Admir Technologies offers geotechnical solutions by means of Geosynthetic products for a broad variety of civil engineering applications. Admir has been engaged for 15 years in adapting Geosynthetic products to engineering projects such as roads, embankments and retaining walls, reservoirs and waste landfills, stabilizing slopes, drainage, and many others. Admir’s engineering know how, the broad variety of its products and proven successful experience gained in hundreds of projects, enables it to provide geotechnical solutions over a broad spectrum of applications, with strict adherence to cost/benefit advantages.

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Separation and Reinforcement of Road Subbase

Separating added subbase layers from the native sub-grade layer has been proven to be an effective method for thousands of years. Use of woven or non-woven geotextiles improves the engineering behavior of roads and runways while fulfilling the following functions:

- Preventing pumping of fines from the subgrade to the base course.
- Maintaining planned base thickness and preventing loss of added material to soft soil.
- Distributing vertical forces over a large area.
- Using geotextiles in the road cross section prevents differential settlement, making it possible to reduce subgrade thickness where necessary.

Loads Support

Neoweb is a three-dimensional cellular confinement system in a honeycombed structure. When filled with granular infill, a new composite geosynthetic entity is created from the complex interaction of cells, geometry and soil on three planes, ideal for soil confinement, stabilization and reinforcement solutions.

Advantages

- Reduces aggregated costs for paved and unpaved roads in weak soil.
- Increases soil modulus/bearing capacity.
- Reduces aggregate structural pavement and asphalt layer thickness.
- Retains cell wall stiffness for project lifespan.
- Maintains compaction by eliminating particle movement.
- Allows utilization of local, inferior and recycled materials for infill.
- Reduces long-term maintenance costs.
- Provides sustainable solutions with significant environmental benefits.
Asphalt Reinforcement

Damage and cracks in asphalt due to fatigue (or ageing), temperature change cycles and traffic load, can be prevented by application of bitumen coated geogrids and nonwoven geotextiles between asphalt layers.

Asphalt concrete is characterized by high compression strength but low tensile resistance – application of a membrane between two asphalt layers retards reflective cracking between asphalt layers by:

- Increasing asphalt tensile strength
- Bearing a significant proportion of horizontal tension forces, thus ensuring even stress distribution over a large area

Geogrids and geotextiles are mostly applied in rehabilitating asphalt pavements with a geotechnical membrane spread over the asphalt layer to be rehabilitated, followed by application of a new upper asphalt layer.

Thirty years of experience have proven that the application of geotextiles/geogrids reduces maintenance of the asphalt road, extends maintenance intervals and produces favorable cost/benefit ratios.

Geomembrane Clay Lining

Using geomembranes to seal clay maintains clay moisture content, thus preventing its swelling.

Sealing of the subbase is carried out when the clay has been worked to the desired moisture content, whereupon HDPE membranes are spread on the horizontal substrate as well as vertically in a 1.5 : 2.5m deep trench, intended to prevent penetration of horizontally flowing ground water.

Sealing the clay prevents damage to its surface and prolongs road lifetime.
Embankments and Retaining Walls – Reinforce Soil

Horizontal placement of geogrids and geotextiles of various types on the embankment section creates a reinforced soil structure. The method is based on the formation of a mass composed of compacted soil layers with the addition of a reinforcement element. The reinforcement geotextiles or geogrids of high tensile strength and low elongation are placed across the section to beyond the sliding circles.

Advantages:
- Cost savings stemming from controlled use of local fill materials.
- Steepening embankment slopes reduces fill and expensive land area.
- Improved overall stability and increased safety coefficients.
- Option of building retaining walls and embankments on soft soils.
- Greater flexibility in selecting various facing elements such as gabions, modular concrete units, Green Terramesh, etc.
Specific Applications /Soil Improvement

High tensile woven geotextiles and geogrids manufactured from “super fibers” such as Aramid and PVA, possessing exceptional engineering properties, facilitate coping with complex civil engineering challenges.

Super fibers serve to bridge sinkholes, stabilize big embankments on compactable soils and minimize soil movement and settlement under high-speed railroad tracks, utilizing their considerable strength and low stress.

Use of super fibers permits offering solutions for typical engineering challenges of the future as such systems are integrated in electronic warning systems, thus permitting remote monitoring of project operation and are used in the most prestigious projects in the world.
Reservoir Lining

Lining reservoirs with synthetic geomembranes separates the liquid mass from the soil. The purpose of the lining is to keep soil clean and prevent groundwater contamination. In cases where clean water is stored, sealing of the reservoir by means of HDPE membranes prevents loss of valuable water and protects the stability of the embankments and adjoining structures.

