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# lifewall

A modular emergency water storage and  
wellness system.

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# lifewall

A modular emergency water storage and wellness system.

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An exegesis presented in partial fulfilment of the requirements for the degree of Masters of Design (198.800) at Massey University, Wellington, New Zealand.

## Abstract

New Zealand is situated in the Pacific Ring of Fire at a junction of three tectonic plates generating steep mountainous topographies that create an environment susceptible to earthquakes, tsunamis, landslides, floods, and other natural disaster events.

The New Zealand Ministry of Civil Defence and Emergency Management supports and enables communities to manage when emergencies strike, and encourages preparedness across the country.

The Ministry recommends a list of emergency survival items for the home, including a supply of potable water. Specifically, three litres of water per person per day for three days.

The Ministry also recommends stocking enough food and water for up to two weeks in the home for prolonged emergencies.

A natural disaster event such as an earthquake can disrupt mains supplied potable water. The resilience of the water network systems during and after events is vital for the response and recovery of the community. Providing safe drinking water, in the initial days after a natural disaster event is crucial to maintaining the health, well-being and resilience of

isolated and affected disaster victims.

Conventional approaches to supplying water in a post natural disaster event zone have been proven logistically challenging, cumbersome and costly to maintain for extended periods of time.

These issues provide an opportunity for new product innovation to address the emergency water supply scenario.

Lifewall, the result of this research project, seeks to ameliorate many of the issues faced in emergency potable water supply due to a natural disaster event. Lifewall has been achieved through an iterative cycle of research through design, building an understanding of the disaster scenario and the latent performance needs required by users.

By taking a human centred industrial design approach, key performance features such as manual handling, usability, integration into the local environment and resilience along with desirability have been addressed. This has

involved a range of methods including: ideation, computer assisted design, task analysis, physical prototyping and testing throughout the project. This heuristic design approach has led to an emergency water storage system with a modular product architecture, which maximises water resource survivability and improves utility before and after a disaster event.

The Lifewall system consists of four main components:

Lifewall Unibody

Lifecell

Lifepod

BIQC (Bottle integrated quick coupler)

The Lifewall system sources water from the municipal supply. It filters and stores a volume of water for emergency purposes which renews and refreshes itself. It does this through the daily use of the living space that it is connected to. In a seismic event it automatically isolates itself to protect stored water, supporting resilience in the community.

During this research degree, New Zealand experienced the third biggest earthquake ever in its recorded history, a poignant reminder of the need for products of this type and design research in this area.

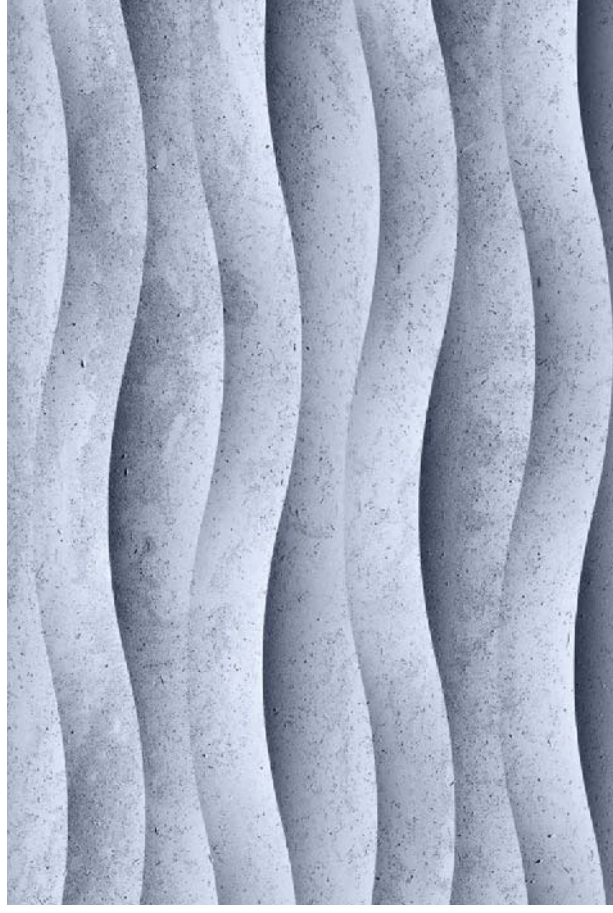


Fig. 1. Texture inspiration for the final Lifewall system.

