

# INNOVATIVE COVERING ROOF ETFE SKYLIGHT SYSTEM

GULF  
SHADE

**RAYTECH**<sup>®</sup>

*"Bringing The Outdoors, Indoors."*



# What is

# RAYTECH®

Gulfshade, as a turn key solution provider for the specialized foil roofing, delivers a skylight system that achieves a light-weight structure by the intelligent use of foil materials and extrusion technology. Being a superb alternative to the traditional skylight made up of glass.



Red Sea Mall, Jeddah.

## 01

### SINGLE LAYERED

This system consists of foils applied in a single layered form and are reinforced with either wire cables, light-weight steel or aluminum to maintain shape and stability.

## 02

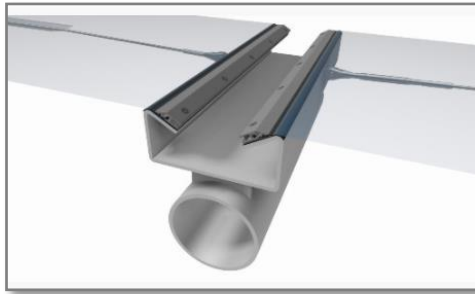
### CUSHION (DOUBLE OR TRIPLE LAYERED)

In a double or triple layered application, the film incorporates a pneumatic system to maintain air between 2 or 3 layers of film attached in aluminum extrusions and supported by a lightweight structure .

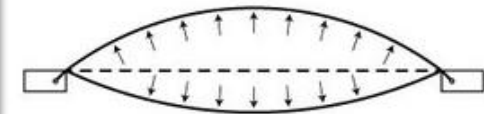
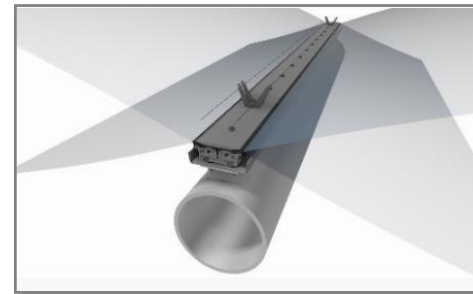
This creates the inflated cushions. These cushions are filled with low-pressure air, providing thermal insulation and structural stability against wind or snow loads.

If needed, small cables can be used for reinforcement.

Under typical loading conditions, these cushions can range from 5 to 15 feet wide and reach up to 200 feet in length.



FOIL-SINGLE LAYERED CROSS SECTION



FOIL-CUSHION CROSS SECTION

Mohammed Bin Khalifa Cardiac Centre, Awali.



Hayat Mall, Riyadh.



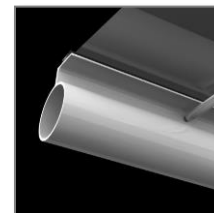
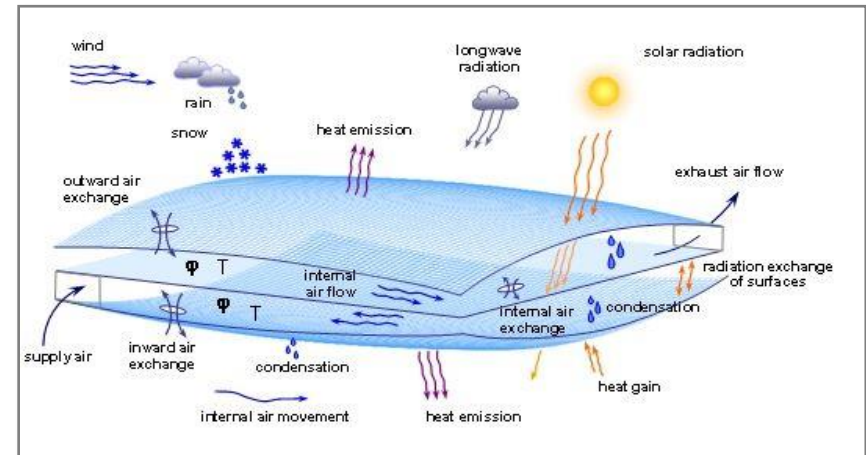


The foils used are constructed in cushions resembling a pillow. The cushions are filled with air. The air is kept at a certain pressure to maintain the cushion pre-stress. The internal pressure ranges from 2% and higher that of the atmospheric pressure depending on the design requirements. The cushion's internal pressure is maintained at the required levels by a special air blower machine. The air quantity within the cushion is increased or decreased depending on the loads the cushion is exposed to. When Rain, wind suction, or snow loads are acting on the cushion a special sensor controls the internal pressure automatically to maintain cushion stiffness and to prevent shape deformation under load. The air is pumped to the cushions through a plumbing system of pipes and connection hoses.

