Developments of mechanized technologies for low seam height mining in platinum

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Synopsis

Most efforts to mechanize low seam (narrow reef) mining of platinum ore are presently based on board-and-pillar methods with 1.6–1.8 m in reef excavation. This paper attempts to substantiate the benefits of low profile mining: primarily improved head grade with resulting reduced tailings losses.

Board-and-pillar equipment supplied by DBT, facilitating 1.1–1.2m mining height has been in operation in an Anglo Platinum mine since September 2001. Major aspects of the equipment, battery scoops (LHDs) and rotary bolting rigs, are described and presently achieved results reported.

The medium term industry goal is rock breaking without the use of explosives. An outline of present DBT developments is presented.

Introduction

When reviewing the history of mechanization in the mining industry, it is obvious that higher levels of mechanization were accompanied by an increase in the excavation of waste rock. In other words: The introduction of mechanized equipment and systems has in many cases compromised the objective to maintain head grade to be as close as possible to the *in situ* reef grade. Productivity, equipment durability and maintainability have been the key drivers for large machines. Safety strategies, having an overriding concern, have also driven designs of mining systems towards larger mine openings. For example large cross-sections allow dilution of diesel exhaust fumes and provide sufficient space between hanging and footwall to facilitate the use of roof bolting rigs which are regarded as safer than manual bolting systems. Other aspects favouring wider excavations are supply logistics, effectiveness of supervision and, last but not least, people and work place considerations: convenience, appeal and ergonomics.

Mining machines depend to a certain extent on components and sub-systems available from machines in other industries. As an example, construction equipment components such as diesel engines and drive trains have been adapted for underground mining machines. As can be expected this approach has resulted also in fairly large machine dimensions, particularly unfavourable for application in narrow vein deposits.

Interestingly, in coal mining the drive to eliminate or at least reduce waste rock excavation has been stronger and more successful. As coal is softer and less abrasive than adjacent rock, it has always been attractive to mine and handle a clean product straight from the face. There are many coal deposits in the one metre thickness range and a variety of mining systems have been developed for use in such restricted height conditions. Mechanization and automation strategies have been pursued on a broad scale in low seam coal mining for approximately 30 years.

DBT is a manufacturer of mining equipment with headquarters in Lünen, Germany. The company has experience in all facets of longwall, room-and-pillar and underground transport equipment following the acquisition of Long-Airdox, USA. Access to hard rock cutting technology was acquired through an agreement with Bechem Co.

Benefits of low profile mining

In the context of this paper the aim of low profile mining is to restrict excavations as much as is practical to the value bearing ore-body. The Merensky and UG2 platinum reefs are seldom >1 m thick, the weighted average is between 0.6–0.8 m. As will be explained in more detail, the present practical lower limit for mechanized board-and-pillar mining is

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1.1–1.2 m and for non-explosive rock cutting in stopes is 0.8–1.0 m. As such, the benefits of mechanized technologies for low seam height mining in platinum will be bench-marked against the presently predominant 1.6–1.8 m high board-and-pillar mining practice.

A key element in mine management is grade control. There are four grade measures.

- *In situ* reef grade, typically 8–10 g/t.
- Planned grade; this reflects dilution as planned by the underground mining method; e.g: reef 0.8 m thick, planned mining width 1.2 m, planned grade would be 5–6 g/t.
- Head grade; the grade of the ore at shaft head, reflects additional dilution from overbreak, typically 4.5–5.5 g/t.
- Tailings grade; the amount of PGMs lost in the tailings, typically 0.4–0.8 g/t, as shown in Table I.

The step from the *in situ* reef grade to planned grade reflects dilution by design. Dilution tends to increase with mechanization, however, it can be controlled within limits by selection of appropriate mining equipment.

