CRAFTED ENGINEERING

STUDIO ray SYNTHESIS

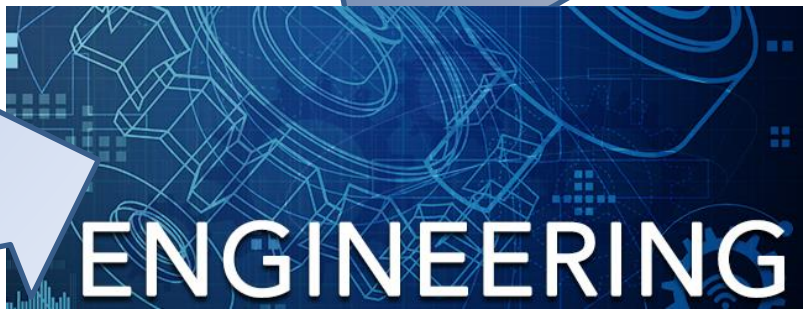
ARCHITECTURAL ENGINEERING CONSULTANCY

THE PROCESS

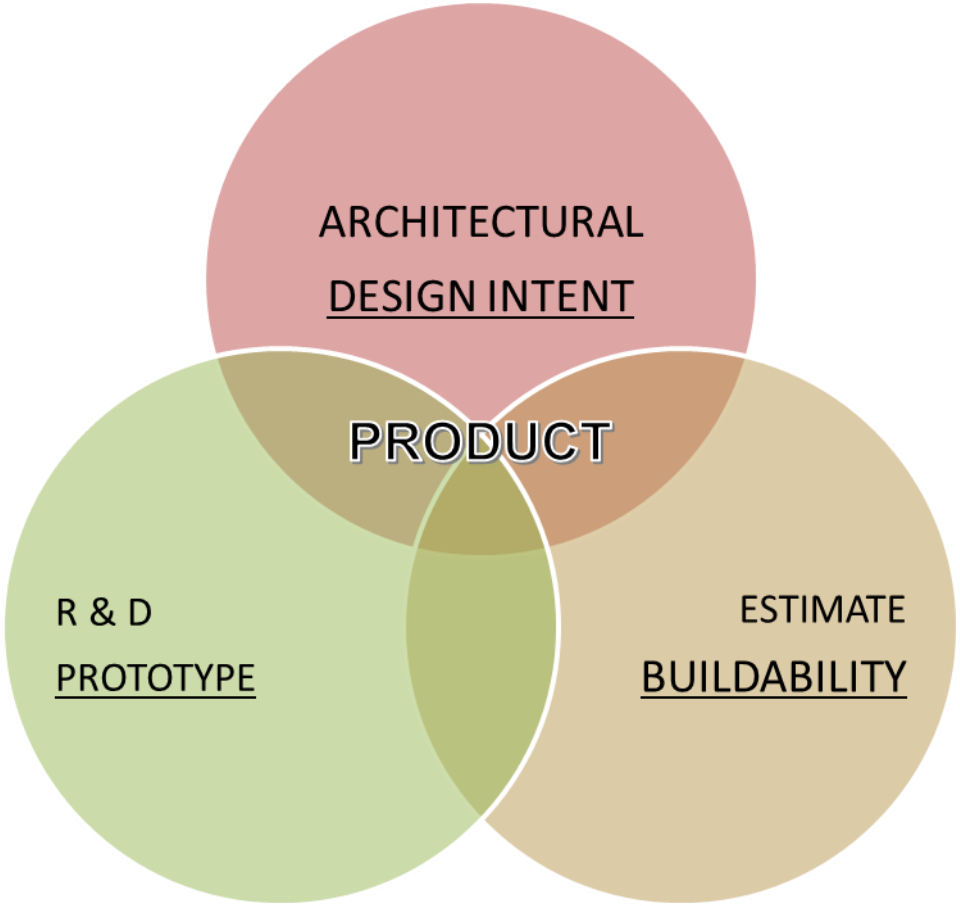
ARCHITECTURAL

ENGINEERING

DESIGN



APPROACH = ENGINEER + TEST & BUILD



STUDIO ray SYNTHESIS

3D SCULPTING

SolidWorks

AUTODESK® INVENTOR®

AUTOCAD®

3D STEEL PRODUCTION

AVEVA BOCAD

PRODUCTION NESTING

lantek

STRUCTURAL ANALYSIS

MEPLA
Software for Structural Glass Design

AUTODESK® NASTRAN® IN-CAD

PARAMETRIC DESIGN

Rhinoceros

grasshopper®
GENERATIVE MODELING FOR RHINO

MULTI-DISCIPLINARY R & D APPROACH

DESIGN & ENGINEER: CONSULTANCY

A1. FACADES, SKYLIGHTS & CANOPIES

- Complex Geometry Hybrids
- Parametric
- Point Fixed & Clamped
- Cable Net
- Shading Screens
- Kinetic & Mechatronics
- Tensile

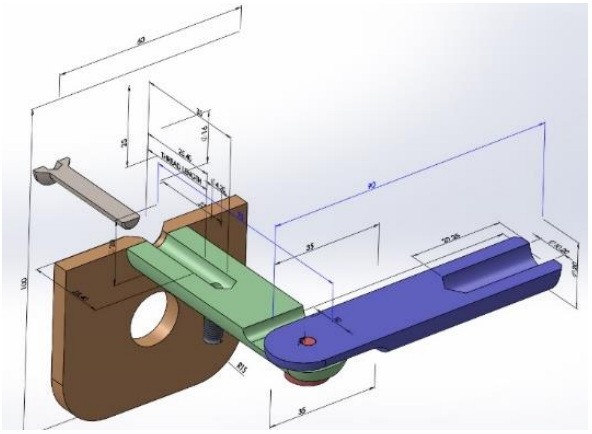
A2. FEATURE STAIRCASES

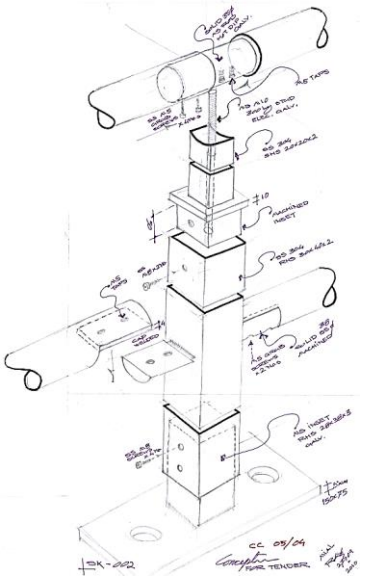
- Glass Treads & Flooring
- Free Standing Glass Railings
- Complex Structural Metal

A3. INSTALLATION ART

- Lighting Installations
- Pavilions
- Landscape Features
- Water Features

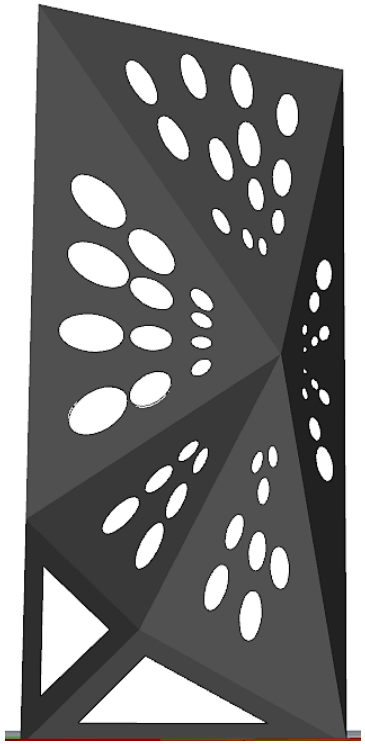
- FAÇADE CONSULTANCY
- FAILED FAÇADE AUDITS
- ENERGY MODELLING
- PARAMETRIC MODELLING
- BIM
- FEASIBILITY STUDIES
- PRODUCTS & MATERIAL APPLICATION R & D
- PROOF OF CONCEPT PROTOTYPES
- PRODUCTION GRADE DRAWINGS



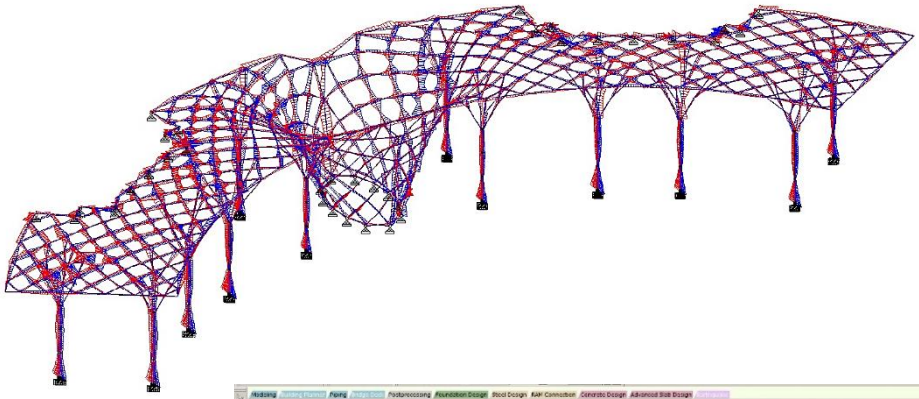


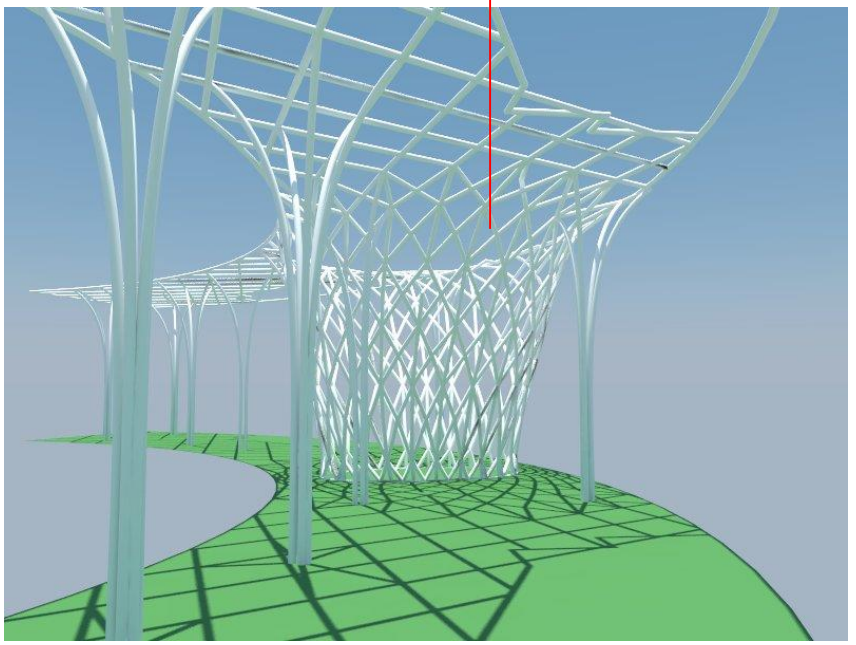
STUDIO ray SYNTHESIS

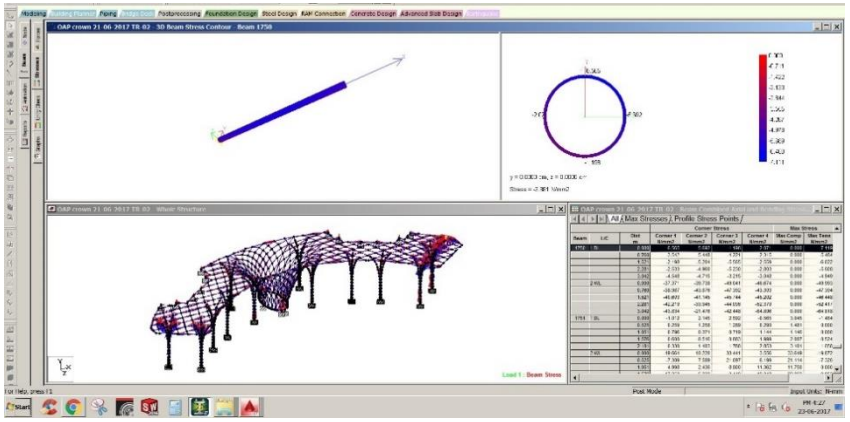
APPLIED MATERIALS R & D

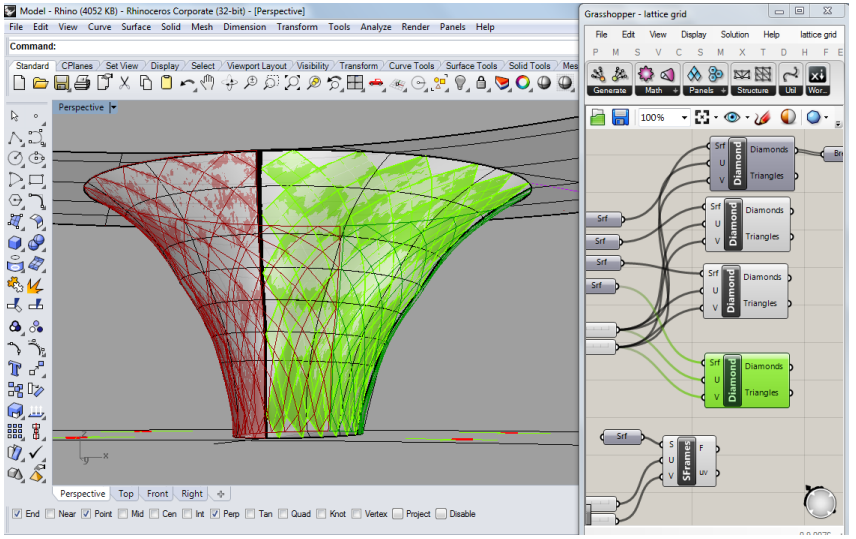


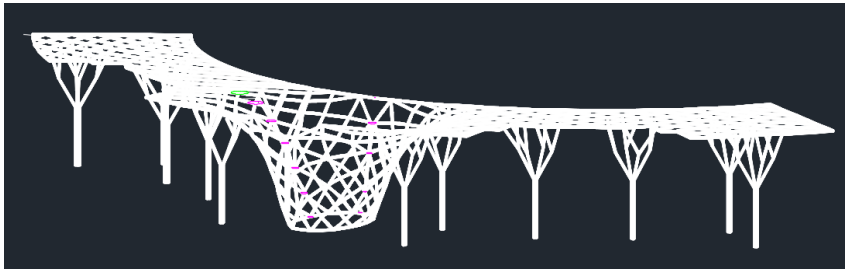
STUDIO ray SYNTHESIS

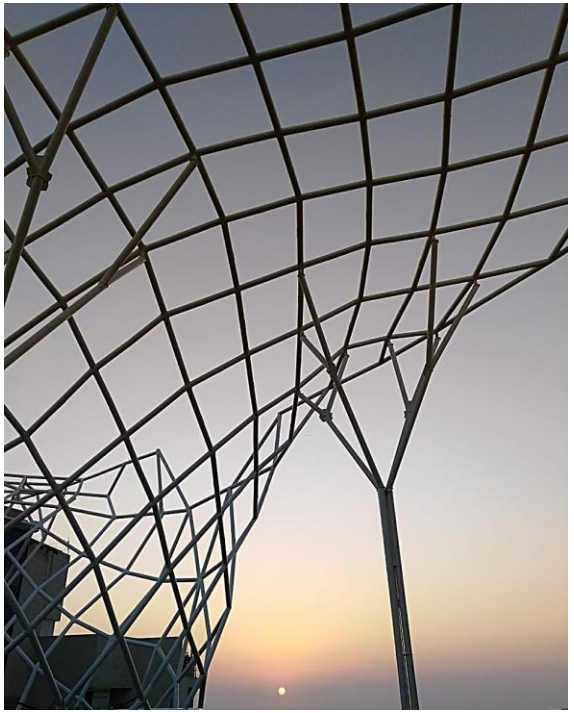







Model - Rhino (4052 KB) - Rhinoceros Corporate (32-bit) - [Perspective]
Grasshopper - lattice grid
Command:
Perspective
Top
Front
Right
Diamonds
Triangles





