



 **CONCRETECANVAS**  
VENT WALL CASE  
STUDIES



RAIL



ROAD



MINING



PETROCHEM



AGRO



UTILITIES



MUNICIPAL



DEFENCE



DESIGN



2014 Fast Track 100  
16th fastest growing  
company in the UK.



2014 Queen's Award  
for Enterprise in  
Innovation



2013 MacRobert Award  
Finalist



2013 Innovation Award Winner  
Railtex Exhibition



2012 R&D 100 Award winner  
R&D Magazine



2011 Expert's Choice Winner  
Most Innovative Product



2011 Brit Insurance  
Designs of the Year Nominee



Material ConneXion®  
MEDIUM AWARD  
MATERIAL OF THE YEAR 2009  
2009 Winner  
Material ConneXion Medium Award  
Material of the Year



2007 Winner  
D&AD Yellow Pencil Award  
Product Design



## Project Info



01 / 05 / 2014



CC13™ Bulk Roll



30sqm



Longitudinal layers



Kalgoorlie, Goldfields W.A., Australia



ROCK Australia for KCGM



CC13™ used to construct a vent wall to improve ventilation in a mine



Finished vent wall

In May 2014, Concrete Canvas® GCCM\* (CC) was used to create a vent wall at The Super Pit mine in Kalgoorlie, Goldfields W.A., Australia. The client was KCGM (Kalgoorlie Consolidated Gold Mines) and was a joint venture between Barrick and Newmont. It was identified that ventilation needed to be improved in the lower levels of Mt. Charlotte Underground Mine. In order to do this several permanent walls needed to be constructed. As the area was difficult to access the use of conventional wall construction methods such as shotcrete were not an option. Investigation was carried out to find the best alternative method to construct walls in remote areas of the mine and it was decided to trial the use of CC.

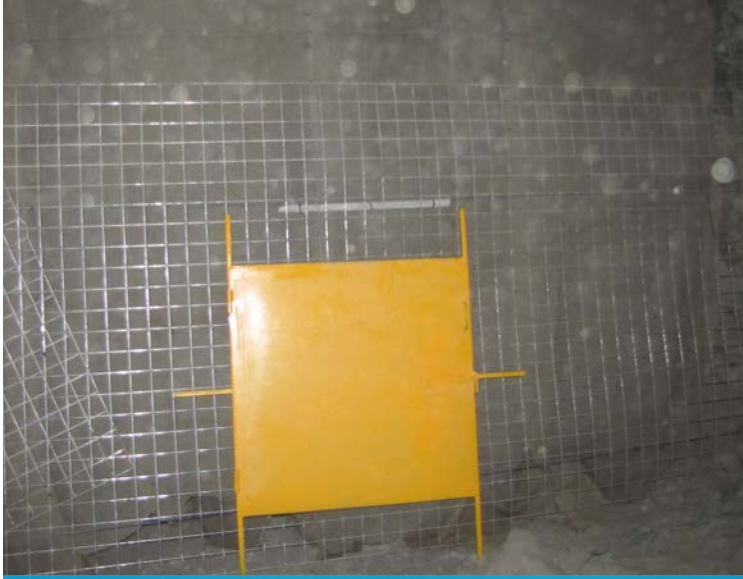
A wall of mesh that covered the entire drive to be blocked was constructed, with a knocker line running around the perimeter of the drive and across the area Concrete Canvas® GCCM was to span. A 500mm x 500mm grid of prongs to be used as fixings for the 13mm thick CC (CC13™) was created by cutting and bending parts of the mesh. A door was then installed in the mesh and secured with cable ties. The bulk roll of CC was installed from an elevated work platform and lowered down, being secured on the prongs by pushing them through the CC13™ and bending the prongs by 90 degrees. Any gaps around the perimeter of the wall were infilled with off-cuts of CC. The CC13™ was then sprayed with water, and re-hydrated an hour later.

**The vent wall was installed by 3 people in 3 days, as a trial to see if CC was a feasible option to create vent walls. The project was deemed a success and it is likely that CC will be used for further vent walls within the mine.**

\*Geosynthetic Cementitious Composite Mat







Door installed in the mesh



Prongs created in the mesh



CC loaded onto the elevated work platform



CC unrolled down the mesh



The prongs holding the CC to the mesh



The finished wall



## Project Info



06 / 06 / 2011



CC8™ Batched Rolls



20sqm per opening



Nuna Innovations Inc.



