



THE GROUND IMPROVEMENT SPECIALIST

DESIGN
CONSTRUCT
PERFORM



ABOUT US



Menard is a worldwide leader in ground improvement works, providing complete range of ground improvement techniques to meet specific project requirements. Based on our experience of operating globally for more than 5 decades, we have improved and developed a complete range of innovative and sustainable ground improvement techniques for the benefits of our clients. A fundamental objective of the company has always been to remain at the forefront of technological advances in this field and to offer more efficient, reliable and economical solutions. Our leading expertise is built on our field experience, our numerical modelling capabilities and the development and optimization of specialized construction equipment.



SRI U3 Project | Cilegon, Indonesia

Innovative, best value solutions

As a result of the geotechnical know-how accumulated through the completion of thousands of projects, Menard consistently provides the essentials for success: an economic solution provider, reliable schedule, well managed construction techniques and a commitment to excellence in safety and environmental protection. We listen to our clients' needs and will suggest the most appropriate ground improvement technique, depending on the soil analysis, structure, environmental constraints and the cost. You can be assured of innovative and best value solutions for your project.

A complete solution provider

Often involved from the project conception onwards, Menard works closely with clients in analyzing their objectives. Our engineers will conduct detailed design, and the subsequent construction will be carried out by a pool of worldwide dedicated construction teams according to the project needs. Finally, our quality control procedures will allow us to complement our design and construct package with a long-term guarantee. Acting as a complete solution provider, our clients can be assured to get projects on schedule and having the utmost quality.



Local expertise supported by a global network

Menard Asia is the South East Asian subsidiary of Menard Group and part of Soletanche Freyssinet Group, who are world leaders in geotechnical, environmental and civil engineering construction.

With permanent bases in more than 100 countries, the Soletanche Freyssinet companies provide local service backed by Group expertise and resources, being comprised of individual companies that are all pacesetters in their own fields.

SOILS

Soletanche Bachy

World leader in special foundations and underground structures

Menard

Recognised world specialist in soils improvement

Together, Soletanche Bachy and Menard form the world's most comprehensive network of geotechnical engineering contractors.

SoilTeam

STRUCTURES

Freyssinet

World leader in prestressing, cables stayed structures and strengthening of structures

Reinforced Earth

Inventor and world leader of the mechanically stabilised earth market

Menard started offering its services in Asia in 1977, providing ground improvement solutions for the construction of Changi Airport, Singapore. Since then, we have completed more than 140 projects in Asia with permanent presence for more than 40 years. Currently, Menard is present in five countries in Asia: Malaysia, Indonesia, India, Singapore and Vietnam.

17,000
employees

100
countries of operation

+1,000
projects a year

\$2.68
billion of revenue

TECHNIQUES

A wide range of geotechnical solutions for the benefit of your project

Our geotechnical experts and broad range of techniques tailored made for our clients, make us a strong and reliable partner.

It guarantees that our teams will determine the best suited solution to handle your ground engineering challenges.



