

## BLASTING BARRICADES - Enhancing precious metals recovery

Blasting rock in a tight space can be tricky, especially when the surrounding rock walls are full of valuable ore. *Mining Mirror* takes a look at the best ways of containing a blast underground.



Ibhesu blasting barriers can withstand the onslaught of blasted rock from as close as three metres.

There is a saying in the gold mining industry that goes, "The longer you wait to retrieve it, the less likely you are to recover it."

This underlines the importance of using blasting barricades in underground mining, especially gold mining, as the density of gold means it filters down to the bottom of any surface and disappears into the cracks and crevices of rock. Gerhard le Roux of Jolowe Construction, marketer and distributor of the relatively new Ibhesu blasting barricading system, says blasting barricades play an important role in underground mining as they contain the ore

in a concentrated area during blasting and prevent ore from being blasted into the back areas of the stope. This has a direct impact on the eventual recovery of precious minerals and the safety working conditions of workers.

Le Roux says the key to the effective use of underground blasting barricades is to erect it as close to the mine face as possible. This ensures that the night shift, which cleans the panel after the blast, has as little area as possible to clean to ensure the panel is prepared for the next day's blasting.

He says that not using a blasting barricade could lead to extensive cleaning

times which wastes time that could have been used for other mining activities.

"In the long run, the two to three days spent only on cleaning the panel could have been used for an extra blast, which would increase revenue," he says.

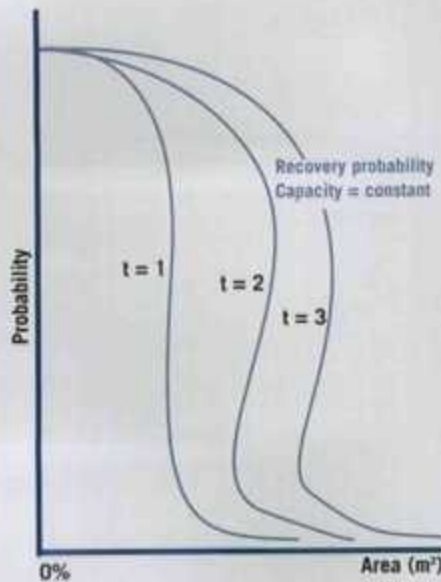
### THE IBHESHU BLASTING BARRICADE

Blasting barricades generally used in underground mines by the local industry include the PVC pipe barricades and continuous barricades manufactured by Ictus Equipment, but some gold majors are turning their attention to the relatively new lightweight, but durable,

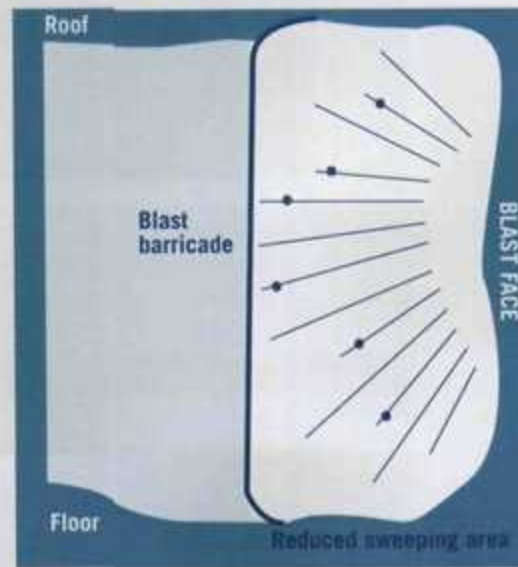
MINING IN FOCUS  
Article by Tessa Kruger



Test results



Side view of mine shaft



Above: The key to the effective use of underground blasting barricades is to erect it as close to the mine face as possible, as fines caused by an underground blast are very rich in gold and platinum due to the nature of the ore and should be contained.

Far left: The probability of recovering scattered ore after a blast is directly related to how small the blast ore fallout area is.

Left: The Ibheshu blasting barricade contains both fines and rocks in close proximity to the face after a blast, thus improving the fines recovery probability and reducing the sweeping area and sweeping time.

blasting barricade known as the Ibheshu blasting barricade (IBB).

George Hoffmann of Uretech, developer and manufacturer of the IBB, says the system is vastly different from any of the other barricading systems available in the market, as it can be likened to a curtain which completely closes the designated blasting area from the hangwall to the footwall. According to him, this is in contrast to the PVC barricades, which feature ventilation gaps between plastic pipes suspended from chains. The IBB is manufactured of polyurethane, polyester and steel rings with polyester straps. This combination of material ensures that the product is lightweight at 4 kg/m<sup>2</sup>, which makes it possible to be carried into the

workplace by one person. The PVC pipes typically weigh 32 kg/m<sup>2</sup>.

