Fjord Sub Zero Impact Protective Wakeboarding Wetsuit

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Keywords: Thermoregulation, Impact Protection, Sustainability, Wakeboarding

Contextual and Concept Statement

Thrill seekers and adrenaline junkies are continuously searching for new ways to have an incredible time. For some wakeboarders, this means venturing out to the planet's harshest icy waters to push the boundaries of their sport (Shoshina, 2018). They aspire to ride and jump off of giant icebergs at heights of 5m while being pulled behind a boat traveling up to speeds of 40 kph (Hemmel, 2016). These athletes have to be exceptionally accurate to execute their iceberg approaches safely and avoid injury, while performing in chilling arctic waters of around 0°C (Illsley, 2018). Riding in these frigid waters requires athletes to layer-up in full surfing wetsuits designed for temperatures of +8C. Currently, there are no wetsuits on the market that satisfy the thermoregulation needs for these athletes while providing proper protection to the chest, back and legs when navigating the erratic elements of arctic waters. The Fjord Sub Zero Impact Protection Wetsuit addresses these challenges by providing male wakeboarders an ultra-warm, impact protective wetsuit for arctic temperatures.

Aesthetic & Visual Properties

Aesthetically, the prototype created was made using all black materials (due to availability), the intent of the Fjord wetsuit was to blend the traditional all black wet-suit aesthetic with hi-vis colored accents, bringing to life a typically boring product (Figure 1). The hi-vis colors also act as a safety feature to increase the riders' visibility to the boat driver. The materials will be colored through a waterless dying process to save water, and 95% of the CO^2 recovered in the process will stored for reuse (Cheeseman, 2016). A major visual aspect of the wetsuit is the foam padding placed over high risk injury zones such as the chest, back, and knees. The padding uses a Grasshopper parametric generated auxetic pattern that is visible from the outside of the production garment adding to the visual aesthetic. When the auxetic pattern stretches longitudinally it becomes thicker perpendicularly and same applies in the latitude direction (Figure 2).

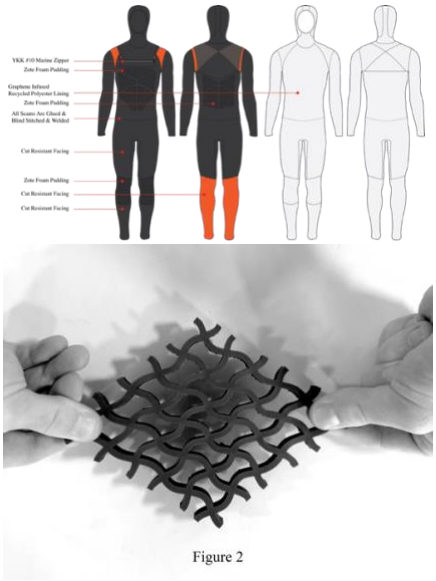

Figure 2

Process, Technique, and Execution

Utilizing flat pattern drafting methods, multiple prototypes were created during the design process before creating the final garment. The prototypes helped to finesse overall fit, hood functionality and padding location. During production each seam would be glued, blind stitched

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and welded to fully seal off the suit system to the elements. However, the prototype created used zig zag stitching and seam taping (due to available machinery). The foam padding elements were LASER cut and bonded with Bemis hot melt film to the neoprene by heat pressing. The hood has two bungees locked in place with a cord lock on either side to adjust and tighten over the shoulders. It also attaches to the chest with a YKK #10 marine zipper. When looking at the execution of the garment it is important to note its sustainable elements. The intended material for the suit during production would be a 6.5mm (body) and 4.5mm (hood) neoprene-free rubber with a Graphene infused recycled polyester backing (material limitations only allowed the suit to be prototyped from a 2mm neoprene). The material on the front and back of the thighs, knees, shins, and calf contains a cut resistant knit with an ultra-high molecular weight polyethylene coating to help protect the athletes from uneven or jagged surfaces they may encounter if they were to fall.

Cohesion

The goal of the Fjord Sub Zero Impact Protective Wakeboarding Wetsuit is to give athletes the most protection possible from dangerous elements, while allowing for mobility in the arms and legs to perform their tricks and maneuvers. When an athlete needs a thicker wetsuit for warmth the thicker material constricts mobility and the athlete is forced to adapt to the suit's limitations. By dropping the armhole patterning down and adding a larger crotch gusset, mobility is increased, and athletes are free previous limitations to perform and reduce the risk of injury by not having to adapt to the suit. If the athlete does fall during a stunt on an iceberg, the wetsuit is designed to help protect through its integrated padding. The driver is also able to spot the athlete in the water or behind the boat easier with the hi-vis colored accents on the suit.

Design Contribution and Innovation

The unique features of the wetsuit fill the need for athletes in cold water temperatures who are looking for extra impact protection while wakeboarding. Utilizing the auxetic patterns unique ability to bend and move, allows the athlete to perform without needing to adapt to the suit which could lead to unnatural movements resulting injury. The pattern allows for any twisting or compression movements with ease. However, if the athlete was to fall, the foam is able to maintain its structural integrity to give the athlete protection and support during impact. Due to the fact that wetsuits on the market do not include foam padding it's important to note that the integration of the foam would also keep athletes more buoyant warmer, and afloat until the boat is able to circle back and give assistance if needed.

Each day the processes and technologies available to wetsuit companies are becoming more environmentally friendly. For watersports industry, sustainability has always been on the bottom of most conversation topics. Not only does the natural rubber material address support sustainability, it also increases the performance characteristics and physical properties of the material (Sustainability Commitment, 2016). By introducing a sustainable option that performs better on the market than traditional manufacturing methods, it will be a step in the right direction to for the industry to move to be more environmentally friendly and take action.

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