Consolidation Methods



Reinforcement Methods





Ground improvement Technique

CLAYS
ORGANIC PEAT

STIFF CLAYS
SILTS

SILTY SAND
SANDY SILTS

SAND
GRAVEL

PVD / Vacuum™

Stone Columns

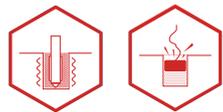
Controlled Modulus Columns / DSM

Dynamic Replacement

Dynamic Compaction

Vibro Compaction

Compaction Methods





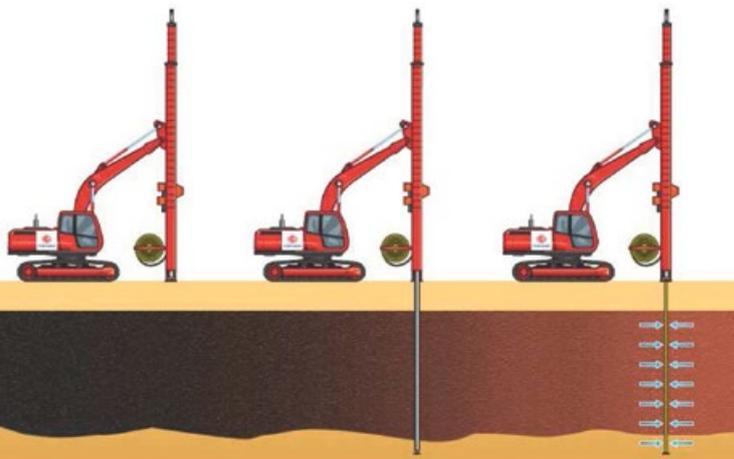
Germany
Airbus factory

PREFABRICATED VERTICAL DRAINS



Description of Technology

Prefabricated Vertical Drain (PVD) is made of corrugated plastic core covered with geotextile. The width is typically 100 mm and the thickness is ranging from 3 to 5 mm. The installation of PVD is done through a specially constructed mast with a steel mandrel installed on an excavator to push the PVD to the required depth on a grid pattern. PVD increases the apparent mass permeability of the soft soils and thus reduces the consolidation time. It is used in combination with temporary preload fill to expedite full or partial primary consolidation as well as induce several decades of secondary consolidation (creep) settlement. The main geotechnical parameters (settlements, pore water pressure, horizontal displacements) are monitored via appropriate instruments throughout the consolidation period to validate the design and ensure safe phasing for the construction of the embankment.



Advantages

Adapted for soft soils	<input type="checkbox"/>
Quality Control (Records)	<input type="checkbox"/>
Speed Execution	<input type="checkbox"/>
Environmentally friendly	<input type="checkbox"/>
Cost Efficiency	<input type="checkbox"/>
Noise & vibrations level	<input type="checkbox"/>
Performance	<input type="checkbox"/>



Application

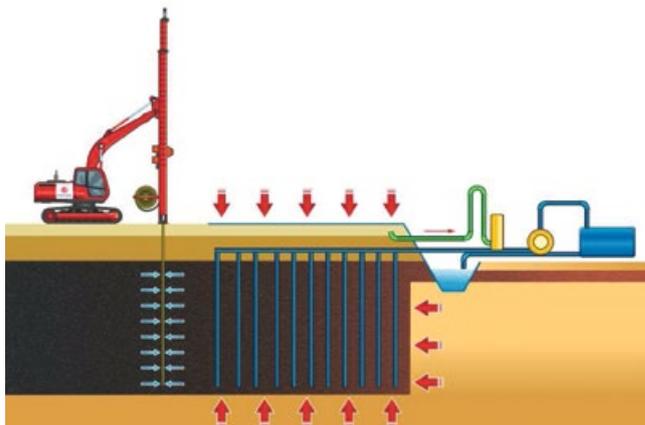
- For projects with construction ranging from 6 to 12 months
- Tailored made for linear infrastructure: road, rail embankments
- Well designed for land reclamation over soft soils
- Airport runways and taxiways, harbour terminals, warehouses



MENARD VACUUM™

Description of Technology

Menard Vacuum™ involves the installation of prefabricated vertical drains, horizontal drains & peripheral trenches. An airtight impervious membrane is installed on the ground surface and sealed in the trenches. Menard vacuum pumps are connected to the system to remove the air below the membrane. This results in the creation of vacuum effect (i.e, depression) under the membrane. This loading process creates an isotropic state of stress in the soils under the membrane, accelerating the consolidation in the soil mass in a very short time and reducing the need for placing potentially unstable surcharge fill.



Advantages

- Adapted for soft soils
- Quality Control (Records)
- Speed Execution
- Environmentally friendly
- Spoils quantity
- Noise & vibrations level
- Performance

Vietnam Camau factory



Application

The Menard Vacuum™ technology has a wide range of applications from the construction of roads, highways, tanks (for fuels, granular materials) to large spatial areas such as airport terminals, harbour container terminals or power plants.

This method is suitable for organic soils with high moisture content and existing in large areas. It is also suitable for soft cohesive soils with a thickness of more than 30 m. Maximum loads transferred to the consolidated soil depend directly on the type, degree of consolidation and the nature of the structure.



