EXXOPOLIS (2012)

NAME

Exxopolis was so named in commemoration of the 20 years of Architects of Air, taking its name from Eggopolis and replacing the ‘gg’ with ‘xx’ – the Roman numeral ‘twenty’.

DIMENSIONS

Standard onfiguration length 53.5m width 29m and an air volume approximately 1500 cubic metres.

FACT

Exxopolis, Architects of Air’s 20th luminarium, was extensively designed on computer and the speed this allowed for concepts to be developed into viable structures unleashed wide-ranging experimentation.

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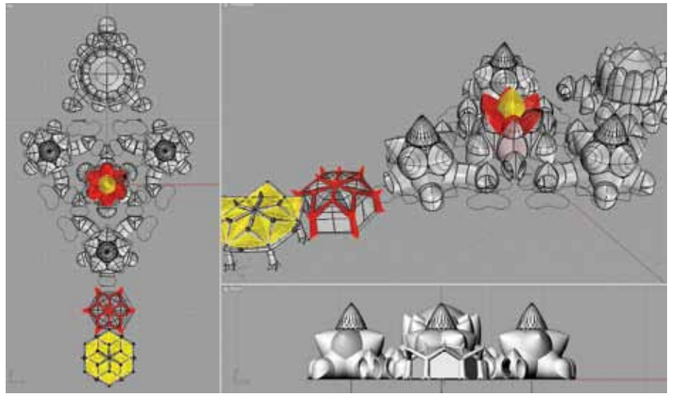
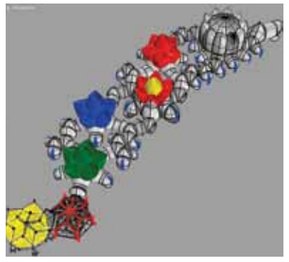
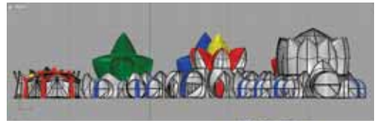
Exxopolis was created with the intention of making a brighter structure, using more translucent plastic in proportion to the opaque material. Increasingly, presenters showed a preference for continuing the opening till after sunset and it was felt that a more translucent structure would help compensate for the lower light levels in the evening.

PLANS







Exxopolis at the Sziget Festival, Budapest
Photo: James Stephenson

Testing the emergency airlock

Tents, Airlocks, and Emergency Exits – The tent and airlock designs were radically changed for Exxopolis. The changes tried to address three questions: how to build forms that were less vulnerable to seams splitting in the heat; how to build more elegant structures; and finally how the structures may better reflect their different functions.

The latter question was answered by creating interlocking forms where the tent had outward projecting arches, whilst those of the airlock projected inward. The airlock could lose its outward projecting arches without sacrificing any of the internal space while the tent gained more space beneath.

To address the first two questions the diameters of all the elements were reduced and the horns no longer used the lune design but instead were simple cones. These two steps theoretically reduced the risk of seam splitting and created an altogether more delicate structure.

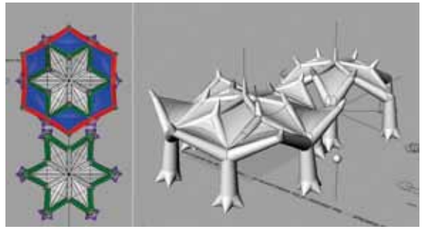
This illustration above right shows the outline of the previous tent design behind the new design.

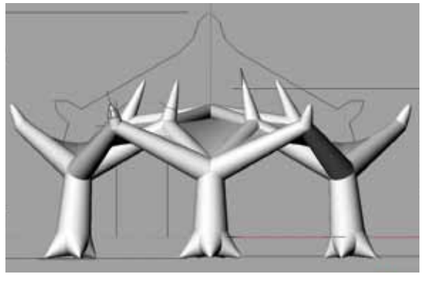
The benefits of this new design were that it was lighter than the previous tent structures, it had less wind resistance, it provided more cover to visitors and it was more beautiful.

The same tent arches could work as a three-legged structure that could dovetail with the six-legged tents.

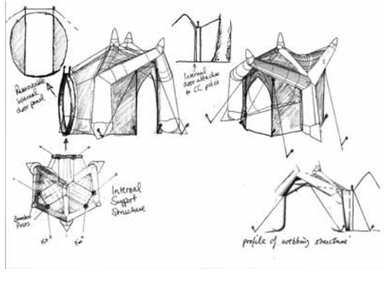
The smallest modular unit – the Tri-Canopy – could also be set up in multiple units to provide a variably configurable shelter.

