

Solutions

How we cracked it

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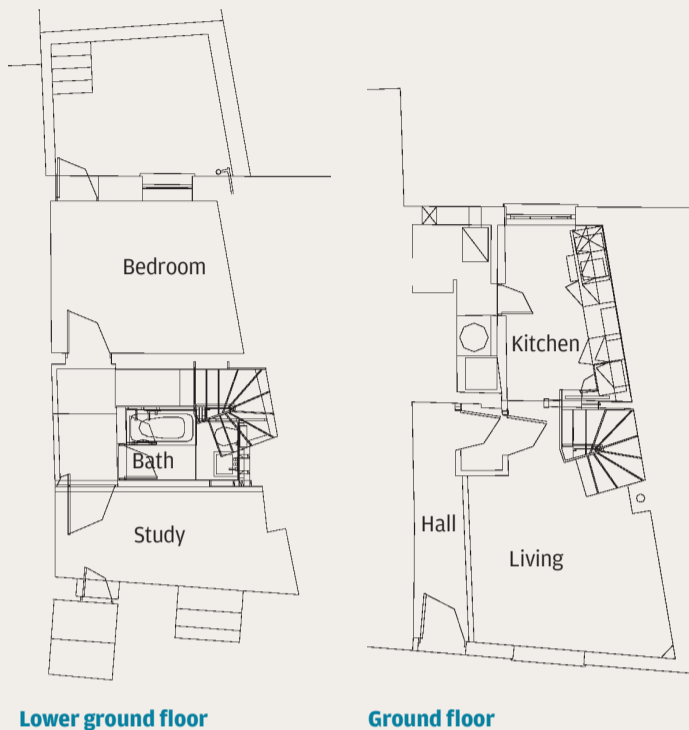
Flat-pack staircase, Islington apartment, London

To squeeze in a new staircase in a compact space, Lisa Harmey draws on the flat-pack system to create an innovative folding stair that can be used easily on domestic projects

Step 1 ▶ Tight space, tight budget

A small refurbishment project in a maisonette in an existing wedge-shaped terraced property, which tapers to 3.5m in width at the rear, had a lot to accommodate on a tight budget. The client wanted to maximise space, improve the layout and increase the property value. The project involved the installation of a new winding stair above a tiny bathroom between the two levels.

Detailed elements with complicated shapes can be hard to commission economically and often involve more than one fabricator. A standard stair system will not maximise space or achieve the quality of execution most architects demand, so it was decided to try a folding sheet stair solution using only one material.



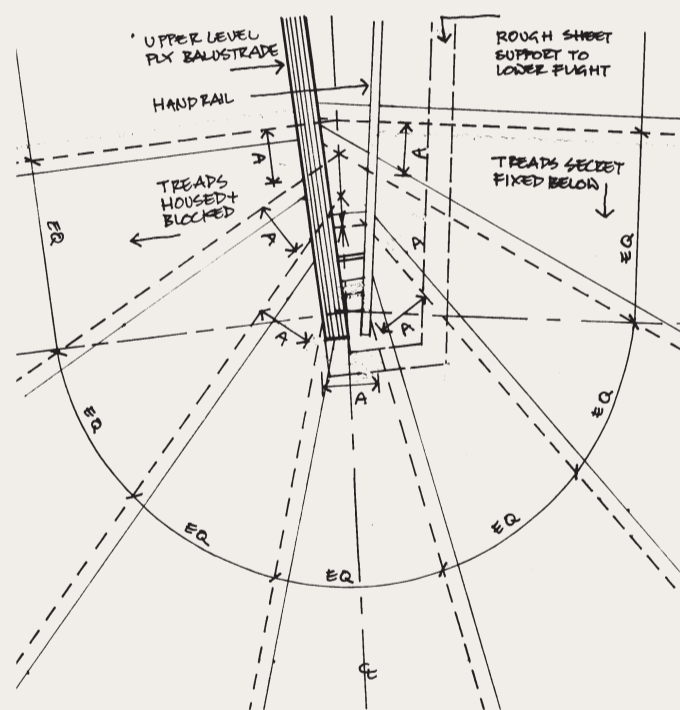
Lower ground floor

Ground floor

Step 3 ▶ Getting approvals

The resolution of junctions, checking loadings with the engineer and getting building regulations approval had to be resolved. The Tilly three-layer sheet proved sufficiently strong when checked by the engineer, critically in the balustrade and at the "newel" – vertical posts that provide support to horizontal beams and winding steps.

Part K of the building regulations (protection from falling collision and impact) shows how to set out winding steps with each tread having a minimum 50mm dimension at the narrowest point. Compliance was achieved by laying out the treads, not radially but symmetrically at the centre (see illustration, right) to achieve a constant tread width and an even spacing.



