

PNEUTRONICAL AND MECHATRONICAL SYSTEMS FOR A MEGAEDIFICE

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Extended Abstract: For the summer 2008 Olympic Games, the Beijing National Aquatics Centre, very well known as "The Water Cube", was realised and put into operation. This is a unique construction that uses the "Pneumatic Quasitransparent Cushions" technology, cushions that are positioned on a very large surface - over 100.000 m².

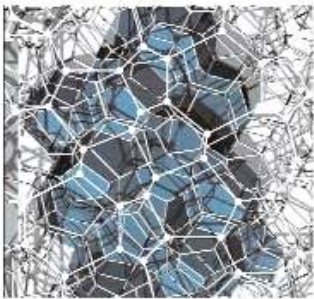


Fig. 1 - The hexagonal structure

• THE RESISTANCE STRUCTURE OF THE EDIFICE

The edifice structure consists in 21.000 steel members from steel with concrete profiles, a double network from steel pipes composed of 3.000 hexagons and almost 10.000 nodes, as well as a ETFE plastic membrane teflon type.

• PNEUMATIC QUASITRANSSPARENT CUSHIONS

The pneumatic quasitransparent cushions are hexagonal as shape, of different sizes and are very resistant at pressure, corrosion and fire; being very light, about 1% of glass specific mass, they determined a reduced mass of the edifice structure. The pneumatic cushions cover a surface-roof and walls - over 100.000 m² and use the solar rays for heating and lighting, reducing so the energy consumption with almost 30%.

• PNEUTRONICAL AND MECHATRONICAL SYSTEMS FOR CLIMATIZATION

The pneutronic systems are monitoring the compressed air pressure in each pneumatic cushion so that the sun light to enter within the edifice as much as possible in winter time, and only as required in summer time. The two cushion layers are separated by an indoor channel in which there is mounted a ventilation steel tubes. Their main attributes are to help breathing the building.

The mechatronic system is monitoring the inside temperature; thus, it is directly connected with the air holes of the ventilating tubulature.

The pneumatic cushions' pressure, and also the inside temperature and humidity are supervised and updated through computers.



Fig. 2 - The pneumatic quasitransparent cushions

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