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THE BRIEF

Finisterre has set Niall Jones the project to re-invent their garment components using Fishy Filaments material. Components like buttons, toggles, logos and zip pulls are fundamental when producing high quality clothing. Currently, nut composite buttons are imported in from Portugal. The toggles and clips are imported from China; Some made from recycled material, others not. Can we produce these products using local materials to a high standard of quality? The design must suit the brand, and the cold-water surfer culture.

FISHY FILAMENTS

The project partner Fishy Filaments produce high quality 3D print filament and injection moulding plastic made from 100% recycled Marine Nylon®. Fishy Filaments is based one the trust port harbour of Newlyn, Penzance. This is where the end - of - life fishing nets used by the MSC Certified Cornish Hake fishery are dropped off. Fishy Filaments produce pellets from the nets, and then processed into 3D printable filament or injection moulding pellets. Newlyn's fishing fleet turn over about 60 tonnes of end - of - life nets a year. I met Ian Falconer, the Director of Fishy Filament at the headquarters,

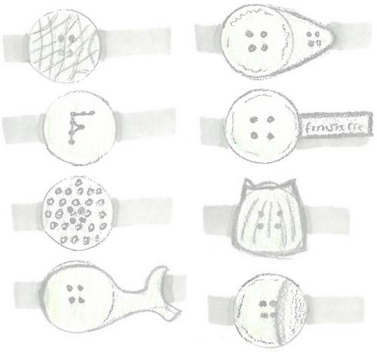
where I learnt the whole process of production and how to get the best quality prints when 3D printing with the material. Ian had kindly supplied me with the Marine Nylon® material for the project, and had offered his expertise in the material to help me produce best quality products.

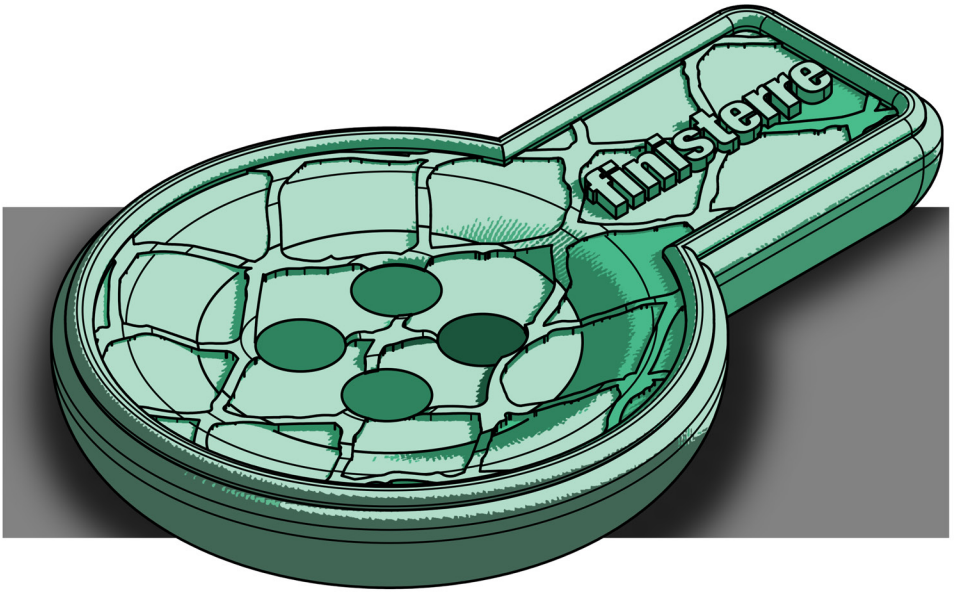
FISHY FILAMENTS 3D PRINTABLE
MARINE NYON® FILAMENT


FISHY FILAMENTS HQ, NEWLYN

SKETCHES

I started off the project sketching my initial thoughts. I then focused on different design practices such as aesthetics, ergonomics, and multi-functionality. I aimed to get as many sketches down as possible, allowing me to then cross off, or merge ideas together. I focused on the Finisterre brand to help me visualise the opportunity to add branding to the buttons where appropriate. My favourite / the most successful sketches were then put onto a laser cutter where I started my primary research. I also explored other components used by Finisterre such as; the toggle and the zip pull.

