MORPHEUS
MACAU, CHINA

Morpheus will form the fifth tower in Macau’s ‘City of Dreams’ complex, a premier leisure and entertainment destination for national and international visitors. Standing 40 storeys high, the 150,000 m$^2$ hotel will accommodate 780 guest rooms, luxury suites and villas, retail outlets, restaurants, a casino, spa and sky pool, as well as meeting and events spaces.

The architect conceived the tower as a monolithic block encased in a striking steel and glass lattice shell. BuroHappold Engineering was appointed to realise this unique exposed exoskeleton, which took considerable technical knowledge and ingenuity. We designed a complex mesh structure that will lend dynamism to the exterior of the tower while also producing a pleasing interior aesthetic by reducing the need for internal structural support, creating expansive spaces within. Sculptural in its appearance, the dramatic exterior will provide both a distinctive identity for the tower and an opportunity to optimise the spaces within.

To achieve the complicated exoskeleton connections of such scale and complexity were required that the structure could be considered the most challenging large-scale steelwork of its kind to ever be accomplished. While its striking, graceful form proved a challenge in itself, the structure also needed to withstand the region’s typhoon climate. The intricate shell can also be seen from inside the building, lending a delicate beauty to the vast, 40 m high lobby and flooding it with natural light.

With the structure being far from a conventional form, the BuroHappold team quickly established that finite element (FE) analysis was the only viable option for determining the structural accuracy of the links needed to achieve the complex geometry. Further challenges included the hotel’s aluminium cladding, which limited the available locations for the connections, and the timescale of just 12 months to complete the detailed design and documentation for the connections.

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CLIENT
Melco Crown (COD) Development Ltd

ARCHITECT
Zaha Hadid Architects

PROJECT VALUE
Confidential

DURATION
April 2012 – April 2016

SERVICES PROVIDED BY
BUROHAPPOLD
Structural engineering, ground engineering, facade engineering, building services engineering, fire engineering, SMART solutions
Drawing on our extensive experience of delivering highly complex structures, our team created a bespoke programmatic approach, enabling us to process the huge number of FE models required and, critically, the corresponding 3D visualisations of every connection. This approach enabled our team to focus on the engineering solution, rather than manually handling the data for each element. Our unique methodology led us to using software in ways that it had never been used before, working to the limits of its capabilities to produce cutting edge solutions. Manipulating the software to produce the desired results, combined with our engineering expertise, enabled us to deliver this seemingly impossible task on time and to the highest standard.

Working collaboratively with the wider design team we applied our expertise in facade and structural design to realise this phenomenal tower, rooting pioneering techniques within our tested methodology to shape a new future in hotel design.