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# Engineering a Better Solution

Maccaferri's motto is 'Engineering a Better Solution'; We do not merely supply products, but work in partnership with our clients, offering technical expertise to deliver versatile, cost effective and environmentally sound solutions. We aim to build mutually beneficial relationships with clients through the quality of our service and solutions.

## GLOBAL ENGINEERS
















In the second half of the 19th century we invented Gabions and dramatically changed civil engineering landscape. We are still changing today. We work every day to find better solutions for our clients at every degree of latitude and longitude. Our worldwide network grows through innovation and diversification of sectors of activity and through an increasing range of high quality and environmentally friendly products and applications.

## OFFICINE MACCAFERRI GROUP PROFILE

Founded in 1879, our Group soon became a worldwide reference in the design and development of advanced solutions, with offices in over 70 countries and 30 factories worldwide.

Our mission is to pursue excellence through continuous improvement, while delivering to customers engineered solutions that are innovative, advanced and environmentally friendly. We are committed to outstanding safety, quality and sustainability, to create value for all stakeholders as well as our communities.

## MACCAFERRI APPLICATIONS

- |  |   |  |   |
|--|---|--|---|
|  RETAINING WALLS & SOIL REINFORCEMENT |  SOIL STABILISATION & PAVEMENTS                              |  DRAINAGE OF STRUCTURES   |  FENCING & WIRE                          |
|  HYDRAULIC WORKS                      |  BASAL REINFORCEMENT   |  TUNNELLING               |  AQUACULTURE NETS/CAGES                  |
|  ROCKFALL PROTECTION & SNOW BARRIERS  |  COASTAL PROTECTION, MARINE STRUCTURES & PIPELINE PROTECTION |  LANDSCAPE & ARCHITECTURE |  CONCRETE FLOORING, PRECAST & OTHER USES |
|  EROSION CONTROL                      |  ENVIRONMENT, DEWATERING & LANDFILLS                         |  SAFETY & NOISE BARRIERS  |  INDUSTRIAL MANUFACTURING                |



# GEOSYNTHETICS

## INTRODUCTION: GEOSYNTHETICS WORLD

Geosynthetics are used for countless applications including: to strengthen existing ground, improve its bearing capacity, make highways last longer, support embankments, stop landfill leachates contaminating the ground and limit erosion.

With defined technical characteristics and performance properties, geosynthetics are replacing the use of natural materials within construction. They are proven to reduce project cost and environmental impact compared with traditional construction methods.



## OUR CAPABILITY A GLOBAL PARTNER FOR OUR CLIENTS

With 140 years of history, 3000 employees, over 30 manufacturing facilities and local operations in 100 countries around the world, Maccaferri can truly claim to have a global presence with local focus.

The knowledge and capability to easily combine products and solutions enables Maccaferri to offer clients tailored solutions, optimising value and reducing project cost.

Maccaferri works with its clients to develop, manufacture, design and construct solutions for the construction industry.

Our geosynthetics products can be used to fulfil the following main functions:

- M** Reinforcement
- M** Stabilisation and Asphalt Reinforcement
- M** Drainage
- M** Separation, Filtration and Protection
- M** Barrier Systems
- M** Erosion Protection



# REINFORCEMENT

For over 30 years, geogrids have reinforced and strengthened soils, enabling the soil to perform better than it would in its unreinforced state, accommodating greater loads, standing at steeper angles and reducing settlement.



## Slopes and Walls

Maccaferri has a wide range of geogrids (with a variety of polymers, configurations and strengths) to maximise the opportunity to reuse site won materials as backfill to reinforced soil walls and slopes.

Cost savings and "carbon footprint" reductions through the use of geogrids can be substantial when compared to traditional solutions. Additional improvements can be realised through re-using site won material as structural backfill, saving the transportation of materials to and from the project site, embracing sustainability and reducing polluting truck movements.

Whether geogrids are used for small retaining walls in housing developments, or reinforced soil megastructure on infrastructure projects, Maccaferri offers cost-effective, value engineered scalable solutions.



## Basal reinforcement and void spanning

In use since 1977 and with strengths up to 1350 kN/m, Maccaferri's Paralink® provides performance and reassurance in the most demanding applications; embankments over piles or on soils subject to voids. For less demanding soil reinforcement applications, the woven composite, MacTex® C2, or woven polyester MacTex® W2, offer performance with value.

For heavy cohesive soils the MacTex® C2 + C2S range offer a good solution.



“Paralink and ParaGrid are amongst the most tried and tested geogrids in the world offering 120 year design life and high performance.”

## STABILISATION & ASPHALT REINFORCEMENT

Whether you are constructing a railway track-bed, gravel forestry track over soft soil, or resurfacing a multi-lane highway carrying many thousands of vehicles per day, we have the technical knowledge to improve rail track, road and asphalt pavement performance.

Maccaferri geogrids are used to extend the life of unbound and asphalt pavements; MacGrid® AR is a specific composite geogrid used to reduce reflective cracking within asphalt pavements and overlays. MacGrid® EG or MacGrid® WG S biaxial geogrids are used (often in combination with MacTex® geotextiles) to strengthen unbound pavements, reducing rutting and the thickness of granular material required.



## DRAINAGE

Excess, or uncontrolled water within soils can weaken them, causing numerous problems. The management of water behind retaining walls and civil engineering structures, beneath highways, inside tunnels and in environmental capping solutions, is one of the most important aspects influencing the long term performance of that structure.

The MacDrain® range are geo-composites for drainage, manufactured with a rigid or flexible polymeric core, providing a free conduit for water and fluid flow, from the adjacent materials. Geotextiles, or geomembranes, bonded to one or both sides of the core ensure filtration, separation, waterproofing and protection of the core.