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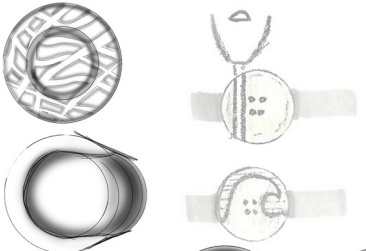

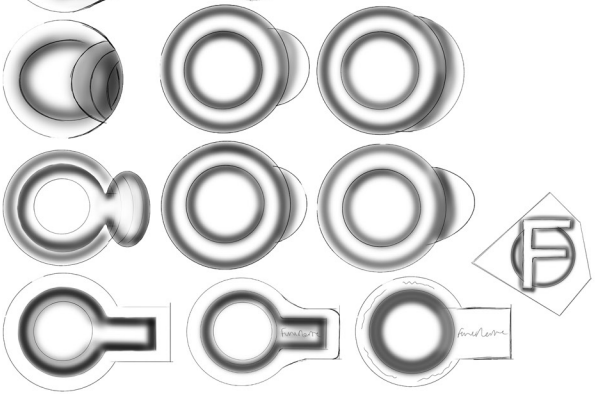

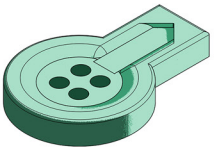

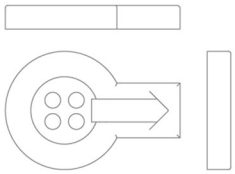

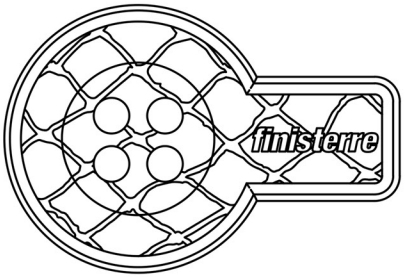
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RESEARCH

I started my research by laser cutting as many interesting button shapes I could imagine. Some based on ergonomics, others based on edges and points, with the idea that they will be more engaging with users that have cold / low dexterity hands. I put six different plywood buttons on a shirt, and asked 15 people to put on / take off the shirt. 12/15 people said their favourite button was the tab button. They were mostly impressed by how much easier fastening / unfastening the shirt was and how it looked on the garment.

PLYWOOD BUTTONS LASER CUT FOR
INITIAL PRODUCT TESTING

TODD ROPER WEARING THE SHIRT
CONTAINING 6 BUTTON DESIGNS

USER FEEDBACK

"I spent most of my time working in the studio today, a few people commented on the buttons. They thought they looked quite cool. The most popular button was the second one down. The shirt never popped open, although the hexagonal shape was annoying, and the diamond shape was also getting caught quite often. My favourite was also the tab button. I found myself self-consciously playing with it. It felt secure. Maybe fillet the edges so it goes into the slot even better."

- Todd Roper, a Third year arcitecture student.

COLD HANDS

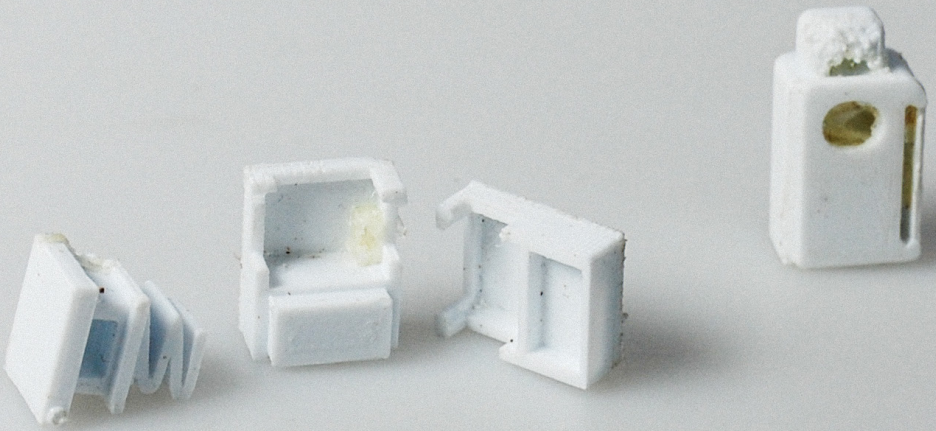
The best way to test the buttons performance would be to test them with cold hands. I spent 2 hours surfing without neoprene gloves in December - it sure was cold. I wanted to focus on using the original shirt button, so I could compare the performance against the redesigned buttons. The photo to the right was taken just as I had got out of the water. As you can see, I struggled to fasten some of the buttons, as a result, I gave up fastening those designs. The easiest button to fasten was by far the tab button.

