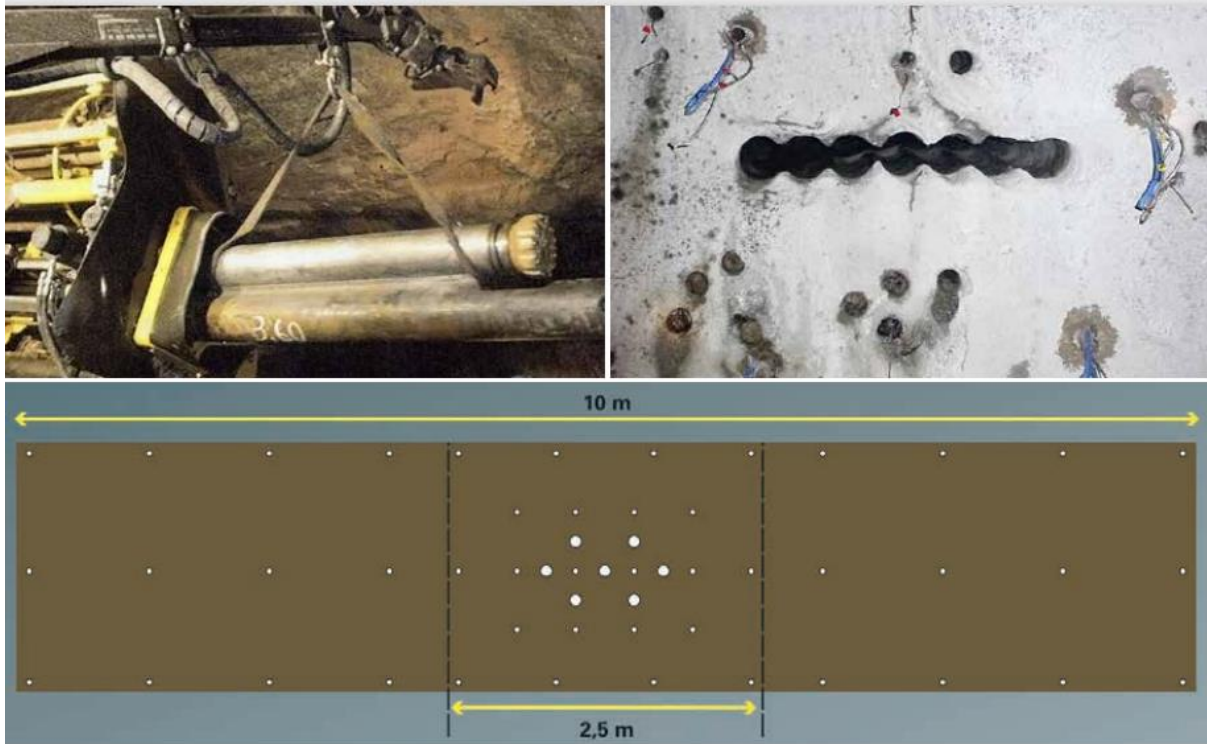


## Slot raises for easy and safe mining.

When starting up a new mining area, miners begin by opening a space that can receive the rock from the first blasts. These indispensable openings used to be difficult and dangerous to construct. Not anymore.



*Top pictures: Slot drilling using a Simba rig equipped with MH drill hammer and guide tool. Bottom picture (Figure 1): Drill pattern for cut-off slot with 7 cut holes of 127 mm in diameter and 64 mm blastholes, all drilled with a Simba rig.*

It is a well-known fact that when rock is blasted it expands and becomes approximately 60% bigger than its original volume. In mining, this is not a problem, providing the blasted rock, both in situ and loose, has somewhere to expand into.

In the initial phase of production drilling, it is, therefore, essential to start by first excavating a void that can accommodate this expanded rock volume. Without it, the rock has nowhere to go, and both blasting and mucking is infinitely more complicated to carry out.

These openings, which are typically 0.6–1.5 m in diameter, are, therefore, of paramount importance. Used in conjunction with sublevel stoping or caving methods, they enable the first few blasts in the primary stope to be carried out easily, quickly, and efficiently.

### Mechanized and safe

In the past, these initial openings, now called slots or slot raises, have been difficult and dangerous to construct. Operators would use hand-held rock drills, often balancing on ladders as high as 50 m. Things improved in later years with the so-called Alimak method whereby the operator works from a hydraulic platform, a practice that is still frequently used. However, all techniques that require the

physical presence of operators inside the void being opened are laborious and hazardous, and the current trend is to minimize the use of such methods. Today, modern mechanized equipment is available to create these all-important openings, making the job faster, simpler and, above all, much safer.



*As in conventional raiseboring or boxhole drilling, the raiseboring machine is set up to drill a pilot hole vertically, upwards or downwards. The hole is then reamed to the required diameter. The cuttings fall down the raise and are deflected from the machine by the use of a muck collector and a muck chute.*

### The methods in use

To create these openings in a modern mine, the key is to choose the right method, and there are three main alternatives:

- Large diameter holes: A top hammer drilled series of 5–7 large diameter cut holes in a pattern surrounded by smaller diameter blastholes, charged and blasted to create the final swelling void. An example of the drill pattern for the total cut-off slot is shown in Figure 1.
- Slot drilling: A more controlled way of creating an opening slot by drilling tightly spaced holes in a row, each hole approximately 150 mm in diameter, using a special guide tube mounted on an ITH drill hammer (see images page 96), which guides the hammer from the previously drilled hole. The slot is surrounded by smaller diameter blastholes that are blasted in sequence.
- Raise opening: A large diameter raise 0.6–1.5 m is drilled using pilot drilling followed by a reamed hole using a raiseboring machine. The raise is normally drilled from the upper level to the lower level but can also be drilled from the lower level and reamed upwards, which is necessary in box hole drilling when the upper level is not possible to reach (caving methods). These openings are generally regarded as the safest methods, especially when the raise opening must be long.

The first two methods are applied using Simba drill rigs to produce the holes. The raise-opening method is applied using a suitable model in the range of Robbins raiseborers.

Recently, however, a new prototype rig called the Easer machine has been introduced that allows for more flexibility when drilling opening raises or box holes as it combines the reamed-hole capacity of raiseborers with the mobility of Simba rigs.

All three methods are seen as efficient and flexible, but the use of standard or modified raiseboring equipment is gaining popularity due to its simplicity and added safety as a reamed raise eliminates the risk of sequence failure in blasting.