



CONCRETE CLOTH™

SLOPE PROTECTION



MTP Gold Medal Award
BUDMA 2011



Material ConneXion
MEDIUM AWARD
Material of the **YEAR 2009**

2009 Winner
Material ConneXion Medium Award
Material of the Year

21.12.10 Case Study : Alcobendas Station, Madrid, Spain

In December 2010, ADIF, the Spanish authority responsible for railway infrastructure management, specified Concrete Cloth (CC) to be used as slope stabilisation to protect a railway station in Madrid. CC was chosen to address years of erosion and instability issues affecting the entrance of Alcobendas tunnel station. Erosion of the steep railway slope trenches had caused silting at the drainage pumps in the tunnel entrance. Shotcrete has long been the traditional solution, but presents several problems with installation and durability.

CC8 was specified and 2500sqm of material was delivered on site in bulk rolls. The project's first phase of 800sqm was completed in under 3 days and was 70% quicker to install than if shotcrete had been used.



View of 40% completed project



Alcobendas tunnel station



CC applied with spreader beam



Hydration of the CC



Terminating CC into a drainage channel

03.08.10 Case Study : Fairlight Cove, East Sussex

In June 2008 Rother Council commissioned a major coastal protection project at Fairlight Cove on the south coast of England. The area has suffered from extreme landslide regression resulting in the loss of residential property and further threatening a large number of dwellings.

CC4 (4mm Concrete Cloth) was specified by Rother Council's geotechnical consultants to stabilise and protect a sub-vertical failure surface close to a key drainage facility. The steep nature of the slope prevented conventional slope stabilisation techniques such as vegetation growth. The Cloth was supplied as man-portable rolls allowing work to be completed in areas with restricted access and where conventional concreting would be impossible.

"Concrete Cloth allowed us to quickly and effectively provide protection to a slope which was experiencing ground movement. The site was particularly difficult as it was on an exposed coastal cliff top and steep slope. The Concrete Cloth was laid in less than a day and without the need for heavy plant machinery, and also allowed the provision of an access ramp and superficial drainage. We would recommend its use to anyone facing similar challenges with slope stabilisation."

**Dr. Jacqueline Skipper, Senior Geologist,
Geotechnical Consulting Group**



Concrete Cloth Slope Protection

CC Slope Protection demonstration, Jeddah, Saudi Arabia



Slope weather protection is important to control soil erosion down slope as a result of direct rainfall and surface runoff. Protection can be a permanent slope covering or a temporary measure until the excavation has been backfilled. Uncovered slopes undergo surface ravelling and gulleying, leading to instabilities and safety concerns. Soil erosion is normally prevented by applying a thin concrete skin. However, this is difficult to apply uniformly and often breaks apart. Plastic sheeting covers are disturbed by strong winds, water flows or site damage and meshes do not provide the same level of direct weather protection.

Concrete Cloth (CC) provides a quick means to directly apply a thin, uniform, protective concrete covering to the slope surface and can be applied in all weather conditions. CC is fixed by short nails and provides a strong, waterproof, surface stabilising covering enhanced by internal reinforcing fibres. CC can be used in conjunction with full length soil nails to increase the stability of slope surfaces by providing similar slope protection measures. CC can also be used to cover landslide scars or cut slopes. Holes can be cut to allow vegetation growth.



CC4 or CC8 in rolls of 200sqm or 125sqm respectively can be handled & positioned using site plant.



CC is rolled from the slope crest down the slope face, with 100mm overlaps between adjacent CC sheets.



CC is cut to length, depending on the slope size.



Short lengths of CC can be provided in man portable lengths for manual application.



CC is fixed using short nails hammered into the soil. Other fixing methods such as drilled bolts can also be used if rock is present.



CC is hydrated once fixed into position. Lined drains can be formed from CC at the slope crest and toe.

CC Mining - Application and Case Study



Concrete Cloth's cementitious fabric properties provides a new solution to Mines and Mining operation both above and below ground. It can be used as an alternative to poured or sprayed concrete or as a quick way of erecting strong permanent or temporary blast and vent structures. Concrete Cloth's fabric roll form provides a fast alternative that solves the logistical difficulties associated with these methods.

The prefabricated nature of Concrete Cloth means that it can be easily transported and stored underground. It can be supplied in man-portable rolls and quickly and easily fixed to the rock face using standard power tools such as fixing methods.

