menard

Menard Asia

Your Local Specialist
in Ground Improvement
and Soil Reinforcement

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◂ *Indonesia - Garuda Maintenance Facility*

About Us

Menard Asia is a specialist geotechnical EPC contractor offering ground improvement works in South-East Asia.

Menard is a worldwide leader in ground improvement works, providing a 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 benefit of our clients. The 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.

"We have a long-time relationship with Asia. Our first job in the region was back in 1977, for the foundation works of a fertiliser plant in Bangladesh. On the same year, we were working on the Changi Airport second runway and subsequently established our first Menard Asia office in Singapore. We then established our base in Malaysia in the mid-90s and have, since then, developed our presence in Bangladesh, Cambodia, Indonesia, Philippines, Thailand, and Vietnam. A true success story that we intend to pursue in the region. We are proud to follow our group ethos of being deeply focused on our local markets while providing the benefits of being one of the world leaders in our field of expertise.

Menard Asia's ambition is to set the standard for ground improvement throughout Asia. To do so, we rely on 3 pillars rooted in our DNA: Safety, our priority which guides all the decisions we make at any level and on many subjects. Fun, we work hard and have fun. Entrepreneurship, by being a solution provider, we continuously think outside the box, and our clients expect that of us."

Olivier Bechet,
Regional Director - Menard Asia

Ground improvement projects have grown tremendously in Asia due to the increasing need to use marginal sites with poor soil conditions for new construction purposes.

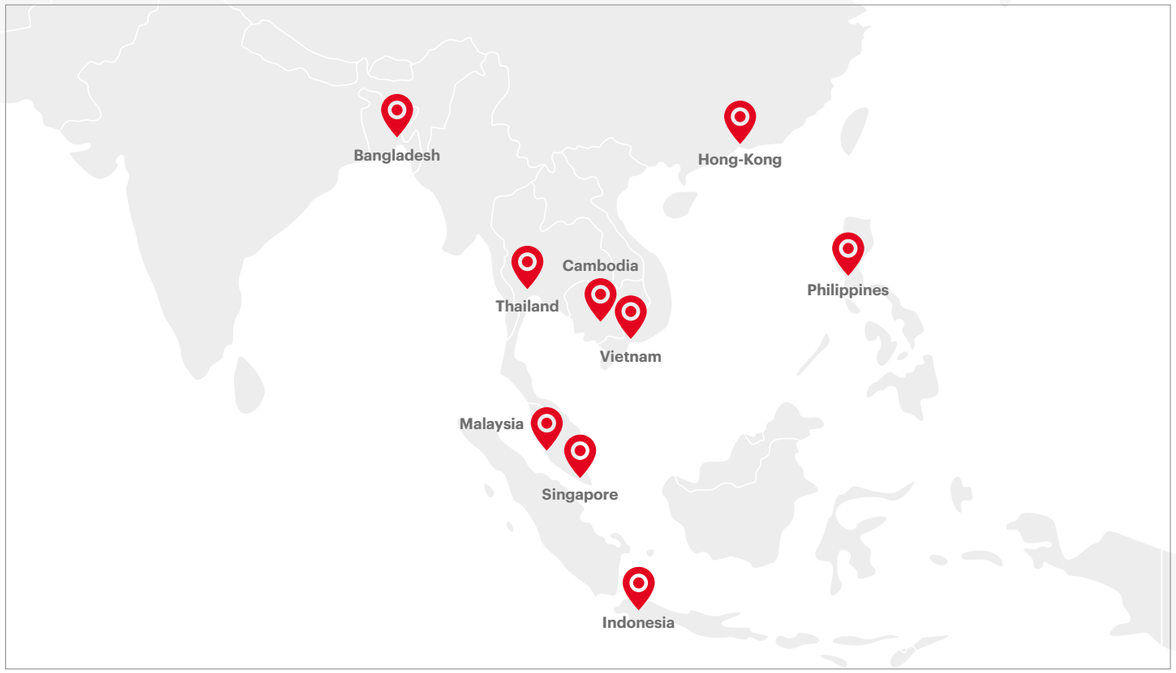
Menard Asia, at the forefront of ground improvement technology in the region has completed more than 300 ground improvement projects in Southeast Asian countries, Bangladesh and India. Based in Malaysia and ASEAN Countries, Menard Asia has the experience working in all stages of ground improvement projects from conception, soil investigation, design, construction, and post-construction instrumentation and monitoring to meet the requirements and add value to our clients. Menard Asia is part of the Soletanche Freyssinet Group, ensuring that the quality of services provided is of international standards with the adaptation to suit localized needs.

