

ITERATE



We created 5 versions of our prototype to perfect the interlocking arms. We went from an initial prototype with 4 arms to our final prototype with 16. Each arm has multiple notches to tailor the Z-Box to the shape and size of the product being shipped. After the Z-Box has been used, it can be fully recycled without the inconvenient need to separate the components into different waste streams since it is completely made of containerboard.

COMMUNICATE



On March 1, 2022, we were interviewed by *FIRST* Robotics Canada on its weekly *FIRST* Canada Live Twitch livestream. On the Show we shared our Z-Box innovation and our passion for STEM robotics enthusiasts around the world.

On February 2, 2022, the Canadian Corrugated and Containerboard (industry) Association posted our Z-Box presentation for the world to see on their YouTube channel. Shortly after that, on February 8, the Board of Directors of the CCCA watched our presentation at their quarterly board meeting. The Board members were thrilled with the effort, planning and execution of our Z-Box innovation.

Both PAC Global and the Canadian Corrugated and Containerboard Association have endorsed the Z-Box.



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March 31, 2022

Attn: FIRST Judges

It is my sincere wish to outline background detail about the amazing Team 5831 Ctrl-Z from Bayview Glen School in Toronto.

I was part of a presentation to this group in October of last year to outline details of the corrugated cardboard packaging industry in Canada. As a "2021" industry our work tends to go unnoticed by the public eye – but that is changing in a world of sharper focus on recycling and sustainability. We are proud to collect and recycle essentially all corrugated packaging materials in Canada. The Ctrl-Z group had detailed questions of my colleague and I that lead to serious discussion about how our industry functions.

The work Ctrl-Z embarked on is truly remarkable. From their own research after our meeting, they created a remarkable design for interior packing to replace fossil-based materials – and then prepared a solid business case capped with an incredible marketing video to announce their Z-Box!

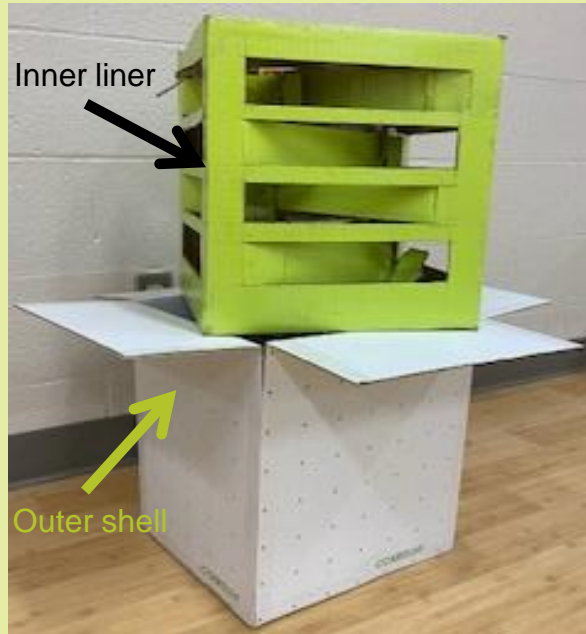
It was a pleasure to present their video and an outline of the design development to the Board of Directors of our Association. To a person, everyone present was thrilled with the effort, planning and execution of an innovation like the Z-Box.

We congratulate the team on winning the Ontario Innovation Celebration and wish to express upon your efforts deserve equal consideration on the Global stage as well.

Yours truly,

Allen Kirkpatrick
Executive Director
Canadian Corrugated & Containerboard Association

HOW THE Z-BOX WORKS



The item is placed securely in the Z-Box, then the locking arms of the inner container are secured to prevent any shifting within the box. The Z-Box is superior to current void fillers because it is easy to use, effective, and petroleum-free.



