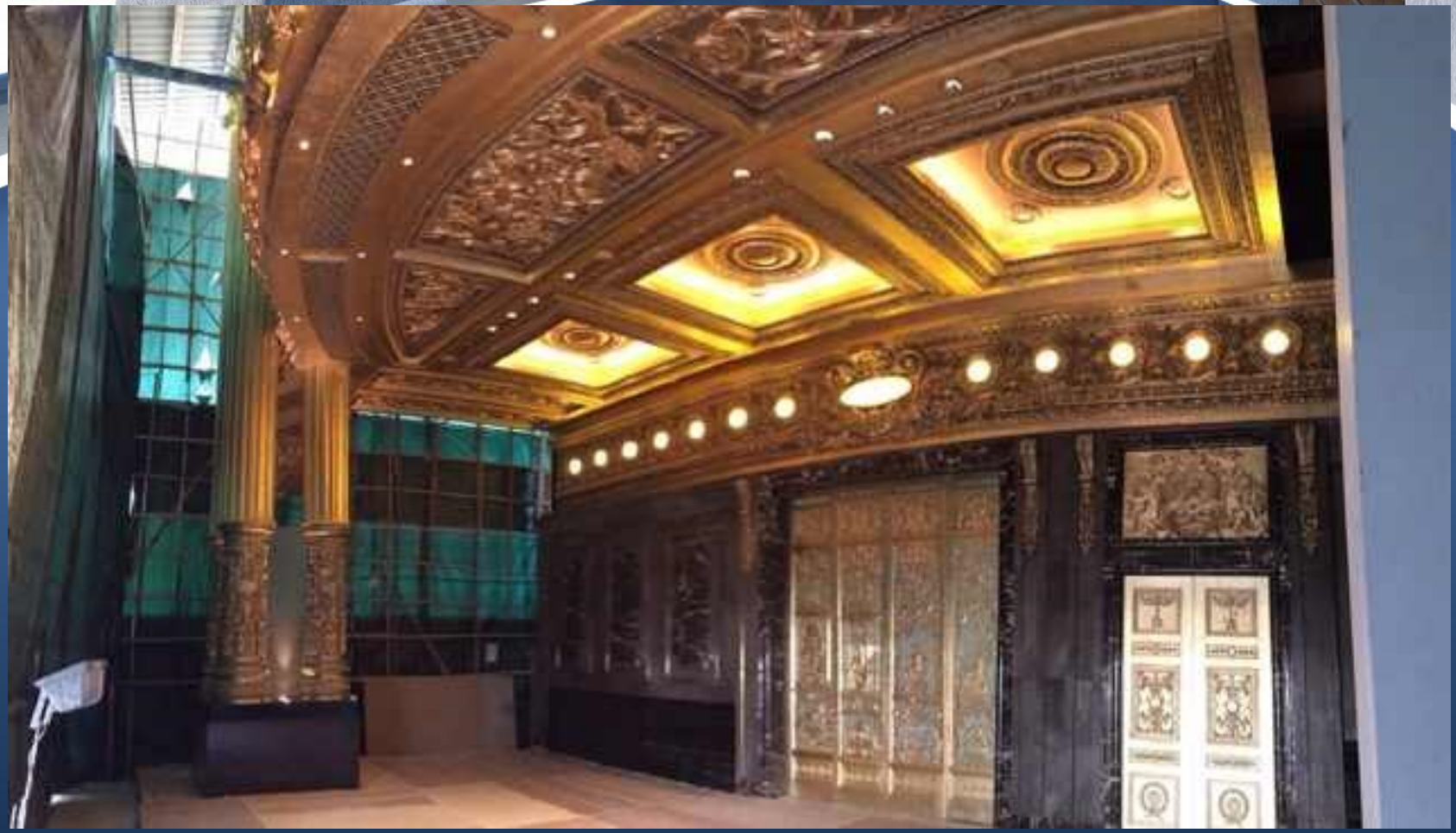
- GLASSS REINFORCED GYPSUM, also known as Glass Fiber Reinforced Gypsum (GFRG) consists of high strength resistant glass fibers bonded with high density gypsum to produce panels that traditionally were done with plaster castings.
- The GFRG is lighter in weight, superior in strength and much easier to install than the traditional plaster castings. GFRG is lighter than traditional gypsum and can be formed to a better detail.