Vertical layers



Creighton Mine,  
Ontario, Canada



CC used to create a simple, effective vent closure in remote, hard to access areas of the mine in a timely, safe and cost effective manner.



Completed vent wall closure

In underground mining, up to 35% of the cost of running the mine is devoted to supplying a fresh air supply and ventilation. When the mining is finished in a particular shaft it is often closed and a vent wall is erected, as a fresh air supply is no longer needed. In the past this could prove logistically difficult, requiring multiple work crews and specialised equipment, which are often difficult to mobilise in remote areas of a mine.

Nuna Innovations Inc. were commissioned by mine owners Vale Canada Ltd, to supply Concrete Canvas® GCCM\* (CC) and relevant installation advice on erecting vent seals at Creighton Mine, an underground nickel mine in Ontario, Canada. The use of CC has changed the way vent walls are now constructed within the mine. Traditionally shotcrete would have been used, which not only requires multiple crews for installation but also more planning and considerable expense.

Batched rolls of CC8™ were chosen for the project; these are man-portable and the length of each roll matched the diameter of the vent openings, reducing waste. CC also gave favourable results during concussion testing, which was important due to the fact that blasting was still taking place in nearby shafts.



CC interface with floor and joints screwed every 200mm

\*Geosynthetic Cementitious Composite Mat







CC trimmed to size using hand tools



CC undergoing hydration prior to installation



Attaching CC to the wire frame using 8mm gauge industrial cable ties



Spray foam was used to fill any voids between the vent wall and the surrounding rock

Very little training or instruction is required in the use of CC; the mine's installation team were fully instructed in just under two hours and the installation was completed without the need for specialist equipment or labour. Several vent seals were constructed using CC, each with an average area of 20sqm. On each vent opening a brattice-backed wire frame was erected and CC was cut and hydrated, before being fastened to the frame using 8mm industrial gauge cable ties to create the vent wall. Voids between the surrounding rock and the CC vent wall were then filled with a low off-gassing spray foam that is approved for underground use.

Vale were impressed with their first experience of CC and cited the following advantages over their traditional methods as reasons for the success of the installation and why they would recommend CC for future projects:

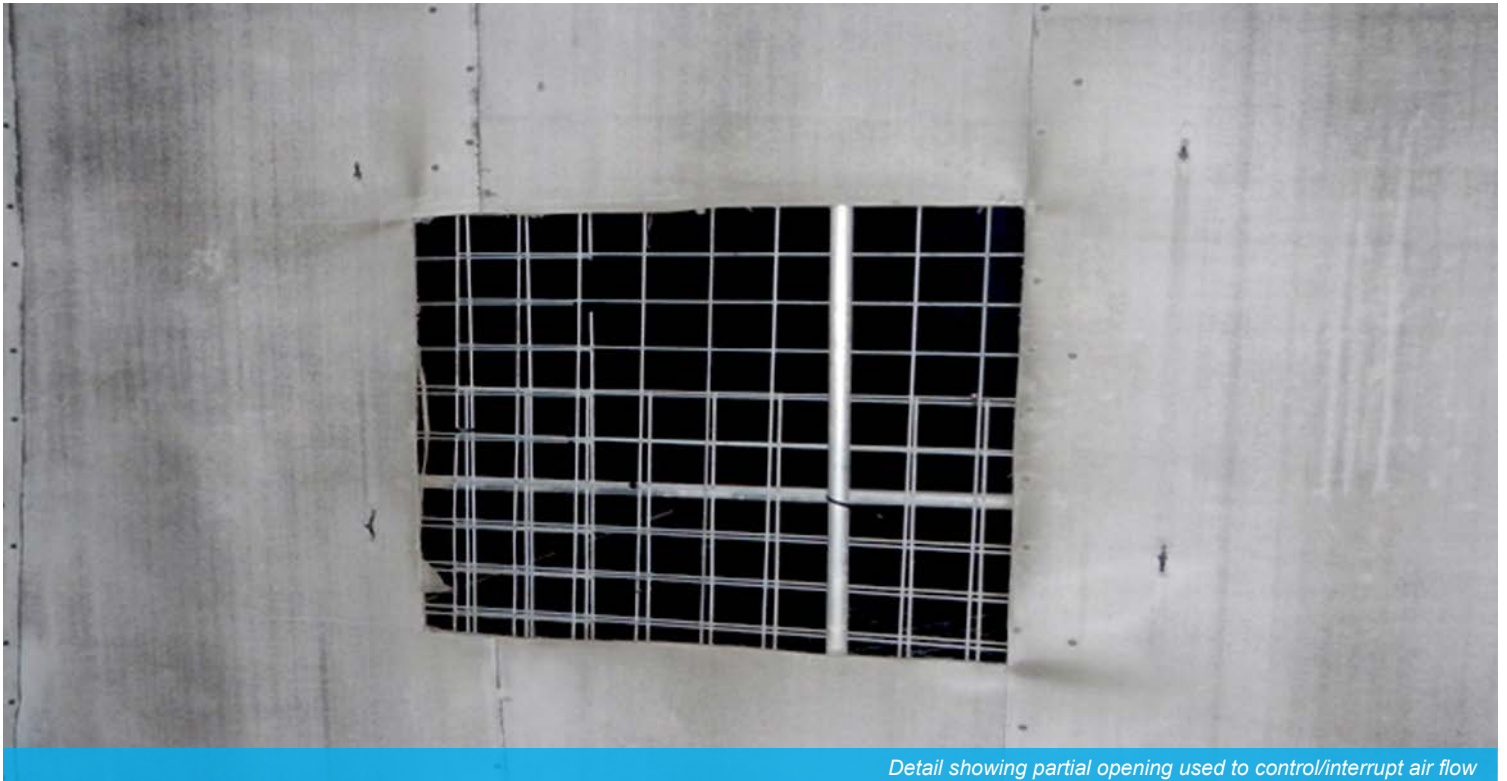
- Quick installation
- Less challenging to install than shotcrete
- Safe in remote locations
- Cost savings of around 20% compared to traditional methods

The speed of installation on the project reduced planned closure times, which in turn resulted in financial and time savings. The use of CC in remote areas also meant that fewer workers were involved in moving equipment, supplies and machinery, allowing further savings.

CC is now used to erect vent walls in three Vale properties and is scheduled for use in other underground mines.

*"We think that the CC is tailor-made for our remote mine locations. It offers us a reliable solution for these areas and makes our daily work lives easier."*

**Paul Aho**  
Ventilation Specialist, Creighton Mine



Detail showing partial opening used to control/interrupt air flow





Vent walls had also been constructed using locally produced gypsum board, but these were prone to rotting



Concrete block vent walls had proved expensive and difficult to install



Brattice cloth had also been used but only as a temporary measure

## British Gypsum Marblaegis Mine Vent Wall

Concrete Canvas® GCCM\* (CC) was specified in the construction of vent walls at Marblaegis Mine, an underground gypsum mine in Loughborough, UK. The mine's owners, British Gypsum, had encountered problems in building vent walls in the past; using concrete blocks was a slow, expensive process requiring specialist labour. Brattice cloth could only be used as a temporary measure due to its durability, whilst their self-produced gypsum boards were quick to install but prone to rotting. British Gypsum therefore required a durable, flexible, cost-effective alternative.

Using batched rolls of CC5™ meant that the 3-man installation team were able to carry the material to site without any plant or specialist equipment. After being cut to length on site using hand tools, the CC5™ was hung, shaped and fixed to a British Gypsum branded aluminium stud wall system and securely fastened using wooden battens, 200mm steel strips and screws. The whole structure was then hydrated using a portable water supply.

British Gypsum were very impressed with the end result. They were confident that CC would prove to be more durable than brattice cloth, whilst being less expensive and easier to mobilise and install than concrete block walls

\*Geosynthetic Cementitious Composite Mat





Frame created using British Gypsum branded aluminium stud wall system



CC cut to size, held in place and screwed to frame



Battens, 200mm steel and screws used to provide strong fixing to rock



CC hydrated using on-site equipment



Completed vent wall closure using CC