

Modelling of Single Tunnel Crosscutting Fractures in the underground rock characterisation facility ONKALO, Olkiluoto, SW Finland

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This research focuses on Single Tunnel Crosscutting Fractures (STCF) in the ONKALO access tunnel in Olkiluoto, SW Finland. A STCF is a single fracture that cuts through the whole tunnel profile or that is at least 20 m in diameter, and is found outside known intersections of brittle deformation zones / is not a part of a brittle deformation zone. The objective of this study was to model the geometries of the STCF to gain better understanding of their size distribution, and to determine any characteristic geological properties that would improve prediction of these potentially large fractures. This work is related to Posiva's Rock Suitability Classification (RSC) system, developed for locating suitable rock volumes for repository design and construction. The aim of the classification is to avoid such features of the host rock that may be detrimental to the favourable conditions within the repository, either initially or in the long term.

The size of all the STCF fractures in ONKALO has been modelled and a minimum and maximum length recorded. Results from the modelling show that the STCF in ONKALO are normally less than 50 m in diameter, but that fractures up to 100-200 m in diameter exist. The STCF fractures follow the general trend of fracturing, but the STCF with a diameter over 50 m possess some distinctive geological characteristics. These fractures are usually characterised by an undulating, slickensided fracture surface and at least 2 mm thick mineral fillings. The occurrence of alteration, presence of water leakages or fracture fillings of quartz, epidote, graphite, or clay minerals are also typical indicators of a fracture potentially over 50 m in diameter.

References:

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