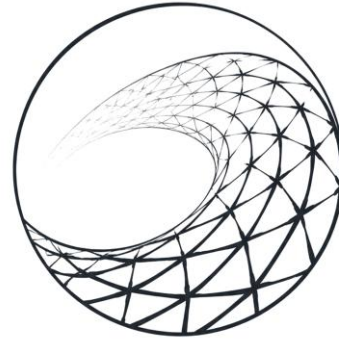




C O R T E X

FACADE ENGINEERING COMPANY

BUILT TO BE SEEN

FAÇADE SYSTEMS

TECHNICAL CATALOGUE



Arndtstrasse, Vienna. Systems 12, 14 and 15 on one building — HPL, aluminium louvre and curtain wall.

HOW TO READ THIS

FIFTEEN SYSTEMS

This volume describes the fifteen envelope and structure systems CORTEX designs, engineers, fabricates and installs. It is written for architects and engineers specifying a system, and for contractors pricing one.

Each system is set out the same way: what it is, where it works, what has to be resolved at design stage, and a specification panel. The panels carry indicative ranges for the system type, referenced to the governing European standards. Rows that genuinely depend on the project — pre-tension, wind and snow load — say so.

Completed projects using these systems are documented separately in Volume 01, *Selected Works*.

THE COMPANY

WHO WE ARE

CORTEX Façade Engineering Group designs, engineers, fabricates and installs building envelopes. One company covers all four stages, which is why our details survive the journey from model to site.

Aluminium profile production sits behind the work. Sections are developed for the project instead of chosen from a catalogue, and that freedom is what makes complex geometry affordable rather than merely possible.

ESTABLISHED

2020

HEAD OFFICE

Tehran, Iran

INTERNATIONAL BASE

Yerevan, Armenia

MARKETS

Iran · Iraq · Caucasus · Gulf · Europe

SYSTEMS

15 documented in this volume

RECOGNITION

2 national steel-structure awards

THE COMPANY

03



ENGINEERING & SIMULATION

Nothing leaves the office on assumption. Geometry is generated, load paths are proven, and thermal behaviour is calculated for the climate the building will stand in — before the first profile is extruded.

Form finding

Parametric surface generation, then rationalisation into geometry that can actually be cut, glazed and set out on site.

Finite element modelling

Structural verification of frames, nets, nodes and connections under the load cases the project is built to.

Computational fluid dynamics

Wind pressure distribution and flow behaviour across complex and doubly curved surfaces.

Energy calculation

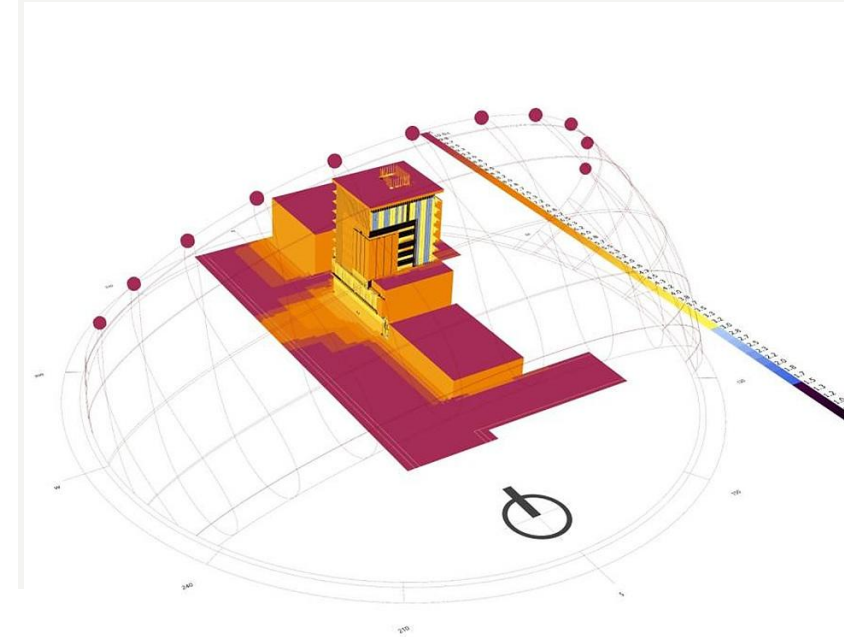
Thermal transmittance, solar gain, condensation risk and daylight performance for the climate in question.

3D detail design

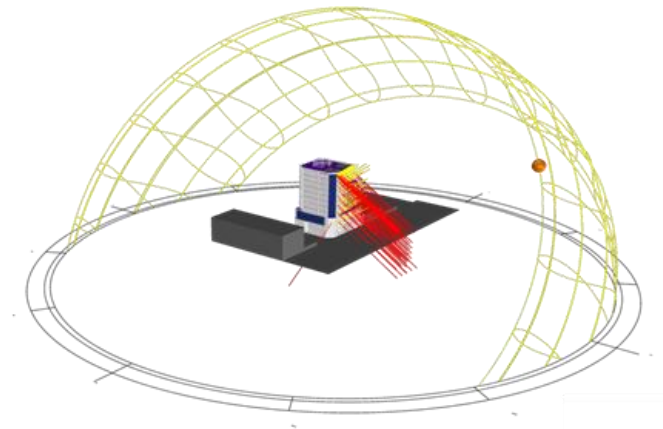
Full shop drawings: panel schedules, node drawings, setting-out and interfaces with adjacent trades.

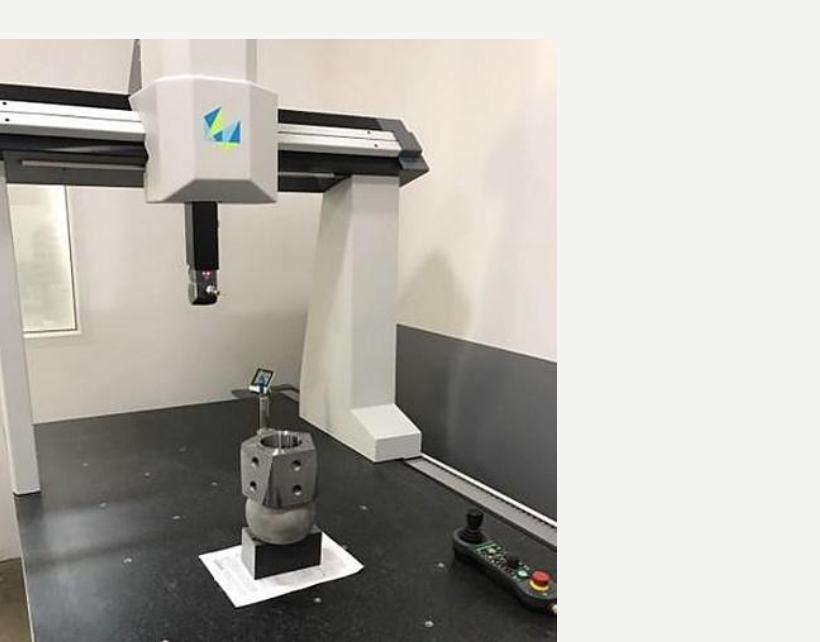
Mock-up testing

Full-scale prototypes measured rather than assumed, where the risk or the geometry justifies it.



Finite element output — a doubly curved surface checked under load before fabrication is released.





CAPABILITY

QUALITY CONTROL

Quality control is a record, not an opinion. Every stage produces evidence that travels with the work and is handed over with it.

Dimensional control

Fabricated components are measured against the model on a coordinate measuring machine before they leave the workshop.

Material traceability

Steel, aluminium, glass and fixings are recorded by batch against the elements they are used in.

Welding and connections

Procedures qualified, welders certified, and joints inspected to the class the design calls for.

Surface treatment

Coating thickness and adhesion checked on every production run.

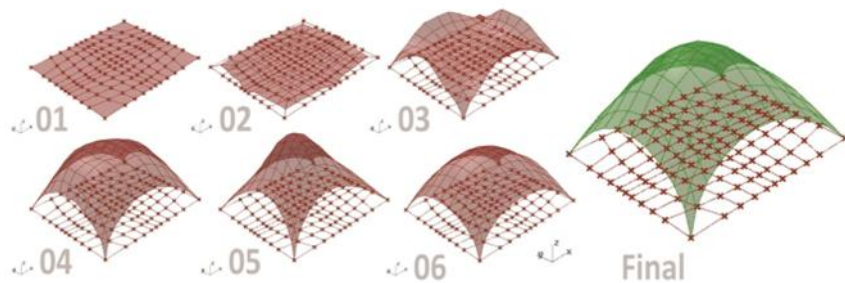
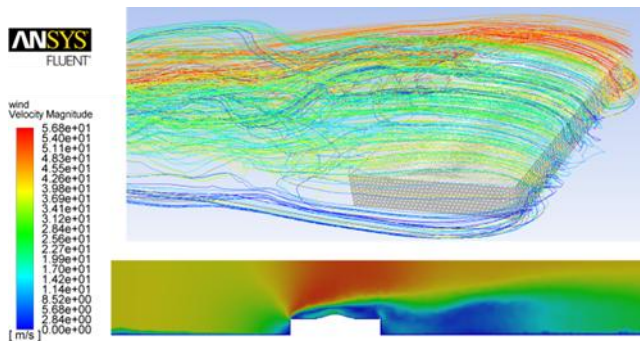
Site survey

As-built structure surveyed and reconciled with the model before fabrication is released, not after.

Handover records

Test certificates, as-built drawings and maintenance requirements issued as one document set.

Coordinate measuring machine — fabricated components verified against the model before despatch.



THE SYSTEMS

Fifteen systems in four families. Each is documented with a specification panel and a reference gallery.



01 A
FREE-FORM STRUCTURES



02 A
FREE-FORM SKYLIGHTS



03 A
FREE-FORM VILLAS & RESORT
ACCOMMODATION



04 A
SPACE STRUCTURES



05 B
CABLE STRUCTURES



06 B
CABLE-SUPPORTED CURTAIN WALL



07 B
CABLE-SUPPORTED SKYLIGHT



08 B
CABLE NET STRUCTURES



09 C
CERAMIC DRY FAÇADE



10 C
STONE DRY FAÇADE



11 C
ALUMINIUM COMPOSITE DRY
FAÇADE



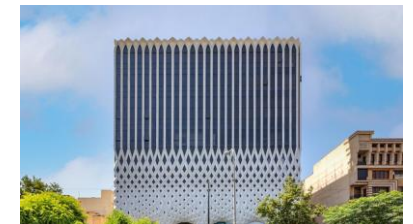
12 C
HPL DRY FAÇADE



13 C
PERFORATED METAL DRY FAÇADE



14 C
ALUMINIUM LOUVRE FAÇADE



15 D
CURTAIN WALL FAÇADE



A

FREE-FORM & LONG-SPAN STRUCTURES

SYSTEMS 01 — 04

Geometry that stops being flat or spherical, and roofs that have to cross a space without touching down. Both are solved the same way: find the surface, rationalise it into something fabricable, then engineer the structure around that rationalisation rather than the other way round.



Middle East Plant Research Center
— doubly curved steel and glass
roof.

01

FREE-FORM STRUCTURES

Doubly curved steel and glass

A free-form structure is one whose surface is not describable by a single radius or a flat plane. Every panel is different, every node resolves at a different angle, and the structure has to be found rather than selected from a range.

The work divides into three stages. The surface is modelled parametrically. It is then rationalised — reduced to a panel and node set that can be cut, coated, glazed and set out without improvisation on site. Only then is the steel engineered, around that set rather than in advance of it.

WHERE IT WORKS

Retail and mixed-use atria

Cultural buildings and museums

Transport terminals

Exhibition halls and pavilions

Canopies and entrance structures

Private residences



The same roof from above: two intersecting shells over one plan.

DESIGN NOTES

Rationalisation before engineering

An unrationalised surface produces a unique part for every position. Panel-set reduction is the single biggest cost lever on this system.

Node geometry

Members meeting at varying angles in three planes need a node family that absorbs the variation. Fixing this early prevents bespoke fabrication later.

Thermal movement

Curved surfaces expand along their own axes. Joints must absorb the movement or the glass will find the stress on its own.

Erection strategy

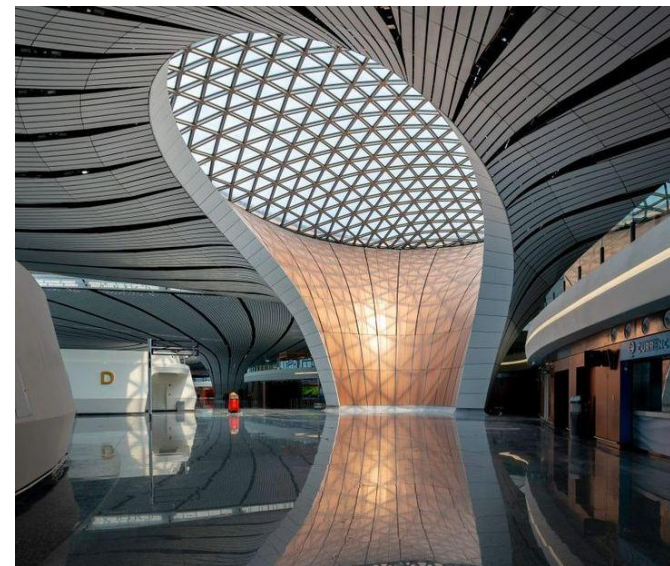
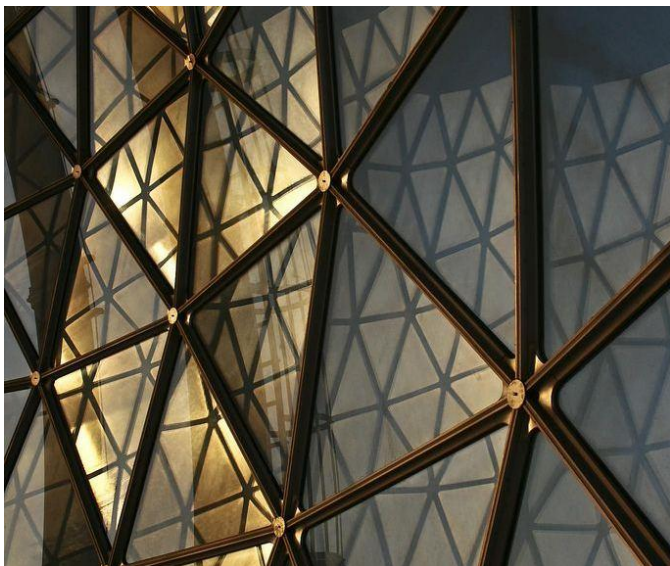
Long spans need temporary support planned before the first component is fabricated, not once it arrives.

SPECIFICATION

PARAMETER	TYPICAL RANGE
Structural system	Single or double-layer steel grid shell
Typical span range	10 m - Unlimited
Primary material and grade	S275 / S355 to EN 10025-2; aluminium EN AW-6063 T6
Node type	Bolted spherical, cast, or welded plate node
Surface tolerance	± 3 to ± 5 mm against the control model
Maximum panel size	1,500 × 3,000 mm typical
Cladding options	Insulated and laminated glass, polycarbonate, ETFE, composite
Reaction to fire	A1 to EN 13501-1 (steel and glass)
Design codes	EN 1993-1-1, EN 1991-1-4; ASCE 7; INBC Part 6 / Standard 2800
Execution class	EXC2 or EXC3 to EN 1090-2

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.

