

## Case Study

Gibraltar :

Ocean Village Development :

A number of Apartment blocks

Contractors had tried to use Pre cast and augured piles but experienced very high failure rates.

Difficult ground conditions : Reclaimed land : Marl, Limestone, Stiff Clays and boulders.

Conditions precluded the use of conventional piling or auguring.

Contractor Roger Bullivant was able to overcome all of these difficult obstacles using SEA-Tech drill bar piling system.

The preferred drill bit was SEA-Tech "Rock-Breaker" a hardened cast bit incorporating ballistic tungsten carbide inserts. Attached to SEA-Tech's high yielding threaded hollow bar the pile could be installed using both percussive and rotary bored drilling techniques.

The SEA-Tech "Rock-Breaker" drill bit is uniquely shaped to punch through tough ground with ease and the size used for this application was our 200mm diameter version. Holes in the cutting head allow for a flush grout to flow down the hollow drill bar after reaching the desired depth and fill the surrounding ground to form a durable foundation.

Seven hundred SEA-Tech piles were installed at The Ocean Village site to depth of between 12m and 15m using a versatile 11-ton rig that repeatedly applies a rotary hammer "drifter" load.

Each pile is designed to accommodate a load of 800kN and even considering the difficult ground conditions an average of 12 drilled piles were completed each day. Output compares favourably to the two piles per day likely to have been achieved on the site using conventional rotary bored technique.

Gerry Cooper, Roger Bullivant Spain's technical manager says ; "We needed to specify a pile capable of quickly drilling through very tough material. Use of rotary bored piles could have proved much slower and there would have been no guarantee they would have coped in these ground conditions".

The speed associated with using SEA-Tech's drill bar system is partly explained by the method of installation used. Once the threaded steel hollow drill bar reaches full depth, it remains in situ and the rig operator can move on to the next pile position.

Roger Bullivant's technical piling manager, Mr Zac Bastin says; "We can install a drill bar pile in around a third of the time it takes to complete a conventionally augured pile. This is because obstructions in the ground are overcome quickly with this system and there is no need to retrieve sections of threaded bar from the ground."

Trying to remove sections of drill rods would not only delay the progress on site, but run the risk of damaging the integrity of the pile positions prior to a flush of grout. Mr Bastin says; "Leaving steel bars in situ also helps with the transfer of load. Most of the tension load is accommodated by the threaded steel bar, which acts as reinforcement and extends to the full length of the pile."

Use of SEA-Tech vertical steel tubes rather than a continuous flight auger also cuts down on the amount of spoil brought to the surface, and the robust SEA-Tech "Rock-Breaker" cutting head keeps vibration and noise generated on site to a minimum.

Manual handling of equipment is also reduced. Sections of drill bar and the cutting head are only handled prior to their installation and not a second time, since the apparatus remains in the ground.

Two versions of the cutting head have been developed for use with our threaded hollow drill bar and can be supplied in a variety of sizes. SEA-Tech "Rock-Breaker" is a domed button bit, designed for use in hard rock and sandstone, while our SEA-Tech "Star-Cut" is a cross-cut type drill bit featuring four flat serrated blades for use in clay and shale.

Each cutting head is designed to be sacrificial, to be used once and remain in the ground. "The heads do not need to last forever; once they have created their hole they are no longer needed," says Mr Bastin or Roger Bullivant.