Engineering a better solution
Maccaferri has been developing solutions for controlling the forces of erosion and retaining the earth’s soil for over 130 years. From the beginning, we have provided world-class technical support and on-site assistance to all of our customers.

Our highly trained staff is committed to excellence and will work with your team to develop sound progressive solutions for your engineering needs including: feasibility analysis, project design, product selection, and installation assistance. Maccaferri offers experience and service you can depend on.

Best Regards,
Paolo Raponi

President, Maccaferri, Inc.
C.E.O., North America
Consultancy and Partnership

Maccaferri’s motto is ‘Engineering a better solution’; not merely supplying products, but working in partnership with clients, offering technical expertise to deliver versatile, cost effective and environmentally sound solutions. Maccaferri aims to build mutually beneficial relationships with clients through the quality of its service and solutions.

Organizational Structure

Maccaferri’s continued growth is based upon long-held values of innovation, integrity, excellent service and respect for the environment. Maccaferri’s vision is to become a leading international provider of advanced solutions to the civil engineering and construction market. Implementing a strategy of vertical integration, Maccaferri researches, manufactures, designs, supplies and constructs solutions within its target markets. With over 2000 employees, 30 manufacturing facilities and local operations in 100 countries around the world, Maccaferri can truly claim to have a global presence with a local focus.
Slope Revetment

All natural slopes are subject to continuous erosion forces. Whether the slope has been recently formed, or is in its original natural state, some form of erosion protection may be required.

Maccaferri offers a range of slope revetment solutions to mitigate erosion. With the development of geosynthetic Turf Reinforcement Mats (MacMat®) and biodegradable Erosion Control Blankets (BioMac®) the variety of solutions has expanded greatly to offer a level of intervention appropriate to the erosion risk.

Soil Bioengineering

Maccaferri has a range of products that can be used in conjunction with soil bioengineering techniques to enhance the ecological aspect of the structures. Benefits of vegetation integration with non-living materials include:

- Erosion control and creation of hospitable conditions for the establishment of native plants
- Slower water velocities near banks, and sediment trapping
- Reinforcement of the soil as roots develop, adding significant shear resistance (on channel linings)
- Vegetated banks filter and slow storm water runoff, improving water quality
Transverse-Drop Structures/Weirs

Transverse works dissipate energy and therefore contribute to the stabilization of the bed material. Gabion weir and drop structures are used to control high energy hydraulic flows, carrying solids or sediments. These structures alter the hydraulic profile of the flow, reducing its energy and capacity to erode until a balanced condition is reached. The type and configuration of the weir is dependent upon hydraulic and topographic conditions. Maccaferri offers design software for channels, longitudinal and transverse structures. This enables the designer to rapidly perform preliminary hydraulic studies to evaluate the bank protection or the transverse weir required.

Longitudinal Structures/Linings

The canalization of a water course involves constructing a channel with a cross-section. This can be used to control the meandering of a river through a built up area, or in the vicinity of infrastructures. Where channels transport clean water flow through polluted ground, or vice-versa, the channels may be lined to make them impermeable.

Reno Mattresses and gabions, together with synthetic or biodegradable erosion protection mats, are often applied to the banks and, if required, to the channel bed to maintain the channel function.
Reinforced Soil Slopes & MSE Walls

Modifying soil slope profiles beyond their natural angle of repose, can lead to slope instability. This situation can arise when reducing the footprint of a new highway embankment, or to gain development area on a sloping site.

Maccaferri geogrid reinforcements, used in conjunction with the soil, enable the soil to perform better than it would in its unreinforced state. Maccaferri geogrids enable soils to accommodate greater loads and stand at steeper angles. The geogrids are laid horizontally within the compacted soil mass during construction, reinforcing it due to their high tensile strength, low strain and good interaction with the soil. Maccaferri reinforced soil slopes and MSE walls are ideal for soils which have poor bearing capacity; the structure accommodates differential settlement far better than more rigid solutions. This is also a great benefit in seismic zones.

