



## STRUCTURAL GLASS & SPIDER GLAZING CURTAIN WALLS

Certified / Approved by:



## ✂ STRUCTURAL GLASS & SPIDER GLAZING CURTAIN WALLS

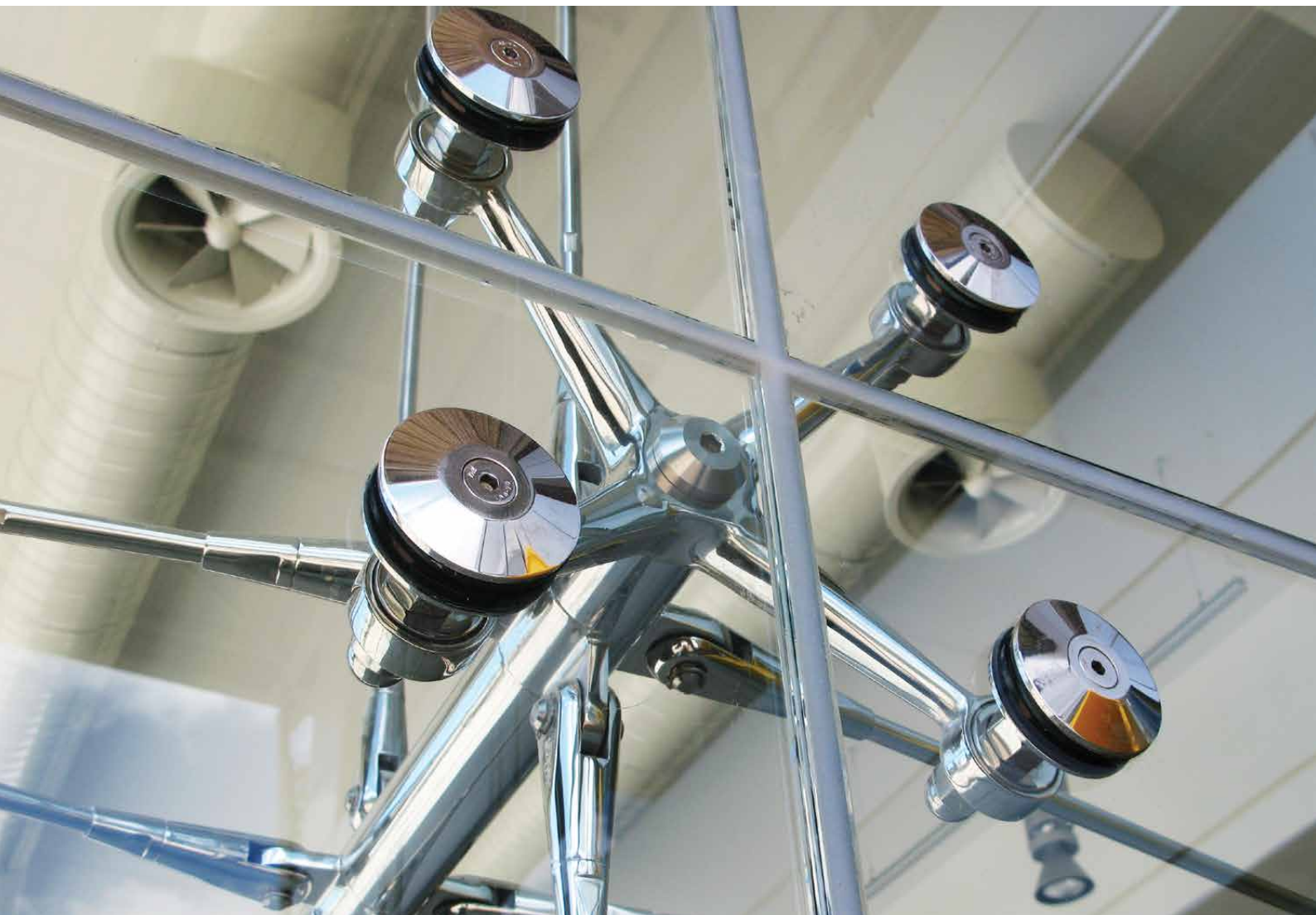
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Structural Glass & Spider Glazing curtain walls provide maximum daylight for building interiors, as well as the possibility of placing large transparent glass surfaces as building envelopes. Due to its visual attractiveness such architectural building envelopes are commonly used on commercial buildings to create premium building skins. A wide variety of applications are available, including curtain walls, canopies and atriums, allowing maximum transparency, brightness optimization and unique design.

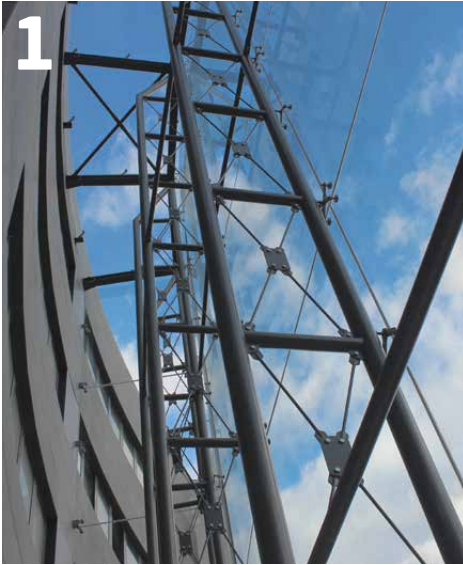
Structural Glass & Spider Glazing facades are best categorized by the structural system types used to support them.

Technology used to fix glass panes includes use of special fittings, such as spiders, rotules, clamps, tension rods and other supporting parts, which are connected to the supporting structure. All hardware is made of high quality mirror polished stainless steel (graded 304, 316, 316LM and V4.A), ensuring best possible protection against oxidation and corrosion. Glass panes are provided in various shapes and are installed without additional vertical and horizontal profiles on the outer side of the façade, being connected by special structural silicone highly resistant to weather conditions and UV radiation. In terms of performance and aesthetics, there are options for clear or low-e glass, low-iron processing, reflective or toughened coating (external or internal finish), as well as silk printing (fritting).

GLASSCON as a “turn-key” façade contractor offers tailored made solutions, by providing complete end-to-end services from design and engineering to fabrication and installation. Highly skilled in-house façade engineers manage all the technological demands of such building envelopes, in terms of performance, functionality, durability and aesthetics. Our products and services have been certified by TÜV NORD ISO 9001: 2015, the world’s most credible German Notified Body. Our vast experience since 1999 includes more than 250 realized projects worldwide, designed by architects and consultants including RENZO PIANO, ATELIERS JEAN NOUVEL, LUFTHANSA CONSULTING, HOPKINS ARCHITECTS and SANTIAGO CALATRAVA among others.



## 4 STRUCTURAL GLASS & SPIDER GLAZING SYSTEMS



### STEEL SUPPORTING SOLUTIONS type “GL/SSS”

Steel supporting designs vary widely, with an emphasis on fine detailing and craftsmanship. The substructure can be constructed using pipe columns (rectangular, I-Beams, CHS, etc.) or complicated trusses and other complex steel substructures, frequently manufactured to the highest standards. This type of solution is suitable for overhead glazing applications as well as vertical facades.

Such systems are often combined with tension rod or cable systems providing a hybrid solution to minimize steel and increase transparency. Snow loads, negative wind pressures and inclination requirements are critical design issues that must be taken in consideration. According to glass pane sizes, rod or cable elements may be incorporated into the design and lateral tensile systems are often used to stabilize the facade structure.



### STRUCTURAL GLASS FINN & MULLIONS SYSTEMS type “GL/GFMS”

Glass fins or mullions supporting solutions represent the earliest form of structural glass façade and are used when the design intent is maximum achievable transparency. The result is a completely frameless and almost invisible facade, with no use of steel or concrete elements, providing complete air tightness and water proofing. Glass-fin glass walls are quite simple in concept, utilizing a glass fin set perpendicular to the glass pane at each vertical line of the glass grid.

Glass panes (Single or Double Glazing Units) are attached to the fins with stainless steel fittings such as rotules, spiders, fin splices and clamps. The whole façade is suspended from concrete or steel beams via pin joints and is fixed to the floor using special stainless steel sill channels. As the span grows, the most challenging part is to create a fin comprised of multiple glass pieces.







### **TENSION ROD SYSTEMS type “GL/TRS”**

Tension rod supporting solutions are used when dematerialization of the structure is needed, to provide a semi-transparent design with very high span. These systems vary widely in both design and configuration, allowing easily achieved vertical, overhead, vaulted and dome applications. Bow string trusses or suspended cable trusses rely on prestress forces into the tensile elements of the truss to provide stability.

All materials are made of high quality stainless steel. Glass is processed according to safety requirements, usually being tempered or tempered laminated as well as heak soak tested. Depending upon conditions of span and load, the required prestress forces can be quite high, and must be resisted by adjacent building structure. This solution requires detailed structural calculations and efficient communication with the building architects and engineers very early in the design process.



### **CABLE NET SYSTEMS type “GL/CNS”**

Cable net supporting solutions represent the ultimate elegant minimalistic structural glazing providing optimum façade transparency. Cable supported facades, often called cable nets, are used where large expanses of glass are required to enclose huge spaces, with limited intrusion from supporting structure. This structural system supports glass by pre-stressed cables in a net geometry, providing a very flat design.

