

PINJARRA CONVEYOR ROCK CUTTING PINJARRA, WESTERN AUSTRALIA

EROSION PROTECTION

Product: Rockfall protection netting

Problem

Alcoa's Pinjarra alumina refinery facility is located 100km south of Perth, Australia. The refinery receives bauxite from Alcoa's mines in the Darling Mountain range. A conveyor system moves the bauxite around the refining facility and a length of this conveyor system runs through a steep sided rock cutting.

Rocks were detaching from the rock cutting and there was a risk that these would damage the conveyor infrastructure or be a hazard to the refinery operatives.

Solution

The rock detachment risk included both small and significant 'large block' boulders. A rockfall drapery mesh system was determined to offer suitable protection. Depending on their dimensions, the rocks would then either be contained on the rockface, or allowed to fall harmlessly in a controlled manner behind the drapery mesh. The mesh would therefore have to offer a suitable tensile strength to contain the rock debris, both on and at the foot of the slope.

In addition, the mesh had to offer the required tensile strength with limited elongation. A product with large elongation may be able to contain rocks, but may bulge outwards into the working area of the conveyor system.

Project engineers, URS Ltd, determined that a combination of Maccaferri High Energy Absorption (HEA) cable mesh panels and double twist woven mesh drapery would fulfil the project requirements. The HEA panels would reinforce the traditional drapery mesh should a large block rockfall event occur which would exceed the capacity of the traditional mesh.

The drapery would contain smaller rock detachments, which would be allowed to fall in a controlled manner, harmlessly behind the protective drapery curtain.

This combination drapery 'geocomposite' was anchored at both the top and the bottom of the slope to contain and control rock detachments. Debris collected behind the mesh at the foot of the slope would be periodically removed.



The protected conveyor rock cutting



The HEA and woven mesh drapery combination



Connecting adjacent rolls together

Client:

ALCOA

Engineer:

URS AUSTRALIA

Installer:

PRA GLOBAL

Products used:

HEA PANELS AND ROCKFALL NETTING

Date of construction

2006



Detail of HEA panel with 'double knot' connection

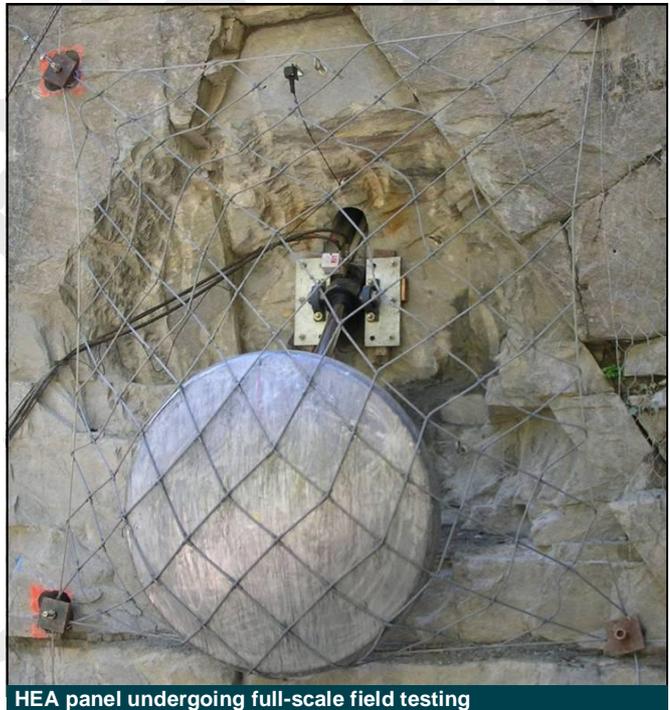


HEA panel undergoing testing

Maccaferri HEA cable mesh panels have high tensile resistance (in excess of 210kN/m depending on the composition of the mesh; cable diameter and aperture size) while exhibiting very low elongation. This means that the debris accumulation at the toe of the slope will not impact on infrastructure like other mesh types of similar tensile strength, but greater elongation.

Maccaferri HEA Panels (High Energy Absorption) are panels of high strength steel cables in a mesh / grid configuration secured with a steel wire 'knot'. This patented knot consists of two bindings, each one formed by winding a pair of 3.00mm diameter steel wires around the junction between all perpendicular steel cables. The two bindings tightly secure the cables where they cross. The binding wire is coated with a Zinc-5% Aluminium alloy for exceptional corrosion protection. The panel is made from a single steel cable, laid to form a grid of square mesh. The loose ends are secured using an aluminium swaged / sleeve fastening, with a resistance of not less than 90% of the cable breaking load. This connection offers over 50% greater strength than traditional high resistance 'clip' fastenings, offering clients greater reassurance in-use.

An optional perimeter cable can also be specified to the HEA panel. This is secured to the mesh panel with aluminium swages.



HEA panel undergoing full-scale field testing

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