CONTROLLED MODULUS COLUMN (CMC)



Indonesia
JAKARTA INTERNATIONAL AIRPORT



Description of Technology

Controlled Modulus Column (CMC) invented by Menard, is installed using a specially designed displacement auger, powered by equipment with large torque capacity and high static down thrust to displace the soil laterally with virtually no spoil and vibration during penetration. The auger is pushed into the ground to the required depth while increasing the density of the surrounding soils. Cement mixture is then injected under pressure to form the CMC, which is also known as rigid or semi-rigid inclusion. The result is a composite of soil-CMC acting as a homogeneous structure with enhanced bearing capacity.



Application

CMC can be applied to various soil conditions. The technology works well in loose sandy soils, soft loams, organic and anthropogenic soils (uncompacted fills, heaps), peat, clays. All types of enclosed buildings, infrastructure and special structures are well suited for the CMC technology.

The length of the CMCs depends on the loading and allowable settlements, which corresponds to the length of the anchorage in load bearing soils. Depending on the load per column, the diameter (ranging from 25 to 60 cm) and spacing (ranging from 1.2 to 3.6 m) are adjusted accordingly.



Advantages

- Versatile Solution
- Quality Control (Records)
- Speed Execution
- Bearing Capacity
- Spoils quantity
- Noise & vibrations level



DEEP SOIL MIXING (DSM)



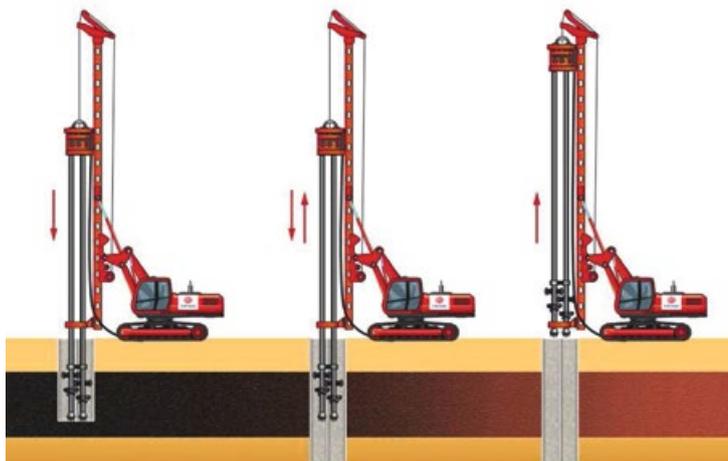
Vietnam
SOFE WHARF



Description of Technology

The principle of the Deep Soil Mixing (DSM) is to improve the strength properties of the soil by mixing it with the binder (cement slurry, cement-fly ash slurry or bentonite). As a result, a solidified mixture of soil and cement is created with considerably higher strength and mechanical parameters.

The installation of DSM columns involves the introduction of a rotating auger into the subsoil which destroys the soil structure and mixes it with the injected binder. Typically, augers consisting of a drilling rod and cross bars are used. The soil mixing process is aided by injecting the cement through nozzles located at the end of the drilling rod. The column formation stage starts after reaching the designed depth.



Advantages

Adapted for soft soils	<input type="checkbox"/>
Quality Control (Records)	<input type="checkbox"/>
Speed Execution	<input type="checkbox"/>
Environmentally friendly	<input type="checkbox"/>
Spoils quantity	<input type="checkbox"/>
Noise & vibrations level	<input type="checkbox"/>
Performance	<input type="checkbox"/>



Application

DSM columns may be successfully applied as the improvement for the footings, bridge abutments, wind turbine foundations, excavation lining, etc. Wherever silty and sandy soils exist; the application of this technology is particularly efficient. The length and arrangement of the columns depend on the load transferred to the columns and maximum allowable deformations of the structure. Due to the lack of soil movements and vibrations during the column forming process, this technology is perfectly suited for stabilisation of the subsoil nearby existing buildings or facilities.



STONES COLUMNS



Description of Technology

The typical Stone Columns (SC) are formed by inserting an electrical or hydraulic vibroflot mounted on a base machine. Depending on the depth of the columns, the following units are used: an excavator (up to 7 m), a purpose-built rig (up to 20 m) or a crawler crane (up to 40 m).