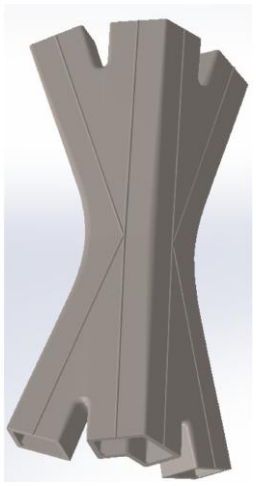
CLIENT:-

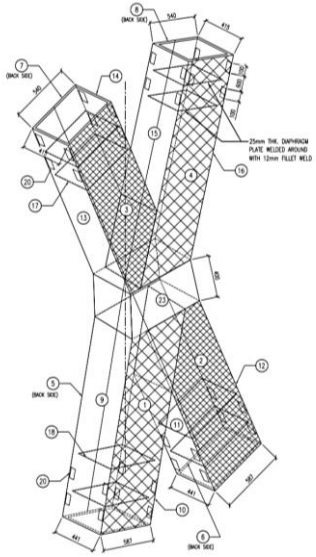
NATIONAL BUILDING CONSTRUCTION CORPORATION
ESIC HOSPITAL CAMPUS,
K.K.NAGAR, CHENNAI -600078

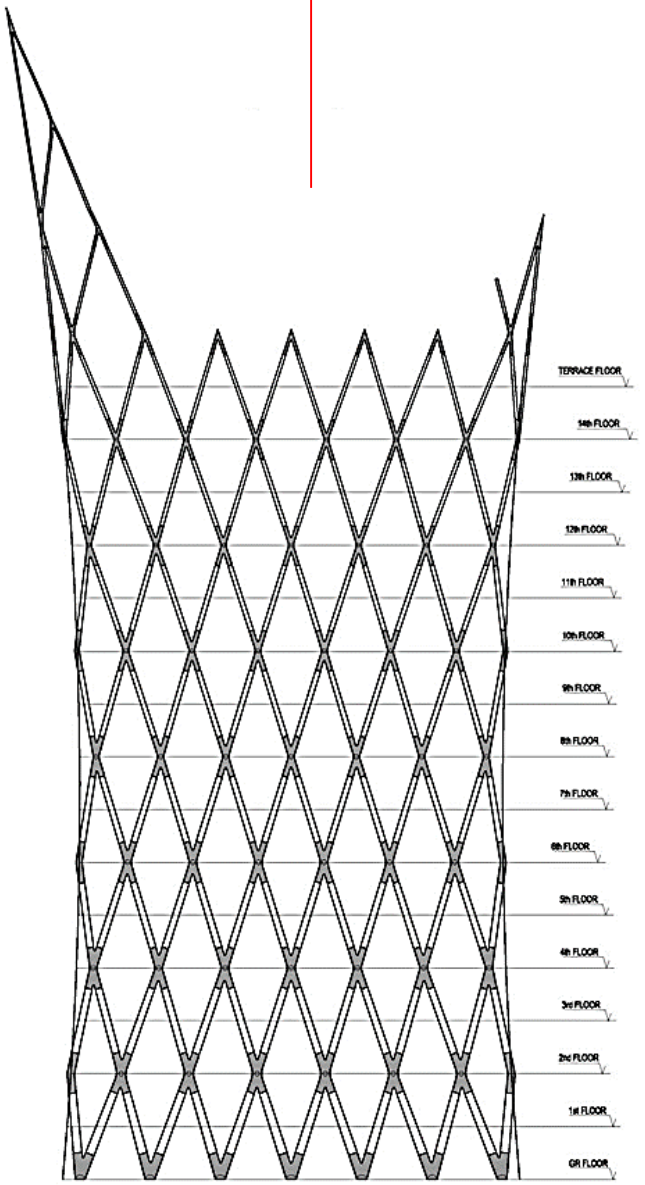
PROPOSED NEW BUILDING FOR UNITED INDIA INSURANCE CO.LTD.
AT CHENNAI

ARCHITECT:-

D.K.& ASSOCIATES
A-385 DEFENCE COLONY
NEW DELHI-110024
PH-011-24333312/918





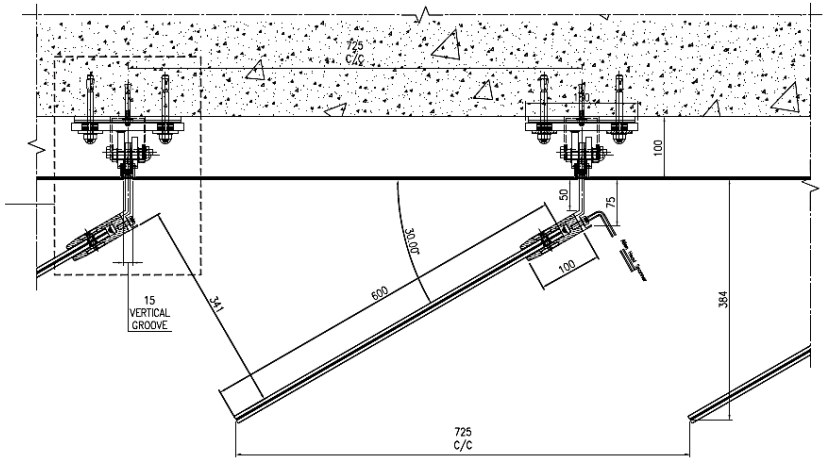


STUDIO
ray
SYNTHESIS

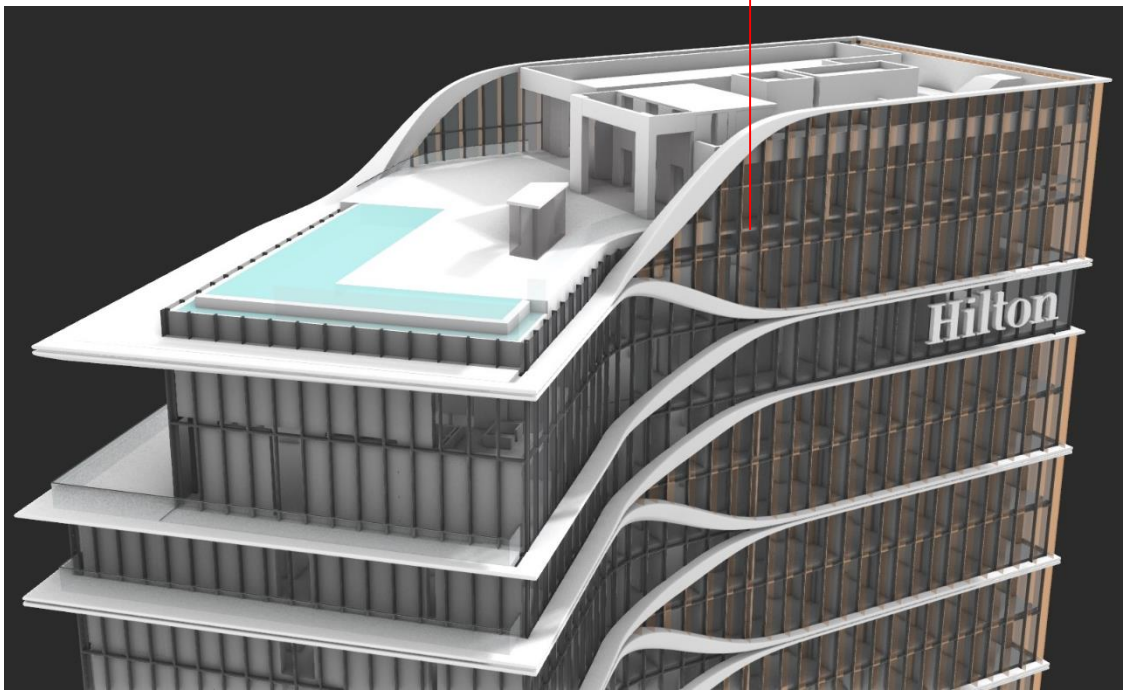
HILTON KATHMANDU – GRC FEATURE FAÇADE.

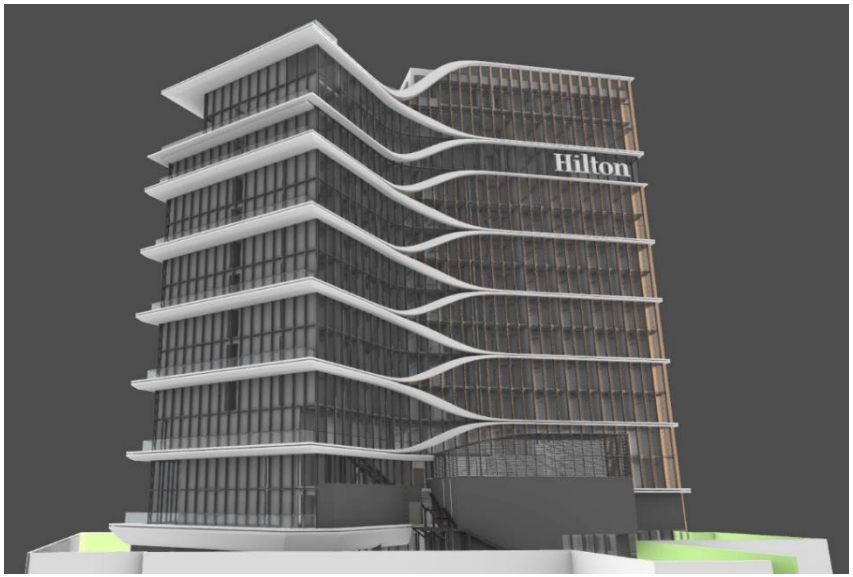
Kathmandu, NEPAl.

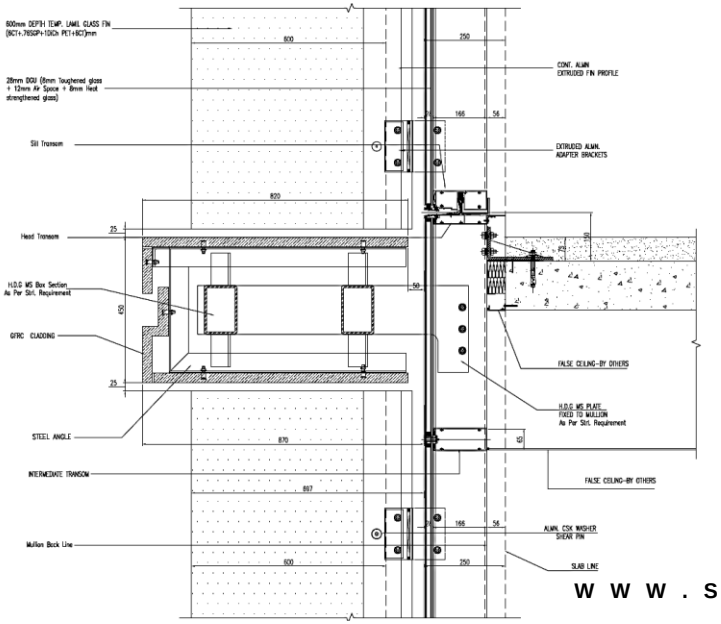
Client: **JAGDAMBA HOSPITALITY.**



02 ENLARGE DETAIL
1:4







STUDIO ray SYNTHESIS

AUDITORIUM SKYLIGHT – DIGITAL PRINTED GLAZING

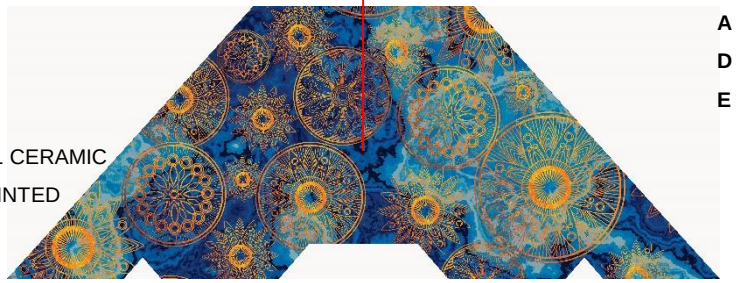
SPECTRA CONVENTION CENTRE - FEATURE FACADE.

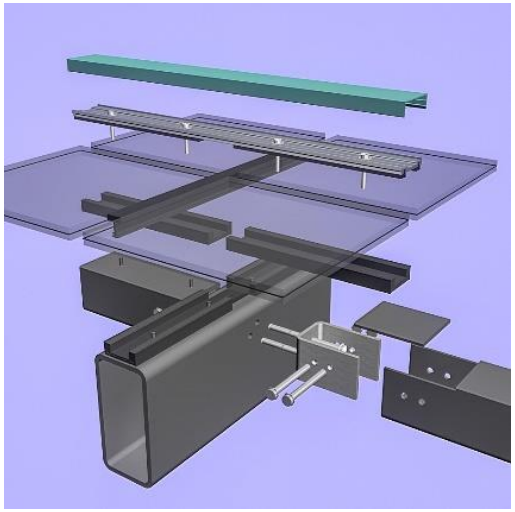
Mysore, INDIA.

