DOUBLE SHIELD COMPACT TBM SYSTEM

SELI

DIVISIONE TECNOLOGIE

THE DSU COMPACT TBM SYSTEM

The DSUC TBM system has been developed to:
- substitute Open Type TBMs in their typical fields of application,
- offer many of the same advantages of traditional Double Shield Universal TBM but with a simpler and easier operating system.

The DSU Compact TBM system is not only a new type of TBM, but also it is a complete integrated system made of: the TBM, the Back-Up and the tunnel transport device.

DSU Compact TBM systems design targets are:
- To improve environment and workers' safety
- To reduce transport and installation time costs
- To reduce the operation and maintenance costs and crews
- To improve performances in a wider range of rock conditions
- To reduce the typical length of tunnels where TBM excavation becomes competitive with conventional heading.

DSU COMPACT TBM SYSTEM DESCRIPTION AND SPECIFICATIONS

The DSC TBM system consists of an integrated set of equipment made of:

DSU Compact TBM - The TBM is a special Double Shield Universal TBM having the following characteristics:
- Extremely short total shield length
- High main and auxiliary thrust capacity
- Variable Frequency Cutterhead drive
- Long life main components
- Simplified hydraulic and electric circuit
- Twin roof drill mounting for rock bolting
- Probe drill mounting for 360° treatment/drainage holes
- Precast segment (steel) ring erector
- Bolted structures to facilitate dismounting and transport back inside the tunnel.

Back-Up system - It is extremely short (Typical length varies from 50 to 65 m). The Back-Up is made of few decks, typically 4 to 6, and includes all typical services equipment for the TBM.
The ventilation system utilises a Dust Scrubber having double the capacity of standard application for similar diameter. This to substantially improve the quality of air in the working area.

Muck Transport system - can be configurated for tunnel conveyor or muck trains depending on the tunnel length/diameter and the Client requirement/preference.

Portal installations - The DSU Compact TBM system requires minimum site installations to allow fast mobilization, set up and demobilization of the site.

DSC OPERATIONAL MODES

There are 3 basic operation modes for a DSUC TBM

Gripper mode in stable rock

The TBM advance by thrusting off the side grippers in the rear shield and extending the main thrust cylinder.

Contemporary with the excavation rock bolts are installed as per requirement and design.

Gripper mode in unstable rock

The TBM advance by thrusting off the side grippers in the rear shield and extending the main thrust cylinder.

Contemporary with the excavation prefabricated steel sets are installed within the tail fingers.

Single shield mode in fault area

The TBM advances as a single shield by thrusting off the auxiliary cylinders. At the end of excavation prefabricated steel sets are installed within the tail fingers.

DSC FIELD OF APPLICATION

DSU Compact TBM System has been especially designed for the following applications:

- Hydraulic tunnels and or sequence of short hydraulic tunnels that do not requires a systematic concrete precast lining
- Mining exploratory and access tunnels
- Road and railway tunnels that do not require systematic concrete precast lining
- Pilot & services tunnels.

The small length and design, which makes the transport/assembly and the operation much easier, allow the utilization of the DSU Compact TBM systems also in very short tunnels as well as in multiple short tunnels.

As far as the geological range of application is concerned, the DSC TBM system can cope basically with all kind of rock formations and rock strengths.

QUALITY AND STANDARDS

The complete system is designed and manufactured according to the most stringent CE norms.

DESIGN LIFE CRITERIA

The system is designed to work 10.000 hr of boring life for multiple use without major overhauls.