COMPANY
JOB
REFERENCES
On GRC/GRP/GRG



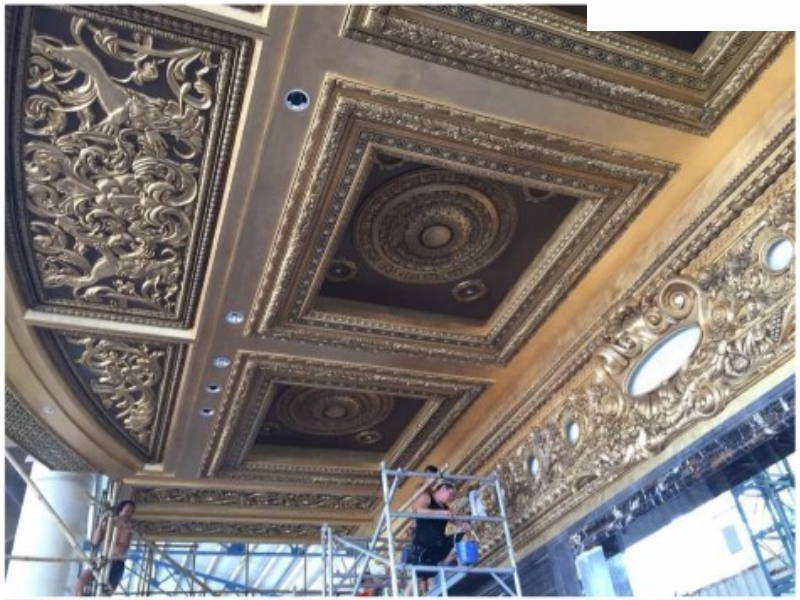
Louis XIII Hotel- Macau

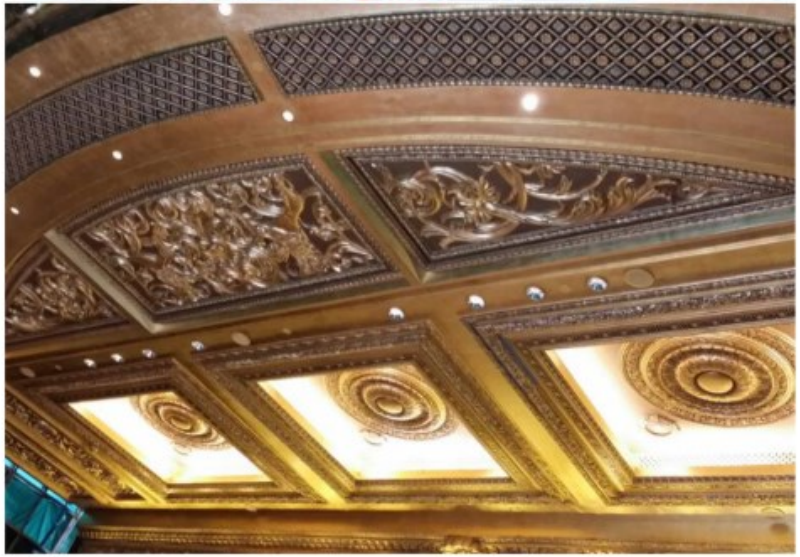


Ceiling Features

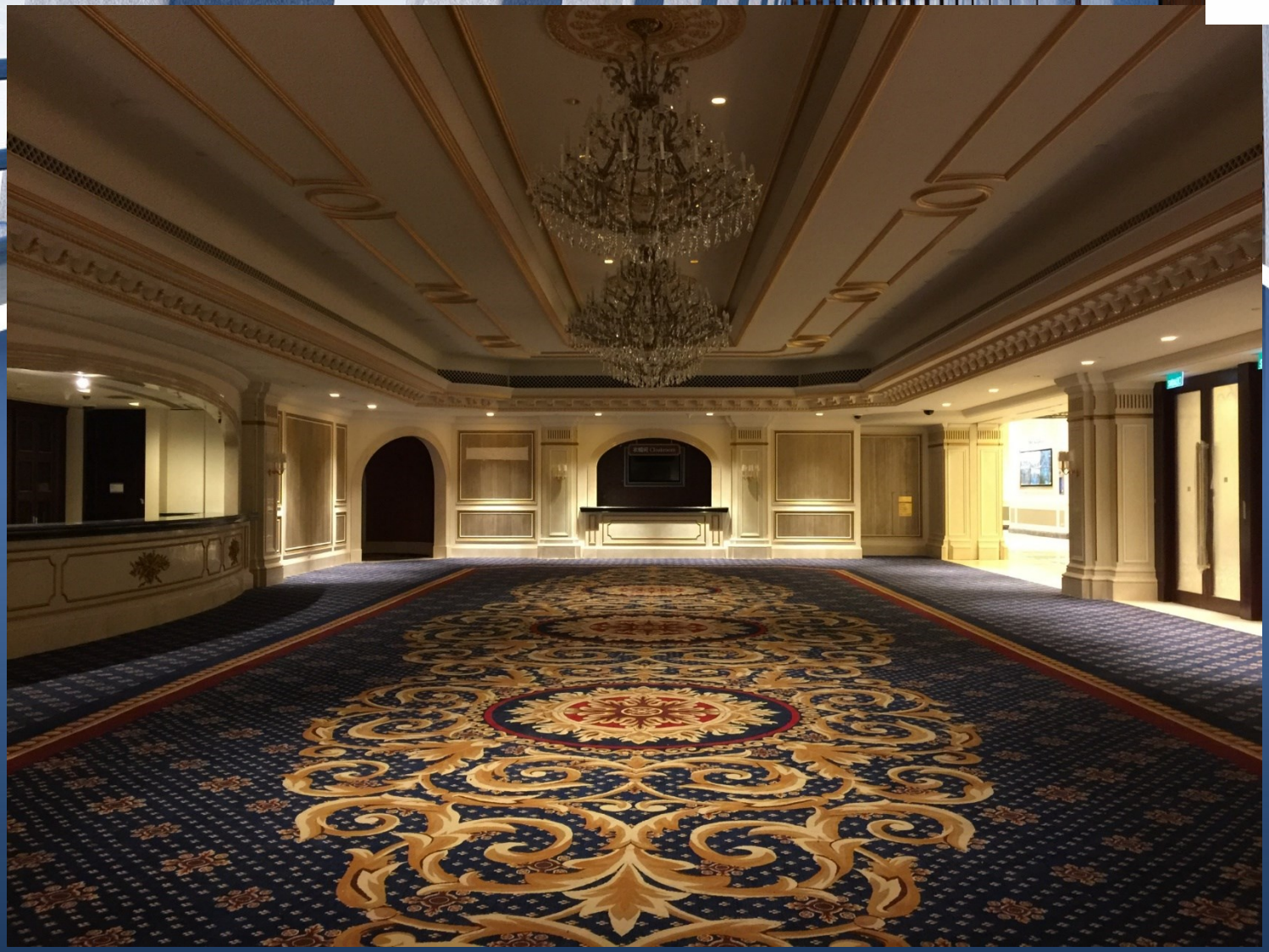
Architectural Columns

Ornamentations





Features and Lightings



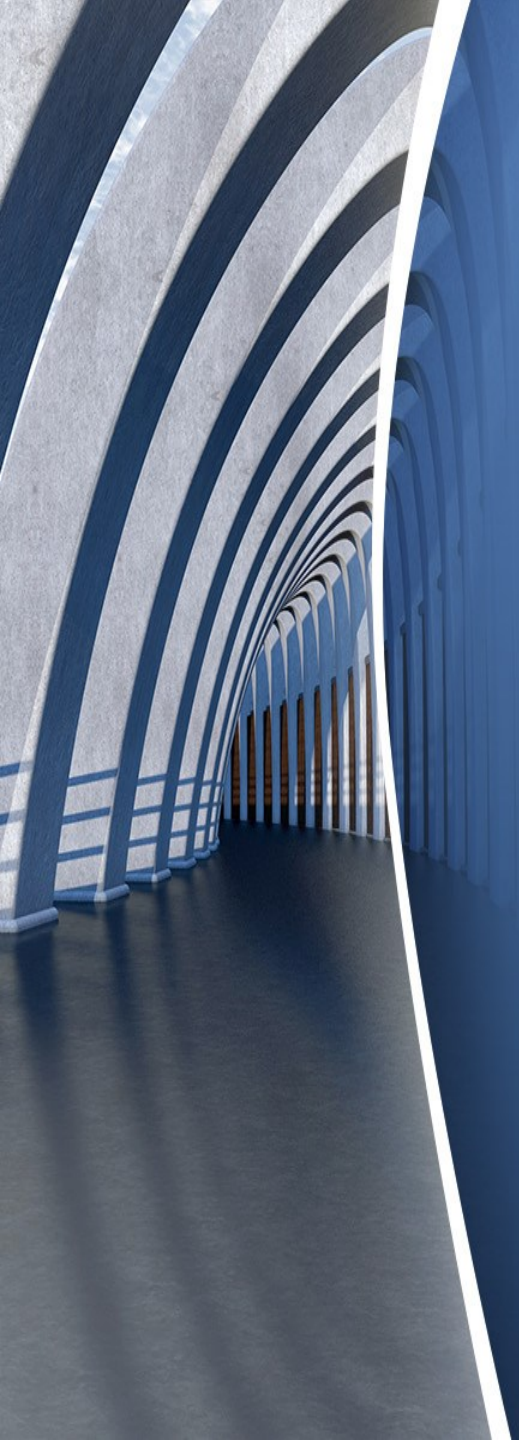
False Ceiling

Spiral Staircase Features

Avenue of Stars - GRC Architectural Features

GRC Features for Greening

GRC Features for Greening

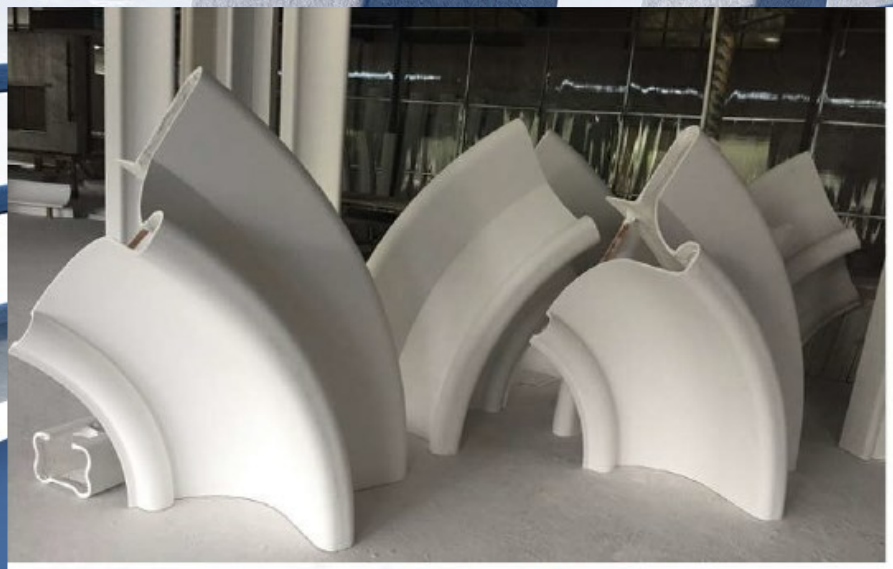


Hong Kong Kai Tak Development

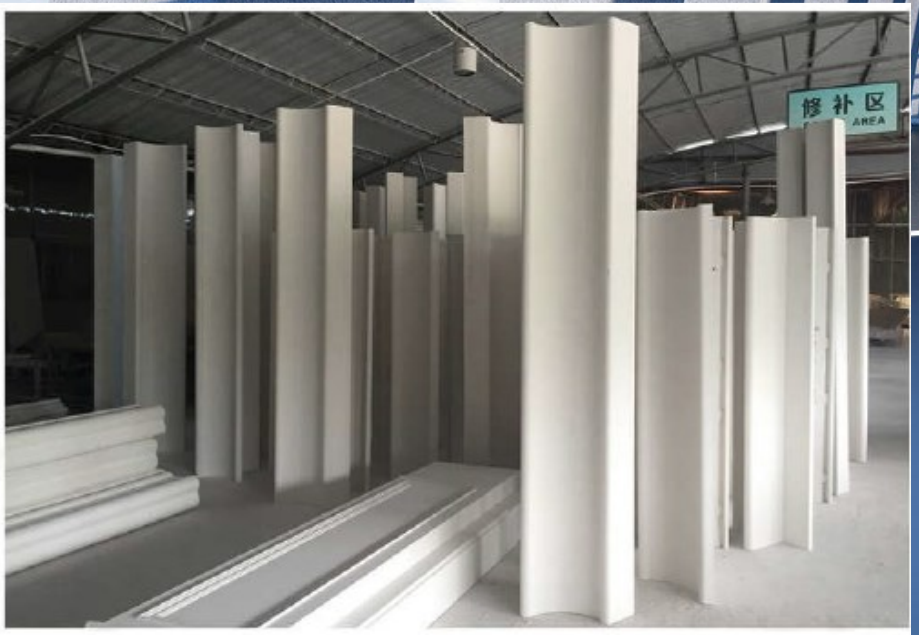
GRC External Claddings

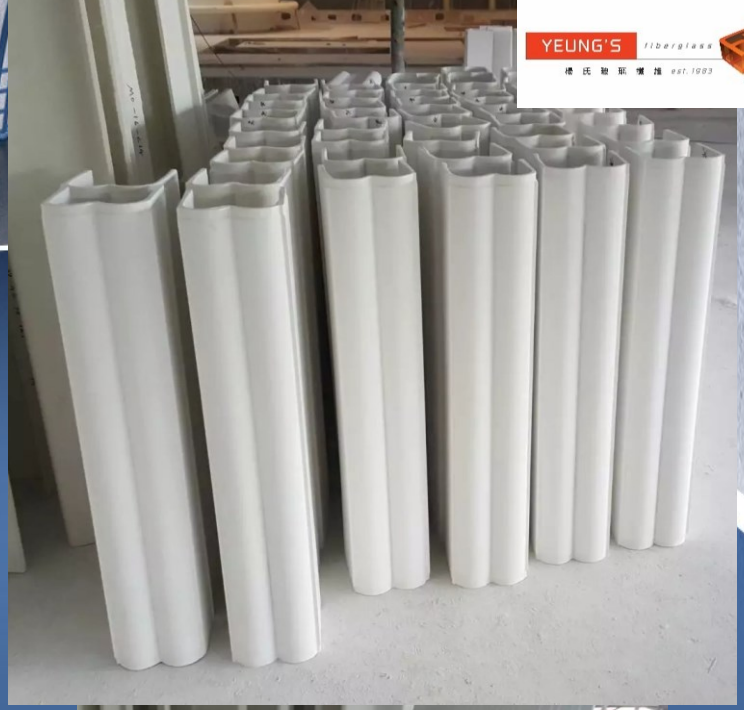
Philippines Manila Bay Resort

GRP Column Features



GRP Column Features
Semi-Product Assembly





GRC Column Features
Polishing and Storage

GRP Column Features
Semi-Product Assembly

GRP Column Features
Semi-Product Assembly

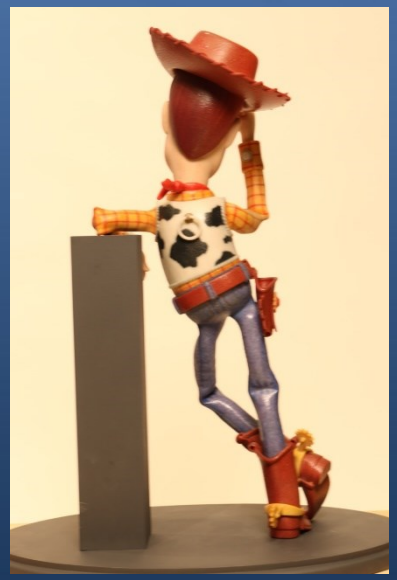
Shanghai Disneyland - Toy Story

Disney Figures