Our unsurpassed range of geogrid reinforcements, including MacGrid® WG, Paragrid and Paralink with strengths up to 1,350kN/m (92,504 lb/ft), maximizes the opportunity to reuse on-site materials as backfill to a reinforced slope. This saves on the export and import of materials from the site, embracing sustainability and reducing polluting truck movements. With over 30 years of continuous use around the world, Paralink is one of the most tried-and-tested geogrids in existence.
Cost savings through the reuse of on-site material with geogrids can be substantial on a project. Furthermore, combinations of geogrid types to build ‘hybrid structures’ often create more efficient designs and faster construction compared to traditional techniques.

Maccaferri Terramesh®, Terrawall® and Green Terramesh® combine the flexibility of soil reinforcement with the benefit of a modular system. With factory assembled face elements, and pre-determined dimensions, these systems significantly reduce on-site installation times.

Maccaferri’s reinforced soil slopes and MSE wall systems are HITEC evaluated and trusted to support roadways, railway embankments and properties around the globe.

Gravity Walls

The stability of mass gravity retaining walls relies upon the structural integrity of the units, and their filled mass, to support or contain unstable earth slopes. In order to select the optimum Maccaferri retaining wall solution, key considerations include:

- The geotechnical parameters of the retained and foundation soils
- The presence of water and hydrostatic loads
- External loads from structures and live or seismic loads
- The simplicity and speed of construction

Certified by many authorities worldwide and manufactured in compliance with ASTM A975, Maccaferri double twist mesh gabions offer strength and high drainage capacity. Long-term stability and client reassurance are provided as these structures are capable of absorbing differential settlement and deformations.

Maccaferri gabions are available with a range of corrosion protection coatings to suit expected exposure conditions and design life requirements.
Reinforcement technology within roads and pavements creates a more dynamic system among the variables in the environment. Reinforcement increases the service life of roads and highways by reducing fatigue, reflective, thermal and settlement cracking.

Reinforcement relieves and redistributes stress concentrations in the pavement:

- Reducing reflective cracking into overlays
- Improving load distribution
- Improving the bearing capacity of the pavement structure
- Increasing resistance to rutting and shoving

The capability of the reinforcement to withstand loads will depend both on the type of reinforcement and the surrounding bituminous material. Discontinuities will inevitably lead to cracks in the asphalt.

Maccaferri offers a wide range of asphalt pavement reinforcement products from Road Mesh and double twisted hexagonal steel wire mesh, used to structurally reinforce pavements, to MacGrid® geogrids and MacTex® geocomposite fabrics. With the extensive product line at Maccaferri, flexibility is our strength.
Basal Reinforcement

Every construction site poses unique challenges due to soil conditions. The solution to challenges in the construction of unbound roads, including forestry tracks, mine haul roads, construction sites and parking areas, lies within the appropriate use of geosynthetics within the unbound layers:

- Increase the load bearing capacity of the structure
- Increase the life of the structure
- Reduce the thickness of the granular layer
- Reduce rutting

The Maccaferri in-house design team utilizes a combination of classical design methods and state-of-the-art software to select the appropriate Maccaferri geogrids and geotextiles to meet project demands, optimizing the structure and cost efficiency.

Pavement Drainage

The ever-increasing value of space requires a sound solution for drainage control. Poor drainage control within a structure or surrounding ground can weaken the foundation or lead to roadway closures.

The selection of an appropriate drainage solution depends on a number of factors:

- The overburden expected
- The expected flow discharge required
- The type of material/soil to be drained (clean, contaminated, etc.)
- Hydraulic gradient
- Dimensions of the area to be drained

MacDrain® geocomposites are designed to replace costly traditional drainage materials such as gravels and sands. Geotextiles, attached to the drainage core on one or both sides, stop the materials or soils being drained from clogging the drainage core or collection pipes.

Sinkhole Remediation

One of the most challenging situations in the geotechnical domain is the sinkhole. Some areas are subject to the sudden formation of cavities or natural depressions caused by mining subsidence, or where natural voids can occur. In these circumstances, it is necessary to introduce innovative reinforcement, typically at the base of the embankment, to prevent the sudden failure of the foundation or sinkholes.