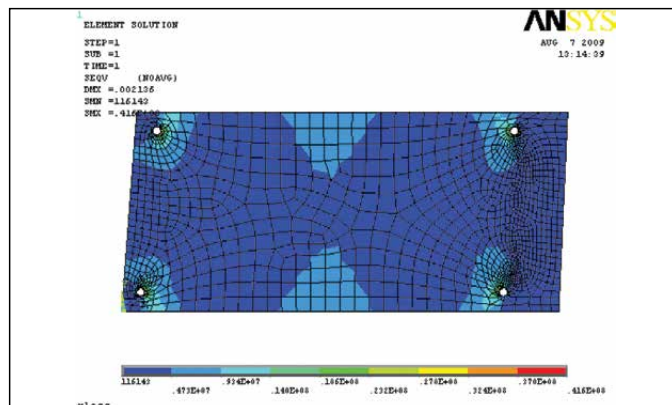
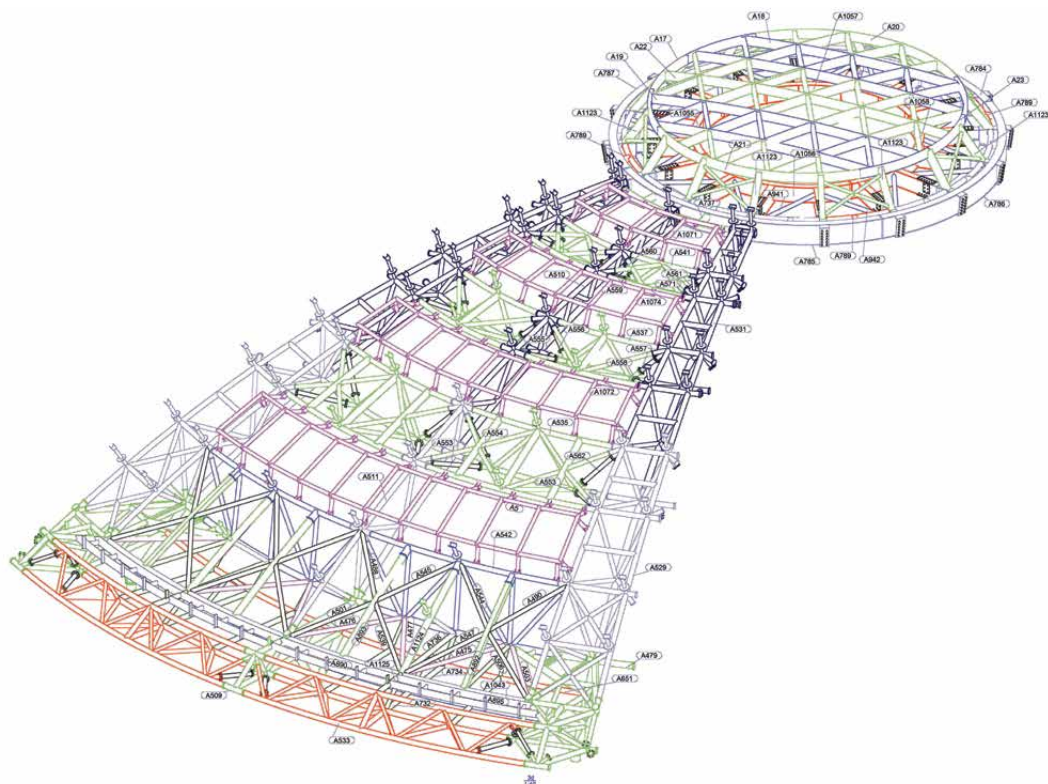
Cables need precise engineering in terms of tensioning to prevent over deflection during strong wind loads. The horizontal cables are tensioned against the adjacent building structures and the vertical ones between the roof structure and the ground. Cables are locked together with stainless steel clamps, which also hold the glass panes. This solution requires an early collaboration between the façade contractor and the building engineers.



## FACADE DESIGN & ENGINEERING - STRUCTURAL CALCULATIONS

With the increasing complexity of modern architectural building facades, innovative system design and engineering is the key-factor for a successful project. Clients need to accurately validate the architect's design and ensure that their building will meet superior performance at competitive cost. GLASSCON has the expertise of modern façade engineering and a long proven track record. Before execution phase, our responsibility is to provide advanced end-to-end design and engineering services such as structural calculations, predictive thermal model analysis, lighting and acoustic engineering, visual and performance mock-up fabrication, testing and certification, as well as environmental compliance analysis.

Our Structural Glass & Spider Glazing curtain walls are comprehensively designed and engineered according to the European Standards (EC), US standards (ASME/ANSI) or local codes and regulations applying for specific countries. Structural calculations for steel and glass (linear and non-linear) are performed according to local standards with Finite Element Method/Analysis (FEM/FEA), using advanced analysis software. Our expert structural glazing engineers conduct various analysis methods such as linear elastic, second order theory, elastic with redistribution of loads, plastic and dynamical phasmatic for earthquake loads, in order to deeply understand the behavior of each application. Most typical loads that are included in structural calculations are self-weight loads, snow loads, wind loads, seismic and earthquake loads, as well as other any active loads on the structure.





## SPIDER GLASS ENCLOSURE WITH TENSION ROD SYSTEM



GLASSCON designed, engineered and constructed an innovative glass envelope for a staircase at a luxurious hotel. The height of this enclosure is over 12 meters. The spider glass curtain wall and roof are supported by a suspended stainless

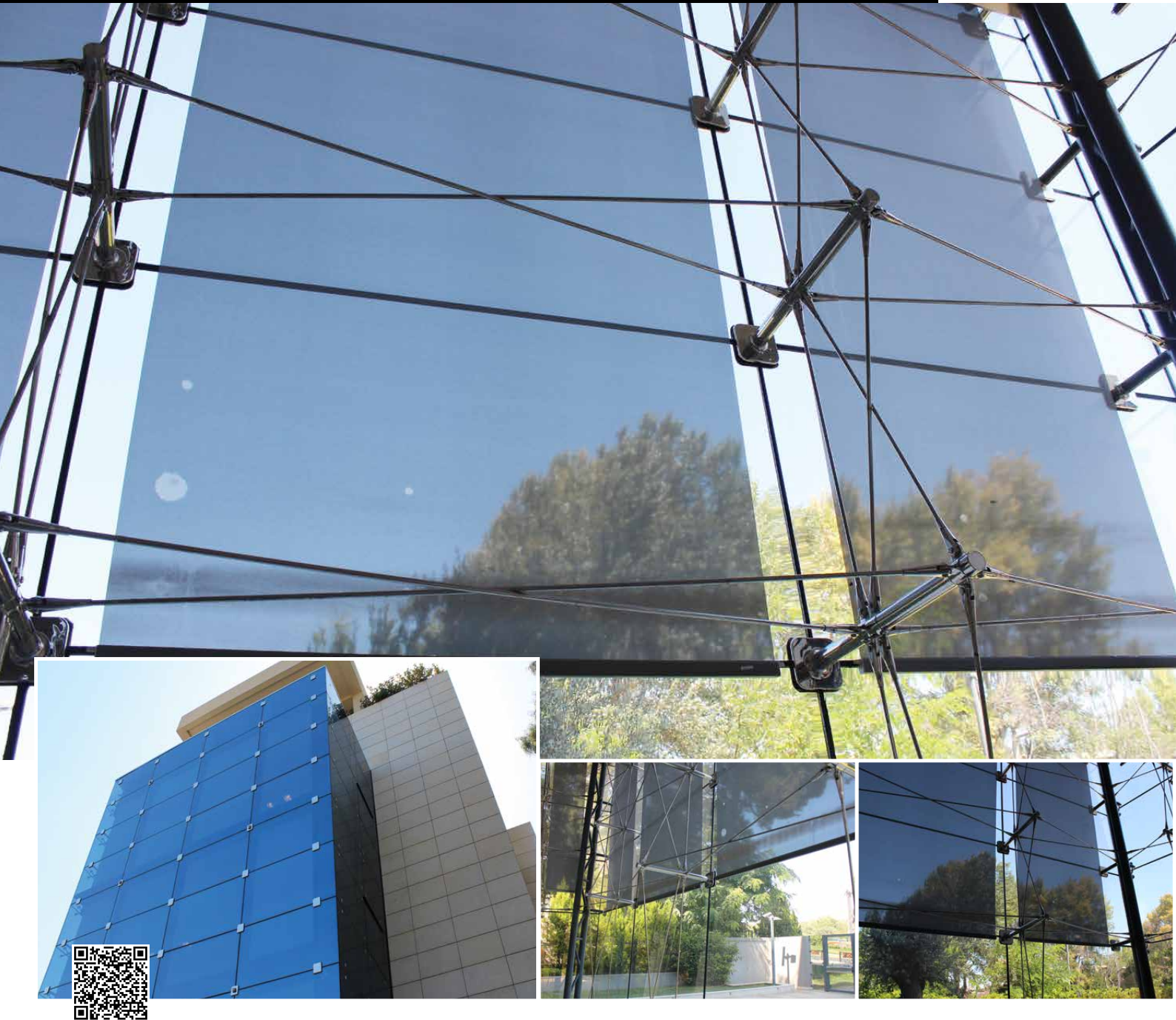
steel 3D TENSION ROD & CABLE SYSTEM along with stainless steel pressure bars and 4-way spider glass fittings. The glass panes of the roof have been processed with silk printing technology to provide the corresponding solar shading.