TESTING THE CAD FILE USINIG PLA TO
REDUCE COST AND FIND DESIGN FLAWS

PROTOTYPING

Nylon naturally absorbs moisture. Unfortunately 3-D printers struggle with materials containing moisture as it can affect the printing quality significantly. In order to print with the Fishy Filaments nylon, I had to be bake the nylon at 55 degrees for 12 hours before printing. Whilst these trials were going ahead, I tested printing the different components sizing and forms using PLA plastic. This helped me understand how the printer will handle each file. Doing this highlighted several problems I had to tackle before working with the Fishy Filaments Marine Nylon®.

TESTING THE MODULAR TOGGLE DESIGN
WITH PLA, OFFERING REPAIRABILITY



WHITE NYLON STRING, THE BY PRODUCT
OF THE END - OF - LIFE FISHING NETS

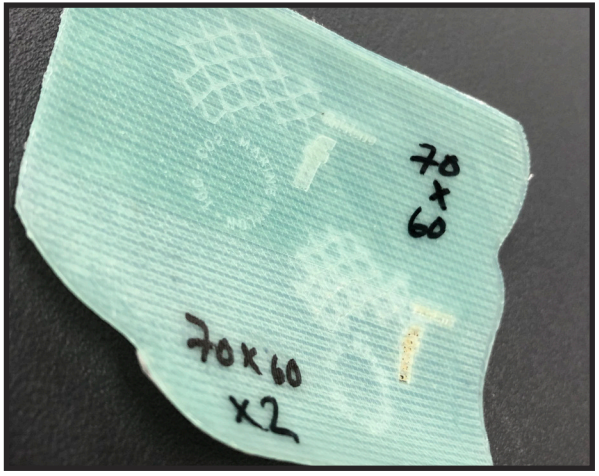

filsteno

A CAD MOCKUP VISUALISING THE
AESTHETIC OF THE MARINE NYLON®

DEVELOPMENT

The Marine Nylon® green may not be to everyone's taste, so I explored the possibility of dying the nylon by using synthetic dye. This also meant that the white non-recyclable nylon strings could be dyed and knotted to be used as a zipper pull. Although the dye was black, the products came out a metallic black / bronze colour which shined in the light nicely. A flaw - Dying the product does make further recycling more difficult as the colours would have to be separated to avoid cross contamination. I also explored laser etching the nylon on the laser cutter to see if I could add visual details. It was successful, but the process was not viable for the buttons.