That innovative reinforcement is Maccaferri’s high strength, low strain Paralink. This reinforcement meets the most stringent design criteria and has been used successfully for many years in sinkhole application. Maccaferri’s expert technical team is ready to help develop a solution for sinkhole challenges.
Rockfall Protection

Simple Drapery

Maccaferri’s Simple Rockfall Drapery Systems are used to control falling debris on slopes, preventing the debris from falling onto roads, railways or areas where loss of life or property damage is possible. As surface debris loosens and falls, it is forced to work its way between the mesh/cable panels of the drapery system and the ground surface until it reaches the base of the slope where it can be removed.

Maccaferri simple rockfall drapery systems are constructed by suspending double twisted hexagonal steel wire mesh and/or cable net panels from an upslope up to downslope on the protected area. The panels are usually draped freely over the ground surface to extend to a specified length downslope. The panels may be fastened to the base of the slope in order to contain fallen debris.

Secured Drapery

Protection against rockfall is frequently carried out with mesh facing and patterned nails; this system is known as Secured Drapery. Secured drapery can also be referred to as pinned drapery, or surficial consolidation. Secured drapery is aimed at improving rock face stability.

The stability of the exposed rock face, reinforced with nails, is obtained by the contribution of steel mesh. The function of the mesh in the secured drapery system is to stabilize the material between the nails by limiting rock movement. The steel mesh facing has a flexible structural behavior, within the limits of its intrinsic deformability, and works in unison with the passive action of the nails.

Secured drapery intervention is typically recommended where the number of unstable blocks is too large and/or the maintenance cost is too high or the location is difficult to access. This allows the nailing of each single rock, so that the surficial portion of the slope can be compared to a continuous unstable thickness.
Barriers/Catch Fences

Barriers/Catch Fences are positioned to intercept and stop falling rocks and boulders. Maccaferri’s rockfall fences are supplied in “kit form” for a specific height, length and energy absorption capacity.

Maccaferri supplies rockfall barriers/catch fences with energy absorption capacities of 500kJ to 5,000kJ, featuring a unique, compression energy absorption device. This simple, yet effective device, maintains its performance throughout the design life of the structure. Unlike traditional ‘friction brake’ devices, Maccaferri’s compression tube brake is very easy to visually inspect as it progressively crushes as the fence is impacted. Also, it does not corrode or become clogged with grit over the life of the fence, potentially reducing the effectiveness of the barrier.

Hybrid Barriers/Attenuators

Hybrid Barriers, or Attenuators, combine rockfall barrier technology with the advantages of simple drapery to form an efficient passive system. The upper section of the rockfall hybrid barrier absorbs the energy of the rock impact and the draped mesh guides the rock down the slope.

The energy of the falling rock is partially dissipated by the rockfall hybrid barrier as it impacts the mesh panel. The falling rock is then contained and slowed between the mesh and ground surface as it continues to fall towards the bottom of the slope.

The raised post at the upper section allows rocks from above to be caught within the system, providing extra protection. Due to lower maintenance costs, the hybrid barrier, or rockfall attenuator, is a cost effective solution.
Maccaferri’s Soil Nailing is a technique that can be used either as a remedial measure, for unstable natural soil slopes, or for steepening new or existing soil slopes. With soil nailing, the slope is reinforced by the insertion of reinforcing steel anchor bars.

Anchors are installed using drilling techniques, and are usually fully grouted and installed with regular spacing across the slope face. Surficial stability can be achieved by using a flexible reinforcing mesh, or a rigid concrete revetment may be used to stabilize the soil between the steel plates.

Typically this type of system provides global stability by improving the soils shear strength while vegetation is established, which provides surface erosion protection.
Geological Hazard Protection

Geological hazards/debris flows are typically mobile liquefied landslides containing a variety of material from fine particles to large boulders and tree branches. They are caused by excessive water on slopes, from rainfall, glacier melts or similar. The likelihood of geological hazards/debris flows is increased when vegetation and other surface protection has been removed from vulnerable slopes, perhaps by wildfire or clearing. Geological hazards/debris flows tend to be channelled by the topography.

Maccaferri’s debris flow barriers are similar to rockfall barrier/catch fences, but work in a totally different way. The rockfall barrier stops rocks with a dynamic load, whereas debris flow barriers work for both dynamic and static loads. Ring nets are ideal in these structures as they have inherent energy absorption capacity, which reduces the loads that are transferred to the compression brakes.