A cushion can be made of two layers or more. The number of layers within a cushion depends on the thermal profile of the roof or the wall in question. The foils are welded using a special welding machines producing weld strength as strong as the foil itself. The space between the cushion layers is filled with air providing heat insulation. The thermal properties of the cushions can meet the building industry standards and more. For example, The U value can be reduced by adding more layers within the cushion.

The G value can be manipulated by printing on these foils to attain the required values. The cushions can be designed and constructed to provide a switchable option to blocking/ allow light transmission as and when it is needed.

Specially designed aluminum extruded profiles are used to attach the cushions to the building structure. The aluminum profiles are designed to secure the cushion against wind ,rain and snow load.



### ○ **Heat Insulation:**

Air is a superior insulating medium. These Foil cushions are filled with air. The air thickness between the layers can be as thick as half a meter or more depending on the design. The multi-chambered (No. of layers) cushion design provides low U value. The shading option to the foil can provide a range of optical preferences.

### ○ **Light weight:**

The cushion system provides a great advantage in savings of the building weight. Raytech structures can span long distances without the need of a support. Compared to glass, which can only span a maximum of 4 meters without a support, cushions can span 20 to 30 meters and longer.

### ○ **Durability:**

Due to high chemical stability and resistance of the materials used, the life expectancy is 50 years.

### ○ **Optical properties:**

Transmits 94 to 97% in the visible range (380 to 780 nm), and 83 to 88% in the ultraviolet range (300 to 380 nm), providing a natural environment and healthy atmosphere for humans and plants.

### ○ **Low Maintenance :**

In the event of damage, the foils used can be easily repaired by patching.

### ○ **Self Cleaning:**

The foils used have Anti-adhesive surface properties.

### ○ **Green:**

The lightness and flexibility of the Raytech structures offer savings on the building's weight, reducing the construction material, and hence the carbon footprint.

### ○ **Fire Resistance:**

Flame retardant and self-extinguishing. The foil does not shatter like glass in the unfortunate event of fire, it melts away and shrinks providing an opening for toxic and harmful fumes to escape.



Marassi Galleria, Diyar Al Muharraq.

**RAYTECH** utilizes the technology of laser welding as an alternative to more conventional types of welding. But for many applications, laser welding is a cleaner, more precise, and more controlled method of welding and is especially useful when looking to bond small, thin materials such as medical tools, wraps and more importantly in our case, **foils**.

Below are the advantages:

01

Cleanliness — no excess bonding material or slag to clean off

02

Environmentally friendly as less likely to corrode

03

Less chance of deforming or damaging nearby areas

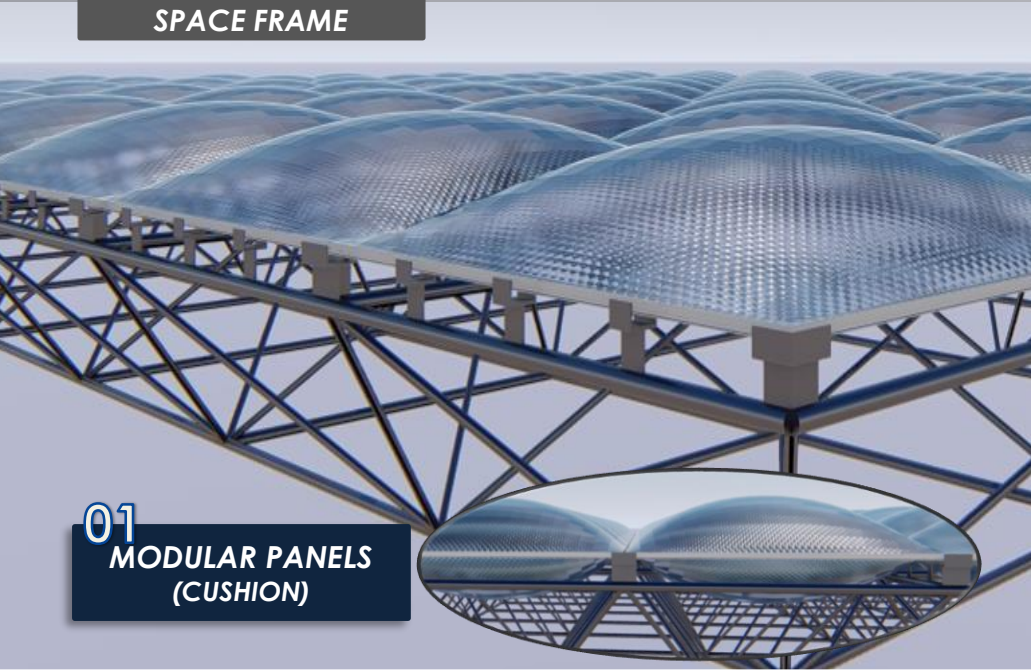
04

More highly repeatable results

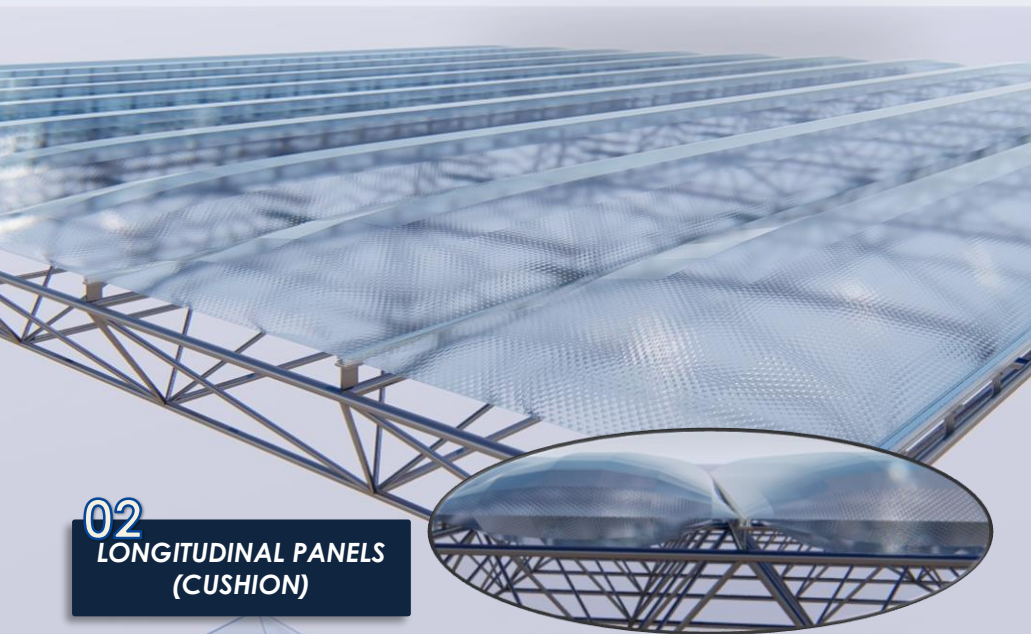
05

Less possibility of contamination

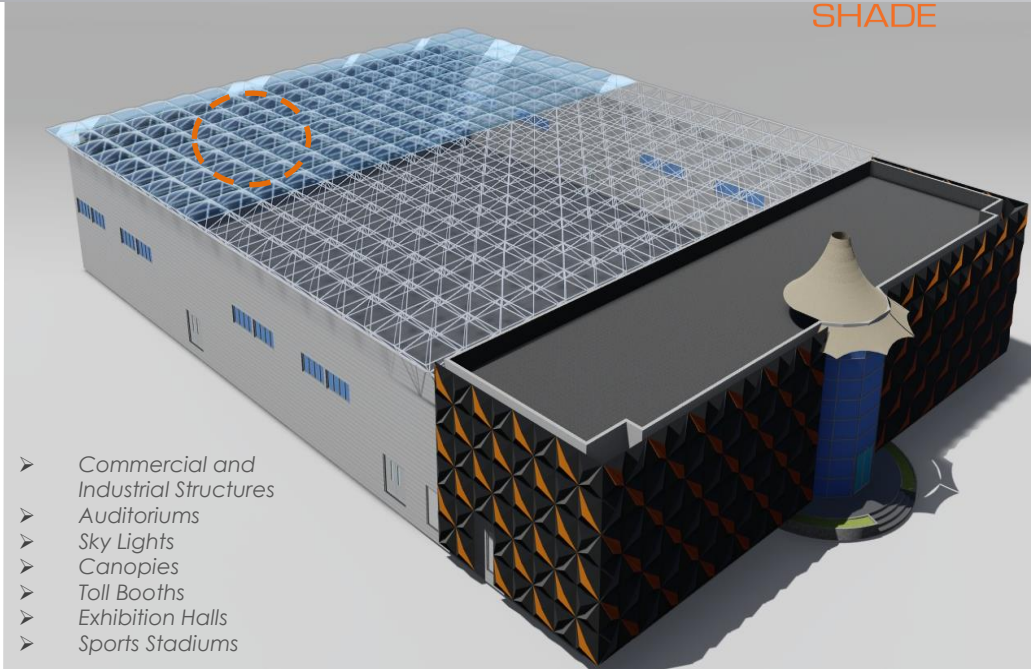




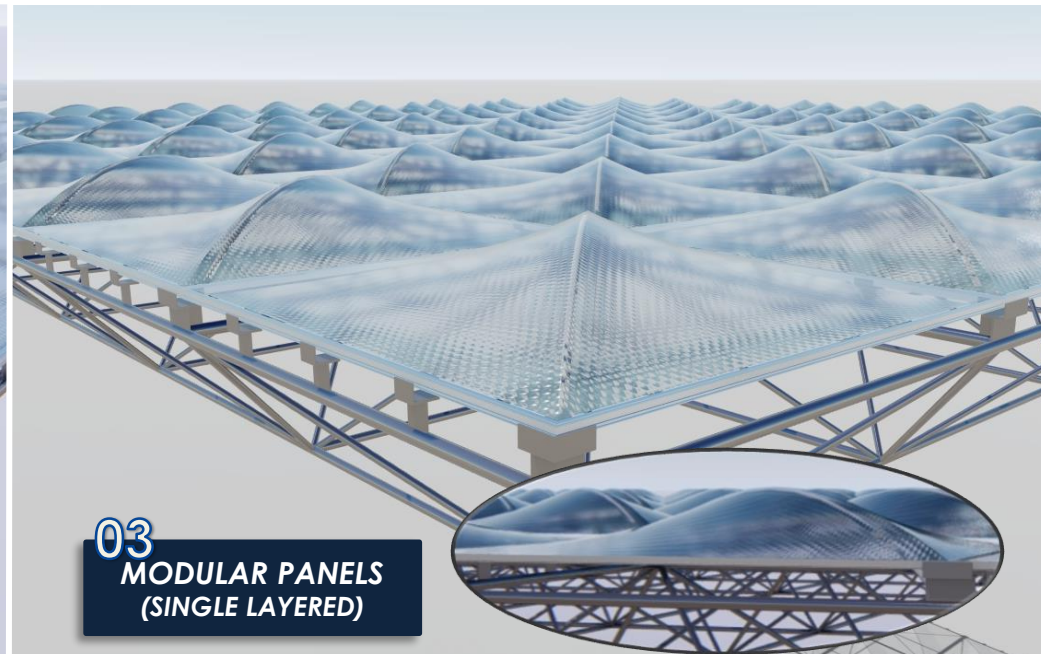
01  
MODULAR PANELS  
(CUSHION)



02  
LONGITUDINAL PANELS  
(CUSHION)

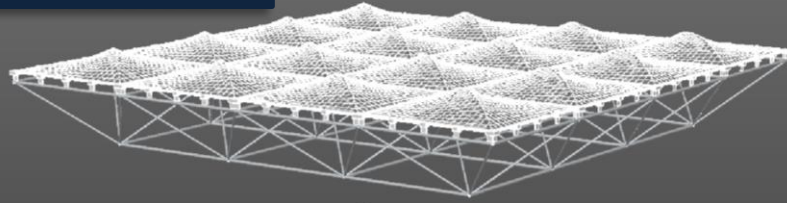


- Commercial and Industrial Structures
- Auditoriums
- Sky Lights
- Canopies
- Toll Booths
- Exhibition Halls
- Sports Stadiums

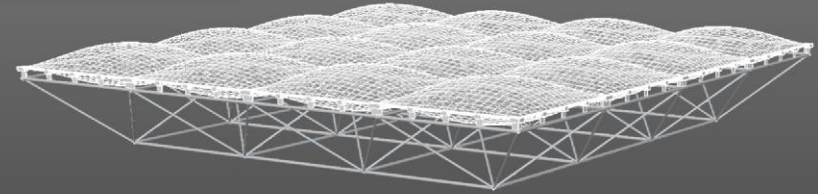


03  
MODULAR PANELS  
(SINGLE LAYERED)

01  
SINGLE LAYERED



02  
CUSHION



RAYTECH  
SPACE  
FRAME  
SYSTEM

FOIL  
MEMBRANES

ALUMINUM  
MODULAR  
PANELS

SPACE FRAME  
STRUCTURE

➤ RAYTECH SPACE FRAME SYSTEM

Process:

- I. The structure is manufactured and assembled in the factory. The purlins are connected while cuts and holes are made on steel plates.
- II. For Single Layered Systems, curved steel rods are placed across each square module of the structure to allow it to form its shape. Cushions are air-blown.
- III. Extruded aluminum profiles are pre-assembled to a square module and fastened to the steel chair plates accordingly.
- IV. The pre-tensioned and pre-assembled foil membranes are fixed to the aluminum profile on site.