Richard Ong
Regional Technical Director
Menard Asia

Local expertise supported by a global network

Menard Asia belongs to Menard Group, part of Soletanche Freyssinet Group, which are world leaders in geotechnical, environmental, and civil engineering construction. With permanent bases in more than 100 countries, the Soletanche Freyssinet companies provide local services backed by the Group expertise and resources, being comprised of individual companies that are all pacesetters in their own field.

Menard started offering its services in Asia in 1977, providing ground improvement solutions for the construction of a fertilizer plant in Bangladesh. Since then, we have completed more than 300 projects in Asia with a permanent presence for more than 40 years. Currently, Menard Asia is present in 8 countries in Asia: Bangladesh, Cambodia, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam.



Our Milestones

About Soletanche Freyssinet

Soletanche Freyssinet brings together 7 brands with complementary offers, who pursue the performance and durability of their works. Their purpose is to address the main challenges of tomorrow's world.

SOLETANCHE FREYSSINET

Soils & Structures

SOLETANCHE BACHY

World specialist in foundations and soil technologies

MENARD

Recognised world specialist in ground improvement

TERRE ARMEE

Terre Armée has unrivalled experience in the field of reinforced backfill and soil-structure interaction

FREYSSINET

Specialist civil engineering for construction and repair

NUVIA

Nuvia uses its nuclear expertise to assist industry clients throughout their highly sensitive and regulated facilities: from design to decommissioning and waste management.

SIXENSE

Sixense monitors the condition and behavior of structures and infrastructures

€382.8
M
turnover

1,900
employees

80
countries of operation

+1,500
projects a year

2021 Menard

Our Sectors

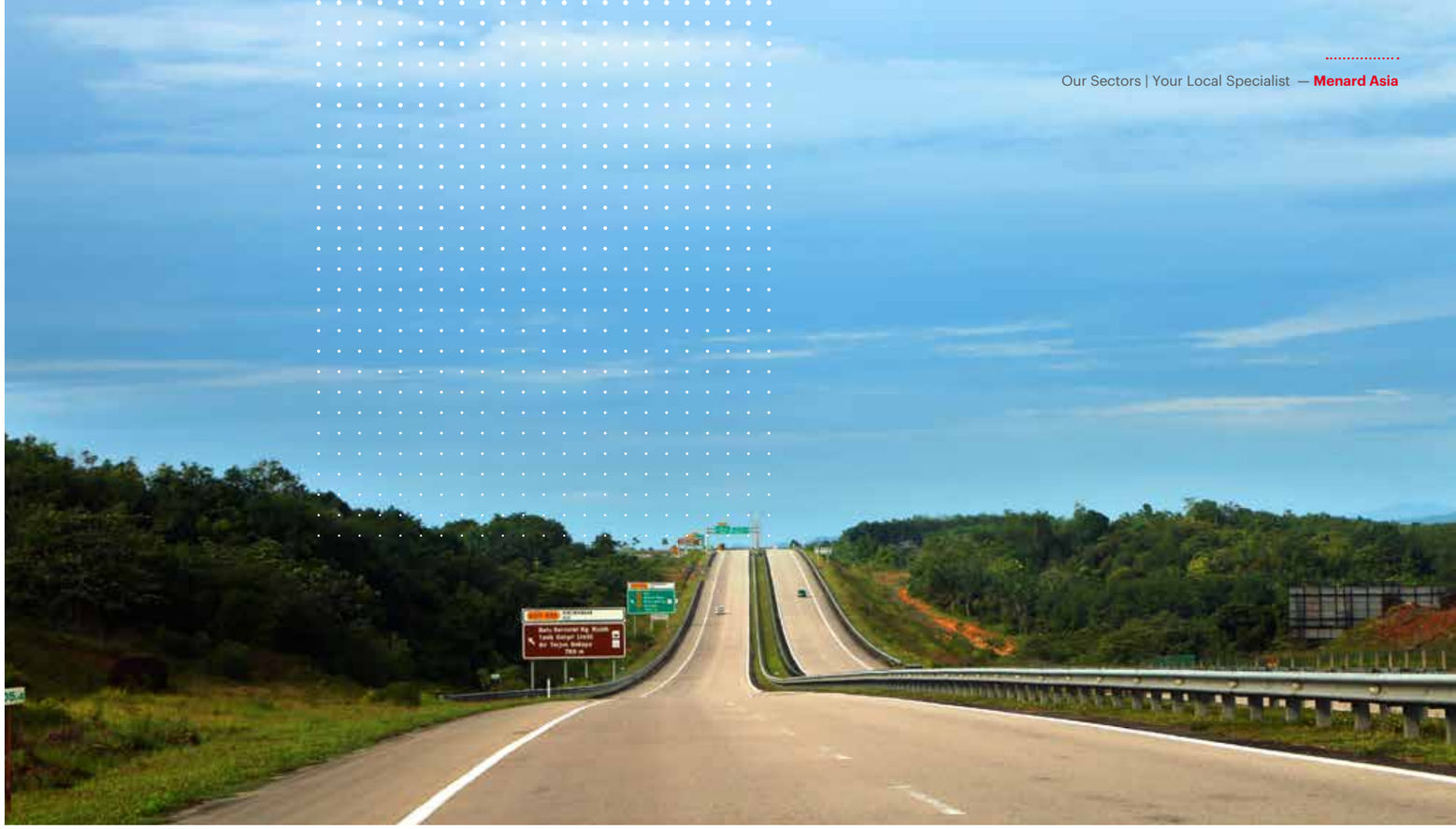
As a ground improvement contractor or specialized subcontractor, we work beside you for the reinforcement, consolidation, or densification of soils for all types of structures around the world: road, airport, railway, marine, inland waterway, hydraulic, commercial, industrial, and energy infrastructure.