PYREX
NO MESS
dye packet
that DISSOLVES
in water!
iDye
Poly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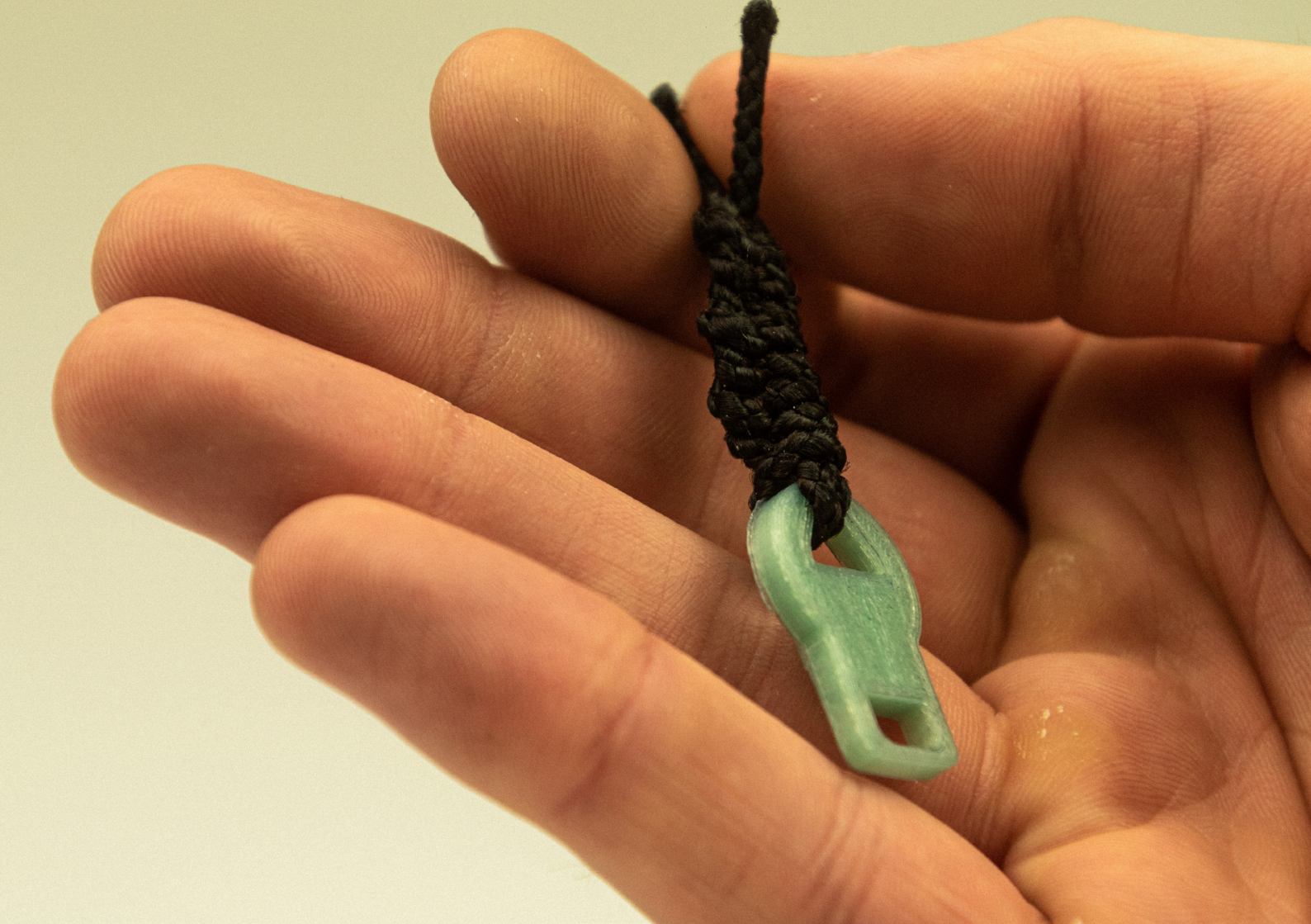


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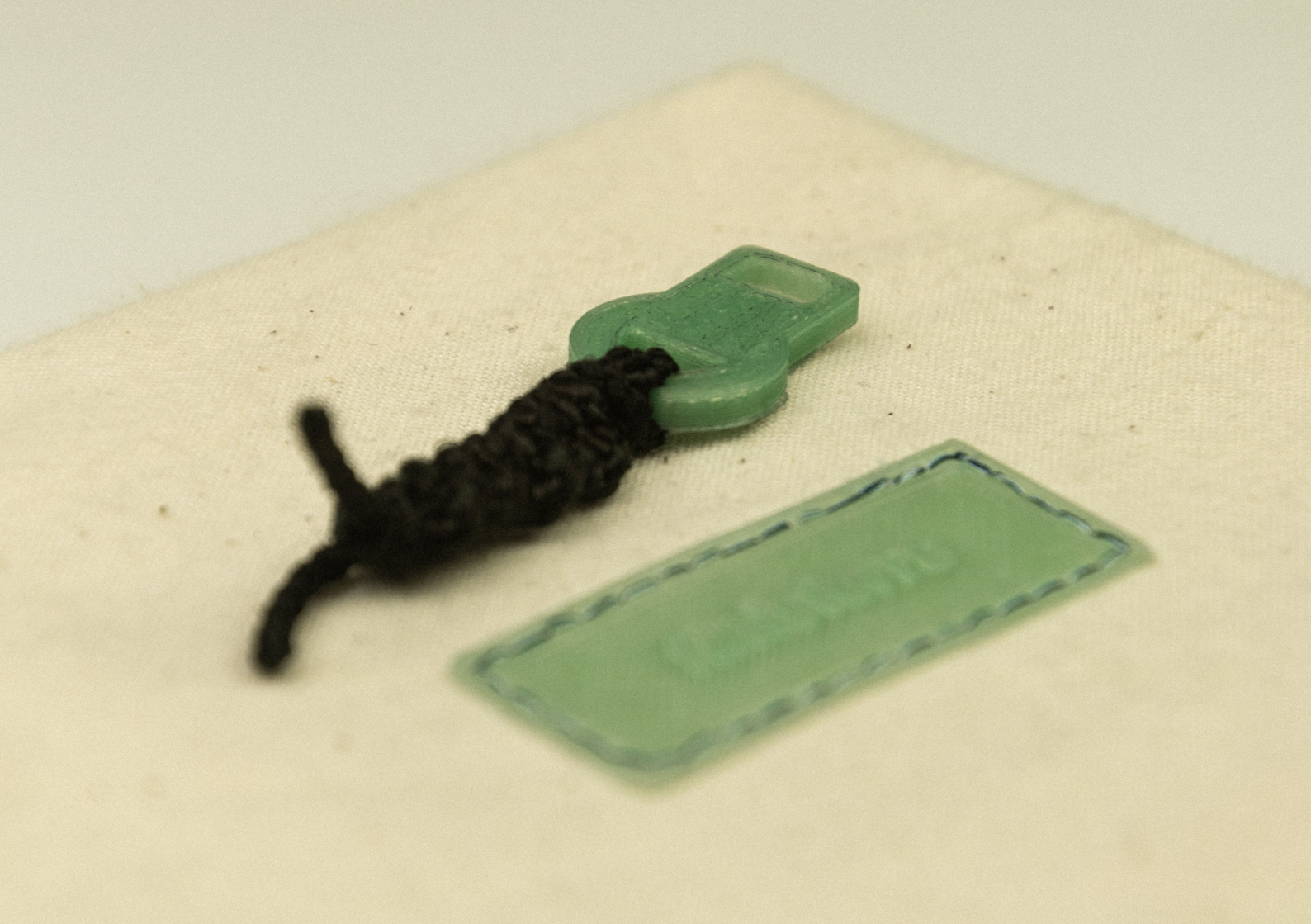