## Acknowledgements

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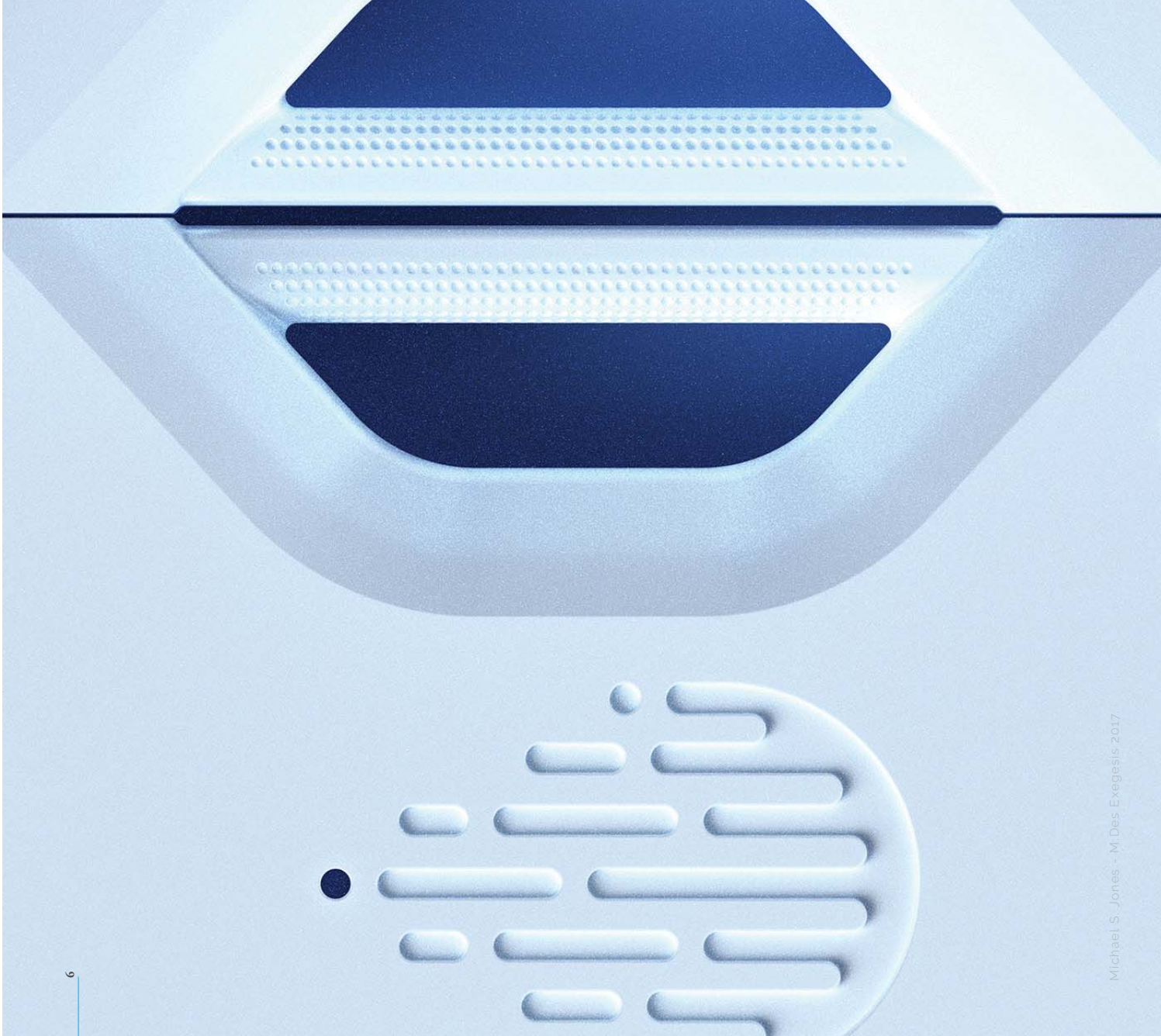


Fig. 2. Lifecell detail.

*"constantly think  
about how you could  
be doing things better"*  
- Elon Musk

## Table of Contents

- 4 Abstract
- 7 Acknowledgements
- 9 **Table of Contents**
- 11 Preface
- 12 Introduction
- 14 Context for research
- 16 Initial research questions
- 24 Market overview
- 26 Case studies
- 36 Design criteria 1.0 for Lifewall
- 40 Qualitative research
- 42 Design criteria 2.0 for Lifewall
- 44 **Research through design**
- 46 Design criteria 3.0 for Lifewall
- 48 Concept generation
- 54 Design development
- 68 Final design criteria
- 70 **The Final Design**
- 86 Evaluation
- 92 Conclusion
- 94 Reference list
- 97 **List of Figures and Tables**
- 98 **Appendices**