structural glass & spider glazing curtain walls



## ILLUMINATED STRUCTURAL GLASS FAÇADE WITH TENSION ROD SYSTEM



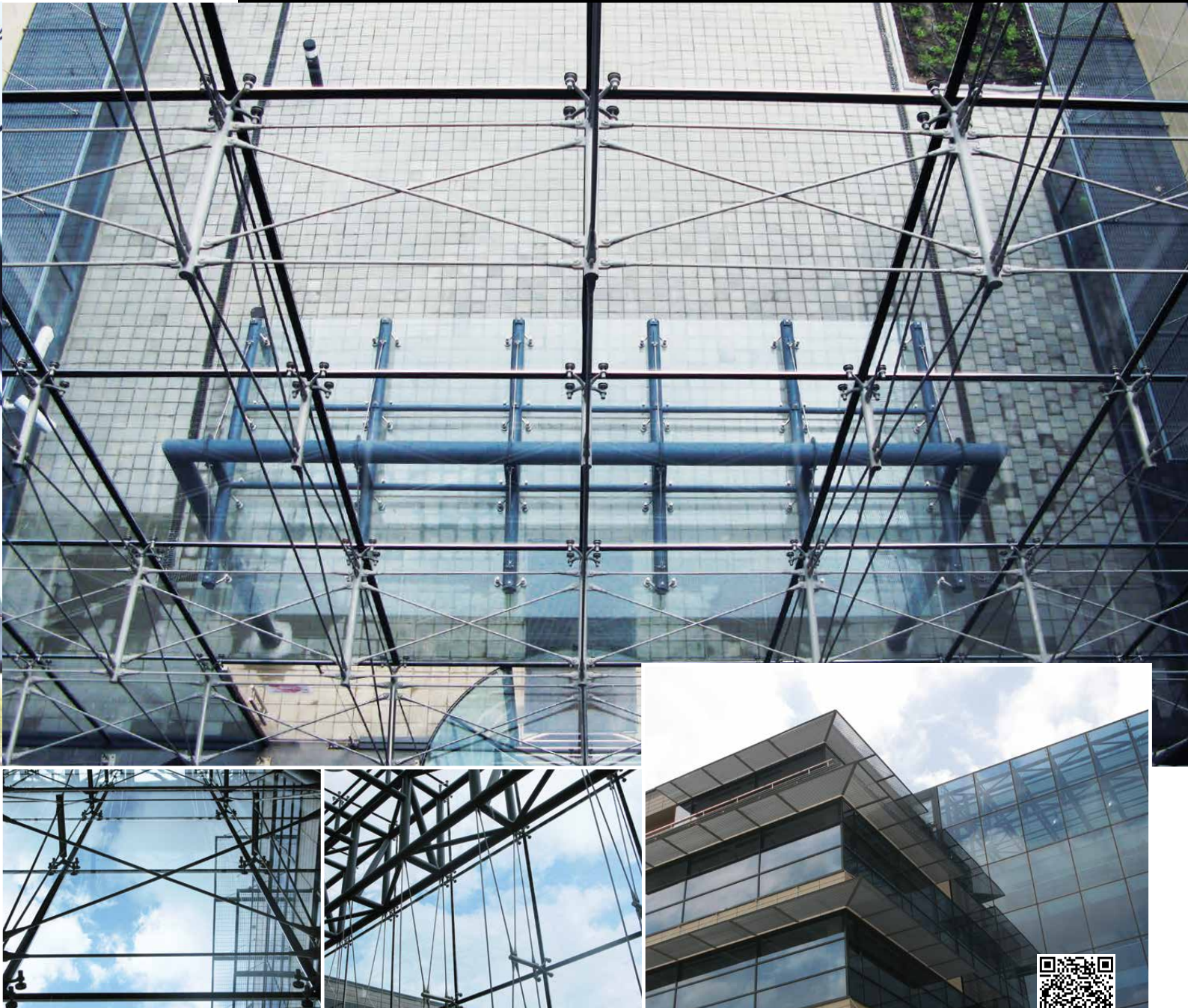
GLASSCON designed, engineered and constructed an inclined frameless illuminated curtain wall with internal shading for an office building complex. The façade is supported by a stainless steel 3D TENSION ROD SYSTEM along with pressure

bars and glass clamps. The illumination of the façade is provided through special LED spots installed on the stainless steel clamps, while shading is performed with INTERNAL ROLLER BLINDS.





## SPIDER GLASS CURTAIN WALL WITH TENSION ROD SYSTEM



GLASSCON designed, engineered and executed the whole façade works of the Department of Business & Technology building located at Ba-neasa, Romania. Scope of works included eight structural curtain wall systems of 32 meters

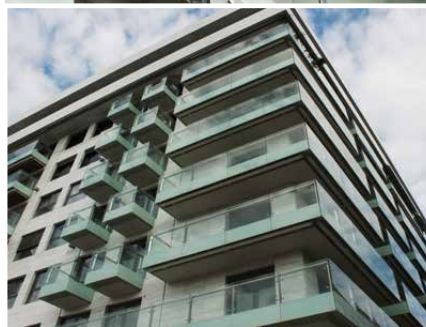
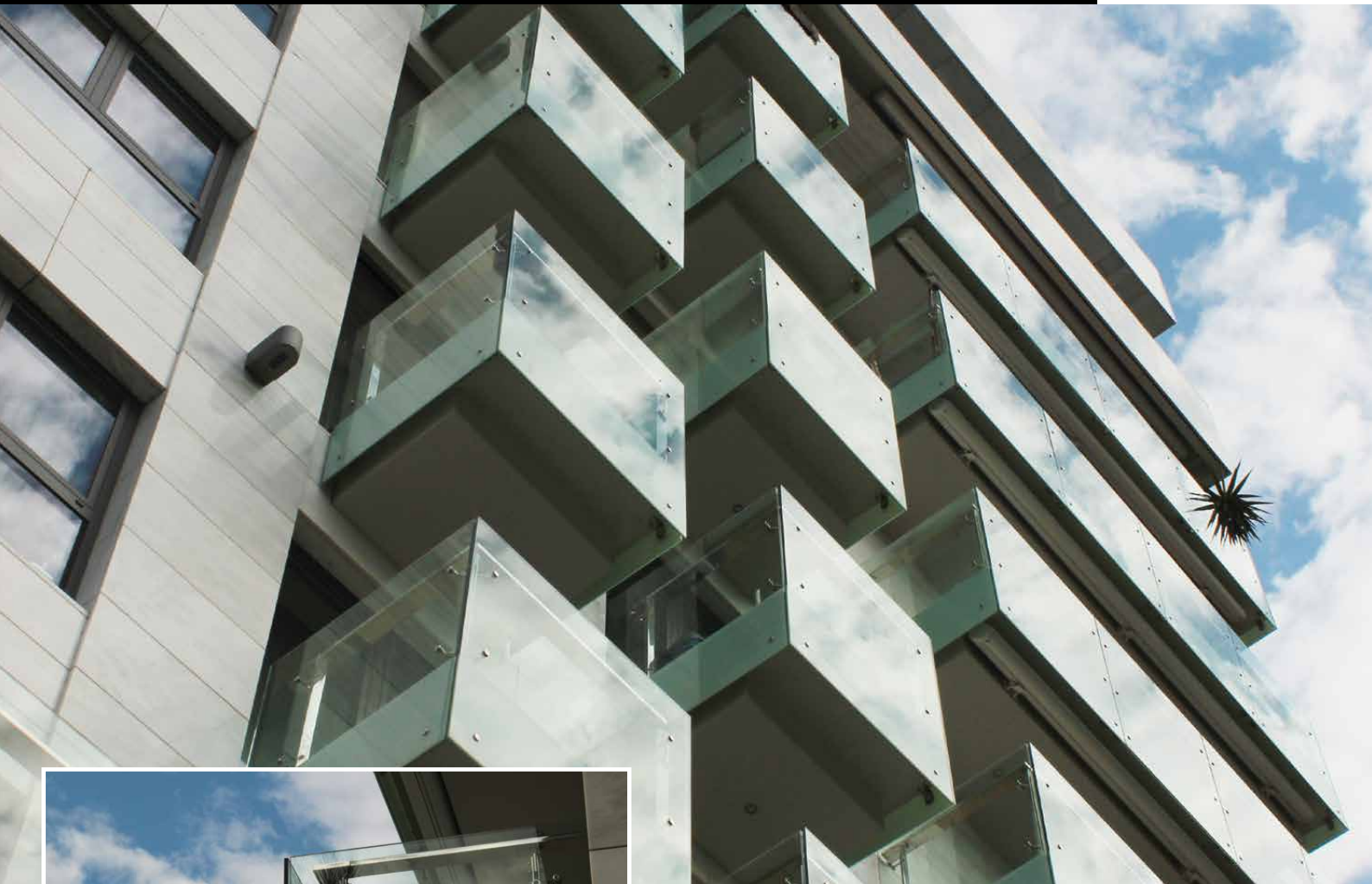
height each one and ceramic clay tiles cladding. The façade is supported by a stainless steel 3D TENSION ROD SYSTEM combined with struts along with pressure bars and 4-way spider glass fittings.



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## GERMAN EMBASSY BUILDING - BOLTED GLASS RAILINGS



GLASSCON successfully designed, fabricated and installed a building envelope for a German Embassy building, which includes external STAINLESS STEEL & GLASS RAILS. All fittings and rails are made of high quality 316L mirror

polished stainless steel. Glass rails are made of tempered-laminated safety glass, which has been processed with silk printing technology to meet architectural requirements and provide a unique design.





