

PoliCarb[®] PoliComp[®]

with filters IR for

**TRANSLUCENT
DAYLIGHTING**

CASE HISTORY: **CENTRO SICILIA**

NOVEMBER 2011



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Recently opened in Sicily, the region's largest mall "Centro Sicilia", is characterized by more than 12,000 m² of translucent covering. This single level structure is an excellent example of architectural functionality based on the principles of eco-sustainable design – the most important feature for a center situated in a region where the temperature easily reaches very high levels. The application of the skylights of huge size would have allowed for tremendous internal heat build-up resulting in extraordinary air conditioning costs. The use of the wide polycarbonate sheets with the exclusive IR filters has permitted to solve the problem of internal overheating, making Centro Sicilia unique project. The Polycarbonate IR sheets constitute covering of all common areas of the center permitting the passage of natural light and maintaining at the same time a comfortable internal atmosphere.

Project data: City of Catania - Sicily, Italy

Customer: Coalbu Srl - Cagliari

Project: Design International Srl - Milan
Planning Srl - Bologna

Contractor: Laprometec Srl - Catania

Executive designer: SAP Engineering - Catania

Surface: 12,000 m²

Product used:

polycarbonate compact sheets **Policomp**[®] with IR filters

polycarbonate multiwall sheets **Policarb**[®] with IR filters

The construction of the skylights was assigned to a group of companies:

dott.Gallina Srl - polycarbonate sheet supply

SAP Engineering studio Srl - executive designer

Laprometec Srl - steel fabrication

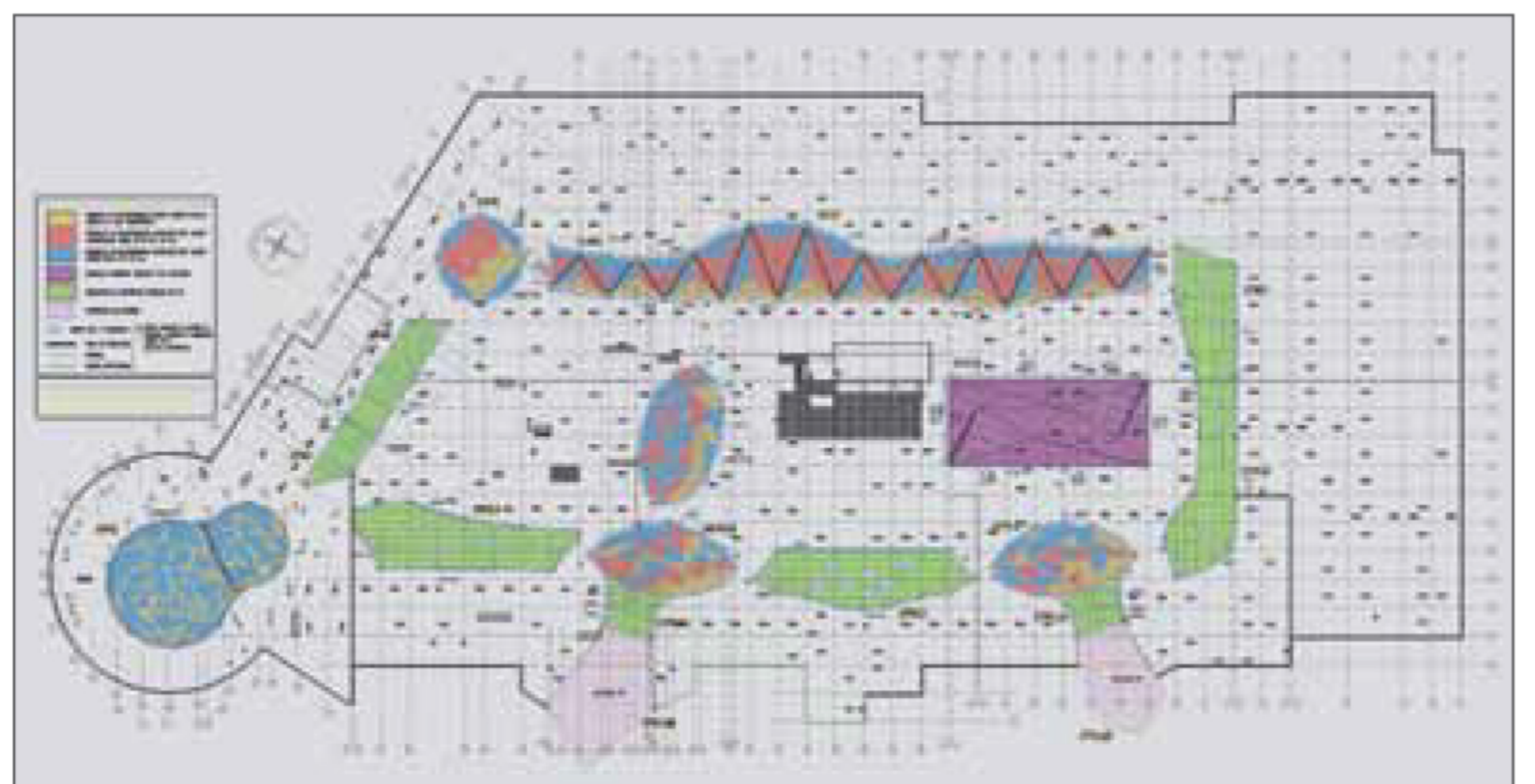
Lazzaro Srl - system assembly

Brunello Srl - installation

The team of companies involved worked together to design the structures, select materials and do the structural calculations necessary for the installation of this roof system - all with a specific mandate: to design and install translucent skylight systems with high thermal insulation values, high light transmission, special color effect, and to be completed expeditiously.