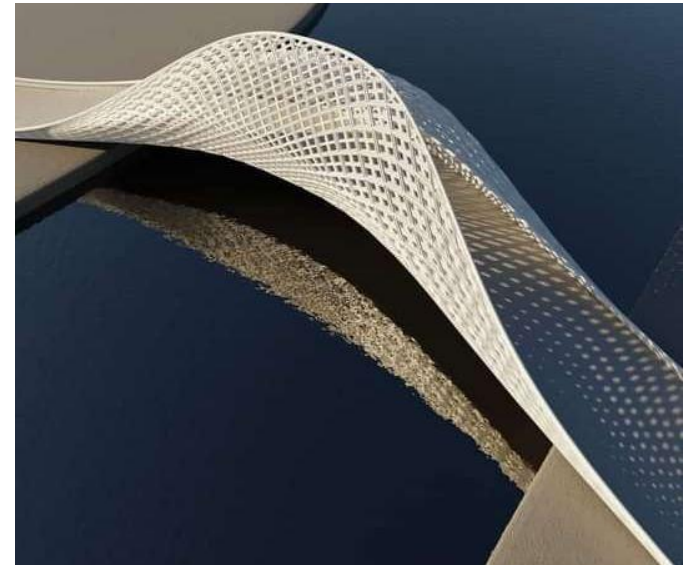
FREE-FORM STRUCTURES



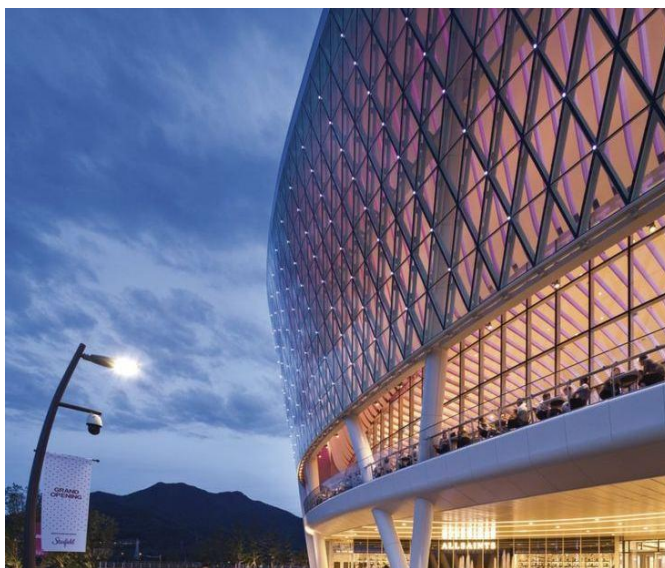
FREE-FORM STRUCTURES



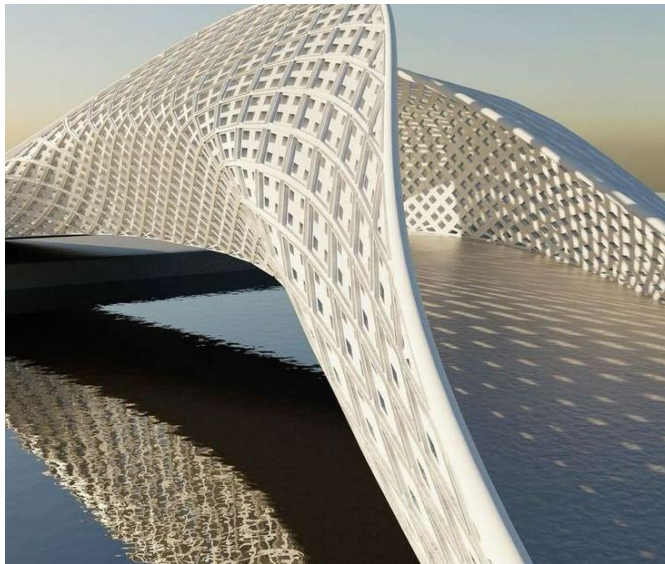
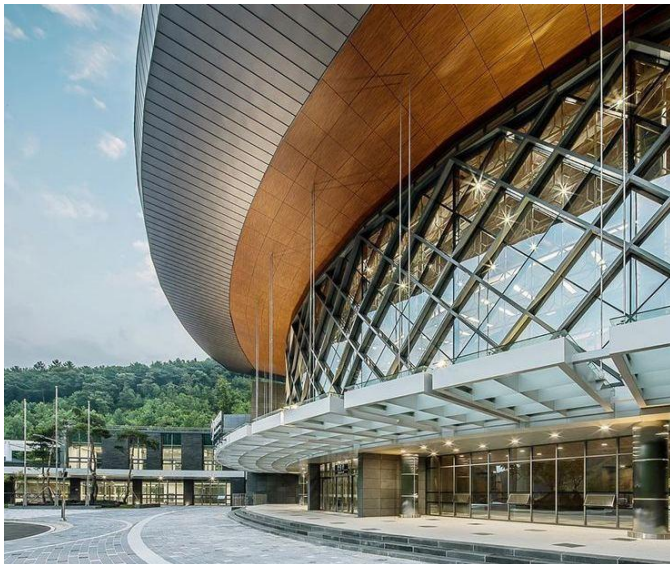
FREE-FORM STRUCTURES



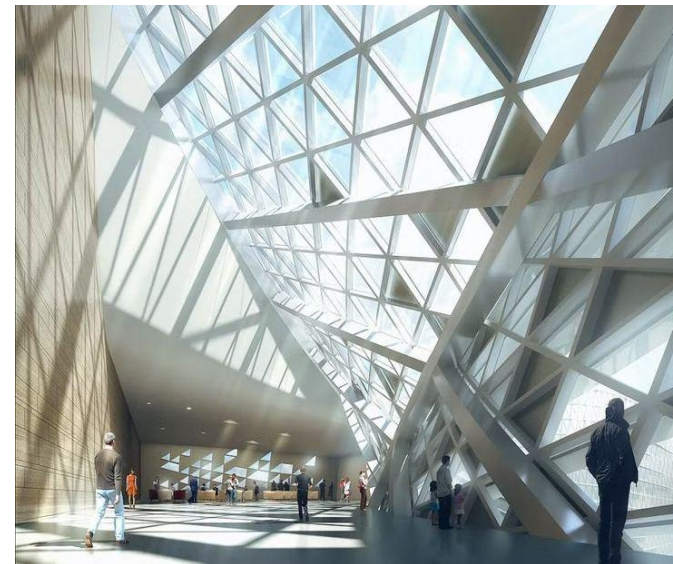
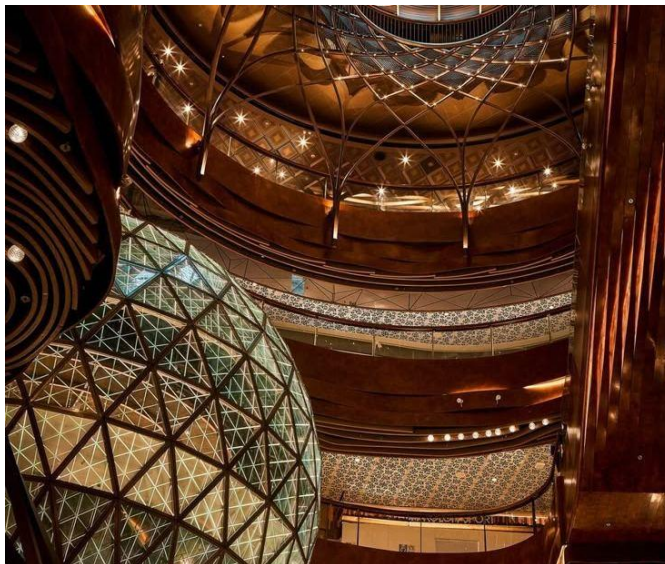
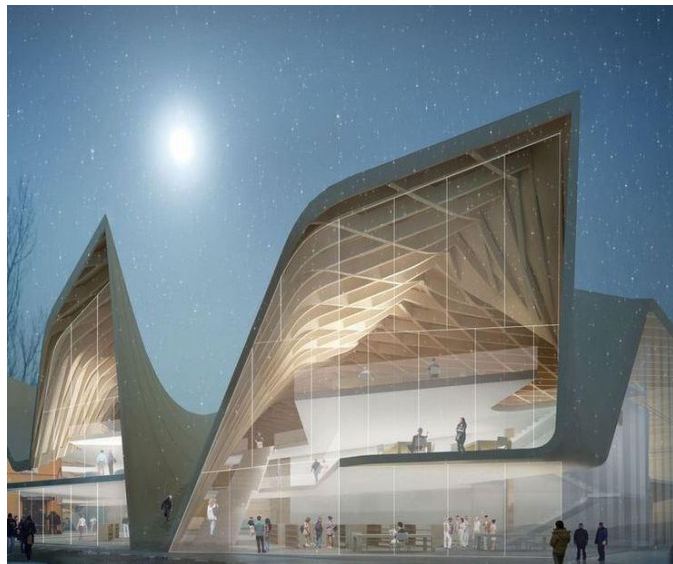
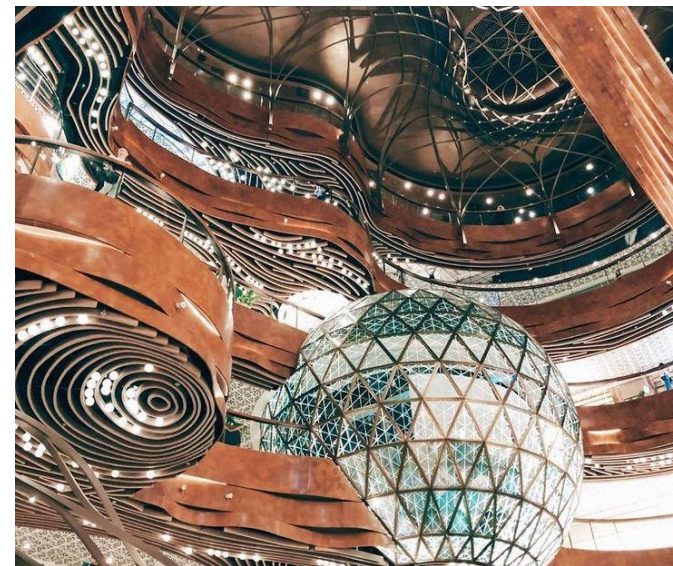
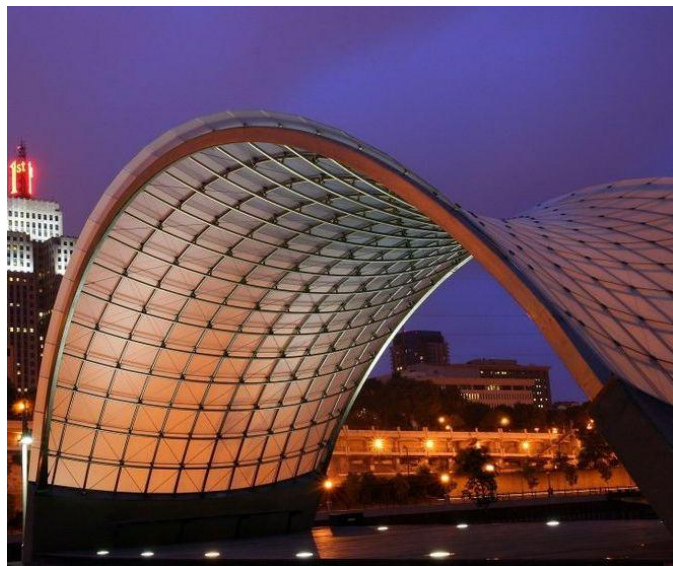
FREE-FORM STRUCTURES



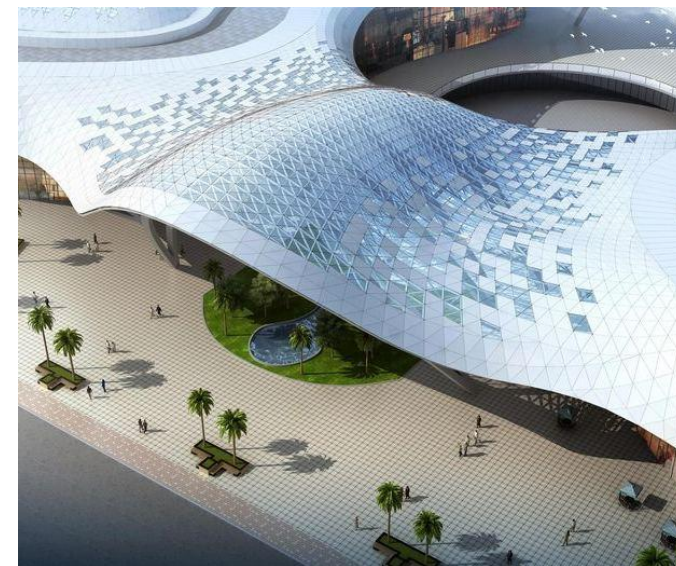
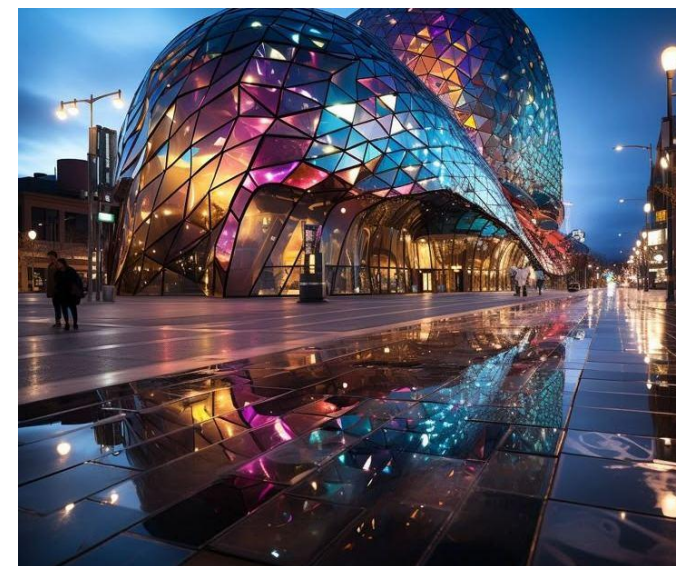
FREE-FORM STRUCTURES



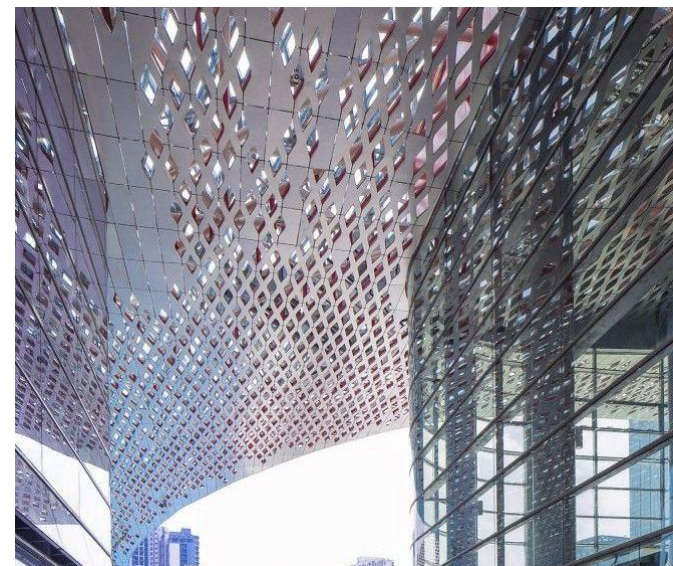
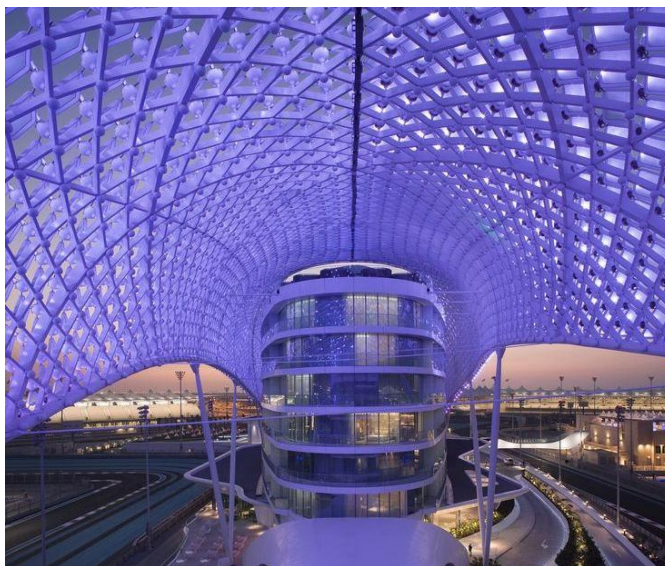
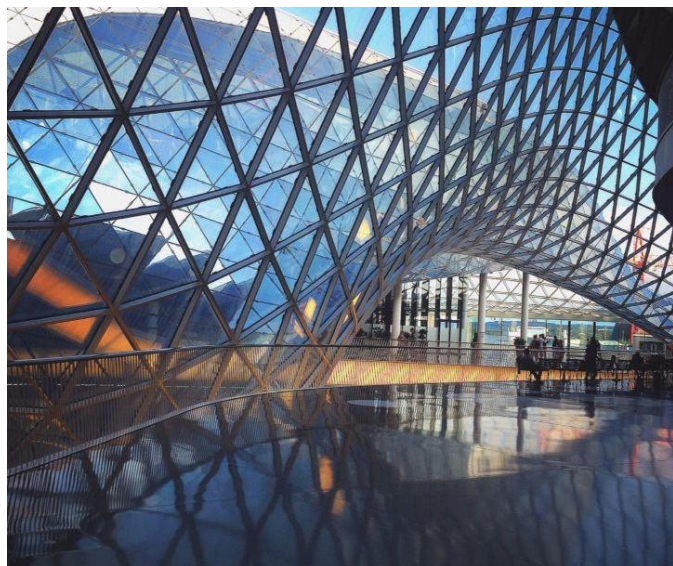
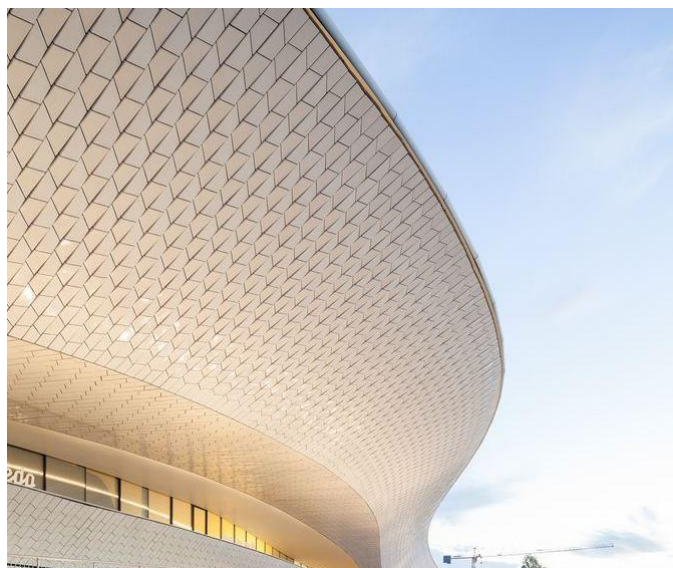
FREE-FORM STRUCTURES



