Marine Fenders International, Inc.

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Marine Fenders International, Inc protects valuable space program assets.

Marine Fenders International, Inc., a manufacturer of marine fendering systems, was selected to supply our Ocean Guard™ Netless foam filled marine fender system to protect the sensitive assets of the Sea Launch space program at its homeport in Long Beach, California.

Sea Launch is a spacecraft launch service that uses a mobile sea platform for equatorial launches of commercial payloads on specialized Zenit 3SL rockets.

The Sea Launch system marine infrastructure consists of two very unique ships.

The first unique ship, *Sea Launch Commander* is the command ship for Sea Launch, know as the Assembly and Command Ship (ACS). It was built by Kværner Govan, at Govan shipyard, in Glasgow, Scotland..

The ship is 660 feet long and approximately 106 feet wide, with a displacement of more than 34,000 tons. The crew is about 240 people. It has a cruising range of 18,000 nautical miles

The launcher and its payload are assembled on a purpose-built ship *Sea Launch Commander* at its home port is Long Beach, California. It is then positioned on top of the self-propelled platform *Ocean Odyssey*, the second unique ship in the Sea Launch infrastructure, and moved to the equatorial Pacific Ocean for launch, with the *Sea Launch Commander* serving as command center.

The *Ocean Odyssey*, known as the Launch Platform—or LP is a self-propelled, semi-submersible drilling rig which was rebuilt as a mobile spacecraft launch platform and is currently used by Sea Launch for equatorial Pacific Ocean launches. It works in concert with the *Sea Launch Commander* assembly and control ship.

The Ocean Odyssey a former North Sea oil drilling platform was refurbished at the Rosenberg Shipyard in Stavanger, Norway.

In its current form, the *Odyssey* is 436 feet long and about 220 feet wide, with an empty draft displacement of 30,000 tons, and a submerged draft displacement of 50,600 tons. It has accommodations for 68 crew and launch system personnel — including living, dining, medical and recreation facilities. A large, environmentally-controlled hangar stores the rocket during transit, and then rolls it out and erects it prior to fueling and launch.

Both vessels are equipped with spacecraft handling and launch support systems.

Upgrades to the homeport were completed in 2006. These upgrades included the installation of 5 ft diameter x 12 ft long Ocean Guard Netless foam filled fenders. These resilient tough marine fenders are constructed with a heat laminated energy absorbing resilient foam core; a thick tough filament nylon tire cord reinforced non-marking urethane skin; and heavy duty integral swivel end fittings internally connected with a stud-link chain.

Ocean Guard™ Netless foam filled marine fenders efficiently absorb significant amounts of energy with a low corresponding reaction force, lower than pneumatic or rubber buckling fenders. These Ocean Guard™ Netless foam filled fenders is designed to absorb 225 ft-kips (31 ton-m) of energy when 60 percent compressed with a corresponding load of 167 kips (75 tons).

The installation of these fenders took full advantage of their floating capabilities, thus providing optimal fendering at all tides.

The resilient nature of a foam-filled Ocean Guard™ Netless Fender give it the unique ability to conform to a vessel's hull contours and extremities, such as rub rails. The hull conforming feature eliminates point loading, which cans occur with panel type fenders, on hull contours therefore evenly distributing energies over a greater surface area. This results in much lower hull pressures.

Marine Fenders International, Inc.'s *Ocean Guard*™*& Ocean Cushion*™ foam filled fenders are constructed and designed for the worlds toughest environments.

ENGINEERED FOR EXCELLENCE.