



# Focusing on best practice and

WITH SOUTH AFRICA BECOMING ONE of the fastest growing hubs for major construction work, the large scale and time constraints of projects in the country are requiring an increasing focus on organisation, design and the introduction of best practice techniques and engineering expertise.

As demand for a whole range of concrete structures grows – from commercial buildings to residential complexes and bridges to tunnels – the introduction of second-stage development for the existing infrastructure to support increases in population is adding to the construction needs of the country.

With so much activity taking place, the real challenge is to combine local experience with expertise gathered from similar projects across the globe. In doing so, efficiency gains can be made for programme time, delivery and cost. It is for these reasons that civil engineering businesses and building contractors in South Africa need to develop a two-pronged approach to tackle the obvious challenges.

The first is to put resources on the ground in the locality of the project in question. Recognising this need, RMD Kwikform South Africa has expanded its presence in the country following the opening of its head office in Pretoria, and now has operations in Cape Town, KwaZulu-Natal and Gauteng. The expansion is led by RMD Kwikform South Africa's new managing director, Theunis

Visser, who has considerable experience in the industry.

The second aspect is to share global expertise in a partnership approach with local businesses that can provide the labour and additional manpower resources required to erect equipment for use in formwork and falsework schemes. Only by supporting local businesses with engineering, training and design expertise can the industry secure a whole range of projects, large and small.

It is this build-up of trust, based around the introduction of best practice at all stages, coupled with the ability to introduce new equipment, including specially designed one-off items, that has ultimately led to the expansion of RMD Kwikform's global operations and its continued investment in South Africa.

## ENGINEERING EXCELLENCE AND BEST PRACTICE

Thanks to an impressive range of equipment, RMD Kwikform can tackle almost any formwork and falsework challenge. When customers are faced with a complex project, they turn to RMD Kwikform for engineering, equipment and support resources.

An example of this is the work carried out by RMD Kwikform Ibérica, who simultaneously worked on the construction of two distinctively different projects, the construction of the Ferreras Viaduct in Asturias, Spain, and the

bridge over the river Homen in Braga, Portugal.

Although each project was different, the solutions designed to support their construction both relied on the use of components from RMD Kwikform's flagship Megashor (1 000 kN) heavy-duty shoring system and beam ranges.

The first of the two projects to be squared off and recently opened for use is the box-shaped Ferreras Viaduct, situated on the Ballota–Cadavedo section of the A8 motorway widening scheme. The Ferreras Viaduct was constructed using an integrated formwork solution comprising a range of RMD Kwikform Ibérica equipment, including Megashor shoring, R700 girders and specially fabricated HEB-800 beams.

Based around a design incorporating gantry style falsework, the major challenge to this project was the development of a solution that did not require the use of intermediate supports, due to ground preparation issues. Measuring 11,5 m in width, the formwork and falsework solution was designed using interior formwork and split into five spans of lengths between axis of 25,5 m – 28,5 m – 31,5 m – 28,5 m – 25,5 m. In total the length of the viaduct between stop ends was 141,3 m, with the maximum height of the bridge approximately 30 m.

Santiago Palmero, RMD Kwikform Ibérica's technical director, says: 'The fact that we





# engineering excellence

couldn't use intermediate supports for this project meant we had to take a totally different view of the challenge we faced. In order to overcome the obstacles, we took an innovative approach to supporting the construction of the five different spans, using complete spans of R700 girders, supported by a row of Megashor feet on the foundations of the abutments. We then incorporated specialist transversal HEB-800 beams, reinforced with triple webs into the design. The HEB-800 beams loaded onto beams that went through the piers in their upper part. This was made possible thanks to windows in the structure that the client prepared, enabling equipment to be adequately sited.

'Once the viaduct was formed, in order to facilitate the removal of the falsework, we supplied hydraulic cylinders capable of withstanding 250 Tm with step strokes of 25 cm. These cylinders were placed in between the beams that went through the piers and the transversal HEB-800 beams that acted as support for the girders,' added Santiago.

In order to adapt to the variation in longitudinal and transversal slopes and to correct the deflections of the girders, RMD Kwikform

developed a system of double Superslim Soldier beams in the base of the formwork. Special parts were then fabricated to connect Slimshor (100 kN support system) bases to the beams to allow adjustments to be made according to girder deflections.

To ensure the highest levels of safety, RMD Kwikform designed a complete access system, including stairs and brackets that was made up of Superslim and T200 beams, anchored to the piers. This allowed complete safe access to key

parts of the system, allowing them to be monitored and measurements to be confirmed. With the final pour completed and equipment now removed from site, the successful on-time construction of the Ferreras Viaduct has enabled work to progress on the remainder of the A8 motorway project, with some sections already open to traffic.

Whilst RMD Kwikform staff were busy working with colleagues to complete the Ferreras project, engineers were helping to



- ① Ferreras Viaduct: individual span sections being lifted into position
- ② Bridge over the river Homen
- ③ Bridge over the river Homen: full span from the riverbank



design the complex and eye-catching formwork system used to construct the bridge to cross the river Homen.

