

For existing structures, regular monitoring, at least after storms, should be carried out and broken armour units may need to be replaced. Rather than repairing a Dolos armour layer the US Army Corps of Engineers has developed the Core-loc, which can fulfil this role.

Tetrapod (see Figure 3.94)

The tetrapod unit was the first concrete unit with a special shape. This unit has been used extensively and projects with units up to 50 m³ can be found. The tetrapod has recently been used mostly in Japan in multi-layer systems.

Analysis on the structural resistance of the unit and its hydraulic stability led to comprehensive guidance (Sotramer-Sogreah, 1978) for manufacturing of the formworks, the fabrication of the units, their storage and placement of the units in two layers. The formwork for producing tetrapods is composed of a bottom shell and three lateral shells.

Wear and breakage have been experienced in several structures caused by rocking of the units in the top layer. The placement of the units as per the recommended standards is essential to guarantee the interlocking and the required porosity of the armour layer.



Figure 3.94

Example of Tetrapods used as armour on breakwater with crown wall (courtesy M Scott)

3.12.2.4 Interlocking units used in a single layer

Accropode (see Figure 3.95)

The Accropode unit was developed from experience of the tetrapod and the observation that double-layer systems may allow unwanted movements of units in the upper layer. This unit has been used extensively and blocks up to 20 m³ have been employed in some projects.

Analyses of structural resistance of the block and of its hydraulic stability has led to comprehensive standards for manufacturing of formworks, fabrication of blocks, storage and placement of units in one layer (Sogreah, 1988). Formwork is made with two lateral shells, allowing a production of one unit per day per mould.

Accropodes are placed in a single layer in a predefined grid whereby the orientation of the blocks has to be varied; the latter is typically specified. Various sling techniques are recommended for placement. The best interlocking of Accropodes can be achieved on steep slopes (3:4 or 1:1.5). For further details see also Sogreah (2000).

For situations where a natural rock appearance is required, the Ecopode (a unit closely related to the Accropode) has been developed.