Conceptual Design and Views

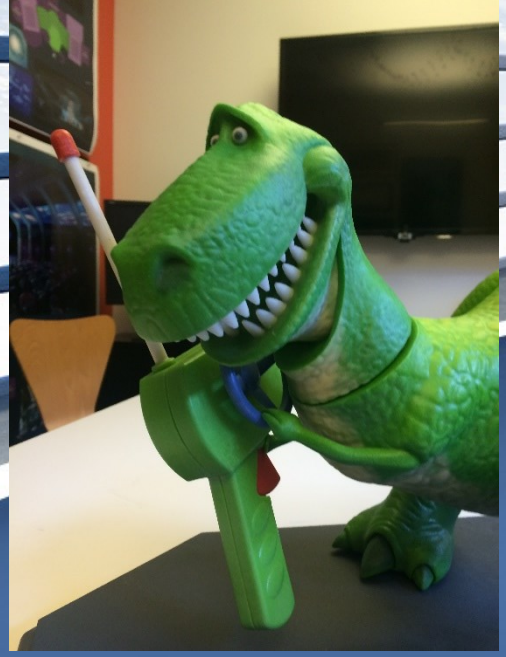
Conceptual Design and Views

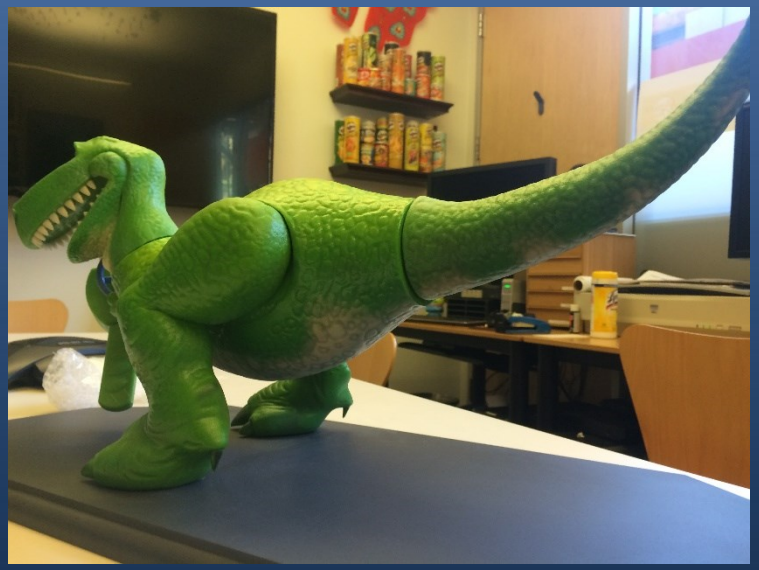
Products prior to painting

Products prior to painting

Products prior to painting

Products after painting

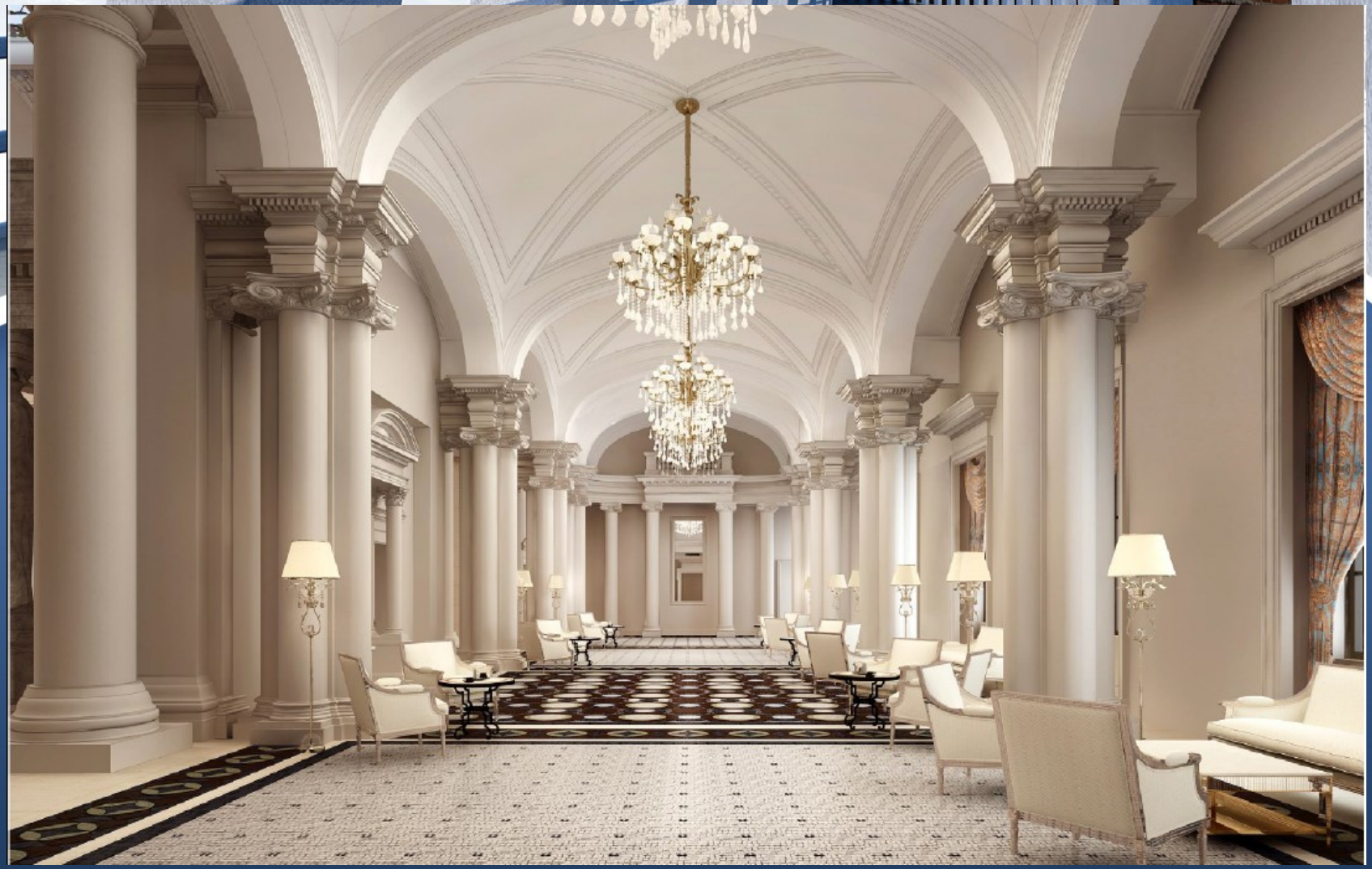




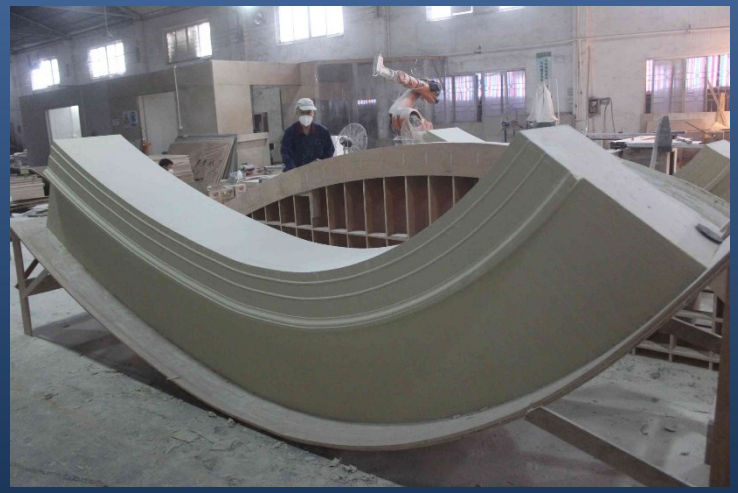
Shanghai Disney - Toy Story

Products prior to painting

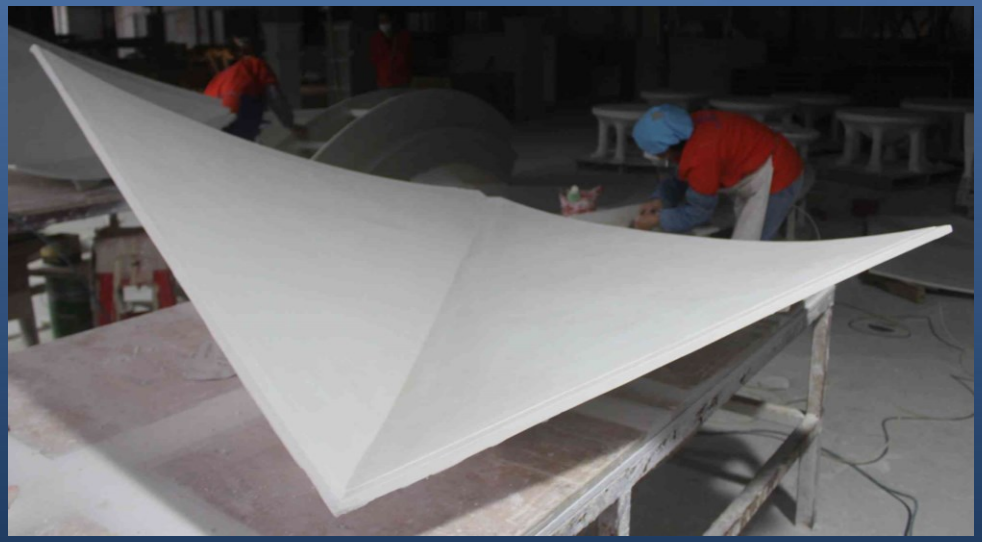

Huawei Technologies Building in Shenzhen



GRG Feature Ceiling and Awnings



GRG Feature Ceiling and Awnings

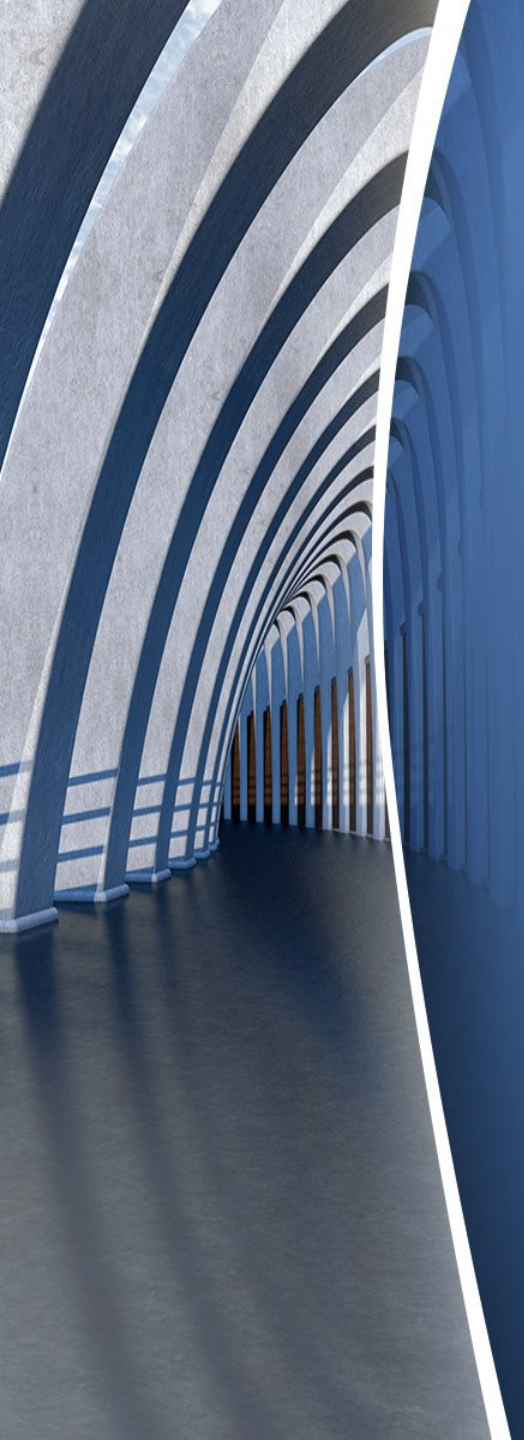


GRG Feature Ceiling and Awnings

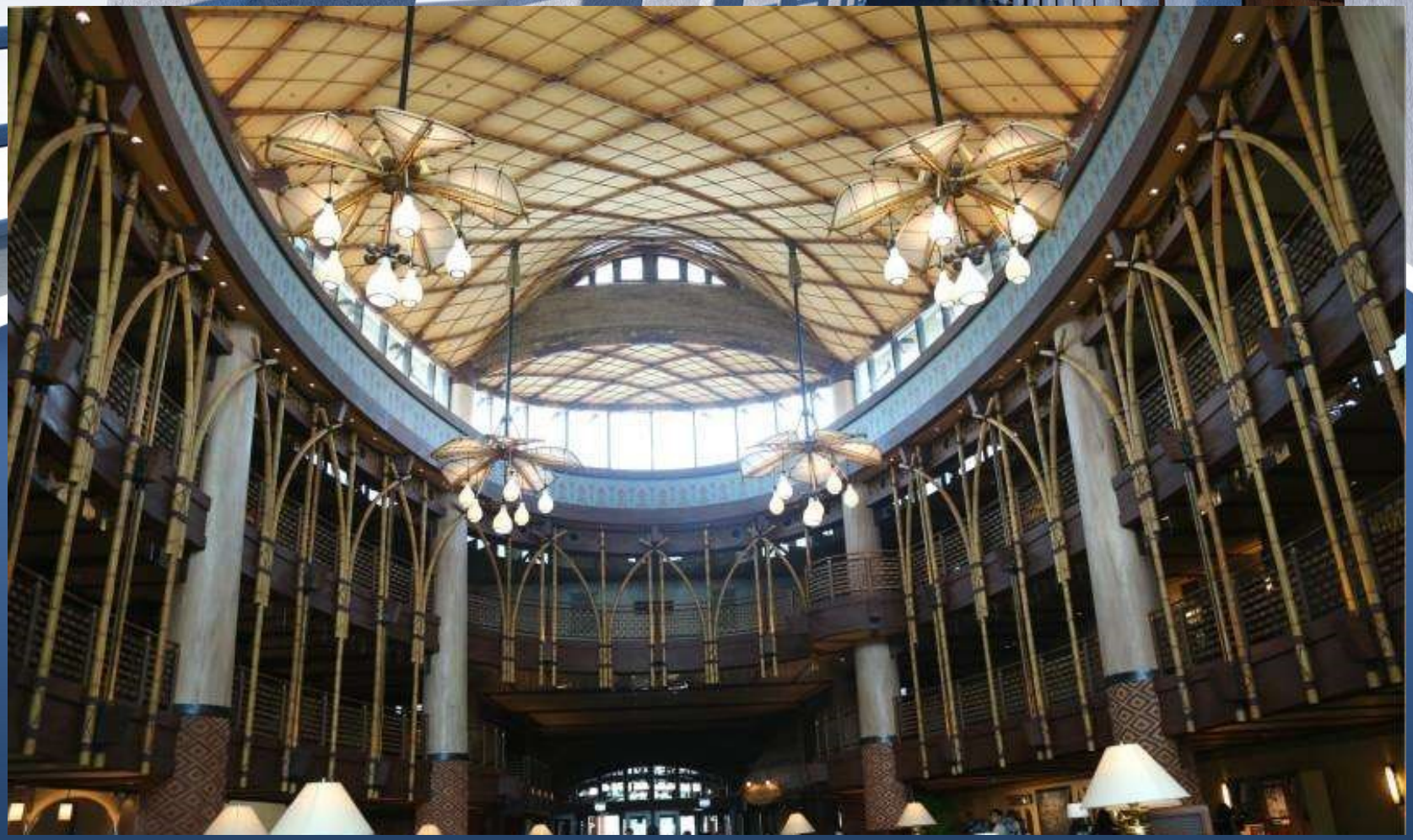
GRG Column Features

GRG Column Features

GRG Column Features

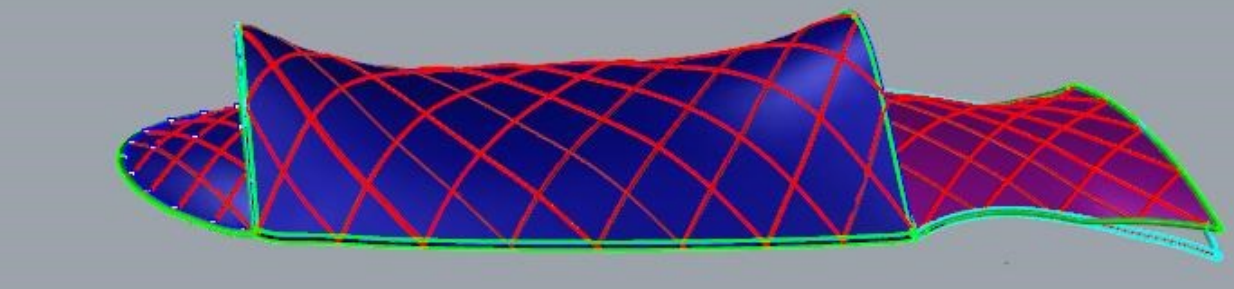


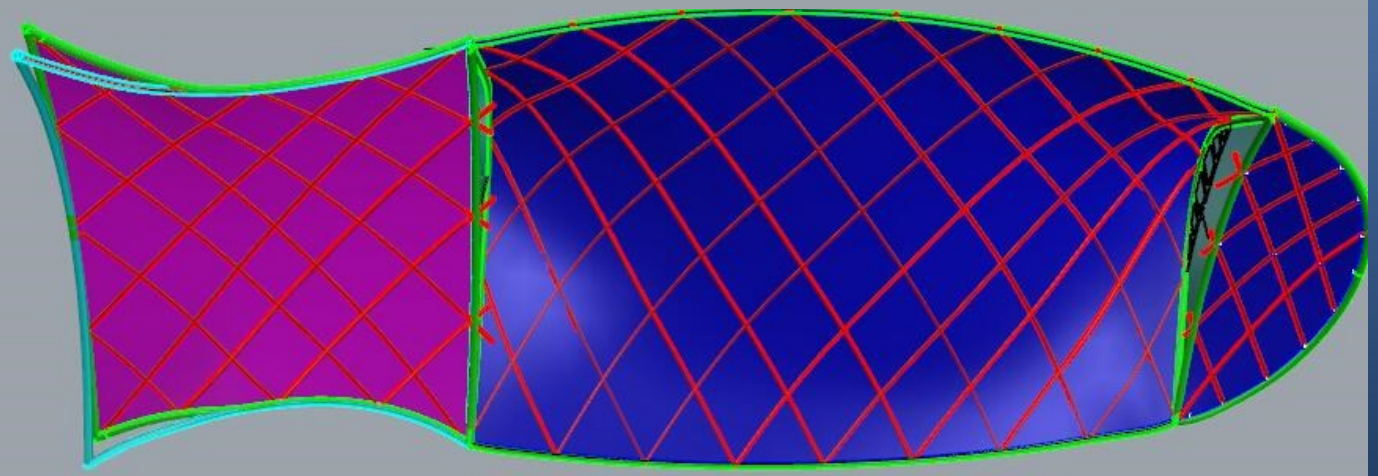
Hong Kong Disney Explorers Lodge



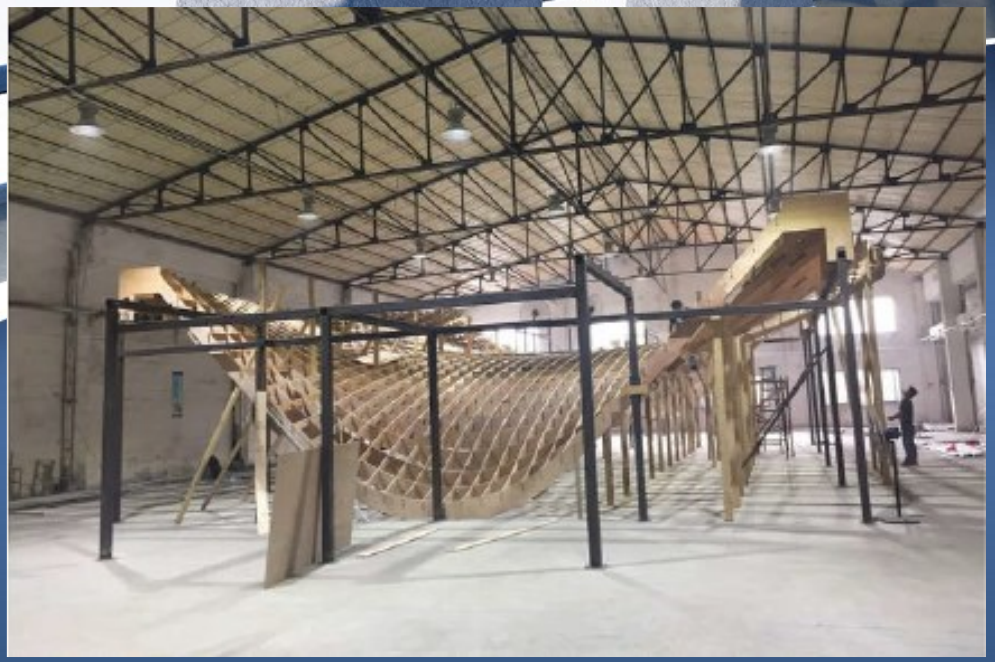
Featured Architectural Ceiling

3D drawing

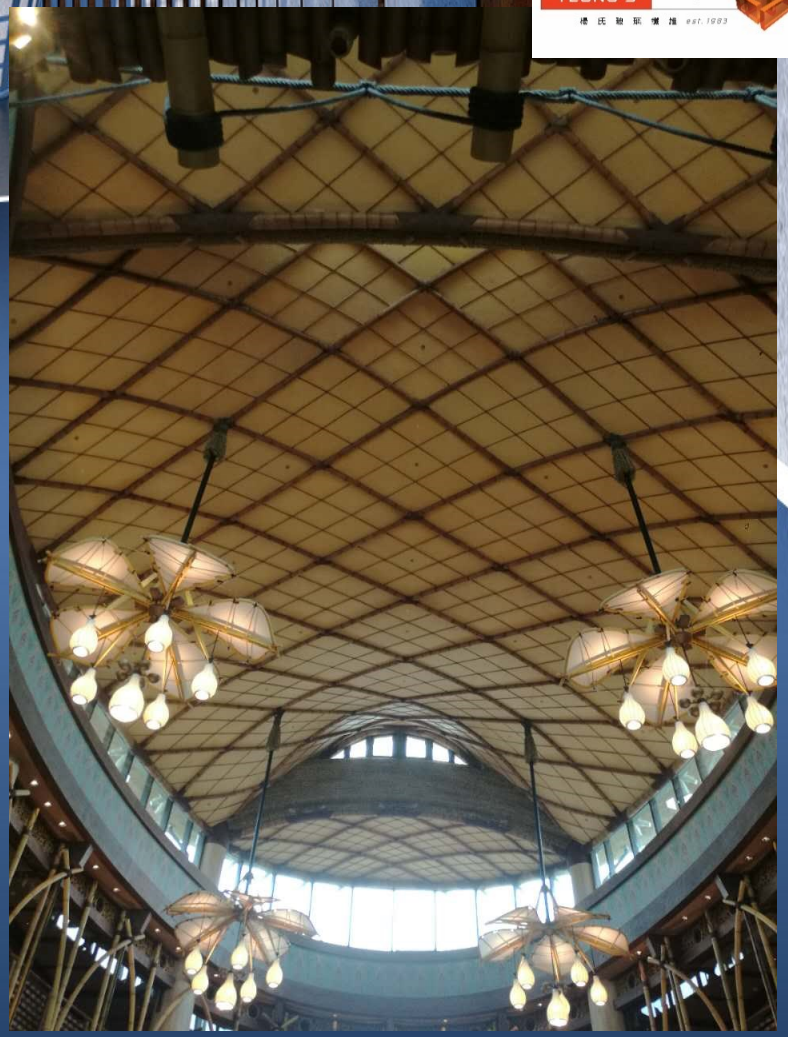




Conceptual Design