For wildfire applications, the barriers are designed to be in place until vegetation is re-established on the vulnerable slopes above. The barrier can then be removed leaving the foundation intact. They can be reinstalled if risks from geological hazards/debris flows increase in the future.

Avalanche Protection

The inhabitants of mountainous areas have always been affected by the risk of avalanches. The need to live alongside this threat has led to attempts to mitigate the risk by constructing intricate systems of artificial structures.

Maccaferri’s snow nets are designed to stabilize the layer of snow at the potential avalanche detachment zone, thereby preventing the triggering effect of an avalanche.
Underground Mines

Operating underground encompasses the necessary processes and applications of specific techniques to extract valuable minerals. Maccaferri offers numerous solutions to line tunnels and control the loose and falling debris that can occur during mining operations. Depending on the specific risks, these solutions include double twisted hexagonal steel wire mesh, ParaRib polymer meshes, or fiber reinforced shotcrete.

Open Pit Mines

To maximize extraction volume and minimize the space for infrastructure, slopes within open pit mines can be steep, causing material to detach and affect mine safety and operations. Maccaferri addresses this problem with a range of high performance steel meshes and rockfall catch fences that range from a few kilojoules to 20,000 kJ.

Crusher Walls

Maccaferri offers reinforced soil and retaining structure solutions for crusher and hopper walls. Wherever possible, the reuse of on-site structural backfill is used with Maccaferri’s geogrids for reinforced soil, reducing costs and material waste. Maccaferri’s wall systems offer vertical structures with a tough fascia and geogrids that have strengths up to 92,500 lb/ft, accommodating even the heaviest of vehicles.
Waste Containment

The safe storage of tailings, waste, leachates and toxic materials is a significant operation within mines. Maccaferri’s range of solutions include geosynthetic membranes, geogrids and drainage geocomposites. These are used in heap leach pad liners, evaporation ponds and lagoon liners. Containment dykes often feature geogrid reinforced soil or gabion retaining structures; also, major dump zones can be supported on basal reinforced platforms.

Infrastructure

Effective access ramps, haul roads, surface water control structures and drainage systems are important to the uninterrupted performance of a mine. Whether a weak haul road requires sub-grade stabilization with geogrids, an outfall structure requires erosion protection or a run-off ditch needs lining, Maccaferri has a product that can help.

Dewatering

MacTube® geotextile containers are used for dewatering, mine tailings, sludge ponds or slurries. They are specifically designed to retain solid particles within the tube, while the filtrate fluids are released through the fabric. The drained solid residue can be left to dry before disposal in a controlled manner.

Mine Reclamation

The closure and reinstatement of the ecosystem is one of the most important activities in the lifecycle of the mine.

Maccaferri offers impermeable capping and drainage systems to prevent surface water from entering the deposits. The rapid re-establishment of vegetation and soil erosion protection systems complete closure operations. Maccaferri’s wide range of synthetic and biodegradable soil stabilization and erosion protection solutions facilitate mine reclamation.
Dune Restoration

Hydraulically filled with sand, Maccaferri’s geotextiles are an effective solution for dune restoration and stabilization of berm crest elevation. Maccaferri geotextiles are easy to install both above and below the water surface; they can improve storm damage vulnerability of upland infrastructure and increase the life cycle of maintenance re-nourishment. As a “soft” armored structure, they offer minimal impact to the environment while providing a cost effective alternative to a “hard” structure.

Habitat Restoration/Island Creation

Maccaferri products offer innovative solutions for applications including habitat restoration, restoration of lost land, island wave attenuation for marina protection, and dredge disposal containment. Our products can be used in a variety of environmental restoration applications, including wetlands, bays, and estuaries.

Dredging & Dewatering

Maccaferri products such as the MacTube® and MacBag® provide an efficient, cost effective and environmentally sound alternative for the disposal, containment, and re-use of dredged material. From channel maintenance dredging to removal of contaminated sediments and stormwater containment, Maccaferri’s geotextile containers provide the ability to readily consolidate sediment on-site and in the field with quality assured performance of high-strength woven geotextile fabric. For dewatering applications, Maccaferri’s geotextile containers increase efficiency and reduce dewatering time by adding environmentally safe polymers to aid in coagulation of solids and in the release of water.
Shoreline Stabilization

Shoreline stabilization is an important and ever-changing aspect in the coastal environment, particularly for protection of upland infrastructure and vulnerability to storms and coastal flooding.