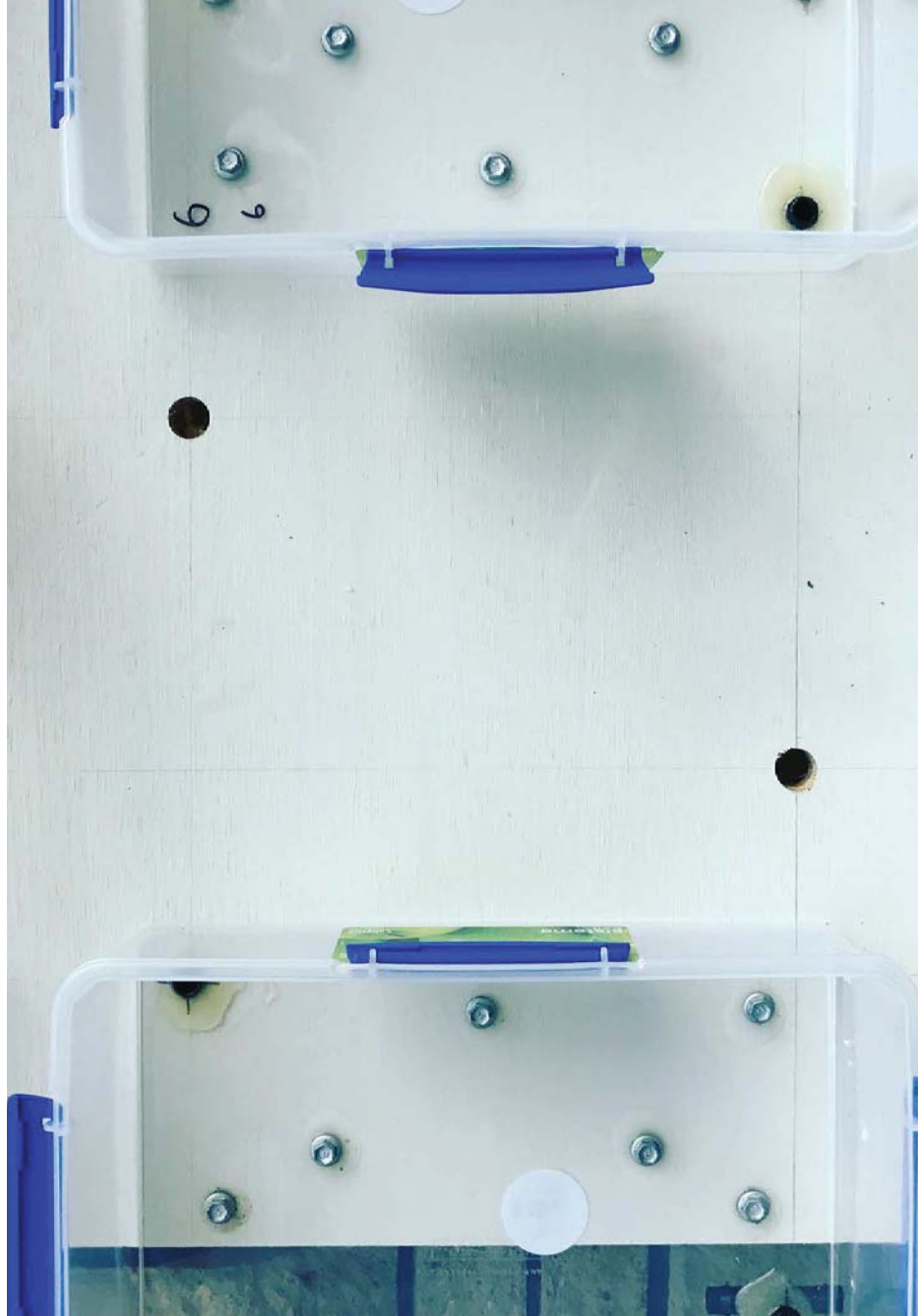


Fig. 3. Hydraulic prototype configuration 1.0 in construction.

## Preface

Following the 2004 Indian Ocean earthquake and tsunami, Affect – the Centre for Affective Design at Massey University, conducted a workshop at the Christchurch Town Hall. It was attended by design and product development professionals, designing product responses for a disaster scenario.

After the Christchurch workshop, an undergraduate paper was developed for third-year Industrial Design students in 2006. This was my opportunity to design a product for a disaster scenario.

My design outcome was a heavy-duty glove with integrated lighting to assist rescue searchers, removing the need to hold a torch in extremely confined spaces.

