Kayak Cargo Carrier

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High-end kayaks commonly have a dry storage compartment behind the seat, accessed through the top, rear of the boat. However, a low end kayak typically does not come with a dry storage compartment. The only on-board storage on a kayak of this nature is provided by the excess room behind the seat or up front between the boater’s feet; areas normally dampened, if not soaked with water. There is a need for an on-board, dry storage compartment for low end kayaks, to carry such items as clothing, food, and small items like cell phones or a navigation device. The Kayak Cargo Carrier is a simple and basic shape, small enough to slide in behind the seat.

The Kayak Cargo Carrier is a perfect product for the extrusion blow molding process for two main reasons. First, since extrusion blow molding is an exceptional hollow part process, the product at hand is ideal seeing how the container is hollow with a tighter diameter neck for access. Secondly, the Kayak Cargo Carrier can be made with low tooling costs allowing for low part cost.

There are two optional parts, one made of a thermoplastic elastomer (TPE) and the second made of rigid polypropylene (PP). The TPE is a design which will allow for ductility and strength. With the many different styles and sizes of kayaks that currently exist, the TPE Carrier will allow for flexibility of kayak designs. Some kayaks may have a short and slender rear while others kayaks may have deep and tall rears. The elastomeric material will conform to the different shapes and sizes of various kayaks. The advantage of using a TPE design is the universality of the Carrier. Critical parameters of the TPE material draft, shrinkage, and a blow ratio of forming the parison to the Carrier’s mold. First, the draft angle is not as critical with the TPE material as with the PP, however, a draft angle of one degree around the perimeter of the Carrier is sufficient. The shrinkage of TPE materials range anywhere from 0.005-0.020 in/in. Lastly, the blow ratio is the ratio of the final part size, diameter for the Kayak Cargo Carrier, to the diameter of the parison as it is extruded. A common blow ratio is three to one, which will be used with the Carrier.
The PP Carrier will be best if used in a specific kayak, for instance, the Kayak Cargo Carrier might be sold to Dick's Sporting Goods who will use the Carrier only for the Old Town Otter, a base model kayak. An advantage of using PP over a TPE is the assembly of the product to the rear of the kayak will be easier, possibly even using a threaded top to allow for perfect assembly. The draft angle is more critical with the non-ductile material due to flexibility of ejection constraints. A draft angle of one degree should be used for easier ejection. The shrinkage of PP typically ranges from 0.010-0.025 in/in. Lastly, the part will use the same blow ratio as the TPE Carrier, a ratio of three to one.

Installation of the product is easy, and requires simple household tools. The Carrier could be installed at the store or at home. The basic installation process starts with cutting a ten inch diameter hole in the placement of choice. Next, the Kayak Cargo Carrier is installation is to be determined, however, the basic idea is for an “O” type ring to snap onto the top of the Carrier, allowing for a snug, and water tight seal.

The mold tooling is typical of an extrusion blow mold, the Kayak Cargo Carrier mold shown in Figure 1. A common mold material for extrusion blow molding is aluminum. Advantages of aluminum include low cost, good thermal properties allowing for easy heating and cooling, and the ease of machining aluminum. The mold consists of two halves, similar to an injection mold’s cavity and core. In extrusion blow however, both halves are very similar. As shown below, the mold contains interlocking guide pins, allowing for best alignment of the two halves. A main difference between the two halves of the mold is the blow pin hole located at the top of only one half. Here, once the mold has been enclosed around the parison, a blow pin injects air into the mold by way of the blow pin hole. Lastly, the relief area allows for the mold to close off around the parison, allowing for the excess parison to flash; this will be trimmed off secondary.
High-end kayaks have a dry storage compartment; however, a low end kayak typically does not come with this. The only on-board storage on a kayak of this nature is provided by the excess room behind the seat or up front between the boater’s feet usually soaked with water. There is a need for an on-board, dry storage compartment for low end kayaks, to carry such items as clothing, food, and small items like cell phones or a navigation device. The Kayak Cargo Carrier is a simple yet ideal solution within the world of kayaking.
Some disadvantages of the extrusion blow molding process include wall thickness variation, filling problems in deep draws and corners, and the secondary operation to remove the flash existing on the top and bottom of the part. Also, a concern of most blow molding molds is the development of drag lines in the parison. Drag lines exist due to two main reasons, material degradation and steel imperfections caused by mishandling. Common processing problems include poor pinch off strength and thickness variation due to and off center parison.

Figure 1: Kayak Cargo Carrier Mold