Maccaferri offers a wide range of products for the construction of various coastal solutions such as groins, breakwaters, revetments, and retaining walls, as well as technical design assistance.

Maccaferri can offer clients a graded range of hydraulic erosion protection techniques from soil bioengineering and low energy solutions, to robust high-energy capacity revetments.

Emergency Works

Maccaferri offers a variety of emergency works products, which are designed with ‘Emergency Permits’ in mind, protecting life and property from almost certain future storm events. Maccaferri emergency works products are designed for integration with a long term solution and are removable should a more viable long term solution alternative be implemented.

Reef Restoration

Maccaferri offers innovative solutions for artificial reef applications, including habitat restoration and mitigation of impacted natural reef. Our worldwide experience in ballasted filter mattresses for stabilization and scour protection is unparalleled. Maccaferri’s mattress systems can also be used in combination with our signature gabion reef unit design, which can be used in place of standard limestone boulder units – providing a more cost effective, complex habitat for marine growth. Our technical engineering staff will work with you to ensure that the stability of the structure will meet the environmental conditions to provide optimum performance.
**Consolidation of Excavation Face**

The adoption of this method is increasing worldwide and is used mainly to reinforce and consolidate the soil mass in front of the excavation face, thereby enabling fast progress in full face excavations. It tends to be used in particular geological conditions, especially in soils considered to be difficult to excavate. The method consists of reinforcing the excavation face by installing fiberglass elements in sub-horizontal holes, which are then grouted to form a set of micro-piles around the entire section. This contains the stresses induced by the excavation and stabilizes any thrusts. Approaches such as ADECO–RS (Analysis of Controlled Deformation in Rocks and Soils) are used to prepare the final designs for such techniques.

**Fiberglass Reinforcement**

These are extruded elements formed by glass filaments and polyester resins that are manufactured with various cross-sections, from hollow to solid; the latter having a high mechanical strength, which may be compared with steel, while maintaining its lightness and versatility.

**Special Expansive Mortars**

These are dry ready-mixed products that are added to water and injected in holes at the excavation face. Due to their expansive characteristics, they compress the soil around the drilled hole, thereby guaranteeing a better adherence between the reinforcement element and the soil itself.

**Polyurethane Resin**

These are chemical products that are mixed before the grouting stage to create a lightweight and expansive closed cell foam. When it comes into contact with water it forms a foam that blocks any accidental inflow of water. It is also widely used to fill the cavities that sometimes form or are encountered during tunnel excavation work.

**Drainage**

Drainage pipes are used, sometimes in combination with flat drainage composites, in order to quickly lower the groundwater level in deep rock masses.

The MacDrain® drainage geocomposite reduces pore water pressures and thereby reduces the threat of saturated ground conditions. The MacTex® family of geotextiles represents an excellent solution to protect the waterproofing of the tunnel formed by HDPE or PVC sheeting.
First & Final Linings

First lining, commonly made of steel fiber reinforced shotcrete, is applied immediately after excavation of the heading face. If structurally required, reinforcement elements consisting of steel sections that have the shape of the tunnel contour can be installed: steel ribs, arches or lattice girders are longitudinally connected together to form the support reinforcement. Composite cross section steel arches and steel fiber reinforced shotcrete produce a strong structure enabling absorption of the initial deformation forces of the tunnel. Where necessary, additional radial reinforcement, in the form of various types of steel anchors, are installed. The final lining determines the durability and structural strength of the underground works, acting as the support for service installations.

Steel Arches

These consist of pre-shaped steel sections to provide first stage support. Variations have also been implemented in order to improve installation, with the use of parts of the arches that are extendable PMET, thereby making the installed rib immediately active. Textile sacks, known as BIM BAGS, are also placed behind the arches. When they are inflated, using the same mortar as the shotcrete, they perfectly fill the spaces behind the arches.

Wirand® Steel Fibers

Wirand® steel fibers give a combined compressive and bending strength to the shotcrete lining, substantially increasing the toughness of the shotcrete, which improves the reinforcement performance and increases work safety. Specialized Maccaferri dosage equipment is provided to add the exact quantity of steel fibers during the batching operation in the mixing plant. Wirand® steel fibers can be used as structural reinforcement in cast in place final linings, enhancing performance and optimizing the amount of reinforcement needed.

