



SLOPE STABILISATION CAN BE TACKLED BY THE USE OF METAL AND ECOLOGY

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Adaptability of the flexible high-tensile steel wire mesh to the slope surface is illustrated

It is routinely acknowledged that much of the prime development land in the suburbs of U.S. cities has already been developed. This has typically left the most challenging parcels remaining.

One of the challenges that is common in these situations is severe slopes.

Not only do slopes present construction hurdles, but often safety issues as well. In addition, slopes are a major concern for Storm Water Pollution Prevention Plans (SWPPP) and National Pollution Discharge Elimination System (NPDES) regulations.

In some instances, slope stabilisation requires a combination of strategies to solve the problems being resolved.

Applications of anchored systems using flexible facings utilise traditional gabion meshes or wire rope nets. Though such systems often have many advantages over stiff systems such as those using shotcrete, there are limitations in strength of the wire meshes, or in installation practicalities for wire rope nets. In response to a need for a very strong and durable wire mesh material, Geobrugg developed TECCO® mesh.

This mesh is manufactured from a very high tensile strength steel wire that is coated with a special galvanisation for corrosion protection. The result is a mesh that is ideally suited to anchored mesh systems. Systems utilising high tensile strength steel wire mesh build upon earlier applications of anchored mesh. In addition to the many advantages of anchored mesh systems, the new mesh material allows wider anchor spacing and thus greater economies, deeper anchors and thus larger retained loads, and a resistance to corrosion.

For a slope to be protected with a TECCO® system, it is first cleaned, leveled and shaped, and then covered with the steel wire mesh. The mesh is fastened to ground or rock nails and pre-stressed with a defined force against these nails by means of

special spike plates. Reacting to these spike plates, the mesh presses against the slope surface and in this way prevents deformations, slips and breaking-out from occurring. It is precisely this external pre-stress that decisively increases the protection capability and efficiency of the system.

The nails to which the TECCO® system are fastened are arranged in a pattern on the slope, depending on the defined slope conditions. They can also be used to stabilise deeper-seated slip or slide planes. Prerequisite for this is the appropriate knowledge of existing or potential slipping or creeping surfaces or zones. Supplementary to the proofs of surface protection, proofs of safety against rupture of the terrain must be submitted in order to determine appropriate dimensioning of the system. This dimensioning is accomplished via a specially developed dimensioning model that optimises the design based on the interaction of the forces exerted on the system versus the strength and other properties of the system.

While the open structure of the TECCO® system lends itself to surface greening, it is also suitable for planting domestic shrubs adapted to the location. In exceptional cases it is also possible to plant smaller trees. In the case of fine-grained substrates with a strong tendency to erode, it is normally necessary to install a mat to protect against erosion so that protection is already provided from the moment the slope stabilisation is installed.

Erosion control measures are required if soil material can be flushed away in fine-grained, non- or insufficiently cohesive substrates. This erosion control may need to be of a temporary nature (in case of subsequent greening) or a permanent nature (without greening). Greening/planting may also be required for reasons of landscape preservation and aesthetics. Especially in such cases, the TECCO® Slope Stabilisation System is preferred over larger, more expensive and permanently visible engineered structures such as with shotcrete systems. To be sure, an aestheticspect can often take precedence over safety or technical considerations.

For protection against erosion, finer meshed geogrids or structural mats must be installed below the mesh. In general and in addition to the mats, slopes with a risk of erosion should be greened. It is important that the erosion control mats are matched to the intended greening process, and that the selection of matting is suitable for use with the TECCO® system in order to ensure success of the greening measures. It is essential that the mat will allow seed penetration, thereby ensuring intimate contact of the seed with the soil. Furthermore, the mat must allow adequate shading from direct sunlight, and must allow penetration of young plants upon seed germination.

Weather-resistant mats of plastic (preferably UV-stabilised PP, PE, or PET) are generally used. With decomposing mats (jute, sisal, coconut fiber), optimal greening results could not be achieved

during testing with the TECCO® system. The Tecmat 400 Erosion Control Mat, consisting of polypropylene, is specifically designed and tested for use with the TECCO® Slope Stabilisation System.

Greening of steep slopes as enabled by the TECCO® Slope Stabilisation System is in principle reserved for experienced greening specialists. It is important that these experts are aware of the local conditions (climate, slope exposure, native plant population, subsoil, etc.) and that they can match the vegetation to these conditions. Dense mats of natural fibers or seed mats (with pre-greening) are normally not suitable for use with the TECCO® system, unless the slope can be shaped very evenly so that the mats



Tecmat 400, the erosion control mat is optionally adapted to the requirements for a successful greening



TECCO Mesh and spike plate with Tecmat 400 and greening

lie tightly on the entire surface and are pressed firmly against the slope by the TECCO® mesh. The Tecmat 400 Erosion Control Mat has been tested in detailed field studies for permeability of hydro and dry seed, and has demonstrated superior performance for all the above criteria, making it the ideal solution for irregular slopes.

REFERENCE

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