CTRL-Z TEAM 5831

Visit our:

- Website: <http://ctrlzfll.com>
- Product description: <https://youtu.be/tBOx6xoMd64>
- Presentation at: <https://youtu.be/EyPuPzLrRrk>



PROFITABILITY PROJECTION

Z-Box 8-Year Financial Projection				
Number of parcels shipped annually in Canada	1,470,000,000			
Percentage of parcels using the Z-Box	2%			
Number of parcels shipped using the Z-Box	29,400,000			
Percentage take up	2.0%	4.0%	7.0%	10.0%
Ctrl-Z selling price for Z-Box	\$0.90			
Number of units sold	294,000	588,000	1,029,000	1,470,000
Sales commission rate	0%			
Manufacturing equipment costs	\$14,000			
Equipment costs per unit	\$0.0095			
Revenue	Year 1	Year 2	Year 3	Year 4
	\$264,600	\$529,100	\$926,100	\$1,313,000
Per unit costs				
Variable cost % of selling price	50%			
Variable cost	\$0.45			
Equipment cost	\$0.0050	\$0.45		
Manufacturing costs	132,980	265,160	464,030	662,900
Manufacturing profit	132,020	264,040	462,070	650,100
Fixed costs				
Advertising	400,000	200,000	100,000	100,000
Insurance	50,000	50,000	50,000	50,000
Rent	15,000	15,000	15,000	15,000
General and admin	10,000	10,000	10,000	10,000
Pretax profit	(141,980)	(10,960)	287,070	484,100
Income taxes	(68,996)	(3,192)	57,414	97,020
Net income	(\$274,384)	(\$8,768)	\$229,656	\$388,080
Required rate of return on Z-Box	35.00%			
Present value	\$ 839,209	(\$ 209,507)	(\$ 612)	\$ 117,584

Ctrl-Z received advice from Atlantic Packaging Inc. concerning materials and technology to be used in the commercial version of the Z-Box. Ctrl-Z estimated the cost to produce the Z-Box, market demand volume and selling price per unit in developing financial projections for the Z-Box which provide strong indication that Z-Box can be a viable and profitable business.



IDENTIFY

Problem Identification

Currently used packaging void fillers, like bubble wrap and polystyrene foam peanuts, are less eco-friendly as they are made of plastics. Nearly all discarded plastics do not get recycled and end up as pollution. We need to make sure that our packaging does not harm the planet.

Research

We have consulted with experts, read several articles, completed a patent search and conducted a survey.

Experts

All our experts, leaders in their field, strongly endorsed the Z-Box.

James Downham, CEO of PAC Global, a Toronto-based global packaging association, found the Z-Box to be unique and recommended the use of thinner material and create different sized Z-Boxes to accommodate different-sized products. He also thought the Z-Box will improve the unboxing experience for the customer.

Allen Kirkpatrick, Executive Director of the Canadian Corrugated and Containerboard (industry) Association, taught us that 89% of corrugated boxes are recycled back into more corrugated boxes, and was impressed with our design.

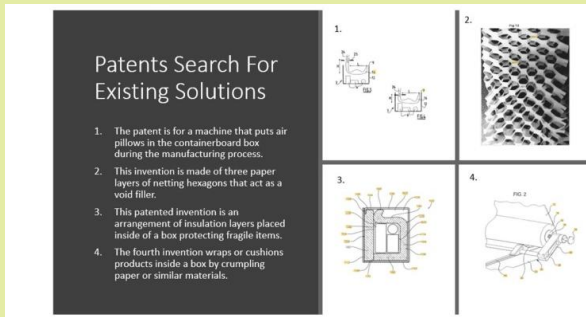
Robert Suga, Director of Quality and Continuous Improvement at Atlantic Packaging, one of Canada's largest containerboard manufacturers, said that the Z-Box is a very good concept and that shippers would appreciate its cost-efficiency.