FibroMac™ Synthetic Fibers

The use of FibroMac™ synthetic fibers permits the construction of a homogenous material which forms an effective passive protective element against fire, thereby reducing the spalling phenomena.

Self-Drilling Bolts & Anchors

These solutions are used to control and/or reduce convergence of the excavated tunnel section. The reinforcement range is comprised of steel anchors, self-drilling rock bolts and high-strength steel bars.
Compared to traditional reinforcement, Wirand® Steel Fiber Reinforced Concrete (SFRC) can:

- Reduce weak points in the slab
- Increase panel sizes by eliminating saw-cuts
- Reduce slab thickness
- Be quicker, safer and cheaper to install
- Replace traditional reinforcement
- Increase the daily construction output

The cyclic loading of flooring slabs, particularly in heavy industrial applications, is demanding. The response of the concrete slab is dependent on the ‘ductility’ or ‘toughness’ of the concrete. Wirand® steel fibers have a high modulus of elasticity and do not creep over time, substantially improving the structural ‘elasto-plastic’ response of the slab.

Jointless floors
Maccaferri’s LODIMAC (LOng DIstance MACcaferri) system enables floor panels up to 2,500m² to be cast without saw-cut joints, greatly increasing design possibilities and flexibility of construction.

Superflat floors
Wirand® SFRC slabs fully comply with the demands of high racking, narrow aisle loads and critical surface level tolerances as required by the manufacturers of racking systems and load-haul equipment manufacturers.

Dosage Equipment
Fibers are one component of the concrete mix, and control of all constituents and processes is important to obtain a perfect result. Using Maccaferri Wirand® SFRC is simple:

- Introduce fibers into the concrete mix
- Let the fibers distribute homogeneously
- Mixing time is typically 1 minute per cubic meter of concrete
- Include admixtures to optimize workability

For smaller and one-off projects, the fibers are conveniently delivered in pre-weighed packs for deployment directly into the concrete mixing truck at the project site.

For larger projects, the rate of delivery and dispersal of fibers within the concrete matrix is important due to the short cycles. Maccaferri’s full range of DOSO fiber dosing systems has been developed to solve the specific problems of large slab flooring contractors, pre-cast plants and any ready mix operation. These can be stand-alone, or fully integrated into the concrete batching plant with the support of our production specialists.
Maccaferri’s Wirand® steel fibers and FibroMac™ synthetic fibers offer significant advantages when used in pre-cast concrete. Customizing the fiber types and blend, within the concrete mix, to suit the concrete end-product, brings many benefits. Wirand® Steel Fiber Reinforced Concrete (SFRC) increases the durability, ductility, shear, impact resistance and fire resistance of the pre-cast concrete products. Other benefits include:

- Reduced complex steel reinforcement detailing
- Reduced damage during demoulding
- Reduced damage during handling and transportation
- Improved freeze-thaw/thermal resistance
- Reduced early-age cracking
- Earlier demoulding/shorter mould times
- More slender products using less concrete

A major use of Wirand® is in pre-cast concrete segments for tunneling applications. Whether small diameter tunnels for services, or large diameter for major infrastructure, Maccaferri can help. Wirand® steel fibers structurally reinforce the segments, in some instances, enabling the complete removal of all traditional steel reinforcement.

FibroMac™ synthetic fibers are added to segments in order to dramatically increase the concrete resistance to high temperatures. This reduces explosive spalling and damage to tunnel linings exposed to fire.

Using renowned testing and research establishments, Maccaferri has repeatedly refined tunnel segment designs through the use of Wirand® steel fibers, saving clients money on projects. Significant pre-cast operations for products such as pre-cast pipe, septic tanks, manholes, and pre-cast steel decks, have implemented Wirand® steel fibers & FibroMac™ synthetic as reinforcement in their product portfolio.