Set up 1:1 ceiling model



Exact and Accurate installation

Accurate Mould Making

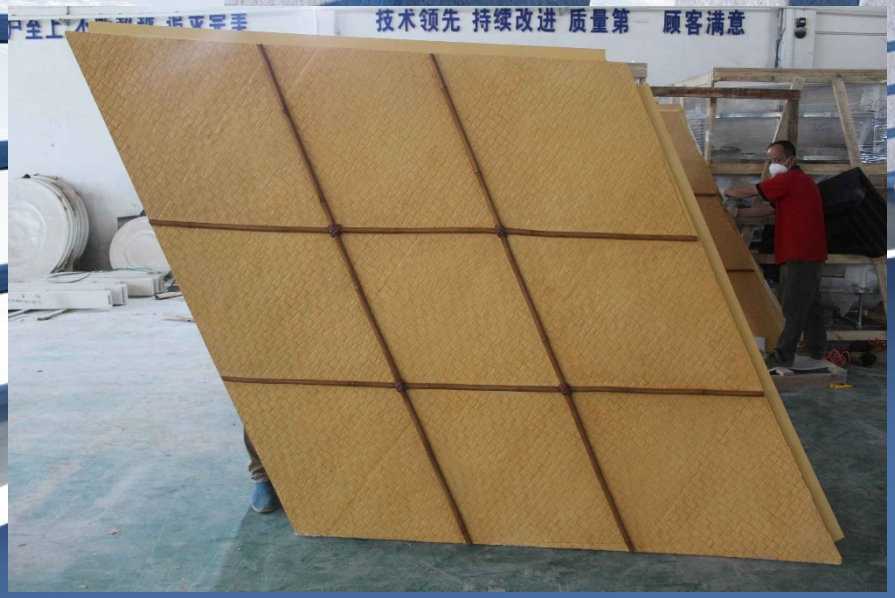
Master model

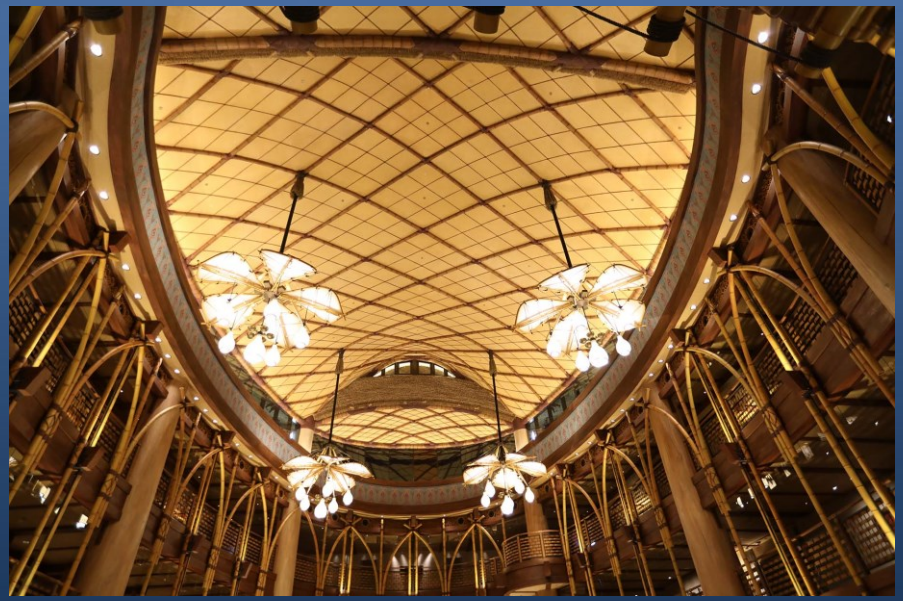
Molding

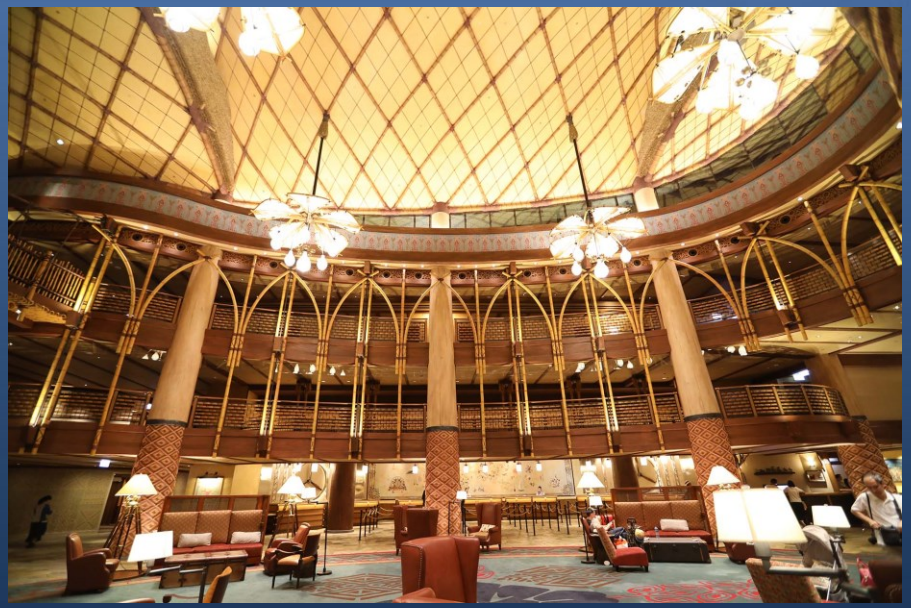
Mold Fabrication Procedures

Master Mould Polishing and Touching Up

Installation of Imitated Bamboo Features

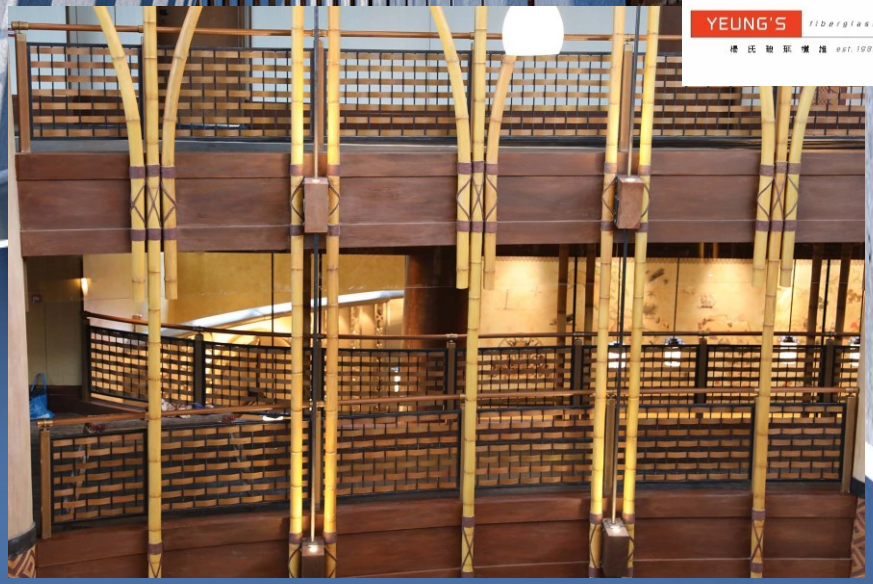


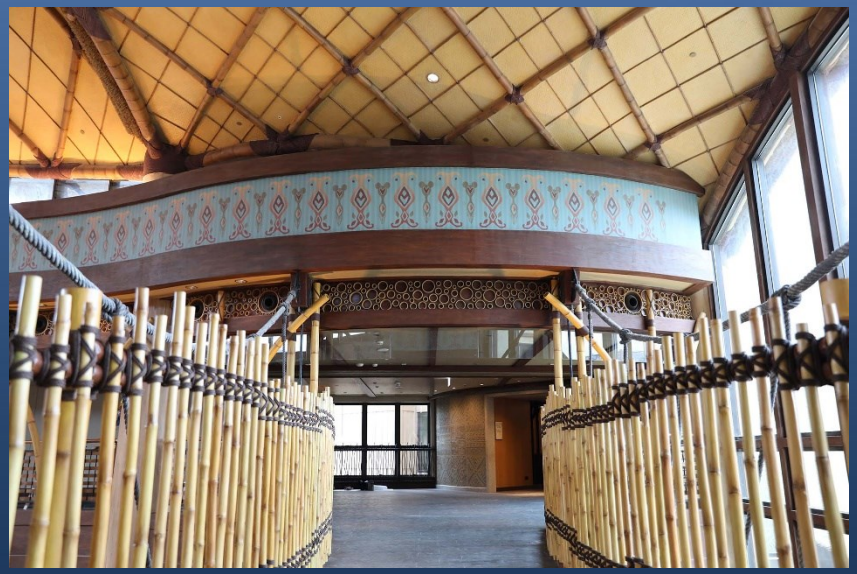




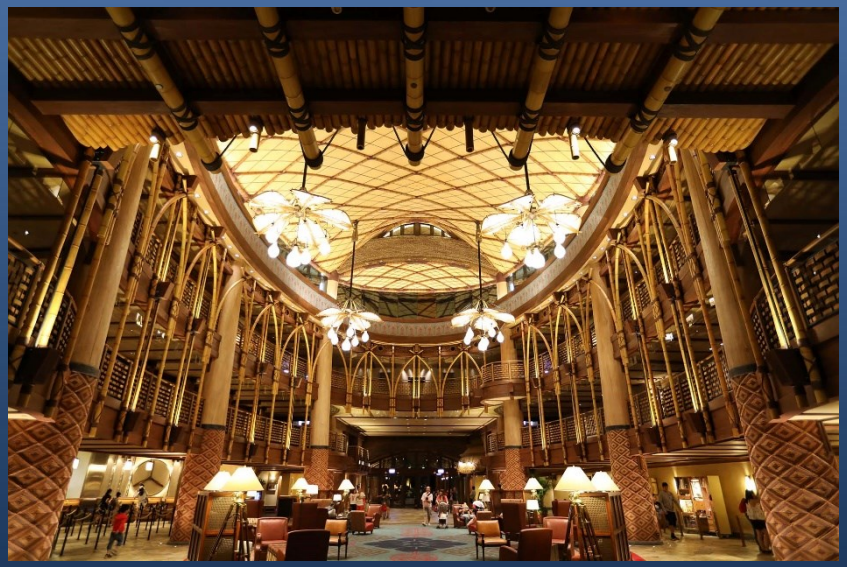
Installation Completed

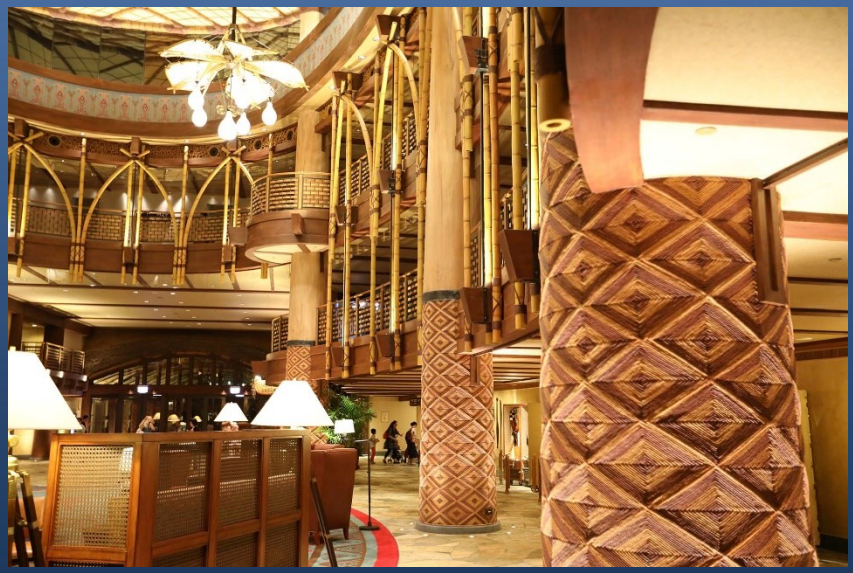
Tree Trunk and Bamboo Features



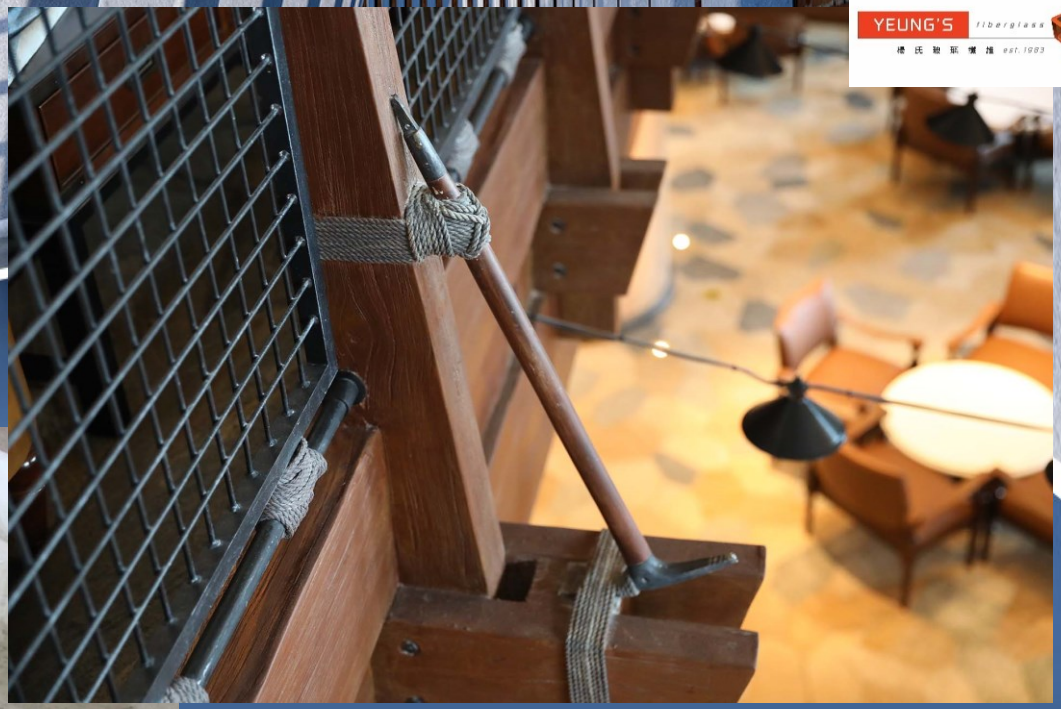


Tree Trunk and Bamboo Features

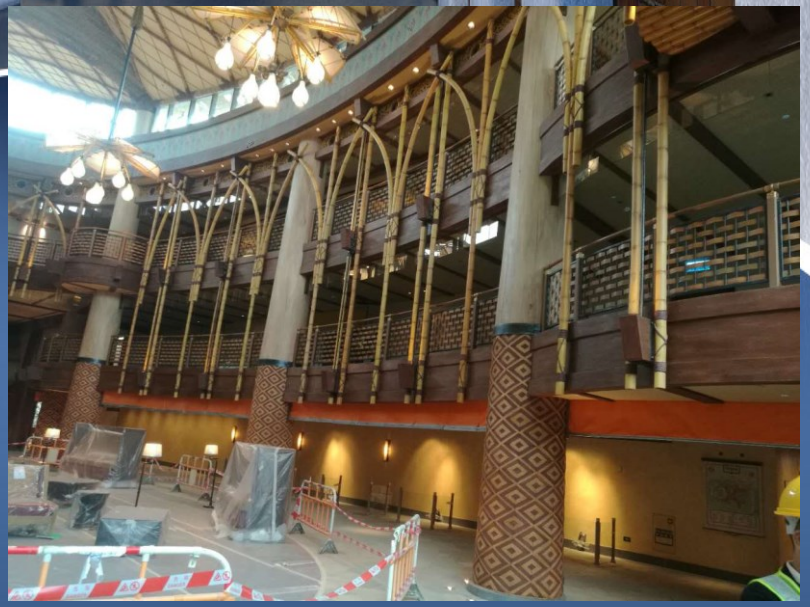


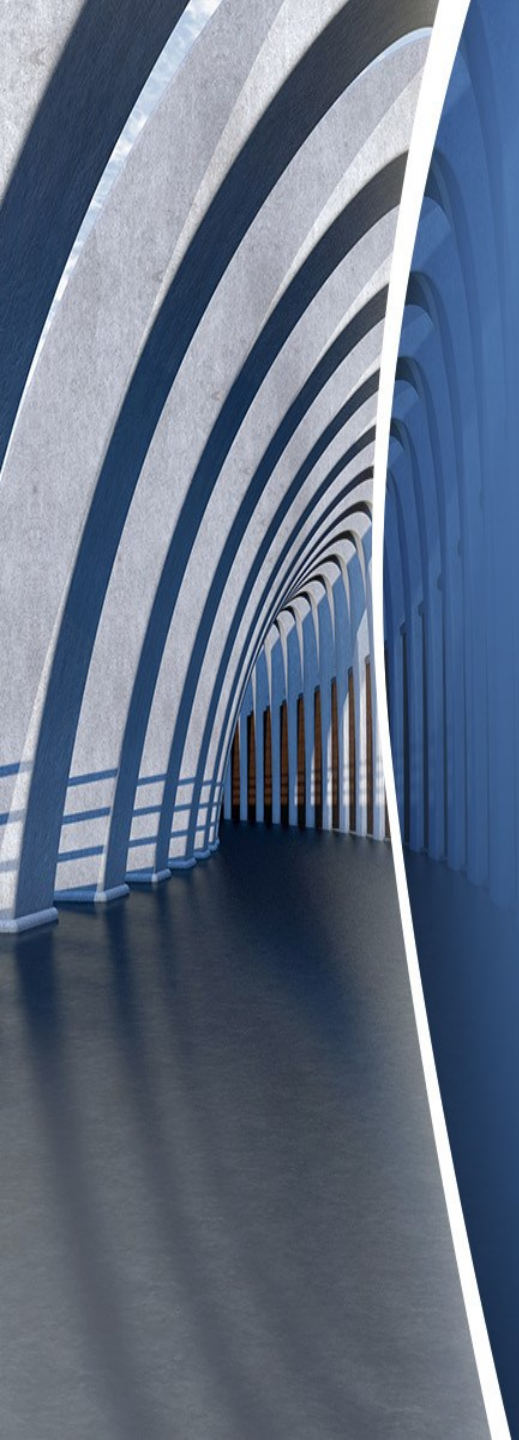


Tree Trunk and Bamboo Features Installation



Tree Trunk and Bamboo Features





Water Park- PRC

Doom and Feature Entrance

Figures and Features

Artificial Rockwork

Feature and Claddings

Signage

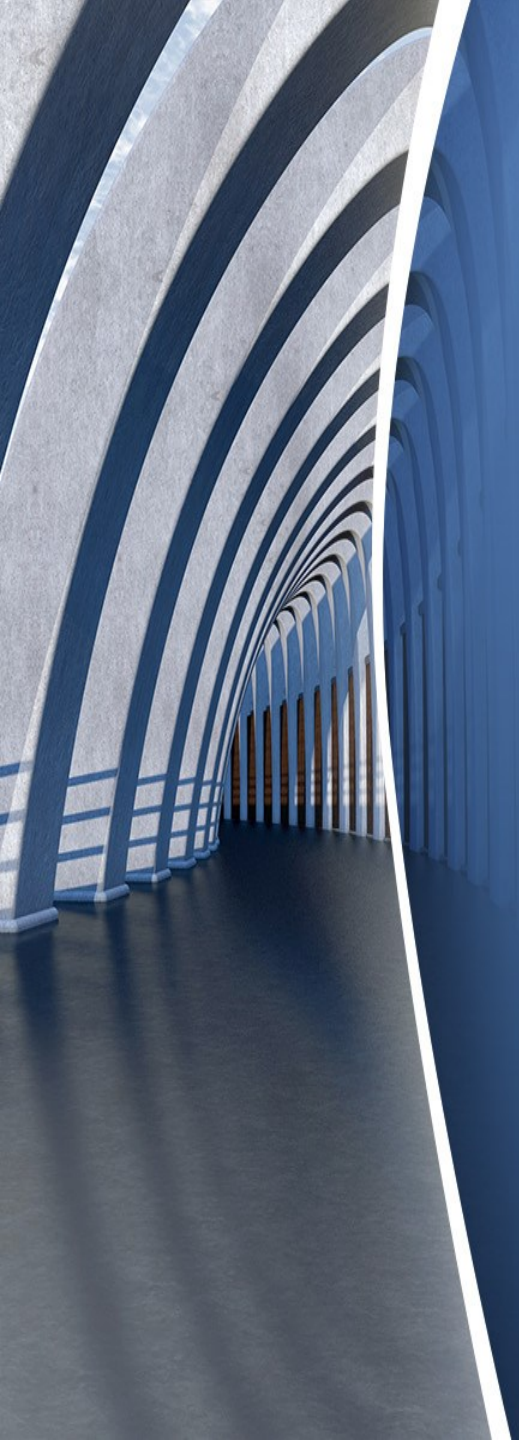
