

Project:
Resorts World Sentosa

Location:
Singapore

Project completed:
2010

Owner/s:
Resorts World Sentosa Pte Ltd

Contractors:
SembCorp Engineers &
Constructors
Kajima-Ting Seng JV
Low Keng Huat (S) Ltd
China JingYe Engineering
Corporation

Concrete Producer:
YTL Concrete (S) Pte Ltd

Architect:
DP Architects

Products used & amounts:
MasterGlenium® 105 SureTEC
– 2,513,480 litres
Conipur M800 – 250,000m³
MasterFlow® 870 – 1,500 bags

Contact:
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Perfecting Resorts World Sentosa in appeal and safety



Our reference in Resorts World Sentosa (Singapore). Photo courtesy of Resorts World Sentosa.

The background

Resorts World Sentosa is an integrated resort in Singapore offering key attractions that include theme parks, hotels, spa facilities, casino as well as meeting and incentive venues. Occupying 49 hectares of land on Sentosa island, the S\$6.59 billion (US\$4.93 billion) resort is developed by the conglomerate group, Genting Singapore.

Universal Studios Singapore, which covers a gross floor area of 245,000m², along with artificial water landscapes, numerous theme park rides and hotel facilities with more than 1,800 rooms, are among some of the project's highlights. The theme park also features the world's tallest pair of dueling roller coasters based on the Battlestar Galactica television series. The resort officially opened in 2010, following 34 months of construction.

The challenge

Under the Sustainable Construction Plan of the Building and Construction Authority, the Resorts World Sentosa Project was required to comply with its environmental guidelines, calling for the use of recycled materials with a reduced dependence on sand and other natural resources.

To fulfil the requirements, VSI manufactured sand (VSI M-sand) and blast furnace slag, substituting natural sand (N-Sand) and cement, were used in concrete production. However, the use of VSI M-sand presented challenges for the project, such as lower concrete strength and poorer slump retention as well as workability. These issues could not be easily overcome with the use of conventional admixtures for concrete.

Waterproofing the 2.5 metre-deep Universal Studios theme park lagoon, which covers an area of 13,000m² directly above an underground car park, was another challenge to surmount. Heavy dynamic loads acting on the Battlestar Galactica roller coaster also warranted a safe anchoring of its metal structure. All the work was completed under a tight project schedule.

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Our solution

Master Builders Solutions experts provided two concrete admixtures with different technical specifications to meet the project's diverse construction needs. They also supported the concrete suppliers in developing a mix design to optimize the use of VSI M-sand and slag.

MasterGlenium® 105 sureTEC, a new-generation superplasticiser, was applied on structures requiring high early and ultimate concrete strength. Containing polycarboxylate ether polymers, the product is designed with super retention (sureTEC) technology to facilitate the extension of concrete workability. It also allows early de-moulding of formworks. With high early strength, it enables other works to be conducted once the demoulds took place and helps to shorten construction time.

Waterproofing solutions provided by the Master Builders Solutions team for the Universal Studios theme park lagoon included Coniroof® system (now known as MasterSeal®) with a MasterSeal®180 top coat. These products, which are easy to apply and fast curing, helped the applicator meet the tight completion timeline. Upon application, they form robust, seamless membranes to provide a long-lasting waterproofing solution.

MasterFlow® 870 precision grouts, with its high-strength compressive and heavy impact resistance, were also installed to provide a safe anchoring for the Battlestar Galactica roller coaster. Given its high flowability, the grouts allowed quicker installation.

The customer's benefit

- Reduction in natural sand use, in compliance with the government's environmental guidelines.
- Fast and cost-effective project delivery.
- Enhanced durability of the facilities is expected to extend the project's service life with a relatively lower maintenance cost.

Projects facts at a glance

- Large-scale project requiring multiple high-quality solutions to be achieved with a tight schedule.
- Conservation of natural resources required.
- Master Builders Solutions provided the concrete admixtures and technical support to provide customized mix designs with the optimal use of manufactured sand and blast furnace slag.
- Swift progress facilitated using solutions offered by Master Builders Solutions, which included Rheobuild® 1000 (rebranded as MasterRheobuild® 1000) for production of highly fluid concrete, Glenium® 105 SureTEC (now known as MasterGlenium® 105 SureTec) for the production of easy-to-apply, fast-curing concrete with high early strength; MasterSeal® waterproofing solutions and highly flowable MasterFlow® grouts.

Master Builders Solutions by MBCC Group

The Master Builders Solutions brand expresses MBCC's expertise in providing customized chemical solutions for new construction, maintenance, repair and restoration of structures.

Master Builders Solutions is built on the experience gained from more than a century in the construction industry. At the core of the Master Builders Solutions brand is the combined know-how and experience of a global community of MBCC construction experts, who connect with you to solve all of your construction challenges.

Further information is available at:

www.master-builders-solutions.com/en-sg