

THE GOOD MIXER

Bachy Soletanche and Cambridge University, in collaboration with 10 industrial partners, have started work on a large Technology Strategy Board-funded project on contaminated land remediation technologies.

The £1.24M SMIRT (soil mix remediation technology) project aims to achieve significant technical advancement and cost savings by developing an innovative system for integrated remediation and ground improvement. This will include the simultaneous delivery of wet and dry additives and an advanced quality assurance system.

Soil mix technology involves the use of a range of mixing tools and additives to construct permeable reactive in-ground barriers, low-permeability containment walls and hot-spot soil treatment by stabilisation / solidification to improve the engineering properties of soft soils.

Three different soil mix technology systems were developed by Bachy Soletanche: the Colmix auger system, the Cutter Soil Mixing (CSM) system and the Trenchmix system. Each is used for different site conditions.

The Colmix system uses multiple overlapping augers that can be arranged either in-line or in a rectangular block. It is used primarily to treat local, relatively deep soils and can be mounted on a range of base equipment depending on the site requirements. However, the block arrangement can be effective for mass in-situ treatment, given the right conditions.

The CSM system uses equipment developed from diaphragm wall cutter technology. It consists of cutting and mixing drums mounted on compact hydraulic motors. A telescopic Kelly bar is used to mix to depths to 30m, while deeper treatment can be carried out using guided rope suspended equipment. Soil-mixed panels are rectangular and typically 0.5m to 1m thick and 2m to 3m long. Sections can be overlapped in plan to produce the required shapes.

The Trenchmix system uses a drainage trencher specifically modified to break up and mix the soil, allow incorporation of binder (or other reagents) and to effectively mix the soil and binder in-situ. The binder may be introduced as powder or in the form of a previously mixed grout.

The mixing is carried out by what is best described as a chain with mixing blades on a boom that is inserted vertically into the ground and then moved horizontally with the trencher. The process produces soil mix walls typically 400mm thick and up to 10m deep.

Bachy Soletanche project leader Peter Barker says: "The Trenchmix is an ideal soil mixing system to use for this work. Its relatively small size, low-track bearing pressure, efficient mixing and high outputs can give real technical and commercial advantages over other systems."

The project involves extensive laboratory treatability studies in which a wide range of conventional and novel binders and additives will be tested together with a range of soils and contaminants. In parallel, the novel equipment will be designed and manufactured. Extensive field trials will then follow, scheduled for the first half of 2009. Extensive in-situ testing, sampling and groundwater monitoring will then be carried out, together with laboratory testing of the site samples and assessment of the field measurements.

As a major step towards increased understanding and uptake of soil-mix technology in the UK, the project will also involve consultation meetings with a wide range of stakeholders. There will also be a major dissemination programme through CL:AIRE (an organisation that stimulates the regeneration of contaminated land in the UK) and Environmental-KTN (a knowledge transfer network that aims to improve the competitiveness of UK environmental industries).

Cambridge University reader in geotechnical engineering Abir Al-Tabbaa says: "This is a very exciting opportunity for academia-industry collaboration to take forward this promising and fledgling technology and its applications in the UK."

The project partners are considering a number of sites for the field trials and are keen to consider other sites available so that the most suitable can be selected. The wish list

for the site includes:

- Secure site
- Access for plant and equipment (including small mixing plant)
- Reasonable working platform
- Suitable ground conditions (no obstructions and no stiff clays)
- Range of significant contamination.
- Groundwater 1.5m to 3m depth
- Well-defined groundwater flow
- Water supply
- Compliant site owner.

If anyone has a site that would be available for a number of years from the end of 2008 and satisfies some if not all of the above requirements, please contact Peter Barker on (01420) 594700 or email peter.barker@bacsol.co.uk

For further information, contact either Peter Barker or Abir Al-Tabbaa, email: aa22@eng.cam.ac.uk

COLLABORATION

The partners are environmental consultants Arcadis Geraghty & Miller, Arup and Merebrook Science and Engineering, materials suppliers Amcol Minerals Europe, Richard Baker Harrison, Kentish Minerals and Civil & Marine and trade associations British Cement Association, UK Quality Ash Association and the British Urban Regeneration Association.



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