THE PROJECT

The project includes two types of skylights: Cupolas (domed) of various sizes and shapes, faceted like irregular diamonds and triangular-based pyramids of various heights, placed side by side and tilted in space. There were 27 different structures, all with welded joints and each requiring different cut shapes.



THE SKYLIGHT

Dott.Gallina was chosen to supply the polycarbonate translucent sheets because we were able to meet the needs of the designers with our "new" generation of product and our high level of service. The **PoliCarb**[®] and **PoliComp**[®] polycarbonate sheets are installed on different skylights and galleries to maximize translucency and performance with solar radiation controls. With the assistance of dott.

Gallina's technical support team, the architects have been able to achieve the following:

- greater efficiencies using natural lighting,
- improved comfort,
- reduction in costs for artificial lighting,
- reduction in cooling costs (estimated to be near 20%),
- fast and safe installation,
- warranty against water infiltration.

IR - AN ADVANCED TECHNOLOGY

The polycarbonate sheets selected were extruded with an advanced technology using IR treatment. The control of the temperature and the management of heat are essential elements in maintaining a desired level of comfort within buildings. They are also critical elements for controlling costs and maximizing energy savings.

The purpose of the IR layer is to absorb the part of the light relative to the infra-red rays (from 780 to 1400nm), effectively blocking the solar heat, while letting the solar light through.



The result is a reduction of the internal transmission of heat and a reduction of the cost for cooling the area. In fact, all the products from the IR line can contribute to reducing heat buildup by up to 25% while increasing light transmission by up to 60% when compared to other window or roof products. With the new IR technology is possible to obtain an excellent comfort, using natural light, without the unpleasant “greenhouse” effect below the transparent surfaces. Our new IR technology now makes it possible to improve the comfort level inside using natural light without the unpleasant “greenhouse” effects typically associated with translucent day lighting. The designers, challenged with the orientation of some of the skylights (specifically the southern exposure), have designed multiwall sheets 32mm in thickness and grey in color to increase the thermal insulation without renouncing the indisputable benefit of natural daylight. The architect also designed a dual glazed application (two sheets assembled with air pocket between) “double glazing” (two sheets assembled with air camera between) the **PoliComp®** sheet has been used with IR treatment using the **PoliComp®** solid sheet with IR treatment.

Lastly, the capabilities of Dott.Gallina were essential to meeting the challenges of the project including maintaining chro-

matic effects, supplying hundreds of different widths, lengths, shapes, utilizing two different materials (solid and multiwall; both with different expansion values) to produce skylights that will not leak.

THE “INVISIBLE RULE”

The final design of the skylight was a challenge of speed, innovation, and technical and economic feasibility. SAP Studios Srl, an engineering firm in Catania and Laprometec Srl, one of the largest steelwork companies in Southern Italy came together. Laprometec, with their professionalism and the latest generation of equipment, were able to manage the entire steel structure in record time. The capacity and the attitude of the Laprometec, was crucial to reach the structural requirements, and the tight timing table. The pre-assembly of the skylights and installation of the steel structures were operating on a 24/7 schedule simultaneously.

SAP Studio Srl, after acquiring the basic design of the skylight (designed by Design International of Milan and planning of Bologna), the project requirements appeared irreconcilable given the short time required and the modern technology of the polycarbonate sheets. The challenge was to redefine the design of the structural steel work to install the polycarbonate solid and multiwall sheets, with varying colours and types along the same pitch. For the dome and pyramids structures, the problem to solve was; how to respect the spirit of the architectural design, given the variety and irregularity of the forms, without unacceptably compromising the time and cost of design.

The solution was found in a mathematical formula, an equation. By writing a software program, given only a few parameters, they were able to generate the entire structural scheme of the pyramids, its beams and nodes. The designers were able to complete the CAD drawings, in dramatically shorter time than would have been possible without the adoption of a precise mathematical rule, an “invisible rule”.

THE FIVE DIAMOND-SHAPED DOMES AND THE 22 PYRAMIDIS

The translucent, polycarbonate sheets used, are “striped covers”. This requirement was to obtain the efficiency in performance, of construction and therefore, economical convenience.

The solution was reached working with Lazzaro Srl, a fabrication company from Venice, who, in association with Dott.Gallina, supplied the aluminum systems necessary for fixing and sealing the polycarbonate sheets.