The river valley is situated in a very rocky and mountainous area, and in order to construct the bridge, a robust yet flexible system of formwork and falsework had to be designed to closely follow the contours of the terrain.

This involved the use of a number of steel shoring, beam and girder products from RMD Kwikform comprehensive equipment range. These included Superslim Soldier and standard steel beams, H33 girders, Megashor and Rapidstage (also referred to as 'Kwikstage' in South Africa) shoring.

Spanning 130 m, with a bridge elevation of some 40 m from the centre of the valley, the height of the structure alone was a challenge for the team of engineers working on the project. As an extra dimension to consider, the preparation of the site was severely restricted due to its location in an environmentally protected area.

With weight restrictions and limited crane access, RMD Kwikform had to work closely with the Sá Machado team to utilise the strength and versatility of its Megashor (1 000 kN shoring system) and Rapidstage (35 kN shoring system) products in order to design an innovative combined system solution that could be easily erected, whilst providing the structural integrity needed to support the main bridge slab and sloping piles.

Says Santiago: 'In order to support the client's formwork for the sloping piles, we mounted a Rapidstage shoring structure onto a span of H33 girders. As a modular system, its versatility allowed us to work efficiently with the varying heights required to achieve the overall design. With a significant amount of Rapidstage shoring used within the design, its high leg capacity allowed RMD Kwikform to combine other components within our portfolio to achieve the significant height requirements which ranged up to 40 m.

'Constructed in phases the overall formwork and falsework design was secured to the base of the valley using H33 girders, which were positioned horizontally using jacks mounted on a small concrete base. Building up from the girders to achieve the required height for phase one, Rapidstage shoring was mounted and fixed to the H33 girders using adjustable jacks. Once work on the abutment was completed, equipment including steel beams, girders and Superslim Soldiers was used to create a platform from the abutment to the pile on each side of the valley.'



### FROM PORTUGAL AND SPAIN TO QATAR

RMD Kwikform has helped numerous customers benefit from its focus on best practice. An example is RMD Kwikform Middle East's relationship with construction specialist J and P in Qatar. Having worked with the business for a number of years, the company was heavily involved with a major project to construct the new US\$118 million Hamad Medical City and Car Park in the city of Doha.

Recognising the scale of the project, which had a footprint of more than 350 000 m<sup>2</sup>, there was a need to support J and P at local level. RMD Kwikform opened an office in Qatar to oversee the overall concrete construction phase, which used its Alshor Plus formwork and falsework equipment. Work on the project commenced in August 2005 and was completed in June 2006; in total the vast scale of the development saw 1 100 tonnes of equipment used to form 285 000 m<sup>2</sup> of slabs 285 mm to 1 000 mm thick.

With the availability of skilled labour and time being a key issue in the project, the use of RMD Kwikform's aluminium shoring and support system, Alshor Plus (with a leg load capacity of 120 kN), was specified as the main equipment for the project.

J and P soon recognised the possibilities made available by the Alshor Plus system, figuring out additional uses for the system before the first delivery arrived on site. In addition to the more traditional use of the product, flying tables, mobile back propping tables and heavily loaded 26 m high supports have been designed to assist with the construction.

### SECURING ADDITIONAL WORK

The success of the above project was the key to unlocking the wonders of The Pearl, a US\$2,5 billion artificial island being constructed off the coast of the West Bay Lagoon area in Doha. Covering 400 ha, the development aims to create over 40 km of new coastline accessed

by visitors and some 30 000 residents, by no fewer than 26 bridges. Developed by the United Development Company (UDC), the bridge phase of the project was awarded to J and P, using equipment and designs from RMD Kwikform in the Middle East.

Once the erection team had completed the second phase of the design to construct the formwork from the abutment to the pile on each side of the valley, Megashor towers (1 000 kN support system) were constructed to allow H33 girders to be fixed on top for the next elevation.

Following the completion of the two main abutments, the main span of the bridge was erected using a number of H33 girders fixed together to create a central girder support some 24 m long, over the river. Says Santiago: 'In order to move the central girders into place, we had to overcome one very large hurdle, the fact that we could not bring in heavy cranes to lower them into place.

'This is where the RMD Kwikform engineering team came into its own, designing a specialist auxiliary scaffolding structure which would allow us to erect the girders. To make the process as simple and safe as possible, we positioned each girder into place one by one. Once the central span of girders was completed, Rapidstage shoring was erected on top to a height of up to 20 m in order to support the formwork that would then give the bridge its definitive and distinctive form.'

RMD Kwikform South Africa is helping businesses across the country meet the challenges of shaping the South African landscape, creating solutions to make the most challenging of projects simple and safe to construct. With no project too small or large and access to world-class equipment supported by an expanding branch network, customers are seeing the benefits to be gained from working with a business focused on best practice and engineering excellence. ■

Source:

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