With lab-tested performance and quality controlled manufacturing, MacDrain® can replace traditional gravel drainage, offering faster installation, quantifiable performance and construction cost savings. Additionally, the reduction of gravel extraction and truck movements to and from the project site, serve to reduce project environmental impact.



## SEPARATION/ FILTRATION/ PROTECTION

Our geotextiles are currently used in many geotechnical and hydraulic engineering applications.

MacTex® geotextiles are used to replace the traditional methods of:

- Separating and filtering two distinct soils or layers and preventing cross-contamination
- Protecting membranes or other vulnerable structures
- Improving the bearing capacity of weak soils

The wide range of products is augmented by Maccaferri's capability to develop and manufacture specific textiles to suit individual projects.

In dewatering, industrial or contaminated slurries can be pumped into the MacTube®. Once the slurry has dried, it can be disposed of far more safely and cost effectively, than wet slurried material.



## BARRIER SYSTEMS

Geomembranes are used to prevent the migration of fluids from one location to another; for example, lining landfills to stop leachate polluting groundwater, controlling groundwater entering tunnels or creating attenuation ponds within developments.

Maccaferri MacLine® geomembranes and geosynthetic clay liners are available in a variety of thicknesses and compositions to suit applications such as mining heap leach pads, settlement lagoons, landfills, tunnels and many other specialist applications.

MacLine® products are often used in conjunction with MacDrain® geocomposites and MacTex® geotextiles providing a complete solution to capture, contain and drain fluids.

MacMat® R, MacGrid® T or MacWeb™ can be used to secure a layer of topsoil on the membrane, facilitating revegetation.



## EROSION PROTECTION

All natural slopes and surfaces are subject to continuous erosion forces. To limit expensive land-loss, Maccaferri offers a range of erosion protection systems to suit the severity of erosion expected.

Relying upon vegetation growth alone is very unpredictable and unreliable as it is difficult to achieve 100% vegetation coverage, leaving vulnerable exposed areas. Furthermore, vegetation can die back or become diseased, reducing the anticipated erosion control capability.

MacMat® and MacMat® R (reinforced), three-dimensional permanent erosion control mats increase the soil's resistance to erosion. They provide immediate protection of exposed topsoil areas from the direct effects of wind, rainfall impact or water flow regardless of the amount of vegetation established.

Additionally MacMat® R and MacGrid® T are used to reinforce soil veneers over low-friction surfaces and also in conjunction with soil nails on strengthened slopes.

In other situations, MacWeb™ geocells in conjunction with other materials can promote slope revegetation.

### Coastal Protection

MacTubes® and MacBags®, fabricated from quality geotextiles are geocontainment systems, used as a component in a variety of marine, hydraulic engineering, coastal protection and dewatering applications.

Filled in-situ with a pumped slurry, the water drains through the fabric walls, leaving the residue within the MacTube®. In coastal and hydraulic works, the filled tubes are then used to construct breakwaters, dykes or for dune reconstruction.



## HOW WE WORK

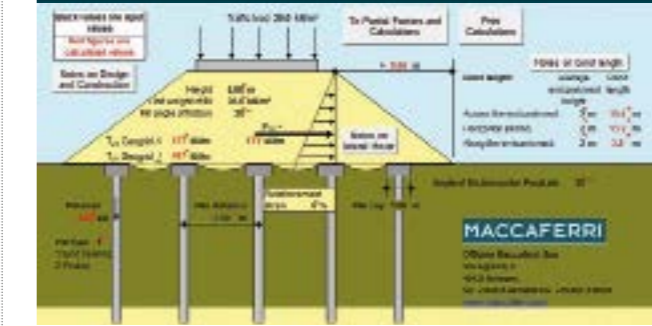
At Maccaferri we do not simply sell products: we provide better solutions – identifying, addressing and responding to the specific needs of each client.

Maccaferri is a partner who works alongside clients from the start of the project, maximising value for money through technical expertise and an extensive portfolio of quality products. High quality products are only part of the solution; design and selection of a solution that meets the clients requirements are equally important. Maccaferri's **software** uses the latest modelling techniques, in accordance with various design methodologies to design robust, cost effective solutions.

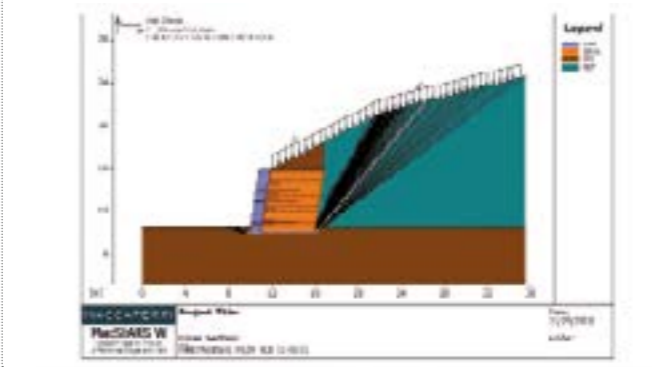
### Quality Control

Maccaferri's geosynthetics are manufactured under quality controlled conditions and where appropriate, are not only CE marked but also tested and certified by third party authority as BBA (UK) and NTPEP (USA). This provides client reassurance that the product has been tried and rigorously tested before installation within the project.

### MacBARS Design of basal platforms and piled embankments



### MacSTARS Design of reinforced soil slopes and walls using the full range of geogrids and soil nails



### MacREAD & OLCRACK Design of paved and unpaved reinforced roadwalls using the full range of geogrids and soil nails



### MacRA Studio Design of channel linings and drop structures for hydraulic erosion protection works

### MacFLOW Design of drainage systems using MacDrain for vertical, flat and sloped applications

### LANDFILLS Design of veneer stability over membranes, drainage capacity and GCL-CCL equivalence