Use of HDPE membranes in reservoirs is of proven cost/benefit advantage, with such reservoir lining implemented in tens of thousands of projects throughout the world.

Lining reservoirs integrates several geotechnical products in addition to the geomembranes, consisting of geotextiles for protection and puncture prevention, various types of drainage mats and geonets and perforated drainage piping.
Waste Disposal Site Lining and Capping

Waste disposal burial combines most of the geosynthetic materials – bottom lining and capping of waste disposal sites integrates products for lining, water drainage, biogas drainage, slope stabilization, etc. Integrated use of geosynthetic products for all customary specifications ensures maintaining environmental quality, savings in waste burial volume as well as efficient and modern operation of waste landfills.

Admir installs the following products for waste site lining and maintenance:
- GCL / Bentonite membranes for clay layer replacement as secondary lining
- Geomembranes of HDPE, LDPE and other types.
- Drainage mats and geonets for biogas collection and water drainage.
- Geogrids for slope stabilization and reinforcement.
- Erosion control systems
Floating Covers

Floating covers are installed in reservoirs of potable water, waste water and other liquids. Admir supplies and installs floating covers of reinforced polypropylene (RPP) membranes and/or HDPE membranes. The system consists of floats, weights and a system for drainage and pumping rainwater.

Advantages:
- Preventing contamination of drinking water
- Preventing evaporation
- Preventing algae growth in the water
- Avoiding the need for chemical treatment
- Savings in operating and cleaning costs
- Preventing odors and environmental contamination (in waste water reservoirs)

Secondary Lining for Oil Storage Tanks

Storage of petroleum products and hazardous materials requires ensuring complete environmental protection, even in extreme situations such as earthquakes, fires, etc. To prevent soil and groundwater contamination, secondary containment is required for fuel and hazardous materials storage facilities.

Use of durable and highly flexible HDPE lining membranes permits compliance with the strictest environmental quality standards – lining concrete structures and berms permits non-destructive testing of all connections and seams, ensuring sealing over time.

Advantages of using HDPE membranes:
- Very high resistance to chemicals
- Permits connection to concrete and piping
- Cost effective
Tunnel Waterproofing

Protection of underground structures from water is of great technical and economic importance. The requirements for tunnel waterproofing include safe operation and durability. Nowadays, waterproofing of underground traffic structures is routinely required by specialists.

Tunnel Lining

Lining and draining tunnels by means of membranes is required for maintaining the safety and quality of tunnel usage. The technology employed involves using special scaffolding, attachment accessories, as well as various types of special membranes, such as PVC liners, drainage mats and drainage pipes. The lining technology offered by Admir has been implemented in a large number of projects, integrating smoothly with overall project implementation.

Lining the Train Tunnel – Modiin Ben Gurion Airport
Drainage of Underground Structures

Draining underground structures is an integral part of the lining systems. An effective and reliable drainage system prevents water penetration and development of hydrostatic pressure. Multilayer drainage mats form effective and rapid vertical/horizontal channels for transporting water.

**Vertical drainage**
Drainage alongside underground structural walls, basements, parking garages, tunnels, as well as drainage alongside retaining walls.

**Horizontal drainage**
Under paved surfaces / soil layers, atop underground basements, green roofs, etc.

**Draining pile walls**
Variable width drainage strips are installed between piles to serve as a drain protected from cast concrete and permitting effective drainage of pile walls.
Wick Drains

Very slow consolidation of saturated soft clay or organic soil is a process which often requires up to 20-25 years. Consolidation can be accelerated by installing vertical drains to a depth of up to 35 meters, shortening its settlement rate from several years to several months.

This advanced technology, employing geotechnical products, improves vertical water transport, thus permitting immediate use of the soil while preventing damage caused by differential settlement over the years.

This solution, using prefabricated vertical drains with a rapid implementation timetable, is economically preferable compared with other alternatives.
Erosion Control

Erosion due to rainfall damages engineering structures and slopes, creating gullies and erosion which in certain cases may endanger the overall stability of the engineering structure. Geocell Cellular Confinement System, employing cells of varying size, texture and height, arrests erosion by confining soil in relatively small cells. Protecting soil surface from gullies and similar damage facilitates growth of plants and protects their roots, allowing the slope or incline to attain in due course an equilibrium that ensures its integrity.

Engineering solutions employing Geocell Cellular Confinement System include a variety methods of anchoring the system, utilizing various types of cells – perforated / non-perforated and in various colors – cells that can be filled with soil and granulated materials, as well as with concrete.