Cartoon Houses

FRP Bridge

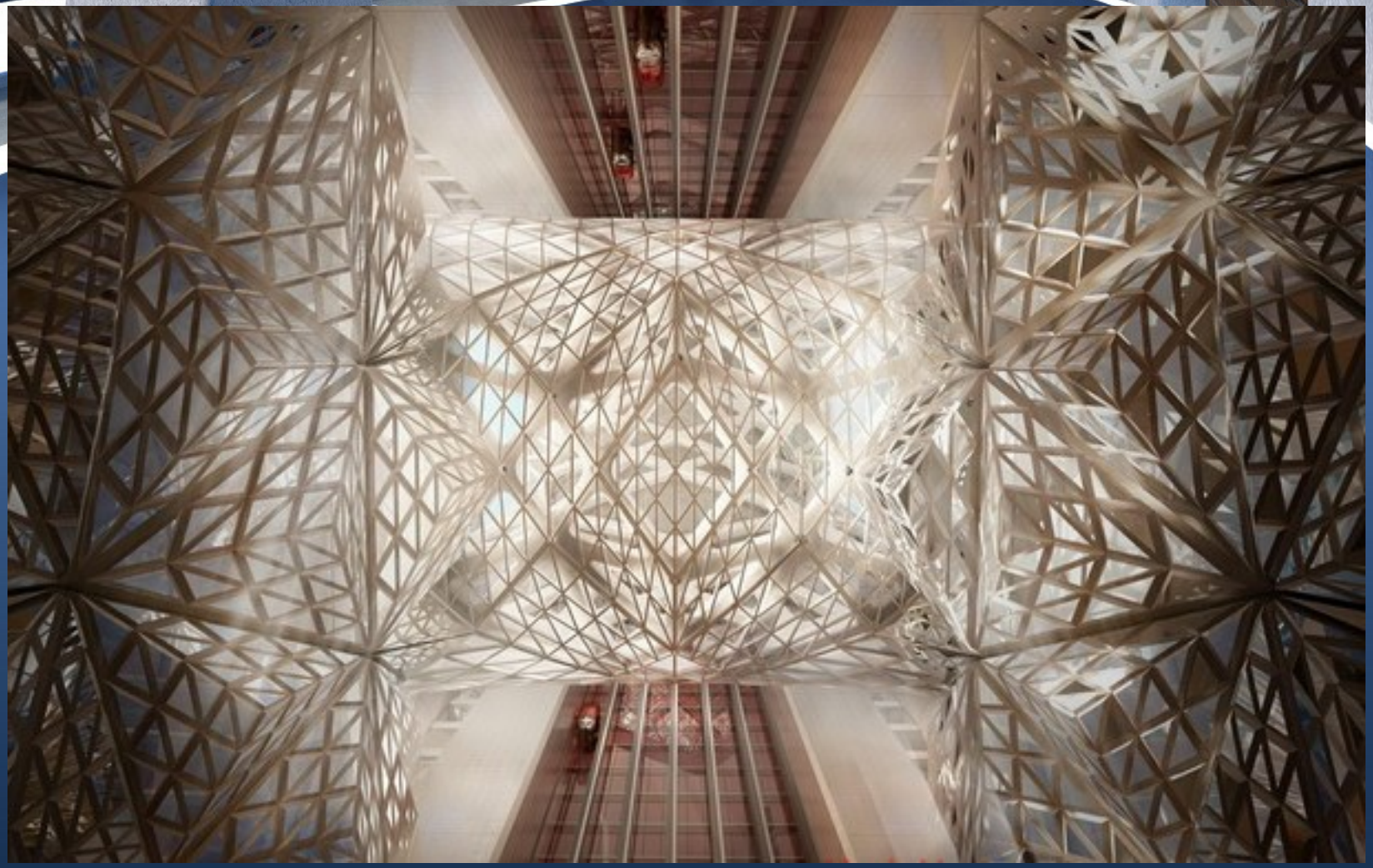
Feature Claddings

Artificial GRC Rockscape

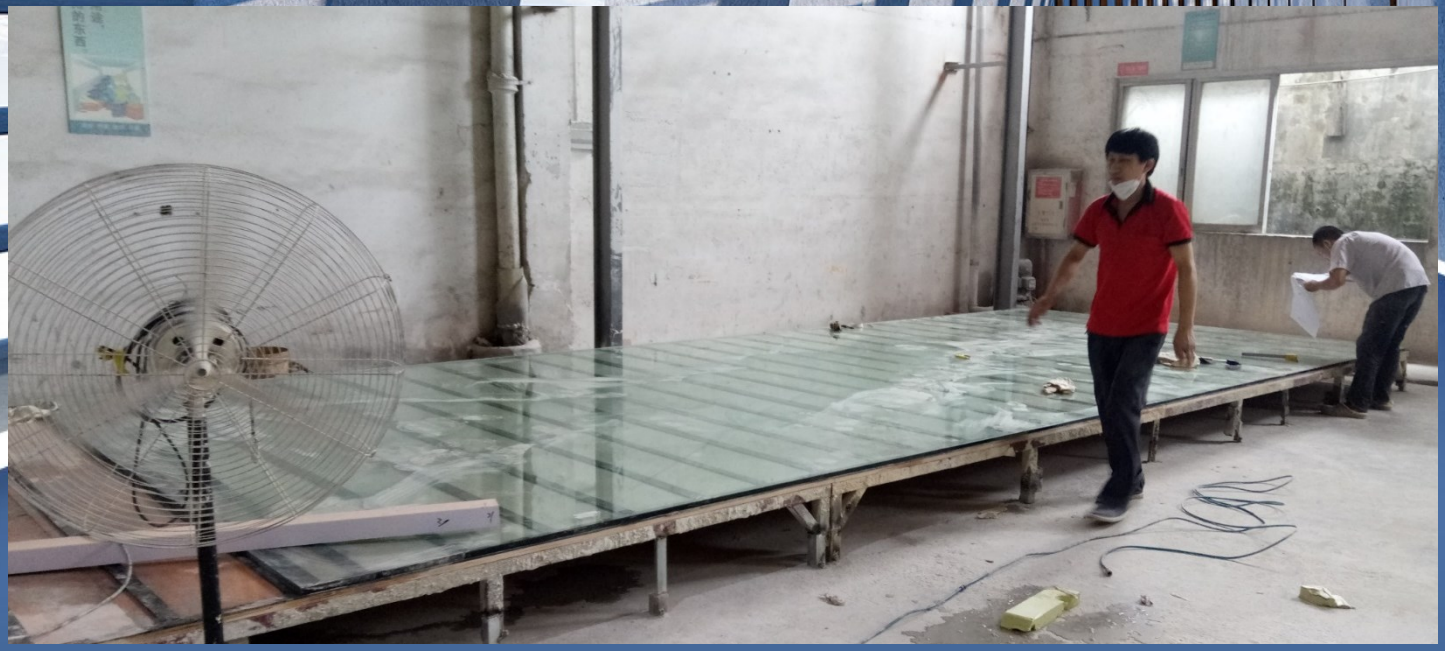
Imitated Ice Cubes



City of Dream in Macau



GRP Feature Ceiling System

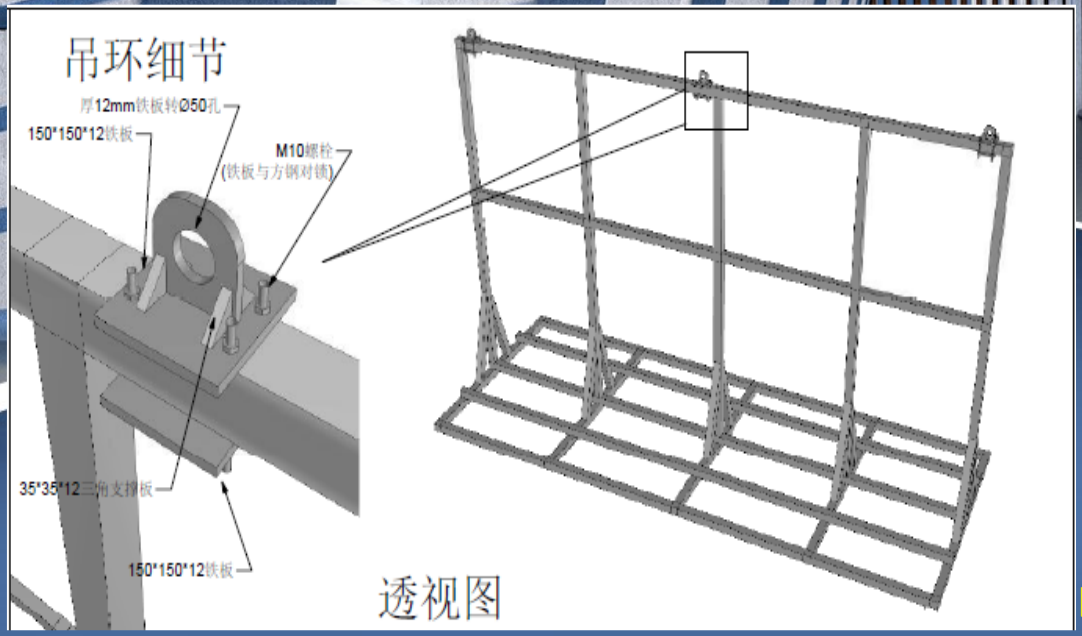


3m * 8m
Custom glass table is 8m in length, 3m in width

mould positioning

GRP Feature Ceiling System

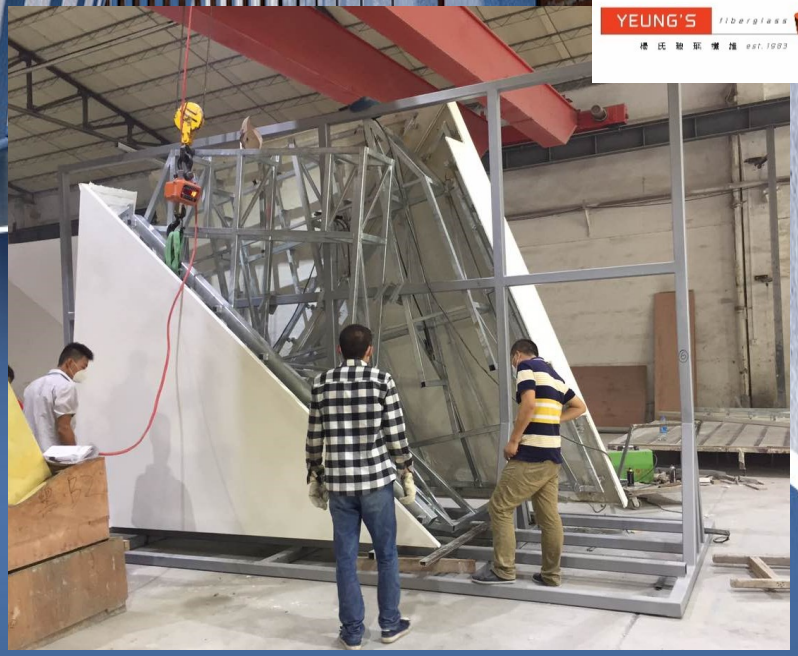
GRP Feature Ceiling System
Lamination



Lifting Procedures

Carrying Shelves

Positioning of secondary steel frame



Product Installation

Re-patching after primer painting

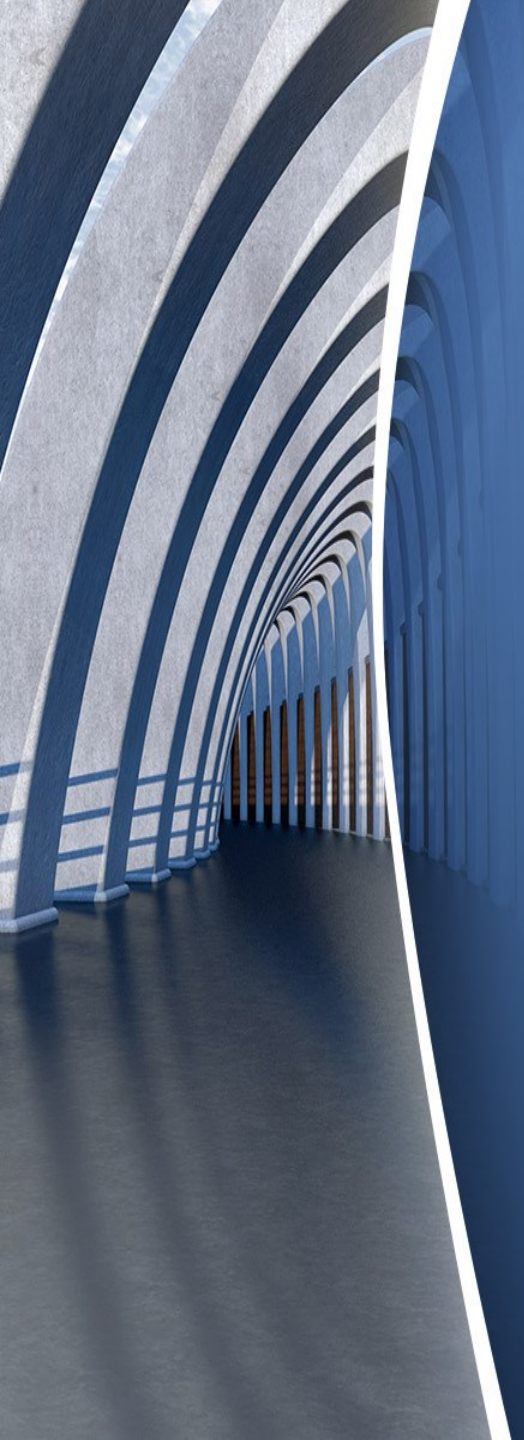
Re-patching after primer painting

Painting Work

QC check after finish painting

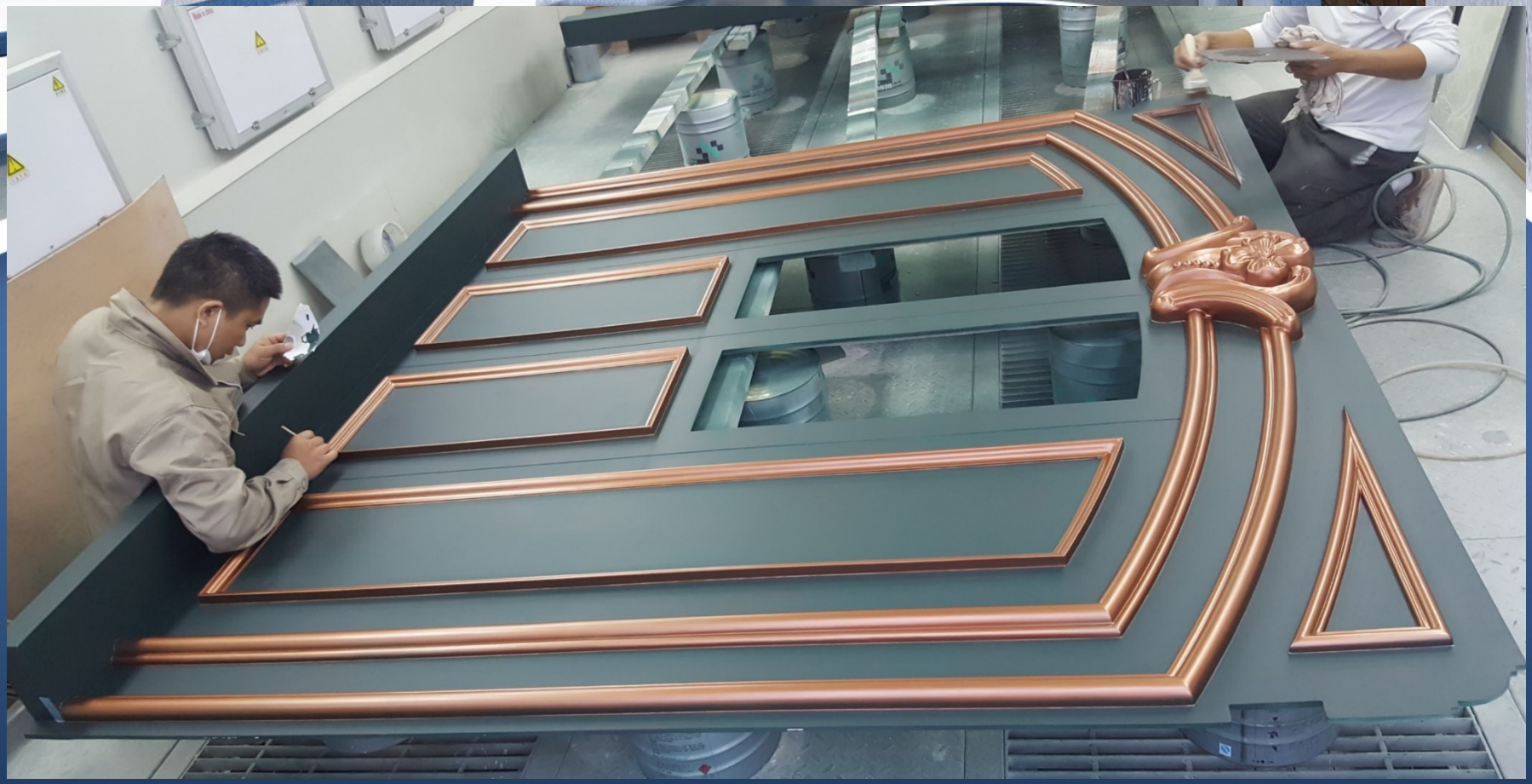
Fully enclosed waterproof packaging

Shipping

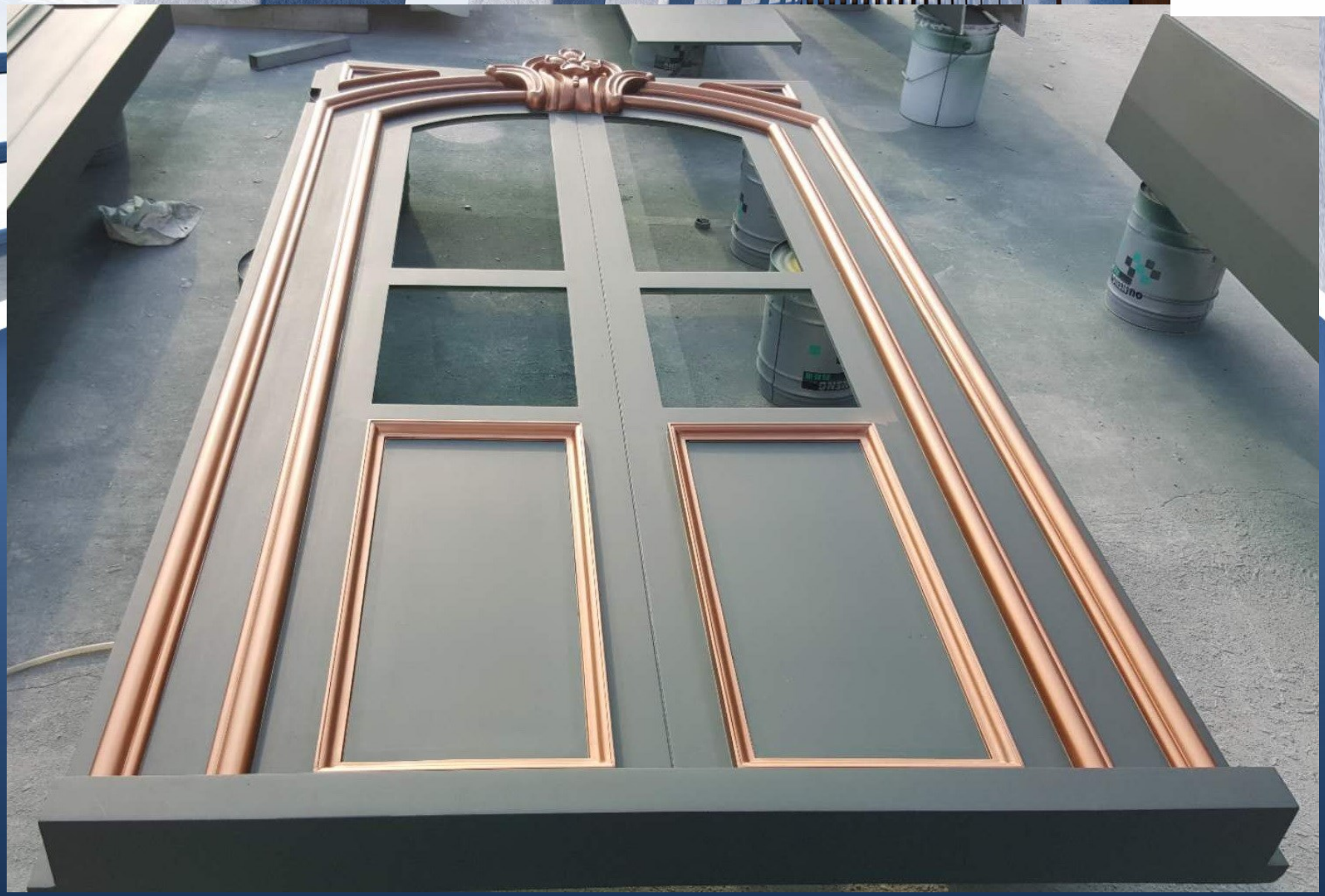


Deluxe Restaurant Location At Wanchai-HK

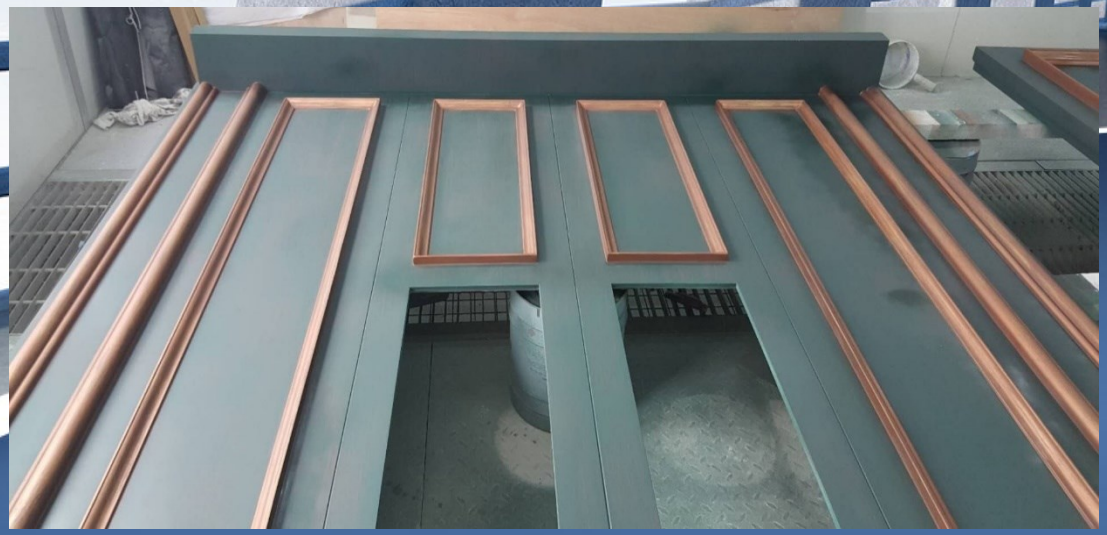

Junon



Off-Site Painting Works

