

Dubai Mall

Client: EMAAR
Contractor: Dutco Balfour Beatty & AGCCC JV
Location: Dubai, UAE
Products: Alshor Plus / Rapidshor / Kwikstage Propping
Rapidclimb / Megashor / Superslim Soldiers

Case Study



Planned as the world's largest shopping mall, situated in the shadow of the world's tallest building – the stunning Burj Khalifa, the Dubai Mall has been one of the largest building projects that formwork and shoring specialist RMD Kwikform Middle East has been involved with. Built in partnership between construction firms Dutco Balfour Beatty and Al Ghandi Consolidated Contractors Company JV (AGCCC JV), the project, funded by EMAAR has further strengthened the position of Dubai as one of the Worlds top tourist destinations.

Housing hundreds of shops, an indoor ice rink, 22 screen cinema, the largest shopping mall aquarium in the world and more than 14,000 car parking spaces, the Dubai Mall has over 350,000 square metres of available space for letting. The main framework of the four storey 350,000 square metre footprint was constructed using formwork and shoring from RMD Kwikform Middle East.

Commenting on the scale of the build, RMD Kwikform Project Manager Andy Teesdale said; "This project is the perfect example of how our product range can be used and combined to construct such a vast structure. We had a whole range of equipment on site including Kwikstage Propping, Alshor Plus, Rapidshor, Superslim Soldiers, GTX Beams and aluminium Alsec Beams, Rapidclimb and Megashor. In total we had approx. 14,000 tonnes of equipment on-site, consisting of over 130,000 square metres of slab and

beam support, and approx. 20,000 square metres of wall formwork."

With RMD Kwikform equipment first arriving on-site in December 2004, the last concrete pour represented a formwork and shoring programme completion time of just 28 months – an impressive achievement for a project that used more than 650,000 cubic metres of concrete to create the final structure.

Before any equipment was delivered to site, RMD Kwikform Middle East engineers worked with Dutco Balfour Beatty and AGCCC JV to design formwork and shoring solutions for the varying wall heights and slab sizes that met both the requirements for flexibility and ease of use, as well as the tight programme time constraints dictated by the project.

Andy: "As a global business we were able to call upon a high level of engineering experience both from a technical and practical on-site perspective. Having worked in the UAE for a number of years, we also have the local knowledge and skills that are so important when dealing with any project. With the Dubai Mall, in addition to calling upon technical expertise from our specialist teams across the globe, we also compiled a team of five engineers and two full time site demonstrators and inspectors to manage the project. Our engineering team was responsible for the design of all formwork and shoring on-site, whilst the demonstrators and inspectors trained operatives in the assembly of equipment, quality checking work throughout the process."

In addition to the use of products from the RMD Kwikform Middle East range, bespoke steel fabricated column formwork were manufactured and delivered to site in December 2004, in order for work to commence prior to the main delivery of Alshor Plus tables and Kwikstage Shoring in February 2005. Used to support beams up to 700mm deep and in-situ concrete slabs of up to 350mm in thickness, the Alshor Plus tables combined with Superslim Soldier primary beams and GTX secondary beams throughout the main mall areas to support slab heights ranging from 6m to 9m.

For the large bespoke and more individual areas of formwork and shoring, including 1.5m deep beams and complex radial slabs and beams, Kwikstage Shoring was used. Similarly for the culverts and trenches totalling 1.5km in length, mobile Kwikstage tables were constructed to reduce the time taken for formwork to be erected and dismantled.

Andy: "The flexibility of Kwikstage Shoring really came into its own within the design for the Carnival and Galleria Car Park's. Here Kwikstage tables were designed to support both precast slabs and in-situ concrete beams,



a task that required complex design work to model the loads for both the precast slabs and in-situ reinforced concrete beams, in order to make sure the overall Kwikstage table construction could withstand the pressures.

“When it came to high pressure and loads, the design of the Mall Aquarium called for the use of our 80kN heavy duty Rapidshor steel shoring system to support the Aquariums huge reinforced concrete beams, one of which is up to 14m deep, 1m wide and 30m long. Before the final construction of the Aquarium roof slab, the Rapidshor was removed, with the 14m deep beam back-propped using our 1,000kN leg capacity Megashor system at one metre centres. Back propping the beam ensured that zero deflection occurred within the deep beam before the construction of the roof slab took place. In order to achieve this, each prop was constructed to a height of 7m with each prop having an axial capacity of 500kN.”

The final element of the construction that required the use of formwork, consisted of a variety of shear and culvert walls, formed using Alsec Beam

and Superslim Soldier formwork. This was also used for stair and elevator cores. For the largest shear reinforced concrete wall, measuring 35m high and 50m long, used to form part of the Carnival Car Park area, a Rapidclimb climbing formwork system was designed to enable the whole area to be formed in one smooth operation.

Andy: “For such a large project it was important to be able to break down the structure into its individual components and look ahead to see where equipment was needed. By having a team of engineers and full time staff on-site, we were able to deliver practical solutions to each individual element of the build.

One clear example of this was the design and manufacture of a rough terrain Alshor Plus wheel unit. This was specially manufactured to enable easy movement of the Alshor Plus tables over uneven sandy ground, due to the foundations slabs not being constructed prior to forming the floor slabs above. In itself this small addition delivered substantial time savings.”



Bahrain
T: +973 1738 2724
E: rmd.bahrain@rmdkwikform.com

Qatar
T: +974 4465 3034
E: rmd.qatar@rmdkwikform.com

Oman
T: +968 244 96037
E: rmd.oman@rmdkwikform.com

Saudi Arabia
T: +966 13 896 8665
E: rmd.ksa@rmdkwikform.com

UAE
T: +971 6 553 4173
E: rmd.uae@rmdkwikform.com

www.rmdkwikform.com