Geocell Cellular Confinement System properties for preventing erosion include:
- Resistance to UV radiation, resistance to chemicals present in the soil.
- High strength and flexibility, facilitating adaptation to the soil surface.
- Easy and rapid installation.
Nets for Preventing Rockfall

Rock Fall Netting (RFN)

Rockfall protection systems are a key element in the design and maintenance of infrastructure networks with a direct impact on safety.

A key distinction must be made between active and passive protection systems.

Passive systems are such that do not affect rock detachment process, focusing rather on containing falling debris, thereby minimizing risks to the infrastructure and its users.

Passive systems include:
- Heavy galvanized steel wire mesh.
- Rockfall protection barriers.
- Rockfall protection embankments.

Active systems act on the rock detachment process.

Double twisted steel wire mesh consists of different kinds of metal wire and cables and is anchored to the rock slope.

The planning, construction and maintenance of these structures must also take into account their durability.
River and Riverbed Protection

Controlling water flow in streams, channels and similar locations is essential for protecting infrastructure and the environment.

Using gabions and mattresses in locations such as dams and waterfalls, and to protect riverbanks, stabilizes the soil and permits plant growth to form a green cover.

Gabions and mattresses have been used throughout the world for over a century – rock fill gives this solution a natural look. Considerable know-how enables detailed design of structures while calculating the static and hydraulic forces required of each.

Advantages of using gabions and mattresses:
- Stabilization of slopes, river banks and shores, as well as protection against erosion
- Fitting into the landscape and integrating plants, stones and water
- Simple implementation
Coastal Protection

Controlling the power of water is a complicated task. Geosystem technology, developed more than 40 years ago, is a proven and cost-effective method for a variety of shoreline protection and marine construction projects.

Geosystem has been used to produce underwater structures and breakwaters, to build new artificial islands, etc.

Geosystem products are represented by Geotextile tubes for use in shallow as well as in deeper water.

Geotextile tube systems are made of high strength woven fabric with a unique structure both flexible and durable.
Rock Bolts

Rock bolts are steel/aluminum/polymer/glass elements designed to anchor and stabilize rocks and soils during excavation of tunnels and slopes.

These active reinforcing elements are intended to react to rock mass movement, develop a restraining force which is transferred back to the rock mass. In this way the driving force is counteracted and ultimately a balanced condition is reached where the total resistance mobilized within the rock mass is not less than equal to the applied force.

Several types of rock bolts / soil nails are available:
- CKT solid threaded bars
- Bolts with drill bit:
  - Self drilling hollow bars - R type
  - Self drilling hollow bars - Titan type
- Friction expansion bolts
- Glass fiber bars bolts
Fibers

Fiber reinforced concrete is used in a wide variety of applications. Fibers may be manufactured of steel, glass, or polymer and may be added to the concrete in a variety of ways. The presence of fiber in the concrete creates an extremely effective reinforcement in respect to the withdrawal cracking phenomenon. The mechanical properties of the fiber material considerably influence its ductility. Fibers of high mechanical resistance permit manufacture of ultra-tough concretes, particularly suited for prefabricated products.

Concrete Steel Fibers

Application of steel fibers as a reinforcing additive to sprayed concrete in tunnels eliminates the need to employ expensive forms and complicated castings which waste valuable time. Using steel fibers reduces micro cracking, accelerates implementation speed and reduces project costs.

Additional applications for steel fibers as a concrete additive:
- Industrial flooring
- Airport and harbor slabs
- Foundation and piles

Polymer fiber

Polypropylene fibers when mixed in concrete will increase permeability during heating thus reducing pore pressure damage in case of fire and risk of spalling.
Admir Projects, a subsidiary, is a contractor specializing in installation of geosynthetic product in various projects.

Admir carries out the installation work as the main contractor or as subcontractor, applying its accumulated considerable knowledge and experience, while maintaining a high level of performance and reliability.

Admir Projects installs the following applications:

- Lining reservoirs
- Waste landfills lining and capping
- Lining / encapsulating clayey soils
- Applying geosynthetics to delay reflective cracking in asphalt
- Laying Rock Fall Netting for protection against loose rock
- Installing vertical drains to accelerate consolidation
- Installing erosion control systems
- Protecting river banks and marine works employing various geosynthetics and related products
1. Highway 2 asphalt reinforcement project
2. Canals stabilization project
3. Ghana 2007 asphalt reinforcement project
4. Guatemala 2004 reservoir lining project
5. Tunnel lining project
6. Clay Lining
7. Reinforcing structure
8. Diverting Ayalon River – Ben Guirion Airport
9. Tunnel Project
10. Train structure reinforcement
11. Reservoir Lining (300,000 m²)