RE-EVALUATION

After mastering 3D printing with the Fishy Filament nylon, I came to the conclusion that 3D printing would not give me a good enough finnish to offer to high quality UK clothing brands. As the button componant is already very small, and the brand identity detailing I wanted was far too fine, the prints were too high resolution for using the Marine Nylon®. Printing in resin however gave me a very high quality product that was more than adequite enough to offer to high quality clothing brands.

SOLUTION

I moved away from the 3D printing process which opened up new opportunities of production. As Fishy Filaments' offer injection moulding pellets, this gave me the opportunity to consider injection moulding as a method of production. This method would allow me to get very high resolution buttons and reduce waste material during production. Injection moulding had also given me the opportunity to get more button-like forms by adding fillets and overhangs, which was a restriction when using 3D printing as a method of production.


POLO
finist
patagonia

MEETING UP WITH TODD AT THE
FINISTERRE HQ TO DISCUSS THE DESIGN


CADDY
MJ08 DH

CARBON EMISSIONS

ISO 14040:2006 compliant assessment carried out by active academics via The University of Exeter Consulting arm.

“The key impact global warming potential is **0.201 kg CO2-eq per kg of Fishy Filament Nylon PA6.**
To put these results into context, the global warming potential of **1 kg of virgin Nylon 6 produced in Europe is 6.52 kg CO2-eq** based on the GaBi dataset (EU-28: Polamide 6 (PA6) PlasticsEurope) and 9.28 kg CO2-eq based on the Ecoinvent dataset (RER: nylon 6 production)**”**

To paraphrase; Fishy Filaments' Marine Nylon® only has between **2-3%** of the **environmental impacts** that virgin nylon does. To put this another way; for every **1** virgin nylon button made, we could make **46** buttons with Fishy Filaments Marine Nylon® before we hit the **same** environmental footprint.
1 virgin nylon button versus **5 shirts-worth of Fishy Filaments'** buttons. That is just the manufacturing process, not considering the landfill avoided, nets not properly refused or transported around the world to other recyclers.


VISSLA
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MANUFACTURING

With the special help of Addifab, a Danish free form injection moulding company, they have made it possible to manufacture the Cold Water surfer friendly button. Using 3D printed moulds, they can inject the Fishy Filament injection mouding pellets and can produce these buttons at low volume. If successful, I can bring high volume moulding back to the UK to keep it a 100% British product. The 3D printed moulds allows us to produce multiply variations of the same product, giving us the opoortunity to offer personal branding.

OPPORTUNITIES

Clothing brands require buttons for their garments. Being able to manufacture these buttons in the UK, made from Cornish Marine Nylon® and offer personal branding will allow UK brands to reduce their carbon emissions whilst supporting a fellow UK company's growth. The image on the right demonstrates how other brands, for example; Billabong, Vissla, can personalise the buttons for their garments and promote their own brand. Not only are these buttons more sustainable, but they spread a powerful message about the health and well being of the environment and oceans.


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