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Rethinking Refrigerated Containment

– a new vision of refrigerated exports

William Nicholson
MDES 2015

Rethinking Refrigerated
a new vision of refrigeration

WILLIAM NICHOLSON MDES

ABSTRACT

This project presents a vision of New Zealand could work smart to capitalise on a lucrative global opportunity, by offering an alternative to the current logistics and trade infrastructure of refrigerated exports.

With the aid of a world-first FTA (*Free-Trade Agreement*) (Barber, 2014), New Zealand frozen lamb exports to China are rapidly growing (*Meat Industry Association of New Zealand, 2013*). However, the current transportation and logistical systems used to export this product were developed over 37 years ago (Chua, 1978). With significant growth in the Chinese market, these systems are now inefficient and

new, lucrative Chinese market in this project comprises a flat shipping container system with packing modules. The flat-packing increases space efficiency and improves security when product. Internal packing modules are more efficient than the current in more complex

ACKNOWLEDGEMENTS

Thank you to the Ken & Elizabeth Powell Bursary, Massey's Master Scholarship and Tulia Moss for financial support. Thanks to my supervisors Tulia Moss, Patricia and Matthijs Siljee for your feedback and invaluable insight and a broad range of fields and people. A special thank you to James A and Sam McCafferty for your support, advice and design experience. Finally, Lauren Wepa for your support.

Figure 1. pg. XVI Global commercial shipping traffic.

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Figure 2. pg.8 Current issues of space efficiency and ability to clean are evident

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Figure 8. pg.13 Without a refrigeration unit Staxxon can flat-pack efficiently

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Figure 9. pg.13 Collapsing mechanism unsuitable for temperature sensitive

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5. pg.65 My second iteration focuses on developing a secure join without the use of pneumatic e.
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7. pg.66 Working across analog and digital modes in parallel.
8. pg.66 Laminated MDF mock-up rotates to connect and interlock the flat-pack panels. Sequence 1/3.
9. pg.67 A solid, air tight seal is achieved.
10. pg.67 Sequence 2/3.
11. pg.67 Sequence 3/3.
12. pg.68 After CAD modeling basic parts, sketching aids in the exploration of further ideas.
13. pg.68 Assembly process for the first iteration of the flat-pack configuration.
14. pg.69 Initial components were drawn in CAD to apply real, physical dimensions. Alternating between digital and analogue modes prompted various explorations of configuration.
15. pg.70 Ventilation of cool and warm air from the integrated refrigeration unit.
16. pg.71 Inset plug design provides two surfaces for an air tight seal to be achieved.
17. pg.71 An interlocking surface ensures the parts self locate and protect the sealing surface from damage which could compromise an air tight seal.
18. pg.71 Encapsulating plug design forms an air tight, torsionally rigid assembly.
19. pg.73 My initial cargo design for a 20ft reefer.
20. pg.73 Cargo is secured with a strap system which hooks into the pallet system, preventing damage and rejection.
21. pg.74 Warm air is extracted while cold air is fed directly into the ventilation system incorporated in my pallet design.

Figure 63. pg.77 Printed panels visualised the concept.

Figure 64. pg.77 Feedback session discussing manufacturing processes, extrusions and the infrastructure required to assemble the flat-pack design.

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Figure 66. pg.81 Floor and wall extrusion development.

Figure 67. pg.82 Final laser cut test of the extrusion design.

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Figure 74. pg.87 Symmetry and asymmetry working together.

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Figure 78. pg.89 Capsules are stacked in a 4 L x 4 W x 6 H to form one module. Each module contains 96 capsules each with a volume of 63.25L.

Figure 79. pg.89 Stacked module.

Figure 80. pg.90 Capsule seated firmly on pallet.

Figure 81. pg.90 Integrated strap system.

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4. pg.91 Module ready to be loaded for export.
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6. pg.91 Securely fastened cargo.
7. pg.91 My cargo design reduces potential damage, eliminates injury, increases food safety improves space efficiency.
3. pg.92 Flat-pack design allows for time efficient loading procedure.
2. pg.93 Hydraulic lifting plate.
2. pg.93 Early cardboard exploration of infrastructure.
1. pg.94 Aesthetic explorations and discussions with Sam McCafferty.
2. pg.96 Exterior asymmetry enforced aesthetic design language.
3. pg.96 Ergonomic considerations of container controls. I tested these in a full scale tape wing.
4. pg.97 Robust, balance, considered and appropriate.
5. pg.97 Subtle and concise detailing.
6. pg.98 I reflected the chosen design language in all aspects of the design.
7. pg.98 Two of many iterations. I explored design language in all aspects of my design.
3. pg.99 Durable, bold and appropriate design language communicated in my design of the infrastructure components.
2. pg. 99 I utilised material and colour choice to communicate system hierarchy.

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