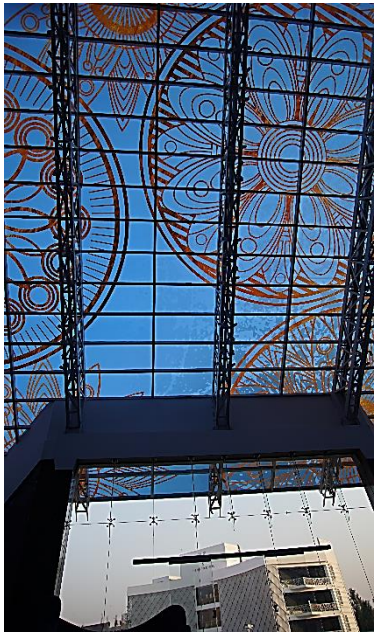
Architects: **ACE GROUP**

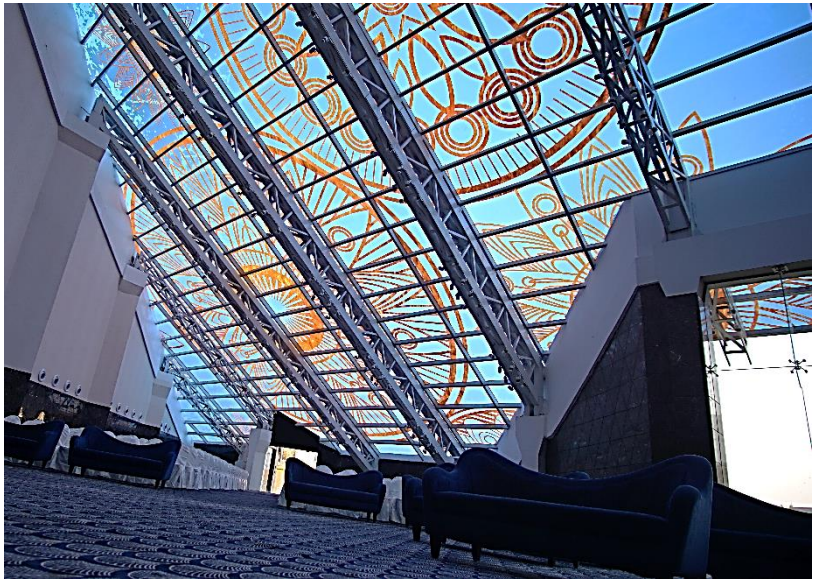
BOUTIQUE FACADE

DIGITAL CERAMIC PRINTED

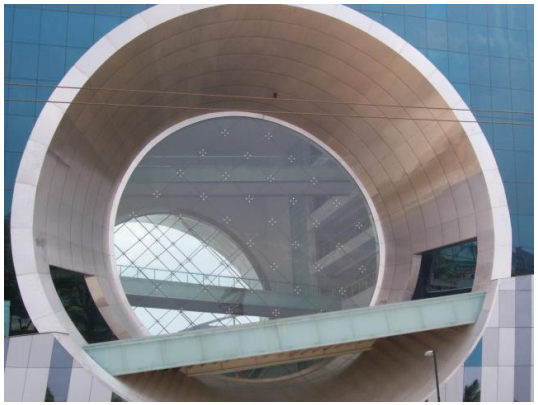




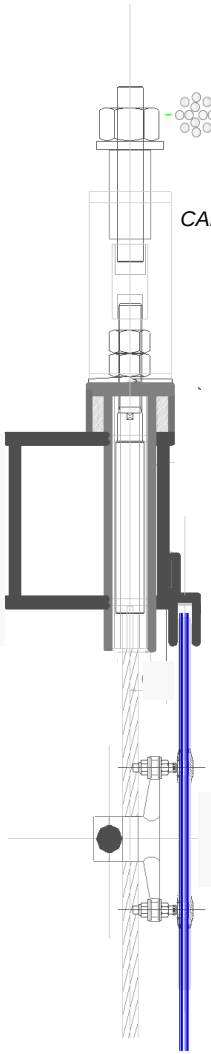




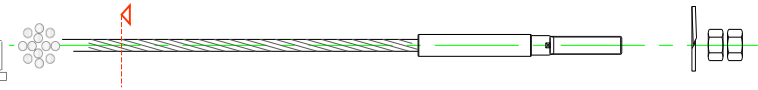
STUDIO ray SYNTHESIS



POINT FIXED CABLE NET DOUBLE FAÇADE



SITE in PROGRESS



CABLE NET GLAZING DESCRIPTION:

The structural concept of a tensile cable net glazing is similar to a tennis racket. The cables consisting of high tensile steel intertwined individual strands of wires that are spirally coiled and drawn to form a steel rope. These 2-way cables are pre-tensioned to the required tensile load as per the structural requirement. Unlike the tension-rod truss system, this does not have too many components to align.

To remove the residual slack, a process of cyclic pre-stretching is done by the manufacturers.

This system is economical for a span greater than 12Mtrs.

HYDRAULIC JACK ADAPTER

CABLE STRESSING PROCESS:

TENNIS RACKET - STRUCTURAL ANALOGY

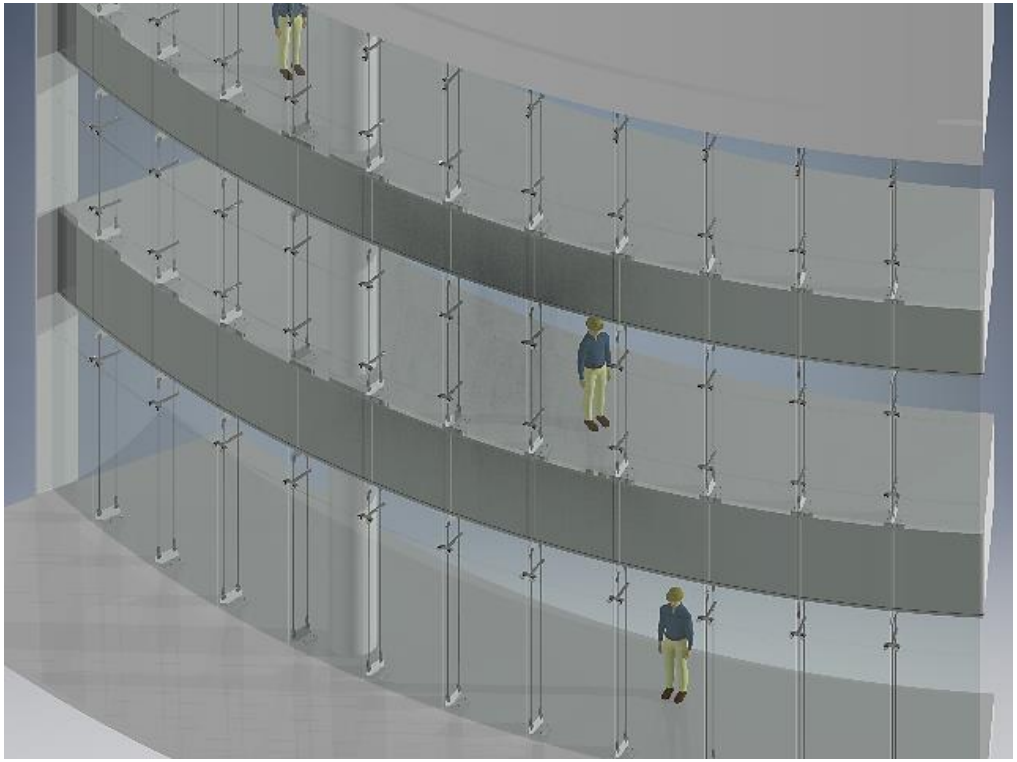
The immense tensile reactions of the cables are contained within the perimeter steel ring beam.

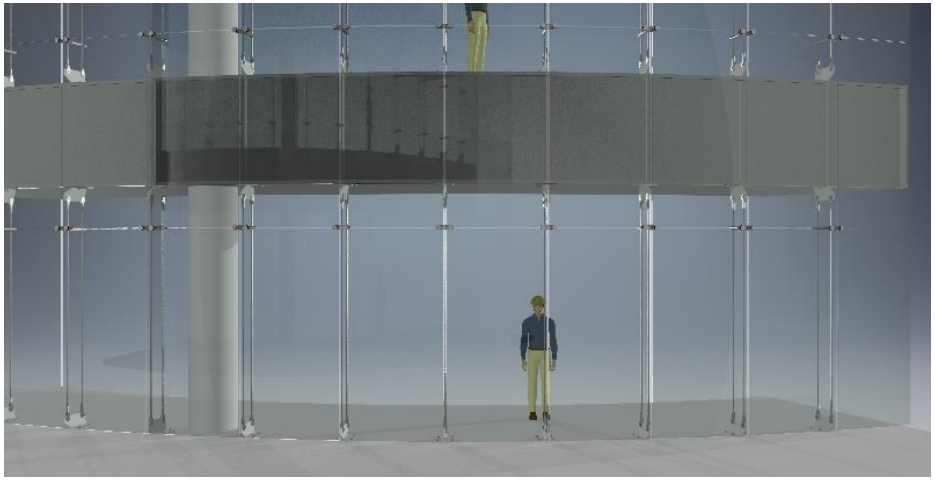
CLIENT: Shoba Glazing.

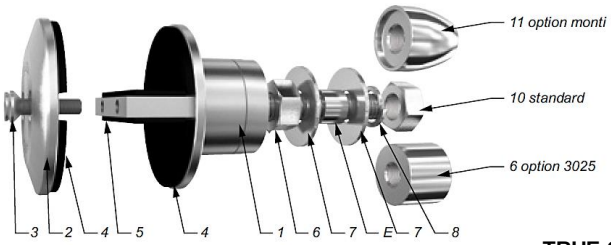
Coordination between ARUP and the execution team at site. ARUP concepts sketches were adapted & converted to executable working drawings as per site conditions.
The spiders and cables were from Kin Long China.

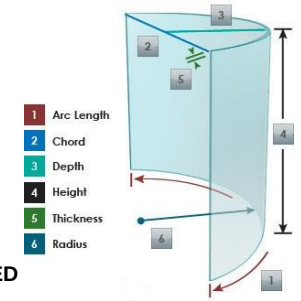
Cyclic cable pre-stretching inspection along with ARUP in the Kin Long Factory.

The glass modules are:
(2000 X 2000)mm
(6CT+1.52PVB+6CT)mm

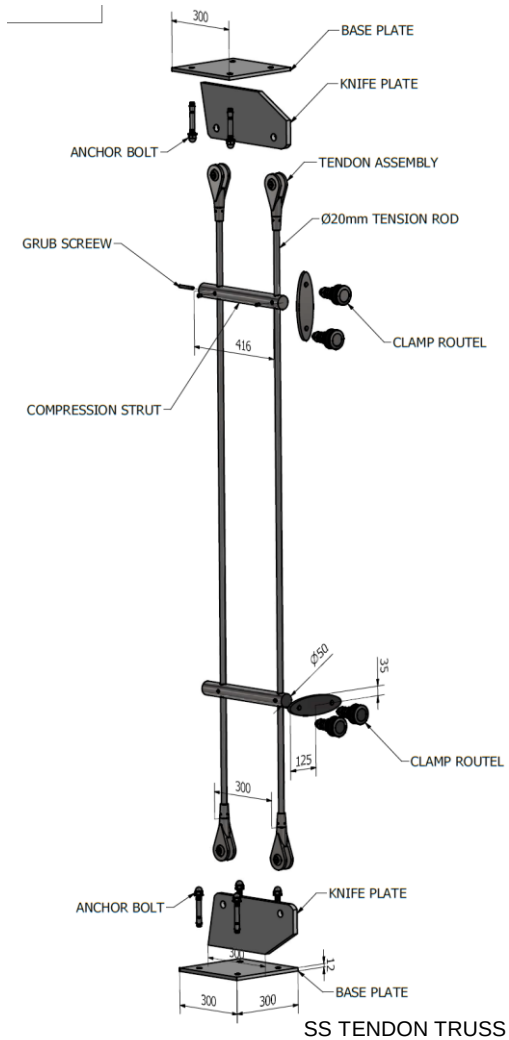








TRUE CURVED with POINT CLAMPS



SS TENDON TRUSS

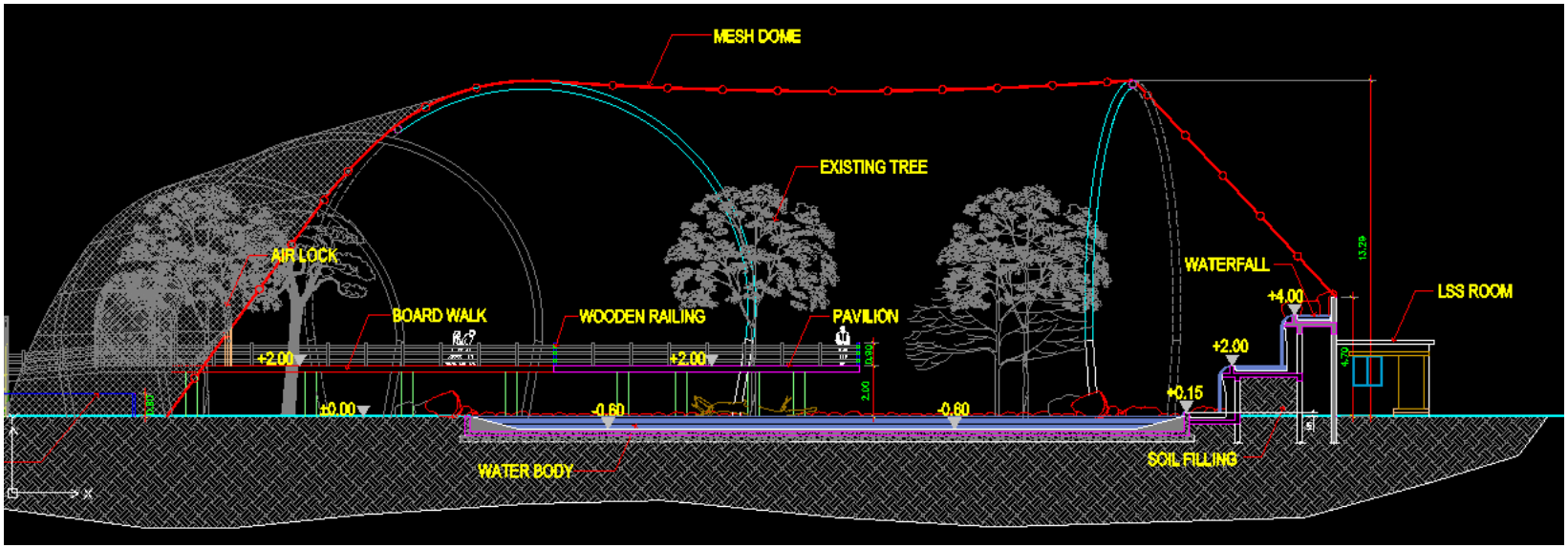
STUDIO ray SYNTHESIS

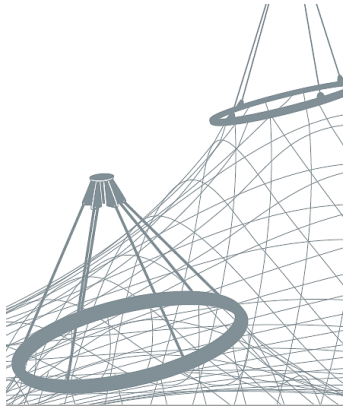
POINT FIXED TENSION ROD FAÇADE:

Kin Long SS 316 grade Tension Rod Truss System, with spiders rotules.