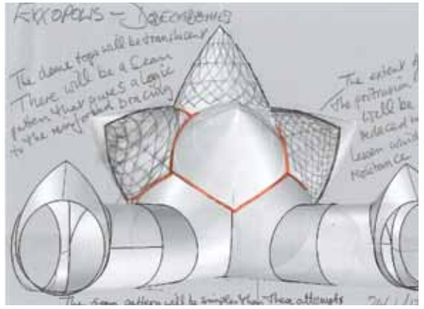
The three-legged unit was also adapted to create a self-supporting emergency exit.





Top: Interlocking tent and airlock combination
Middle: New tent with old tent outline behind
Above: Try-out of Tri-Canopy design
Below: Emergency airlock plan





Above: Exxopolis seam detail design
Centre: Exxpolis Red Dodecadome
Below: Exxopolis Dodecadome seam pattern (interior)
Photo:: Lamar Francois

Insiode Exxopolis

Dodecadomes – The dodecahedral domes were built for Exxopolis with flattened protrusions to reduce their wind resistance.

As the upper half of the Dodecadome was to be translucent there was an exploration to see how the seam pattern might be adapted to fit the dark shadow of the reinforcement strips.

The dilemma over whether to visually integrate the reinforcing shadow or to leave it and risk it being visually clumsy was resolved in favour of the latter – both to save time and because the former risked being arbitrarily decorative.

Red Tree – For the first time, a tree-form became the central element of the structure. When Parkinson moved the tree to occupy and fill the centre space, this permitted the creation of an especially imposing tree-form. A yellow egg surmounted the tree, and this pulled down and made a feature of light in the tree 'trunk'.

The Exxopolis Tree featured extra large pods that had the effect of making anyone standing in them look small.

Main Dome – The pièce de résistance of Exxopolis, 'the Cupola', was the dome that the visitors discovered after journeying the length of the luminarium.

The Centre Domes of Mirazozo and Miracoco were placed at the heart of their structures. They were open monolithic spaces in contrast to the multiform main domes of previous luminaria, and this meant that they were places that totally revealed themselves as soon as one entered. Their cavernous nature meant they became places easier to pass through than to rest and the positioning of the Exxopolis Cupola at the rear was intended to rectify this. There was also a sense

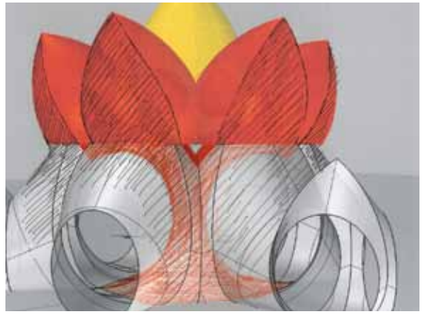
Exxpolis tree

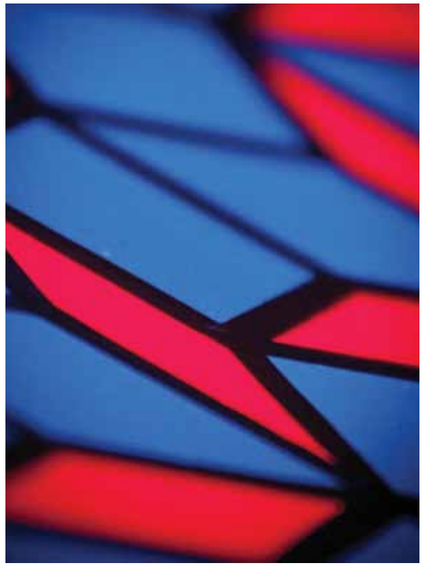
that it would be good to have a space that was more practical for performance. The previous main domes had all been at crossroads within the luminarium; placing the Cupola at the back of the structure meant that people could enter without invading the performance space.

This was the first time a main dome had been isolated at the back, one of the reasons for not having done so before being that the largest element would be more exposed to the wind if isolated from the rest for the structure. To compensate, ten extra strong anchors descended from the waist to supplement sixteen anchors at ground level – over 5,000 kilos of anchorage to stabalise the dome.

