

Fore-Plate Method

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Fore-poling with three-meter-long bolts to stabilize the crown is the usual option when drilling poor natural ground using NATM. The fore-plate, on the other hand, is a method that represses the looseness of natural ground by placing steel sheet-piles using no drilling fluid.

Fore-poling is implemented using a drill jumbo, by drilling a hole using drilling fluids, applying mortar to the hole, and placing bolts. This method, though, may promote further loosening of natural ground, especially with poor natural ground, especially with sandy soil. So, our team focused on the idea of using steel sheet-piles, which require no pre-drilling, instead of bolts. We also made improvements on general purpose drill jumbos, so the piles can be implemented by machine and not by hand, as they were conventionally.

This improved machine can be used by attaching special rods and centralizers, which were newly developed for this process, on the guide cell of the drill jumbo. Attachments can be changed, so one can use the same drill jumbo for rock-bolt drilling, for example.

Compared to rock-bolts, steel sheet-piles can support the natural ground better, and less dirt fall through any cracks, as the size and bending rigidity are larger. Construction time can be shortened to half of the conventional method as the required time for installing sheet-piles as the same as drilling rock-bolts, and the process of applying mortar and inserting bolts are unnecessary.

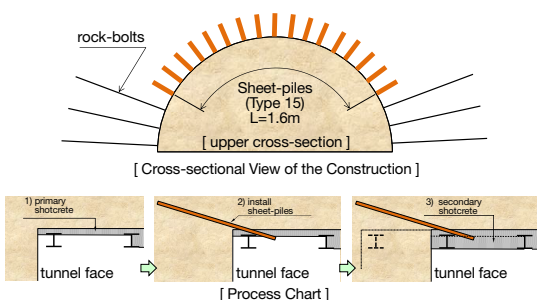


Fig. 1 Outline of the Fore-plate Method

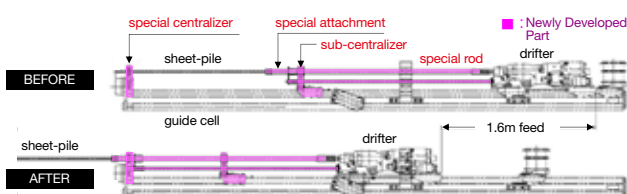


Fig. 2 Sheet-pile Installation Device

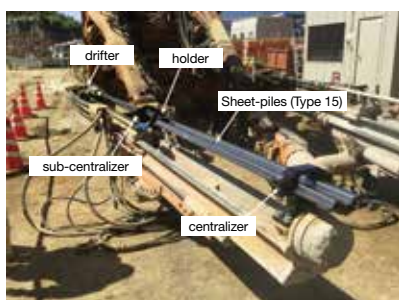


Fig. 3 Sheet-pile Installation Device Loaded on a Guide Cell