For more information
please visit our website
or scan this QR code :

Ports and Airports

The land available on riverbanks and coasts on which port and airport infrastructure are built can often consist of compressible terrain which is saturated with water. Given the large surface areas which are generally (several hectares) required, land for ports and airports platforms are often reclaimed from the sea using hydraulic or terrestrial backfill. Cost-effective ground treatment techniques are very commonly used to treat such sites. Ground improvement works make it possible to accelerate subsoils consolidation and thus ensure low residual settlement during the operation of the infrastructure. When the foundations of the infrastructure are required, intensive treatment of filling materials can increase their load-bearing capacity and reduce thrust on quay walls. In cases of strong seismic loading, the treatment can include measures to reduce the risk of liquefaction. These projects call for the use of substantial resources to treat large surface areas within a relatively short period of time.

▾ *Vietnam – Cai Mep International Port Terminal*



▲ *Malaysia - Lebuhraya Pantai Timur (LPT) Expressway*

Roads and Railways

Transport infrastructure – roads and railways – are frequently built in areas where the soil is highly compressible, such as swamps, marshes, or areas near watercourses. In such cases, substantial consolidation work is required to avoid shear failure of the fill used to build the structure. This type of project requires simultaneous management of multiple sites along the alignment and can often involve the use of a variety of solutions to meet the wide-ranging geotechnical conditions and specific constraints of the terrain. To ensure the long-term integrity of the infrastructure and the safety of the vehicles using it, these areas must be over-consolidated to reduce settlement due to primary settlements, creep, and to limit differential settlement. For engineering structures built along the alignment, backfill generates very high loads associated with strict settlement limitations. These critical areas generally require even more extensive treatment and careful management of the interfaces.

Process and Energy

Industrial plant and equipment consist of special structures that are often very heavy and sensitive. When foundations are built on compressible soils, careful consideration must be taken during design and execution to ensure the safe operation of the plant within the structure. The most cost-effective foundation solutions generally call for a combination of ground improvement techniques suited to the load and the soil conditions. These solutions make it possible to support heavy uniform loads (water, oil and gas storage), support individual loads (pipeline supports, industrial equipment), support dynamic loads (oscillations, vibrations, seismic loadings), reduce absolute and differential settlement of structures, and reduce the risk of soil liquefaction This type of project calls for good knowledge of the constraints and specifications of each structure to be treated with a familiarity with the potential technical issues which could arise during the various stages of the project from concept to handover.

▾ *Fântânele-Cogealac Wind Farm, Romania*

▲ *USA - Kearny Point NJ*

Buildings

Ground improvement techniques are particularly well suited to load-bearing structures (slabs, and columns supported on pads) in buildings, and more particularly industrial, wholesale and retail, and logistics facilities. These types of projects require rigorous organisation to manage scheduling and interfaces among a large number of project participants on the worksite. Rapid execution and on-time delivery are crucial to the success of these projects. Menard has developed ground reinforcement systems that cause little disruption (waste, noise, vibrations, etc.), can be rapidly implemented, and are well suited to these types of projects. These solutions are also used to create safe and cost-effective shallow foundations for these structures without a direct mechanical connection between the foundations and the structure. This simplifies and accelerates construction and reduces the cost of the structure compared to conventional solutions using deep foundations.

A wide range of geotechnical solutions for the benefit of your project. Our geotechnical experts and a 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.

Our Techniques

Menard delivers a full range of ground improvement techniques to provide effective and innovative solutions for its clients.