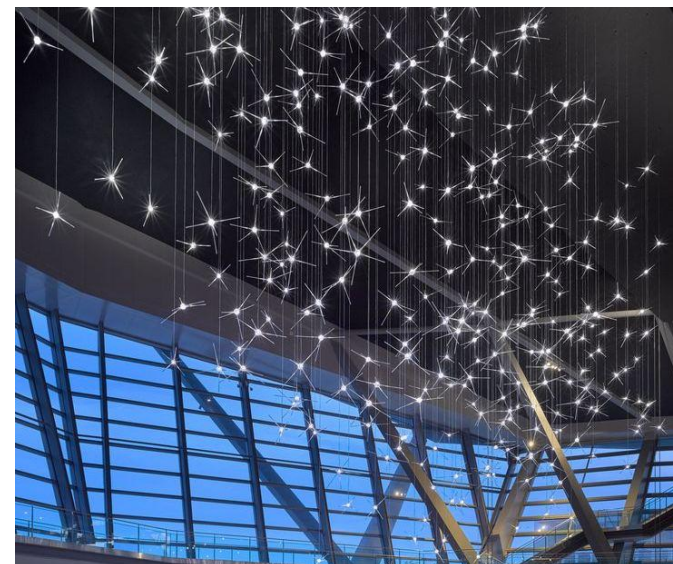
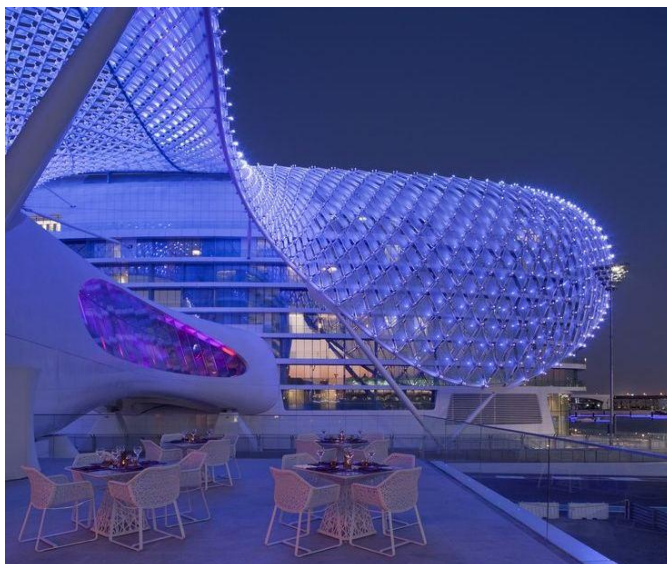
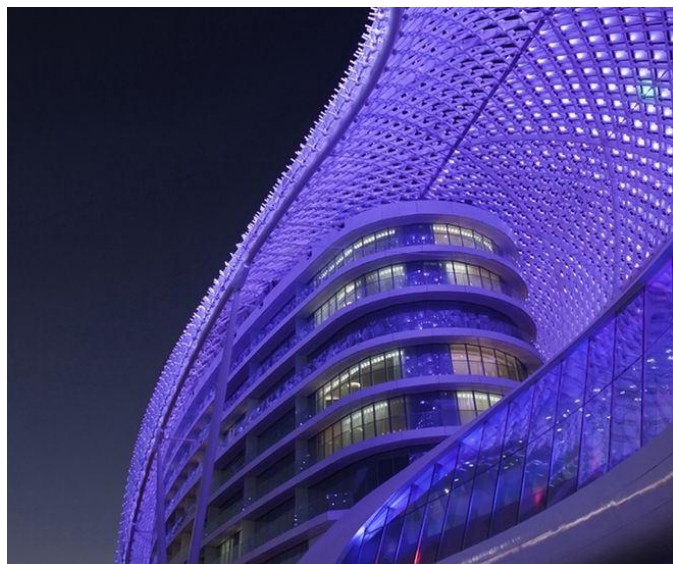
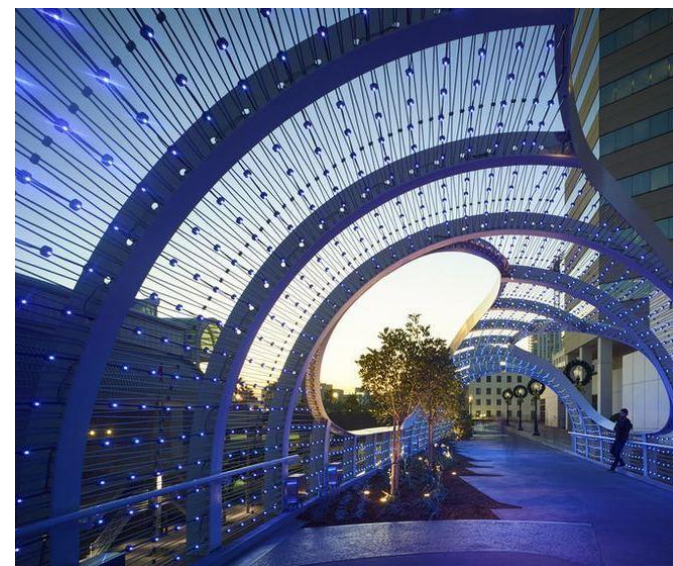
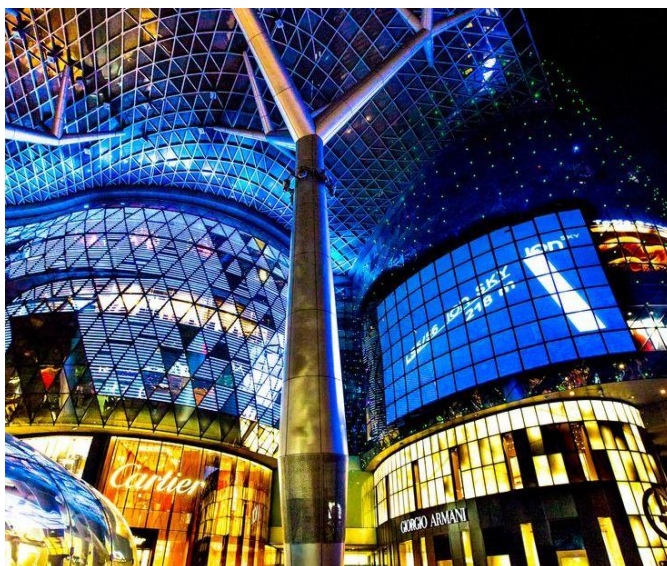
FREE-FORM STRUCTURES



FREE-FORM STRUCTURES

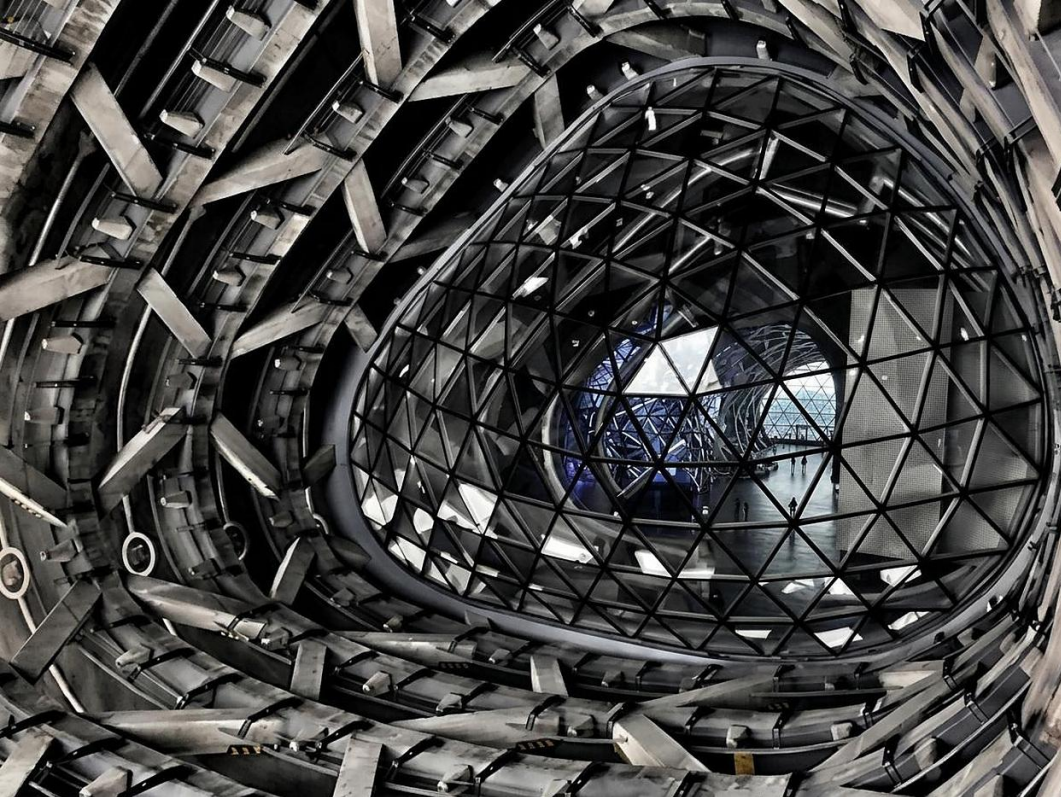


FREE-FORM STRUCTURES



FREE-FORM STRUCTURES





Ava Center — free-form skylight seen from the atrium floor.

02

FREE-FORM SKYLIGHTS

Curved roof glazing

A free-form skylight is not a larger rooflight. Once the roof surface curves in two directions, the glazing, the drainage and the structure all become project-specific, and each one constrains the other two.

The payoff is daylight reaching parts of a plan that no vertical glazing can serve, across spans that would otherwise need columns. Panels are prefabricated and digitally set out, which keeps site time short even where the geometry is complex.

WHERE IT WORKS

Atria and shopping concourses

Hotel lobbies and courtyards

Airport and station halls

Exhibition and conference space

Sports and leisure buildings

Residential courtyards



Panel geometry resolves differently at every position on the surface.

DESIGN NOTES

Drainage in two directions

A curved surface sheds water along paths that are not obvious in plan. Falls, gutters and outlets are designed from the surface model.

Glare and solar gain

Daylight modelled for level and glare, not assumed. Coatings, fritting or switchable glass specified against the modelled result.

Glazing selection

Glass, polycarbonate or ETFE, chosen against span, climate, snow load and the access strategy for cleaning.

Access and maintenance

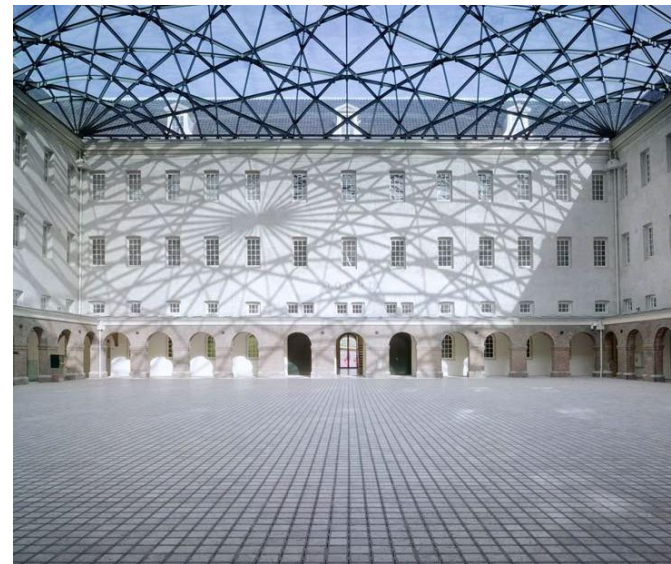
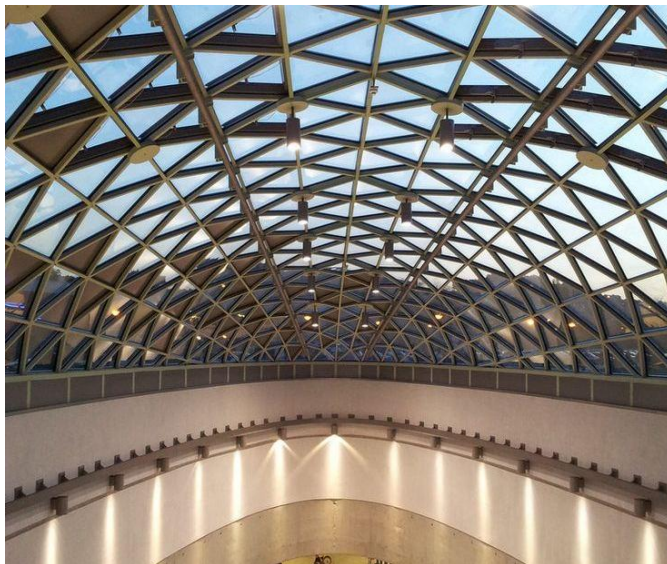
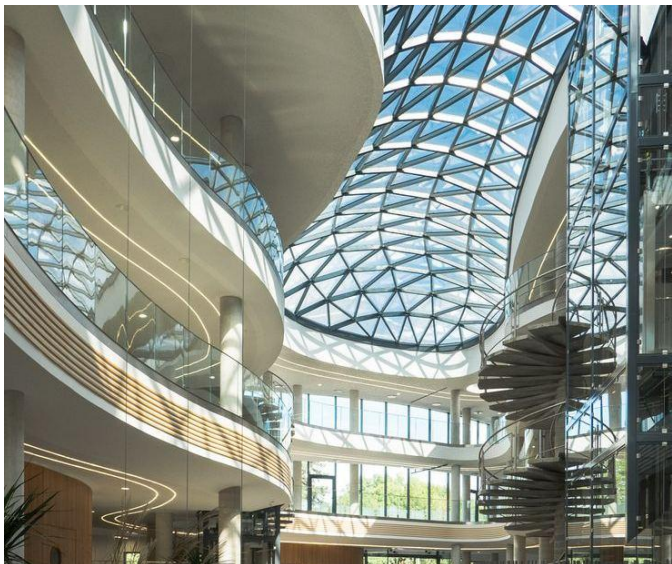
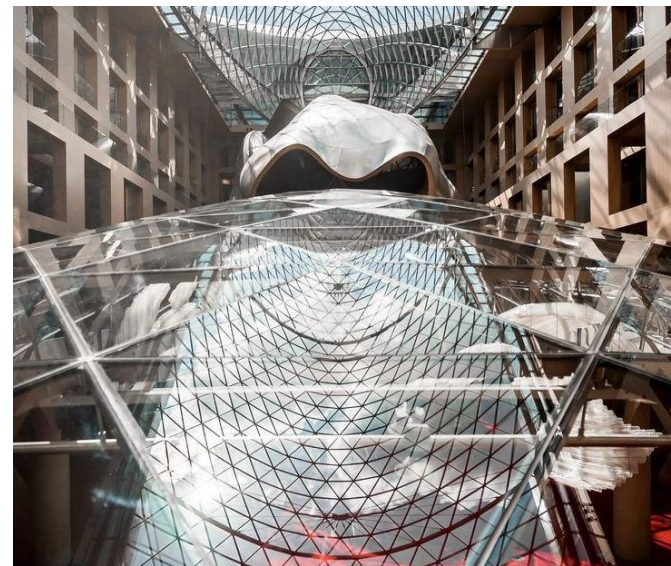
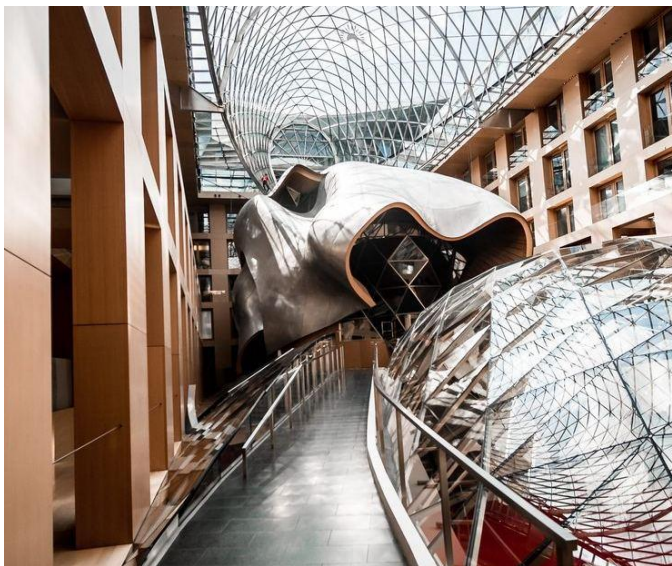
Cleaning and glass replacement routes resolved at design stage. Retrofitting access to a curved roof is expensive.