## BALLISTIC STRUCTURAL GLASS MULLIONS CURTAIN WALL WITH GLASS FINES



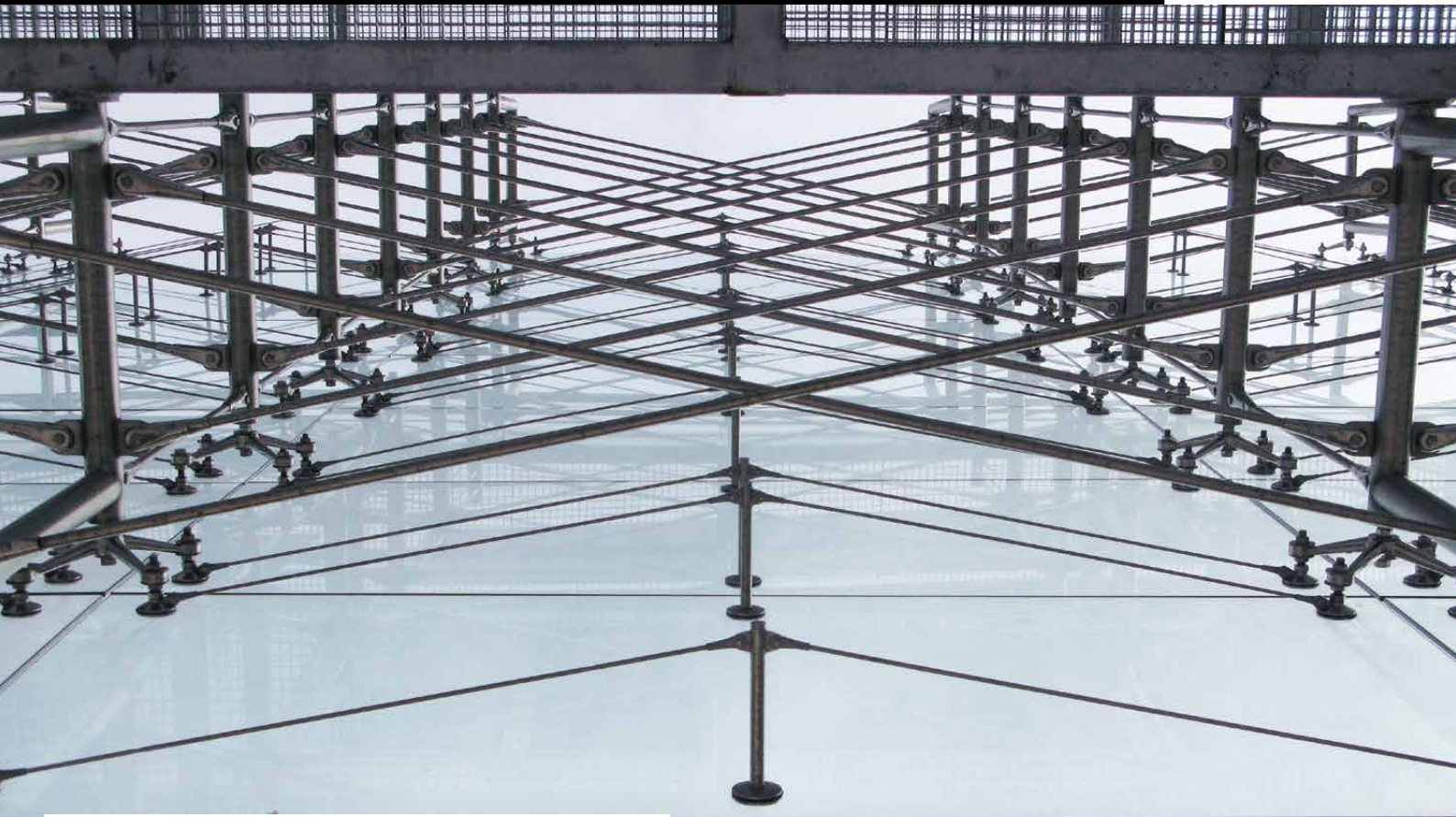
GLASSCON designed, engineered and constructed a bullet proof illuminated structural curtain wall for a bank building. The façade is supported by GLASS FINS with height of 15 meters each one along with mirror polished stainless steel fit-

tings and glass clamps. The illumination of the façade is provided through special LED spots installed on the stainless steel clamps. The glass panes are certified to provide ballistic protection.



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## DOUBLE SKIN FAÇADE WITH STRUCTURAL GLASS WALL



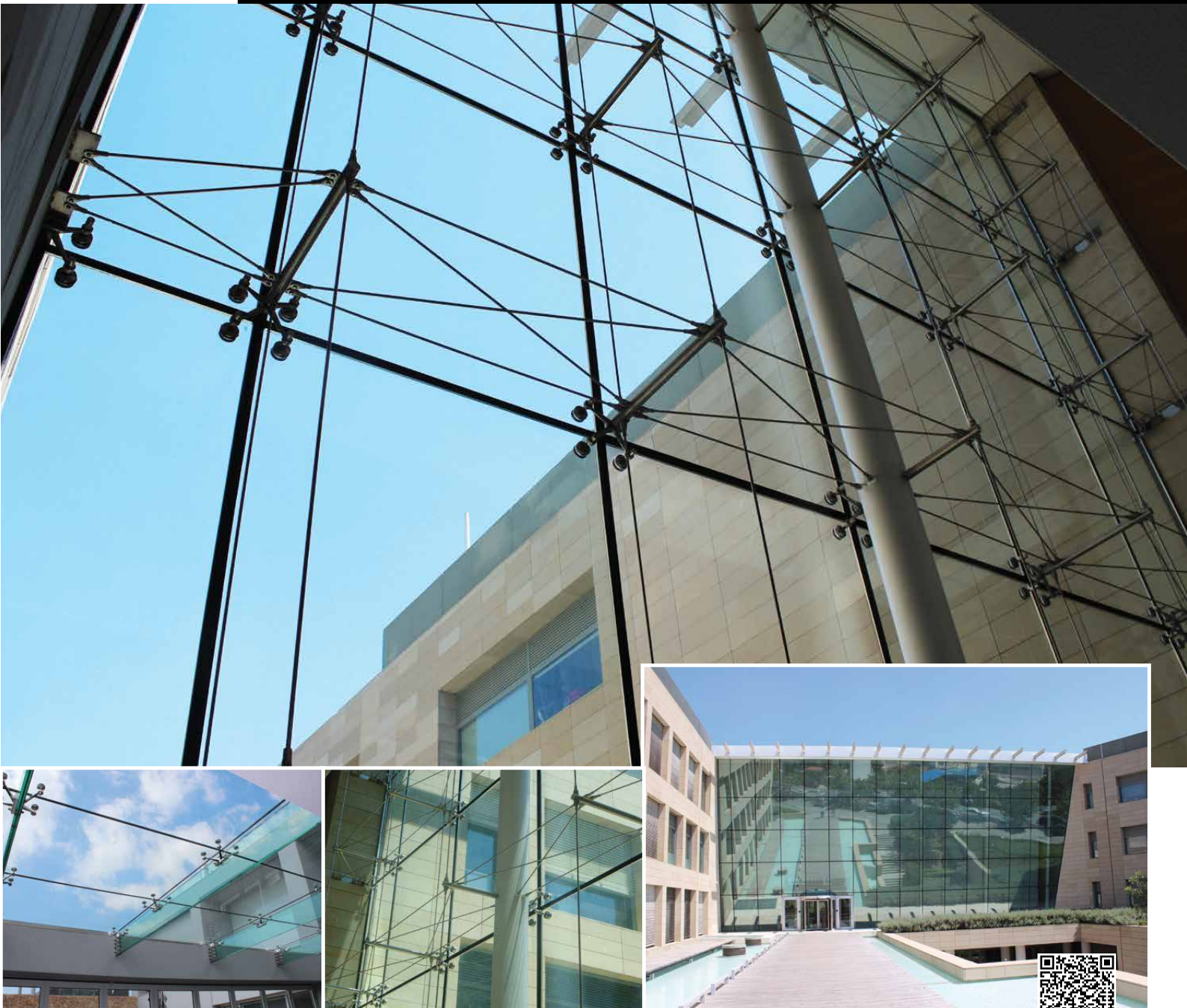
GLASSCON designed, engineered and executed the complete façade works for an office building, including aluminium solar shades, cladding, inox meshes and point fixed second skin glass façade. The double skin glass façade is supported by a stainless steel 3D TENSION ROD SYSTEM com-

bined with tension mesh along with pressure bars and 4-way spider glass fittings. The glass panes of the roof have been processed with silk printing technology to provide the corresponding shading.





## SOUND PROOF (48 dB) SPIDER GLASS ON TENSION ROD SYSTEM



GLASSCON designed, engineered and executed the complete façade works for an office building, including aluminium louvers, stone cladding and an inclined curtain wall. The structural glazing façade is supported by a stainless steel 3D TEN-

SION ROD SYSTEM along with pressure bars and 4-way spider glass fittings. The glass panes are certified for sound proofing, as well as processed with silk printing technology to provide the corresponding shading.