- Prefabricated Vertical/Horizontal Drain
- Menard Vacuum™ Consolidation
- Vibrocompaction / Vibroflotation
- Rapid Impact Compaction
- Dynamic Compaction
- Dynamic Replacement
- Stone Column
- Controlled Modulus Columns
- Bi-modulus Columns
- Deep Soil Mixing
- Jet Grouting

Singapore - Pasir Panjang Container Terminal ▸

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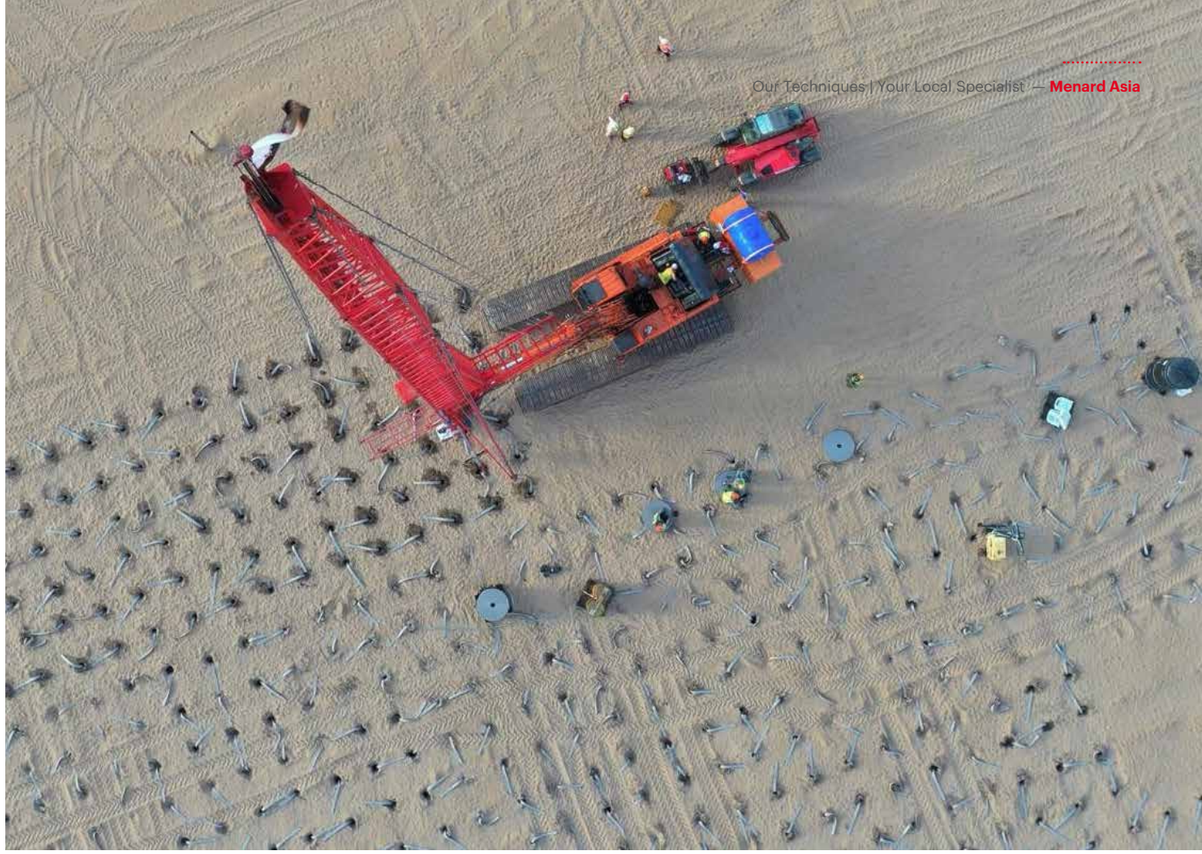


▲ *Cambodia - Bakheng Water Production Facilities*

Prefabricated Vertical Drain

Prefabricated Vertical Drain technology is closely related to the consolidation process. Often applied with the surcharge fill, it is one of the most reliable and certainly the most economical ground improvement method to treat soft cohesive soils.

Prefabricated Vertical Drain (PVD) is made of corrugated plastic core covered with geotextile. Menard Asia only uses PVD that meets project requirements in terms of water flow capacity, filtration properties, and durability. Menard Asia has developed its own fleet of PVD installation equipment to meet a wide variety of soil and site conditions. The company uses hydraulic rigs to install the PVD and has considerable experience in penetrating difficult surface layers including predrilling through stiff clays and dense sands. The PVD rigs in Menard Asia have a maximum installation depth of 50 m but this can be extended if required to meet project needs.

When and why use it?

Fine cohesive soils have low permeability and it takes relatively long periods for them to consolidate under loads. Installation of vertical drains greatly shortens the water drainage path and significantly reduces the consolidation time.

The machines used can install drains up to depths of about 50 meters.

Menard's tip

The combination of vertical drains with preloading or a surcharge program accelerates the consolidation period.