SPECIFICATION

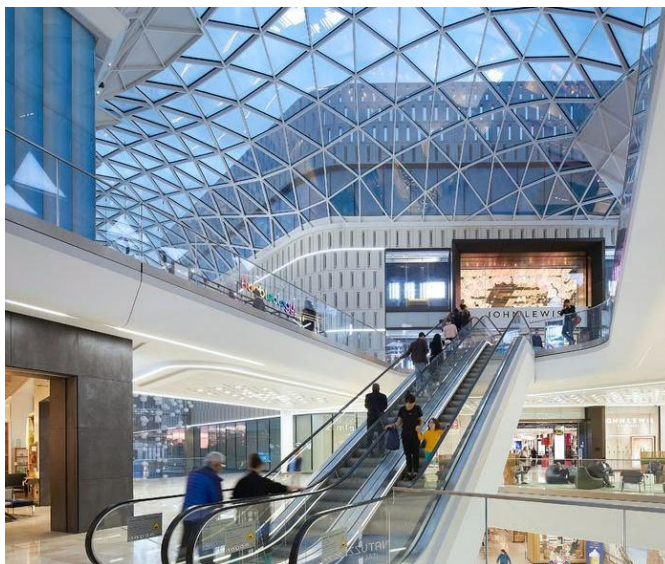
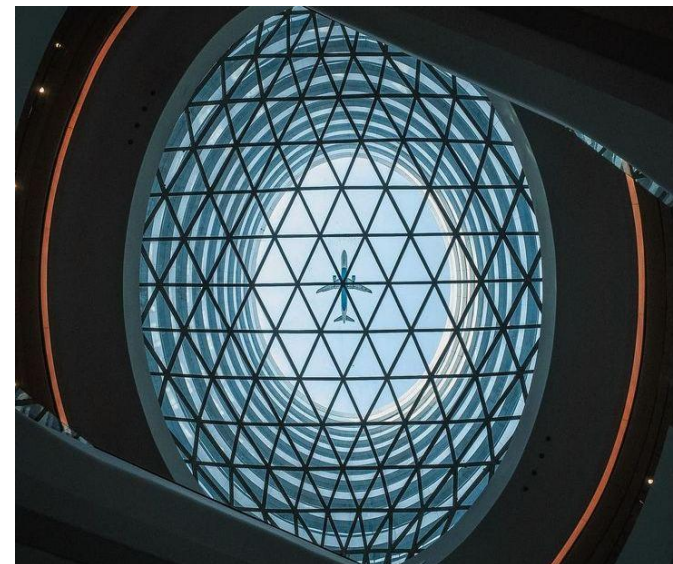
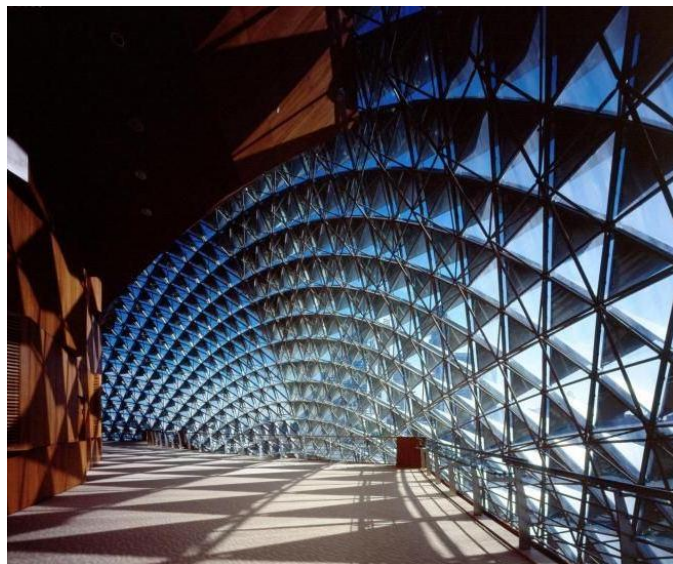
PARAMETER	TYPICAL RANGE
Span range	8 m – Unlimited
Glazing build-up	Laminated insulating units, 28 – 44 mm overall
Glass type	Heat-soaked toughened outer, laminated inner, low-E coated
Thermal transmittance Ug	1.0 – 1.6 W/m²K double; 0.6 – 0.9 triple
Solar factor g	25 – 50% with solar-control coating
Light transmission	40 – 70%
Snow and live load	Project-specific — to EN 1991-1-3 or local code
Watertightness	Class RE to EN 12154, verified by mock-up
Drainage	Two-stage drained and pressure-equalised
Fragility class	Non-fragile to ACR[M]001; walk-on build-up on request

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.

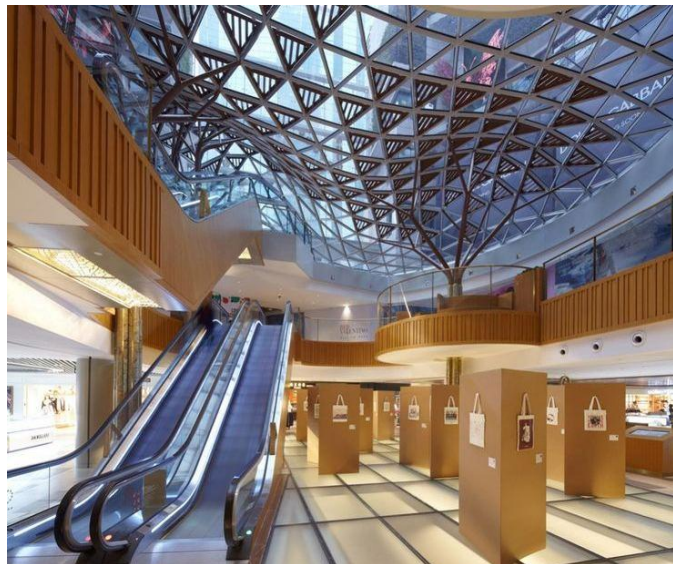
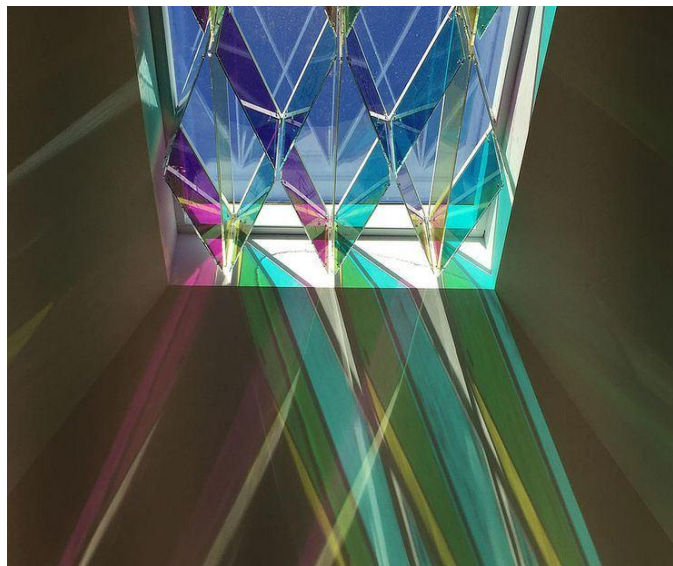
FREE-FORM SKYLIGHTS



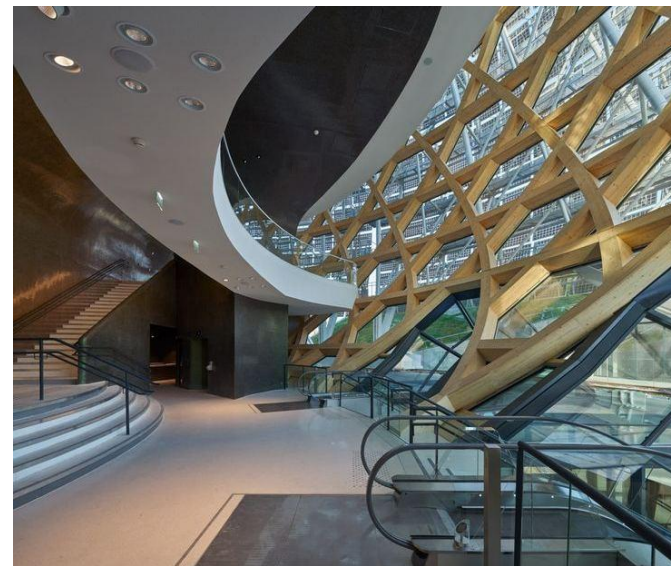
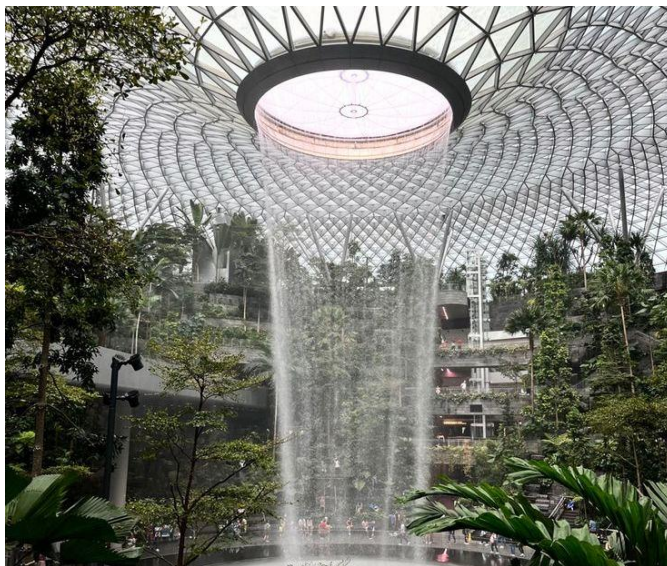
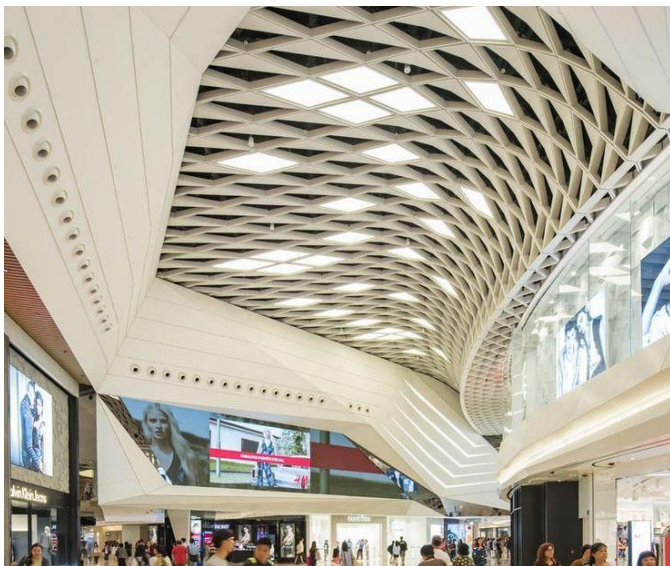
FREE-FORM SKYLIGHTS



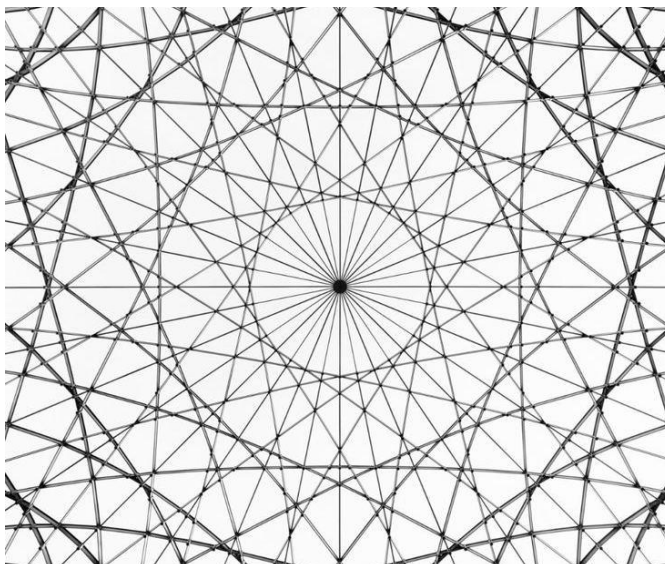
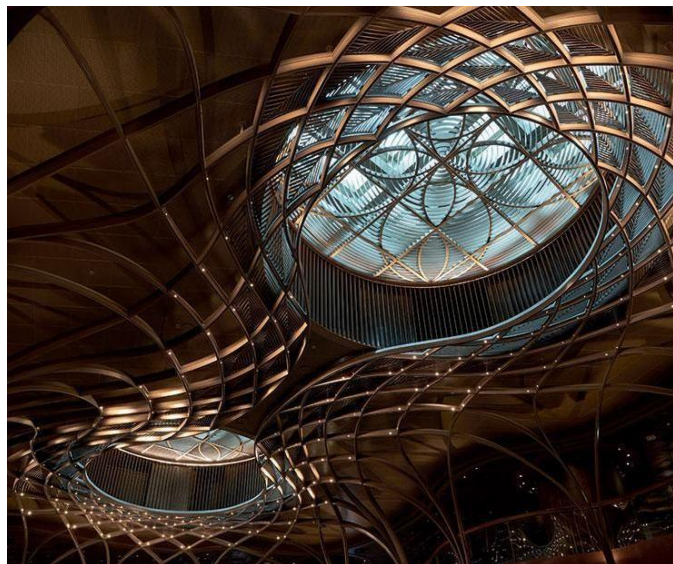
FREE-FORM SKYLIGHTS