Applications for Maccaferri Pre-Cast Concrete

- Tunnel segments
- Reinforced concrete pipe
- Prison cells
- Septic tanks
- Manholes
- Utility vaults
- Burial vaults
- Railroad ties
Anchors
Steel rock bolts for ground support

B Zero Tondo
Steel structural element for underground support

BFM
Ballasted Filtering Mattress (BFM) is a pre-fabricated composite marine mattress system used in and around water

Double Twist Mesh
Double twisted hexagonal steel wire mesh

Envirolog®
Double twist wire mesh basket lined with a 100% coconut (coir) blanket

Fiberglass Reinforcement
Fiberglass dowels or rock bolts for ground consolidation and support

Green Gabion®
Manufactured from 8 x 10 double twist mesh with different fascia inclination. Front face panel is lined with 100% coconut (coir) blanket for vegetation

Green Terramesh®
HITEC approved, environmentally friendly modular system used for reinforced soil slope embankments

HEA Panel
High energy absorption cable panels with variable cable diameters and mesh openings containing double wire knotted junctions

MacELB
Emergency Lift Bags composed of woven high-tenacity polypropylene (PP) yarns for use in emergency situations for infrastructure protection

MacGrid® EG
Biaxial geogrid composed of one layer of high strength extruded biaxial oriented polypropylene

MacGrid® WG
Uniaxial geogrid composed of high tenacity polyester multifilament yarns

MacTex®
Woven and non-woven geotextiles manufactured from polymers and engineered for use in a wide variety of applications

MacTube®
Polypropylene tubes inert to biological degradation and resistant to most naturally encountered chemicals, alkalis and acids

Para Product
High tenacity, multifilament polyester yarns placed in tension, then co-extruded with polyethylene to form polymeric strips

Rockfall Barrier
A barrier structure with a containment panel system to stop and retain rocks

Rockfall Embankments
A reinforcement soil structure used in rockfall protection where revetments are not possible

Rock Mesh® Steel Grid®
Woven composite, made of steel wire and steel wire ropes with a longitudinal weave, woven together during the production of double twist mesh

Terramesh® System
HITEC approved MSE wall system, consisting of gabion fascia units with integral soil reinforcing woven wire mesh tails

Terrawall®
An MSE system consisting of welded panels and fascia, manufactured with integral soil reinforcing woven wire mesh tails
BioMac®
An Erosion Control Blanket (ECB) well-suited to the relatively short-term challenges of establishing vegetation in low to moderate erosion applications

FibroMac™
Synthetic fibers for concrete reinforcement

Debris Flow Barriers
Containment panel systems with or without structural barrier elements, designed to stop and retain rocks and smaller debris

Grouting compounds for soil consolidation and conditioning

Chemicals & Accessories

Gabion
A basket manufactured from 8 x 10 double twist mesh in compliance with ASTM A975

Debris Flow Barriers

Gabion Mattress
A long mattress manufactured from 8 x 10 double twist mesh

MacBag®
Polypropylene bags inert to biological degradation and resistant to most naturally encountered chemicals, alkalis and acids

MacDrain
A three-dimensional geocomposite forming a system to draw and transfer water from the surrounding soils to drainage pipes

Hybrid Barriers
Rockfall barrier structure supporting a high energy simple drapery to attenuate rock impacts

MacMat®
A three dimensional matrix of polypropylene filaments used as a Turf Reinforcement Mat (TRM)

Hybrid Barriers

MacMat® R
A geocomposite Turf Reinforcement Mat (TRM) reinforced with double twist mesh

MacLine
High density polyethylene geomembrane produced from specially formulated, virgin polyethylene resin

Road Mesh
A double twist mesh reinforced with steel rods across the weave direction

Sack Gabion
Cylindrical baskets made of 8 X 10 double twist mesh

Ring Net Panels
High energy absorption ring panels with wire strand rings on a four point interlocking pattern

Reno Mattress
A gabion type structure manufactured from 6 x 8 double twist mesh with more planar area and relatively small thickness and in compliance with ASTM A975

Road Mesh

Shotcrete Additives
Concrete add mixtures, accelerators, and plasticizers

Sack Gabion

Snow Net
Snow blanket stabilization barrier

Variety of geocomposites for drainage, filtering and protection

Tunneling Drainage

Wirand®
Steel fibers for concrete reinforcement

Water Log
Densely packed coconut coir fibers contained within tubular netting of synthetic or coir yarn and planted with aquatic plants