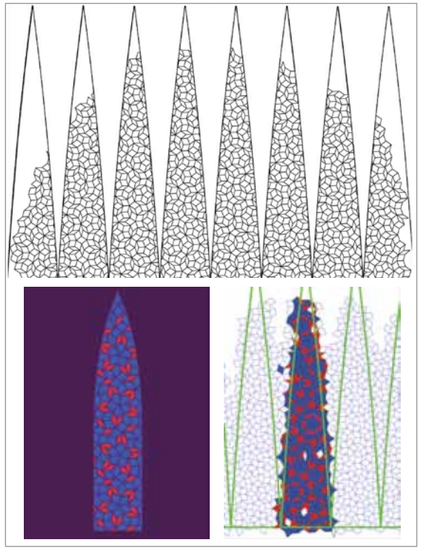
The Cupola was conceived as a cathedral-like space, one inspiration being the circular space of the Chapter House of nearby Southwell Minster. Structurally the space was a hybrid, drawing on both Christian and Islamic traditions in architecture. The ten stained-glass windows that rise over seven metres off the ground refer to the Gothic perpendicular and the ceiling with its muqarnas–style structure, crowned by a smaller iridescent cupola that was wholly inspired by mosque and bazaar architecture.

The dome top used a lattice of webbing to constrain the form. Initially the webbing failed but some judicious strengthening enabled it to stand the test of time and of high temperatures.

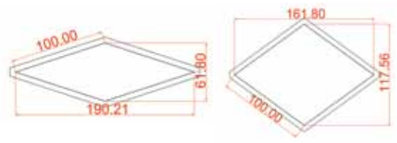




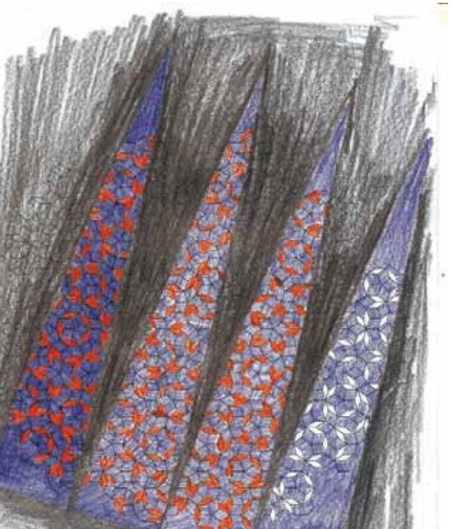
Above: Exxopolis tree design
Below: Exxopolis windows (close up)
Photo: Lamar Francois



Penrose design sketches



Penrose tiling shapes



Making the first window at Lakeside Arts Centre, Nottingham UK
Photo: Alan Fletcher

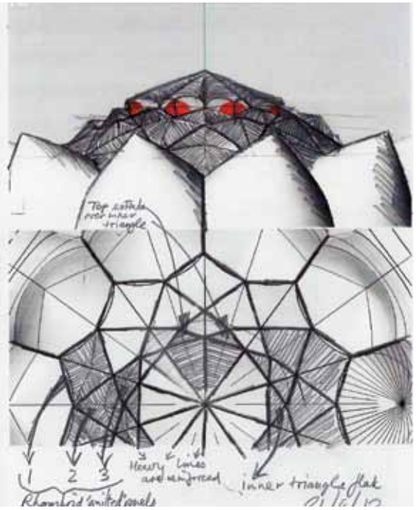
The tall windows enabled the dome to be well lit at night – but such large areas of colour lacked interest and so the idea of creating stained-glass windows in the Cupola was born.

The stained-glass design that Parkinson employed in Exxopolis was eventually based on Penrose tiling, which used just two shapes for space-filling.

The beauty of the Penrose tiling is revealed by the way in which it created a kind of disordered order. The viewer is not induced to settle on the image pattern before their eyes, as there is no real repetition. Some motifs emerge but they are not regular in their placement.

The task of creating the windows, with their hundreds of tiles, was potentially very time-consuming, so Architects of Air invited voluteers from the local community in Nottingham to collaborate with them on a project to make them.

