

Chatswood to Epping rail tunnel

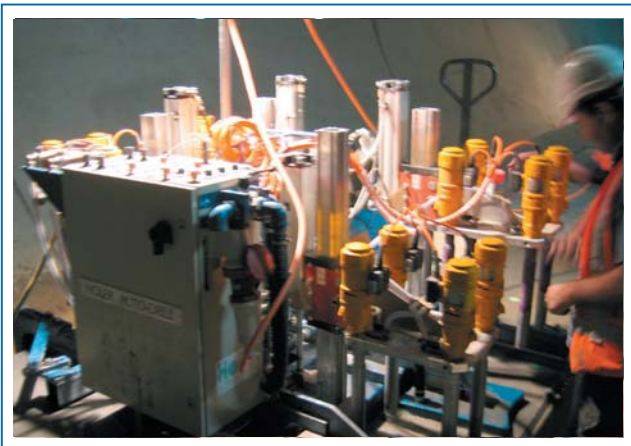
'Multi-national construction company Thies Hochtief choose COMBINED for 96,000 hole drilling assignment.'

This challenging project required 96,000 holes to be drilled 2km underground to a tolerance of +/- 1mm in less than 100 days!

For the Chatswood to Epping rail tunnel in Sydney, the design required the rail lines to be fixed to the concrete track slab by the use of Delkor rail base plates.

There are two basic types of base plate:

- One for fixing the rail to a 'floating' track slab (used where the tunnel passes under high-density housing to reduce noise and vibration); and
- One for fixing the rail to a 'fixed' track slab (used in less noise critical areas).



- The 'floating' track slabs were 20m x 2.1m x 600mm.
- After pouring slabs are jacked up 20mm and rubber bearers inserted to insulate them from the tunnel base.
- Each slab is about 20mm from the next and they are held in position by 600mm x 600mm key blocks.

Combined gets results!

The 16 head-drilling rig worked better than anticipated, and all objectives and targets were met.

The 'fixed' slab is poured directly onto the tunnel base. There were two options to secure the base plates to the concrete:

- Set the base plates in position and pour the concrete to the required height around the hold down bolts. This method was used for the majority of the 'fixed' slabs.
- Drill holes for the hold-down bolts after curing and jacking the slabs. This method was used for the 'floating' track slabs and some of the 'fixed' track slabs.

There was 5.5km of 'floating' slabs and 3.1km of DFF drill and grout slabs in the 26km tunnel requiring 96,000 50mm diameter holes to a minimum depth of 135mm.

To get the job done in a timely manner and to the accuracy specified (+/- 1mm) Combined designed a multi-head drill rig that would simultaneously drill 16 holes and still meet the tight tolerance specification.

The logistics were difficult with problems including:

- No manufacturer that we contacted had ever built such a machine or had even heard of one being built;
- We were working up to 2km from the tunnel entrance;
- Water had to be supplied to the job site;
- A 75kVA generator was required to supply power;
- Slurry was to be disposed of using the tunnel's environmental systems;
- There was 75 tonnes of concrete cores to be transported to the surface for disposal;
- All holes were to be within a tolerance of +/- 1mm; and
- An average of 1000 holes needed to be drilled each day.

