

Cementation

SKANSKA

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Grouting

Techniques

- Bulk Infill Grouting
- Permeation Grouting
- Compaction Grouting
- Compensation Grouting

Applications

- Bulk Infill
- Old Coal Workings
- Void Filling

Permeation Grouting

- Shafts
- Tunnels
- Excavations
- Ground Stabilisation

Compaction Grouting

- Underpinning
- Ground Stabilisation

Compensation Grouting

- Tunnelling
- Settlement Prevention

Advantages

Bulk Infill

- Economic development of land previously considered unsafe.

Permeation Grouting

- Ground improvement to ease construction of basements.
- Eliminates unwanted ground water.

Trademarks

CEMGROUT®



Application of Grouting Techniques

Cementation Skanska's grouting techniques can be used to provide a cost effective solution to both temporary and permanent geotechnical problems. Voids, soft ground, settlement and water inflow are just a few obstacles encountered where grouting solutions can be employed to mitigate their effects during construction. Since we began working in the Doncaster coalfields in 1910, we have played a leading role in the development of grouting solutions to stem water flow, stabilise soils, improve ground bearing pressures and negate settlement.

Effective grouting requires an understanding of theoretical principles, accurate interpretation of ground characteristics, skilled application and careful monitoring. We can draw on a wealth of experience and resources to provide an effective grouting solution tailored to the client's needs.

Bulk Infill/Ground Stabilisation

Developers now seek to build new projects in areas once deemed uneconomic due to their poor

ground conditions. In order to provide economic foundation solutions, ground stabilisation has become widely used for turning unsuitable soils into useful founding strata. The technique is often used in areas which have been heavily mined. Old workings are now in various states of distress and pose a potential risk of collapse – with or without any application of load from the surface.

Expensive mass blanket treatments may be avoided by the effective use of detailed site investigation and knowledge of the workings. We can provide



a value-engineered solution to enable further development of the site.

Permeation Grouting

Basement construction, shaft sinking, dam cut-offs and tunnel excavations are all prime examples where the need for ground water control is necessary.

Permeation grouting relies upon the liquid grout flowing through the soil, displacing water and gases by forcing them out as the grout steadily advances. The grout must be pumped steadily, taking care not to disturb the soil structure. This is a critical operation and one which needs to be controlled and monitored appropriately.

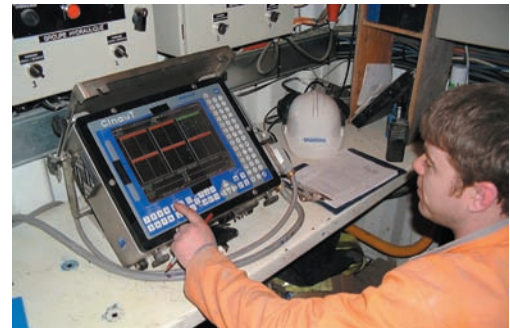
We have custom made computer-controlled grouting units to monitor and control flow and pressure during specialist grouting operations. Specific instructions can be set to control each injection, and in turn each injection is recorded and downloaded immediately for the engineer to analyse. Grouting demands full application of the observational method, and electronic data management of the grouting data improves this iterative approach. Cost effective grouting requires comprehensive knowledge of the ground and ground water conditions in order to select the most appropriate grout and delivery system.

Choice of grout	Coefficient of permeability (m/s)						
	10 ⁻¹	10 ⁻²	10 ⁻³	10 ⁻⁴	10 ⁻⁵	10 ⁻⁶	10 ⁻⁷
Cement							
Grout with filler (PFA/sand)							
Bentonite (or clay)/cement							
Grout with improved penetrability							
Microfine cements							
Silicate gel (high resistant gel)							
Silicate gel (low resistant gel)							
Resins							
Ground conditions	Coarse ground/scree/ coarse alluvial highly fissured rock			Coarse pre-treated alluvial/fine alluvial (sand & gravel, sands, silty sands)/finely fissured rock			

Compensation Grouting

The excavation of tunnels produces settlement which can propagate to the surface and cause structural damage to those structures which lie on or near their path. The philosophy of compensation grouting is to reduce, or even prevent settlement by injecting relatively small quantities of grout between the source of the settlement, (the tunnel) and the foundations of the structures that require protection. Typically, horizontal arrays of Tube a Manchettes are installed over the treatment area which allow repeat injections at any one location. This allows multiple injections to be made in areas where settlement is predicted or has occurred.

An essential component of compensation grouting is the monitoring of movements. Precise levelling and electrolevel monitoring of the ground and structures overlying the tunnel provide key data to designing the daily grouting instructions. The data is collated and analysed using our award winning software CemSMART (formerly known as Surpoint +). Close coordination and cooperation is essential to the success of the works.



Plant and Resources

Our plant depot and workshops are centrally located in the UK to provide first class support to sites and projects throughout the UK. Bentley Works is the traditional home of Cementation Skanska and has grown into the premier plant depot within the industry. It houses and maintains the largest fleet of specialist plant in the UK.

Awards

Our proactive approach to safety, quality and production has received wide recognition from within the industry.

Specifically, we have proven capability to design and carry out complex geotechnical projects and deliver them on time and within budget to our client's satisfaction.

