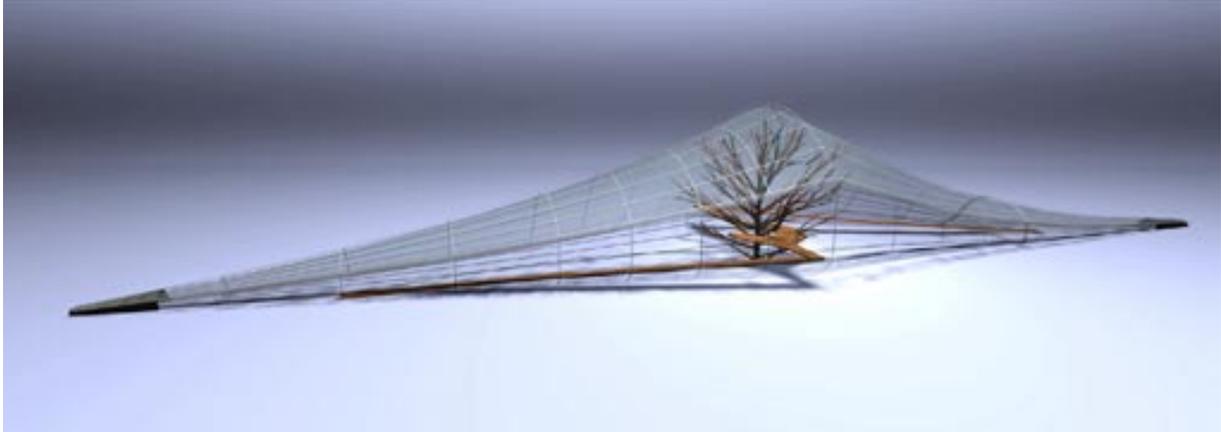


AVIARY OF THE NEW MARINE ZOO OF BARCELONA

Description of the Aviary at Barcelona's new Marine Zoo



The aviary, with its asymmetric, fusiform geometry is laid out longitudinally in order to create longer flight paths. Its ground plan is 237 metres long, 62 metres wide at its broadest and 15 metres wide at its narrowest point, with a maximum height of 25 metres in the central area. The main area is a large bird enclosure closed in by mesh, with a ground plan of 9,000 m². In the centre is the treelike structure which acts as a support for a green hydroponic landscape (1,256 m²).



The main construction is a double compensated cable structure, with two surfaces with an anticlastic conical directrix in the form of continuous stainless steel mesh. The lower end of each of the cables will be attached to a reinforced concrete support forming the entrance and exit ways to the enclosure.



The landscape of the marshes is drawn inside the aviary; it is the natural habitat of the birds, which are native species of marshland and seaboard woods. In this case, our reference is the Empordà marshlands park.

The strategy is the understanding that to construct a landscape inside the zoo is to define an architecture of the natural and the artificial landscape.

