

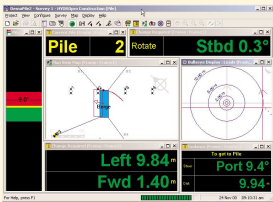
# application brief

## Port of Sines Development

**Customer:**  
Bento Pedroso,  
Etermar and Somague

**Project:**  
Port of Sines, Portugal

**Project Date:**  
July 2001



The consortium is to construct the breakwater to protect Terminal XXI, with the aim that Port of Sines will become the Western Mediterranean hub port for the transshipment of containers. Terminal XXI will begin operating in 2003. A contract has been recently signed between Administração do Porto de Sines, SA (Port of Sines Authority) and PSA Corporation from Singapore, whose conjoint investments in the development of the terminal amount to \$230 Million Euro.

PSA-Sines SA, is responsible for the construction of the terminal, and the Port of Sines Authority will construct the breakwater, as well as the new access required.

The Terminal will be developed in two phases:

- Phase one will start with a 320 m wharf, 13.5 ha embankment, and a breakwater. The terminal will be able to handle 600,000 TEU's (1 TEU = 1 container of 20 feet) per year during this phase.
- The project will be progressively enlarged with 10 cranes, etc. and a capacity to handle about 1.35 million TEU's per year.

To assist in the construction of this project the survey company Etermar SA selected Trimble solutions. Pedro Santos, Representacoes e Servicos Lda, is Trimble's dealer in Portugal, and came up with a selection of equipment that has been proven in other port construction projects both in Portugal



and worldwide. The tasks carried out in such a project involve:

- pre dredge surveys of the port
- dredging guidance and rock dumping
- piling for wharfs
- land reclamation surveys
- as built surveys, and determination of volume of material moved.

The survey and positioning 'tools' chosen for the project had to save time and money by being accurate and allowing productive work. The centimetre accurate 5700 RTK GPS receivers using the TRIMTALK™ 450 radio links were selected for all the precise positioning tasks such as pile positioning and land reclamation progress surveys. The 5700 receiver is a sixth generation Trimble receiver that was released at the start of 2001. It has features such as eRTK™ (extended RTK), it is lightweight, has 10 Hz updates, and it is extremely rugged.



### SYSTEM FEATURES

- Precise positioning for pile placement and land reclamation surveys
- Use of centimeter-accurate RTK and submeter DGPS
- Graphical and textural displays for construction
- Total system solutions from one supplier – Trimble



To position piles and seabed structures the Target:Structures™ software was used with two 5700 receivers on the barge. The software determined the position and orientation of the structures and presented this information graphically on the screen—allowing an operator to position the structure rapidly.

For marine survey and rock dumping barge tasks the HYDROpro™ Navigation and Construction software was used with DSM™12 submeter DGPS.

For more information on the systems used here please visit <http://www.trimble.com/marine>

#### The equipment used on this project includes:

- HYDROpro Navigation and Construction software
- Target:Structures software using two mobile 5700 RTK GPS receivers
- 5700 GPS base station
- TRIMTALK 450 radios
- DSM12 submeter DGPS

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