What fascinated me about the disaster scenario was how the systems we rely on to make many products function, are suddenly damaged or rendered useless. You could not depend on any power supply; communication lines would be down in various areas; water supply could be disrupted or damaged to the extent it was unsafe to drink.

The disaster scenario has provided an enduring fascination for me as a product designer. Living through the third largest earthquake in New Zealand's recorded history (Culverden, Kaikoura) was an affecting experience and left me considering how design could respond.

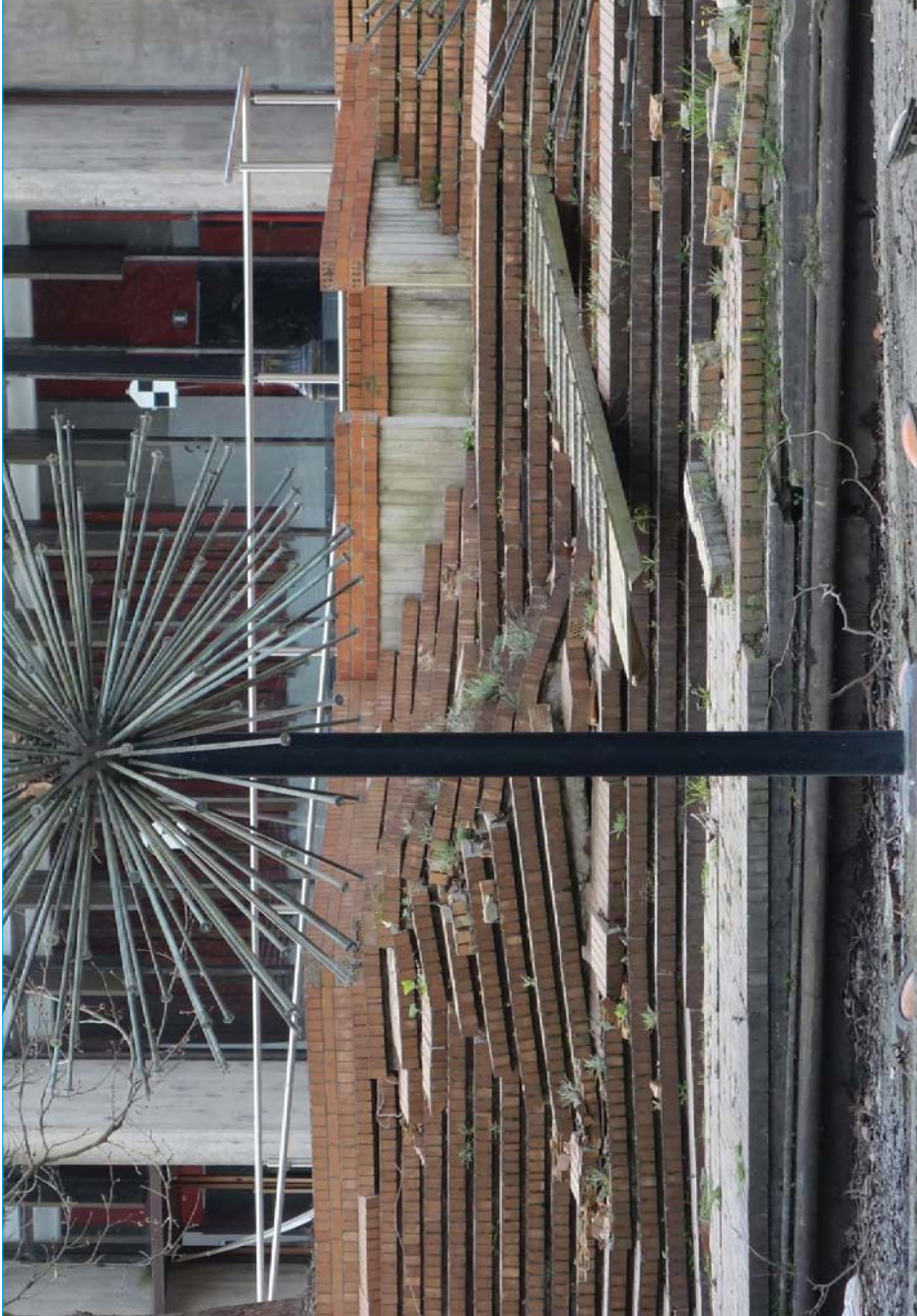


Fig. 4. The Christchurch Town Hall where the original Affect workshop was undertaken was destroyed by earthquake in 2011.