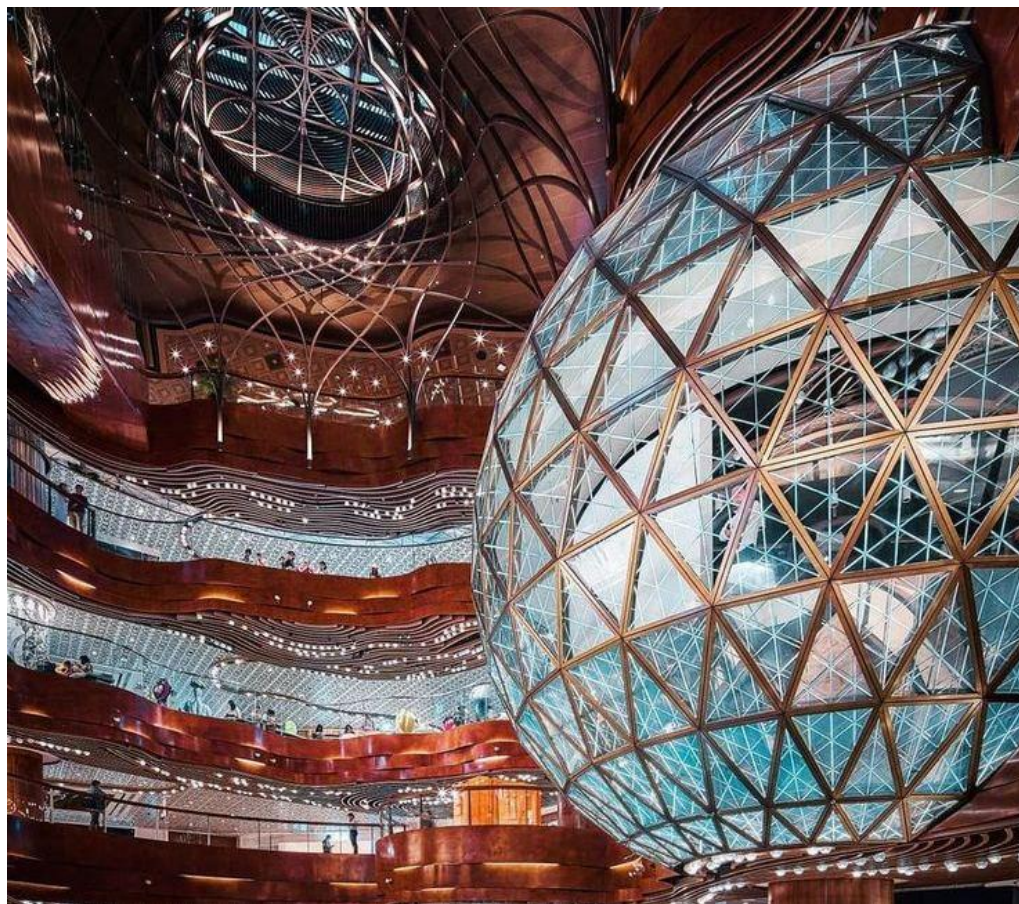
FREE-FORM SKYLIGHTS



FREE-FORM SKYLIGHTS



FREE-FORM SKYLIGHTS





Curved-shell villa — structure and envelope engineered as one package.

03

FREE-FORM VILLAS & RESORT ACCOMMODATION

Curved-form building envelopes

The same free-form methods applied to a whole building rather than a roof or a wall. Curved shells, sculptural roofs and continuous envelopes, delivered as a single engineered package rather than as separate trades.

Because the structure and the envelope are designed together, the building can be lighter, the insulation continuous, and the interior free of the columns and downstands that usually follow a curved form.



WHERE IT WORKS

Private villas

Boutique hotels and eco-lodges

Wellness and retreat buildings

Restaurant and reception pavilions

Glamping and resort accommodation units

Beach and mountain residences



A resort pavilion in timber and steel; the roof is the architecture.

DESIGN NOTES

Envelope continuity

Curved shells make thermal bridging harder to avoid. Insulation and vapour control are detailed as continuous layers across the whole surface.

Prefabrication and transport

Module sizes are set by what can reach the site, particularly on remote resort locations. This governs the panelisation.

Foundations

A lighter envelope reduces foundation loads, which matters on sloping, coastal or poor ground.

Openings

Windows and doors in a curved surface need their own geometry. Standard rectangular units rarely resolve cleanly.

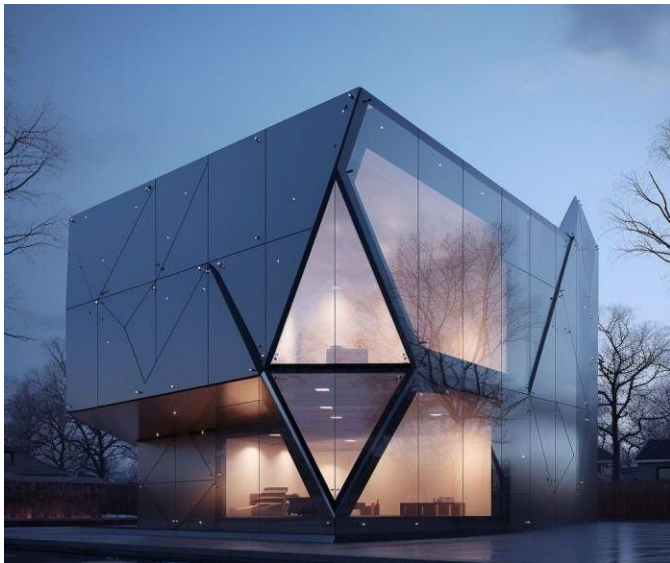
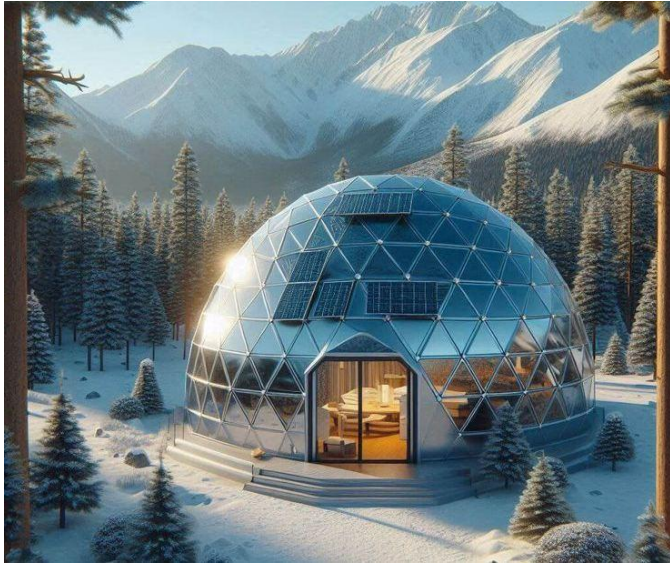
SPECIFICATION

PARAMETER	TYPICAL RANGE
Structural system	Steel or laminated timber gridshell with panelised shell
Typical footprint range	80 – 1,200 m² per unit
Envelope build-up	180 – 320 mm overall
Thermal transmittance U	0.15 – 0.30 W/m²K, roof and wall
External finish	GRC, render, single-ply membrane, timber, standing-seam metal
Acoustic performance Rw	38 – 48 dB
Module transport size	2,400 × 12,000 mm maximum by road
Foundation type	Pad, raft or screw pile — ground dependent
Installation period	10 – 24 weeks depending on scale and access
Design codes	EN 1990 – EN 1999; ASCE 7; INBC / Standard 2800

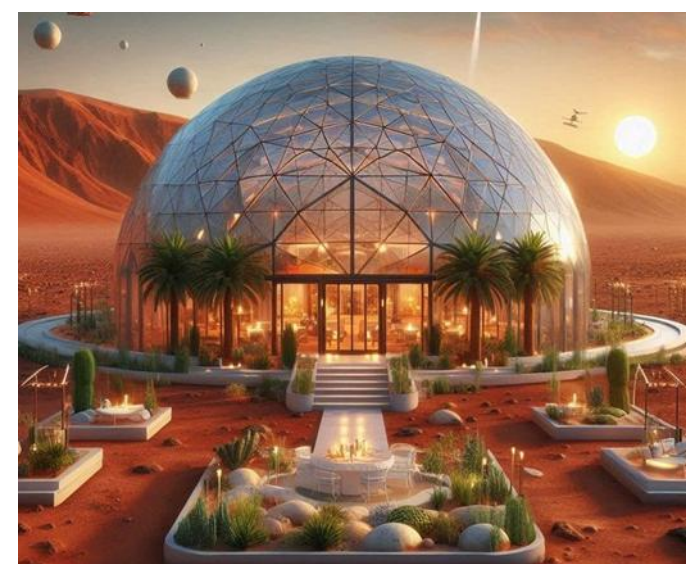
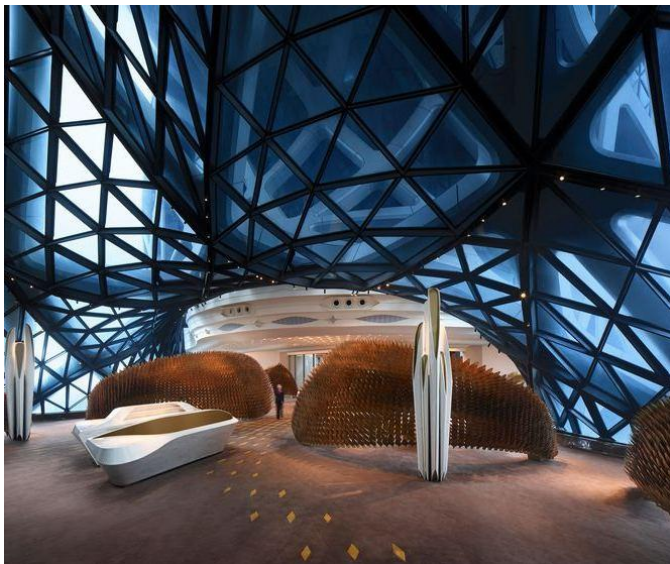
Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.



FREE-FORM VILLAS & RESORT ACCOMMODATION

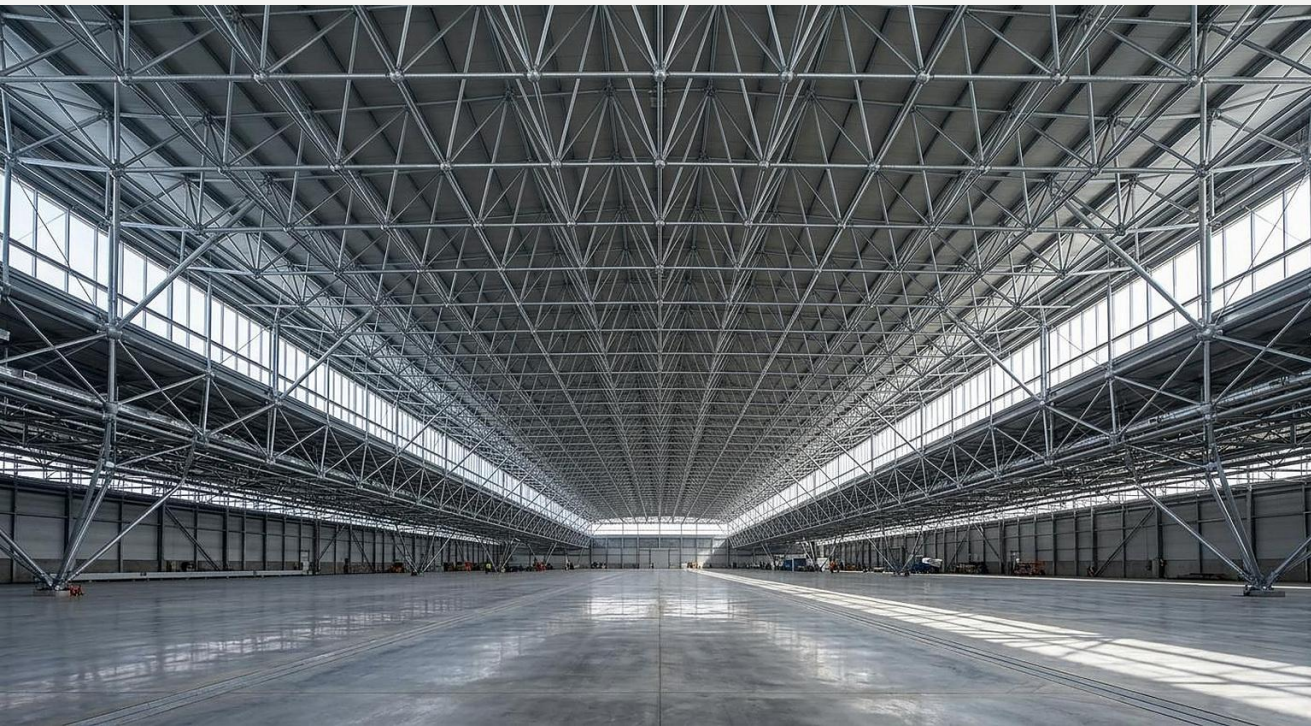


FREE-FORM VILLAS & RESORT ACCOMMODATION



FREE-FORM VILLAS & RESORT ACCOMMODATION





A 2,000 m² production hall roofed without a single interior column.

04

SPACE STRUCTURES

Long-span three-dimensional steel

A space frame carries load through a triangulated three-dimensional network of tubular members and nodes. Force finds many routes rather than a few, and the whole roof behaves as one shell rather than as a series of parallel frames.

It earns its place in an industrial or public building for one reason above the others: it takes the columns out of the middle of the floor. Everything else — the weight saving, the erection speed, the seismic behaviour — follows from the same geometry.

WHERE IT WORKS

Production halls and warehouses

Aircraft hangars

Sports halls and stadium roofs

Exhibition buildings

Parking structures

Terminal and concourse roofs



Erection in progress. Members and nodes arrive finished; assembly is repetition.

DESIGN NOTES

Structural redundancy

Failure of one member does not collapse the structure. Load redistributes through alternative paths in the network.

Weight and foundations

At the spans where a space frame is the right answer — roughly 30 m and above — it is typically 25–40% lighter than an equivalent portal frame hall, with correspondingly smaller footings.

Seismic behaviour

Lower mass means lower inertial force. Members that yield shed load to healthy members rather than initiating collapse.

Erection

Members and nodes are CNC-fabricated to millimetre accuracy and bolted on site. Erection typically runs 25–40% faster than site-welded portal frames, with a smaller crew and lighter quality control.

SPECIFICATION

PARAMETER	TYPICAL RANGE
Grid module	1,500 – 3,000 mm
Typical span range	20 – 200 m, double-layer flat or curved
Member sections	CHS 33.7 – 168.3 mm, wall 2.6 – 8.0 mm
Node system	Bolted spherical ball-and-sleeve, up to 18 members
Steel grade	S235 / S355 to EN 10025-2; hollow sections EN 10219
Surface treatment	Hot-dip galvanised to EN ISO 1461, or powder coat
Deflection limit	L/250 roof; L/300 where glazed
Roof covering options	Sandwich panel, standing seam, glass, polycarbonate, membrane
Erection method	Ground assembly and lift, or piecemeal on falsework
Design codes	EN 1993-1-1; EN 1090-2 EXC2/EXC3; ASCE 7

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.



B

CABLE SYSTEMS

SYSTEMS 05 — 08

Tension replaces framing. The structure gets lighter, the glass line gets cleaner, and the engineering moves into the anchorage — where cable pre-tension, deflection under wind and the glass fixings have to be calculated together rather than in sequence.



Tensile cable roof — the shape and the force distribution are one problem.

05

CABLE STRUCTURES

Tensile roofs and canopies

High-strength steel cables working in pure tension, stabilised by pre-stress and anchored back into a primary structure or into the ground. Material use falls sharply because nothing is asked to resist bending.

