Geophysical Research Abstracts, Vol. 9, 10835, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10835

Next Generation Aggregates – the shape of things to come

K.Jeffrey (1)
Department of geology, University of Leicester, UK (kip1@le.ac.uk)

Most aggregates are performing the same function as they have done for centuries or even millennia. This is at a time when technical advances in almost all fields have developed at a staggering rate. Our aspirations for aggregates are low – it is enough that they should be cheap, resilient and either pack together well or stick to cement paste or bitumen.

The industry has developed some more 'innovative' products, in the UK for example dry silo mortars, specialist asphalts, and coloured aggregates. Recent technical advances have focussed on using waste materials, for example recycled demolition rubble, asphalt planings, and crushed glass in concrete blocks.

What is needed is a more 'blue skies' look at what aggregates for the future could be and what they could do, and the research needed to underpin these ideas. A range of ideas are proposed centring on new technologies that allow simultaneous laser or video based size and shape characterisation. This in turn leads to novel topological modification to yield specialist products.

For materials to perform better in bonded applications cheap surface modification of aggregates needs to be explored eg. by sand blasting, surfactant and detergent treatment, and surface coatings, and the effects considered on both natural and waste materials. The geologist in the aggregate industry needs to think of their materials as a series of shapes and surfaces on which many things can be done. Surface modification in the filler business particularly for kaolin and carbonates is now routine.

In the area of synthetic aggregates projects have already been undertaken in fused materials, carbonation and pelletised fines to create aggregates. These need to be expanded to explore the performance of new shapes and microstructures for high quality

applications rather than focus purely on the use of waste raw materials.

In real life aggregate surfaces are not clean and the potential for bio-aggregate materials and structures is an exciting area to investigate. Reactive surface coatings applied to the aggregates using materials science and even IT technology has enormous potential.

In order to continue the use of recycled and waste materials we need to take less promising materials and see how they perform in combination with each other and primary aggregates. The properties of these hybrid mixtures will be surprising and the scientific understanding needs developing

Techniques to model and investigate these also need to be explored. Mathematical mix modelling, non-destructive 3d visualization using high energy x-ray CT- scanning to reveal microstructure, and high resolution surface imaging are all available and have major applications.

The market is essential in deciding if any of these ideas has the greatest potential but we need a bit more materials science with our geology!

New developments include photocatalytic concrete incorporating Ti powder for buildings and roads in urban areas. The building and road surfaces are the active surfaces for the reactions that break down polluting gases improving air quality in cities. Nanotechnology offers even further opportunities for functional surface active materials.