NPA Cells in the Marine Environment

Eyal Blatman[1*]
[1]PRS Geo Tech Technologies

1 Abstract

Novel Polymeric Alloy (NPA) cells are a cellular confinement system with the engineering properties required by international standards for long-term confinement in demanding infrastructure projects. Three-dimensional NPA cells are used as a cover protection system against channel, stream and shoreline erosion caused by flowing water and tractive forces. NPA cells enhance the performance of conventional erosion control materials and dissipate energy from flood, current and wave action for hydraulic and marine structures and are a best available technique for canals, channels, drainage, shorelines, riverbanks, sea-walls, dams and port infrastructure.

Soft or hard armor is used to optimize the erosion protection for natural or man-made channels, hydraulic structures and barriers. The surface treatment is dependent upon the geometry, hydraulic, site and environmental conditions along the water course, as well as optimization and cost-efficiencies. For example, sand infill is used for beachfront erosion control, vegetation for riverbank protection, gravel in sites subject to moderate flow velocities and concrete hard-armor in high velocity channels and walls subject to wave action. Reinforcement of load support structures in port applications can use sand, granular or recycled materials.

Whereas the suitability of a cellular confinement system is directly dependent on the key attributes of the cell as well as its geometry, cells made of Novel Polymeric Alloy (NPA) have measurable higher tensile strength, resistance to deformation and environmental durability to hydraulic forces and thermal cycling over the project lifespan than conventional HDPE-based soft-cells. This includes high resistance to photochemical degradation – leaching of additives, oxidation and UV light – to preserve confinement for the lifespan of the project.

Concrete solutions in non-erodible canals and walls are particularly advantageous with NPA cells. While the cellular mattress eliminates form work for fast construction, NPA cells add high tensile strength to the concrete. The creates a strong yet flexible mattress, which absorbs hydraulic forces and ground movement and resists cracking of the concrete for improved surface durability. Additionally, the high reinforcement factor of the NPA system also enables a reduction in concrete thickness to improve cost-effectiveness and sustainability. These properties also make NPA cells suitable to load support pavements used in marine ports, wharfs, terminals and container yards situated on soft, compressible and saturated soils, using sand for structural infill with no loss in structural stability.

* Corresponding author: eyal@prs-med.com

Figure 1: Retaining Wall, Dominican Republic

Figure 2: Heavy Loading Platform, Israel

Figure 3: Irrigation Channels, Vietnam