

underwater blasting

Construction of 2 new docks and deepening of the bottom of the touristic harbor
Olbia, Sardinia, Italy

Olbia touristic harbor deepening of the bottom



Nitrex® srl

Via Mantova 61,
25017 Lonato d/G- IT
Tel. +39 03 09 90 40 39
Fax. +39 03 09 90 61 89
info@nitrex.it www.nitrex.it

Job performed for **Isola Bianca jv**, year **2008-2009**



Blasting close to the old docks
Control of the overpressure wave in water by means of air bubble curtaining



Blasting with shaped charges

Job

To face an increase of the touristic traffic the Olbia Harbor authorities wanted 2 new dock being added to the previous 5 and also bottom of the harbor being deepened to comply with specifications of the new larger ships.

About 200.000 m³ of granite had to be blasted in about 14 months, with maximum charge being blasted in the borehole of 1600 kg (sequential blasting).

Due to the proximity to the existing docks, offices and the city itself, the impact due to the explosion had to be kept under control for ground vibration and also for overpressure in water.

Reference for seismic waves was done to the German norms DIN 4150-1, 2 and 3 as well as to the Italian UNI 9916 and UNI 9614.

Overpressure in water and its impulse was also kept under control to prevent damage not just to the docks but also to the barges and drilling jack-up on site and to the ships standing just outside the harbor. Reference values were set according to the specific acceptor.

Several precautions were taken to minimize vibrations and overpressure in water especially when blasting the thinner rock layers with shaped charges.

Among this an air bubble curtain.

Design and field activity

A DATABASE was set up FOR the ACCEPTORS (the surrounding structures to be safeguarded).

Geo-mechanical parameters of the rock to be blasted were defined on the base of preexisting reports, logs and of on field and surveys.

Design was structured in GUIDELINES where the controlled blasting was exposed and presented to supervisors and authorities.

MONITORING SPECIFICATION were given together with a decay curve of the seismic waves induced by the blast referring to previous similar jobs.

This was adjusted in a preliminary "fine-tuning" monitoring session.

Continuous monitoring of blast induced seismic waves was performed in 5 different spots including one on the nearest spot on dock. This permitted to acquire also environmental seismic waves to be compared with those of the blast (heavy traffic, ships, etc.).

Blast was also monitored in two spots with overpressure sensors. This permitted to asses a single-blast-decay-curve overpressure vs distance so that also overpressure induced in spots different from those were measured could be assessed with accuracy.

