

CASE STUDY: THEOHEAT

THE BRIEF

Theoheat prides itself on its highly skilled technical team with over 50 years experience of underfloor heating. Theoheat offers three separate wet underfloor heating systems depending on the construction of the floors, tailoring their systems to work equally as well with either screed/solid, joisted or floating floors.

Each and every system is bespoke and designed to meet the needs and specifications of each customer, giving full control and flexibility for their systems to give the maximum heat output for their project.

Theoheat wished to design, manufacture and market its own range of Staple Gun for underfloor heating and require the support of the LJMU CW4.0 team to assess the potential solutions available to them to achieve these objectives, particularly in-house manufacturing.

THE APPROACH

A problem was identified with the hand-operated staplers used by Theoheat during the installation of their underfloor heating systems. Three different makes of staplers were supplied, all of which experienced the same problem as the staples were jamming during deployment. Clearing the staples can cause time delays in project delivery.

Experimental use of the various staple guns provided by Theoheat, along with the staples, revealed two discrete failure modes (identified as a "misfire" and "tipped staple") common to all of them. The mechanism of failure was investigated in greater depth and the worst staple gun was used for investigation as this could be found most reliable to have a failure induced.

It was decided that 'Tipping' would be the failure to look at addressing. By ensuring the stapler is perpendicular to the floor may remove all potential influences that lead to the problem. As such, a bolt-on plate at the bottom of the stapler, which could pick up on current stapler body fixing positions, would create an easy-to-use steading surface. This needed to be undertaken with great care to ensure that the application of the stapler was not compromised (i.e. staples needing to be inserted next to a wall, limiting the size of the plate on one side.)

Two prototypes would be developed utilising the following:

- 3D CAD modelling
- Additive Manufacturing

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THE BENEFITS

The real-time analysis was captured on a document and forwarded to Theoheat, providing a source of background information to draw on as the project progressed.

Investigation of solutions was facilitated by dismantling the selected staple gun before modelling it, and its associated staples, in CAD. Based on this, a range of initial solutions have been modelled and 3D printed for in-field testing by Theoheat.

“Working with the JMU has given Theoheat a new perspective on how we look at our products, the information provided was detailed and always explained in full.”

The information given by JMU was amazing to say the least, we had an issue with a staple gun this is not just ours but an industry issue, with the testing provided the simplest of things came to light but without their thorough testing we would never have come to this conclusion. We can't wait to work on another project with JMU.”