The installation starts by inserting the vibroflot into the ground up to the design depth and the process is often assisted by injecting compressed air, water or air-water mix. Subsequently, stones are placed into the space formed and compacted in stages by layer of 0.4 m. Depending on the methods, stones are supplied via a feeding pipe connected to the vibroflot (bottom feed) or from the level of the working platform along the vibroflot (top feed). Typically the columns formed are 50 to 120 cm in diameter depending on the subsoil stiffness.



Indonesia SRI U3 - CHEMICAL PLANT

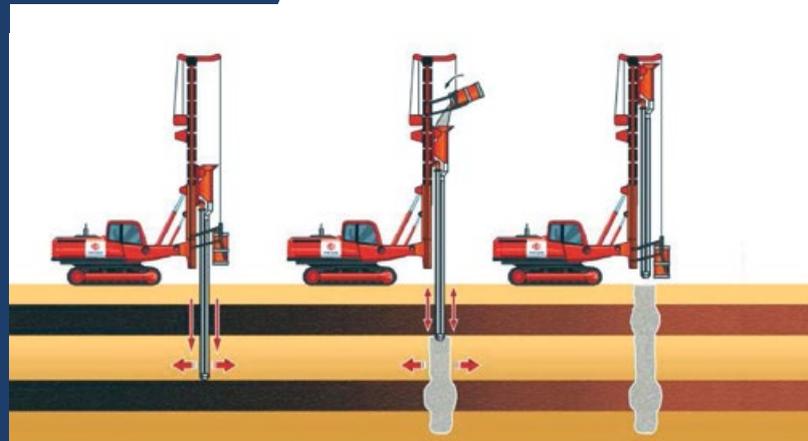


Malaysia LPT2 EXPRESSWAY - TERENGGANU



Advantages

- Drainage capacity
- Spoils quantity
- Fit for liquefaction
- Bearing Capacity
- Performance



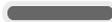
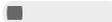
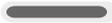
Application

This technology is well suited for the improvement of firm and soft soils (silts, sandy silts, loams and non-homogeneous soils) as well as non-cohesive soils where enhanced properties are needed. Typical load that can be carried by a single stone column ranges from 200 to 300 kN. The columns are arranged in a square or triangular grid with a spacing ranging from 1.5 m to 3.0 m so that the soil replacement factor is within the range from 15% to 35%.



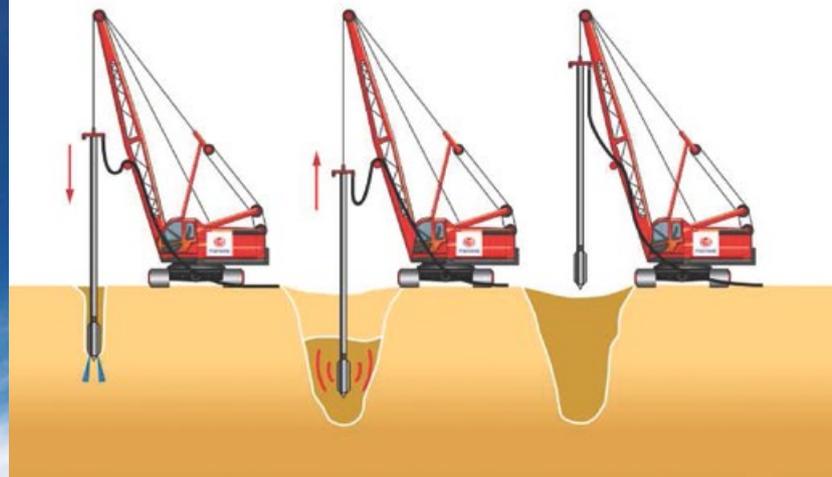
VIBRO COMPACTION

Advantages

- Cost Effectivity 
- Spoils quantity 
- Simplicity of Execution 
- Bearing Capacity 
- Performance 

Description of Technology

Vibro Compaction (VC) improves non-cohesive soils by rearranging the grain distribution pattern through the application of cyclic vibrations to compact the soil. The equipment used for the vibro compaction is a heavy plunge vibrator called vibroflot, with a cylindrical shape and a diameter ranging from 30 to 50 cm. Often, the bottom part of the vibroflot is equipped with jets where water or air is pumped in order to enhance the soil compaction. The vibroflot with a leading pipe penetrates the ground under its own weight with simultaneous action of vibration. The compaction occurs as the vibroflot is surged up and down. The compacted column has a diameter ranging from 1.5 to 3.5 m depending on the grid of compaction points and the type of soil.



