



Assessment of aggregate quality and petrographic properties' influence on rock quality: A case study from Nordland county, Norway

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Good access to construction materials is crucial for future infrastructure development and continued economic growth. In Norway >80 % of construction materials come from crushed aggregates and represent an growing share of the consumption. Although recycling to some extent can cover the need for construction materials, economic growth, increasing population and urbanization necessitates exploitation of new rock resources in Norway as well as many other parts of the world. Aggregates must fulfill a number of technical requirements to ensure high quality and long life expectancy of new roads, buildings and structures. Aggregates also have to be extracted near the consumer market. Particularly for road construction strict criteria are in place for wearing course for roads with high traffic density. Thus knowledge of mechanical rock quality is paramount for both exploitation as well as future resource and land-use planning but is often not assessed or mapped beyond the quarry scale.

The Geological survey of Norway runs a database with information about crushed aggregate deposits from >1500 Norwegian quarries and sample sites. Here we use mechanical test analyses from the database to assess the aggregate quality in the Nordland county, Norway. Maps have been produced linking bed rock geology with rock quality parameters. The survey documents that the county is challenged in meeting the requirements for roads with high traffic density and especially in the middle parts of the county many samples have weak mechanical properties. This to some degree reflect that weak Cambro-Silurian rocks like phyllite, schist, carbonate and greenstone are abundant in Nordland. Typically mechanically stronger rock types such as gabbro, monzonite and granite are also exposed in large parts of the county, but are also characterized by relative poor or very variable mechanical test quality.

Preliminary results indicate that many intrinsic parameters influence the mechanical rock strength, but variable degrees of deformation in the different tectonostratigraphic units exposed in Nordland affects the rock mechanical properties and is a prominent feature of our mapping. Unsurprisingly rock type, mineralogy, grain size and rock texture are all important factors that have a major control on the mechanical behaviour of the rocks. However, this assessment shows that there is an intricate interaction between these parameters and the resulting mechanical properties at present making it difficult to assess mechanical quality accurately only based on petrographic examination.