Some Projects on PVD

- Cambodia - 60 M Mall
- Cambodia - Bakheng Water Production Facilities
- Cambodia - Sihanoukville International Airport
- Indonesia - Asam Asam Power Plant
- Indonesia - Karimun Fabrication Yard Construction
- Malaysia – Sime Darby Property at Bandar Bukit Raja
- Malaysia - University Malaysia Kelantan

For more information please visit our website or scan this QR code :

Menard Vacuum™ Consolidation

Menard Vacuum™ Consolidation developed by Menard in the 1980s enables the effective use of vacuum pumps to accelerate weak soil compression. It is an efficient time-saving consolidation method; loading and subsequent embankment construction can proceed as early as two weeks after vacuum pumping.

Menard Vacuum™ Consolidation involves the installation of both vertical and horizontal vacuum transmission pipes and peripheral trenches. An airtight impervious membrane is then installed on the ground surface and sealed in the peripheral trenches.

Menard Vacuum Pumps are then connected to the system to remove the air below the membrane. This results in the creation of a vacuum under this membrane. The difference in pressure at the membrane interface creates a gradient resulting in the application of pressure almost equivalent to the atmospheric pressure on the ground below the membrane.

When and why use it?

Menard Vacuum™ is a technique created and developed by Menard to control long term residual settlement in saturated cohesive compressible soils. The drainage of water and soil consolidation can be a very lengthy process. Menard Vacuum™ accelerates the process so you can safely develop your projects.

Some Projects on Menard Vacuum™

- Malaysia – North-South Highway – Ipoh to Gopeng stretch
- Singapore - Tuas Reclamation
- Singapore - Jurong Island West Extension
- Thailand - Bang Bo Project
- Vietnam - Gemalink Container Terminal
- Vietnam - Cai Mep International Terminal

▲ *Vietnam - Ca Mau Power Plant*

Menard's tip

Menard Vacuum™ is particularly relevant for deep layers of highly compressible cohesive soils and when embankment stability is of concern. Because of the stabilising effect of the isotropic pressure, it allows for fast and safe embankment construction.

For more information please visit our website or scan this QR code :

Vibrocompaction/ Vibroflotation

Vibrocompaction improves granular soils by rearranging the grain distribution pattern using cyclic vibrations via vibroflot to compact the soils.

Vibroflotation technology or vibrocompaction method is used to compact loose granular soils to increase bearing capacity; reduce settlement and mitigate the potential of liquefaction. vibrocompaction can improve non-cohesive soils by rearranging the grain distribution pattern through the application of cyclic vibrations to compact the soil. The main equipment used for the vibrocompaction is a heavy plunge vibrator called vibroflot, which is cylindrical with a diameter ranging from 30 to 50 cm and capable of generating lateral vibrations with an amplitude ranging from 5 to 48 mm. Often, the bottom part of the vibroflot is equipped with jets where water or air is pumped to enhance the soil compaction. The vibroflot with a leading pipe penetrates the ground under its weight with the simultaneous action of vibration. The compaction occurs as the vibro surging up and down. The compacted column has a diameter ranging from 1.5 to 4.0 m depending on the grid of compaction points and the type of soil.

When and why use it?

Loose sand or sandfill can be compacted at great depths (i.e., 20 m or more) with vibrocompaction. It is used to control and reduce settlement, mitigate liquefaction, treat hydraulic fill and limit lateral earth pressure behind quay walls.

Menard's tip

Vibrocompaction generally generates settlement amounting to 5 to 10% of the thickness of the soil treated.

Some Projects on vibrocompaction

- Hong Kong – Hong Kong Boundary Crossing Facilities
- Singapore – Pasir Panjang Phase 3 & 4
- Singapore – Reclamation of Changi

▾ *Hong Kong Boarder Cross Facility*

For more information please visit our website or scan this QR code :

Rapid Impact Compaction (RIC)

Rapid Impact Compaction is a ground improvement technique that densifies the soil by pounding it at a high frequency with a steel pounder.

Rapid Impact Compaction is a high-frequency, controlled energy, soil compaction technique used to densify surface layers of soils (to a depth of 3 to 7 meters in most cases) with minimum impact on the immediate worksite environment. It is widely used to densify loose granular soils (sand or gravel) as well as loam fill and industrial brownfield sites for surface compaction, foundations, floor slab support, liquefaction mitigation, and waste stabilisation.

The principle of the technique is similar to other compaction or densification techniques where energy is transmitted into a compressible or loose soil to improve its geotechnical properties.

When and why use it?

Rapid Impact Compaction is used to compact loose granular soils or waste material ranging from 3 to 7 m to increase bearing capacity and reduce settlement. It is often used in low headroom sites or when the minimal vibrations are allowed.

Menard's tip

Without specific site precautions, a safe working distance of 5 to 6 m can usually be adapted for normal structures. At that distance, noise levels are lower than 90 dBA!