Hong Kong **BOUNDARY CROSSING FACILITIES**

Application

Vibro Compaction (VC) is best suited for non-cohesive soils such as loose sands, gravels and sandy gravels. Soils containing over 10% of silt and clay fraction are not suitable for this method.

VC is well suited for the foundation of facilities with uniformly distributed pressure onto the subsoil. It significantly reduces the settlement and leads to the unification of the foundation conditions (i.e., minimise the differential settlement).



DYNAMIC REPLACEMENT



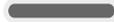
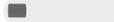
Description of Technology

The Dynamic Replacement (DR) column is formed by a heavy pounder with a weight ranging from 10 to 40 tons drops from a height ranging from 10 to 30 m on a 0.6 to 1.2 m thick working platform using non-cohesive soil. A single column is formed by a few series of pounding. Large diameter (1.6 to 3.0 m) columns are driven to a depth ranging from 4 to 7 m.

Following the installation of DR columns, the "ironing phase" is executed where the working platform and the top layer of soil are compacted. This process is normally performed by using a flat-shaped pounder with a square base. Finally, classic compaction with the use of heavy vibratory rollers is conducted to complete the soil treatment.



Advantages

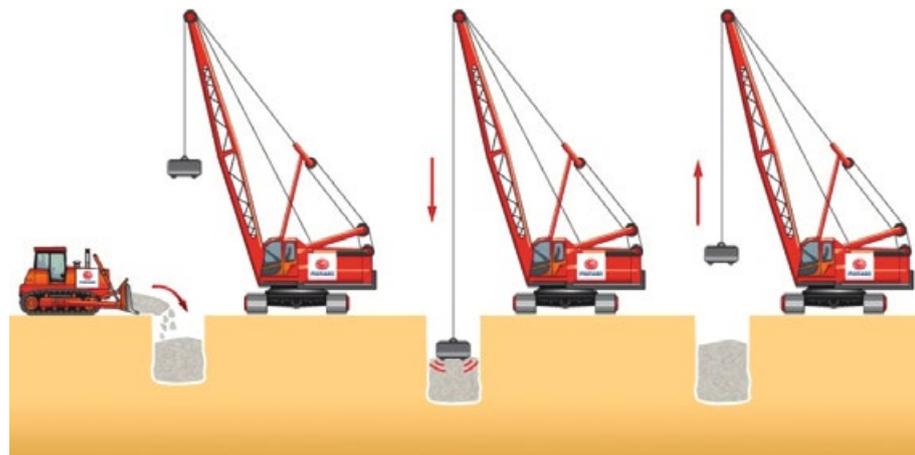
- Bearing Capacity 
- Spoils quantity 
- Speed Execution 
- Environmentally friendly 
- Performance 



Application

- Applicable to cohesive soil, silts, clay, peat
- Efficient with organic soil, heterogeneous
- Well designed for reclaimed & swamp areas
- Heavy warehouses, tanks, aprons, roads...
- Depth of compaction : 4 to 7 m

DR is an extension of Dynamic Compaction (DC) technology to construct large diameter aggregate columns in cohesive soil with high internal shear resistance. DR columns can act as supple piles with an extended head for stabilisation of road or rail embankments where the columns improve the stability and increase the safety factor of the embankment. These columns are also applied to reduce the foundation settlement of commercial and industrial buildings and to stabilise landfills.