## SPIDER GLASS CURTAIN WALL WITH TENSION ROD SYSTEM



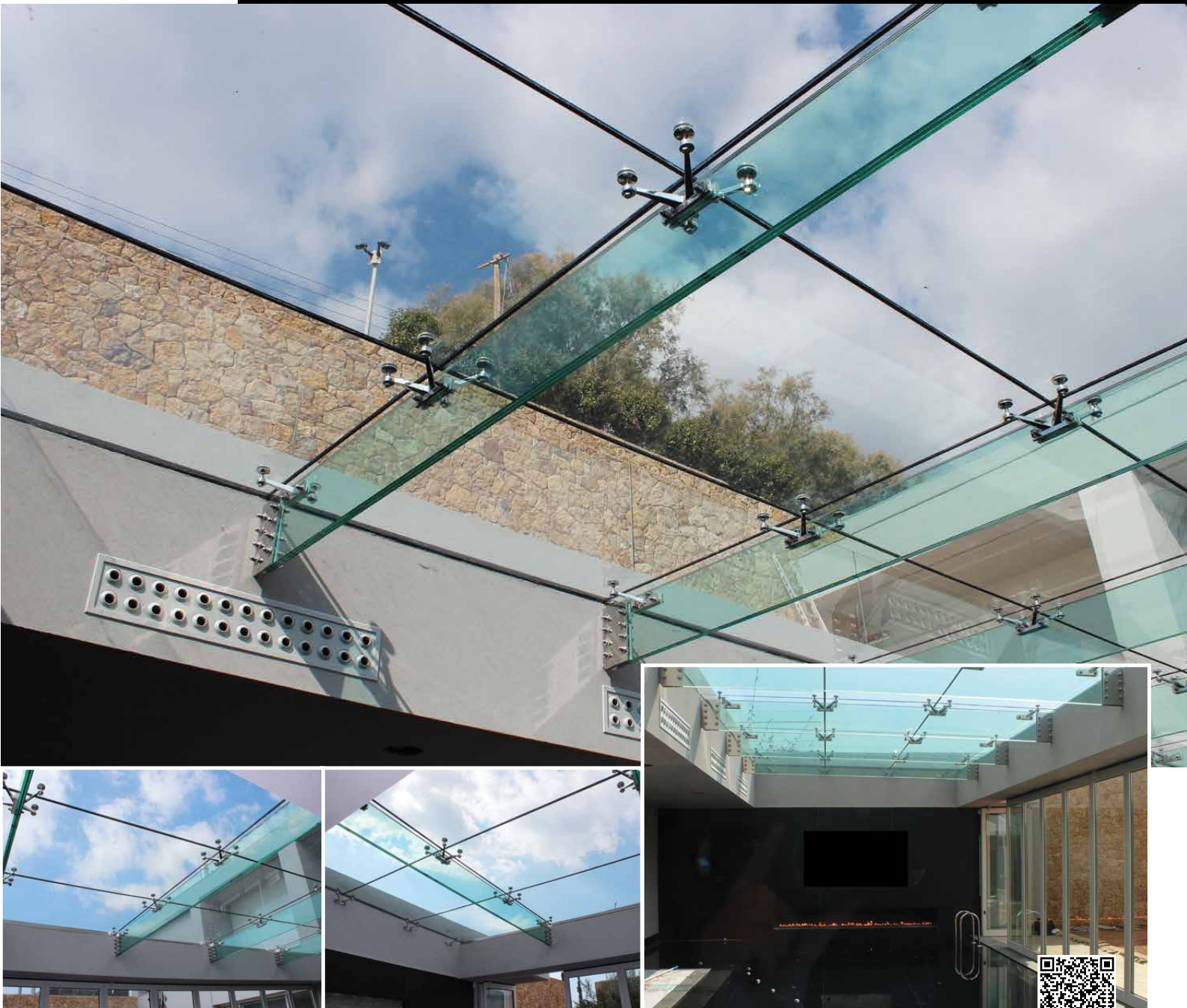
GLASSCON designed, engineered and executed the complete façade works for an office building, including motorized aluminium louvers, external brise soleil, aluminium composite panel clad-

ding, external brise soleil and a structural glass facade. The façade is supported by a stainless steel 3D TENSION ROD SYSTEM along with pressure bars and 4-way spider glass fittings.





## STRUCTURAL GLASS ROOF WITH GLASS FINNS



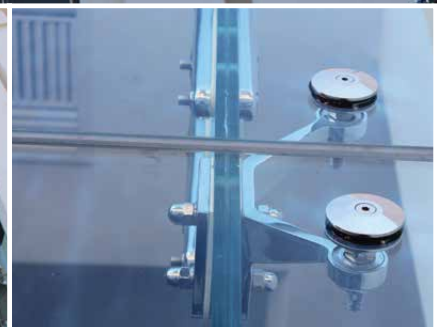
GLASSCON designed, engineered and installed an innovative structural skylight and a set of folding glass doors to create an indoor swimming pool area at a very high-end residence. The glass roof is almost transparent and is supported

by GLASS FINNS along with stainless steel 4-way spider glass fittings. The glass panes are made of tempered-laminated safety glass, specially coated to provide shading while allowing daylight.



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## CURTAIN WALL WITH GLASS MULLIONS



GLASSCON designed, engineered and constructed a structural curtain wall for an iconic building facade. The façade is almost 100 % transparent as it is supported by GLASS MULLIONS along with 4-way spider glass fittings. Glass mullions

are made of tempered-laminated safety glass and are connected via stainless steel joints and silicone gaskets. Glass panes are also made of tempered-laminated safety glass.





## GLASS ATRIUM - CANOPY WITH BOLTED GLAZING



GLASSCON designed, engineered and installed an innovative structural glass atrium at a shopping mall. The glass canopy covers a surface of 1.650 square meters and is supported by

STEEL SUBSTRUCTURE along with stainless steel 4-way spider fittings. Glass panes are made of tempered-laminated safety glass, specially tinted to provide shading while allowing daylight.



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## ILLUMINATED STRUCTURAL CABLE NET GLASS FAÇADE



GLASSCON designed, engineered and constructed a frameless illuminated curtain wall of a total height of 25 meters for a new office building. The façade is supported by a grid of stainless steel tensioned CABLES along with custom made LED

glass clamps. Structural calculations according to EC1 led to a cross section cable of  $\text{Ø}22\text{mm}$  thickness, pre-tensioned to 90kN horizontally and 43kN vertically.





## SPIDER GLASS DOUBLE SKIN FAÇADE WITH FRIT GLASS



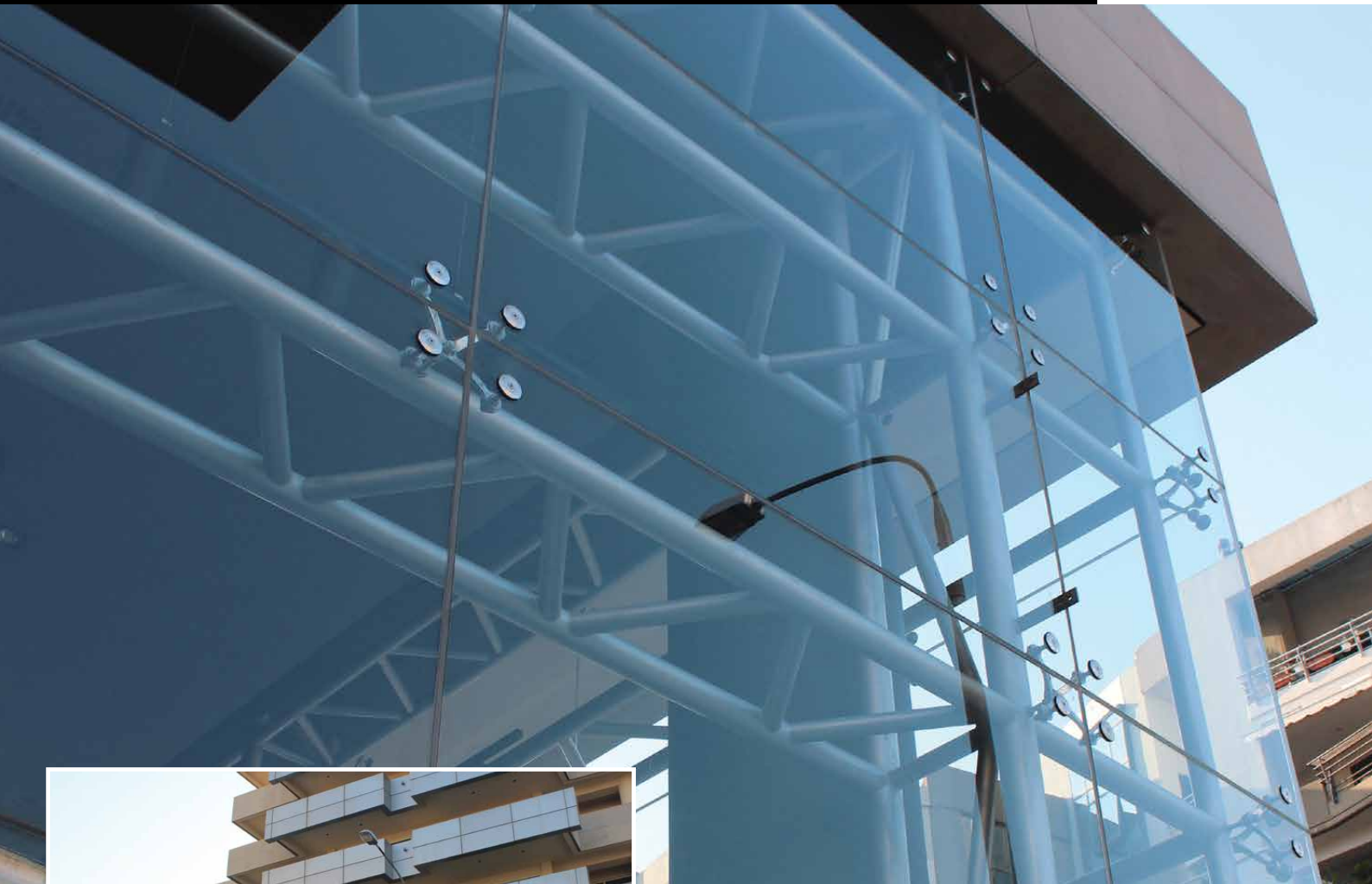
GLASSCON designed, engineered and executed the whole façade works for a spider glass second skin glass façade at an existing office building. The double skin glass façade is supported by a STEEL STRUCTURE along with 4-way spi-

der glass fittings. The necessary air ventilation is provided with motorized aluminium louvered windows. The glass panes have been processed with silk printing technology to provide the corresponding shading.



