Abstract

In tunneling practice the meaning of soil management is becoming increasingly important against the background of rising ecological demands accompanied by declining economic possibilities. This is in particular true with regard to slurry shield tunneling in fine-grained soil because in this context dealing with the excavated soil is rather complex due to the fact that multiple mechanical and hydraulic impacts impinge on the soil.

Hence, for the first time the present work details, systemizes and classifies the process of soil management as a comprehensive approach. Therefore, each step of the process is described in chronological order, starting with the prognosis of the mass of excavated soil, followed by mechanisms for separation and recording of the actually excavated soil, concluded with invoicing which is usually problematic in tunneling practice.

With regard to each step and intermediate stages thereof significant shortcomings in the system and influencing factors of the discrepancy between the predicted mass of excavated soil in theory and the actually excavated mass of solid material are presented in detail. It becomes obvious that dispersion plays a significant role in the context of soil management which is why it has been made the focus of this work. The development and execution of a new testing method for the prediction of the dispersion of different soils is detailed. For the first time in tunneling practice this test allows for a qualitative assessment and therefore a prognosis of the expected dispersion based on quantitative values determined in a traceable and reproducible testing method. In addition the test allows for an estimation of the dispersion tendency based on figures which are usually collected anyway in the preliminary stages of a tunneling project for the plasticity and consistency.

Since the work deals with a topic resulting from practical experience it concludes with specific recommendations for tunneling practice hoping to provide a small contribution to improve the culture of constructing.