The Millennium Dome is the largest dome-shaped tensile structure in the world. Built to herald the dawn of a new millennium, its design was inspired by time and the heavens. The 12 support towers represent the 12 hours, 12 months and 12 constellations of the sky. Each span is 365 meters apart, symbolic of the numbers of days in a standard year. Time and space were literally of the essence to the Millennium Dome Project.

After careful consultation with BuroHappold Engineering it was determined that the best solution would be an economical, lightweight tensile dome-styled structure that would enable a swift construction to address the short and inflexible time constraints. The other advantage of dome-shaped roofs is that they allow for a wide variety floor plans and configurations due to the wide placement of the support towers. The Greenwich Peninsula site was selected in 1996 – which is very late in a time line used in a project of this scale. The Millennium Dome had to be completed by 1998 to allow enough time for exhibitions for the Millennium Experience to be installed. Rather than building separate pavilions, it was much more cost-effective and time-efficient to use a tensile structure to enclose the entire space.

The Millennium Dome features twelve 100m high steel masts that support a tensioned net of seventy kilometres worth of steel cables, arranged radially on the surface of the roof and held in place by hanger and tie down cables. The canopy itself is a one millimetre white PTFE (polytetrafluoroethylene) fabric with an interior lining designed to reduce thermal gain, and improve thermal and acoustic performance – in essence absorb both sound and condensation. The Dome is naturally ventilated with openings at the centre of the roof to allow rising hot air to escape, while 12 fans work to draw cool air from the outside, in.

As previously mentioned one of the advantages of a tensile structures is the ability to easily modify interior spaces.
We took this degree of flexibility further by positioning the 12 service cylinders outside the perimeter of the Dome to create a ‘flexible racking system’. Our building service engineers cleverly opted to house the primary electrical and mechanical plants in these cylinders, in keeping with the architect’s aesthetic desires. The facade of these cylinders were outfitted with exterior fins which can be easily detached, to service and remove the plants as needed.

Sustainability is consistently a concern for the BuroHappold team. Great care was taken with the design of the Millennium Dome to minimise the environmental impact. Rainwater runoff is collected, naturally filtered through the reed beds and recycled as grey water for the toilets. The translucent PTFE canopy allows some sunlight to filter into the Dome thus reducing the need for interior lighting and lowering power usage. The energy which is needed for the facility comes from renewable sources, such as household waste, sewage and wind power.

In light of all of the extraordinary accomplishments of the Millennium Dome project, the team won the highly coveted Royal Academy of Engineering MacRobert Award for Innovation, the first construction project to win this prize since the Severn Bridge in the 1970’s.

The Millennium Dome was delivered within 15 months, under-budget and at a relatively inexpensive cost of £43million, which is a remarkable achievement given the scale of the project. Given the inherent flexibility of the design, the Dome site was transformed into a 20,000 seat arena for the London 2010 Olympic Games. Today the Millennium Dome houses the O2 Centre, which based on ticket sales, is one of the most popular concert venues in the world.