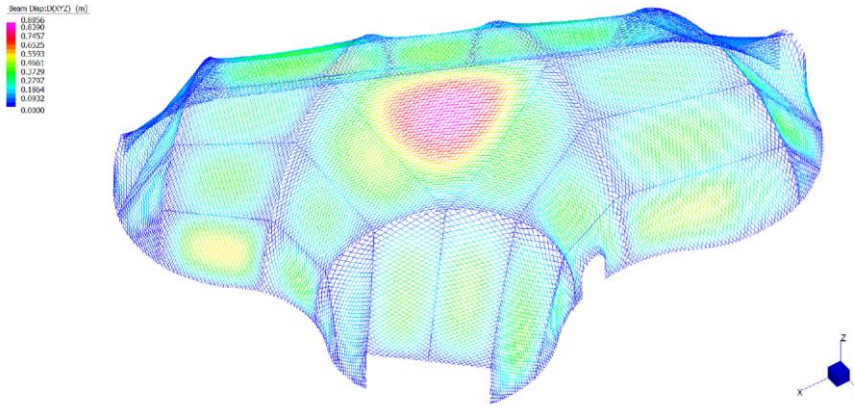
Segmented curved façade with 12mm clear tempered panels set into SS structural skirting.

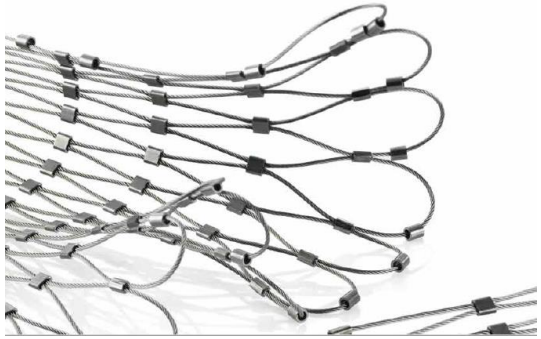
STUDIO ray SYNTHESIS

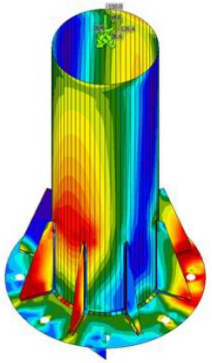




ARCHITECT'S DESIGN INTENT

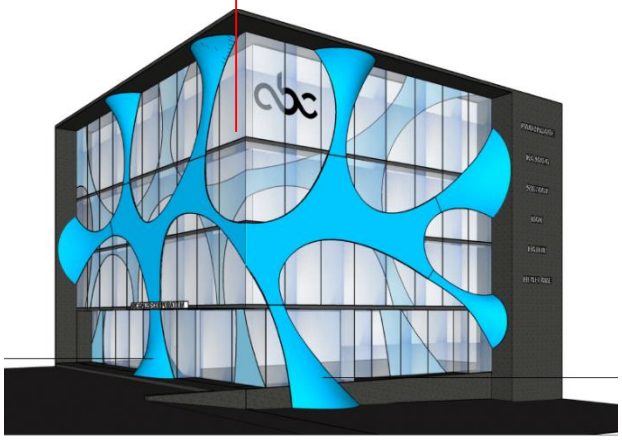


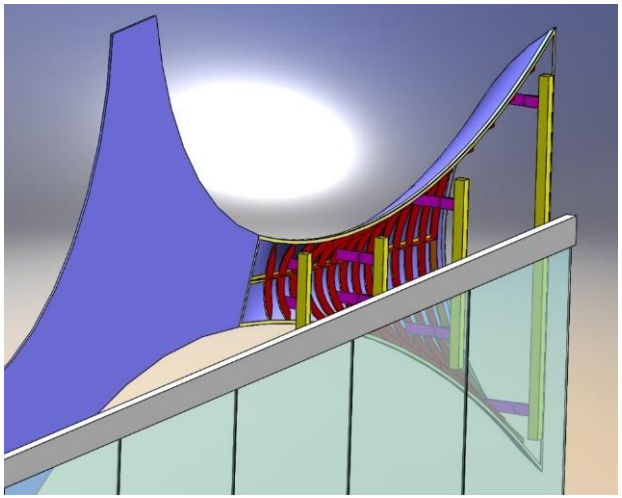




STUDIO ray SYNTHESIS

ABC EMPORIO - FEATURE FACADE.
Kannur, INDIA.
Architects: **ATMOF**

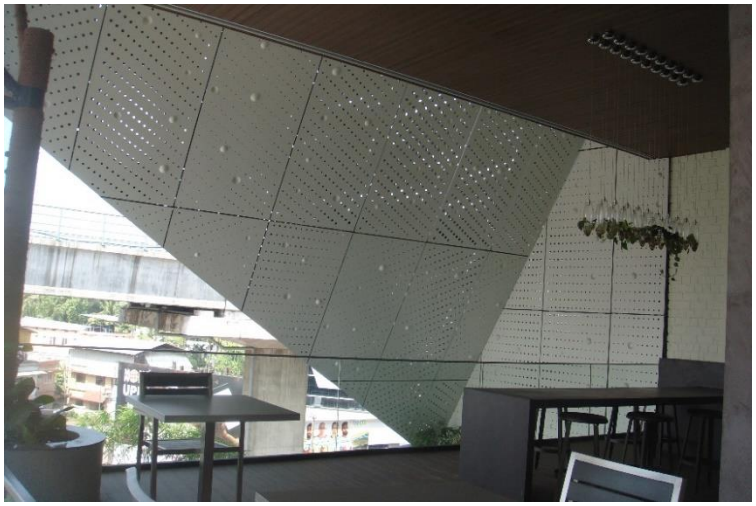


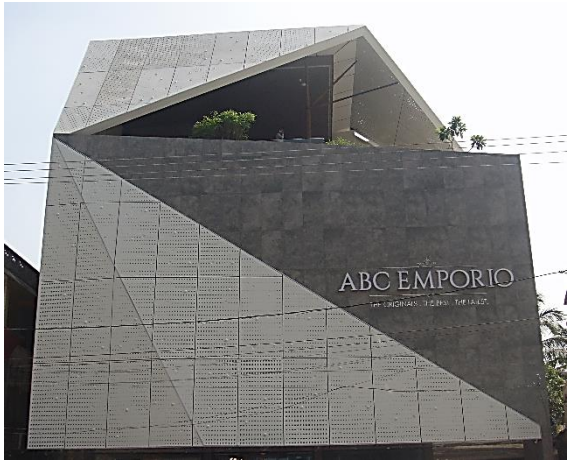


STUDIO ray SYNTHESIS

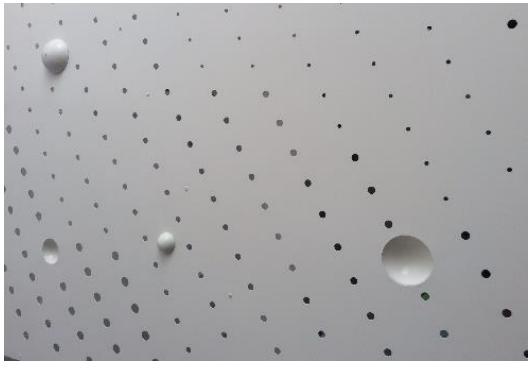
Serge Ferrari

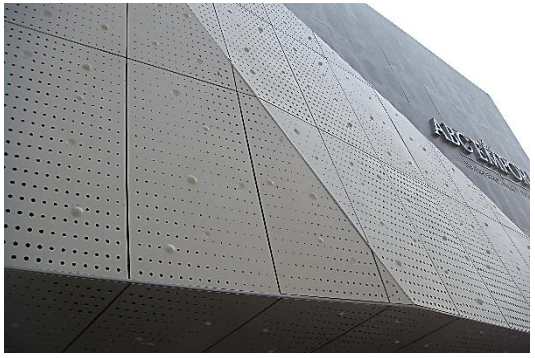
ABC EMPORIO - FEATURE FACADE.
Kochi, INDIA.
Architects: **ATMOF**



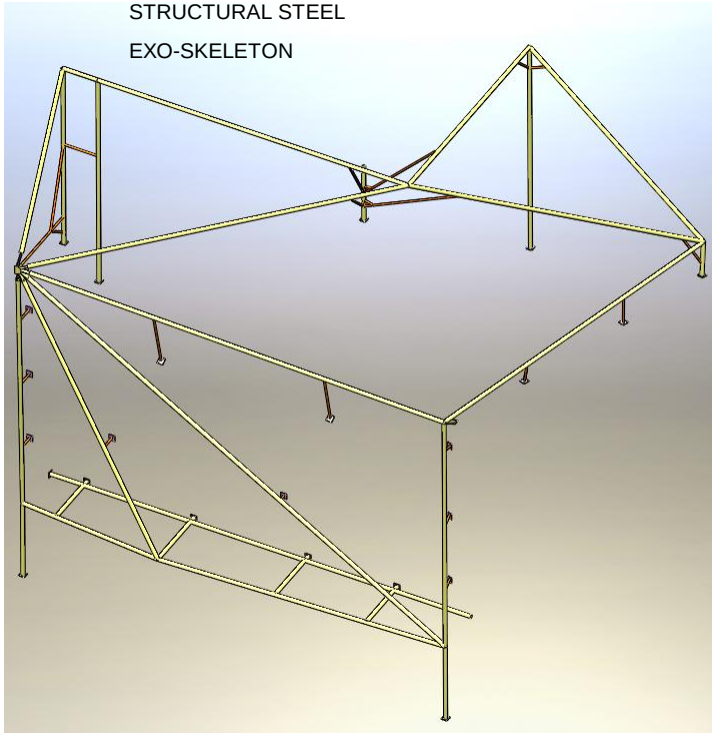


CNC PERFORATED & FORMED
PVDV COATED ALMN. PANELS.



