

REMOTE RAILWAY ROCKFALL PROTECTION DRUMBUIE, KYLE OF LOCHALSH, SCOTLAND

EROSION PROTECTION-ROCKFALL MITIGATION

Product: Steelgrid® B150 & Rockfall netting

Problem

The Kyle line is a remote part of Network Rail's infrastructure comprising a single bi-directional track between Inverness and Kyle of Lochalsh. The construction of the line was challenging in its time and was phased to meet funding commitments. Indeed, the line terminated at Stromeferry for many years due to the technical challenges of extending to Kyle of Lochalsh itself through over 90 individual rock cuttings. These rock cuttings continue to pose Network Rail an asset problem with rock falls a potential and realised hazard which interferes with the safe operation of the railway.

Solution

Network Rail conduct annual inspections and assessments of all their rock slopes and the Kyle line is no exception. As part of their asset management strategy rock slope maintenance comprising vegetation management and scaling was implemented in 2007 at Kyle.

Network Rail's assessment of KYL YD020 highlighted the potential rockfall hazard from the cut slope up to 16m in height. The initial phase of maintenance confirmed Network Rail's fears. TRAC Engineering uncovered an upper slope comprising stacked cobbles and boulders extending to 40m directly on top of the cut slope. During the vegetation clearance rock fall occurred amounting to over 900T of material, which shut the line for 2 days while TRAC Engineering's team worked to stabilise the area.

A temporary equilibrium was reached within the boulder field and the line opened to rail traffic with full time slope monitoring implemented.

Network Rail demanded a fast turnaround in design and implementation of a stabilisation solution that would prevent further rock fall.

TRAC Engineering worked with Donaldson Associates and Network Rail to develop a solution with supply chain partner Maccaferri.

TRAC Engineering required material that would be available on site within 5 days that could act a rock fall protection and rockfall containment i.e. both a passive and "active" solution. Steelgrid B150 was selected with perimeter and pattern anchorages.

Client:

NETWORK RAIL

Main contractor:

TRAC ENGINEERING LTD

Designer:

DONALDSON ASSOCIATES LTD

Products used:

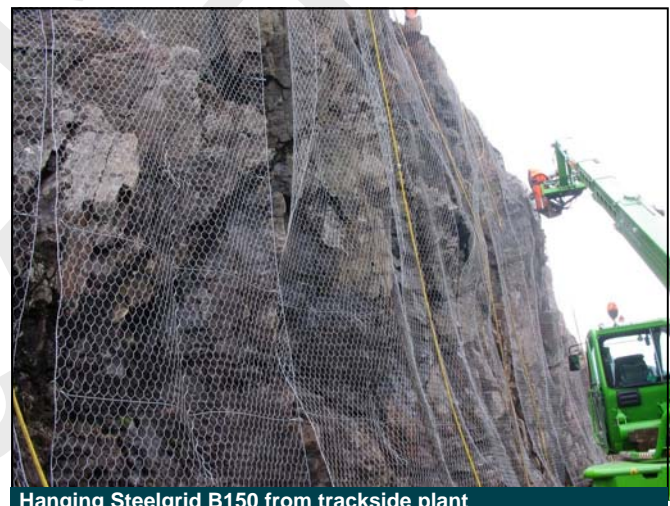
STEELGRID® B150 & ROCKFALL NETTING

Date of construction

SPRING 2007



Steelgrid B150 rolls ready for deployment into works



Hanging Steelgrid B150 from trackside plant



During construction using roped access specialists



During construction using roped access specialists



Project nearing completion

TRAC Engineering installed perimeter anchorages and hung the netting on the face to provide passive protection to the workforce to allow installation of active pattern bolting.

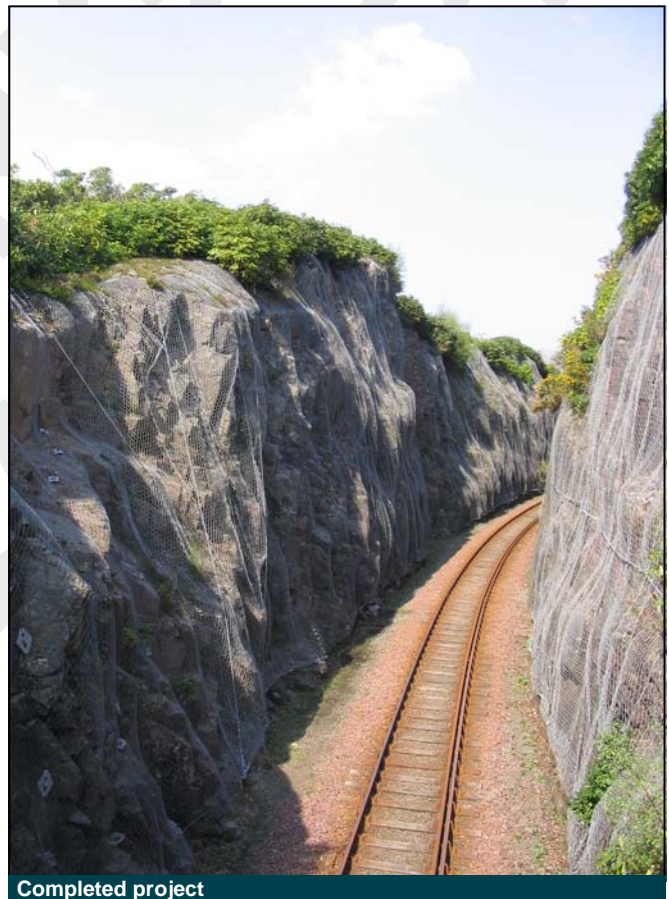
The works were completed in 10 days and allowed Network rail to remove the full time slope monitoring.

Maccaferri Steelgrid is becoming increasingly popular as it offers high strength rockfall protection to slopes and is cost effective.

Within Steelgrid, traditional double twist mesh, which has been in use for over 50 years, is supplemented by high tensile steel cables, woven into the mesh at intervals. The spacing between steel cables is varied to alter the strength of the mesh required. Typical strengths are between 50 and 170kN/m. If required transverse high-tensile steel cables can also be woven into the mesh making the bi-oriented product; Steelgrid B.

The double twist mesh in Steelgrid offers significant advantages over other meshing systems, for example, high tensile wire single twisted mesh systems;

- The double twist mesh is flexible. It can conform to the rock slope if needed without additional bolting
- It is easy to unroll on the rock-face, unlike single twist (chain link) style meshes, which can get caught upon themselves during deployment, causing delays and increased time on the slope face
- If wires within the mesh are damaged or broken, the double twist construction will not unravel and maintains 85% of its strength even when a wire is broken. Single twist meshes unravel when damaged
- Maccaferri MacRO 2 software assists the designer in the design of drapery on slopes
- Steelgrid does not require specially shaped, expensive anchor plates to work effectively.



Completed project

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