



Structural mechanization of giant observation wheels

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Summary

The innovative design required to mechanize any large movable structure creates a high profile for engineering and can inspire opportunities for increasingly more creative kinetic architecture in buildings, sports stadia and bridge engineering.

The Vegas High Roller is the latest in the evolution of modern observation wheels with the London Eye and Singapore Flyer being notable precursors. Located in Las Vegas, the High Roller is arguably the most innovative and, at 167,6m high, currently the largest observation wheel in the world. It also has the largest capacity of any observation wheel, carrying 1120 people per 30 minute revolution.

This paper discusses the Vegas High Roller's mechanization systems, and how they address the particular demands of the project. It covers the challenges of designing a large moving structure for the desert environment, the interface between moving and static elements, details of the bearing arrangement, and the use of factory based development testing. The paper also covers the procurement methodology.

The paper should be read with the companion papers [1] and [2].

Keywords: Ferris wheel; giant observation wheel; movable structures; kinetic architecture; mechanization; spherical roller bearings; design-build.

1. Introduction

The recent resurgence in the construction of giant observation wheels (GOWs) is just part of an increasing interest in kinetic architecture.

Unlike their smaller fairground counterparts these devices have become iconic additions to city skylines and a catalyst for urban regeneration. Arup has been involved in the design of some of the largest of these wheels: the London Eye; the Singapore Flyer; and, most recently, the Vegas High Roller. All these wheels are in excess of 135m diameter and characterized by being continually rotating structures with large capacity cabins (or capsules) sitting outside the rim to create a panoramic view from the top, rather than hanging cabins stabilized by gravity.

While there are undoubtedly economic drivers encouraging the creation of GOWs, the technical challenges posed by these large rotating structures are similar to those of other moving structures such as movable bridges and retractable stadium roofs that use movement to enhance their function and, perhaps equally importantly, to provide some architectural or engineering delight.