

## Helping Gentle Giants

Design engineers rely on specially formulated monolithic urethane to protect manatees from injury and death.

By Lisa Arrigo, Editor in Chief

**E**ndangered manatees are getting a helping hand from design technology. Thanks to the efforts of engineers at the Harbor Branch Oceanographic Institution and the materials technology at Kastalon Inc., these gentle creatures have a better chance of staying alive.

The Florida manatee is one of the most threatened marine animals in the United States. They are often killed by collisions with boats or from entrapment in man-made structures. In fact, only a few thousand of these friendly "sea cows" can be found in the shallow rivers, bays, canals, and coastal areas of the Florida peninsula.

South Florida Water Management, which operates a series of remote-controlled gates that regulate the water level in its vast system of canals, knew more had to be done to save these sea wonders. The canals, full of warm brackish water, attract numerous manatees. Finding warm water is a matter of survival for them. If manatees remain in the Gulf of Mexico after the water turns cold, they risk catching a fatal respiratory illness. However, the warm waters of

the canals can also prove fatal to the slow-moving manatee. The vertical gates that regulate water flow between the canals and ocean are unmanned. Manatees, which measure about 12 feet long and weigh about 1,000 pounds, are often trapped when the 20- to 33-foot-wide gates close. Since no one is around to rescue them, the manatees die. Making matters worse is the turbulent flow of water through the gates, which carries all manner of debris from floating branches to illegally discarded washing machines.

Fortunately, seven sophisticated manatee protection systems are currently in place in the canal system, and an additional 13 have been contracted. These systems are sensitive enough to detect the soft body of a manatee and yet are not prone to false alarms triggered by debris.

The first system was installed on the Miami Canal in 1996. "This site had the worst record of manatee mortality before the system was installed," recalls Larry Taylor, Harbor Branch Oceanographic Institution's EE production manager and the project manager for manatee protection systems. "Since the system has been online, there has not been another injury."

The engineers at the Harbor Branch Oceanographic Institution invented the manatee protection system after extensive testing of various alarm mechanisms. Called the Manatee Piezo-Electric Detector bumper system, it allows the vertical gates, which move at a fixed speed of 6 inches per minute, to gently contact the manatee, stop, and then reverse without harming the animal. The system's sensor is sensitive enough to distinguish between a large object being violently pushed into the bumper and a manatee caught in the lowering gates. In addition, the

unique shape of the bumper protects the sensor from impact.

"The bumper sensor design provides an extremely sensitive detector for the endangered manatee while including the ruggedness required for the industrial submerged environment," says Taylor. "Kastalon provided the custom molding capability and the perfect materials for us to meet the required 10-year service life of this system."

Kastalon, a manufacturer of polyurethane

components located outside Chicago, developed the durable material needed for the bumper system. It's a specially formulated monolithic urethane engineered to withstand years of continuous submersion in brackish water as well as impact from surging water and moving debris. Designed to offer mechanical properties stronger and more durable than rubber, it also resists both UV rays and salt water.

During a demonstration of the manatee protection system, a plump tomato was used to simulate a manatee. When light pressure was applied to the tomato, the system activated without damaging the tomato. More important, the Harbor Branch Oceanographic Institution has confirmed dozens of cases in which a manatee has been spared from injury or death.

"Although a good design is always rewarding to an engineer, saving an endangered animal really makes this project special," says Taylor.

More information on polyurethanes and urethanes is available by contacting Kastalon Inc., 4100 W. 124th Place, Alsip, IL 60803 or calling (708) 389-2210.



Kastalon's materials engineering is helping to save the friendly and fragile manatee.