Applications for mining include:

- Spall Lining – Substrate stabilisation, fire resistant to Euroclass B
- Ventilation structures – Quickly constructed over a timber frame
- Blast walls – Ready in less than 24 hours
- Drainage and water management
- Ground Stabilisation
- Pipe protection

The two images to the right show a successful CC vent wall trial conducted in the Gloria Mine in Mpumalanga for Optimum Coal Mining, via our South African distributor, Concrete Canvas SA in November 2010.



Miners and contractors in platinum mine, South Africa



CC vent wall

<xx.12.10> Case Study : <Location?>

In December 2010 Concrete Cloth was trialled to inhibit weed growth beneath a set of steel seawall steps. The steps provide Environment Agency (EA) operatives safe access up/down their seawall embankments to structures such as sluices and pumping stations. The steps had an open tread mesh which allowed grass to grow up from beneath rendering the steps unsafe due to possible slippage.

The grass and vegetation below the steps could not be removed using strimming equipment and herbicides were discounted as many of the seawalls that the stairs gave access to were environmentally designated sites (SSSI, RAMSAR, SPA, SAC etc.) and had nearby water. The decision was reached that the best way to prevent grass growth was to suppress the area beneath the stair access. A layer of geotextile or filter cloth was considered but it was thought that this would degrade in UV and wouldn't provide a long term solution. CC4 was chosen instead for its durability and protection from weathering and UV degradation. The Cloth was installed quickly, by removing several of the step treads and unrolling a 10sqm batched roll down the embankment. This was advantageous as the steps did not have to be fully removed which saved on time and did not require plant equipment.

The project was considered a success and plans are being considered to apply Concrete Cloth to a number of other seawall step sites.
<method of hydration?>



Concrete Cloth Pipe Protection

Concrete Cloth (CC) can be used as practical, simple to install coating for pipeline protection. CC is flexible prior to hydration and can be wrapped around the pipe to provide mechanical protection, negative buoyancy and backfill protection of anti corrosion coatings.

The unique properties of CC make it suitable for the most demanding pipeline applications. In remote areas it can be used to coat steel pipe on site without setting up expensive fixed wet concrete application plants. It can be used wherever the following properties are required:

- Rapid strength gain.
- High impact and tear resistance.
- Abrasion and sag resistant when hardened.
- Heat resistant for high temperature or fire proofing applications.
- Chemically resistant for situations subject to chemical attack in aggressive soil conditions or in inter tidal marine areas.
- Underwater setting (including seawater), ideal for subsea applications

04.10.10 Case Study : Doha, Qatar

Iberdrola, an international energy company, commissioned Doha Engineering Services Co. to provide protection for a 1200m shallow water pipeline carrying water and chlorine for their facility in Qatar.

CC13 was specified to provide impact protection and negative buoyancy to the 6" diameter PVC pipe.

The CC was installed in-situ at a depth of 5m below tidal waters. Divers were able to line approximately 60m of pipeline per day. The CC was cut into sections on site which were latitudinally wrapped around the pipe and fixed in position using heavy duty cable ties. CC can be hydrated using seawater, so the Cloth set underwater providing a durable and impact resistant protection.

"The end customer was extremely satisfied with the speed and ease of use of CC. There was no other material that could have been used to provide underwater pipeline protection in this way."

S. Raghavendra

General Manager, Doha Engineering Services CO. WLL



12.01.11 Case Study : Curb Repair

In January 2011, Miller Capilano Highway Services were commissioned via our Canadian distributor, Nuna Innovations, to trial the use of Concrete Cloth (CC) to repair damaged curbs. The void in the curb was first filled and then lined with CC8. The CC was wrapped around the curb and fixed into position using standard concrete anchor screws before hydrating. Following the success of the trial, which was completed in under two hours, a number of other curb sites are being considered for refurbishment using CC.



Damaged curb section at main junction



Damaged curb section detail



Completed, refurbished curb section

21.12.10 Case Study : Alcobendas Station, Madrid, Spain

In December 2010, ADIF, the Spanish authority responsible for railway infrastructure management, specified Concrete Cloth (CC) to be used as slope stabilisation to protect a railway station in Madrid. CC was chosen to address years of erosion and instability issues affecting the entrance of Alcobendas tunnel station. Erosion of the steep railway slope trenches had caused silting at the drainage pumps in the tunnel entrance. Shotcrete has long been the traditional solution, but presents several problems with installation and durability.

CC8 was specified and 2500sqm of material was delivered on site in bulk rolls. Using a crane mounted with a spreader beam to position the CC, the project's first phase of 800sqm in under 3 days.



View of 40% completed project



Alcobendas tunnel station



CC applied with spreader beam



Hydration of the CC



Terminating CC into a drainage channel