The design sequence is different from framed structures. The geometry is found before it is analysed — the shape and the force distribution are the same problem — and the anchorage governs everything downstream.

WHERE IT WORKS

Stadium and grandstand roofs

Large-span canopies

Pedestrian bridge covers

Entrance and forecourt structures

Exhibition and event structures

Transport interchange roofs

DESIGN NOTES

Form finding

Shape and force are solved together. A cable structure cannot be drawn and then analysed; the equilibrium shape is the design.

Pre-tension

Too little and the structure flutters; too much and the anchorage grows. The pre-tension range is a design decision with cost consequences at both ends.

Anchorage

Cable forces have to go somewhere. Foundations, ring beams or the primary frame must be designed for them from the outset.

Corrosion protection

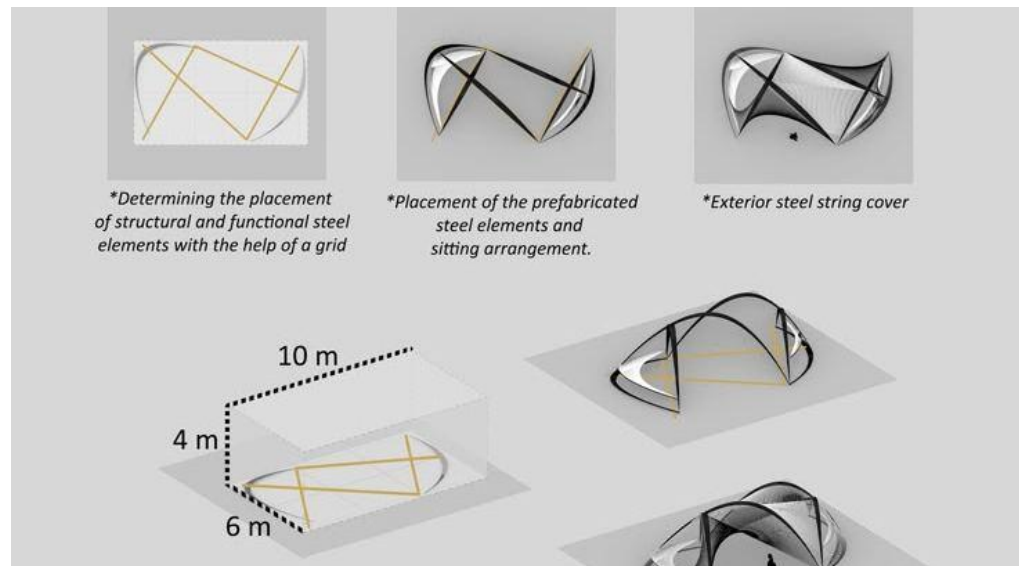
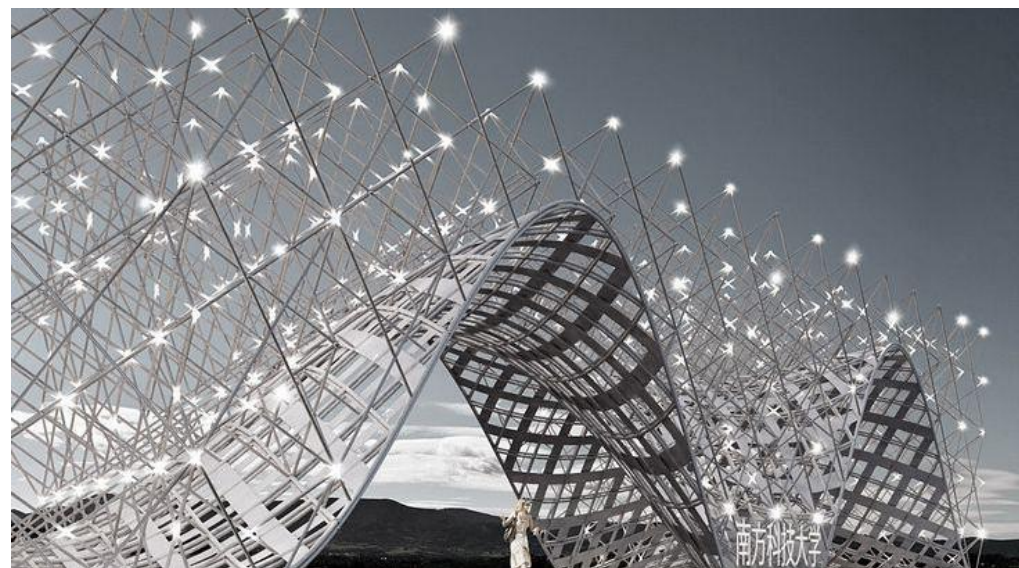
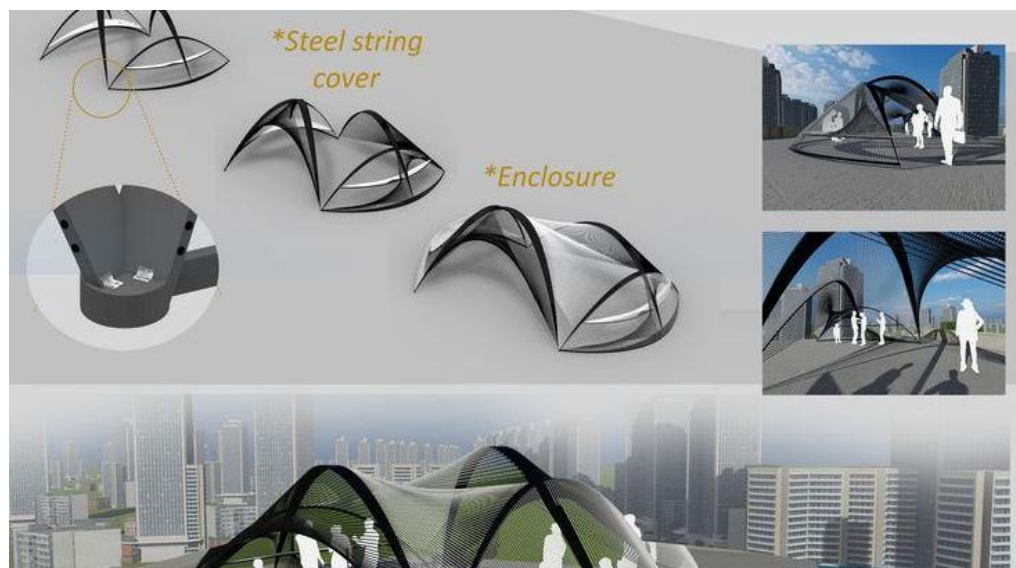
Cable life is a coating and detailing question. Galvanised, sheathed or stainless, specified against the environment.

SPECIFICATION

PARAMETER	TYPICAL RANGE
Cable type	Spiral strand, full-locked coil, or structural strand
Cable diameter range	10 – 100 mm; locked coil to 180 mm
Wire tensile strength	1,370 – 1,570 MPa to EN 1993-1-11
Pre-tension	Project-specific — derived from form finding
End fittings	Open and closed sockets, forks, adjustable turnbuckles
Corrosion protection	Galvanised Class A, Galfan, or stainless 1.4401 / 1.4462
Span range	15 – 120 m
Covering options	PTFE or PVC membrane, ETFE, glass, metal panel
Deflection limit	Serviceability limit agreed with the design team
Design codes	EN 1993-1-11, EN 1993-1-1; ropes to EN 12385-4

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.

CABLE STRUCTURES





Moghaddas Ardebili Office — cable-net wall to the street elevation.

06

CABLE-SUPPORTED CURTAIN WALL

Point-fixed tensioned glazing

High-tension cables replace mullions. Glass is point-fixed to the cable net with spiders, clamps or countersunk bolts, and the structure very nearly disappears. What remains is glass and a grid of steel.

Because the system carries load in tension it is light, which reduces demand on the frame behind it. The trade is deflection: a cable wall moves further under wind than a mullion wall, so the fixings, the glass and the anchorage must be calculated as one system.

WHERE IT WORKS

Lobby and entrance walls

Atrium enclosures

Airport and terminal glazing

Retail frontages

Cultural and civic buildings

Office tower ground floors



Point fixing at a cable intersection. The fitting must rotate as the net moves.

DESIGN NOTES

Deflection

Movement under wind is an order of magnitude greater than a framed wall. Fixings must rotate and the perimeter seals must accommodate it.

Anchorage stiffness

The wall is only as stiff as what it is tied to. Slab edges and ring beams are designed for cable pre-tension, not just for gravity.

Glass build-up

Point fixings concentrate stress at the corners. Glass thickness and lamination are driven by the fixing, not only by the span.

Thermal performance

Minimal framing removes the thermal break. Insulated units and edge detailing carry the whole thermal load.

SPECIFICATION

PARAMETER	TYPICAL RANGE
Cable type and diameter	Stainless spiral strand, 12 – 40 mm
Pre-tension	Project-specific — derived from form finding
Maximum height	8 – 30 m single span
Glass build-up	Laminated or laminated insulating, 21.5 – 52 mm
Fixing type	Spider fitting, countersunk bolt, or clamp plate
Deflection limit	L/50 – L/100 under design wind
Design wind load	Project-specific — to EN 1991-1-4 or ASCE 7
Air permeability	Class AE to EN 12152
Watertightness	Class RE to EN 12154
Thermal transmittance U _{cw}	1.4 – 1.9 W/m ² K

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.



Fanap Campus — cable-reinforced skylight over the central courtyard.

07

CABLE-SUPPORTED SKYLIGHT

Tension-reinforced roof glazing

A flat roof puts its members into bending, and bending is the least efficient thing you can ask a steel section to do. Sections grow to cope, and the view of the sky the skylight existed to provide starts to disappear behind them.

Adding a cable system changes the load path. The steel works in tension and compression, sections come back down, and the roof reads as a lattice rather than as structure.

WHERE IT WORKS

Atrium and courtyard roofs

Concourse and mall glazing

Terminal and station roofs

Conference and exhibition halls

Hotel courtyards

Civic and cultural buildings



Seen from below: slim members because the steel works in tension.

DESIGN NOTES

Snow and ponding

Deflection under snow must not create a pond that increases the deflection. Falls are designed for the loaded, not the unloaded, shape.

Drainage and sealing

A moving roof plane needs seals that move with it. Gutters and outlets are sized for the deflected geometry.

Access class

Whether the glazing is non-fragile, restricted-access or walk-on changes the build-up entirely. Decide before the glass is specified.

Tensioning sequence

Cables are stressed in a defined order. The sequence is part of the design, not a site decision.

SPECIFICATION

PARAMETER	TYPICAL RANGE
Cable type and diameter	Stainless spiral strand, 12 – 36 mm
Pre-tension	Project-specific — derived from form finding
Span range	10 – 45 m
Glazing build-up	Laminated insulating units, 28 – 48 mm overall
Fixing type	Point-fixed spider or clamped rotule
Snow and live load	Project-specific — to EN 1991-1-3 or local code
Deflection limit	L/100 – L/200 under snow
Watertightness	Class RE to EN 12154, verified by mock-up
Access and fragility	Non-fragile to ACR[M]001; walk-on optional
Thermal transmittance Ug	1.0 – 1.6 W/m²K

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.



A pre-stressed cable net. Stability comes from opposing curvature.

08

CABLE NET STRUCTURES

Pre-stressed cable networks

A network of high-strength cables tensioned in two directions, carrying its infill — glass, membrane, ETFE or panels — at the intersections. The system works almost entirely in tension, which is why it can cross large spans on very little material.

Geometry, cable force and anchorage are a single calculation. Change the curvature and the forces change; change the pre-tension and the shape changes. This is what separates a cable net from a frame with cables in it.

WHERE IT WORKS

Transparent façades and atria

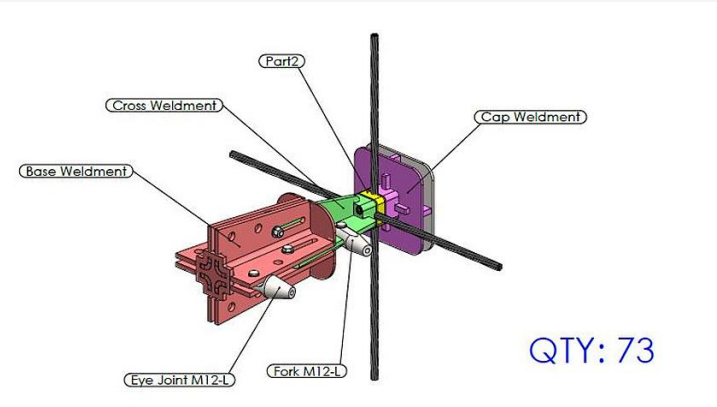
Stadium and arena roofs

Large-span canopies

Exhibition and pavilion envelopes

Pedestrian bridge enclosures

Sculptural entrance structures



Anchorage assembly — where cable tension enters the primary structure.

DESIGN NOTES

Double curvature

Stability comes from opposing curvature. A flat net has no stiffness and will oscillate.

Wind and seismic analysis

Dynamic behaviour, not just static load. Flutter and resonance are checked as part of the design.

Anchorage design

The critical element. Cable tension is transferred into the primary structure through connections that govern the whole system's safety.

Infill compatibility

The infill must tolerate the net's movement. Rigid panels on a flexible net need articulated fixings.

SPECIFICATION

PARAMETER	TYPICAL RANGE
Net geometry	Single, cross or diagonal net; anticlastic double curvature
Grid spacing	1,000 – 2,000 mm
Cable diameter	10 – 40 mm
Pre-tension	Project-specific — derived from form finding
Anchorage type	Ring beam, edge truss, or slab-edge bracket
Infill material	Laminated glass, insulating units, ETFE, membrane, metal
Maximum panel size	2,000 × 3,000 mm typical
Deflection limit	L/50 – L/100 under design wind
Design wind load	Project-specific — static and dynamic assessment
Design codes	EN 1993-1-11; EN 13830; EN 1991-1-4

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.



C

VENTILATED DRY FAÇADES

SYSTEMS 09 — 14

Six cladding materials on one principle: a panel held clear of the wall on a mechanical substructure, with a drained and ventilated cavity behind it. The material changes the appearance and the panel format. The physics behind it does not.

HOW A VENTILATED FAÇADE WORKS

All six systems in this section are the same construction wearing different materials. Understanding the build-up once removes most of the repetition.

A rainscreen is not a waterproof layer. It is a screen that takes the weather, behind which a drained and ventilated cavity manages whatever gets past it. The airtight and insulated line is the wall behind, not the panel in front.

BUILD-UP, OUTWARDS

01 Structural wall

Concrete, blockwork or steel framing. Carries the bracket loads and forms the airtight line.

02 Insulation

Continuous, mechanically fixed, uninterrupted by the brackets wherever the bracket design allows.

03 Cavity

Open at base and head. Drains water and equalises pressure. Its depth is a design value, not a tolerance.

04 Substructure

Aluminium brackets and rails, thermally isolated at the wall and adjustable in three axes.

05 Panel

Ceramic, stone, composite, HPL, perforated metal or louvre. Removable individually without disturbing its neighbours.

WHAT IT BUYS

Moisture

Water that passes the joints drains away instead of reaching the wall.

Thermal

Continuous external insulation with the cavity reducing summer heat gain.

Safety

Mechanically restrained panels do not depend on an adhesive bond that ages.

Maintenance

Any single panel can be replaced without disturbing the façade around it.

Programme

Dry construction, unaffected by weather and independent of curing times.

Seismic

Independently fixed panels move with the structure rather than against it.



Two materials, one build-up: ceramic above, natural stone below.



Porcelain rainscreen on an aluminium substructure.

09

CERAMIC DRY FAÇADE

Ventilated porcelain rainscreen

Porcelain or ceramic panels carried on an aluminium substructure, with a drained and ventilated cavity behind. No mortar, no wet trades, and no bond between the panel and the wall that can fail.

Porcelain is the most weather-stable of the rainscreen materials. It does not fade, does not absorb water and does not stain, which makes it the conservative choice where the building has to look the same in fifteen years.