Some Projects on RIC

- Canada – Kemptville Commercial Retail Unit
- Canada – VALE Thompson Dam Raise
- Poland - N-S highway
- UAE - Baniyas North Development

For more information please visit our website or scan this QR code :

Canada - Kemptville Commercial Retail Unit ▸

Dynamic Compaction

Dynamic Compaction is a cost-effective densification method using shock waves by impact for loose granular soils, uncontrolled fills, or waste landfills.

Dynamic Compaction technology, also known as dynamic consolidation, is a technology invented and developed by Menard. This technology was extensively tested and optimised hence its safe and economic application today.

The basic principle behind the Dynamic Compaction technique consists in the transmission of high energy waves to improve weak subsoil. As the result of the impact, the soil is compacted depending to depths ranging from 5 to 12 m. 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.

When and why use it?

Dynamic Compaction is applicable to compact areas of loose granular soils, uncontrolled fills, or waste to increase density and collapse voids. Dynamic Compaction efficiently increases the bearing capacity of granular soils, reduces the volume of landfills and lowers post-construction settlements. It is commonly used to treat old uncontrolled fills, waste material and native granular soils to depths up to 12 m.

Did you know?

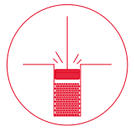
The technique was invented and developed by Mr. Louis Ménard!

Some Projects on Dynamic Compaction

- Indonesia – New Yogyakarta International Airport
- Malaysia - United Motor Works (UMW) Factory Serendah
- Malaysia – Expressway LPT 2
- Malaysia – Duta Ulu-Kelang Expressway (DUKE) Express
- Philippines - Marina Properties Manila

▴ *Malaysia - Serendah UMW, Selangor*

For more information please visit our website or scan this QR code :



Dynamic Replacement

Dynamic Replacement is an extremely economical method for improving the overall stiffness of clay, silt and organic soils by reinforcing the ground with large diameter granular columns.

The Dynamic Replacement columns are formed by a heavy pounder with a weight ranging from 15 to 30 tons drops from a height ranging from 10 to 30 m on a 0.6 to 1.2 m thick working platform prepared on the construction site using granular 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 Dynamic Replacement columns, the “ironing phase” is executed where the working platform and the top layer of soil are compacted. Single pounds are performed side by side at a distance equal to the external dimension of the pounder base so that the whole improved surface area is covered. Finally, classic compaction with the use of heavy vibratory rollers is conducted to complete the soil treatment. Dynamic Replacementcolumns can be constructed in soft cohesive soils as well as in organic deposits. Natural aggregates, concrete rubble, crushed asphalt, and construction rubble can be used to form the Dynamic Replacement columns.

When and why use it?

If the ground cannot be dynamically compacted directly due to high fines content within the soil, a granular material must be added. This technique is well suited to highly compressible and weak soils and can be applied to structures with high loading (high embankment, storage tanks, etc.). It improves the bearing capacity of the poor soils and the subsequent reduction and control of total and differential settlements. An additional benefit is that dynamic replacement pillars allow for rapid drainage of the ground.

Menard’s tip

The technique can be carried out with or without pre-excavation!

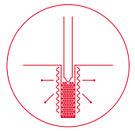
Some Projects on Dynamic Replacement

- Indonesia – Kaltim Methanol
- Malaysia – Royal Malaysia Police Facilities at Subang Airport
- Malaysia – Expressway LPT 2
- Singapore – Tuas Reclamation

Malaysia - Serendah UMW, Selangor ►

For more information please visit our website or scan this QR code :

Indonesia - Synthetic Rubber ►
Indonesia (SRI) project



Stone Column

Stone Column is an aggregate column formed by inserting a vibratory probe to incorporate granular material into the ground to create a vertical inclusion.

Stone Columns are made with various methods with the use of different equipment units depending on the depth and diameter of the columns and parameters of the soil to be improved. The popularity of this method resulted in its widespread use.

The typical Stone Columns 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, aggregate backfill is placed into the space formed and compacted in stages by adding the aggregate at every 0.5 m. Depending on the methods, aggregate is supplied via a feeding pipe connected to the vibroflot (bottom feed) or from the level of the working platform to the vibroflot (top feed). Typically, the columns formed are 50 to 120 cm in diameter depending on the subsoil stiffness.

When and why use it?

Stone Columns are well suited for the improvement of soft or loose soils as they create vertical inclusions with high stiffness, shear strength and draining characteristics. The result is an increased bearing capacity and a reduction of the total and differential settlements. They are particularly effective in improving slope stability and preventing liquefaction by increasing the ground’s shear strength.

For more information please visit our website or scan this QR code :

Menard’s tip

There are a wide variety of construction methods for stone columns: dry and wet, vibratory probes in the top or bottom of the tool, crane mounted or mast-guided system.