According to Le Roux, the lightweight material is highly durable, as it can not only withstand a blast from as close as 3 m from the mining face, but it can also be exposed to more than 60 blasts on average. "The life span of the Ibheshu Blasting Barricade is long, some IBBs have been exposed to more than 100 blasts before they were replaced," says Le Roux.

**THE COST OF BARRICADES**

Although the IBB product is more expensive than PVC barricades, Hoffmann says its life expectancy is two or three times that of the pipe barricades

and every panel only has to be replaced two or three times per year.

He says the cost per blast of the two systems is very similar – in fact a major platinum company recently compared the cost per blast with a pipe barricade in place to the cost per blast with the Ibheshu system and found that it respectively worked out to R35/t and R36/t. However, Hoffmann feels the Ibheshu product has the benefits of being less labour intensive, since its lighter weight makes it easy to install. "It would take two people eight hours to set up PVC pipe barricades in a 30 m panel compared to two hours if the same manpower installed IBBs in a 30 m panel," he tells *Mining Mirror*.



Photograph by Uretech

### BARRICADE INSTALLATION

Hoffmann says that the installation of the IBB has been simplified to a point where it almost can not be improved. The material required for the installation of the IBB is the barricade itself, straining wire, clamps and the IBB fastener spikes. The fastener spike is hit into the support and the straining wire is secured to the spikes and pulled tight with the clamps securing it further.

The barricade is fastened to the straining wire with its straps and steel rings and the straining wire is pulled only hand tight to create a "trampoline effect" of the ore blasting onto the IBB and then bouncing back.

Le Roux says the simple installation makes both the removing and moving forward of the system much easier. "Once the face is blasted the night shift will start their clearing process. The barricade installation team does maintenance on the barricade the next day to ensure it is ready for the next blast," he says. "The barricade remains in one position for approximately three to four blasts and once a new row of permanent support is installed, the IBB is moved forward in a manner that keeps the cleaning areas as small as possible."

### ORE RECOVERY AND THE GRADE GAP

In terms of effective ore recovery, the IBB curtain system importantly does not have any gaps. This compares favourably with the PVC pipe system which Uretech believes has 18,5% open spaces or ventilation gaps in total.

Hoffmann says platinum and gold fines blasted through the ventilation gaps in the pipe barricading system are

probably never recovered. Moreover, the cost of an underground mining blast correlates directly to the sweeping work carried out after the blast. The IBB keeps the ore from being blown and scattered over the panel, making the sweeping of the area quicker and easier.

He elaborates that during blasting the aim is to keep the rock concentrated. "After the blast, a scraper is used to scrape the ore into a gully and costs are higher if a larger area has to be swept," he says. "Since the IBB closes the entire face, we retain 95% to 98% of blasted ore. The issue with the pipe system is that the pipes are rigid and not able to adapt to the curve of the underground rock to fully cover the mine face."

Le Roux adds that once blasted, some gold particles break up to smaller than 3 mm in diameter. "If these are blasted past the barricade it will be lost and it is highly unlikely that it will be recovered," he explains. "The amount of fines lost due to openings in the barricade can be astronomically high if you look in more detail at the manner in which gold particles break up after a blast. In some instances, the gold is finer than baby powder and any opening on a barricade system amounts to huge potential for loss of fine gold."

A comparison between the two systems showed the Ibbeshu barricading system in fact delivered a 15% higher yield or higher gold recovery compared



with the pipe barricading system. These results were evident from extensive tests carried out on 23 underground panels in a prominent gold mine.

Hoffmann comments that the issue of yield is often referred to as the grade gap, which is essentially the difference between the amount of gold per ton recovered from the gold reef, for instance 2 g/t, compared to the original density of gold in the reef that could be 3 g/t. Going to the heart of the gold mining business, a higher yield leads to an improvement in the advancement rate, which means that blasts can be performed more often. Hoffmann says the latest test results show that the Ibbeshu barricading system's average advance rate is 16%.

Le Roux says there are a number of major gold and platinum companies that are currently using the IBB in certain underground shafts, since they have suc-

Once a new support is in place, the barricade is moved further forward and blasting can continue.

cessfully conducted tests and trials of the system. A major gold company found last year that there was a substantial improvement in face tons and face advance after the IBB was installed in the top ten panels of one of its major shafts. The company has since decided to implement the system on the next

ten panels to further quantify the effect of the IBB on mining in the shaft.

This wider roll-out came after the company successfully tested, over a period of eighteen months at various shafts, the barricade's ability to withstand a blast and ensure that minimal ore escapes to the back area.