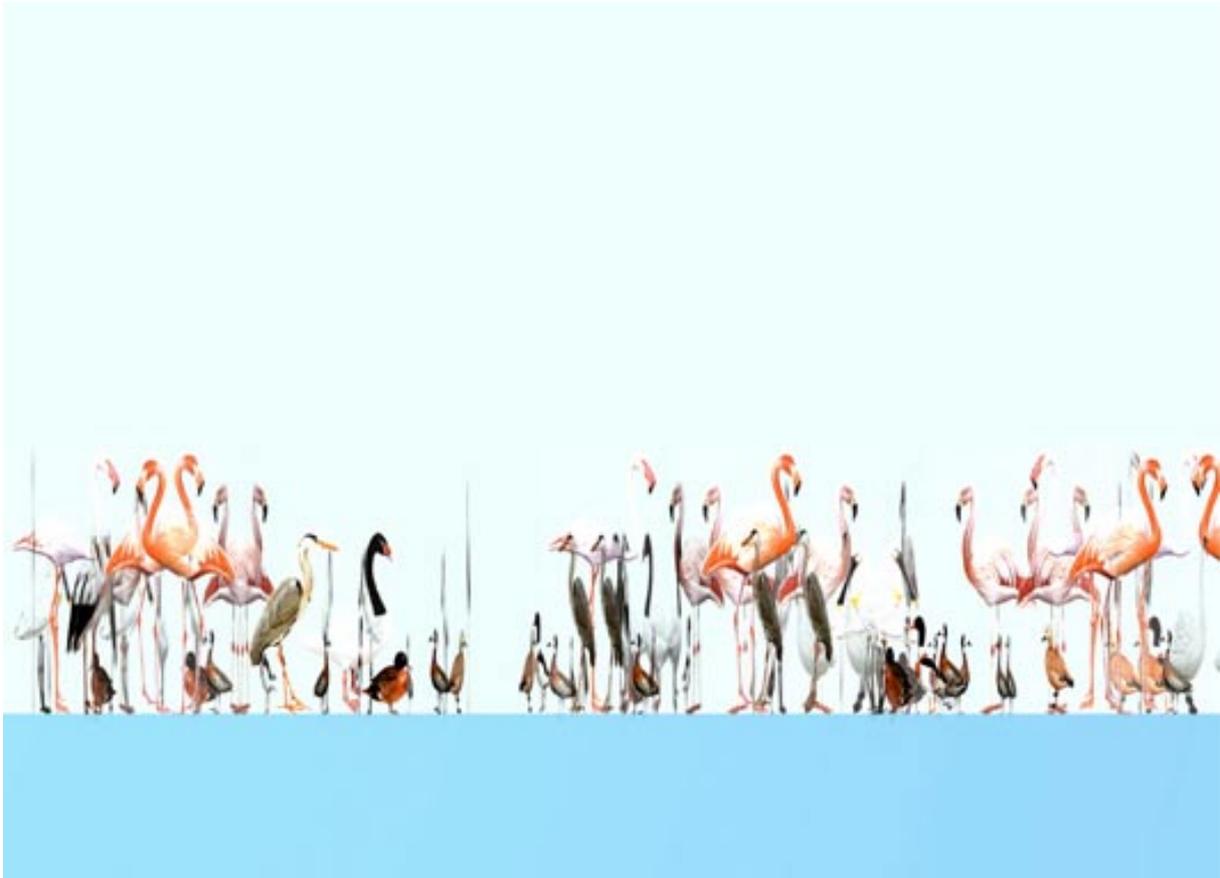
Solution: the Penrose system.

When designing a landscape inside the aviary, we cannot simply adopt a real landscape and scale it down, reducing it to fit the available plot.

What we propose is an exercise in abstraction, a reduction of complexities and relations with a view to understanding the wealth of a landscape without the necessity for a larger space in which to develop it.

The Penrose mosaic allows us to create an infinite, extensive, non-repetitive landscape. It addresses the issue of continuity, at the same time taking into account the different units and individual elements within it around which it creates borders, and marking out the layout, contours and so on.

AVIFAUNA

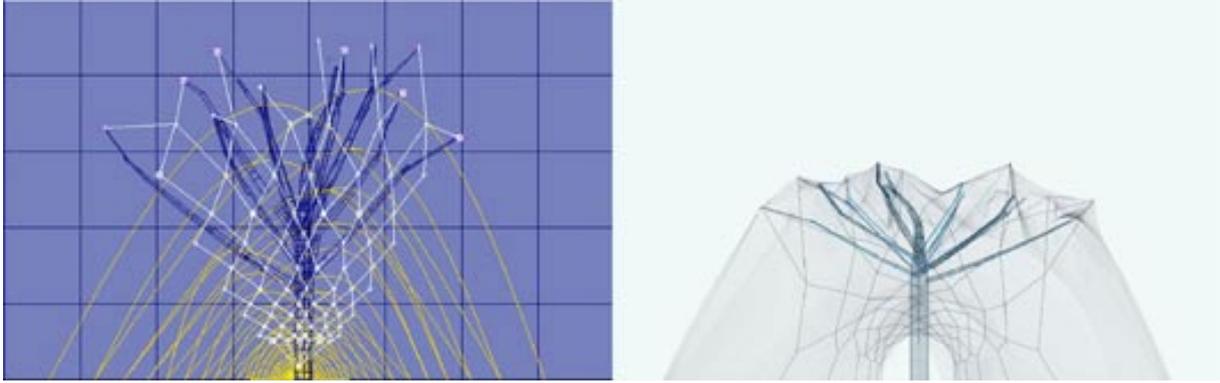


The aviary will house the new zoo's water birds: large native species which live in an aquatic environment.

In total there are 62 species and 785 birds, of which the zoo currently houses 34 and 426, respectively.

All of these species can live together in one segregated volume.

The central treelike structure, covered with hidroponic plants, is the habitat for 9 species: the stork, spoonbill, grey heron, cattle egret, little egret, night heron, glossy ibis, cormorant and sacred ibis (265 birds / 136 current total), and serves as a support for the 132 nests it holds.



