

AUSTAR COAL MINE PAXTON, NSW, AUSTRALIA

ROCKFALL PROTECTION

Product: Steelgrid MO

Problem

In the early 1920's, a railway cutting was constructed to allow the transport of coal from the Bellbird and Kalingo Collieries to the Port of Newcastle. Over the last thirty years, the railway cutting which consists of weathered sandstones and mudstones showed signs of weathering which led to small fragments of rock dislodging from the rock face.

Over the last five years, larger boulders dislodged after heavy rainfall events which landed very near to the railway line. This caused a great concern for safety during track maintenance and possible closure of the railway line causing significant business risk as no coal could be delivered to the port.

Solution

Project consultants, Coffee Geotechnics Ltd, needed a solution that was robust enough to capture and contain rocks falling from the face. Also, the close proximity of the rail tracks to the rock cutting meant that the mesh had to conform easily to the rockface; in summary, a mesh that offered high strength at low strain.

Maccaferri Steelgrid MO was selected because it met these objectives. Compared to high tensile strength single twist "chain link" style meshes, Steelgrid provides high strength at low strain. It conforms to the rock slope more easily and if wires within the mesh are broken due to rock impact or damage, the Steelgrid double twist mesh does not unravel like a single twist "chain link" style mesh. Thus, even a damaged Steelgrid mesh continues to offer rockfall mitigation.

Furthermore, Steelgrid offered cost effectiveness, ease of installation and a proven track record. Steelgrid MO is a geocomposite material manufactured from double twist steel wire woven mesh with 8mm high tensile steel cables woven into the mesh at intervals. The spacing of the steel cables is varied to provide a range of tensile strengths.

Specialized Geo, a specialist rockfall protection contractor, and one of Maccaferri Australia's preferred installers, began the installation of the Steelgrid MO drapery in February 2009.

Client:

AUSTAR COAL MINE

Main contractor:

SPECIALISED GEO

Designer:

COFFEY GEOTECHNICS

Products used:

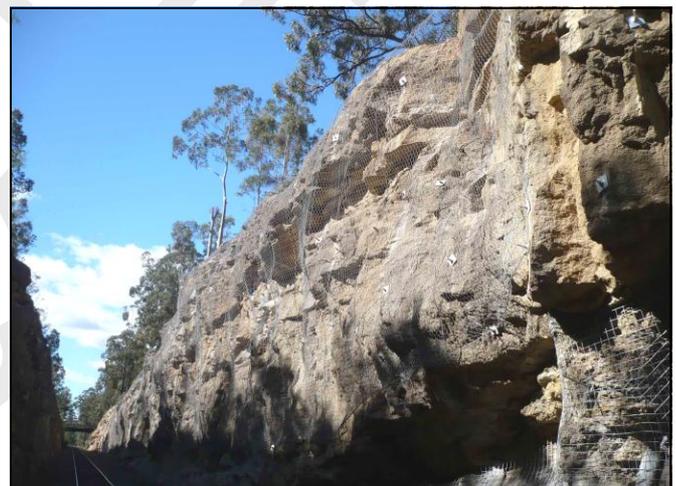
STEELGRID MO

Date of construction

2009



Railway cutting and evidence of rock detachments



Steelgrid MO draped over cut face and anchored to cut face



Adherence of Steelgrid MO to cut face



View of railway cutting draped with Steelgrid MO

Using MacRO 2 design software, Coffee Geotechnics and Maccaferri determined the strength of mesh required, along with the allowable deformation of the system in use. Too much deflection in the system would mean that the rocks contained by the mesh would bulge outwards into the kinetic envelope of the trains using the adjacent tracks. The relationship between the tensile strength and strain is important when designing these solutions.

Rockfall drapery systems are effective in restraining and controlling the fall of rocks up to 600mm in diameter. Where high loads are expected, high tensile strength steel cables are used to supplement the drapery. Steelgrid combines these products within one system, reducing installation face-time.

The rolls of Steelgrid MO were anchored at the top of the slope using 21mm diameter threaded bars grouted 3m deep into competent hard rock.

To prevent larger rocks from detaching from the 12m high cut face, the mesh was anchored to the face using 21mm diameter, 4m long threaded bar anchors grouted into the rock.

150mm x 150mm anchor thread plates were placed over the Steelgrid MO and bolted in place to ensure adherence of the Steelgrid MO to the cut face.

Increasingly, rockfall contractors are turning to the use of Steelgrid, due to its ease of installation and performance compared to single twist high tensile strength chain link type meshes. These meshes offer apparent high tensile strength due to their stiff wires, but this strength is only available at high rates of strain as the inherent slack in the mesh has to be overcome before the mesh becomes useful. To address this shortcoming, these single twist meshes require many more bolts and expensive face fixings to force the mesh onto the rockface and remove the slack in the mesh. In contrast to this, Steelgrid does not suffer these shortfalls.



Connection detail between adjacent panels of Steelgrid



Adherence of Steelgrid MO to the cut face

Officine Maccaferri S.p.A. Global Headquarters

Via JF Kennedy 10, 40069 Zola Predosa (BO) - Italy
T: (+39) 051 6436000 F: (+39) 051 236507
E: comes@maccaferri.com
www.Maccaferri.com

Bureau Veritas Certified Quality System Company
with SINCERT and UKAS accreditation.