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Gripping end to design of innovative wall repair device

'Joining Forces North East', TWI's regional technology transfer programme, has helped a Tyne and Wear company to optimise the design of its novel wall-tie.

Holdfast's remedial wall-tie is for use where existing metal wall-ties in cavity construction buildings have failed, usually due to corrosion.

Invented by Holdfast themselves with design input and prototyping effort from Northumbria University, the company says that their new wall-tie is considerably faster and easier to install than existing remedial systems.

Easy installation

Fitting the new wall-tie involves drilling a suitable diameter hole through the outer wall and part-way into the inner wall. The wall-tie is then inserted, and hammered home to complete its installation.

Made from a long-fibre reinforced polymer composite material, the dual-expansion wall-tie consists of a 200mm long outer sheath and an inner sprue of similar length.

Fig.1. The Holdfast remedial wall-tie. Advanced polymer construction ensures that the wall-tie is strong and will not rust



Fig.2. Holdfast remedial wall-tie. Top: as supplied to user, ready for insertion;



Bottom: sprue removed and sheath opened to show construction

The sprue has a conical portion at each end causing expansion of the outer sheath into the pre-drilled hole in the inner and outer brickwork, locking the wall-tie in position.

Development and prototyping has taken Holdfast nearly seven years and the company was eager to ensure that its final design was the best possible. The organisation was put in touch with TWI's Joining Forces North East technology transfer programme which provided advice, technical support and R&D work to optimise the final design.

Finite Element Analysis

R&D work at TWI involved finite element analysis (FEA), a computer-based method widely used in engineering to study the effects of impact, vibration, thermal, or static loads on components and structures.

It can simulate and predict stresses, deformations, temperatures and other important parameters to achieve an understanding of strength and in-service performance.

FEA predicted the degree of grip between each end of the wall-tie and its corresponding hole in the inner or outer brickwork. TWI's FEA specialists were able to show that a small change in the geometry of the sprue would help achieve the desired equal amount of grip at each end of the wall-tie.

June Seaber-Tellum of Holdfast said: 'The additional design work carried out under Joining Forces North East was to ensure that when used in the field our new remedial wall-tie performs as effectively and efficiently as possible.

'TWI's analyses enabled us to modify the design with confidence and improve the tie's performance to end up with a superior product. An added benefit has been more credibility within our industry, gained through the application of sophisticated analytical tools plus specialist expertise.'