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## SPIDER GLASS SHOP FRONT CURTAIN WALL



GLASSCON successfully designed, fabricated and installed a spider glass curtain wall for a SMEG front shop. The façade is supported by custom made horizontal STEEL TRUSSES, co-developed with the project architect. Glass panes

are attached to the truss via 316L stainless steel 4-way spider fittings. Glass panes are made of monolithic tempered glass and heat soak tested to minimize the risk of spontaneous breakages.





## BOLTED ARCHITECTURAL GLASS LOUVERS



GLASSCON successfully designed, fabricated and installed a facade of architectural glass fins used for external shading. Glass fins are interconnected and attached to the building façade by

high quality custom made stainless steel fittings developed for this project only. Glass fins carry a special design using silk printing technology, in order to provide the appropriate solar shading..



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# SPIDER GLASS SKYLIGHT PYRAMID & GLASS BRIDGE



GLASSCON designed, engineered and installed an innovative glass pyramid at the top of an atrium, covering an area of 650 square meters, as well as a glass bridge for a new office building. Both systems are supported by STEEL SUB-

STRUCTURE along with stainless steel 4-way spider fittings. Glass panes are made of tempered safety glass with reflective coating to provide shading while allowing daylight.





## SPIDER GLASS DOUBLE SKIN FAÇADE ON STEEL TRUSS



GLASSCON designed, engineered and executed various façade works for a mid-rise office building, including marble cladding and a point fixed second skin glass façade. The double skin glass façade is supported by STEEL TRUSS SUBSTRUC-

TURE along with stainless steel 4-way spider glass fittings. The glass panes are extra clear to provide complete transparency, while air ventilation is achieved with waterproof glass motorized louvered roof windows.



## BOLTED GLAZING GLASS FAÇADE WITH TRUSS SUPPORT



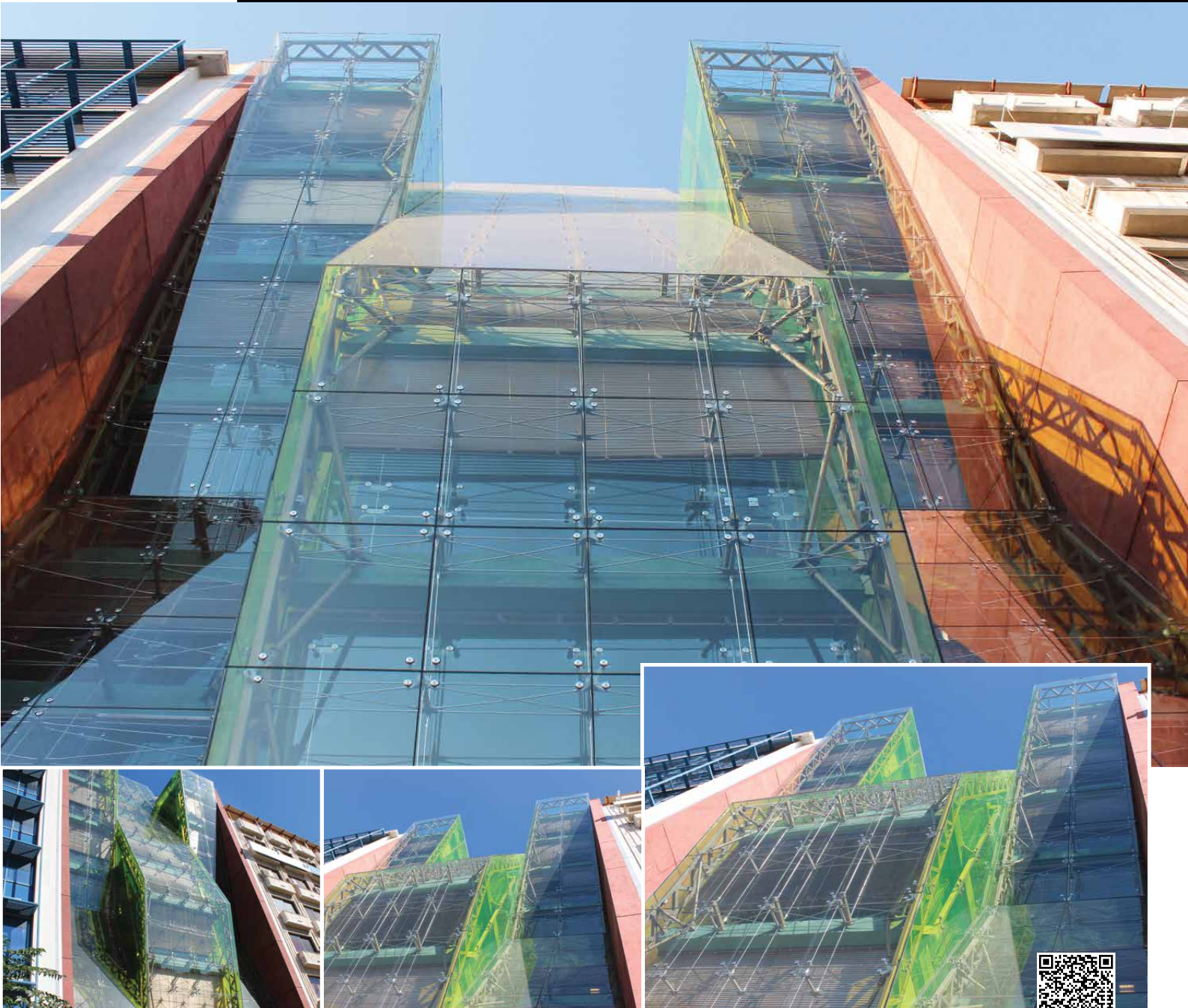
GLASSCON designed, fabricated and installed a spider glass shop front for a large retail shop. The façade is supported by custom made vertical STEEL TRUSSES, co-developed with the project architect. Glass panes are attached to the truss

via 316L stainless steel 4-way spider fittings. Glass panes are made of monolithic tempered glass and heat soak tested to minimize the risk of spontaneous breakages.





## 3D DOUBLE SKIN FAÇADE & FRAMELESS GLAZING



GLASSCON designed, engineered and executed the whole façade works for a double skin façade supported by 3D TENSION ROD SYSTEM along with stainless steel pressure bars and 4-way spi-

der glass fittings. The necessary air ventilation is provided with motorized aluminium louvered windows. The glass panes have been colored to different variations in order to meet architectural



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## SPIDER GLAZING ILLUMINATED DOUBLE GLAZING UNITS



GLASSCON designed, engineered and constructed a complete illuminated glass façade of a modern pharmacy, including thermal insulated double glazing unit and U-shaped glass profiles installation, using high quality point fixed stain-

less steel fittings. Insulated glass meets the highest thermal performance standards. U-shaped glass profile reaches a length up to 7 meters and is illuminated via integrated LED stripes.





## SPIDER GLASS CANOPY WITH STEEL SUPPORT STRUCTURE



GLASSCON successfully executed the complete façade works for the Presidential Conference Centre located at Brazzaville International Airport of Congo, which was engineered by LUFTHANSA CONSULTING. Façade works include ballistic curtain walls, windows, doors and atria

with glass panes of the highest ballistic standards (BR4 - BR7), as well as honeycomb shading panels. The spider glass canopy is supported by STEEL STRUCTURE along with stainless steel 4-way spider glass fittings.



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# SPIDER GLAZING CURTAIN WALL & SOLAR BLINDS



