

**Marine Structures****Reference Details:**

Owner Republic of Pakistan +++ **Structural Design** Joint Venture of Frederic R. Harris, Engineering Consultants, The Onyx Group, Inc., Delft Hydraulics +++ **Tie back engineering** DSI Munich +++ **General Contractor** SFFA Construction Co.; SF-FA-Temel Piles Construction Co., Turkey

DSI Services Supply of 255 DYWIDAG tie rods (*GEWI*[®] Threadbar dia. 63,5mm), designed for a service-load of 1000kN; Technical consulting; Jobsite assistance.

**DYWIDAG 63.5mm DCP as permanent tie rods for landing dock****Ormara, Pakistan: Ormara Seaport**

The principle element of the seaport is the 430 m long landing dock. Its seaward side, is composed of sheet piling. About 2.5 m. below the water line, there are DYWIDAG tie rods spaced at 1.7 m. Those tendons connected to steel piles, that were driven into the ground about 35 m behind the sheet piling.

DSI Turkey supplied a total of 255 DYWIDAG tie rods along with shop-drawings and structural calculations of all connections. The 63.5 mm *GEWI*[®] threadbar was designed for a service load of 1,000 kN. All tie rods were detailed with double corrosion protection (DCP) with a PE sheathing and cement grout. At a production rate of 8-10 anchors per day the project was successfully completed in December 1996.