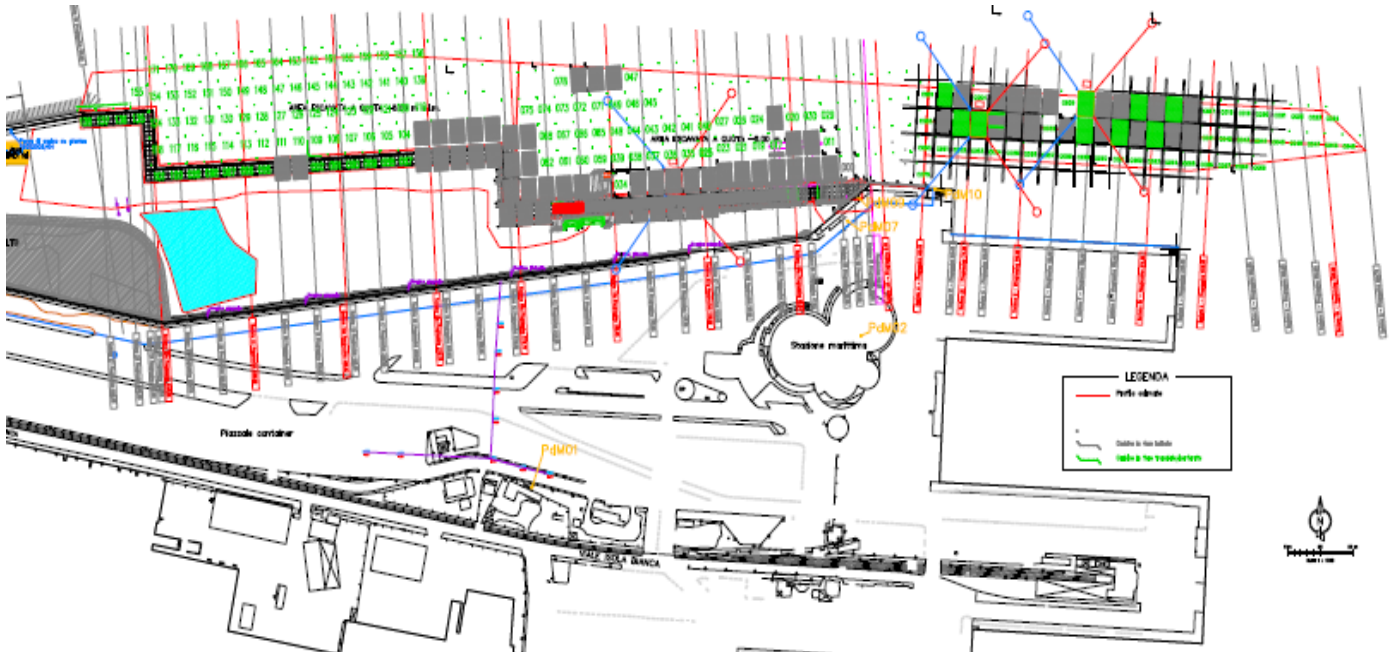
Operation procedure was given in a METHOD STATEMENT and a HEALTH AND SAFETY PLAN with RISK ASSESSMENT.

DAILY REPORTs including recorded seismic waves, photo and video of each blast, were taken.



OD drilling

Layout of Olbia tourist harbor and blasting fields

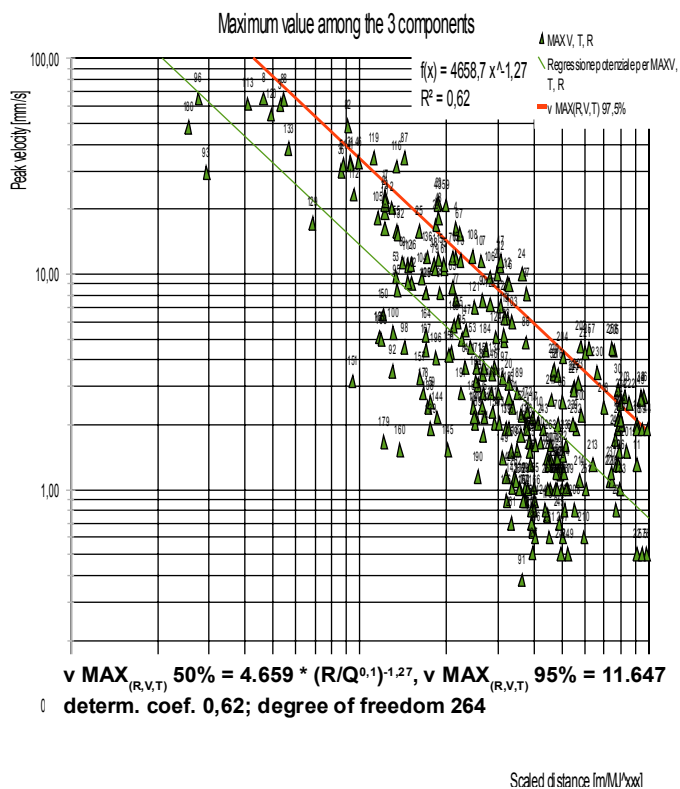


Composition B cylindrical charges



Muck pile

Peak particle velocity regression curve



Jack up

Monitoring

Peak velocity decay curve for both charges in hole and shaped charges were recomputed on the base of the recorded data and actualized monthly for increased accuracy. Cooperation of the charge was found at short distance for sequential blasting of 25 ms.