



**R&G Engineering**  
Global Solutions

# Case study

## EuroCaps Expansion Tredegar, UK



EuroCaps extended a warehouse and a production area at its base on Crown Business Park by 3200m<sup>2</sup>.

Twintec Projects Ltd. was appointed by the end-user to design and build their new 3,200 m<sup>2</sup> ground floor slab for the extension. Because of the manufacturing process of EuroCaps a so called "Clean Room" construction was required. Therefore the whole slab was finished with a Epoxy resin. The design of the floor slab and its connections to the adjacent structure was provided by R&G Engineering, responsible for designs for the Twintec Group.

With the product "Twintec® ULTIMATE" Twintec has specialised in constructing slabs with optimised crack control, so that the occurring cracks at the wearing surface of the floor are reduced to a minimum. Important factors for this crack control are, in addition to the steel fibres, the presence of a reinforcement mesh at the top of the floor and the optimal concrete mix proportions to minimise the shrinkage. The project was completed in December 2019.

### Project specifications:

Project:	EuroCaps expansion in Tredegar (UK)
Type:	Warehouse and production area
Floor slab:	Twintec® ULTIMATE
Slab depth:	160 mm, with steel fabric # Ø9-100 at top
Fibre type:	AFT® 08/55
Fibre dosage:	30 kg/m <sup>3</sup>
Foundation type:	On grade (5% CBR)
M2:	3200m <sup>2</sup>
Surface finish:	Epoxy resin



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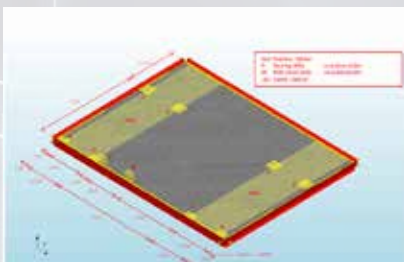
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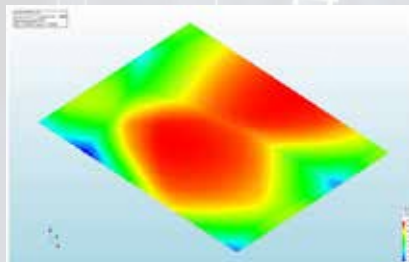
### Calculation:

For the design, non-linear calculations were executed with the Diana FEM program. The advantage of this specialist analysis is that, based on the design parameters such as soil conditions and loads specifications, the deformations, crack pattern and crack widths can be accurately calculated as per Eurocode BS EN 1992, enabling an optimal floor design. A special design requirement for this floor was that it had to be designed for liquid tightness. Therefore the average design crack width at the top mesh of the floor was limited to 0.15 mm.

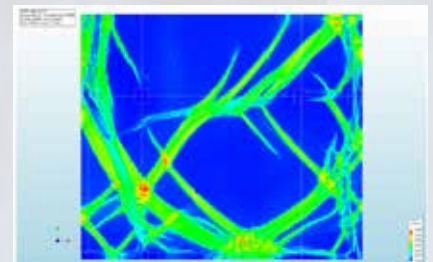
In picture 1 an image of the Diana model with the loads. In picture 2 the vertical deformations (in mm) of the model are presented. In picture 3 the maximum crack width (mm) for the topsurface of the slab is calculated, and shrinkage load has also been taken into account.



Picture 1



Picture 2

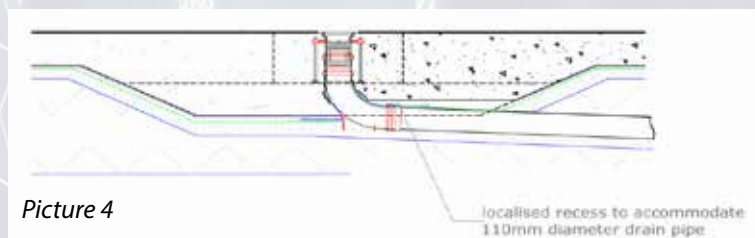


Picture 3

### Detailing:

To protect the new extension against ground gases (radon, carbon dioxide, carbon monoxide and methane) from the subbase a gas membrane was installed under the slab.

This impenetrable membrane presented a challenge for the detailing of penetrations for piping and required detailed interaction between the architect, the consultant of the building structure and Twintec Projects / R&G Engineering. See Picture 4.



Picture 4

localised recess to accommodate  
110mm diameter drain pipe.

A second challenge was that many recessed zones for equipment had to be installed in the floor. Due to the susceptibility to cracking formation of these zones, additional reinforcement around these zones was incorporated.



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### R&G Engineering, the company

R&G Engineering is a specialist engineering company, employing industry leading engineers and consultants with over 25 years of expertise in reinforced concrete structures.

The headquarters of the company is located in The Netherlands with local experts available worldwide.

With a primary focus on concrete flooring and building sub-structures, R&G Engineering provides innovative, state of the art consultancy services worldwide related to:

- Structural design
- Construction detailing
- Construction methodology
- Materials testing
- Surveying
- Maintenance & refurbishment

The company is uniquely placed to offer advice and to provide tailor made design solutions as a result of long term relations and experience worldwide with real estate investors, developers, consultancy firms, contractors, end users, local authorities, standards committees and universities.



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