WHERE IT WORKS

Office and commercial buildings

Residential towers

Healthcare and education

Hotels

Retail centres

Façade renovation and overclad



SPECIFICATION

PARAMETER	TYPICAL RANGE
Panel material	Porcelain stoneware to EN 14411, group Bla ($E \leq 0.5\%$)
Panel format range	300 × 600 to 1,500 × 3,000 mm
Panel thickness	10 – 20 mm for ventilated cladding
Weight	22 – 45 kg/m ² depending on thickness
Substructure	Aluminium bracket and T-rail, adjustable in three axes
Fixing type	Visible clip, concealed undercut anchor, or kerf
Cavity depth	30 – 60 mm, open at base and head
Insulation	Mineral wool A1, 50 – 150 mm, mechanically fixed
Reaction to fire	A1 to EN 13501-1, panel and substructure
Design wind load	Project-specific — to EN 1991-1-4 or ASCE 7

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.

DESIGN NOTES

Cavity and drainage

The cavity must be open at the base and the head. A blocked cavity turns a ventilated façade into a moisture trap.

Panel format and weight

Large-format panels reduce joints but increase handling weight and bracket spacing. The two are traded against each other.

Fixing type

Visible clips are cheaper and demountable. Concealed undercut anchors are cleaner but need panel thickness and factory drilling.

Fire and cavity barriers

Cavity barriers at compartment lines are part of the façade design, not an afterthought.



Mechanically fixed natural stone — every slab individually restrained.

10

STONE DRY FAÇADE

Mechanically fixed natural stone

Natural stone — travertine, granite, marble or limestone — carried on brackets, rails and anchors rather than bedded in mortar. Each slab is mechanically restrained and individually removable.

The safety argument is the strongest one. A mortar-bedded stone façade depends on an adhesive bond that ages, moves and eventually fails. A mechanically fixed slab does not rely on that bond at all.

WHERE IT WORKS

Residential and office towers

Hotels and hospitality

Civic and institutional buildings

Luxury villas

Retail and commercial centres

Stone façade replacement



Section through the build-up: wall, insulation, cavity, bracket, slab.

DESIGN NOTES

Stone selection and testing

Flexural strength and water absorption vary enormously between quarries. Anchor design follows the tested stone, not the stone type.

Anchor position

Kerf, undercut or pin fixings each impose their own minimum edge distances and slab thickness.

Movement and tolerance

Stone, the substructure and the building frame all move at different rates. Joint widths are designed for the difference.

Seismic performance

Individually restrained slabs behave far better than bedded stone under seismic movement — the failure mode is local, not progressive.

SPECIFICATION

PARAMETER	TYPICAL RANGE
Stone types	Granite, travertine, limestone, marble to EN 1469
Slab format range	600 × 600 to 1,200 × 2,400 mm
Slab thickness	30 – 40 mm, set by tested flexural strength
Weight	75 – 110 kg/m²
Flexural strength	6 – 20 MPa, tested to EN 12372
Anchor type	Kerf, undercut or pin, stainless 1.4401
Substructure	Aluminium or stainless bracket and rail
Cavity depth	40 – 80 mm, open at base and head
Insulation	Mineral wool A1, 50 – 150 mm, mechanically fixed
Design wind load	Project-specific — to EN 1991-1-4 or ASCE 7

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.



Composite cassettes formed into returns no rigid panel would make.

11

ALUMINIUM COMPOSITE DRY FAÇADE

ACP rainscreen cladding

Two aluminium skins bonded to a mineral or polymer core, formed into cassettes and hung on an aluminium substructure. Light, flat, and formable into curves and returns that no rigid panel will make.

The critical specification is the core. Fire-rated and A2 mineral cores behave entirely differently from polyethylene ones, and the difference is not visible in the finished façade.

WHERE IT WORKS

Commercial and office buildings

Retail and showroom frontages

Airports and transport buildings

Healthcare buildings

Signage and feature elements

Overcladding and renovation



SPECIFICATION

PARAMETER	TYPICAL RANGE
Panel construction	0.5 / 3.0 / 0.5 mm aluminium – core – aluminium
Core type	A2 mineral-filled or FR grade — specify explicitly
Total thickness	4 mm standard; 6 mm on request
Panel format range	Cassettes to 1,500 × 4,000 mm
Weight	5.5 kg/m ² standard core; 7.6 kg/m ² A2 mineral core
Coating system	PVDF 70/30 or FEVE to EN 12206 / AAMA 2605
Colour range	Full RAL and NCS, metallic, and custom matched
Fixing system	Folded cassette on rail, concealed or riveted
Reaction to fire	A2-s1,d0 to EN 13501-1 with mineral core
Design wind load	Project-specific — to EN 1991-1-4 or ASCE 7

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.

DESIGN NOTES

Core specification

Specify the core class explicitly — A2 or FR — and require certification. This is the single most important line in the specification.

Cassette fabrication

Folded cassettes hold their line better than riveted flat sheet, and allow concealed fixing.

Coating

PVDF or FEVE for colour stability. Polyester coatings chalk within a few years in high-UV climates.

Oil-canning

Flatness across large panels is a function of thickness, fixing spacing and handling. Panel size is limited by appearance before it is limited by strength.



Timber appearance at a fraction of the weight and the maintenance.

12

HPL

DRY FAÇADE

High-pressure laminate rainscreen

Kraft paper layers impregnated with thermosetting resin and compressed under heat into a dense, homogeneous panel. The result is dimensionally stable, colour-fast and impact-resistant, with the decorative layer running through rather than sitting on the surface.

It carries wood, stone and concrete finishes convincingly at a fraction of the weight, which makes it the usual answer where the architecture wants timber and the maintenance budget does not.

WHERE IT WORKS

Schools and universities

Healthcare buildings

Residential and apartment façades

Balconies and soffits

Hotels and hospitality

Renovation and overclad



HPL carries its decorative layer through the panel rather than on it.

DESIGN NOTES

Exterior grade only

Interior HPL will not survive external exposure. Specify exterior-grade, and fire-rated where the building height requires it.

Thermal movement

HPL moves more than ceramic or stone. Fixing holes are elongated and joint widths sized for the panel format.

Fixing method

Visible coloured rivets are the economical route; concealed undercut fixings give a clean surface but need panel thickness.

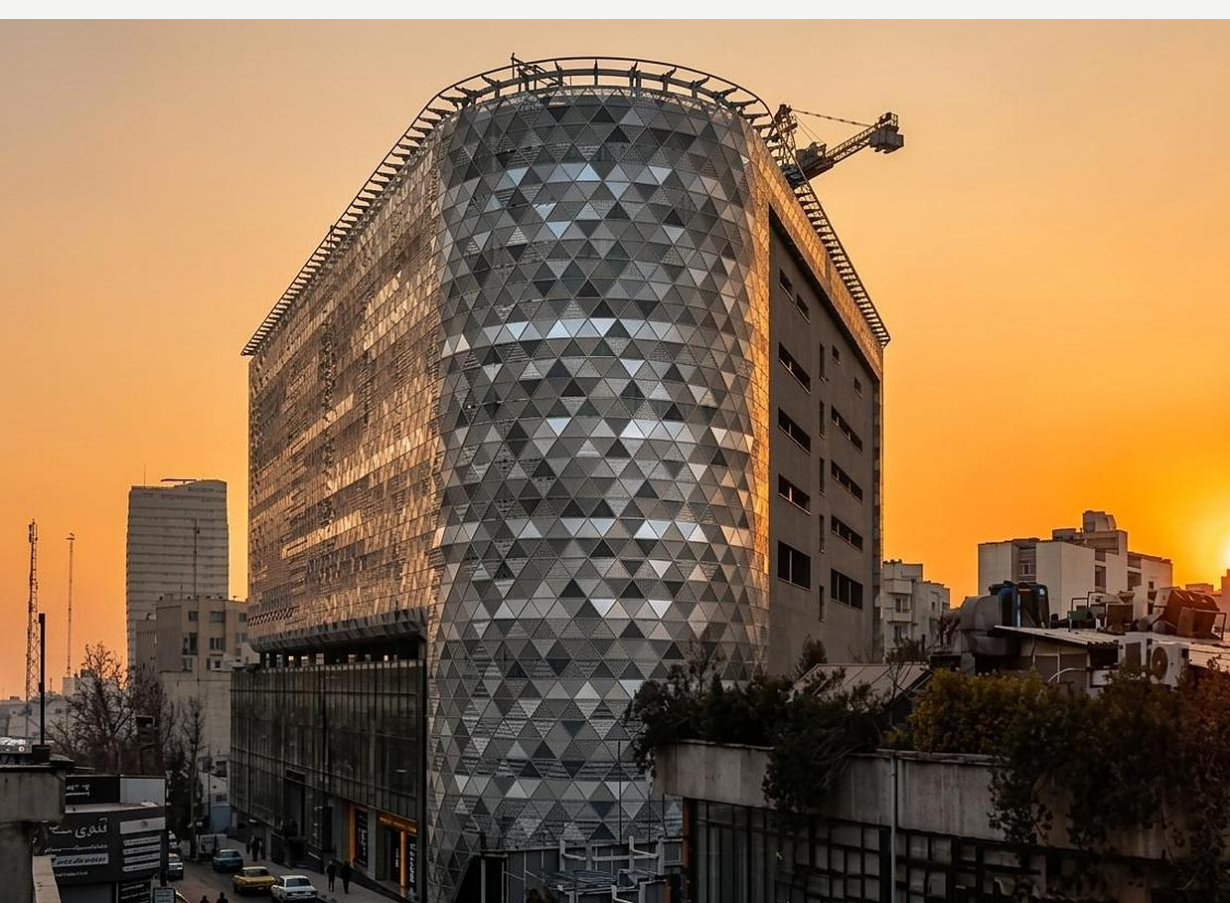
Edge condition

Cut edges show the core. Where this matters, panels are ordered to size rather than cut on site.

SPECIFICATION

PARAMETER	TYPICAL RANGE
Panel thickness	6 – 10 mm; 8 mm most common
Panel format range	Up to 1,300 × 3,050 mm
Weight	8 – 14 kg/m²
Surface finish range	Wood, stone, concrete, solid colour and metallic
Fixing method	Colour-matched visible rivet or concealed undercut
Substructure	Aluminium rail; timber only where code permits
Reaction to fire	B-s1,d0 standard; A2-s1,d0 in FR grade
Product standard	Exterior-grade compact laminate to EN 438-6
Cavity depth	20 – 50 mm, open at base and head
Design wind load	Project-specific — to EN 1991-1-4 or ASCE 7

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.



Yas Shopping Mall — punched metal screen over the glazed envelope.

13

PERFORATED METAL DRY FAÇADE

Punched metal screens and second skins

Aluminium, galvanised steel, stainless or weathering steel, perforated to a chosen pattern and hung as a screen. It performs two jobs at once: it controls sunlight and views, and it gives the elevation depth and texture that a flat panel cannot.

Open area is the governing number. It sets the shading performance, the wind load on the panel, the degree of privacy and how the façade reads by day against how it reads when lit from behind at night.

WHERE IT WORKS

Car park façades

Office and commercial buildings

Plant and equipment screening

Balcony and privacy screens

Solar shading second skins

Feature and branded façades



Open area governs shading, privacy, wind load and night appearance.

DESIGN NOTES

Open area

Shading, ventilation, privacy and wind load all follow from it. Fix the open area before the pattern is chosen for appearance.

Panel stiffness

Perforation removes material and stiffness. Folded returns or stiffeners are usually required at larger formats.

Image perforation

Graded hole sizes can render a pattern or image. This needs the viewing distance agreed at design stage.

Night appearance

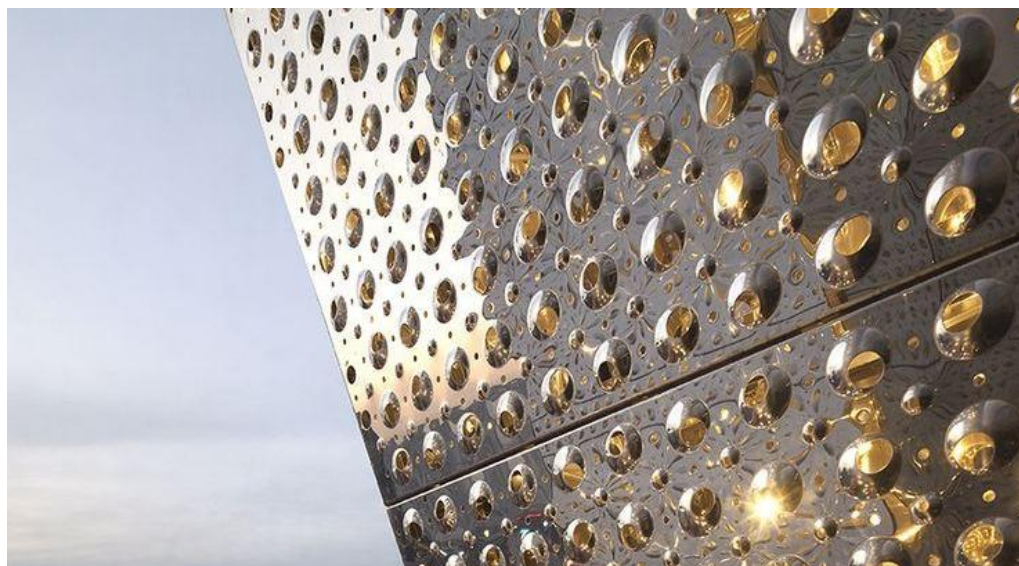
A perforated screen inverts when backlit. If the façade is lit, design for both conditions.

SPECIFICATION

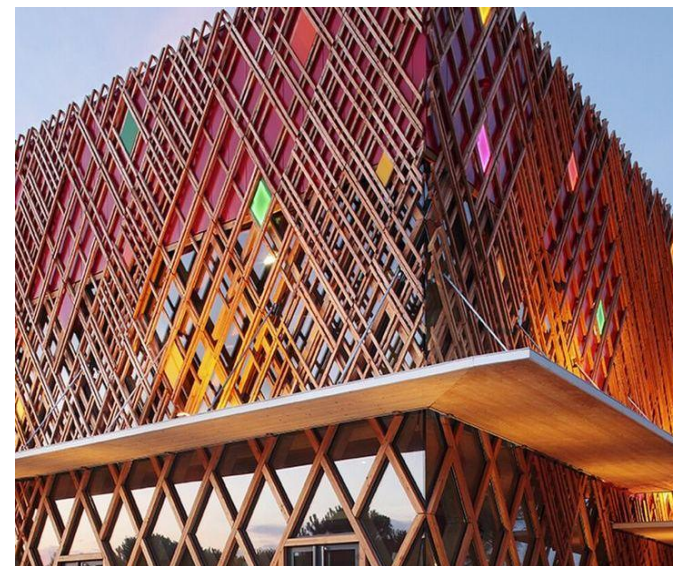
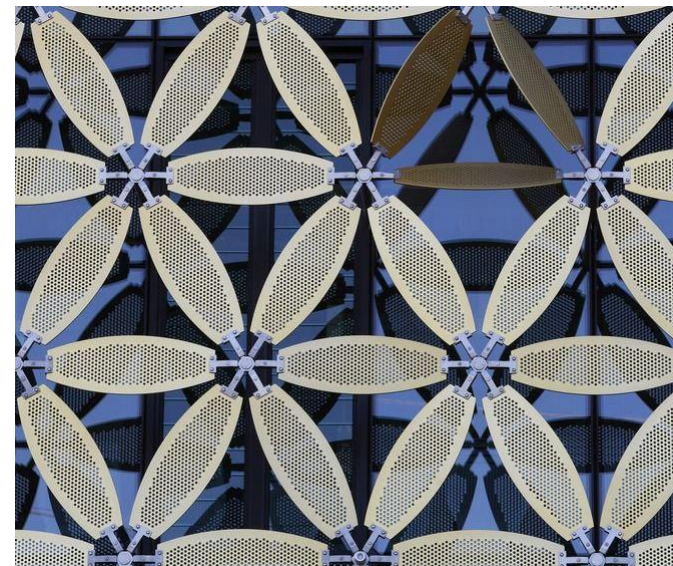
PARAMETER	TYPICAL RANGE
Base metal and alloy	Aluminium 3003 / 5005, galvanised steel, stainless 1.4301, weathering steel
Sheet thickness	1.5 – 3.0 mm aluminium; 1.0 – 2.0 mm steel
Perforation pattern	Round, square, slot, hexagonal, or image-graded
Open area	10 – 50%
Panel format range	Up to 1,500 × 3,000 mm
Edge treatment	Folded return 20 – 30 mm, stiffened at larger formats
Surface finish	Powder coat to EN 12206; anodised 20 – 25 µm to EN 12373
Fixing system	Cassette on rail, hook-on, or bolted
Weight	4 – 9 kg/m ² depending on open area
Design wind load	Project-specific — to EN 1991-1-4 or ASCE 7

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.

