PROJECT PROFILE
UK23-913

Teretek® chosen to treat subsidence in a warehouse in Ireland

INDUSTRY
Commercial

STRUCTURE
Warehouse

PROBLEM
Subsidence

LOCATION
Crok, Ireland

DURATION / YEAR
27 days, 2023

TECHNOLOGY
Teretek

BUSINESS UNIT
Mainmark UK

When their warehouse in Ireland continued showing the impact of severe and continued subsidence, Hosetech chose resin injection, rather than traditional piling, to treat the problem. Teretek®, tested and proven geopolymer resin injection technology from award-winning ground engineering specialists Mainmark, provided a quick, cost-effective solution when compared to the more disruptive traditional deep piling.

Hosetech manufacture and supply specialist hoses and fittings to a variety of businesses including those in the chemical, food, drink, pharmaceutical and automotive sectors. They moved their new head office to Little Island, Co Cork in 2005. This newly constructed building comprised of warehouses, a workshop and office areas. After a few months, signs of subsidence started to become apparent. Cracks first appeared in the concrete slab. As the ground settlement continued and the floor slab started to sink, the cracks got larger, especially in the warehouse area. Internal and external cracks also appeared in the block wall sections of the portal steel-framed building.

Surveys were commissioned and boreholes and trial pits revealed that the ground below the building comprised soft alluvial soil under made ground. In some areas, this type of soil with poor load-bearing capacity reached as much as 30m below ground level. The conclusion was that the original piles were not deep enough to continue providing adequate support to the steel frame structure above. The building continued to sink and uneven concrete slabs in the warehouse made safe operation of forklift trucks and the safe racking of goods increasingly difficult.

With finances around liabilities for the ongoing subsidence problems in order, Hosetech assessed three options available to them:

Demolish and rebuild the warehouse with new deep piles

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This is the costliest and most time-consuming option, and the business would have had to find alternative premises of a suitable size. The current warehouse was a bespoke size, making it more likely that finding a temporary alternative would involve renting premises larger than required – adding further costs on top of the move and business disruption.

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Re-piling of the warehouse foundations

The original piles would have to be replaced with piles of the correct size and depth to cope with the poor soil conditions. The concrete slab across the site would need to be removed and a new slab poured. Like the first option, the high cost, coupled with having to empty the building of stock and find an alternate business location made this option unattractive.

Finding a third way…alternative to piling

When faced with the first two costly, time-consuming and disruptive options, Hosetech began looking for alternatives. When they discovered resin injection technology and enquired about the application and case studies, it was seen as the most appropriate solution to the challenge.

Nathanael Ottman, Head of Purchasing at Hosetech commented:

“When Mainmark popped up on our radar their geopolymer solution seemed too good to be true and we were excited to see what they could do”

Why was resin injection the best option to treat subsidence in the warehouse?

Hosetech holds more than 350,000m of hoses and tubes and over 460,000 fittings, clips and clamps, making the smooth running, selection, and distribution of stock essential when providing the high level of service expected by their customers. This was in danger of being compromised by the continuing effects of subsidence as the settlement in the ground floor concrete slab had been measured at over 148mm between 2008 and 2017 and was continuing to sink.

Hosetech were looking for a solution that could treat the symptoms of subsidence in the sinking warehouse floor in the shortest possible timeframe and with minimal disruption to business operations. Resin injection technology fitted the bill on both counts.

The technology works by injecting a liquid mixture of a resin and hardener into the ground where a reaction between the two causes the liquid to expand and set quickly. During this expansion, the geopolymer resin fills any voids, cracks and discontinuities within the ground. When applied under floor slabs, the expansion of the resin compacts the loose soil under the slab, creating a denser soil matrix. Through carefully planned resin injection sequencing, the ground conditions beneath the warehouse floor were improved and the required lift was achieved in designated areas to address the unevenly sinking concrete slab. The whole process took a little over three weeks.

As the work was carefully planned to be carried out in sections of the warehouse at a time, the business could continue to operate. This made resin injection an easy choice over the traditional underpinning alternative of replacing all the piles. This would take over six to nine months, during which time the business would have to find alternative temporary premises from which to trade.

When asked why resin injection was chosen Hosetech’s Nathanael replied:

“Addressing the sinking warehouse floor was the number one priority for the business and resin injection technology gave us a way to achieve this and keep the business running at the same time”.

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What was the process that allowed resin injection to level up the subsided floor of the warehouse?

Mainmark specialist engineers began by carrying out a level survey of the warehouse floor. This established a datum point to which all other levels could be compared. Then a detailed plan of the injection point locations and sequence along with targets of lift to be achieved was drawn up for the 2135m2 of concrete slab to be treated.

The geopolymer Teretek® resin was delivered through injection tubes driven into the ground through 16mm holes drilled into the concrete slab. A controlled quantity of resin was injected at each location and lasers were used to check that the right amount of lift had occurred.

To prevent putting the concrete slab under undue stress, not all the resin needed achieve the specified lift at each injection point was delivered in one operation. The process had to be repeated at each location in stages, to lift the slab gradually and under monitoring, until the targets had been met. In all, more than 800 separate injections of resin took place and, in some positions, lifts as high as 300mm was achieved.

Mainmark coordinated their treatment programme with Hosetech to minimise disruption by treating sections of the warehouse in turn at times that suited the business operation. In this way, stock could be relocated elsewhere and then returned once the process was complete. This prompted a comment from Hosetech about the effect on the business.

“It was a much less impactful than we thought it would be”.

Why were Mainmark chosen to provide the resin injection solution?

When looking for companies who could carry out resin injection to treat the subsidence under the warehouse floor, Hosetech looked for detailed quotes, surveys and method statements to give them confidence in their chosen supplier.

Mainmark was quick in responding to Hosetech’s correspondence and, in response, rapidly sent out two engineers experienced in assessing commercial premises to evaluate the issues on-site in person.

With their overall professional and knowledgeable engineering and delivery approach, Mainmark was chosen to deliver the project objectives using resin injection technology. Mainmark provided survey results and the most appropriate and cost-effective recommended solution, methodology of delivery and quotation to Hosetech backed up by a 20-year materials and workmanship warranty.

The openness and genuine desire of Mainmark to work in partnership with their customer to find the optimum subsidence treatment solution impressed Hosetech. They also appreciated the honest approach that Mainmark took when evaluating the project. Hosetech were aware that, due to the poor soil conditions, the piles were likely to continue to sink and further subsidence could occur. Nathanael was impressed with the transparent and honest approach that Mainmark took:

“Mainmark did not try to claim that they could prevent all further subsidence using resin injection and said that, due to the underlying ground conditions, there would always be the possibility that further subsidence could occur.”

How can I find out more about using Mainmark’s resin injection technology to treat subsidence or a sinking floor slab in a warehouse?

Using Mainmark’s resin injection technology proved itself to be a cost-effective solution for Hosetech that could be tailored to suit the specific needs of their project and can be applied to a variety of commercial buildings where subsidence is present.

Nathanael summed up the experience of using Mainmark: “We were impressed by Mainmark’s honest and professional approach and are so pleased that we have used resin injection to return the warehouse to normal operations so quickly. It wasn’t too good to be true after all”