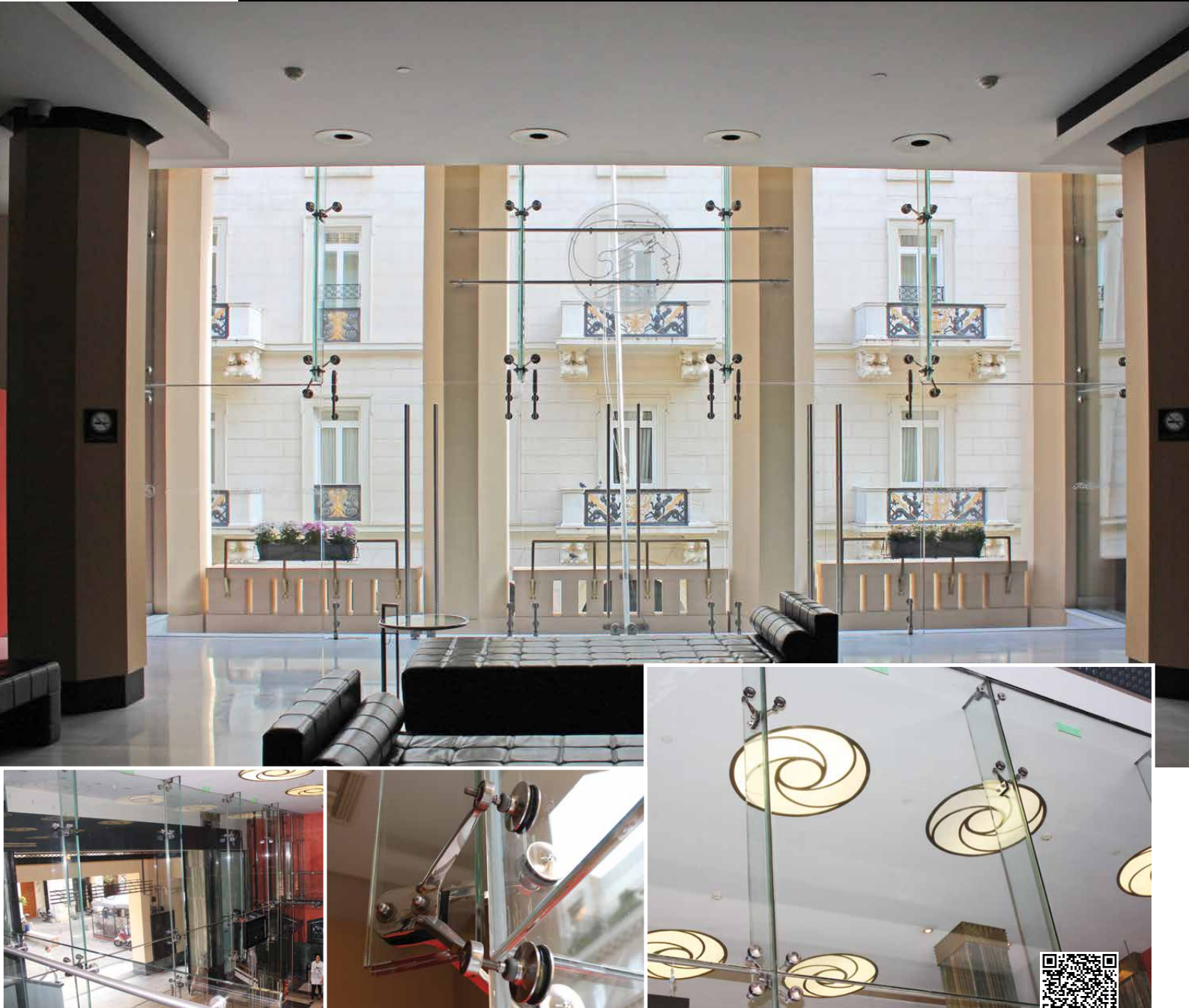
GLASSCON designed, engineered and executed various façade works for a shopping mall, including curtain walls HPL and glass cladding, glass railings, as well as a bent spider glass façade. All structural glazing is supported by STEEL TRUSS

SUBSTRUCTURE along with high quality stainless steel fittings. The glass panes vary according to the application, including tempered-laminated, curved, fritted, silk printed, with different colors and coatings.





## STRUCTURAL GLASS WALL WITH GLASS MULLIONS



GLASSCON designed, engineered and constructed a structural curtain wall for an iconic building facade. The façade is almost 100% transparent as it is supported by GLASS MULLIONS along with spider glass fittings. Glass mullions are

made of tempered-laminated safety glass and are connected via stainless steel joints and silicone gaskets. Glass panes are made of low-iron extra clear safety glass.



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## ILLUMINATED SPIDER GLASS FAÇADE WITH STEEL STRUCTURE



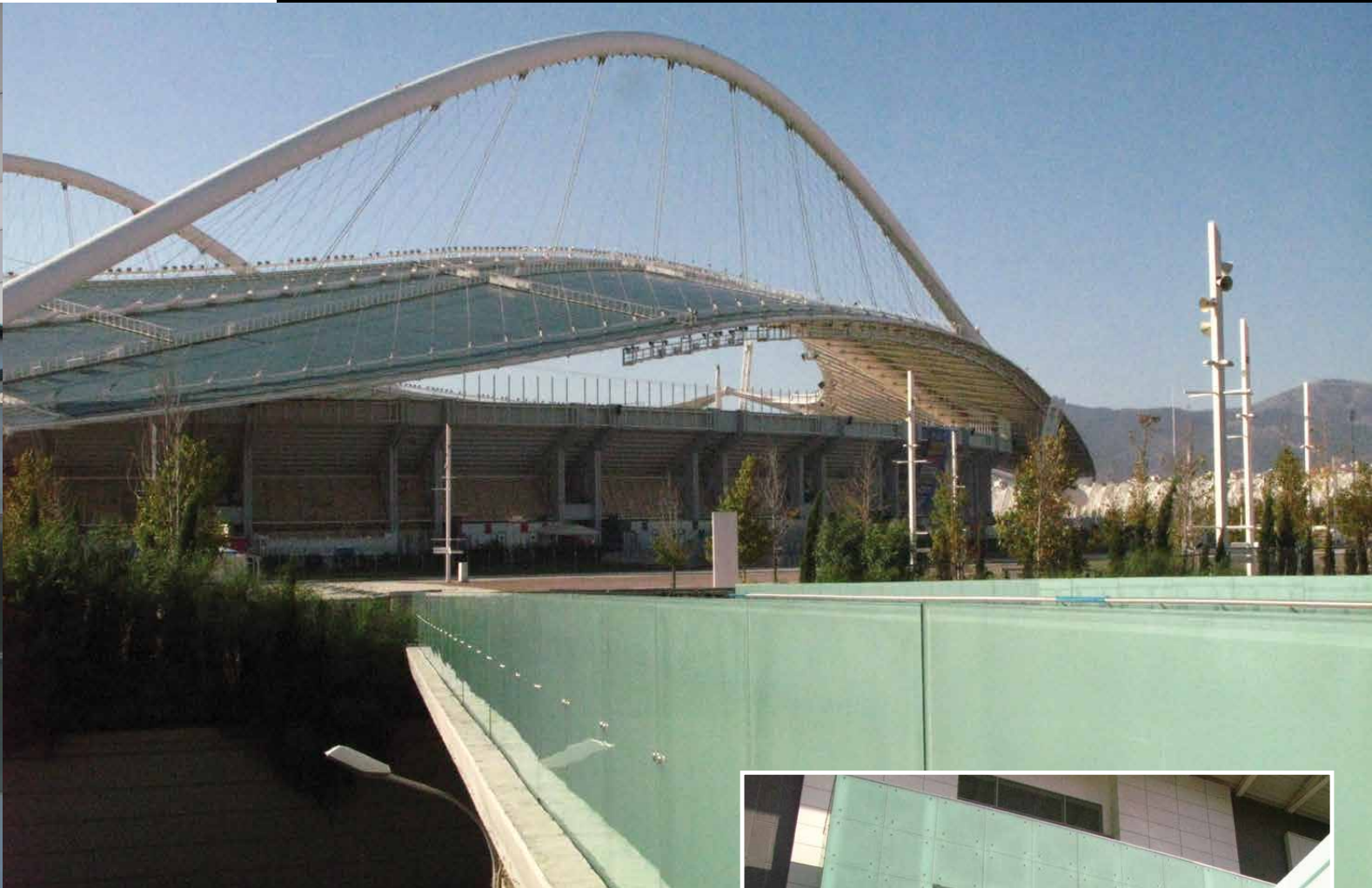
GLASSCON designed, engineered and executed various façade works for an exhibition center including an illuminated structural glazing curtain wall, aluminium composite panels cladding, glass

canopies and glass railings. The structural glass façade is supported by a STEEL SUBSTRUCTURE along with stainless steel 4-way spider glass fittings with integrated waterproof LED spot lights.





## STRUCTURAL GLASS WALL - SANTIAGO CALATRAVA PROJECT



GLASSCON designed, engineered and executed various façade works for a SANTIAGO CALATRAVA project located at Athens, Greece. Scope of works included the frontal arched spider glazing wall entrance of a museum and glass railings. All

structural glazing is supported by STEEL TRUSS SUBSTRUCTURE along with high quality stainless steel fittings. The glass panes have been processed with silk printing technology to meet architectural design requirements.



structural glass & spider glazing curtain walls

## BOLTED GLAZING SUPPORTED MOTORIZED SOLAR SHADES



GLASSCON designed, fabricated and installed an innovative building architectural envelope with movable glass louvers as external shading system, for an eye clinic. The glass louvers carry silk printing to create the desired transparency and provide efficient shading. Glass used is tem-

pered and heat soak tested to minimize the risk of spontaneous breakages. The rotation of the glazed louvers is handled by stainless steel German ELERO motors controlled by a fully customizable German WAREMA control unit.