Exxopolis Dome landscape



Exxopolis Cupola, 2012

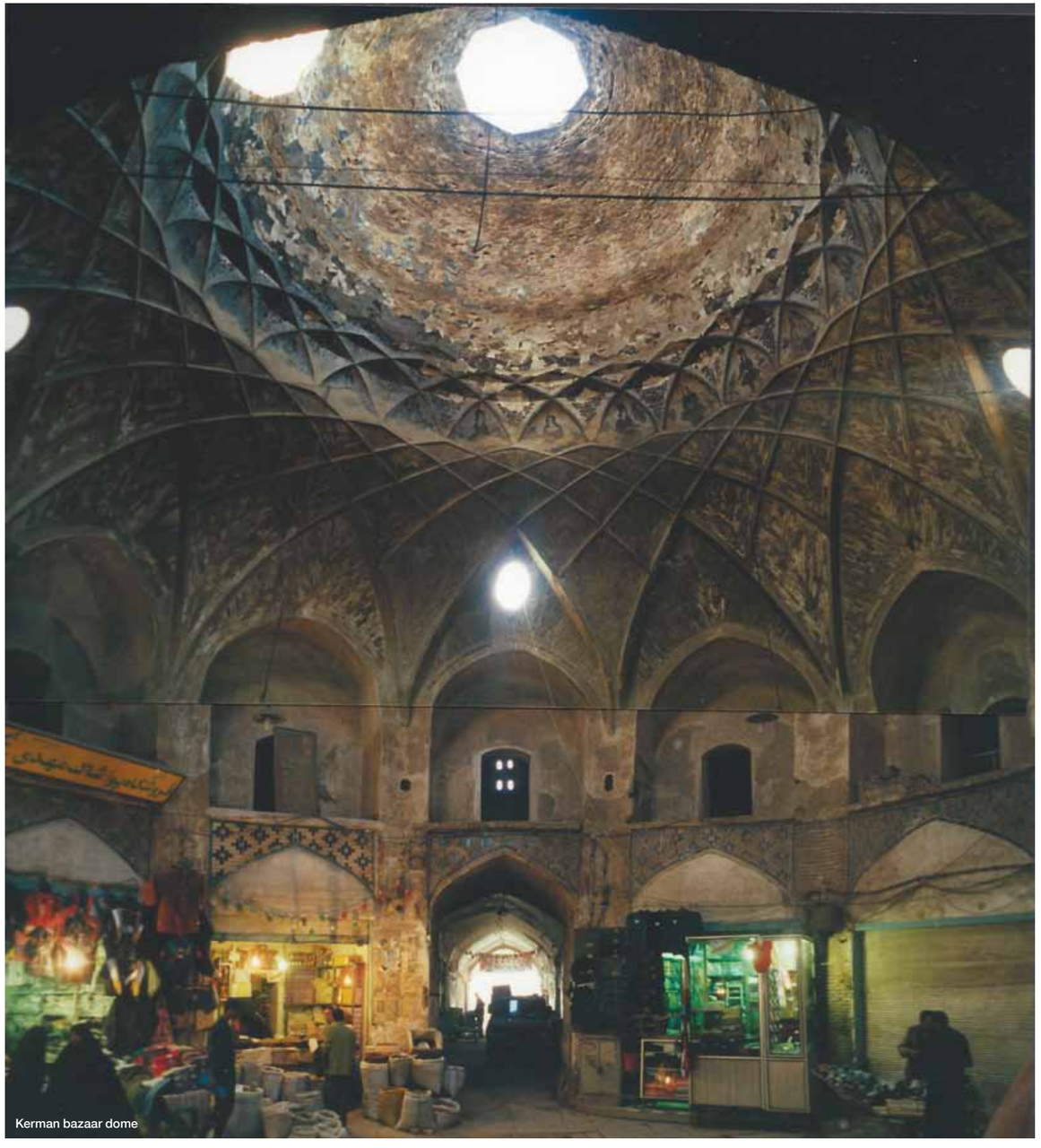
"EVERY NEW STRUCTURE, WITH ITS FAILURES AND SUCCESSES, POINTS THE WAY TO DESIGNING AND MAKING NEXT ONE. FOR AS LONG AS THE PUBLIC AUDIENCE ARE DRAWN TO OUR LUMINARIA WE WILL CONTINUE REFINING THEM TO BECOME MORE FUNCTIONAL AND MORE FITTING FRAMES FOR THE BEAUTY OF LIGHT"
ALAN PARKINSON

Exxopolis being conceived as a celebration of Architects of Air's 20 years, it was fitting for the company to return to its community roots to share the celebration.

Initially each community group was to be allowed to assemble their own window how they chose, but the possibility that the graphic potential of the tiling could create disharmonious designs led to a template being provided for each group to follow.

The Cupola Dome of Exxopolis fulfilled Parkinson's aspiration to create a structure that would frame the experience of light, and which could do justice to the inspirations of mosque and cathedral architecture.

Exxopolis Cupola
Photo: Lamar Francois



Kerman bazaar dome

Exxopolis Dome top
Photo: Sabrina Bean Photography