PERFORATED METAL DRY FAÇADE



PERFORATED METAL DRY FAÇADE





Extruded aluminium blades set as the elevation itself.

14

ALUMINIUM LOUVRE FAÇADE

Solar shading and screening

Extruded aluminium blades on a supporting substructure, set horizontally, vertically or on the diagonal. Fixed or adjustable, and used as shading, screening, plant enclosure or simply as the elevation itself.

Blade depth, spacing and angle are a daylight calculation, not a styling choice. Get them right and the cooling load falls measurably while the view out survives; get them wrong and you have an expensive dark room.

WHERE IT WORKS

Office and commercial buildings

Car park ventilation façades

Rooftop plant screening

Balcony and terrace screens

Residential solar shading

Institutional buildings



Vertical louvres on a pharmaceutical plant, Al-Diwaniyah, Iraq.

DESIGN NOTES

Blade geometry

Depth, spacing and angle set against the orientation and the sun path. The same louvre performs differently on each elevation.

Fixed or adjustable

Adjustable blades perform better and cost more, and introduce motors, controls and a maintenance regime.

Span between supports

Blade deflection is visible long before it is structural. Support spacing is set by appearance.

Wind load and acoustics

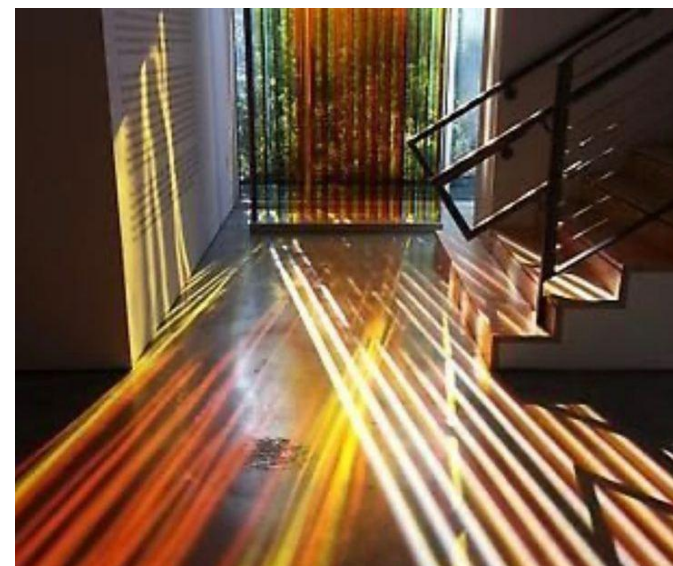
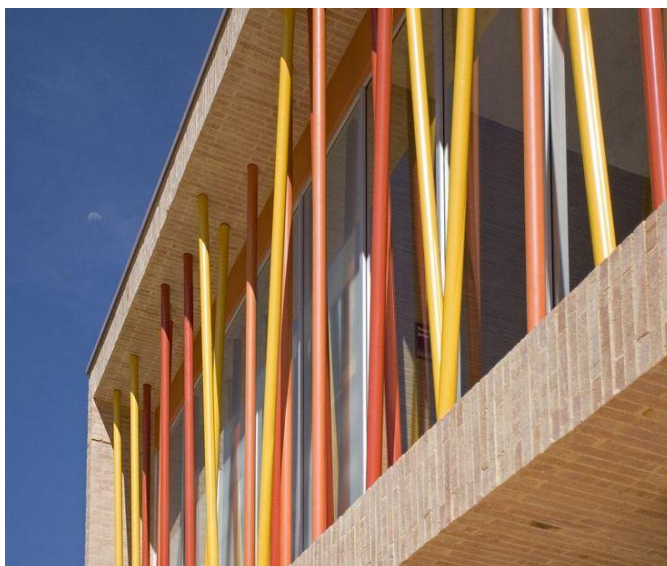
Deep blades attract wind load and can whistle. Both are checked at design stage where the elevation is exposed.

SPECIFICATION

PARAMETER	TYPICAL RANGE
Blade profile and depth	Aerofoil or rectangular, 100 – 400 mm deep
Blade spacing	150 – 500 mm centres
Orientation	Horizontal, vertical, or raked
Fixed or adjustable	Both; adjustable blades manual or motorised
Maximum span between supports	1,500 – 3,000 mm, profile dependent
Free area	40 – 70%
Alloy and temper	EN AW-6063 T6 / 6060 T66 extrusions to EN 755
Finish	Powder coat to EN 12206, anodised 20 – 25 µm, or wood-effect
Weight	8 – 18 kg/m²
Design wind load	Project-specific — to EN 1991-1-4 or ASCE 7

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.

ALUMINIUM LOUVRE FAÇADE





D

GLAZED FAÇADES

SYSTEMS 15

The curtain wall, in its stick, unitised, semi-unitised, structurally glazed and point-fixed forms. Chosen by programme and site access as much as by appearance.



Ansar Cultural Center — stick curtain wall and aluminium windows.

15

CURTAIN WALL FAÇADE

Framed and structurally glazed systems

A non-loadbearing glazed envelope hung from the building frame, carrying its own weight and wind load back to the slab edges. The most established system in the catalogue, and the one with the most variants.

The choice between stick, unitised and structurally glazed is made on programme, site access and crane availability as much as on appearance. Unitised work moves labour off the scaffold and into the factory; stick work absorbs site tolerance more forgivingly.

WHERE IT WORKS

Office towers

Hotels and mixed-use

Retail and commercial centres

Institutional and civic buildings

Residential high-rise

Atria and lobbies



Curtain wall combined with a diagonal louvre field, Pardis Technology Park.

DESIGN NOTES

System type

Stick, unitised, semi-unitised, structurally glazed or point-fixed. Decide early — each has a different tolerance, sequence and interface.

Thermal break

Frame transmittance dominates the wall U-value at typical framing ratios. The break is not a detail, it is the performance.

Movement joints

Inter-storey drift, thermal movement and slab deflection all pass through the wall. Stack joints are designed for the sum, not the largest.

Testing

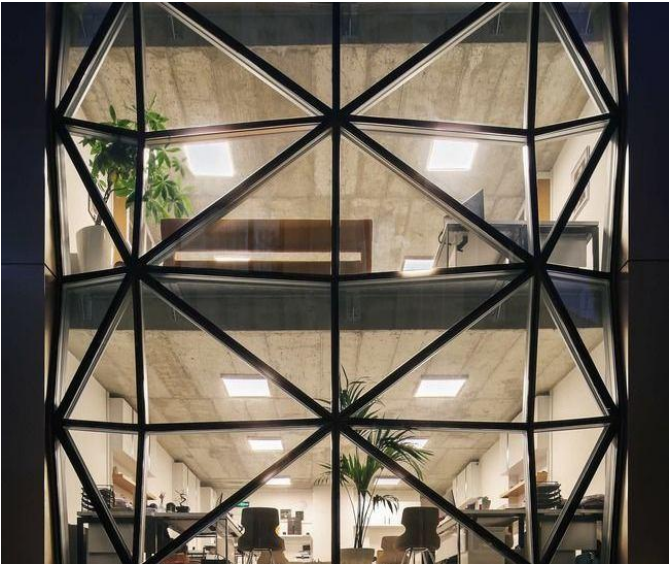
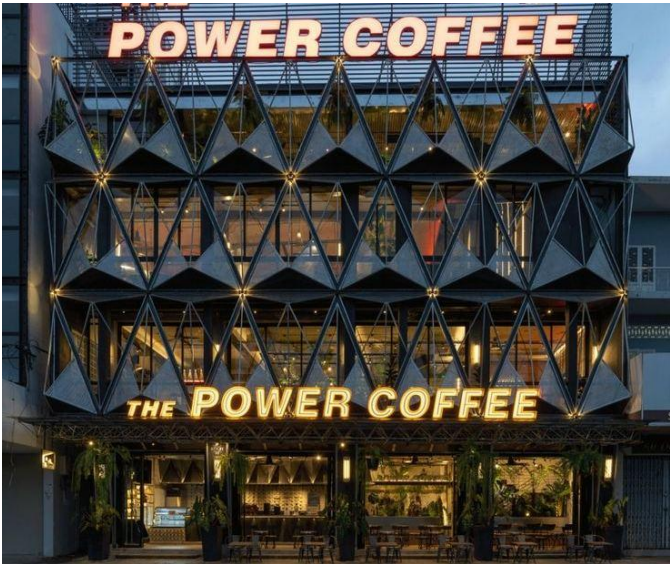
Air, water and structural performance verified on a project mock-up before production release on anything of significant scale.

SPECIFICATION

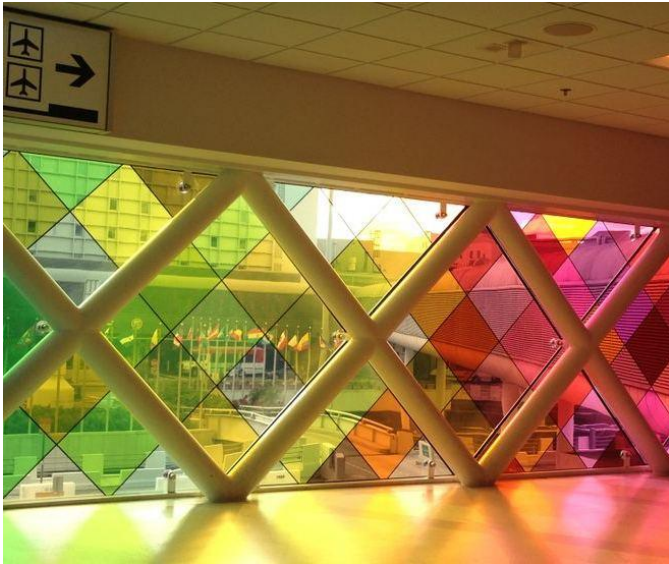
PARAMETER	TYPICAL RANGE
System type	Stick, unitised, semi-unitised, structurally glazed, point-fixed
Product standard	EN 13830 curtain walling
Mullion depth range	50 – 250 mm, set by span and wind load
Maximum panel size	1,500 × 4,200 mm unitised
Glass build-up	Laminated insulating units, 28 – 40 mm overall
Frame transmittance Uf	1.4 – 2.6 W/m²K, thermally broken
Overall Ucw	1.2 – 1.8 W/m²K double; 0.9 – 1.3 triple
Air permeability	Class AE 1200 to EN 12152
Watertightness	Class RE 1200 to EN 12154
Acoustic performance Rw	36 – 48 dB

Indicative ranges for the system type, referenced to the governing standards. Project values are confirmed by CORTEX against the brief, the applicable code and the tested assembly.

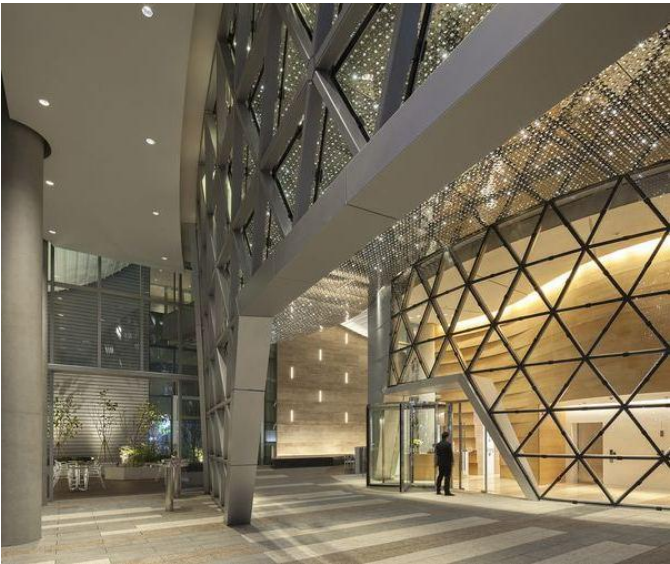
CURTAIN WALL FAÇADE



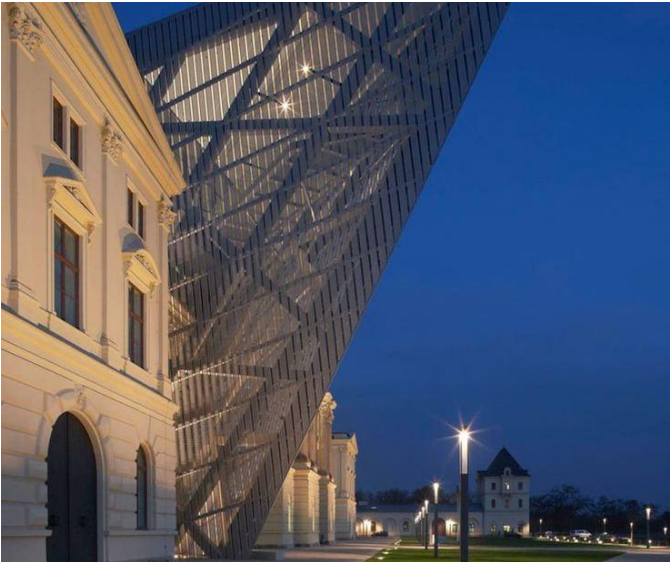
CURTAIN WALL FAÇADE



CURTAIN WALL FAÇADE



CURTAIN WALL FAÇADE



SELECTION MATRIX

A first filter only. Final selection follows from span, exposure, programme and budget — and usually from a conversation.

SYSTEM	FAMILY	TYPICAL USE	RELATIVE WEIGHT	TRANSPARENCY
01 Free-form structures	A	Landmark roofs and envelopes	Medium	Variable
02 Free-form skylights	A	Curved roof daylighting	Light	High
03 Free-form villas	A	Whole-building envelopes	Light	Variable
04 Space structures	A	Long-span column-free roofs	Light	Low
05 Cable structures	B	Tensile roofs and canopies	Very light	Variable
06 Cable-supported curtain wall	B	Tall transparent walls	Very light	Very high
07 Cable-supported skylight	B	Flat spans with slim members	Very light	Very high
08 Cable net structures	B	Large transparent envelopes	Very light	Very high
09 Ceramic dry façade	C	Durable ventilated cladding	Medium	None
10 Stone dry façade	C	Premium ventilated cladding	Heavy	None
11 Aluminium composite	C	Formable ventilated cladding	Light	None
12 HPL dry façade	C	Timber and stone appearance	Light	None
13 Perforated metal	C	Screening and second skins	Light	Partial
14 Aluminium louvre	C	Solar shading and screening	Light	Partial
15 Curtain wall façade	D	General glazed envelope	Medium	High

RECOGNITION

AWARDS



2019

2019

Best Special Steel Structure in Iran

Ava Center Skylight — free-form steel and glass roof, Tehran



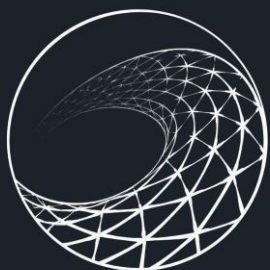
2022

2022

Best Special Steel Structure in Iran

Fanap Cable-Support Skylight — cable-reinforced flat skylight, Tehran

Both awards were made for steel-and-glass roof structures engineered, fabricated and installed by CORTEX. Both are documented in Volume 01, Selected Works.



CORTEX

FAÇADE ENGINEERING COMPANY

Send us the geometry that is causing the argument. We will tell you how it gets built, what it weighs, and what it costs — before anyone commits to a system.

TELEPHONE

+98 912 0 926 826

EMAIL

info@cortexfacade.com

WEB

cortexfacade.com

TEHRAN

Unit 402, No. 12, Second East,
Velenjak Street, Tehran, Iran

YEREVAN

Armenia · in registration