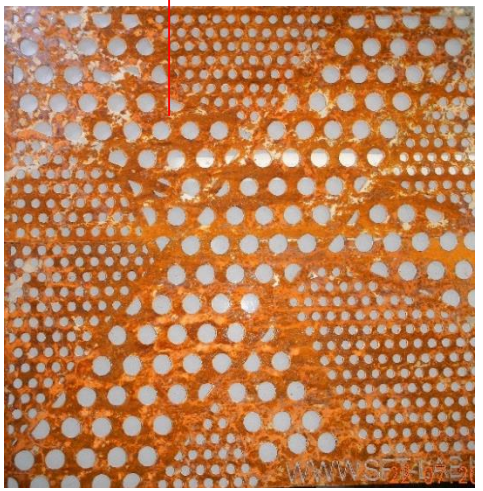


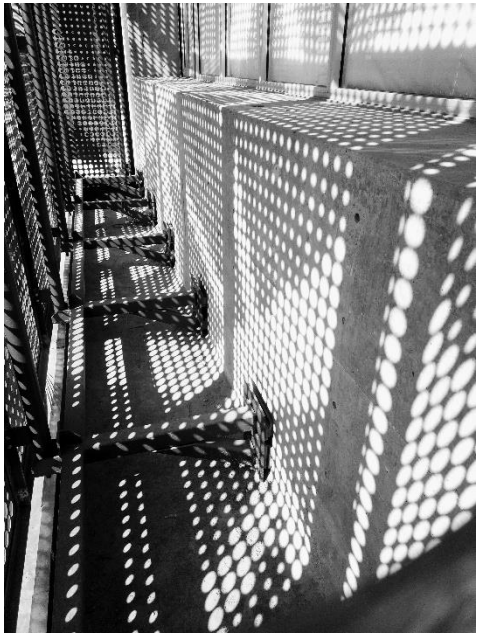
STRUCTURAL STEEL
EXO-SKELETON



STUDIO ray SYNTHESIS

ANKIT GEMS - FEATURE FACADE.
Surat, Gujrat. INDIA.
Architects: **ESSTEAM**





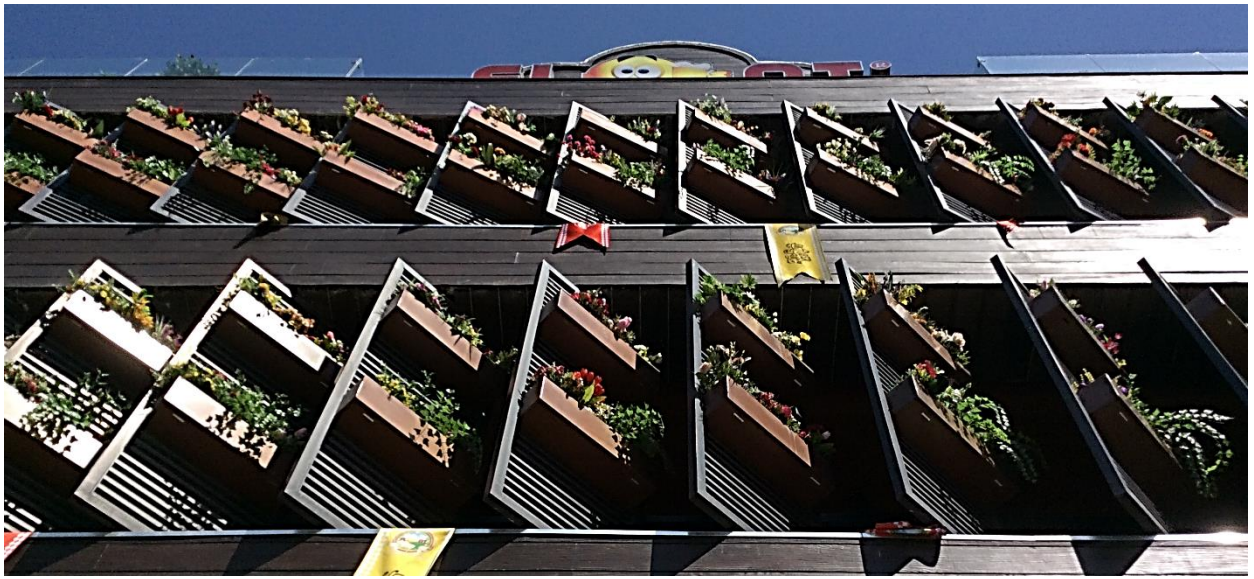

Freedom
of
Living
Script


Freedom
of
Living
Script

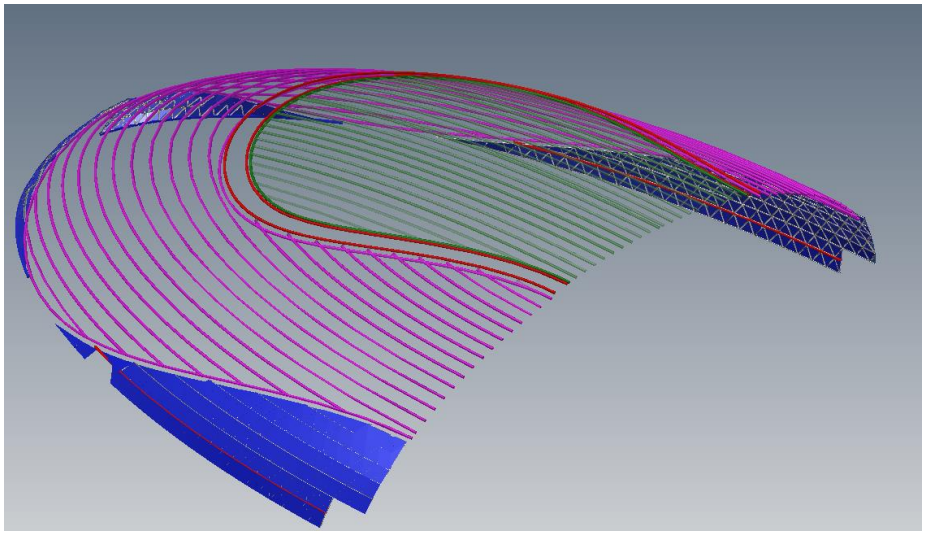
FLOAT MICRO BREWERY PUB - SYNCHRO LOUVER FACADE.

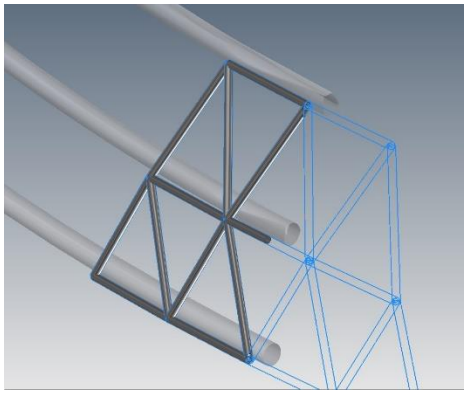
Bangalore, INDIA.

