





Cutter Soil Mixing or CSM for short is an innovative approach to improving soils by in-situ mixing a cementicious binder into the soil. These improved blocks of soil can be utilised for ground improvement and retaining wall structures alike.

CONSTRUCTION METHODOLOGY

PANEL SIZE & LAYOUT:

CSM panels are rectangular in shape, measuring 2.8m in width, with varying thicknesses depending on the size of cutter drum fitted to the head. These panels can be overlapped with one and other and their orientations changed to form different geometric shapes.

Placement tolerances will depend on the method of setout. For tight tolerances we would recommend the use of concrete guidewall structures.



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Moving Sp	eed 0.00 m/min	Cumule F	ative Mixing Tool X Factor	Deviation Tool	' Deviation	X 0.1 ° Y 0.7 °
Tool Weig	ht 27.0 0.6 Tf	0.00 m 0	11 rev/m 100-20.0	-1.5 cm 20.0-26.0	3.8 cm 26.0	27195 5 5229.82
42	Torque 50 bar			A I	A I	H H
Rotation Speed 12.7 12.8 rpm		4.75 m			<u>41 —</u>	GP 2.7 bar CP 3.9 bar
Injection F	Pressure 1.3 bar	9.50 m				Ĭ
Flow Rate	168 (/min				$\langle $	
Density 1.03 kg/l		14.25 m				
40 60 11 rev/m		19.00 m				Sonar
-1.5 cm						12.33 m
TOOT T DE	3.8 cm	23.61 m				
Wait	Mix-Up					

MIXING:

The top 1200mm of the panel is initially excavated using an excavator to form a trench which acts to contain any fluid/slurry generated by the CSM tool.

The cutting head is inserted into the trench, at which point the cutting drums commence rotating. The tool is then inserted down into the trench to commence cutting and mixing the soil of the panel. The soil is premixed during the downward excavation and the spoil is moved towards the top of the cutting head.

On reaching the specified depth, the tool is extracted upwards at a controlled rate. The spoil mix is drawn back through the tool while a binding agent (cement or other SCM) is injected and mixed into the soil.





ADVANCED CONTROL:

The onboard monitoring and control system are based upon hydrofraise diaphragm wall excavation experience. This provides the operator with real-time monitoring of the two key process parameters: the volume of binding agent being injected into the panel and the homogeneity of the soil and binding agent mix. It also allows for monitoring and control of the verticality of the panel.



APPLICATIONS:

GROUND IMPROVEMENT:

Cutter Soil Mixed panels have been effectively utilised to improve the characteristics of in-situ soils for various ground improvement needs such as:

Increased Bearing Capacity: CSM enhances the load-bearing capacity of weak or compressible soils, allowing for the construction of foundations and structures on otherwise unsuitable ground conditions.

Settlement Control: By stabilizing and reinforcing the soil mass, CSM helps to minimize settlement and differential settlement, ensuring the long-term performance and structural integrity of built infrastructure.

Liquefaction / Lateral Spread Mitigation: In earthquake-prone regions, CSM can be used to mitigate the risk of soil liquefaction and lateral spread by forming inground lattice structures, that can encapsulate at risk soils and create load paths for seismic loads.

Enhanced Interlock: CSM lattice structures benefit from the technology and instrumentation that has been developed over decades for diaphragm walls. The achievable verticality tolerances of 1:200 ensures interlock between panels is achieved over the design depth.

Improved Slope Stability: CSM can be employed to stabilize slopes and embankments by forming in-situ shear walls, reducing the risk of slope failure and landslides in geotechnically challenging terrain.











APPLICATIONS:

RETAINING WALL STRUCTURES:

Cutter Soil Mixing is a highly effective method for constructing retaining walls, offering numerous advantages over traditional techniques. Benefits of Using Cutter Soil Mixing for Retaining Walls include:

Enhanced Verticality: CSM retaining walls can be installed with a 1:200 verticality tolerances. This maximises excavation footprint.

Versatility: Cutter Soil Mixing can be adapted to various soil types and site conditions, making it suitable for a wide range of retaining wall applications.

Water tightness: The soil-cement matrix formed by CSM creates an effective water barrier to water ingress. Utilising other additives such as bentonite to the soil mix greatly increases the imperviousness of the panels.

Cost-Effectiveness: Compared to traditional retaining wall construction methods, CSM offers faster installation times, reduced material and labor costs, leading to a much more cost effective.

Minimal Site Disruption: The equipment used for CSM is relatively compact and maneuverable, allowing for efficient operation in confined spaces with minimal disruption to surrounding areas.

Environmental Friendliness: CSM minimises the need for transporting materials to and from the site, reducing carbon emissions and environmental impact associated with construction activities.

Long-Term Durability: Retaining walls constructed using Cutter Soil Mixing are designed to withstand the effects of soil movement, water pressure, and other environmental factors, ensuring long-term performance and reliability.

















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