## CURVED SPIDER GLASS FAÇADE ON SPACE FRAME



GLASSCON executed the installation of a curved structural spider glazing façade for Nile University located at Cairo, Egypt. The glass façade is supported by a custom made STEEL TRUSS SUBSTRUCTURE installed by MERO, along with

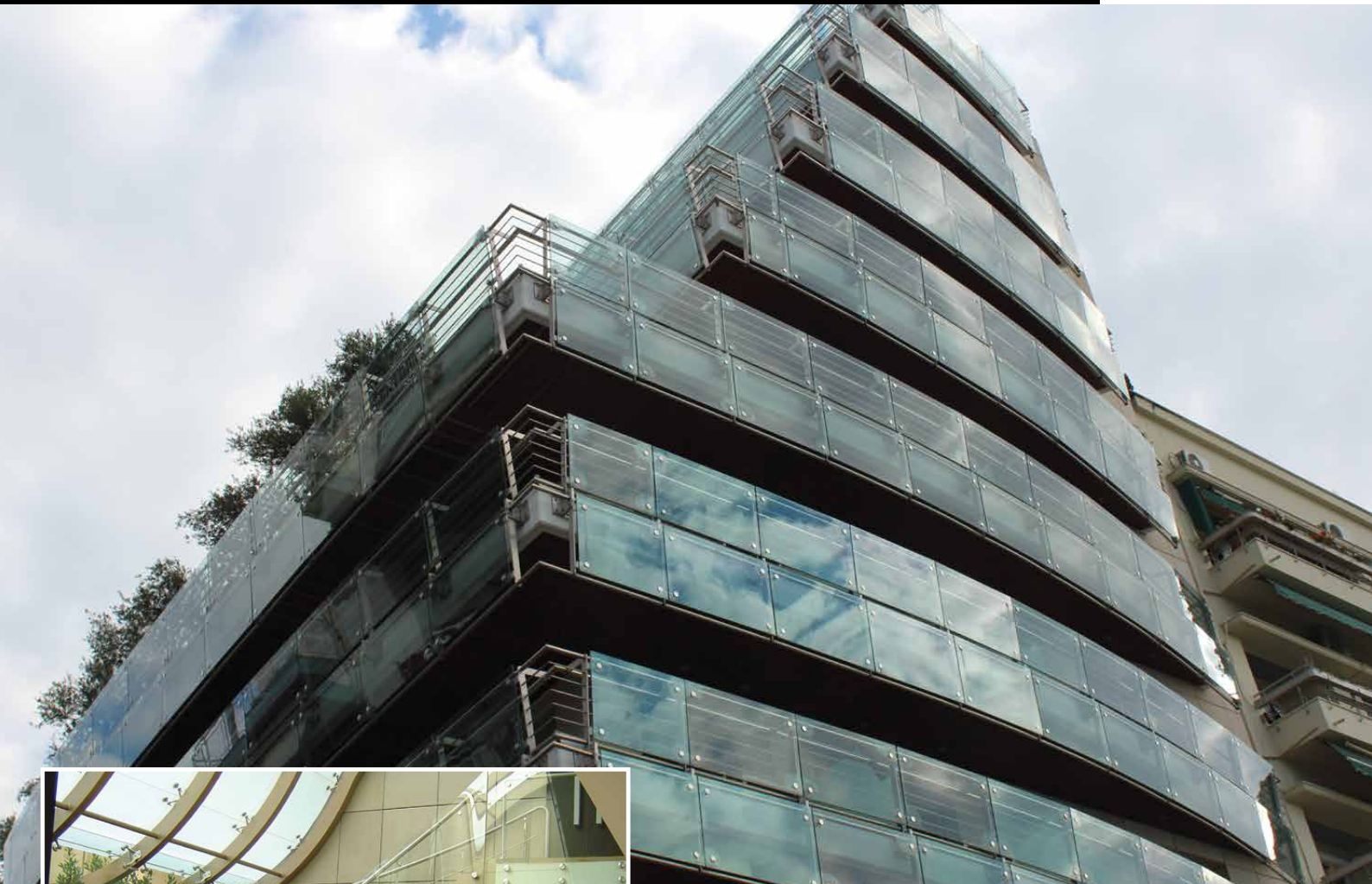
stainless steel 4-way spider glass fittings. Glass panes are made of tempered safety glass with reflective coating to provide shading while allowing daylight.



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## BOLTED GLASS RAILS ON STAINLESS STEEL SUPPORTING STRUCTURE

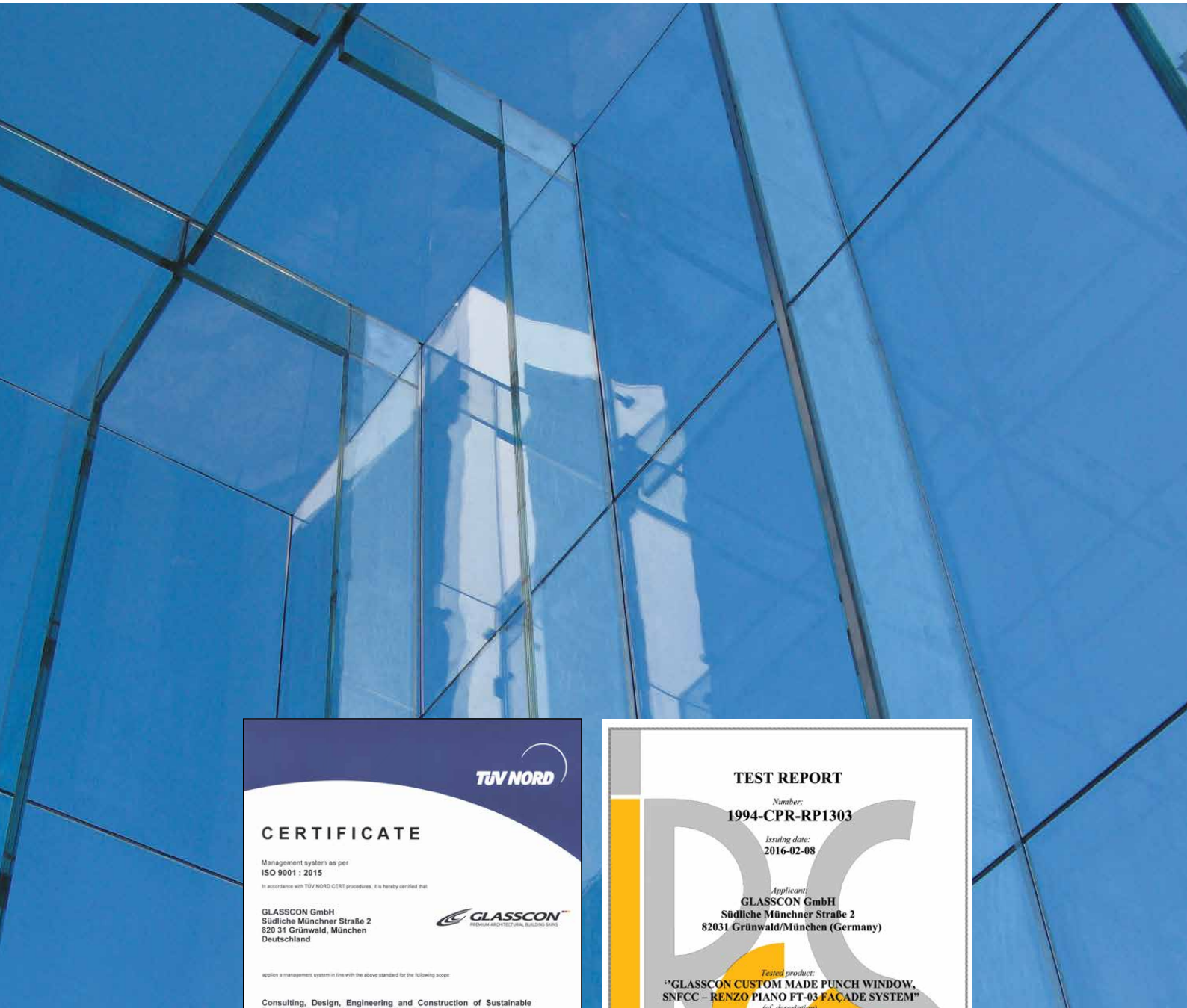


GLASSCON designed, engineered and executed the whole façade works for an existing 5-star luxurious hotel. Scope of works included the installation of curved (bent) glass panels, various

steel structures, atriums, curtain walls, U-profile decorative glass and stainless steel railings. Most of the glazing is supported by stainless steel spider glass fittings.







**TUV NORD**

### CERTIFICATE

Management system as per  
**ISO 9001 : 2015**

In accordance with TUV NORD CERT procedures, it is hereby certified that

**GLASSCON GmbH**  
Südliche Münchner Straße 2  
820 31 Grünwald, München  
Deutschland

**GLASSCON™**  
PREMIUM ARCHITECTURAL BUILDING SYSTEM

applies a management system in line with the above standard for the following scope

Consulting, Design, Engineering and Construction of Sustainable Building Skins, Architectural Building Envelopes & Bespoke Facades (Curtain Walls, Glazing, Cladding Systems, Brise Soleil, Solar Shades, Lead Assessment).

Certificate Registration No. 44 100 16370208  
Audit Report No. 3069/2016

Valid from 2016-05-26  
Valid until 2019-05-25

*K. K. I. W.*

Certification Body  
at TUV NORD CERT GmbH

This certification was conducted in accordance with the TUV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

www.tuv-nord-cert.com

**IAF** **Dakks**  
DAKKS  
DEUTSCHE ANERKENNUNGSGEMEINSCHAFT  
DIN EN ISO 9001

### TEST REPORT

Number:  
**1994-CPR-RP1303**

Issuing date:  
**2016-02-08**

Applicant:  
**GLASSCON GmbH**  
Südliche Münchner Straße 2  
82031 Grünwald/München (Germany)

Tested product:  
**"GLASSCON CUSTOM MADE PUNCH WINDOW,  
SNFCC – RENZO PIANO FT-03 FAÇADE SYSTEM"**  
(cf. description)

Executed tests:  
**Air permeability  
Watertightness under static pressure  
Resistance to wind load**

Normative References:  
EN 13830:2003  
EN 12153:2000 - EN 12152:2002  
EN 1026:2000 - EN 12207:1999  
EN 12155:2000 - EN 12154:1999  
EN 12179:2000 - EN 13116:2001



GLASSCON GmbH  
📍 Mergenthalerallee 77, 65760 Eschborn, Germany  
☎ +49(0)61967889560  
@ sales@glasscon.com  
🌐 www.glasscon.com

Certified / Approved by:

