

**Research on technology of slide style bit switching system and electrolytic corrosion
launch-arrival method**

" Research on technology of slide style bit switching system and its utilization (combined) "

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(Purpose)

Recently, for shield construction in the urban district, the understanding of the inhabitants is hard to be obtained owing to vibrations, noise and induction of the traffic jam, etc., and the security of the shaft lot is becoming difficult from lot shortage due to the high density. In the meantime, the underground utilities are congested under the roads in urban area, the installation of new pipe line has to be made into the great underground, and the increase of construction cost has been caused.

Though the long-distance excavation of shield tunneling is mentioned as one of the countermeasures, there are many technical problems of construction cost, construction period and the safety, because the bit exchange had to be conducted jointed with soil improvement in the inside of tunnel.

In the meantime, the back ground is made to be self-supporting by the soil improvement for the departure and arrival of shield construction, and the earth-retaining wall is to be destroyed in manpower, etc.. However, the effect to surroundings is big for the supplementary construction method of the ground work, and construction cost, construction period increase.

As object of this research, Sliding style bit switching system is the technology that enabled bit exchange in inside of shield without requiring the soil improvement. And, the electrolytic corrosion departure arrival method which the earth-retaining wall is deteriorated by electrolytic corrosion and is directly cut by the shield, enabled the departure and arrival to execute with the omission of the supplementary construction.

In this study, it is to establish the technology of sliding bit switching system and the departure arrival method of electrolytic corrosion, with the aims at cost reduction, reduction of effect to surroundings, relaxation of the shaft lot problem, improvement of the safety for shield construction.

(Result)

Main results of this study were shown as following, and as a collective of the research results, the pamphlet was made.

1. Sliding style bit switching system.

(1) Arrangement of the basic performance

For the practical application of this system, the following were arranged based on the results of elemental experiments: Strength and durability, actuating of sliding mechanism, performance of water proof and switching time.

(2) Arrangement of the application range.

The application range of this system was arranged from the basic performances. It is applicable for the largest excavation extension of 5km, under waterproof of 600kPa, from clay to gravel, outer diameter beyond f3.0m, and excavation type of slurry and earth pressure shield

(3) Examination of the elemental technology

For grasping the bit exchange time, and for doing the efficient utilization of this system, the developing bit abrasion proximity device of electromagnet-inducting was focused on at present. From field mounting experimental result, the practical application was judged to be practicable.

2. Departure arrival method with the electrolytic corrosion.

(1) Control of the electrolytic corrosion.

The insulating material was affixed in the pile core in order to reduce the electrolytic corrosion quantity and shorten construction period, and the electrolytic corrosion range was controlled. Timber or rubber was suitable as an insulating material, and it became clear that the optimum electrolytic corrosion groove width was 10mm.

(2) A grasp of the necessary degradation level

By the circling electric quantity, whether the electrolytic corrosion progressed to the condition in which the directly cutting of pile core becomes possible should be grasped, and the necessary electric quantity was obtained by the elemental experiment.

(3) Evaluation of the cutting ability.

Trial wall of the full scale was manufactured, and the cutting ability by shield was confirmed. Cutter torque and all thrusts were in the range which the sufficient correspondence was possible by the equipment of the usual shield.

(4) examination on effect to underground utilities

As experimental result of confirming the effect to underground utilities by the stray current, that it has not effect was clarified.

(5) Verification by the demonstration shaft

The real shaft was constructed, by which the electrolytic corrosion and cutting ability and applicability to the peristylar underground continuous wall were verified.

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