

# Furniture Design for Re-use and Remanufacture in Compact Housing

Neat Living and Edinburgh Napier University

*A Scottish Institute for Remanufacture Case Study*

## A Neat solution to modern day living

Neat Living provide high quality, space efficient and energy efficient homes with a strong emphasis on occupant experience. Building on the findings of the Consumer Reuse Attitudinal Research commissioned by Zero Waste Scotland (2015), this project aimed to establish a set of guidelines for designing furniture for re-use and to test these in full scale furniture prototypes, in a collaborative partnership between Neat Living and Edinburgh Napier University's School of Arts and Creative Industries.

In a debrief of Scottish consumer research findings prepared by Crush et al (Zero Waste Scotland, 2015), participants identified personal motivations as more significant than local or environmental factors when considering re-use in furniture. Motivations for buying used included having the opportunity to purchase a one-off item, reacting against consumerism and the opportunity to reduce life span costs; the biggest barriers to uptake of used items included the stigma of used furniture and uncertainty regarding quality. Significant potential exists to address these concerns through furniture design which makes future re-use explicit, enables multiple options and embodies the quality and durability needed for several lifespans.

Through this project, the team set out to establish a set of principles for design for re-use in furniture with wider academic and economic value, and demonstrate the specific application of these principles with a commercial partner to illustrate the value of design for re-use and remanufacture. In doing so, the broader aim is to demonstrate the capacity of Scotland to design for re-use in the context of domestic furniture, create new furniture products with the potential to increase turnover for both skilled manufacturing subcontractors in Scotland in addition to construction, and so contribute towards reducing raw material use and move towards a circular economy.

## Engaging with users

The project identified key factors relevant to consumer choices about the reuse and remanufacture of living room storage furniture using

a targeted survey, and developed a new probe kit using magnetically attachable scale models, designed to elicit user response to the process of recombining modular furniture.

Using the approach of a probe kit for eliciting user responses to modular storage furniture was developed specifically through this project, and was packaged in a format suitable for wider applications.



*Probe kits for user engagement*

Through the results of the user survey and feedback from the probe kit, the project identified **key factors** in user decisions relating to living room storage furniture:

**Priorities for content of storage and display:** In descending order: ornaments/photos; TV; Books; Christmas cards, other

**Current user behaviour when faced with full storage units:** 41% have a big sort out; 21% cram more in; 19% reconfigure what they have

**Factors informing decision to reconfigure furniture:** 73% need more space; 62% want to change appearance

**Almost half or respondents (49%) would love the idea of reconfiguring furniture,** with a further 38% being fairly keen or not feeling strongly either way. Only 14% would not be keen to reconfigure what they have.

**Over two thirds (67%) of respondents would be fine with using simply tools such as a hex key or screwdriver** to reconfigure furniture, with the remainder happy to delve deeper into the world of powered cordless tools and 10% overjoyed to be using specialist tools.

**Visible Quality is the top priority for users choosing furniture, but durability is a close second**, followed by ease of maintenance and suitable colour for surroundings.

**Breakages or damage (76%)** was the number one factor for users getting rid of storage furniture, followed by change of appearance (57%), and then not being able to accommodate contents (43%).

## Design for reuse framework and prototype

The data analysis led to the development of a design for re-use framework for furniture, intended to be used to appraise existing or proposed furniture systems, and which informed a final prototype of modular storage furniture. This framework has benefits for a wide range of users;

- Designers – to assess and refine proposals;
- Consumers – as a shopping aid;
- Procurement and/or strategy of investment, e.g. for housing providers.

The potential cost savings are derived from the full product life-cycle, equivalent to approximately 5 normal life spans. Based on this prototype, the project benefits are significant;

**Job creation** – the turnover per project based on the size of furniture prototyped would be £2500 - £4000, though this would potentially increase with an improved profit margin for remanufacturing phase. Ten such projects would be equivalent to one small high-end furniture manufacturing business taking on an extra employee per year.

**Cost savings to the user** – although the original price would be approximately 60% higher than the equivalent item designed without re-use, the cost saving over 5 lifespans (25 years on a typical 5-year interior decoration cycle) would be approximately £7000, or 70% of the comparable cost without furniture re-use.

## Potential benefits of this approach

Accessing matched funding from the [Scottish Institute for Remanufacture](https://www.scot-reman.ac.uk) enabled the project team at Edinburgh Napier to demonstrate the viability of their prototype and design guidelines by collaborating with a circular economy focused manufacturing business, Neat Living. Graphically visualised results of the user survey, new draft guidelines for furniture design for remanufacture, and the scale prototype probe kit have informed further research identifying material use in remanufacture and repurposing furniture.

Plans are now being implemented to create a full-scale test housing unit at the Construction Scotland Innovation Centre, which will be an opportunity to test the permutations of the modular furniture unit with users. Further research steps include the refinement and testing of the scale magnetic modular furniture kit, strategies for identifying user priorities for space planning, and durability / reconfigurability testing through occupation and daily use.

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