DYNAMIC COMPACTION

Advantages

- Cost Efficiency Solution
- Performance
- Speed Execution
- Environmentally friendly
- Spoils quantity
- Bearing Capacity

Malaysia SERENDAH FACTORY



Description of Technology

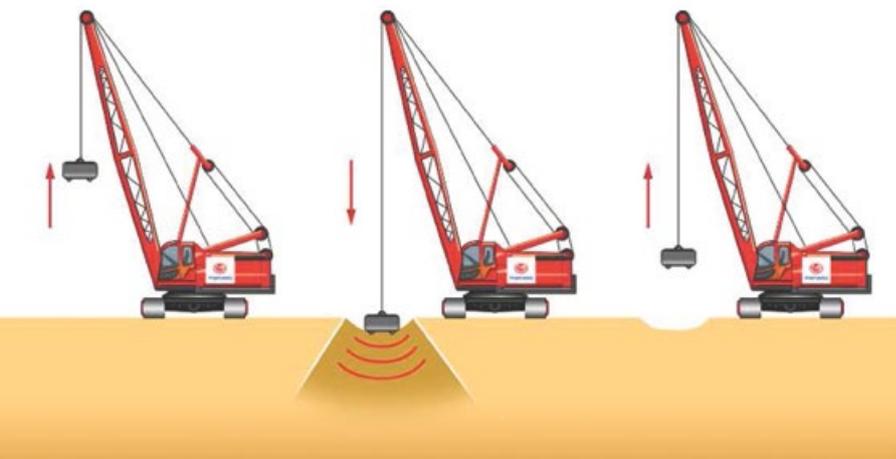
Dynamic Compaction (DC) is a high energy method of ground improvement, effecting densification of granular soils by the creation of shock waves generated by very high impact loads. As a result of the impact the soil is compacted depending on its condition, structure and depth.

The energy is transferred to the subsoil by multiple impacts with properly shaped weight (normally steel pounder) with a weight ranging from 10 to 40 tons free falling from a height ranging from 5 to 40 m.

Application

- Applicable to any non cohesive soil, granular/ rocky soils
- Efficient with non organic soil, heterogeneous
- Well designed for reclaimed areas, mines, quarries
- Tailored made for industrial & commercial halls
- Heavy warehouses, tanks, aprons, roads...
- Depth of compaction : 3 to 10 m
- Any type of linear or large land

For an effective DC, the lattice-boom cranes are used to obtain sufficiently high impact energy. DC works is normally preceded by the development of a test plot where the grid spacing is determined along with the impact energy which is needed to achieve the required compaction, i.e. weight and shape of the pounder, height of its drop...





Menard Asia holds **SAFETY** as its top priority

Menard Asia holds safety as its top priority and “zero incident” is our goal. We have a great responsibility to each other to ensure that everyone makes it home safely every day. How do we do keep that priority? Everyone participates, or “Steps Up”, by embracing our values, taking part in trainings and offering opinions openly.

Culture of
Excellence

Creating **added value**

Commitment for **Safety**

Smart **Value**

“Value engineering” approach

High skilled **teams**

Protecting team members

Risk **Mitigation**



Olivier Bechet
Regional Director

“On every job sites that we undertake, our objective is to achieve zero incident. Safety is our first priority in Menard Asia and is guiding all the decisions which are made at any levels and on any subjects.

Our conviction is that safety is more than procedures, but relies on behaviour, positive and committed attitude.

Safety is a mindset consisting in planning rather than rushing, stopping works when uneasy and analysing before proceeding. It is about caring for others and for ourselves, simply to come back home safe for our families and loved ones. Everyday. Everywhere. Anytime.”

What is SAFETY for us ?



“Menard Asia is fully committed to ensure Health and Safety remains a key focus to the success of its business. A pro-active approach and attitude stems from our leadership qualities and commitment to safety at all levels thus ensuring at no time is safety compromised in any way *The Safe Way is the Only Way.*

Our certified HSE Program / Systems are fully implemented across the region and recognized by OHSAS 18001 and ISO 9001 Standards.

Our team members are empowered to STOP any work activity they believe may impose a risk to themselves or others in order to STEP UP for safety.”



Vicky Nathan Ji
Regional HSE Manager

Servant

Leadership

Culture of **Innovation**



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