Some Projects on Stone Columns

- Brunei Darussalam – LNG Tanks Brunei
- Indonesia – Synthetic Rubber Plant Cilegon
- Indonesia – Refinery Development Master Plan (RDMP) Pertamina Balikpapan
- Malaysia – Lebuhraya Damansara-Puchong (LDP) Expressway Puchong
- Malaysia – West Coast Expressway
- Singapore – Marina South

Controlled Modulus Column (CMC)

Menard developed Controlled Modulus Columns in the 1990s to overcome the lack of lateral confinement problem in highly compressible and organic soils. They are now used in all types of soil (cohesive or granular) up to depths of 30 meters or more.

Controlled Modulus Columns (CMC), also called rigid inclusions, are a ground improvement technique used to control and reduce settlement and increase bearing capacity in soft or loose soils. They are an economical alternative to traditional deep foundation solutions especially for structures with uniform loads over large areas such area warehouses, logistics platforms, tanks, etc. The entire installation process is vibration-free and generates a very limited amount of surface spoil, which allows a cleaner job environment and limits the risk of contamination.

The increase of bearing capacity and settlement reduction is achieved through the reinforcement of the soft or loose soil layers using rigid inclusions. The scheme details a load-sharing system combining the existing soil capacity and the stiffer rigid inclusions to ensure compliance with project specifications.

When and why use it?

CMC is an environmentally sound and economical solution for strengthening soft ground when construction needs to begin within days instead of months. CMC is well adapted to high surface loading conditions and strict settlement requirements and are used to support slabs-on-grade, isolated footings, and embankments on compressible clays, fills and organic soils. The use of a rigid inclusion ground improvement enables reduction of the structure costs (decrease concrete thickness and reduce steel reinforcement).

For more information please visit our website or scan this QR code :

▲ *Indonesia - Krakatau Steel*

Menard's tip

CMC is typically installed using a specially designed displacement auger that displaces the soil laterally, which has the benefits of densifying the surrounding soil and resulting in virtually no spoils at construction site.

Some Projects on CMC

- Cambodia – CBL Biomass Boiler Plant
- Cambodia – Sihanoukville Runway
- Indonesia – Jakarta International Airport Terminal 3
- Indonesia – Jakarta Airport Garuda Maintenance Facilities
- Vietnam – Nghi Son Refinery Tank Farm

▲ *Indonesia - RDMP Pertamina Balikpapan*

Bi-modulus Column

Bi-modulus columns are a ground improvement technique that reinforces the soil by a combination of CMC and stone column.

The bi-modulus column technique, developed in the early 2000s, is vertical soil reinforcement elements composed of rigid inclusions which are topped by a compacted granular material. In 2009, Menard drew up a specification and had it approved by an independent technical third party. To date, Menard has successfully carried out numerous projects using the method. The bi-modulus columns result in an increased bearing capacity, a reduction of total and differential settlements as well as improved stress distribution from the structure to the inclusions which leads to an optimization of the thickness of the load transfer platform between the structure and the inclusions.

Bi-modulus columns are particularly effective in cases of deep cut-off, to avoid unwanted moments in slabs on backfill or in a seismic zone. The features of this solution have led to an exponential growth in the use of the technique since it was developed.

When and why use it?

Bi-modulus columns combine the advantages of stone columns and controlled modulus columns, so the upper soil is not over-stiffened and is more compliant in areas with high seismicity, the thickness of the Load Transfer Platform (LTP) required for rigid inclusions is reduced, and there is no risk of column buckling or bulging in deeper weak soils.

Bi-modulus columns result in an increased bearing capacity, reduction of total and differential settlements as well as improved stress distribution from the structure to the inclusions which leads to an optimization of the thickness of the LTP between the structure and the inclusions.

Menard's tip

In 2009, Menard developed a specification for this technique that we are now using on every project.

Some Projects on BMC

- Canada – YVR Airport
- Indonesia – Refinery Development Master Plan (RDMP) Pertamina Balikpapan
- UK – Belfast Translink

For more information please visit our website or scan this QR code :

Deep Soil Mixing

Deep Soil Mixing involves the injection of binder agents to mix with the soil and form columns to reinforce the ground.

Soil Mixing is a ground improvement technique used for a wide variety of applications, such as controlling and reducing settlement under structures, increasing the bearing capacity of the soil, ensuring stability, reducing liquefaction risk, mass stabilization, reducing earth pressure behind retaining structures, blocking groundwater, increasing lateral reaction around foundation piles, etc.

Soil Mixing generally comprises three stages: drilling and premixing of the soil, injection of the binding agent, and incorporation of the soil/ binder mix.

When and why use it?