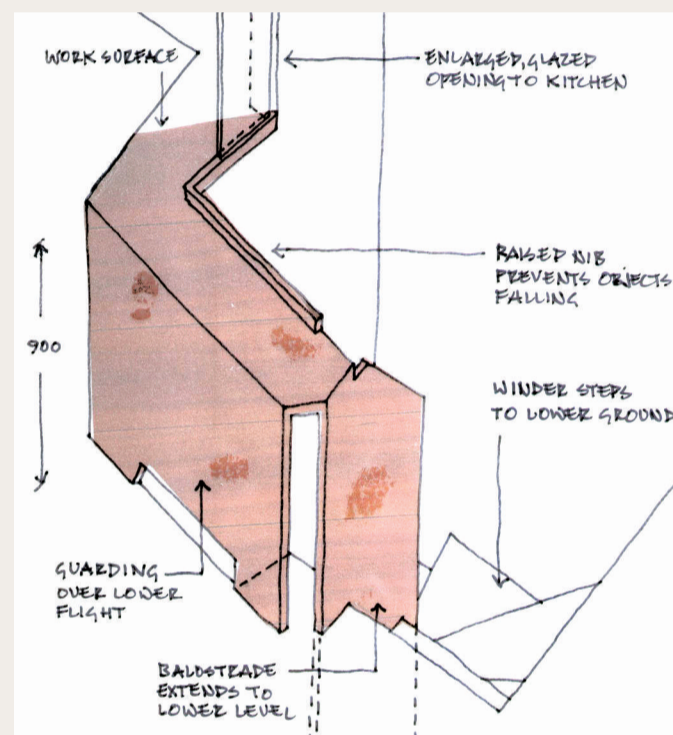
Step 2 ▶ Finding the material

Locating a suitable sheet material, in terms of the optimum 30mm thickness, available sizes and strength, needed research. Engineered plywood (Kerto Q from Finnforest), comprising 11 3mm-thick spruce layers, seemed to meet the criteria in terms of sizes available (up to 26m long), thickness and strength. However, it was clear that the surface, even when sanded and filled, was too crude for a domestic interior. An "S" grade birch plywood was substituted but proved less than ideal due to the thin face veneer,



which would not allow for re-sanding and reduced long-term durability.

Ultimately, a robust three-layer softwood (in larch, spruce, pine or oak) panel measuring 1.25m x 5m at a maximum thickness of 42mm manufactured by Austrian company Tilly (pictured above) proved to be the best choice for this project.



Ground-level axonometric

Step 4 ▶ Detail design

Chamfered junctions and screwed and plugged joints are used to achieve a seamless, fluid balustrade that folds back to meet a horizontal work surface on the first floor. Instead of using conventional edge supports for steps and balustrading, a timber solid panel has been used to perform all these functions. This solution is particularly appropriate for winding steps.

The stair can be constructed from cut sheets assembled by a normal contractor using standard straps, plates and joints to form junctions, although the setting-out template remains complex.

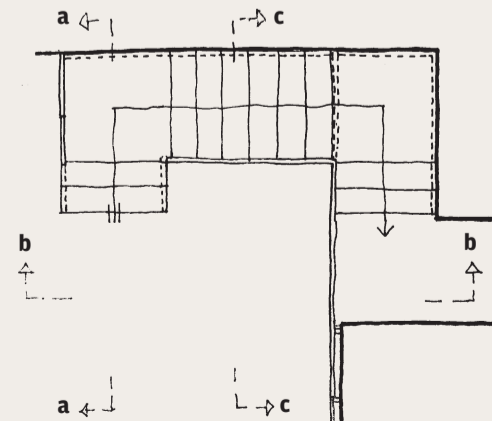
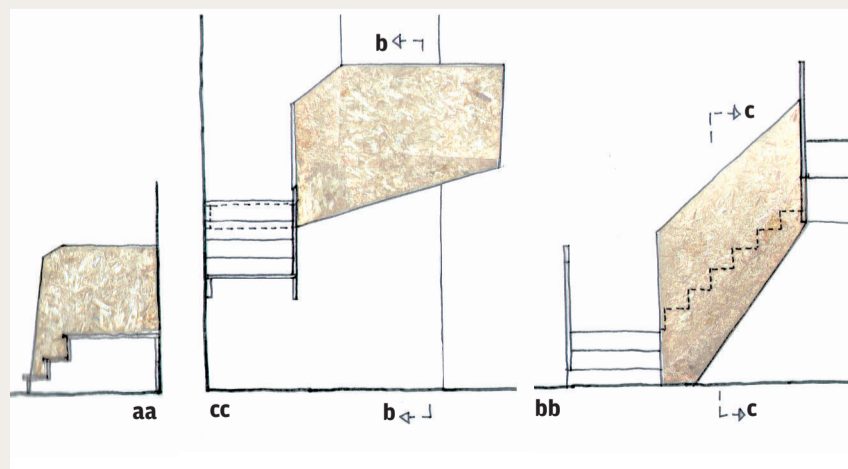
Several factors prevented the execution of this design. The traditional contractor was difficult to persuade and the sheet material specification was not straightforward. However, the flat-pack stair is now resolved and can be used when the opportunity next arises.

Step 5 Other applications ▼

The technology is similar to flat-pack furniture and this method of constructing a stair has the potential to be used as a system, using computer technology to cut bespoke shapes for individual projects and configurations. The system can be used on a typical layout (as shown, far right).

The illustrations show how the edge supports for steps can be extended vertically to form a timber wall or panel. The beauty of the system is that it can respond flexibly to different layouts.

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Have you solved an architectural problem in an ingenious manner? Contact Amanda Birch on 020 7921 8213 or email abirch@cmpinformation.com