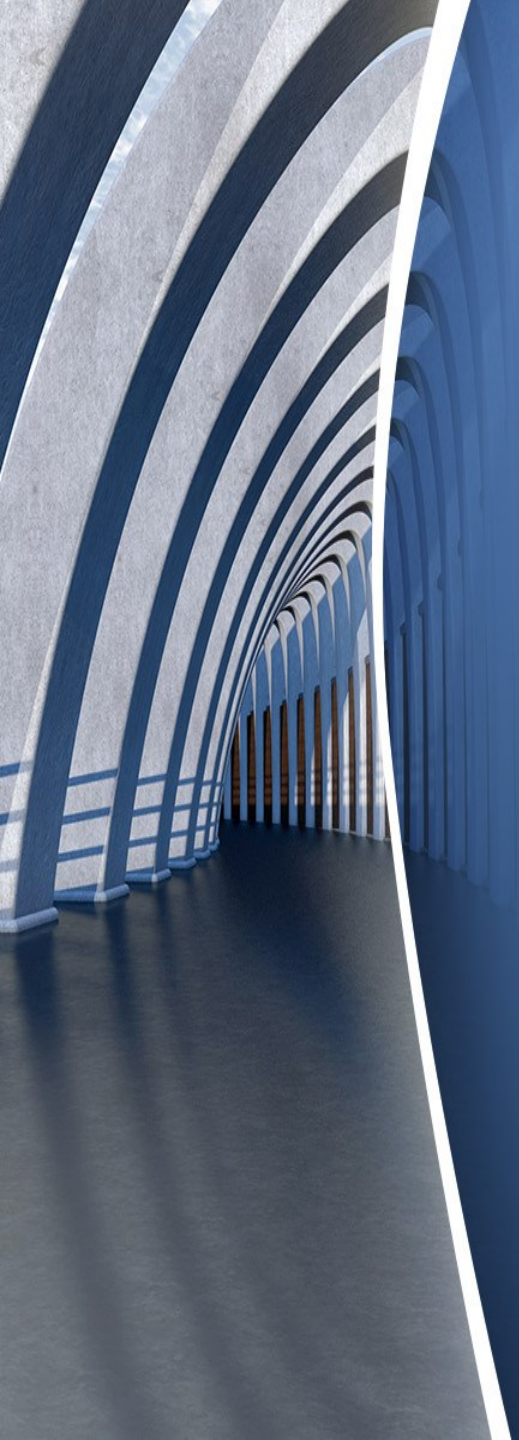


Off-Site Painting Works Completed



Off-Site Painting Works Completed

On-Site Painting and Touch-up



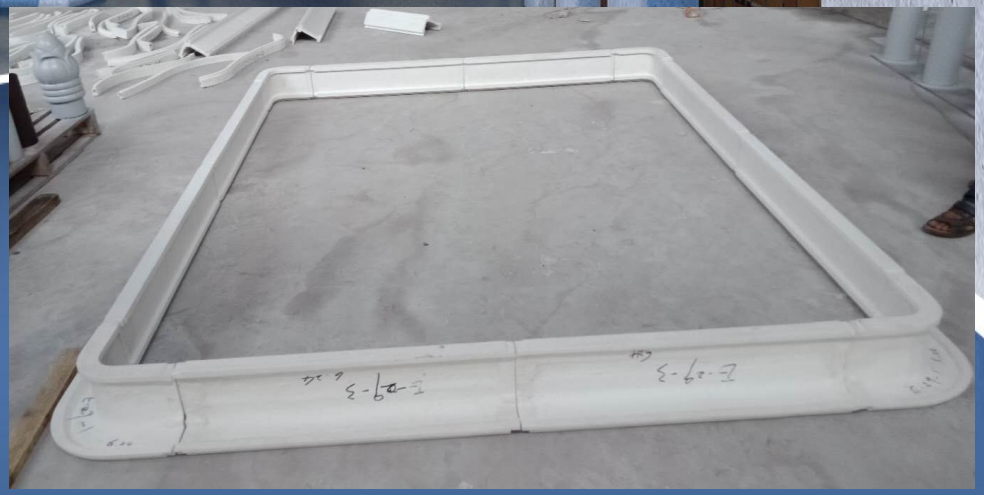
MGM in Macau

Column Cladding and Feature Ceiling

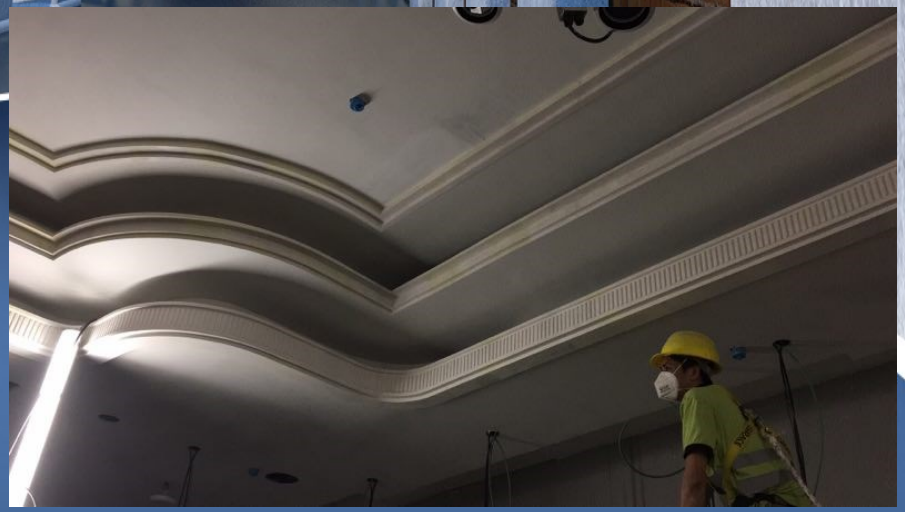
Mould Fabrication

Curing in Progress

Curing and Touch ups

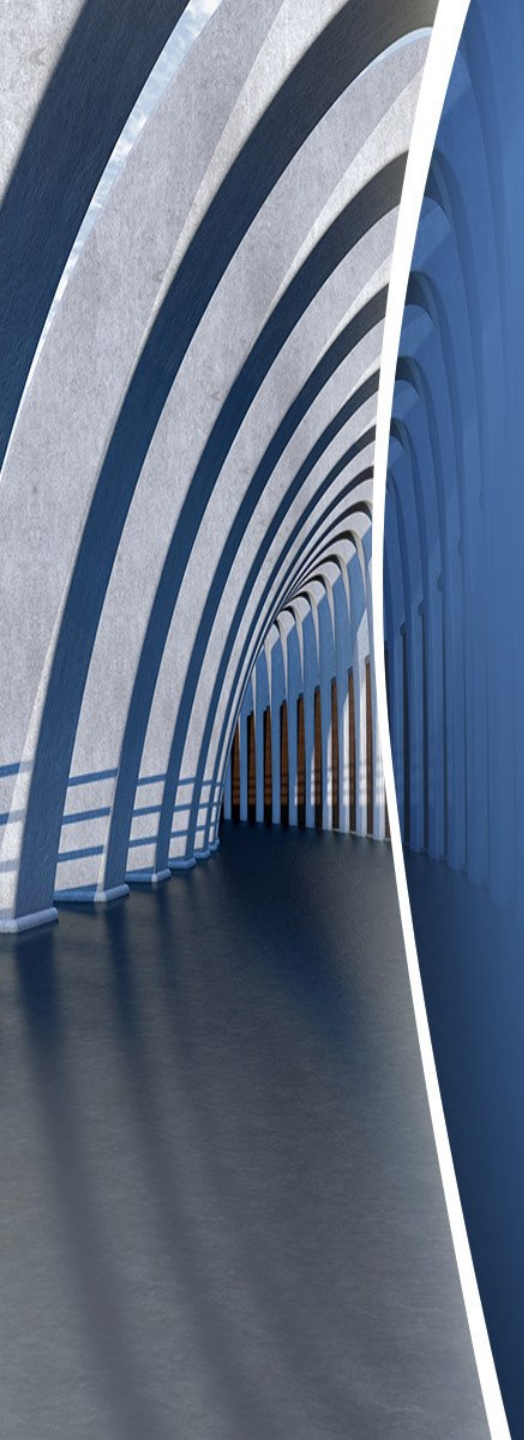


Curing and Touch ups



On site Installation

Installation Completed

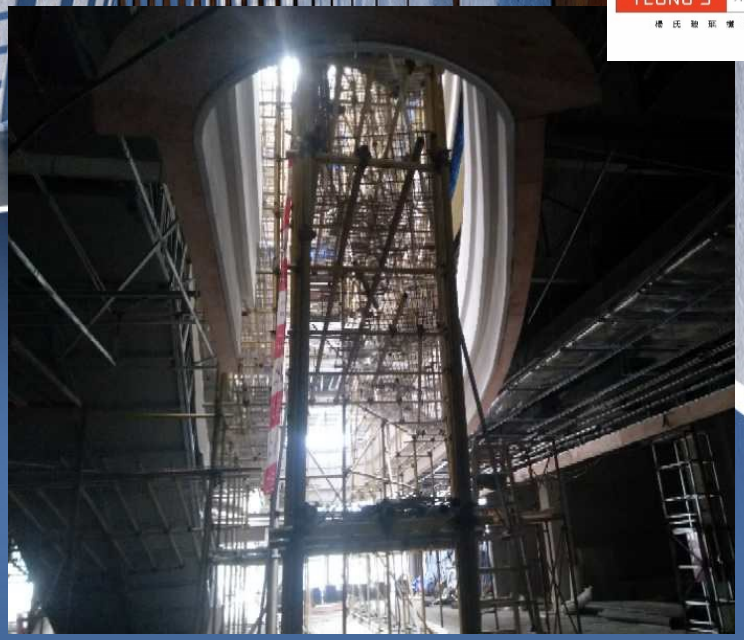


GRG Ceiling for Shopping Mall-PRC

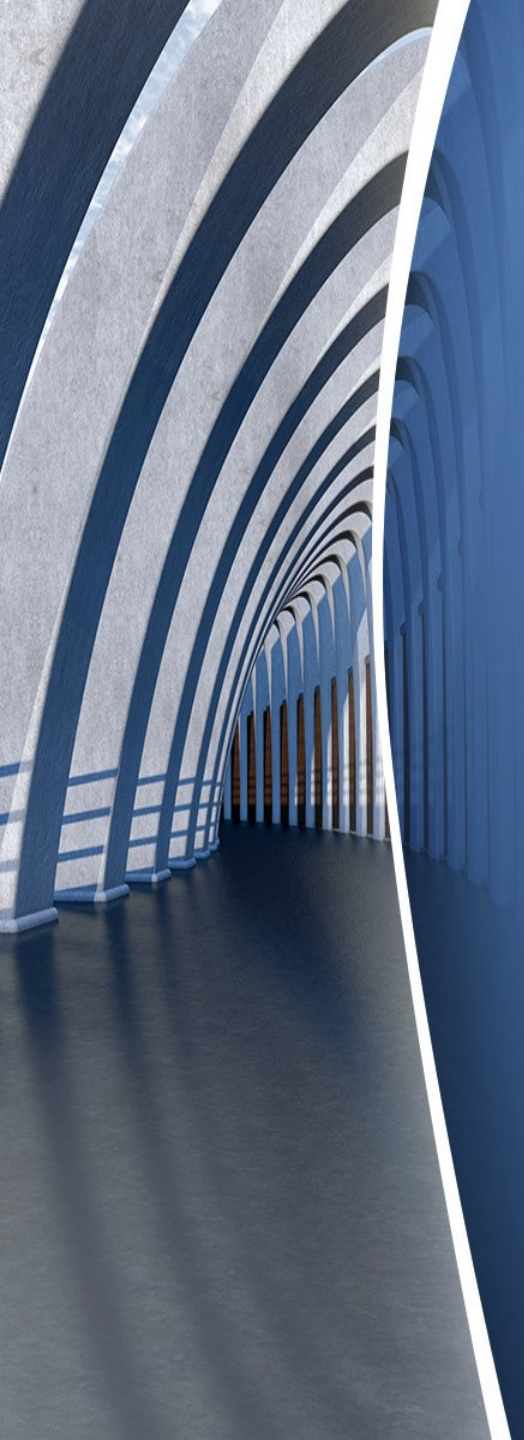
Mould Fabrication

Produc[illegible]

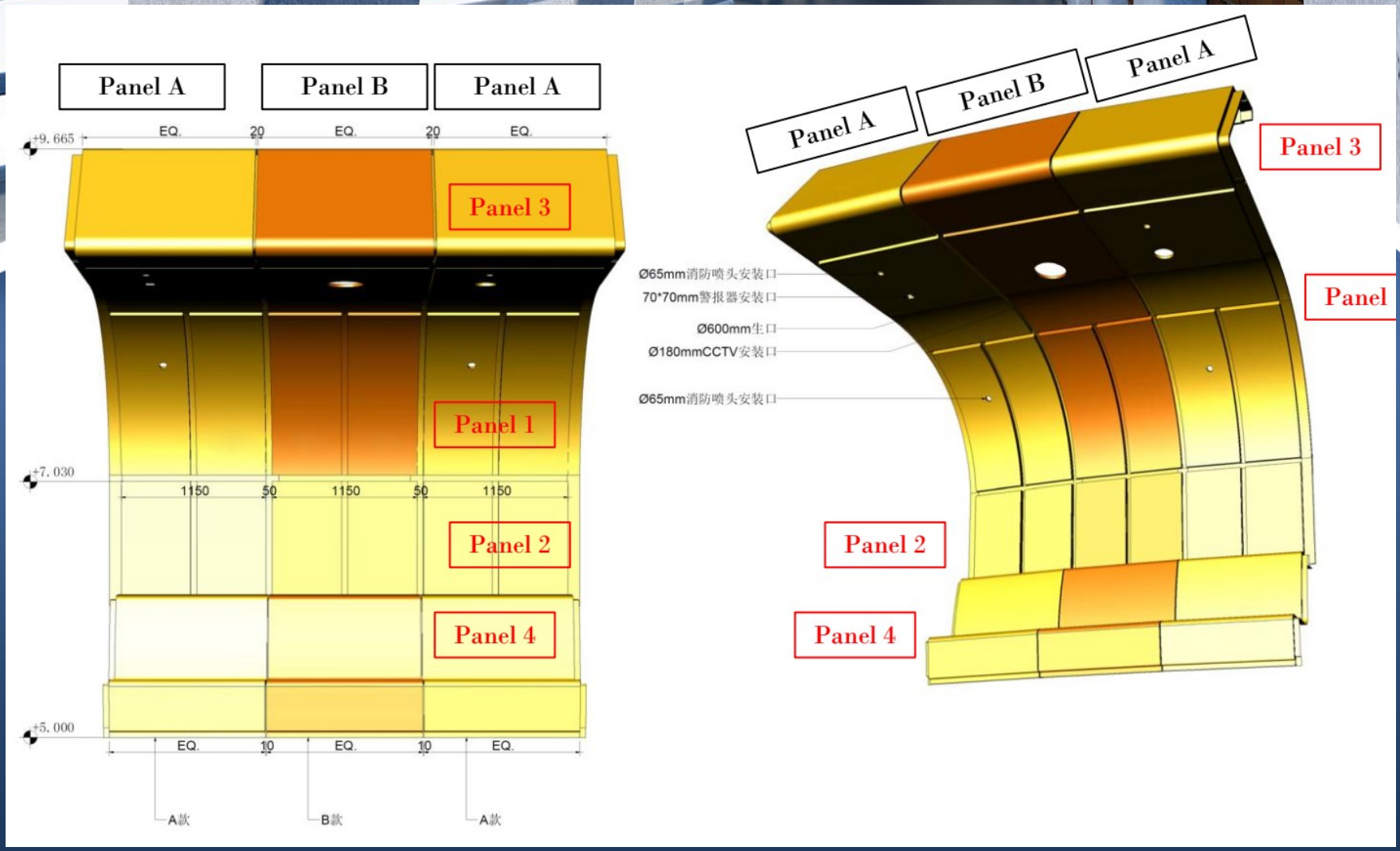
Product Fabrication



Installation Works in Progress



West Kowloon – The Park GRC Cladding



Conceptual Design and Prototype

Mock Up – Off-site

	Job No.		Page
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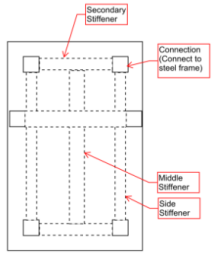
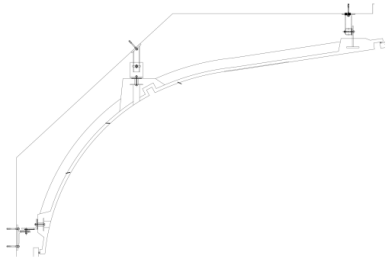
3.1 Structural design for GRC Panel





