

Jointless design for industrial floor slab

Twintec Scandinavia AB of Malmö, part of the Twintec International Group of Companies based in Luxembourg, has recently designed and installed a 21,500m² suspended concrete industrial floor slab for Prologis at a large distribution centre that will be operated by the Lear Corporation at Gothenburg, Sweden.

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Figure 1: The most effective way of incorporating the steel fibres is with a pneumatic 'blast' machine.

The Lear Corporation is a supply chain partner to the car manufacturer, Volvo, delivering equipment for the interior of cars. The main contractor was Logistic Contractor HB (owned by Wäst-Bygg AB and WH-Bygg AB); this company was created to specialise in the design and construction of buildings for the logistics industry and has an agreement with Prologis in Scandinavia. Twintec has now designed and installed industrial floor slabs for Prologis in Sweden, Germany, France and the UK.

Design challenge

The demands placed upon the ground floor slab were high; the entire slab was suspended on 235mm square concrete piles with a pile head diameter of 600mm on a grid of 3.6 × 3.6m and needed to support a UDL of 35kN/m² and for a maximum racking end frame of 120 kN.

Twintec's solution for this project was a simply supported, jointless design, 240mm thick, using C30/37 concrete with a 0.52 water/cement ratio and reinforced with 45kg/m³ steel fibres. No additional structural bar was required in this design. Twintec verify their designs for the ultimate state using yield line theory, together with a finite element/grillage analysis in order to verify the service state.

The fact that no additional reinforcement is used leads to increased productivity, simplified use of the laserscreed and, of course, means that there will be no compaction problems over piles, which has been experienced with combination steel-fibre/bar designs.



Figure 2: Twintec's low-pressure concrete dumpers.

Steel-fibre reinforcement

Twintec's AFT +1/60 fibres (high-tensile undulated steel fibres, 60mm long and 1mm in diameter) were used to reinforce the concrete. Proper mixing of the fibres is essential, ensuring that a uniform distribution of the fibres takes place throughout the batch. In Twintec's experience, the most effective way of incorporating the steel fibres is with a pneumatic 'blast' machine (see Figure 1).

Concrete placement

Due to the poor ground conditions, direct discharge was not possible and to pump all of the concrete would have been slow. As successfully used on many projects previously, Twintec chose to use their fleet of low-pressure concrete dumpers (see Figure 2).

Flatness tolerance

The flatness tolerance for the whole of the floor area complied with Swedish Standard AMA98 (3mm in 2m) and no remedial grinding was needed anywhere on the slab. In order to achieve the high standards of flatness in large area jointless pours on this, as well as on other sites, Twintec ensures that its

installation teams receive the proper level of training and supervision. The company has also developed a selection of specialist tools and some unique techniques. In addition,

projects are planned well, managed effectively and resourced correctly. As a result, it is possible to consistently produce very flat floors without the need for remedial grinding (see Figure 3).

Vital to the finished quality of any floor slab is the commitment of all parties on site to a shared goal. All those concerned in the project realised the vital importance of the floor slab to the long-term success of the building user. As a result, following extensive discussions and considerable planning, the works were programmed at the time

when conditions for producing such a floor slab were as ideal as possible.

Conclusion

Using 5160m³ of concrete, 230 tonnes of steel fibres, 100 tonnes of dry-shake topping and 2000 litres of curing agent/sealer, Twintec produced the floor slab in just 13 days. The floor slab is virtually fibre-free and the survey results for flatness are outstanding. ■



Figure 3: With the correct approach, it is possible to consistently produce very flat floors without the need for remedial grinding.