Surf Boards of Tomorrow
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Introduction

The sport of surfing has grown in popularity over the past decade. Technology has evolved and taken surfboards from wood to fiberglass. Just recently, surfboard companies have begun to experiment with the possibilities of using plastic material. Companies that have approached this idea have previously used vacuum forming to create the surfboards. The surfboards start out as a core piece and then a plastic skin is vacuum formed over this core. This combination has created some of the most durable surfboards yet.

My project is going to redesign the idea of the plastic surfboard by the use of blow molding. Blow molding would allow for a quicker production rate to keep up with the growing sport. Blow molding allows for a wide variety of plastics to be molded. It also allows for a greater flexibility when designing the part. Co-extrusion is possible with extrusion blow molding, allowing for different layers of plastic throughout the board. A better surface finish will be produced by using blow molding because of smoother mold surfaces.

After the board is blow molded, a second material such as polyurethane, could be used to fill in the hollow space in the board. By filling this hollow space, this would ensure no water will leak into the board. This is something all board companies are striving for, a completely waterproof, durable board.

Application of Blow molding

Creating a surfboard is a time consuming and hands on experience. The normal construction of a board requires the shaping of a urethane blank. This involves a lot of sanding and cutting to get the shape of the board. Once the blank is made, a fiber glass layer is added. This process is time consuming and untidy.

Fiberglass surfboards are not as durable for beginning users due to the fact that minor damage may ruin the board and result in its disposal. With over 20 million surfers in the world this can add up to a lot of waste. New developments are trying to be made to create an eco-friendly board. This has created a struggle to create a durable board while keeping the cost down. Blow molding will introduce new material and allow for a more durable board at a lower cost to consumers.

By blow molding the surfboard a shell is created to fill with polyurethane foam. This eliminates any cutting, sanding, and applying fiberglass to the board. Cutting the time drastically it takes to traditionally make a surfboard. With the use of co-extrusion blow molding different layers of material can be used to help to add rigidity or cut cost by using recycled material. With countless different
shapes and sizes of surfboards, this industry can easily be dominated by the pure speed of manufacturing these surfboards.

**Design Details**

The board I have chosen to work with is a 6’6” short board. To think about it in a simple way, a surfboard is practically an oversized bottle. All of the edges have a generous radius on them, eliminating any sharp corners which can cause possible wall thickness or filling problems. For a core material, polyurethane foam is the most common and reliable material to use. An innovative material that Surftech, a surfboard company, is using with their boards is FEPS foam. A fused expanded polystyrene that is virtually waterproof. Even if there is a hole in the board it will still function the way it should.

For a skin layer, the blow molded boards could use HDPE a material that is durable and commonly blow molded. The strength that polycarbonate has would also be a good material choice candidate.

**Mold Tooling Details**

An aluminum cast tool would be used to help keep costs down and steel inserts would be used in high wear areas, such as pinch off points, to help prolong the life of the mold.

Although it is not a common process, creating an oval shaped die and mandrel will help to create a uniform wall thickness. Doing this could become a disadvantage because more problems could arise while fine tuning the new die and mandrel. To possibly prevent this problem and try to get the same effect, just creating an oval mandrel would be enough to obtain the same effect.

**Manufacturing Details**

Possible problems with blow molding a surfboard would be the addition of fins, and filling the hole made by the blow pin during the process. All surfboards have fins which are added to the board to help increase stability while in the water. Adding these fins to the board would be a difficult procedure. The fins are too skinny and it would be too deep of a draw to blow mold the fins and board as one piece. The only other options would be to add another layer to the board in which the fins could be added. The next step would be to attach the fins with some type of bonding agent or over-mold the fins in during the process which may not even be possible.
Filling the hole made by the blow pin could be covered with plastic filler. The need to cover the hole would only be for cosmetic reasons considering FEPS foam is waterproof.

Another possible problem would be weld strength at the pinch off points. This could be an obstacle that could never be overcome. Surfboards take the abuse of the rider and the environment, making it only as strong as its weakest point.