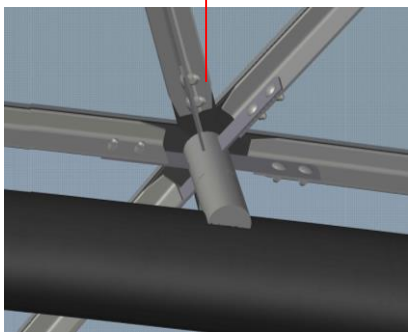
Architects: **Tilak Raj Associates**

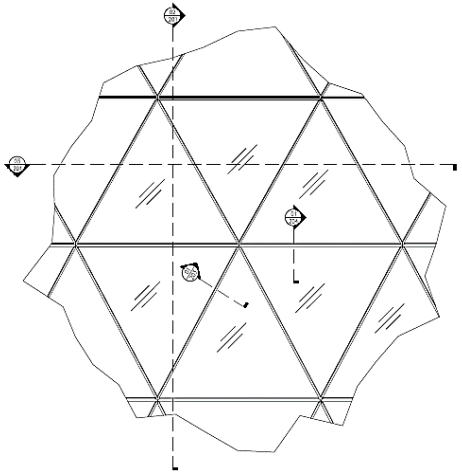


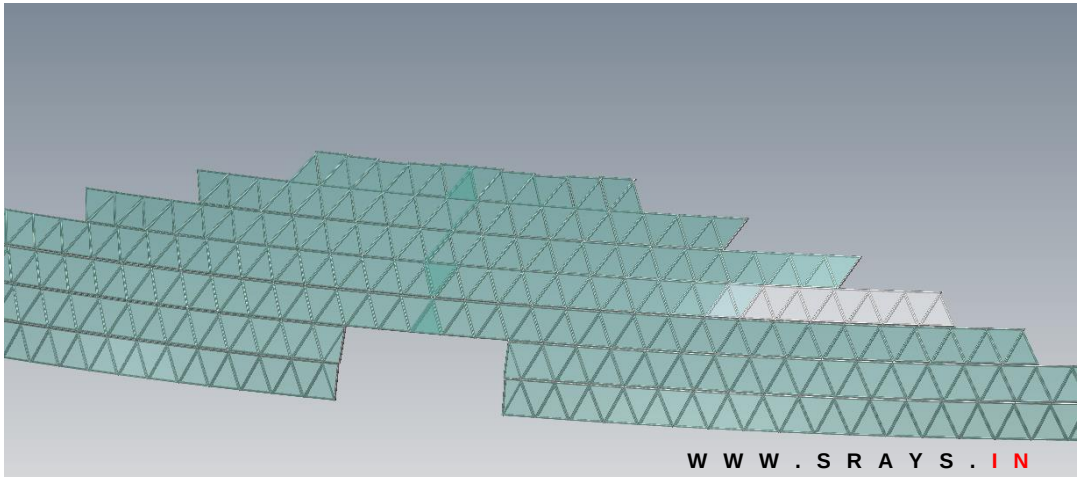
STUDIO ray SYNTHESIS



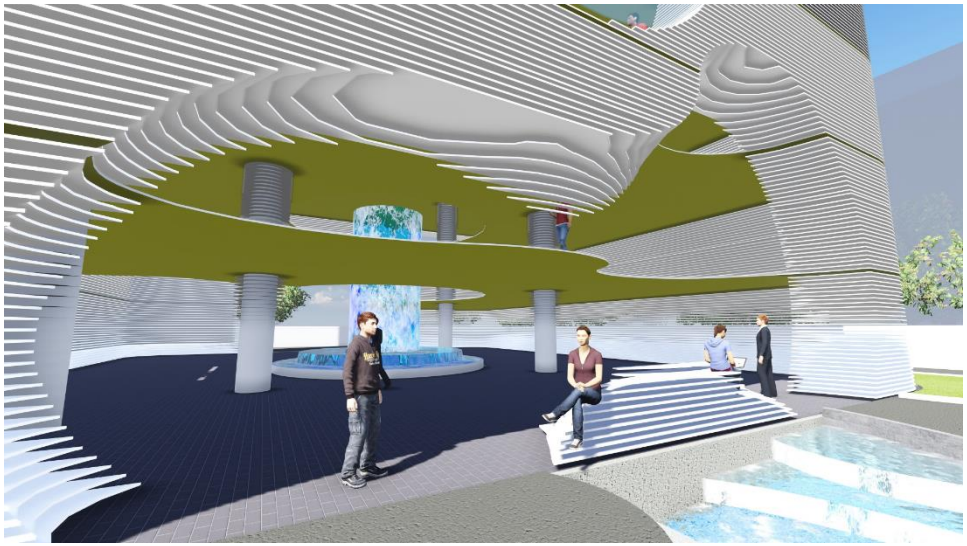


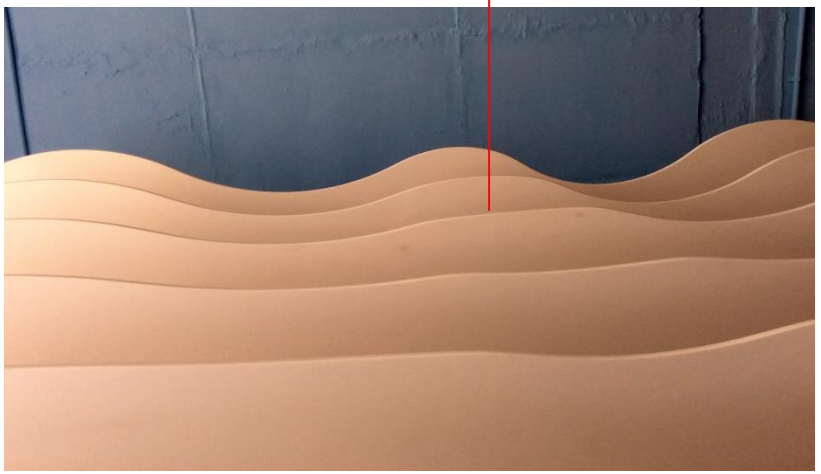






STUDIO
ray
SYNTHESIS

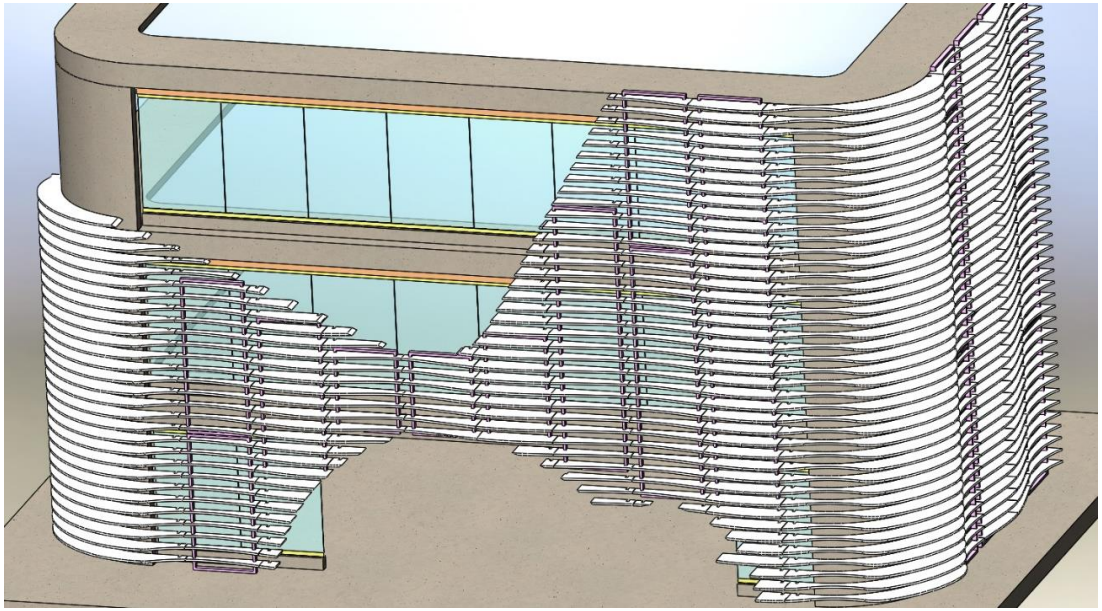




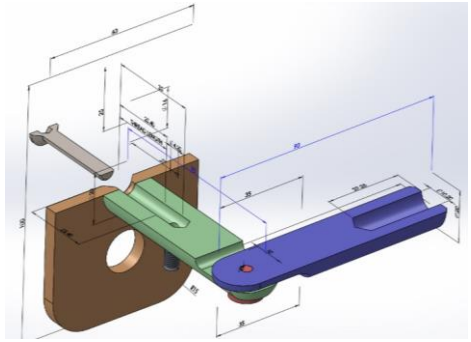
ARCHITECT'S DESIGN INTENT

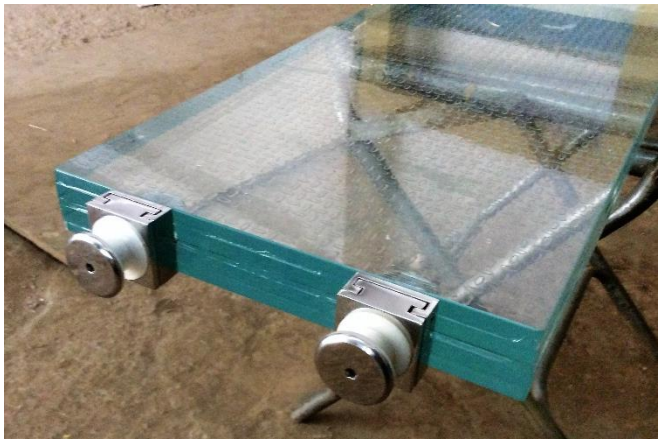
STUDIO WORK IN PROGRESS

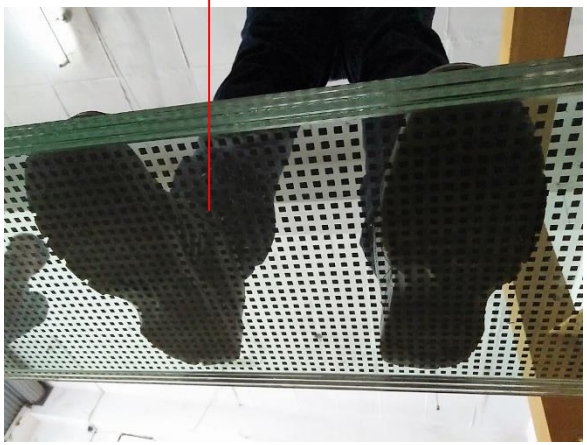
DESIGN & ENGINEERING PHASE

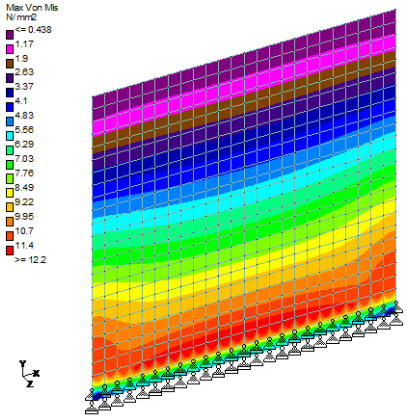


1:1 SCALE MOCK UP









DESIGN ANALYSIS CODES AS PER ASTM / BIS

ANIT-SLIP PERFORMANCE IN WET CONDITIONS

POST BREAKAGE STRUCTURAL INTEGRITY

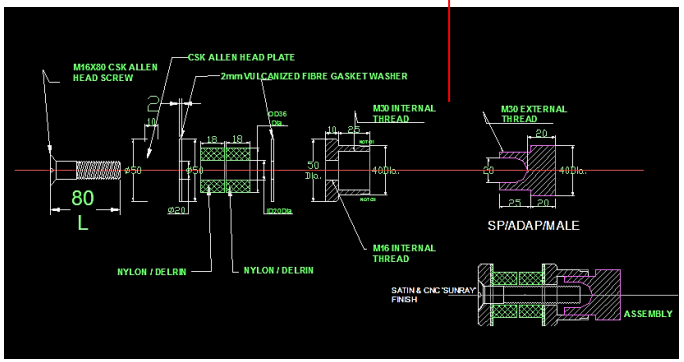
PUBLIC SPACE LOAD BEARING CAPACITY

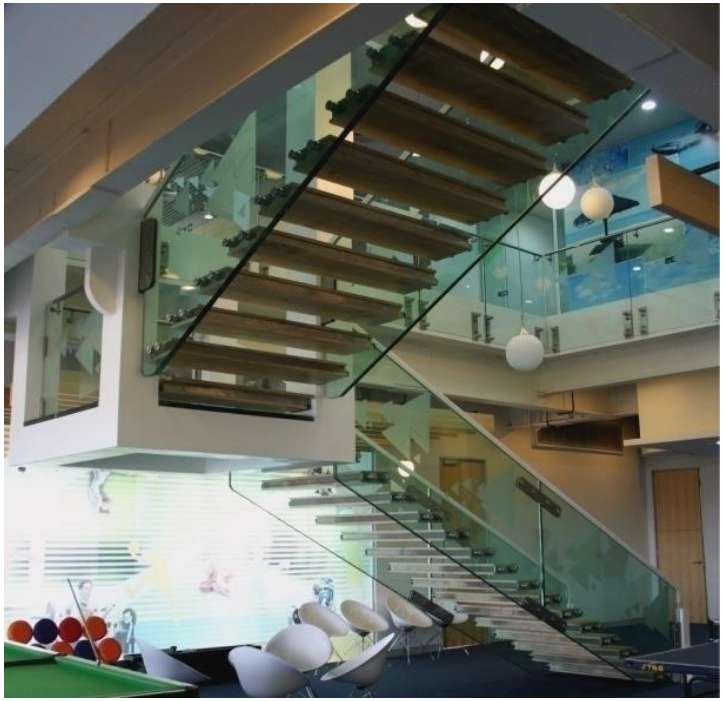
WIND PRESSURE & LINE LOADING WITH 1.5 FACTOR OF SAFETY

ENDURENCE TO LONG TERM WEATHER ELEMENTS EXPOSURE

EASE OF MAINTENANCE & PANEL REPLACEMENT

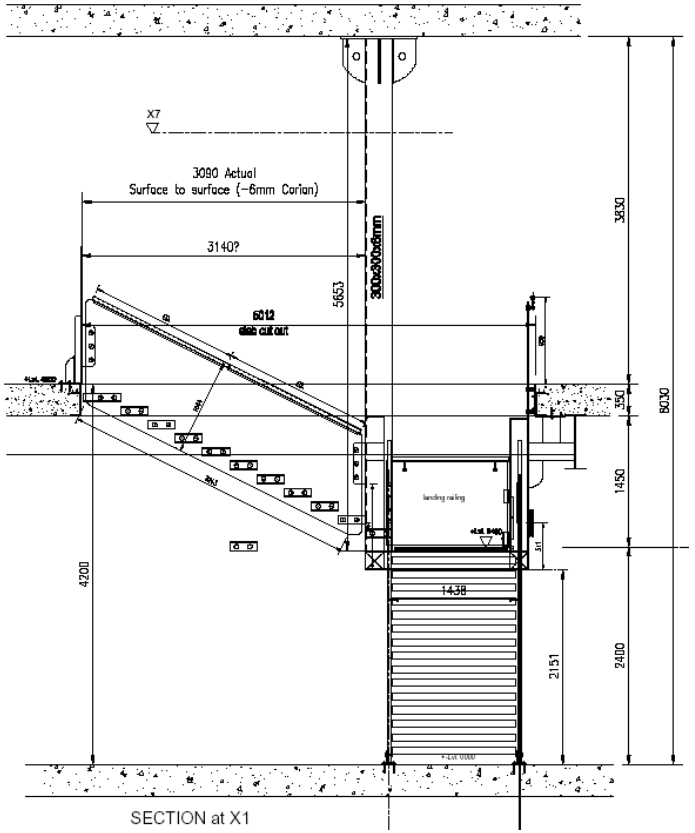
STUDIO ray SYNTHESIS





CEILING SUSPENDED GLASS LANDING:

6mm Glacier white Corian (DuPont) Clad MS Structure with triple laminated glass Floor Panels.

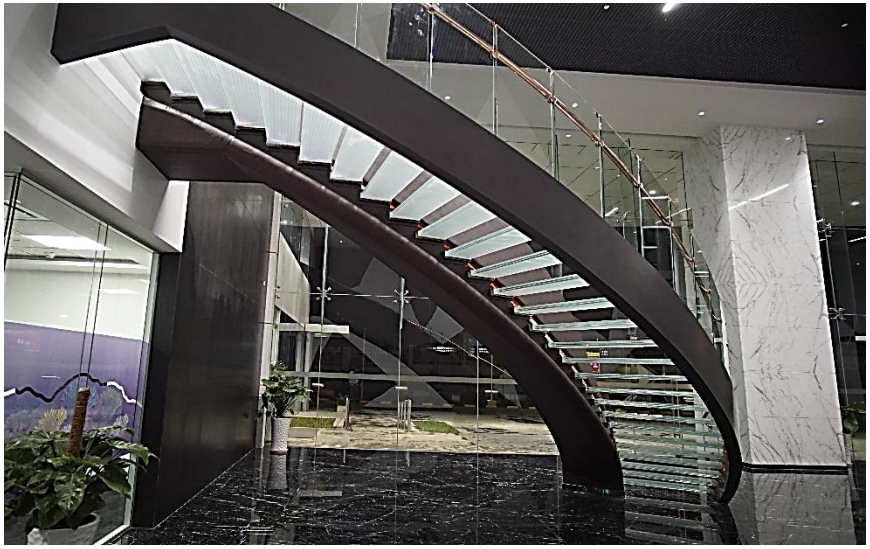


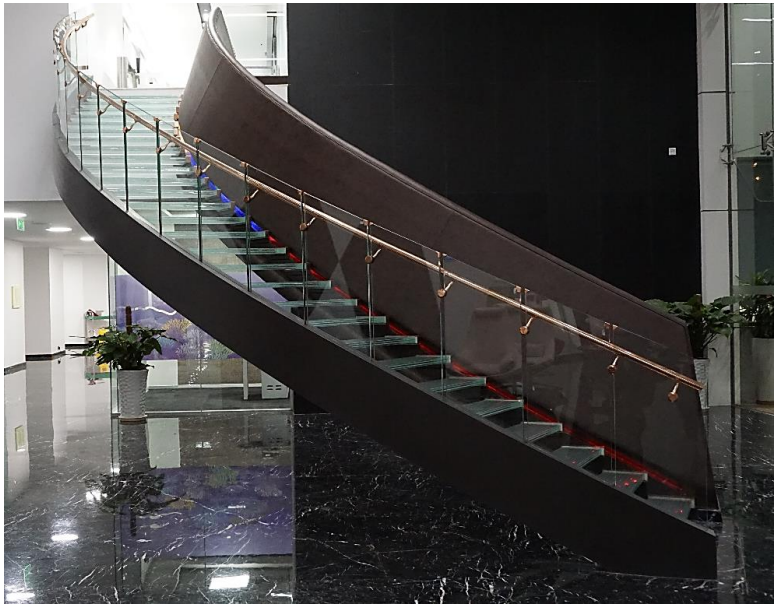
GLASS BEAM STAIRCASE

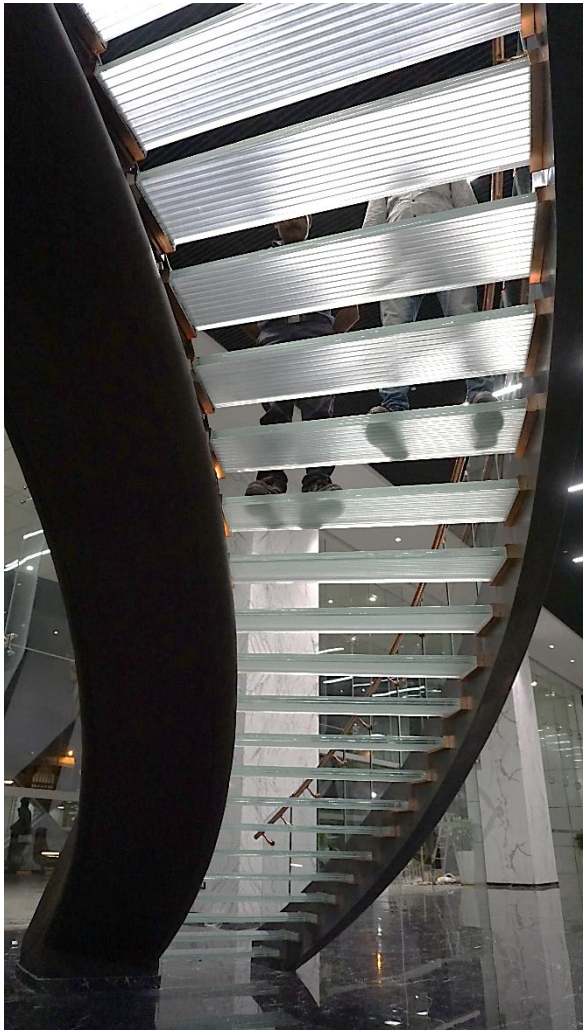
The ceiling suspended landing is the cardinal structural support for the glass beams.

The treads are SS frames with solid teak wood cladding.

STUDIO ray SYNTHESIS



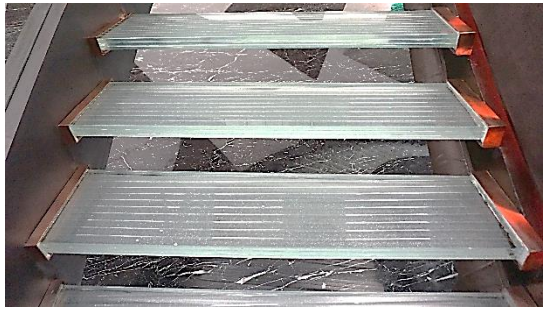




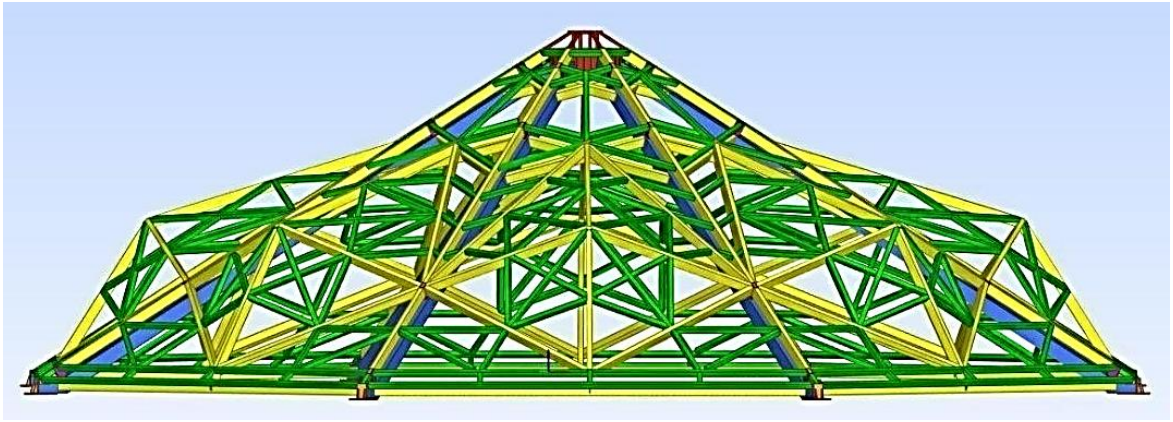
39.04MM THICK SGP LAMINATED LOW IRON TEMPERED GLASS TREADS