3.1.1 Design Data

(1) Loading data

Dry density of GRC	ρ_g = (2000x9.81) =	19.62	kNm^{-3}	
Elastic Modulus:	=	20000	MPa	
Thickness of GRC panel:	t_g =	25	mm	
Basic wind pressure:	q_b =	2.23	kPa	
Wind coefficient:	C_f =	1.4		(App. E of HKWC 2004, for cladding)
Design wind pressure:	q = qb·Cf =	3.122	kPa	

(2). Design strength for GRC

Design Flexural Strength of GRC	=	2.89	MPa
Design In planeShear Strength of GRC	=	2.59	MPa
Design Interlamilar Shear Strength of GRC	=	1.04	MPa
Design Punching Shear Strength of GRC	=	9.25	MPa

3.1.2 Check GRC cladding panel (25mm thk.)

(1). Check GRC cladding panel:

Max. span of GRC panel	L =	3200	mm			
Load width:	B =	287.5	mm			
Design wind pressure (WL):	q =	3.122	kPa			
Design Imposed Load (LL):	(Section 3.8.1.1 of Code of Practice for Dead and Imposed Loads 2011)					
LL1: UDL applied on wall=		0	kNm^{-2}			(Consideded wind load)
LL2: Line Load applied on panel at 1.1m height=		0	kPa = 0	kNm^{-2}		(Consideded wind load)
LL3: Point Load applied on panel=		0	kN			(Consideded wind load)
Design Dead Load (DL):	=	0.49	kNm^{-2}			

	Job No.		Page
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(2) Structural checking (ULS)

1. Load Combination: 1.4DL + 1.6 L.L

Design UDL, q = 0.6867 kNm^{-1}

2. Load Combination: 1.2LL + 1.2 W.L + 1.2DL

Design UDL, q = 4.335 kNm^{-1}

3. Load Combination: 1.4DL + 1.4 W.L

Design UDL, q = 5.058 kNm^{-1}

Therefore, Design UDL, q = 5.058 kNm^{-1}

Short side dimension, lx = 288 mm
Long side dimension, ly = 3200 mm

l_y/l_x	1.0	1.1	1.2	1.3	1.4	1.5
α_{sx}	0.062	0.074	0.084	0.093	0.099	0.104
α_{sy}	0.062	0.061	0.059	0.055	0.051	0.046

Aspect Ratio = ly / lx = 11.1 (Therefore, it is assumed one wayslab)

Therefore, Design moment, M= wL^2 /8 = 0.05225 kNm
Design shear, V= 0.5 x q x lx = 0.727 kN

Section properties

I of GRC panel $I_x = \frac{Bt_g^3}{12}$ = 374349 mm^4

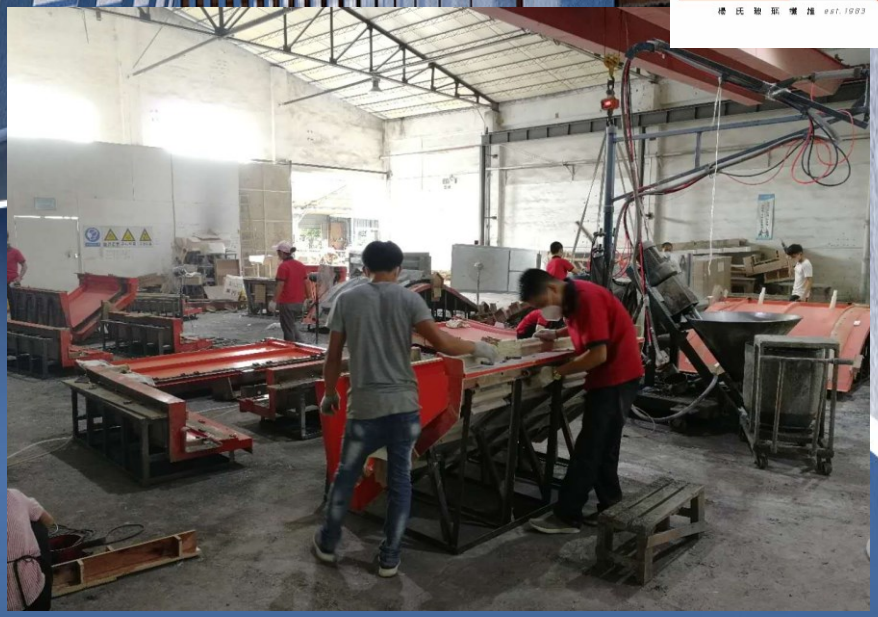
Z of GRC panel $Z_x = \frac{Bt_g^2}{6}$ = 29947.9 mm^3

flexural stress:	σ_{mh} = M/Zx =	1.74	MPa	<	2.89	MPa	OK!
max. shear stress:	σ_v = V / (B x t_g) =	0.10	MPa	<	2.59	MPa	OK!
Interlamilar Shear stress:	σ_v = 1.5xV/(B x t_g) =	0.15	MPa	<	1.04	MPa	OK!
Combined stress checking:	= M/Mc + V/Vc =	0.64		<	1.00		OK!

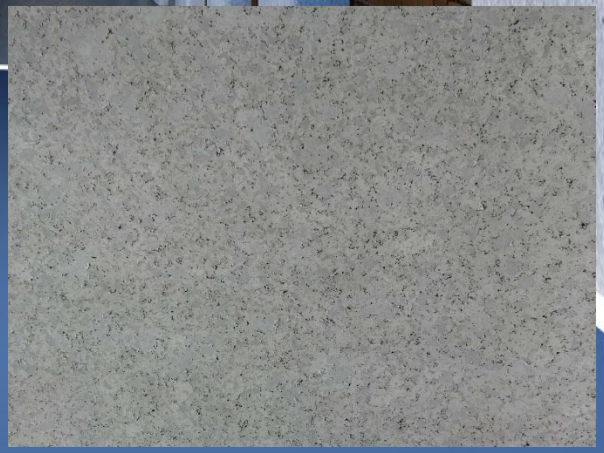
(3) Structural checking (SLS)

Material partial FOS (bending)	$\gamma_{mb.sls}$ =	1.8				
Themal stress:	σ_{ts} =	0.8	MPa			
Shrinkage stress:	σ_{ss} =	0.6	MPa			
Design Unfactored UDL:	DL + WL =	3.613	kNm			
Unfactored moment: M = wL^2 /8	=	0.037	kNm			
flexural stress: σ_{mh} =	=	1.24631	MPa			
(i) LOP required at 28 days:	$f_{req.LOP}$ = (σmh+σts+σss) x γmb.sls =	4.76	MPa <	7	MPa	OK!
(ii) Check deflection:						
Due to wind load:	$\Delta x = \frac{5wL^4}{384EIx}$ =	0.01234	mm < L/360 =	8.9	mm	OK!

