



## ACETube® - The Project of an L-Shaped, Sand-Containing Breakwater in UAE



### Background

This project took place at a coast in Ras Al Khaimah City, UAE, where an existing groin was found for navigation channel protection and harbor calmness. The local authority wanted to build a new fish port beside the existing groin. And later, the designer defined the existing groin as part of the fish port.

### The Problem/ Task

An L-shaped breakwater of about 700 meters long was to be built, forming an enclosure with the existing groin and making it a new fish port. The required breakwater would protrude 147 meters from the coast and then turn 90 degrees (towards the northeast) for 524 meters heading the existing groin. This breakwater must be 9 meters in height, where 2.5 meters of it would be underwater and 6.5 meters above the sea level to accommodate the tidal range of 3m. Cost-effectiveness, fast construction, and optimal safety were the requirements for this particular project. However, most breakwaters built in UAE were rubble mound type. And rubble was a costly material in local market; so it was out of the primary consideration. Other breakwater structure types, such as concrete box-type (caisson), single concrete block type, and composite type, were costly and/or time consuming; as a result, they were out of the primary consideration as well. Obviously, a better type of breakwater structure was expected by the local authority.

### The Solution/ Design & Construction

After a thorough assessment, ACETube® was chosen to construct the proposed breakwater. Generally, geotextile tube was filled with sand and used as a core in breakwater structure; however, this project design applied various types of ACETube® as the perimeter barrier structure to contain and trap in-situ sand inside the barrier, forming the core of the breakwater; and externally, The ACETube® were covered by an under-layer of aggregates and then further protected by a layer of rock armor. The final appearance turned out to be similar to a rubble mound type breakwater. A total of 286 ACETube®, processed by ACETex® 70-I PP woven geotextile fabric, were used; comprising circumferences of 8.6 meters and 12.9 meters with different length from 10 meters to 50 meters. And 33 geotextile aprons of 13.8 meters width with length of 20 meters and 50 meter were anchored on the sea bed to prevent scouring. The entire construction was carried out from bottom to top and from shore to sea direction.

### Result

The innovative application of ACETube® in breakwater construction satisfies the requirements of cost-effectiveness, fast construction, and optimal safety. Furthermore, the use of in-situ material not only significantly reduces the construction cost, but also the environmental disturbance. The result is beyond expectation that it wins the 2013 International Achievement Award from IFAI. This is recognized as one of the classic case of ACETube® application.

