

# Marine Dock Systems

## *Concrete Pontoon System*

The following information is provided to enable the appraisal of Marine Dock Systems (MDS) concrete pontoon system; also provided are comparisons with other pontoon systems on the market.

The key elements of the Marine Dock Systems concrete pontoon system are as follows:

### **Flotation Modules**

- Flotation modules are one piece, rotationally moulded, U.V. Stabilized, high stress-crack and impact resistant polyethylene. They provide long life, low maintenance flotation which is not attacked by osmosis nor other chemicals found in the marine environment.

The flotation modules are provided with the additional security of a polystyrene core, producing a positively buoyant, unsinkable system.

Marine Dock Systems has pontoons and marinas in use now for over 20 years, with the flotation modules requiring No Maintenance.

The advantage of rotationally moulded polyethylene is as follows:

- a) The outside skin of the module is in one (1) piece. A Marine Dock Systems (MDS) rotationally moulded skin is seamless and does not rely on glue or plastic welding for sealing the skin against the ingress of water or structural integrity.

*A variety of systems “wrap” a polystyrene block of foam with polyethylene sheeting or film. All the seams are then plastic welded or glued. The integrity of these skins is dependent on the quality of the welding and/or the adhesives.*

- b) The minimum wall thickness of the MDS polyethylene skin is 5-6mm. The moulding process also allows the build up of the wall thickness in the corners of the module. This maximises the structural integrity, impact, and abrasion resistance where it is required most.

*Systems using the polyethylene “wrap” and welded method don’t usually have a polyethylene wall thickness greater than 2-3mm. Some are even as low as 0.5mm.*

*Some systems use glued together, polystyrene foam blocks, which are then sprayed with a polyurethane, elastomeric covering. These systems are also relying on minimal coverage and thickness (less than 2mm) for sealing the skin against the ingress of water or structural integrity. Quite often, these skins can be damaged during transport. Marine organisms have also been known to damage and burrow through these sprayed on systems. The UV stability, stress-crack resistance and impact resistance of these sprayed on systems is generally not as good as polyethylene.*

*Other systems on the market use a full concrete encased polystyrene block. Most of these run a minimal concrete thickness all over. Usually the bottom and the walls are only about 25mm thick, with the decks only 30-50mm thick. Some of these systems use steel reinforcing in the deck and the bottom only. Some even use it in the deck alone.*

*A lot of these systems have problems transferring torsional loading through the pods. This results in the concrete pods cracking. Some cases have seen pods crack in half, and the bottoms have fallen off.*

Marine Dock Systems is confident that the impact resistance of its rotationally moulded polyethylene floats is far greater than many other pontoon systems on the market.

A sledge hammer demonstration can be preformed at the MDS factory if required.

## **Decking**

- Decking is poured in place, galvanised reinforced, marine mix 50Mpa concrete with fibre-mesh additive. The structural decking will have a minimum deck thickness of 100mm. Deck strength is also increased with a 200mm deep edge beam around the outer perimeter of the pod. Finish to the deck is a standard broom finish for non-slip. (other finishes are available on request)

The NSW Department of Public Works and Services has approved the Concrete mix on previous projects, for a design life in the marine environment of 20+ years.

The advantage of MDS concrete decking is as follows:

- a) Deck thickness and top cover to reinforcement is greater than many other systems on the market. This results in greater strength with the ability to transfer greater lateral and vertical loading. The design life is also increased with greater deck thickness and top cover.

*Some systems have less than 50mm-deck thickness and less than 30mm of top cover to reinforcing. Such systems have an increased chance of cracking and failing, with the result that design life is significantly reduced.*

*Some competitors say that the thicker deck increases the height of the centre of gravity of the pontoon, which in turn reduces the pontoon stability.*

This is true, however stability is only a concern with narrow rectangular pontoons. "L" shaped and "T" shaped pontoons have adequate stability by virtue of connections.

If a narrow rectangular pontoon is required, MDS can increase the stability of these pontoons with solid ballast in the bottom of the polyethylene float. Stability will not be a concern with a MDS pontoon.

Flotation and stability calculations are always performed to ensure the pontoon is in accordance with Australian Standard AS3962.

- b) Reinforcement is hot dipped galvanised steel reinforcing, consisting of square Ribmesh sheets, "L" bars and deformed bars, typical of concrete construction. Fibre mesh additive is also used to increase mechanical properties of the concrete

*Some systems do not galvanise the steel reinforcing, which can produce corrosion issues in the marine environment, whilst other systems only use the smaller sized "Weldmesh" for reinforcing.*

#### ***Framing, fasteners and accessories.***

- The Pontoon modules are framed together with structural hardwood walers. All hardwood is a minimum F17 stress grade, with class 1 or 2 durability. The walers are all dressed to size and finished with an arrest edge. Walers are attached with stainless steel (316) tie rods (through bolts) Walers are easily replaced if damaged and provide a sound impact absorbing berthing face.

*Some competitor systems use lower durability hardwood and softwood, which generally will have a reduced life. Others use aluminium framing which works fine in the marine environment, provided it is not in direct contact with concrete or dissimilar metals. Aluminium requires adequate isolation from contact with these materials to avoid corrosion problems.*

- All fasteners used by MDS are corrosion resistant stainless steel. All fasteners are isolated if in contact with dissimilar metals.

Stainless steel exceeds the life of galvanised steel fasteners in the marine environment. Galvanised steel will rust and seize making future maintenance more costly.

*Other systems use galvanised steel fasteners throughout, or combine both galvanised and stainless. .*

- All through bolts are fastened with 'Nyloc nuts' or spring washers to prevent loosening.
- Pontoon berthing faces are fitted with UV stabilised PVC fender if required
- Heavy-duty cast aluminium mooring cleats are provided for berthing vessels if required.