



## **Aggregate product quality maps for sand and gravel deposits**

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A range of new data analysis techniques have been developed to allow a spatial assessment of potential product quality within sand and gravel deposits to be produced. The techniques allow the ease with which exploration borehole samples or average gradings might be processed into a particular product to be quantified.

The gradings for exploration borehole samples are mainly used to define the potential saleable products that could be produced. Products are generally sold in accordance with British and latterly European Standards which define size range specification for each product. The maximum and minimum acceptable percentage value for sand fractions retained on or passing each sieve during a particle size analysis defines an envelope in which acceptable materials must fall. Material should preferably fall well within the envelope rather than close to the envelope boundary.

A techniques to quantify the 'closeness' of a sample to the edge of a particular specification envelope or an ideal centre line value has been developed. Four complimentary parameters are proposed that describe the 'fit' of the sample grading to the specification envelope. These include size, ease of production and risk based approaches.

The 'closeness of fit' data from borehole investigation projects can be presented to show how these quality measures vary around the deposit giving new information on spatial deposit variability with particular relevance to specific mineral product distribution.

These calculation and presentation techniques have been deployed on four greenfield sites being evaluated by one of the largest aggregate producers in the UK. The plans produced in this way are providing additional information on site design, planning applications and management decision making. The improved site design will lead

to a direct improvement in reserve recovery, waste minimisation and environmental performance.

Software has also been developed to allow simple or more complex plant simulations to be applied to exploration samples to more accurately define likely product gradings. This has also allowed retrospective study of existing processing plants allowing reconciliation of feed and products, indicating where loss of some sand fractions has occurred with particular extraction methods.