The principle of Deep Doil Mixing is to improve the strength properties of a weak soil (clay, silt and/or sand) by mixing it with the binder (e.g., cement slurry, bentonite, lime, etc.) to form a solidified mixture of soil and cement with a considerable higher strength and mechanical parameters. It is a very flexible technique adopted mainly to increase bearing capacity, reduce settlement and mitigate liquefaction.

Menard's tip

Binder dosage and mixing parameters are selected according to soil characteristics and specifications to be achieved. Typically, laboratory trial mixes are to be followed with field calibration at project site.

Some Projects on Soil Mixing

- Bangladesh - Gandhrabpur Water Treatment Plant
- Malaysia – Riverbank Rehabilitation for Axis Vista
- Vietnam – Saigon Offshore Fabrication and Engineering Limited (SOFE) Wharf

▲ *Ground reinforcement of a Danish quay in Saigon, Vietnam*

For more information please visit our website or scan this QR code :

Jet Grouting

Jet Grouting is a ground reinforcement technique. One or several jets of fluid with high kinetic energy are used to break apart and mix the ground with a liquid cement slurry to form a column of "soil concrete".

Jet Grouting is a soil reinforcement technique used as a targeted treatment for a wide range of applications: control and reduce settlement under structures, increase bearing capacity, create an impervious cut-off wall or impervious bottom for deep excavation, install retaining walls, underpin existing structures, reinforce soils with existing utilities lines and burred structures, operate in areas that are difficult to access (limited headroom, cramped spaces, etc.).

Jet Grouting improves the mechanical characteristics of the soil using fluid jetting with a very high kinetic energy that breaks up the soil structure and mixes the soil particles in-situ with grout to create a homogeneous mass of high strength reinforced soil-cement material.

Depending on the overall design and soil conditions, several methods of treatment have been developed (single or double curtain walls, secant column walls, plugs, isolated columns, etc.) making jet grouting a flexible technique.

When and why use it?

Jet Grouting can theoretically be used in any type of soft soils, from soft clay to sand and gravel. However, the technique is not suited to coarse gravel or soils with underground water flow. For ground improvement projects, it is typically used under uniform loading (e.g., storage platforms, embankments, slab-on-grade) or under localized loads (e.g., building footings, bridge piers).

Some Projects on Jet Grouting

- Australia - Murrumbidgee to Googong Water Transfer
- Australia – Sydney Airport Seawall Stabilisation
- France - Usson-du-Poitou Wind Farm

▲ *The Venetian Casino, Macau*

For more information please visit our website or scan this QR code :

Menard's tip

Jet Grouting can be applied in areas that are difficult to access using inclined columns, directional drilling and mast of different sizes to fit within tight spaces.

Our Values

#1 HOME SAFE

At Menard we always strive to be the contractor of choice that clients can trust on and off site. We pride ourselves on being quality driven, and our clients can always bank on the strength of our foundations. However, it is health and safety that forms our first and foremost priority.

#2 LESS IS MORE MENARD

We live in a world in which resources are becoming increasingly scarce, so we develop optimal solutions using the least amount of material possible with a view to improve the sustainability of your projects.

The Less is More Menard attitude relies on several simple principles:

- less quantities through better designs, better operation, better organization
- less 'big toys' but instead ones that are adapted to the task
- less carbon-emitting resources when replacements are available through the supply chain.

The Group has set the goal to reduce our Scope 1[(1)] & 2[(2)] emissions by 40% and our Scope 3[(3)] emissions by 20% before the end of 2030.

#3 INNOVATION IN OUR BLOOD

In 1954, Louis Ménard, a young French mechanical engineering student, invented a device to measure the soil's stress - deformation relationship at various depths in a borehole to calculate its bearing capacity and settlement. The pressuremeter was a drastic innovation in the geotechnical industry that continues to inspire the Menard spirit to this day!

Since then, the group has invented and developed the Dynamic Compaction technique for granular soils as well as the Menard Vacuum™ Consolidation for cohesive soils and the Controlled Modulus Columns (CMC) technology for high-level control of ground deformations accommodating higher loads.

Working on the most demanding projects, our engineers, technicians and operators concentrate on bringing value to our clients by keeping up to date with the latest state-of-the-art technologies. The performance of thousands of successful projects each year provides a constant flow of information to support our local and group R&D teams in generating a continuous flow of innovations.

(1) Scope 1 (direct emissions): Greenhouse gas emissions directly produced by Group operations, in particular from fossil fuels used by vehicles, equipment and generators owned or controlled by the Group. — **(2) Scope 2 (direct emissions)**: Emissions from the generation of energy purchased by the Group. — **(3) Scope 3 (indirect emissions)**: Downstream activities.

Follow to the updated group DNA on website:

menard

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