

JWANENG-DEBSWANA MINE BOTSWANA

ROCKFALL DRAPERY SYSTEM

Product: Steelgrid MO

Problem

In this project Maccaferri SA (Pty) Ltd had faced the problem of securing the slope located in Cut 6 in Jwaneng Open Pit Mine.

The slope showed signs of instability and in the recent past there has been the rockfall phenomena which had caused serious damages to vehicles, however the people occupying them have miraculously survived.

After repeated similar episodes Safety Management decided to address the situation by securing the slope. To the mine solving this problem also meant to keep the production running safely and efficiently.

As Debswana Mine Industry is the largest diamond mine in Botswana, any road closure would impact on the mine's economy. In this project the maximum height of the slope protection was approximately 150m with a total surface area to cover of 53,000m² (photo 1).

Solution

The solution had to prevent rockfall reaching the bottom haul road, be relatively easy and safe to install, and not affect the width of the road.

Maccaferri SA (Pty) Ltd engaged Melis & Du Plessis Consulting Engineers (Pty) Ltd to investigate the problem and determine the optimum solution for this specific mining environment.

Steelgrid™ MO (photo 2) was selected as it met with the Client's criteria of:

- Low maintenance
- No effect on the haul road width (Photo 3).

Steelgrid™ MO is a high strength drapery system, designed to control the fall of rocks down the slope, so that the debris material is gathered at the base of the slope without interfering with the mine operations.

This approach is referred to as a "passive measure" as the rockfall is controlled as it occurs.

Client:

DEBSWANA JWANENG MINE

Main Contractor Name:

MACCAFERRI SOUTHERN AFRICA / WEPEX

Consultant:

MELIS & DU PLESSIS CONSULTING ENGINEERS

Products used:

STEELGRID™ MO

Date of construction

March 2010



Photo 1: Slope overview-53,000m²



Photo 2: Steelgrid MO



Photo 3: Product doesn't affect the haul road width

In this way the system allows the rock detachment to occur in a safe manner, by guiding the debris to the foot of the slope behind the 'curtain' of Steelgrid™.

The Steelgrid™ rolls for this project of a non standard roll size of dimensions 3m x 100m per roll, were manufactured at Maccaferri factories in Africa. The duration from production until delivery on site, was a month and half (November – mid-December 2009); Maccaferri's large manufacturing capacity was an advantage to the client.

The complex construction work was carried out by Wepex using a patented "Decoiling Machine" with ASP providing specialist rope access techniques for the lacing procedure on the slope. This allowed for over 1,000m² of Steelgrid™ MO to be installed per day (Photo 4).

Steelgrid™ MO is a geocomposite comprising of double twisted woven mesh with high-tensile steel cables incorporated into the mesh twists during the manufacturing process. The cables provide effective strength transfer to the upper anchors during a rockfall event, or when retaining rock debris.

Compared to high tensile strength single twist "chain link" style meshes, Steelgrid™ is available in strengths up to 170kN/m and offers high strength with 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, in the unlikely event that the Steelgrid mesh is damaged, it continues to offer rockfall mitigation.

A further advantage over single twist 'chain link' high tensile steel wire meshes, is that Steelgrid™ does not strain as much to offer its useful load; Steelgrid™ does not require 'pre-tensioning' to the rockface to remove the elasticity from the mesh, a near impossible task on slopes, especially ones that are uneven.



Photo 4: Installation Procedure-Decoil Machine on the slope



Photo 5: Lacing procedure on the slope



Jwaneng-Debswana Mine, Botswana

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