Selected References

- Paper Packager Ranpak Packs a Punch-and So Could Its Stock, AI Root, Barron's, Dec 23, 2021
- Recycling Isn't as Clear-Cut as You Might Think, Jo Craven McGinty, Wall Street Journal, Apr 23, 2021
- The Parcel Shipping Boom Continues, Katharina Buchholz, Statista, Sep 28, 2021
- Turn Your Shipping Box into A Competitive Advantage, Brent Hughes, Forbes, Jan 11, 2021
- The Packaging Mistakes Companies Make-and Why They Make Them, Kate Murphey, Wall Street Journal, Nov 23, 2021
- Cardboard Boxes Have Never Been in More Demand-or More Expensive, Ryan Dezember, Wall Street Journal, Mar 31, 2021
- Dive-21% of Online Oversized Packages Arrive Damaged, Dan Alaimo, Retail Dive, Aug 27, 2018
- Don't Give Them A Break-Avoiding Parcel Shipping, Amware Fulfilment, Amware, Nov 30, 2020
- When Your Packaging Fails The Cost of Shipping Damage, Rocket Industrial, Rocket Industrial, Feb 20, 2020
- UPS-Peak Demand Projected to Exceed Capacity by 5M Packages Daily, Max Garland, Supply Chain Dive, Jul 27, 2021
- Items labelled as "fragile" not covered by Canada Post if damaged, Courtney Greenberg, CTV News Toronto, Feb 23, 2017

IDENTIFY (continued)

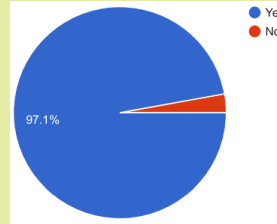
Existing Solutions



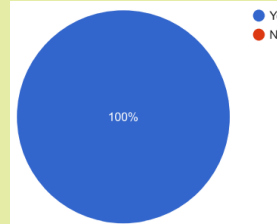
Our patent search revealed that the Z-Box is superior to existing void fillers because it is eco-friendly and convenient for shippers to use.

Survey Results

We surveyed adult consumers and 97% were concerned that most protective packaging is ending up as landfill. 100% of respondents would prefer to receive fully sustainable packaging.

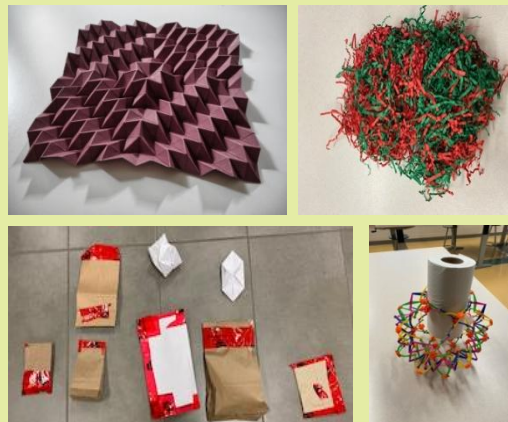


Does it concern you that most protective packaging, like bubble wrap, is petroleum-based and ends up in landfill?



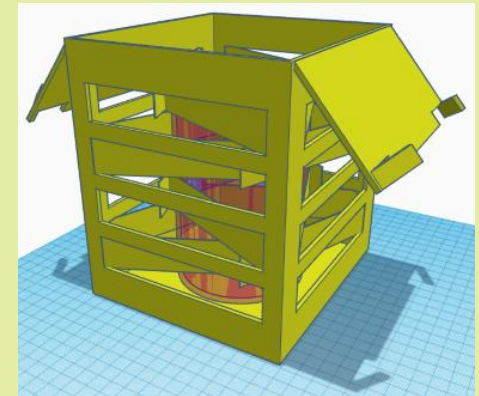
Would you prefer to receive products shipped in 100% sustainable packaging that can be fully recycled?

DESIGN



In developing an alternate void filler, we were inspired by the Hoberman Ball. We experimented with air filled bags and origami muri-ori fold as possible void fillers.

DESIGN (continued)



Our 3D prototype drawing using Tinkercad



Building our fourth prototype

CREATE

Ctrl-Z's Solution

The Z-Box is an integrated containerboard box solution that protects products of various sizes and shapes for shipping, while serving as an environmentally friendly alternative to traditional polystyrene and resin void fillers. The inner carton has adjustable interlocking pre-cut arms to safely encase the product during transport.