COMFORT UNDER THE SKYLIGHT

It is difficult to measure and explain the feeling that you get walking under these big skylights. Passing from a shady area to an illuminated area you would expect heat and not a pleasant sensation. In this case the sensation was very comfortable without the expected heat.



The solution chosen was to connect the upper translucent surface with the steelwork below using short tubular legs, so the two structures are close enough to give the desired effect. The solution used is a complete and tested "roof system". An exclusive system including aluminum profiles, with special joint and adjustable brackets, specifically designed by the company Lazzaro Srl.

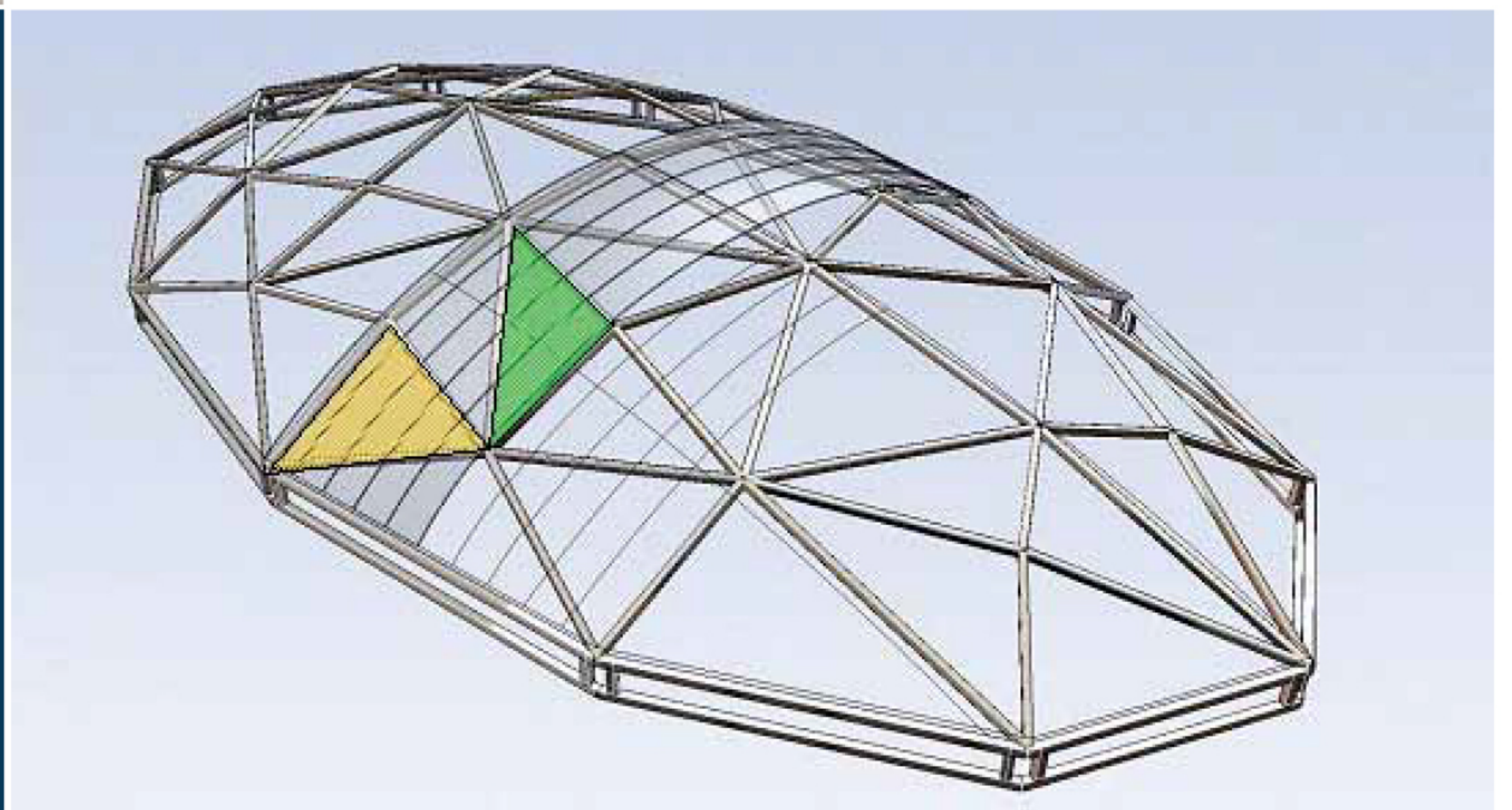
This system has allowed us to use the sheets with different thicknesses and different thermal expansions in full lengths up to 15m, avoiding the risk of water infiltration.

It also allows us to obtain a regular surface with the maximum width and bend radiuses.



THE INSTALLATION

The installation work on site has been entrusted to Brunello Srl with consolidated experience in the complex installations, the company Brunello, reach to install, under tight deadlines, the different sheets of polycarbonate that, for project needs were variable in length up to 15 meters and in the domed skylights also the width was variable for each section with different thickness and colour.



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