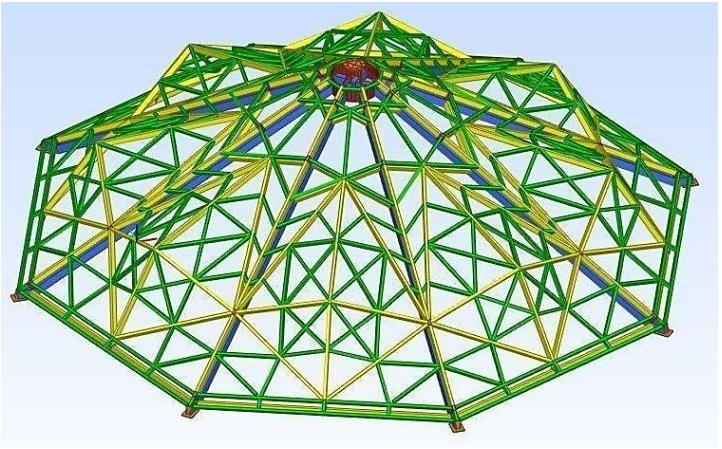
CNC ANTI-SKID GROOVES

RGB LED INTEGRATED

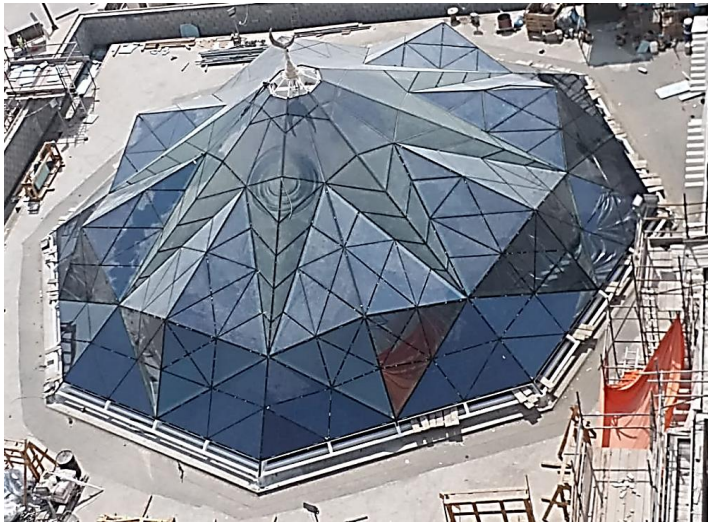


STUDIO
ray
SYNTHESIS

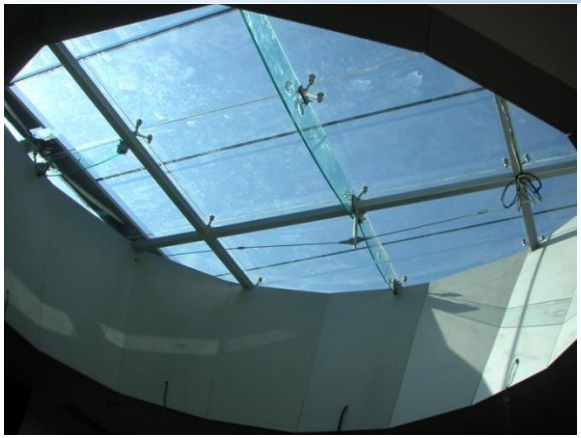


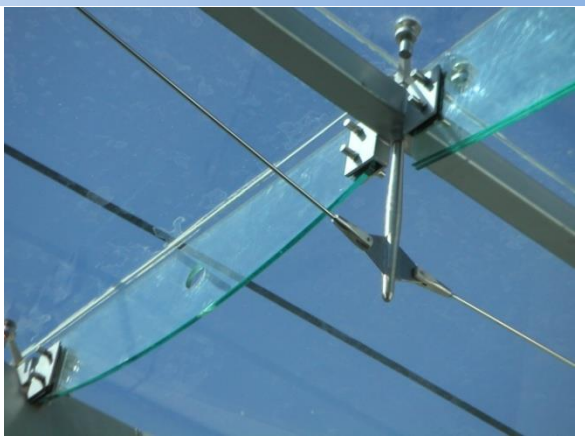


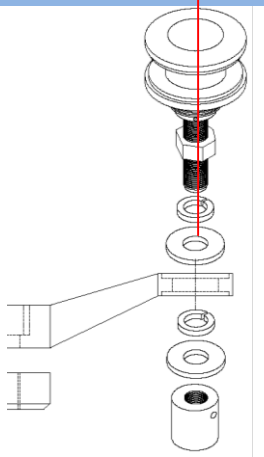
PRE-FAB SKYLIGHT DOME for MOSQUE
Doha, QATAR.
Client: **DUBAI METAL, UAE.**



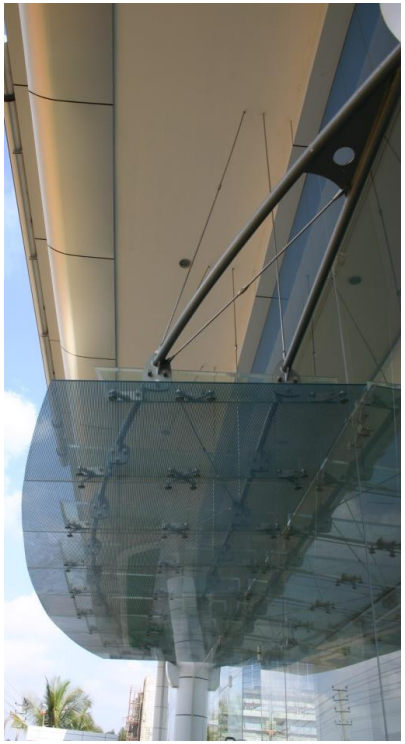
STUDIO ray SYNTHESIS





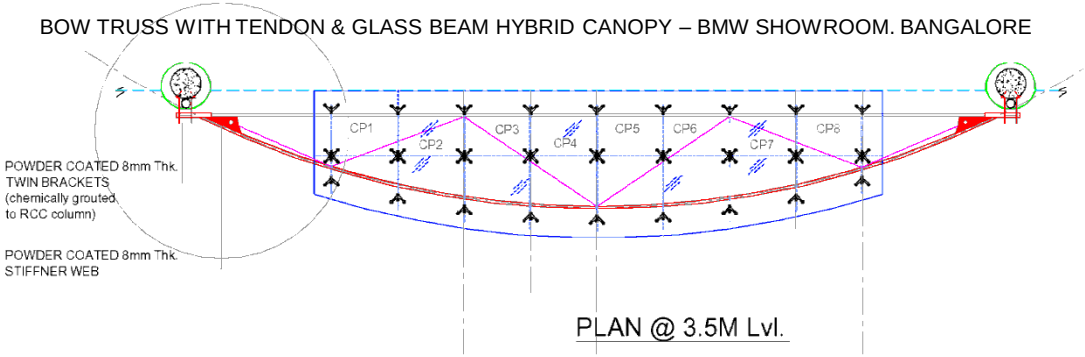


SS TENDON & GLASS BEAM HYBRID SKY LIGHT – INSILLICA. BANGALORE



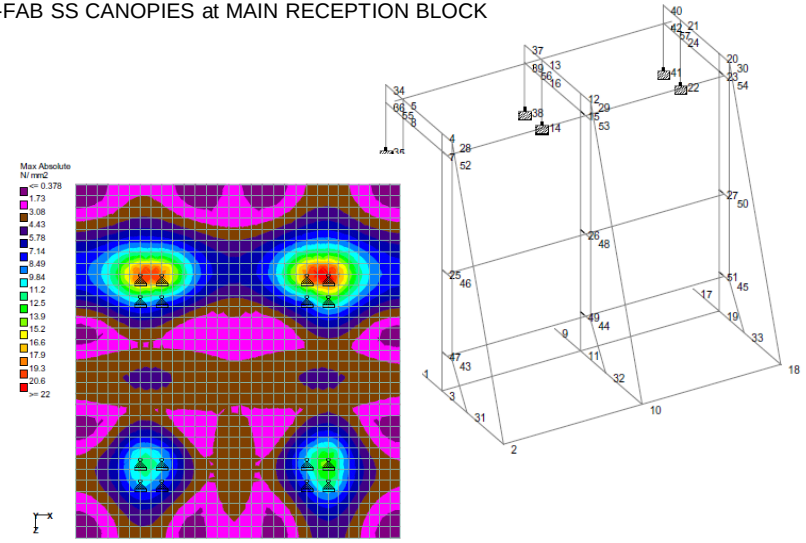
The challenge is to always create a signature entrance for a building.

BOW TRUSS WITH TENDON & GLASS BEAM HYBRID CANOPY – BMW SHOWROOM. BANGALORE

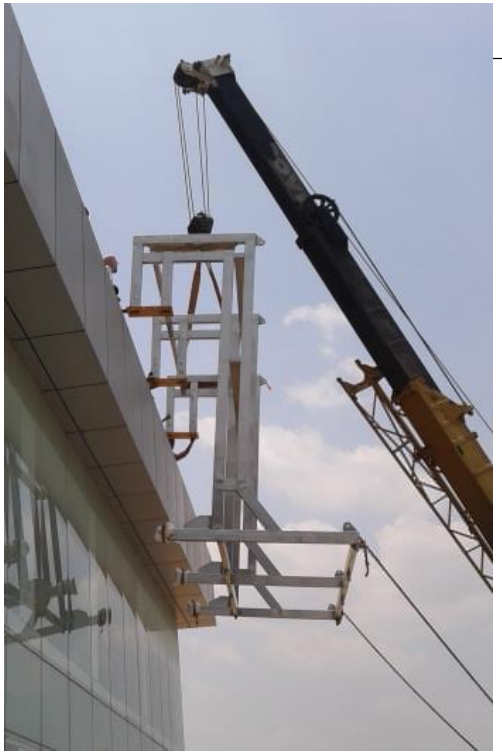


STUDIO ray SYNTHESIS

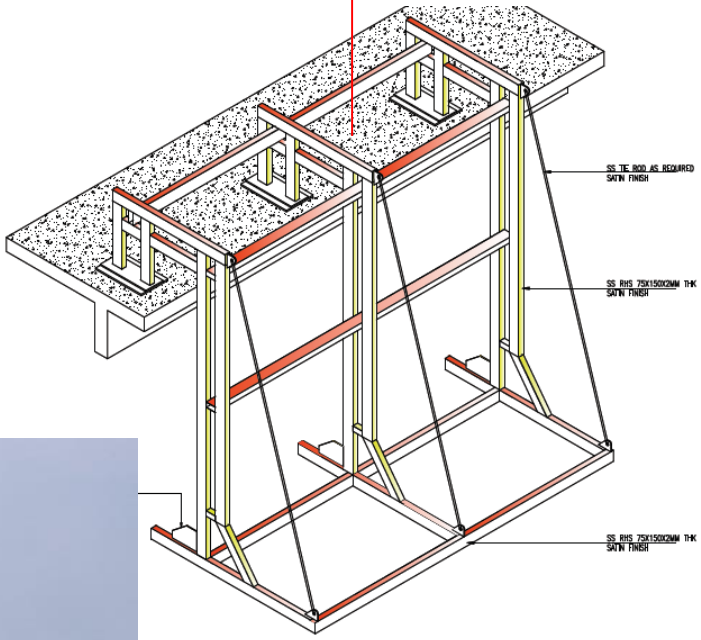
PRE-FAB SS CANOPIES at MAIN RECEPTION BLOCK



STRUCTURAL VALIDATION MODELING



ON-SITE INSTALLATION with BOOM CRANE



Retro-fit Solution:

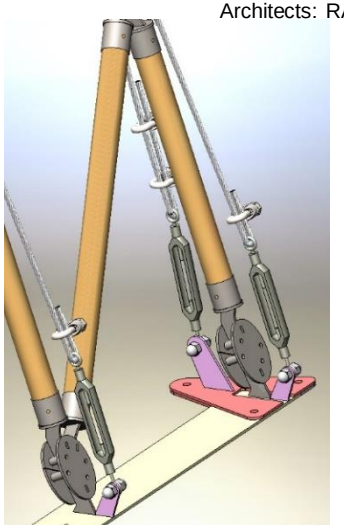
The design & execution challenge was to install the 2 canopies with out touching the existing façade.

2Ton of SS 304 off-site pre-fabricated .canopies.

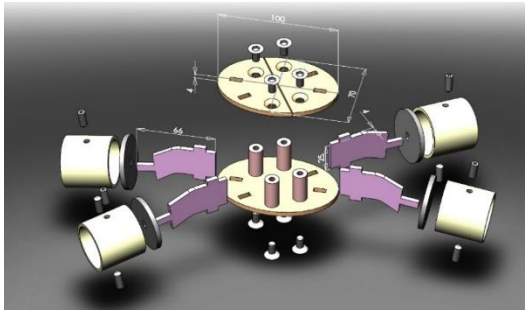
Point Fixed 16.52mm Laminated ceramic fritted glass panels

STUDIO ray SYNTHESIS

PROJECT: AMAZON R & R.
Bangalore, INDIA.
Architects: RAJ Consultants + IA



Bamboo-tecture NODE:
Patent Application 201641009829



FREE STANDING TENSILE CABLE REINFORCED BAMBOO LATTICE TUNNEL

Sustainably grown & hand-cut 300 bamboo struts, seasoned & sourced from artists community in West Bengal, Siliguri.

170 patent applied LASER Cut non-rigid nodes on site assembled & painted.

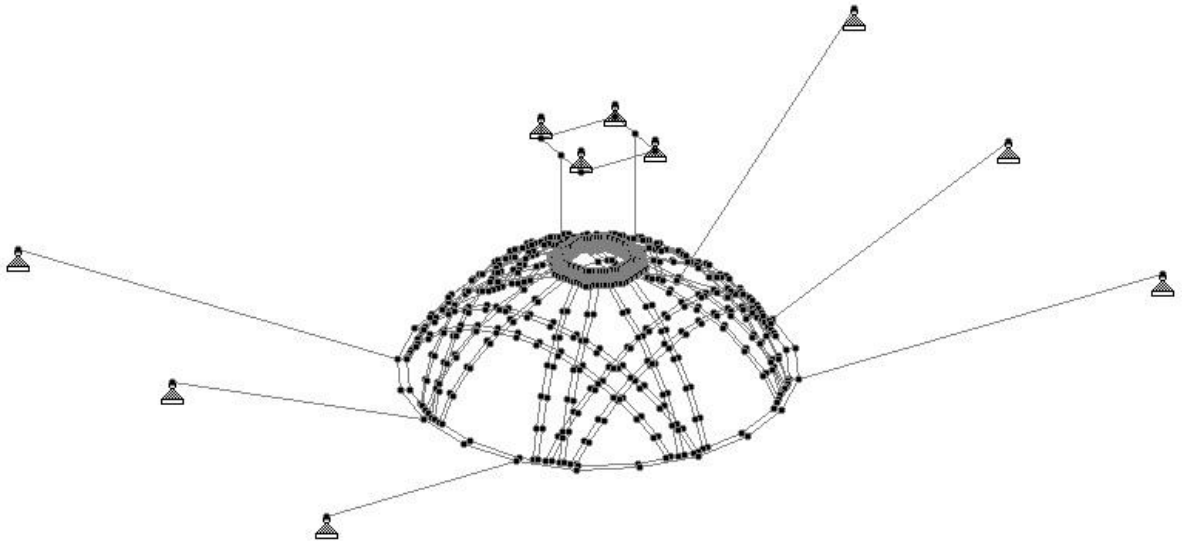
Site Improvisation:

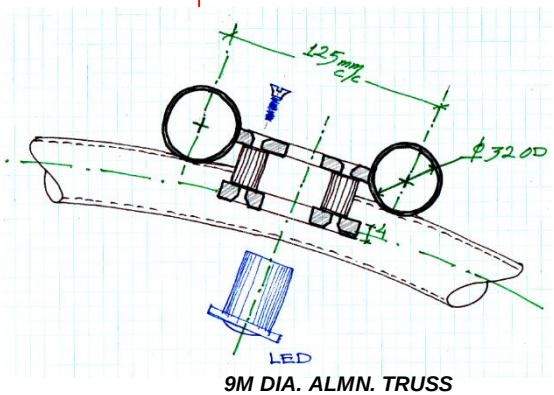
Deflection control & rigidity achieved empirically at site with 6mm Dia. multi-strand plated steel cables post-tensioned with custom made SS 304 turn buckles. Steel Base plates anchored to slab with 150mm length M10 SS chemical anchors.

