

Hard Rock Tunnel Boring Machine TM-100

Applied to the boring of hard rock with a uniaxial compressive strength 100 MPa

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Minimizing the environmental impact is one of the essential requirements in tunnel boring in order to preserve the natural environment, buildings, and embedded structures at the site. In addition, it is important to save the environment of neighborhood residents. From these background, the use of impact-producing excavation depending on explosives and large-scaled breakers are restricted for many sites. In order to cope with this issue, a new type of tunnel boring machine TM-100 (hereinafter referred to as TM-100) was developed to bore hard rock.

1. Characteristics of TM-100

- A disk cutter is provided on the machine, capable of crushing hard rock exceeding 100 MPa for any free cross section.
- There is also a disk cutter able to crush material with low vibration.
- Automatic boring is possible to improve boring accuracy and quality.
- To save worker's safety, it is able to eliminate for workers to enter the area just in front of the face
- An automatic operation saves labor forces.
- Since an assembling time of the machine at site can be decreased to only a week, a site schedule can be optimize anytime when required.

2. Application to a tunneling site

In 2015, TM-100 was installed for a tunnel construction on the Shin-Meishin Expressway. This site is located in the proximity of a residential area, national highway and railway, including some sections where explosive boring was prohibited, and partially encountering hard rock exceeding 100 MPa in uniaxial compressive strength. Since it was predicted that excavation would be difficult with a conventional tunnel boring machine, we decided on using TM-100. Although some sections in the alignment to be bored included hard rock layers of 200 MPa, the project was able to be completed safely. The result of vibration measurements in the vicinity were less than 50 dB, the upper limit permitted by regulations, and capability of a monthly rate of 35 meters was demonstrated.

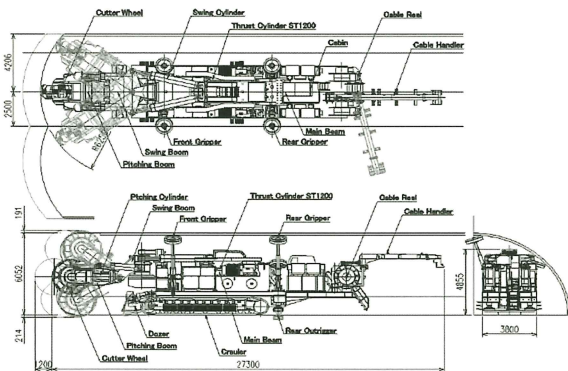


Fig. 1 Plan and sectional view

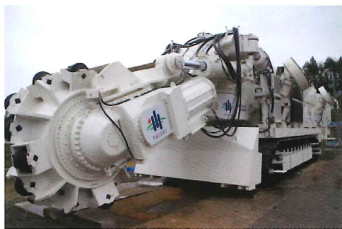


Photo 1 Boring machine



Photo 2 Excavation