**\*Modular panels are subject to change in accordance to the chosen design.**



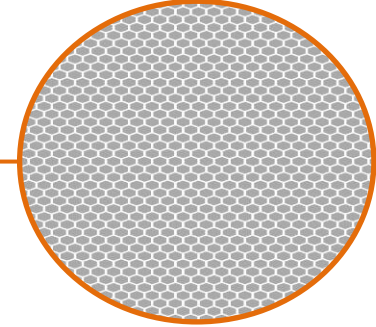
➤ **Welded Purlins**

- Creates low stress concentration.
- High strength of joints.
- Excellent for fatigue load, impact load and vibrations.
- No deduction in the area, thus the cross-section is effective to carry loads.



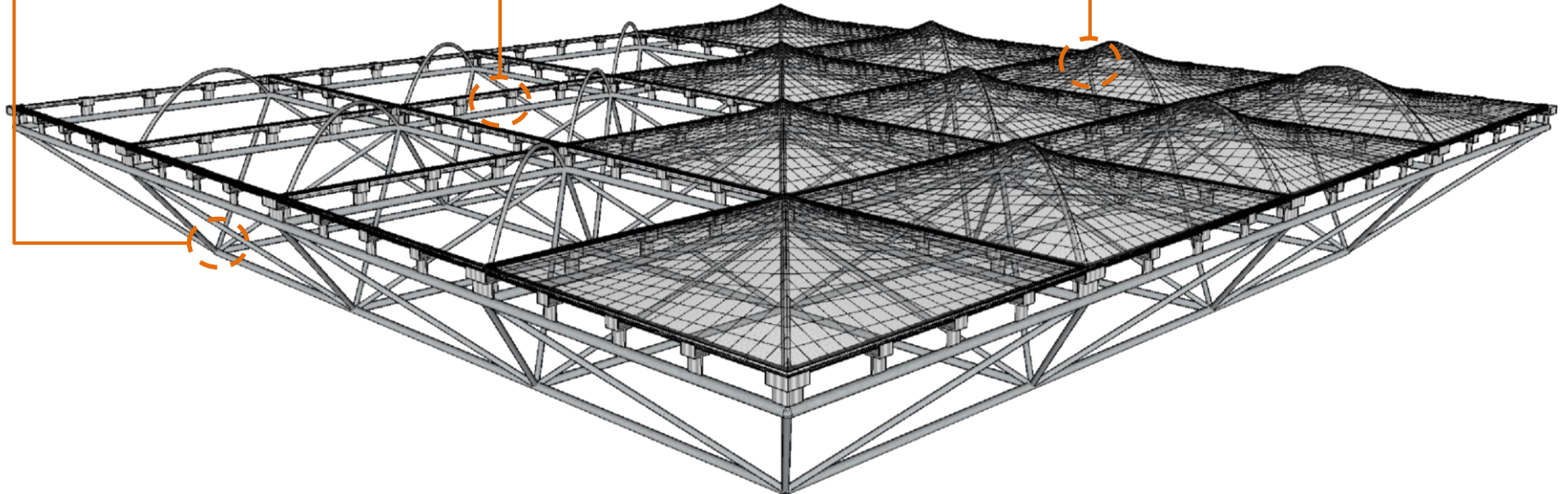
➤ **System Solitaire KS-P02**

- System appropriate for pneumatic and mechanical pre-stressed foil constructions.
- High flexibility.
- Penetration of gutter **NOT** required
- Standard-lengths are 5m.



➤ **ETFE/STFE (Single Layered/Cushion)**

- Lightweight, durable and abrasion resistant.
- Excellent thermal and chemical characteristics.
- Undergoes no mechanical or visible aging under stress.
- Available in a wide range of patterns and colors.



■ Car Parks



■ Textile Façade System

TEXTRA

■ Cable Net System



Tensile Shading System ■



Roofing System ■



