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Digital photogrammetric documentation of tunnel excavation – Application at the Gleinalmtunnel site

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Geological documentation of tunnel excavation traditionally relies on visual examination and preparing a sketch of the tunnel face. Measurements of discontinuity orientation are made with a geological compass, often by visually targeting the discontinuity because it is out of reach or because access of the face is not possible due to security reasons. Work is completed by estimating the main engineering geological parameters (e. g. discontinuity spacing, weathering, UCS, etc.). This procedure of geological documentation has mainly remained unchanged for many decades. This is in strong contrast to the general progress in the fields of engineering geology, rock mechanics and tunnelling, but also to the increased demand for geological expertise in claims related to ground conditions.

During the last two decades digital photogrammetric techniques have been developed for application in tunnelling and at least since approx. 10 years they represent “ready to use” techniques. However, up to various reasons they have only sparsely been applied in tunnelling.

The construction of the 8 km long second tube of the Gleinalmtunnel (Styria, Austria) was awarded to a consortium which gained the contract with an alternative bid based on full face excavation of large parts of the tunnel. This alternative excavation procedure results in a nearly bisected excavation time and led to the decision of the responsible highway authorities (ASFINAG) to award GEOCONSULT ZT GmbH with the digital photogrammetric documentation of the tunnel excavation.

This contribution presents the current practice of geological documentation at the Gleinalmtunnel and discusses the techniques, their possibilities and their limitations out of the perspective of the documenting geologists.