The main support is positioned in the centre: it is a tree-like structure comprising sections made up of stainless steel tube (Aisi-316-L type). The compensated design of the extensions of cable and the upper sliding support eliminate the need for horizontal load components; as a result, the dimensions of these pieces can be reduced to their simple function of compressed struts.

The main cables will be galvanised steel, 40 mm in diameter, and will be joined by steel clamps to form an asymmetric intertwined structure.

On one side (flamingo zone), this structure will form an increasing rhomboidal sequence; on the other (entrance area), the joined cables will progressively separate from a single "tendon" at one end, with a 160-mm diameter, to the twelve independent cables which will rest on the main branches of the tree. Basically, all the sections will comprise a tube construction in an automorphic rhomboidal arrangement.



The aim is to build the main treelike structure as a habitat for birds, using hydroponic cultures. The design involves plant capsules that are integrated into the structure and can be lowered for maintenance or exchanged for others from the nursery. The tree structure serves as both a support and a conduit for the hydroponic system that carries water with nutrients to the vegetation and drains it to the recirculation system. The tree is a hybrid: it is built of natural plants and artificial metal structure. The water goes up and the data taken from the sensors: information about climate, humidity, nutrition, and video images of the nest and birds, flows down. The tree is an "airport": it registers the life of the birds and analyses the production of the 230 nest sounds.

Tree process list



- 1-EXISTING NATURAL PINE TREE, "PI DE BOFARULL", 25m high x 40m diameter.
- 2-SCULPTURING DIGITAL trees using 3DMax software, process of changing parameters.
- 3-13 BRANCHES: hand made drawings by korean artist, used as 13 fractal elements to built the aviary full scale tree.
- 4-MAP of links of the 3D model, 72 points (x,y,z)
- 5-Path 3D model, 10 ml long.
- 6-Modeling of the poligons, variables diameters from 40cm to 5cm.
- 7-Development of the 61 poligons surfaces using FormZ software.
- 8-Romboic patern calculated by the streng forces aplied to 80 % transparency.
- 9-Sostenibility's plan on the use of a 2x1m stainless steel plate, by the lasser's soft. system.
- 10-Lasser Cutter ready to cut the stainless steel plate of 4 mm thikness.
- 11-Lasser on.
- 12-14-Process of cutting: a 4m long branch = 8 hours
- 15-17-Process of blending, 30°= 20 hours
- 18-19-First branch prototipe built, as a dodecaedric poligon.
- 20-3D modelling of the 4m long branch prototipe.
- 21-22-Natural Coconat fabrick mesh, interior skin of the HP capsule.
- 23-Hidroponic cultive capsule and plants, together with irrigation, humidity sensors and video network.
- 24-Relationship between the Aviary mesh, the prototipe and some birds.

List of the credits for the Aviary project

Office	Cloud 9
Principal architect	Enric Ruiz-Geli
Associate architect	Gerard Veciana
Stage	Project
Prototyping	2002
Construction	2006
Client	INFRAESTRUCTURES 2004 BARCELONA REGIONAL BARCELONA ZOO AJUNTAMENT DE BARCELONA
Client's advisors	
Biodiversity Script	Estudi Ramon Folch
Birds	Josep del Hoyo
Cloud 9's advisors	
Structure	Manuel Arguijo y asociados sl.
Know-how management	Peckam Guyton Albers & Viets, Inc.
Tree Landscaping	Jardins Munné Pericall sl, Silvia Bures
Growing Media	Bures sa, Silvia Bures
Irrigation System	Regaber, Ignaci Pujol
Multimedia Technology	Sono, Ramon Caus
Environmental Polluting Agents Prevention	Acyc sa, Antonio Casado
Landscape Lay out	Albert Bestard
Water Recluyng System	Phil Mayfield
Sostenibility and Instalations	Jaume Serrasolses
Waterlands	Fundacio Natura, Francesc Giro
Estimatives Cost	3M

Cloud 9 collaborators

Carlos Garcia, Carlos Bañon, Niko, Tine Beinemeier, Pablo Ros, Jordi Fernandez, Oscar Puga, Carolina Sanza, Eduardo Gutierrez, Andre Brössel, Fred Guillaud, Juanjo González, Rupert Maurus, Marina Sans, David Scheunemann, Philippe Bosch, Javier Villar.