Sub-Frame Fabrication

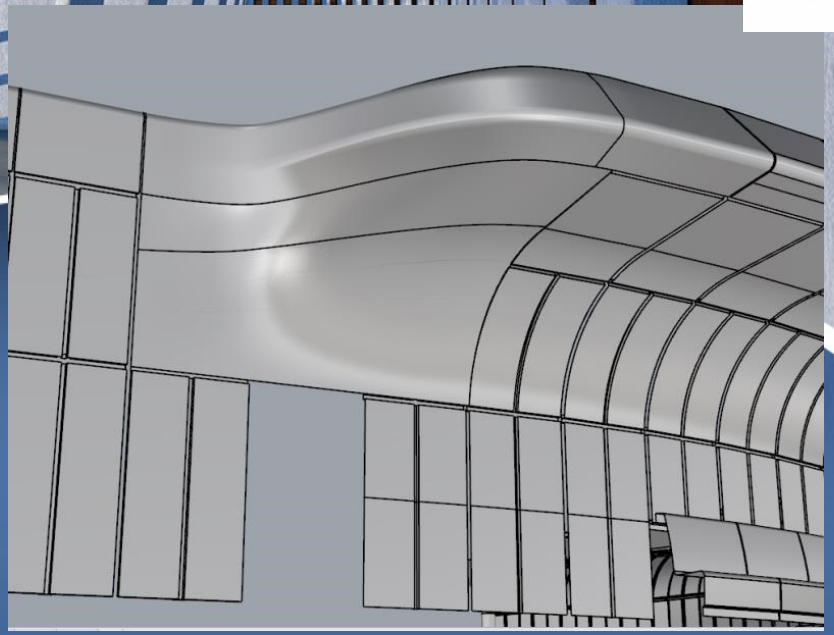


Master Mould Fabrication

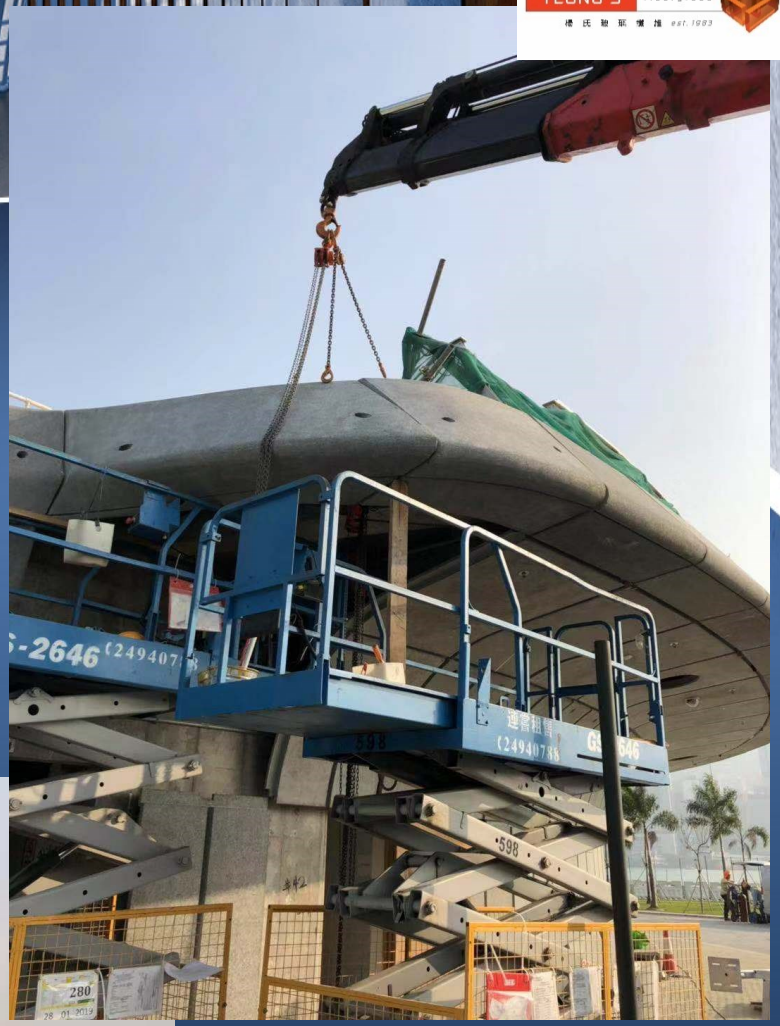


GRC Panel Fabrication

Dispatch and Delivery

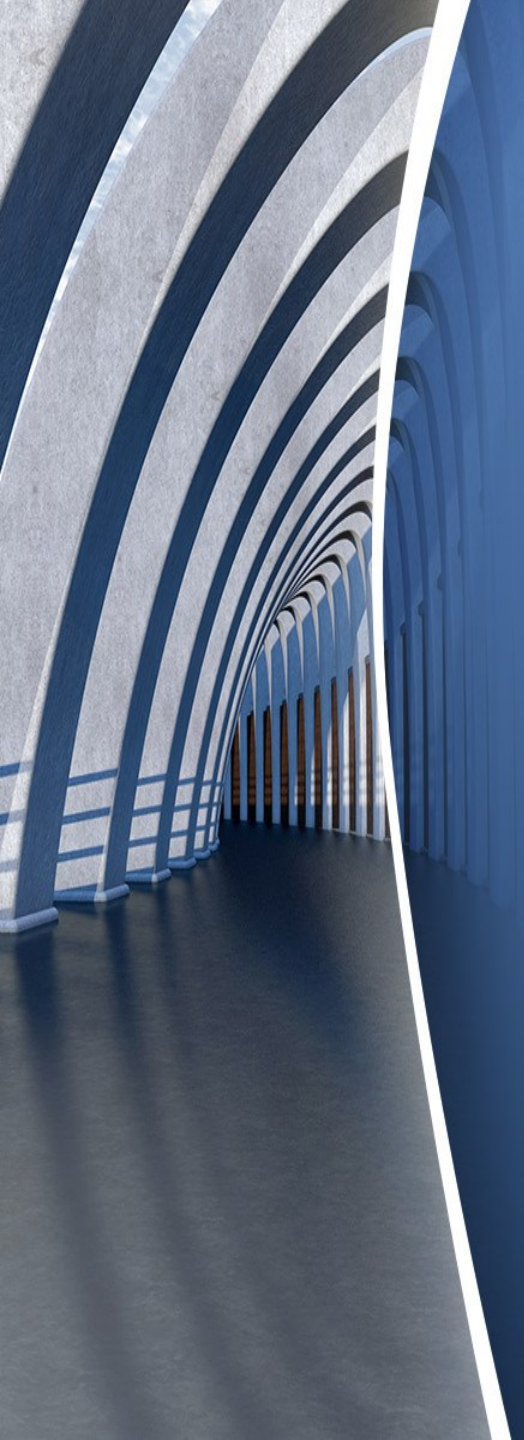


Installation Works



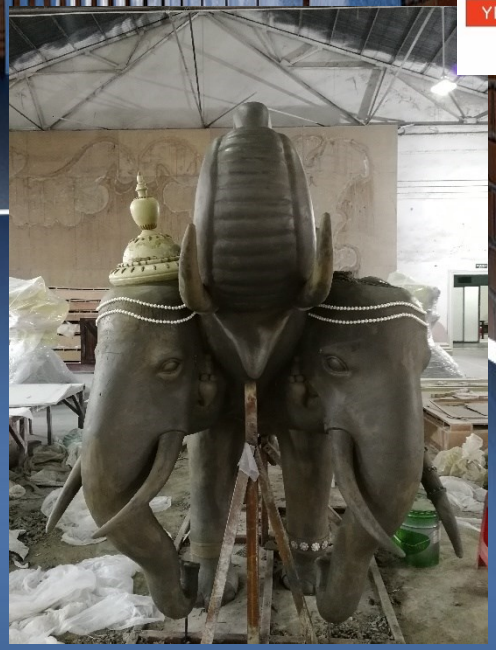
Installation Works

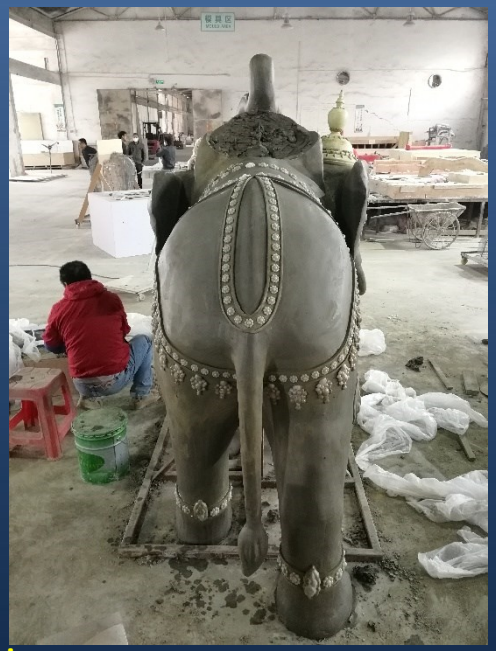
Installation Works



The elephant sculptures in lobby of Mekong hotel

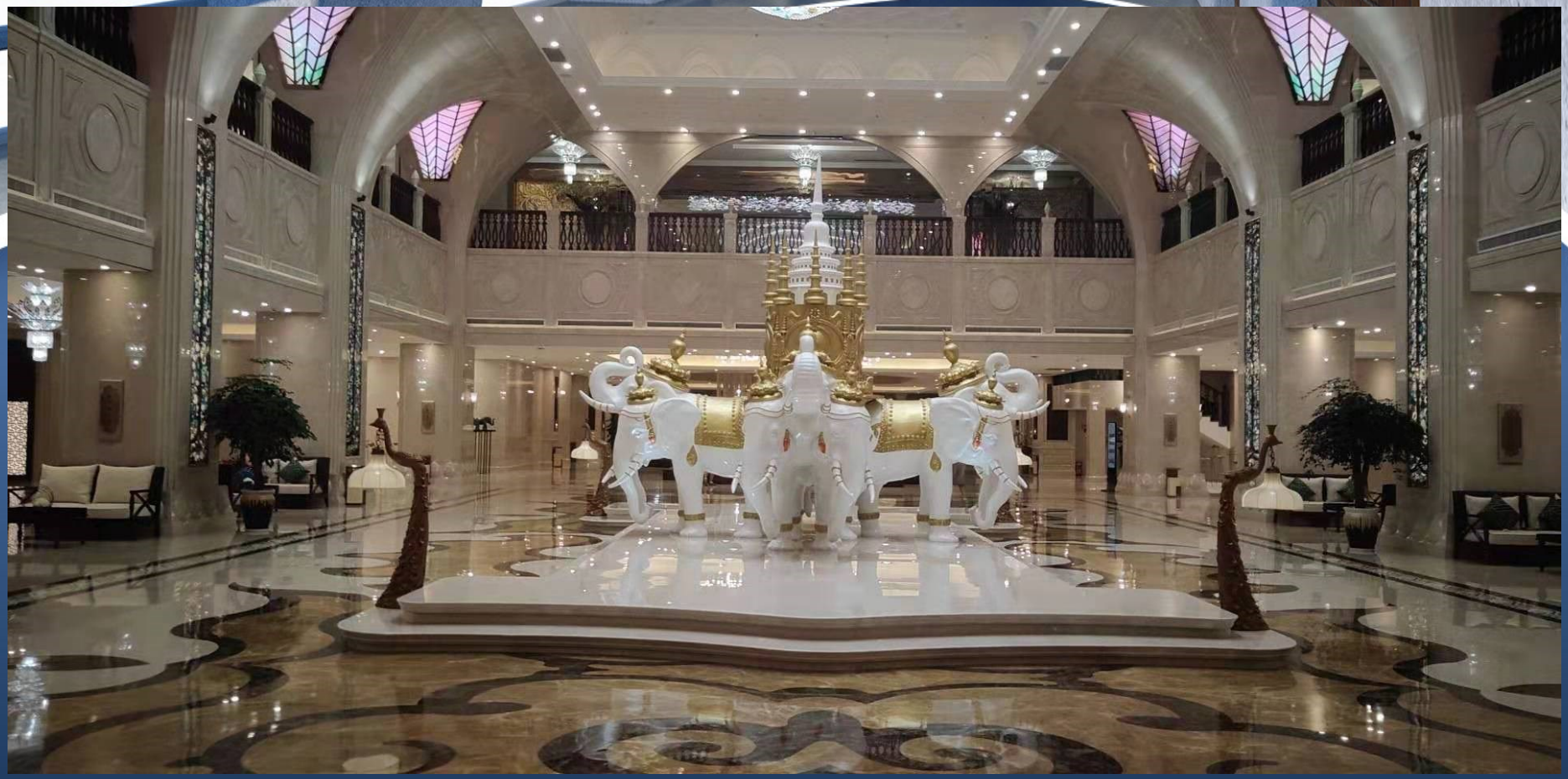
Conceptual Design



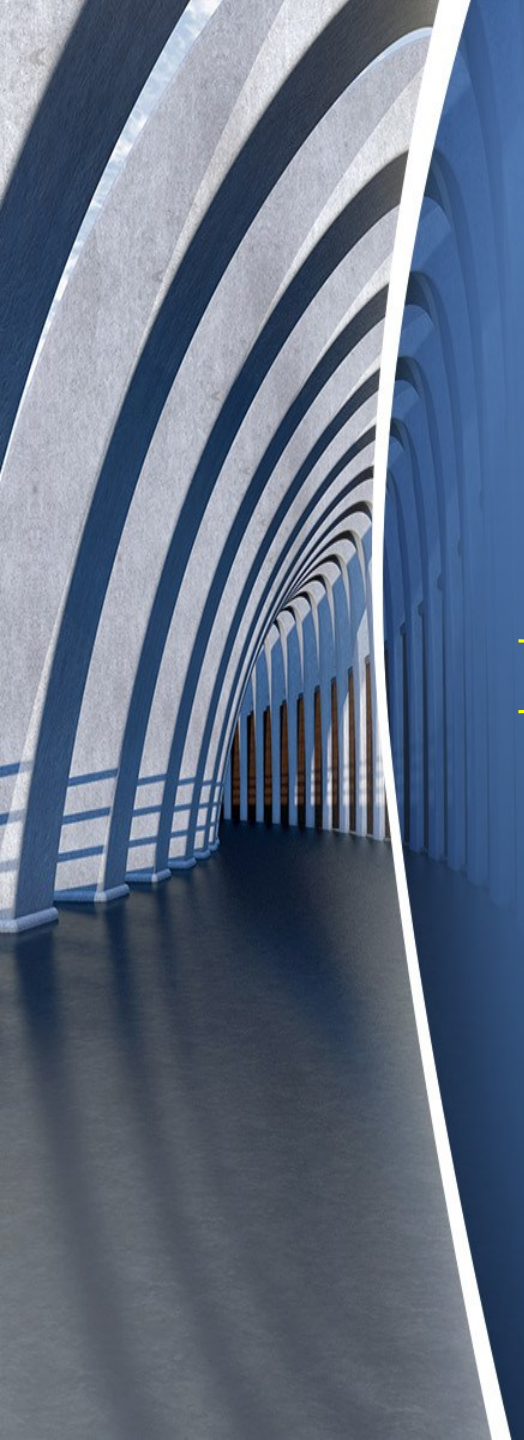


Master Clay Mould Fabrication

GRP Fabrication



Installation Completed



深圳歡樂谷
Happy Valley in Shenzhen


西部矿镇
WESTERN GOLD MINE TOWN


金矿听音室
INTERRACTIVE AUDIO HOUSE
金矿听音室
INTERACTIVE AUDIO HOUSE


金矿俱乐部
GOLD MINE TOWN CLUB


矿镇小馆
GOLD MINE TOWN RESTAURANT


欢乐水炮


金矿火车站
GOLD MINE TOWN STATION
金矿火车站
GOLD MINE TOWN STATION
金新主题区“西部矿镇”
将于2019年暑期全面开放
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更多精彩演艺
敬请期待


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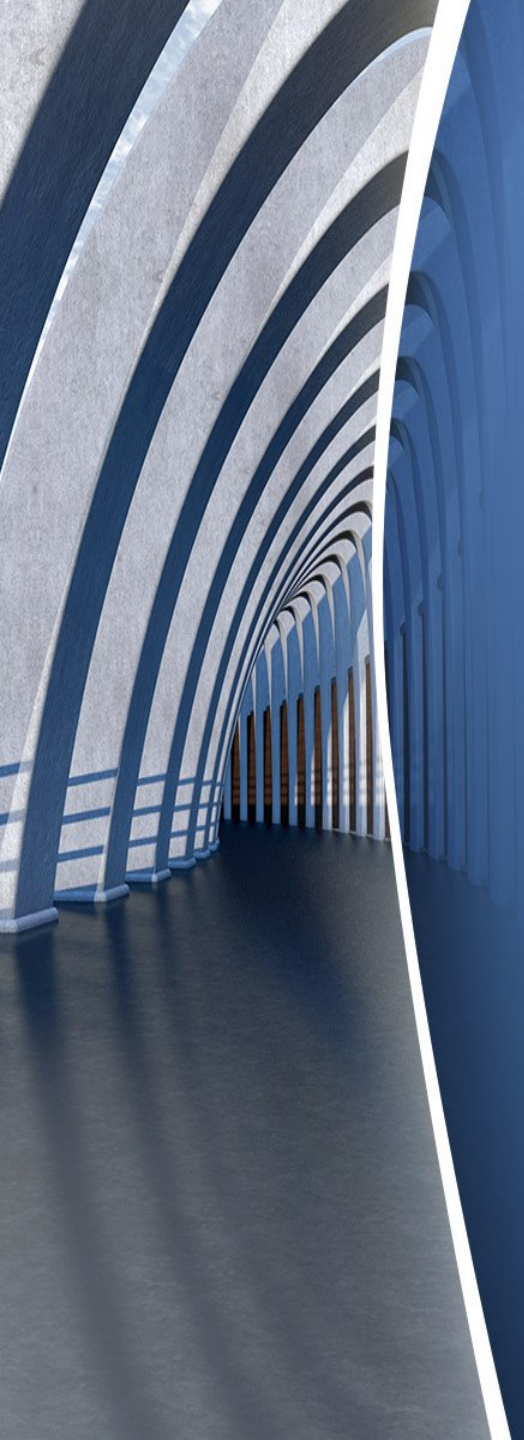
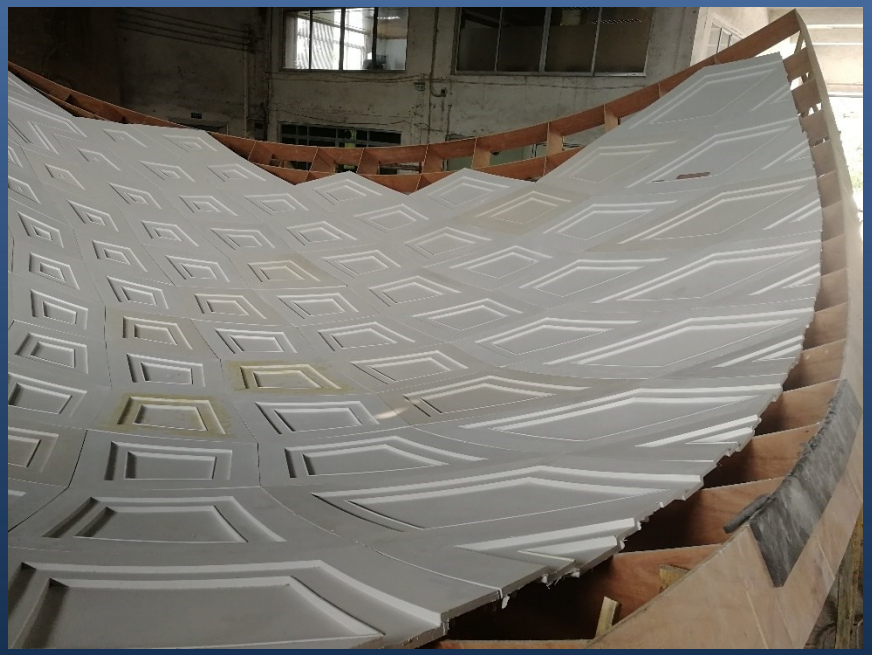


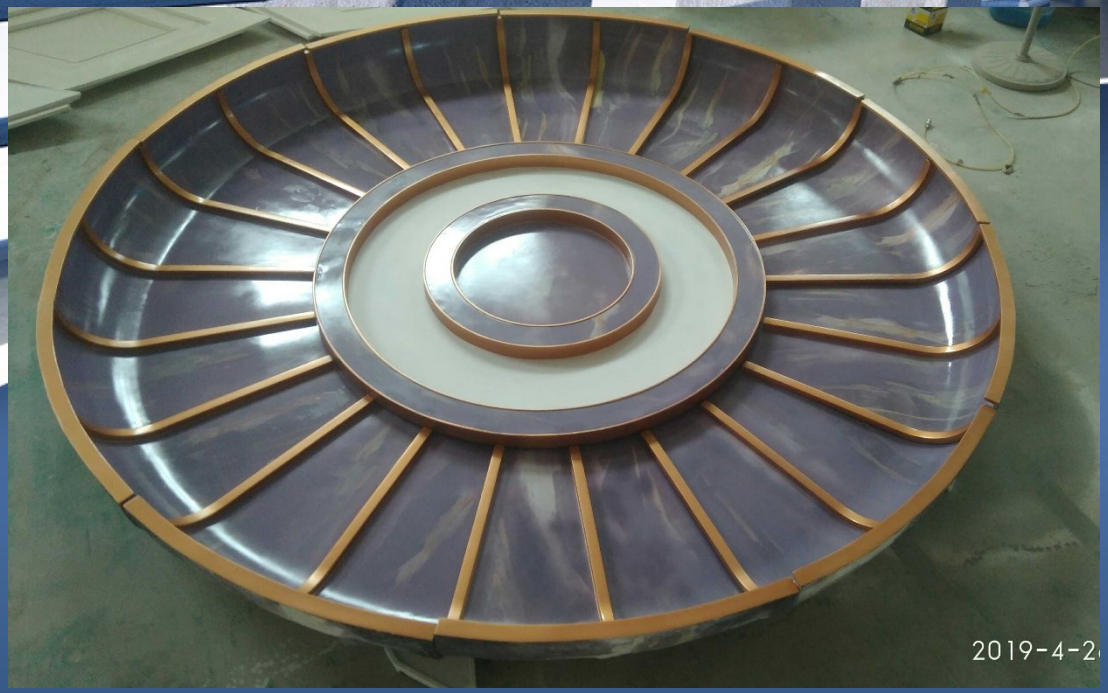
Cilty of Dream in Philippines

Conceptual Design of GRG Ceiling

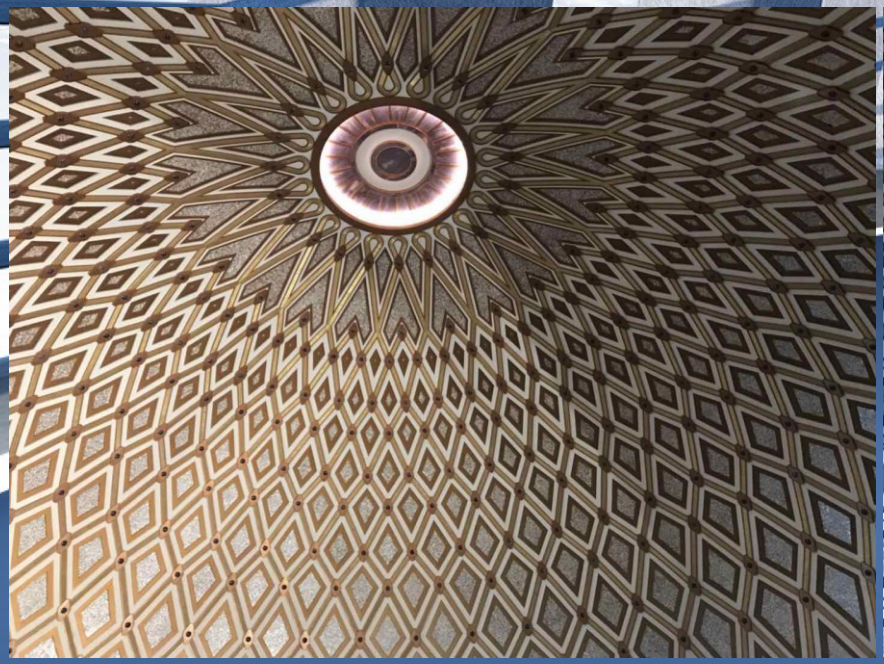
Master Mould Fabrication

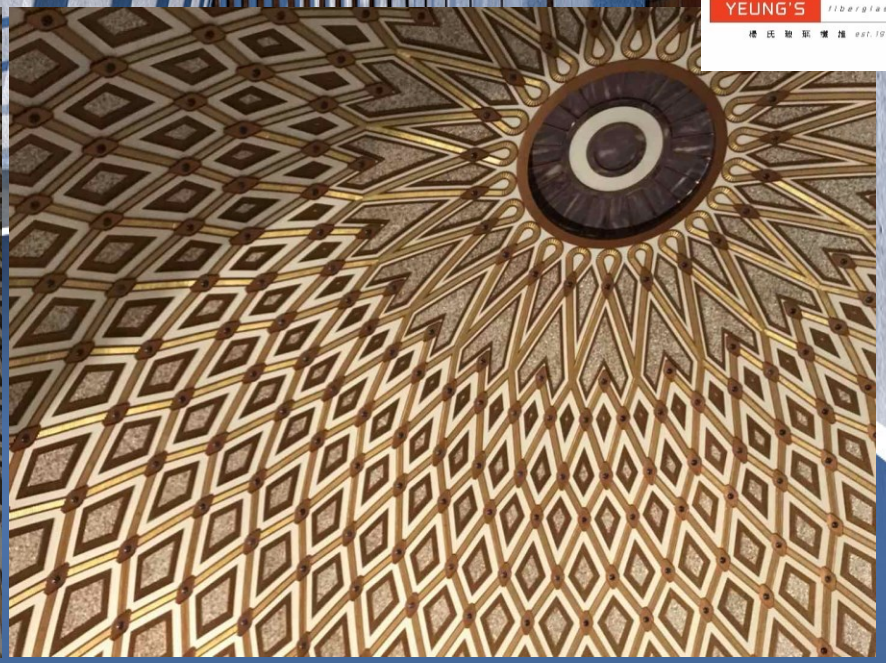


Master Mould Fabrication



Product Fabrication





Product Fabrication