

MINE SLOPE STABILISATION BUTTRESS WALL CAPE PRESTON, WESTERN AUSTRALIA

SLOPE REINFORCEMENT WITHIN MINES

Product: Terramesh® System and Paralink®

Problem

CITIC Pacific's Sino Iron project is a world class, large-scale magnetite iron ore project located at Cape Preston, 100km south west of Karratha in Western Australia's Pilbara region. It is the largest planned magnetite project in Australia. The project has over two billion tonnes of identified ore and targets exports of more than 27.6 million tonnes of high grade iron ore concentrate and pellets each year over its estimated projected mine life of 25 years.

The project features significant investment in dedicated infrastructure including concentrate processing, pelletising, a 51 gigalitre desalination plant and port facility, as well as a 450 MW combined cycle gas fired power station.

As part of the project, four large semi-mobile in-pit crushing stations are required to be installed in the main pit. This involved construction of four primary crusher pockets using sophisticated blasting techniques and up to 24m long soil nails. During the course of construction of Pockets #1 and #2, it was identified that the south west corner geology was not competent enough to carry the proposed design dynamic loads. The truck (600T) turning zone in this area was affected by an adjacent blast when the permanent batters were created between crusher pockets.

Initial proposals included that the area should be protected by a 100mm layer of fibre reinforced shotcrete and cable bolt anchor array. The cable bolts would be 15m and 10m in length and installed on a 3m by 3.5m spacing. This cable bolt proposal was deemed difficult to construct by project contractor, BGC Contracting, with the risk of possible cost penalties.

Solution

In August 2010, BGC Contracting contacted Geofabrics

Client:

CITIC PACIFIC MINING

Main contractor:

BGC CONTRACTING

Designer:

PARSONS BRINCKERHOFF

Products used:

2000 M2 TERRAMESH®, PARALINK®

Date of construction

JUNE 2011



Unstable blasted slope requiring protection



During construction - laying Paralink & Terramesh



During construction

Australasia to develop a 'Gabion type' buttress solution to stabilise the slope.

To minimise excavation of the slope and to provide a 'best-fit' scenario, a buttress face angle of 63 degrees was selected. It was decided that a combination Terramesh® and Geogrid Mechanically Stabilised Earth (MSE) structure would be offer an efficient solution, suited to the conditions.

Using **Maccaferri MACSTARS** Mechanically Stabilised Earth design software, Geofabrics provided technical support to BGC. This was based on a Maccaferri Terramesh® soil reinforcement system with Paralink® geogrid primary soil reinforcement, thus creating a 'reinforced block'.

Paralink® is available in strengths up to 1350kN/m. This enables the amount of reinforcement in the slope to be optimised in terms of location, vertical spacing and required strength. Placing fewer layers of a higher strength geogrid enabled a more rapid construction, compared to installing many layers of a lower strength geogrid.

BGC Contractors engaged Parsons Brinckerhoff to certify the design and provide the on-site design verification function.

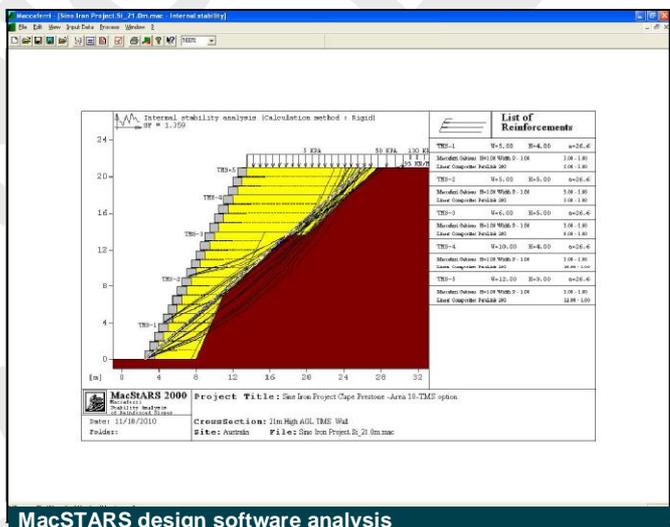
The Maccaferri Terramesh® units used in the buttress wall comprise a continuous horizontal panel of woven steel-wire mesh geogrid with an integral gabion fascia unit. This makes the system efficient and economical to construct as there is no complex connection between grid and fascia element. Installation is quicker and there is less potential risk of errors and omissions during construction.

The fascia unit is filled with hard, rock-fill in the same manner as a gabion and the geogrid tail is then sandwiched between layers of compacted granular fill. When forces within the reinforced soil block are demanding, for example, the 600t dump-trucks on this project, the Terramesh® geogrids are supplemented with higher strength polymeric geogrids. BBA Certified Paralink® is a premium geogrid for demanding situations. It has high tenacity polyester strength elements encased within a polyethylene sheath providing best-in class installation damage resistance.

The 2000m² faced Terramesh® structure took around 10 weeks to construct including place and compact of backfill which met the client's expectations.



During construction - note access stairs



MacSTARS design software analysis



Completed buttress wall

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