

COLLABORATIVE RESEARCH CENTER 837

INTERACTION MODELING IN
MECHANIZED TUNNELING

RUB

APPLICABILITY OF SHIELDED TBMS IN TUNNELING THROUGH SQUEEZING GROUND

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The shielded TBMs are amongst the most technically sophisticated excavation machines in use by tunneling industry. Despite successful use of this type of TBMs in many projects, presence of shield makes the machine susceptible to be entrapped in deep tunnels under high stresses experiencing high convergence. Therefore, TBM may get stuck in the complicated geological structures commonly referred to as squeezing ground leading to slow down or stoppage of TBM operation, requiring manual excavation to release the machine, and sometimes even call into question the feasibility of using shielded machines in such ground conditions.

To realistic evaluation of the possibility of machine entrapment and applicability of shielded TBMs in squeezing condition, the interactions between ground and machine components should be recognized thoroughly. These complex interactions can be investigated in detail by using 3D numerical modeling that takes all of the ground, machine and tunnel factors into accounts. To achieve this purpose, this lecture presents employing finite difference method for 3D simulation of mechanized tunneling mined by the shielded TBMs. The results from numerical analysis make it possible to evalu-

ate the effective design parameters and the operational measures. It also allows evaluating applicability of shielded TBMs at design stage of a tunneling project.

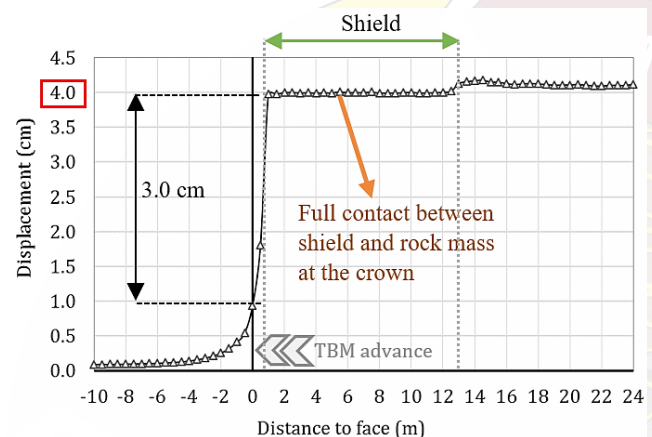
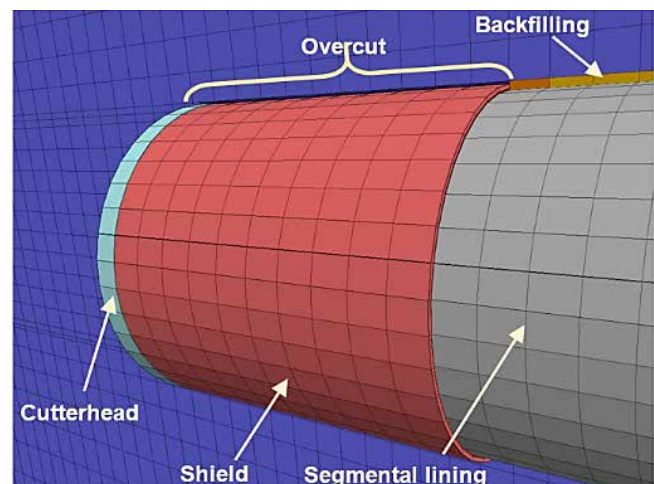


Fig. 1a & b: 3D schematic model of tunneling using a single shielded TBM with the longitudinal displacement profile at the crown

Guests are welcome!