Duration: Design, R & D to Installation – 4 Months.

STUDIO ray SYNTHESIS

Vernacular craft + Digital Fabrication = Engineered Art

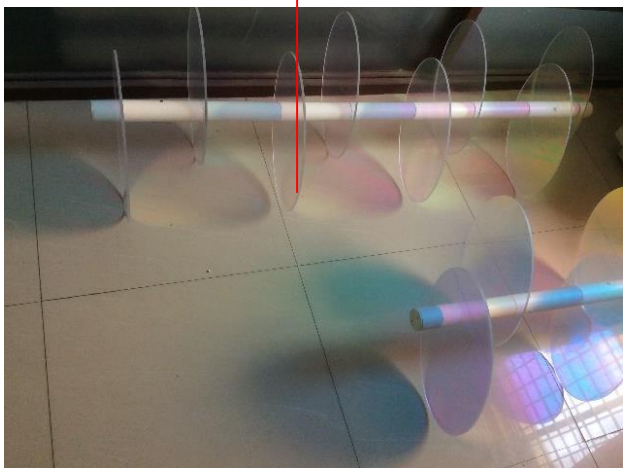


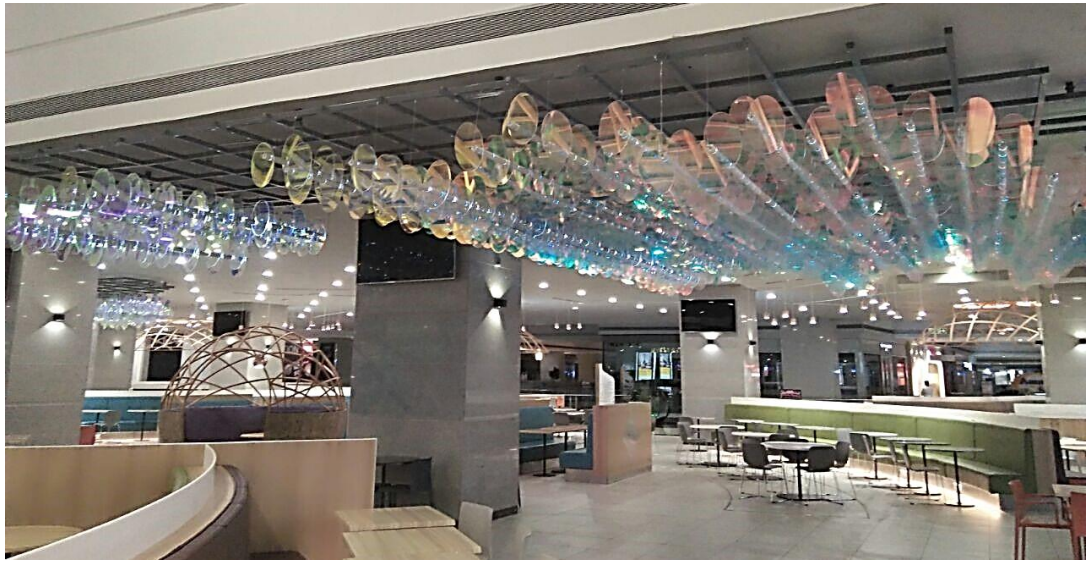


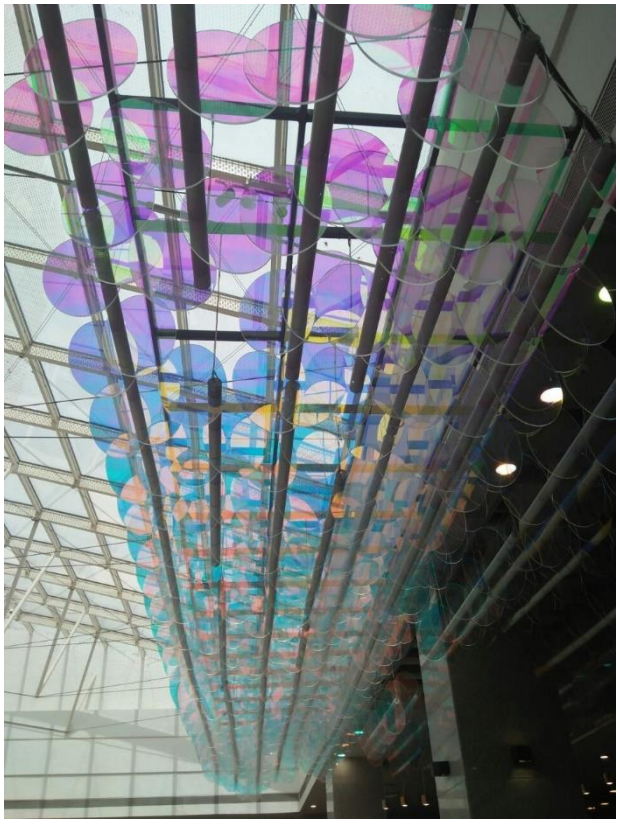
9M DIA. ALMN. TRUSS DOME.
SUSPENDED FROM CEILING WITH TENDONS.
CUSTOM MADE LIGHTING INSTALLATION

GRAND MALL - DICHROIC LIGHTING.
Mumbai, INDIA.
Architects: **SYNERGY + RAWL**

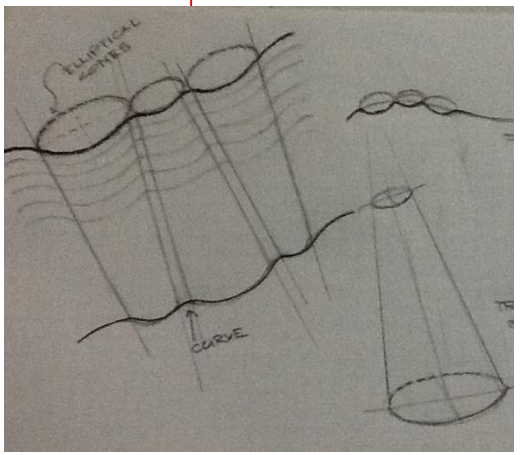
INSTALLATION ART







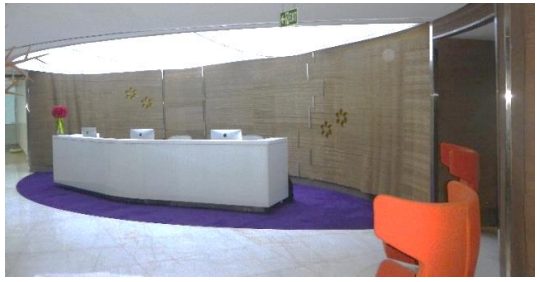
STUDIO ray SYNTHESIS

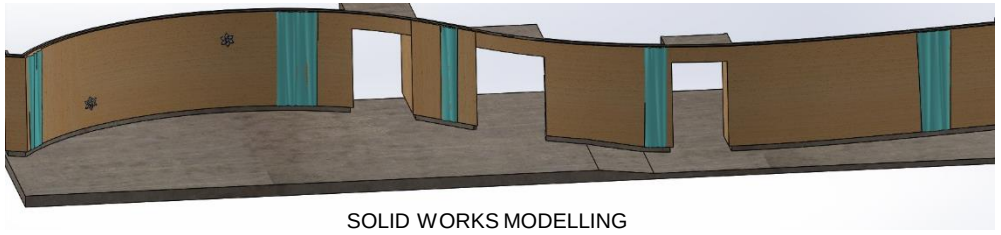


CNC PROFILE CUT, STACKED CARDBOARD 3D FEATURE WALL:

We took a simple recycled packaging material & used it in an extremely complex way.....

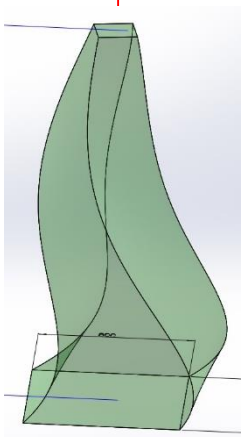
Jute & Coir Rope reinforced; **20,000 CNC cut corrugated cardboard** profiles stacked to form a 3D feature wall.





SOLID WORKS MODELLING

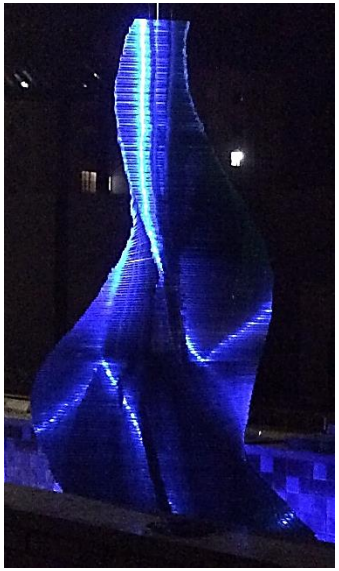
STUDIO ray SYNTHESIS

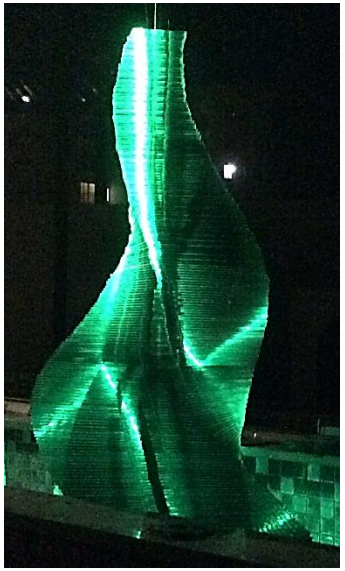


SOLID WORKS MODELLING

STACKED GLASS SCULPUTERS:

850 CNC cut float glass plates stacked with internally SS cables post tensioned at site. IP67 LED lighting through the core.





STUDIO ray SYNTHESIS

UTTARAN BAIDYA RAY : **PRINCIPAL** AT **STUDIO RAY SYNTHESIS**

QUALIFICATION: **B. Arch - 1998** (Bachelor of Architecture, MIT Manipal, Mangalore University, India)

CAREER TIME LINE:

2000 – 2007 Consulting Architect to Impact Safety Glass Works, (Industrial Architecture.)

Parallel Practice of Architecture + Glass Engineering

2003 – 2007 Impact Design Cell (Glass Engineering Contracts Division) Design Director

Application Architect (consultant) to DuPont India, Solid Surfaces.

2008 – 2011 Permasteelisa India Pvt Ltd. Design Manager for Special Works,

2011 – Studio Form Techniques Pvt. Ltd. Founder & Managing Director.

REFERENCES:

Phil Davis – DuPont, Australia. **Dr. Rajam Sankaran** – CSIRO, Australia.
Samy Hanna Helmy – Global Tech Design, Singapore.

Ar. Venkatramanan Snr. (Founder VA Architects, Bangalore.)

Thomas Henriksen - Director Design & Research Seele, Austria

EXPERIENCE:

With an overall 20 years of experience in engineered glass design & turnkey contracting, understanding working with various other composite materials & fabrication methods is not a challenge.

VISION:

To provide multi-disciplinary design solutions by integrating emerging technology.

MISSION:

To be the market leaders in the advanced architectural engineering segment. **To steer the company as a corporate entity that will take "innovation India" to the rest of the world.**

PROFILE

Uttaran B Ray has a hands-on approach to almost all of life's challenges.

A firm believer in empowering & mentoring talented colleagues who have the potential of being future leaders.

Early Influences:

His primary school education in Australia (Tasmania, Hobart) had exposed him to the importance of developing practical skills in all aspects of any profession. His syllabus in high school included wood work, metal work and even cooking & sewing.

It was during this period he developed skill of putting things together with his hands. His hobbies included tinkering with DIY electronics kits.

His hands-on encouragement at the grass root fundamentals drives his colleagues to continuously push the envelope of architectural engineering.

He strongly believes that unless he himself cant achieve the desired quality of workmanship; he can not expect the same from his colleagues.

The multidisciplinary trade that he practices today has its origin in MIT, Manipal where he graduated with a bachelor's degree in Architecture.

The B. Arch syllabus (in the late ninety's) introduced him to fundamental principles of structural engineering and the elementary joinery details that even today has relevance in the complex structural and composite materials application of the façade industry.

Progressive & Evolving Engineered Art:

As a techno-preneur in the domain of bespoke design & build contracting, he passionately finds solutions to complex multi-dimensional challenges by self-funded R & D. He is patient by nature to the trial & error results of experimental outcomes.

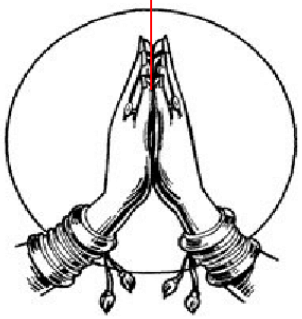
His time tested success formula is to find solutions by adopting & adapting principles from various industries that may not be directly related to his work. His diverse portfolio demonstrates the combination of fundamentals from the automotive / aerospace industry and handy craft skills of the traditional cottage industry. This approach has been used many a times to fabricate and install advanced architectural products.

Uttaran fondly known as "Ray" in his industry always strives to achieve the Architect's "design intent" and many a times even contributes to deliver a better design with his intuitive knack of materials application and fabrication.

Curious to learn about industrial fabrication; his mindset is always to adapt & adopt the manufacturing process from various industries to bring into life a designer's vision.

His creative license akin to most artists; allows him a few quirks in his personality. He is not the best when it comes to diplomacy; often direct to the point causing professional relationship stress. Described as "introverted" if work is not the topic of discussion & true to the nature of any artist his perfectionist desire of putting the project & product quality above the client's sentiments or the business profits.

THANK YOU FOR YOUR TIME



STUDIO ray SYNTHESIS

ARCHITECTURAL ENGINEERING CONSULTANCY