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Geotextile sand container shoreline protection systems: Design and application

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ABSTRACT

The use geotextile sand containers (GSCs) as shoreline protection systems, has grown moderately since the first applications in the 1970s. This slow growth can be attributed to two factors; firstly, the lack of understanding of coastal processes and design fundamentals by the larger geosyntheticcommunity in order to provide coastal engineers with suitable solutions, and secondly; there has been very little rigorous scientific wave flume testing with which to analyse the wave stability of geotextile sand containers.

The application of geotextile containers in coastal protection works can be traced back to early works carried out in 1970s. The application of these types of structures was somewhat haphazard as very little was understood about the wave stability and durability of the structures. Early wave stability work was carried out Ray (1977) and Jacobs (1983) with small containers, however, the testing programs were limited and did not provide sufficient confidence in the product to carry out exhaustive engineering design. As a result, the technology until recently has relied on manufacturers' design suggestions based on monitoring of actual structures. Over the past five years, coastal population pressure, extreme events and concerns over climate change and sea level rise have resulted in more emphasis being placed on shoreline protection systems. Geotextile manufacturers have responded to the challenges put forward by design engineers and intensive research has been carried out in the field.

This paper outlines the current "state of the art" in terms of the design and specification of geotextile sand containers (GSC). This paper covers the key issues which will ensure the long term integrity of a geotextile shoreline protection system is maintained, these issues include:

- Container stability;
- Detailed analysis of recent large scale wave flume testing which assess filling capacity, size of container, structure slope and scour protection etc.;
- Container/geotextile durability;
- Methods and specifications used to limit the effects of the fundamental factors affecting the life span of geotextile containers such as vandal resistance, UV degradation and abrasion resistance etc.

1. Introduction

The appeal of living or playing alongside the water, whether it is the beach, river or canal has placed these amenities under considerable pressure, which may be exacerbated by sea level rise, climate change and extreme events. Issues such as maintaining property boundaries while providing safe public access have become an important issue for many stakeholders.

The Australian trend in population movement is away from inland towns or large cities towards coastal communities. The rate of growth in coastal areas is 60% higher than the national average. This phenomena known locally as 'sea change' has placed considerable pressure on the valuable foreshore environment and amenity. Where beaches were previously allowed to erode or accrete naturally depending on the natural coastal processes, ongoing development has placed artificial boundaries on the extent to which the erosion can take place, resulting in the construction of revetments (sea walls), groynes and other structures to protect this development. Traditionally these structures have been constructed using rock, concrete or wood, however, a combination of limited access to suitable natural materials to construct these features and the beach users' demand for more user friendly materials has

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