

COLLABORATIVE RESEARCH CENTER 837

## INTERACTION MODELING IN MECHANIZED TUNNELING

RUB

# On the Interaction between a Tunnel Boring Machine and the Surrounding Soil

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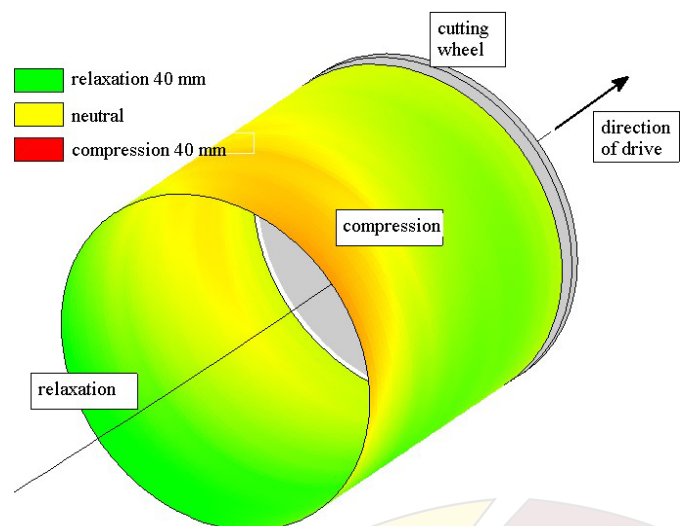
*Delft University of Technology, the Netherlands*

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The presentation gives a brief overview of my PhD research. This research project investigated the mechanical equilibrium of a Tunnel Boring Machine (TBM) driving in soft soil and the interaction between the TBM-shield and the soil, where primarily monitoring data is used to model the physical processes induced by the TBM advance. The monitoring data used is obtained from the Hubertus tunnel in The Hague, Netherlands.

A kinematic model of shield behaviour is introduced that captures the displacement history of the soil induced by the advancing shield. The calculated displacements are processed into stresses acting on the shield by means of a purpose-built bedding model. Limitations and advantages of the newly proposed bedding curves are discussed.

Stresses, forces and moments acting on the TBM are combined to verify its mechanical equilibrium. The conditions where a static equilibrium is or is not achieved are discussed. As a result, a quantitative assessment of the influence of the tail-void grouting is made.



The interface displacements calculated by the model and those actually measured into the soil are compared. Where correlation is weak alternative explanations are proposed, including the penetration of pressurized grout mortar into the interspace between the TBM-shield and the excavated geometry. It is shown that the pattern of the induced displacements substantially differs from that assumed by the volume-loss scheme.

**Guests are welcome!**