



1 CENTRAL PARK

Linear Static, Non Linear Static and Natural Frequency

Date: March 2011 to June 2013

Client: Kennovations, Sydney

Project Description:

David Beneke Consulting was commissioned by Kennovations, Sydney to assist with the structural design of heliostats and reflectors for the 1 Central Park project, Sydney. Situated at the previous Carlton and United Brewery site on Broadway in Sydney, the heliostats and reflectors formed part of a primary architectural feature associated with two building towers. The heliostats, placed on top of the shorter western tower reflect sunlight up to a series of reflectors positioned under a steelwork structure cantilevering off the taller east tower. From there the light is directed off down into the space between the two towers.

The structural design of the heliostats and reflectors involved various materials such as extruded aluminium, fabricated steel, stainless steel. Alubond sandwich panels were used as the reflective media for both structure types and was affixed using 3M VHB structural tape. A significant number of connections on the reflector also involved aluminium rivets, an uncommon occurrence in structural engineering.

Wind tunnel test results were used as the basis of the applied loads and a combination of linear static, non-linear static and natural frequency analyses were used to evaluate structural performance and allow member sizing and connection detailing. Particular attention was paid to the serviceability behaviour of the heliostats and reflectors. Minimum levels of natural frequency were adhered to minimise the potential for wind induced excitation of these structures to occur. In addition maximum rotations of both structures was rigidly adhered to ensure that when reflecting light, the movement of the reflection had minimal movement.



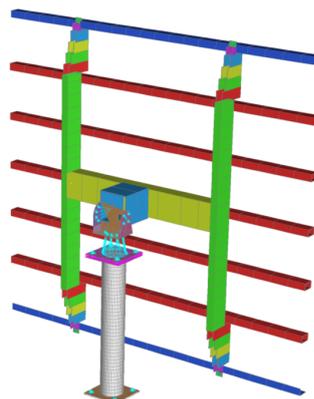
Upward view at the east tower cantilever supporting the reflectors.



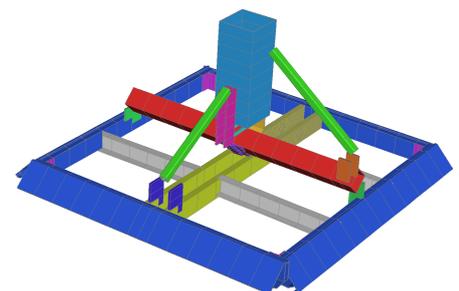
Heliostat panels on top of the west tower.

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Heliostat FEA Model



FEA model of a typical reflector.