Table I

Head grade—% of head grade lost

	Mine 1	Mine 2	Mine 3
PGM (000's) (oz)	505	1,176	1,172
T milled (000's)	4,466	7,733	7,086
Head grade g/t	4.4	5.38	5.68
Refined grade g/t	3.62	4.86	5.29
Tailings grade g/t	0.78	0.52	0.39
% of head gr. lost in tail-gr.	18.0	9.7	6.9

Data taken from Anglo Platinum Annual Report 2001

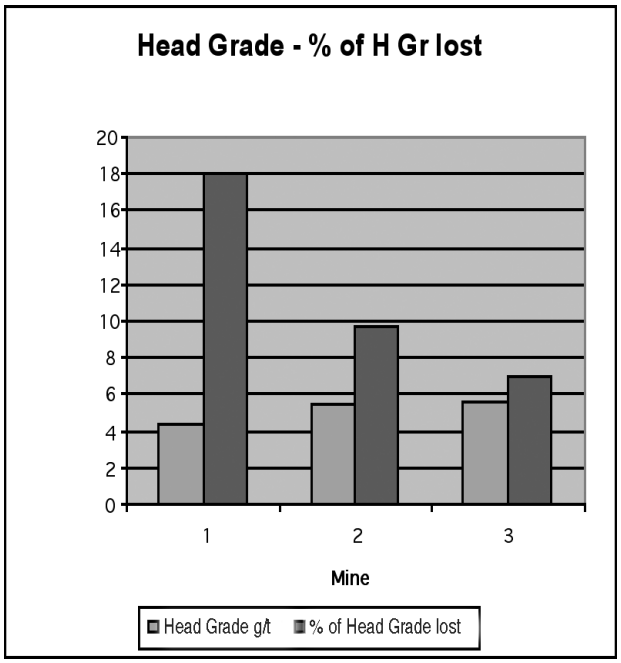

Figure 1—Head grade—% of head grade lost
(Grades in g/t are '4E': Platinum, Palladium, Rhodium, Gold)

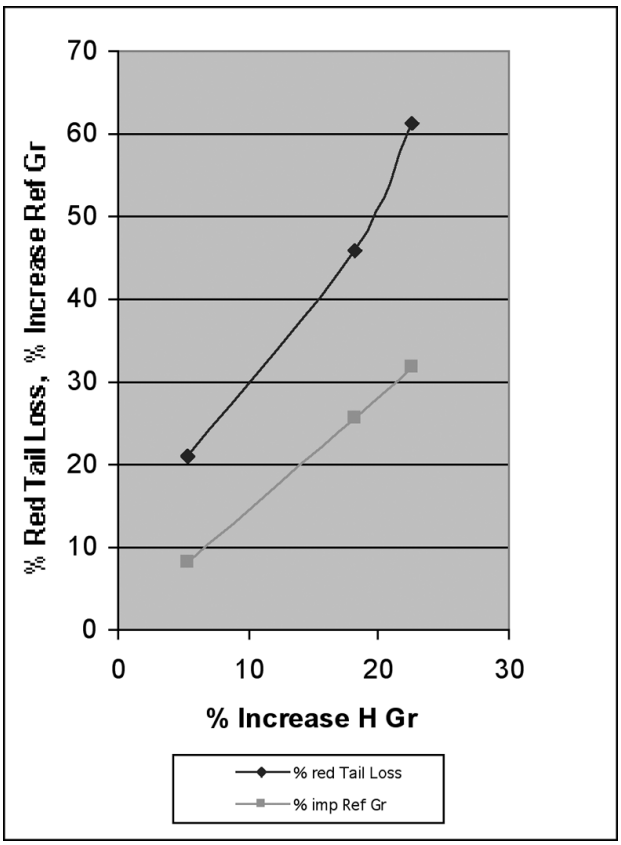

Figure 2—Improved value recovery by improved head grade

The variation from planned grade to head grade is a combination of reef characteristics, skills of workforce, management (supervision) and also flexibility/availability of the selected mining technology; how this technology is able to adjust to changing conditions, natural and man-made.

The tailings grade is a measure for value lost in the refining process. Processing and refining efficiency tends to drop as head grades become lower.

These relationships are highlighted in Table I and Figures 1 and 2. Table I shows data for 3 mine sections of Anglo Platinum, Amandelbult, Rustenburg and Union, taken from Anglo Platinum Annual Report 2001.

Figure 1 shows the relationship between 4 E head grade and per cent of head grade lost in the tailings for these mine sections. Figure 2 relates the per cent increase in 4 E head grade to the per cent improvement in refined grade and per cent reduction in tailings loss. There may be differences in ore minerals and refining technologies and processes, however, the benefit of improved head grades on value recovery is apparent. Head grade improvement should therefore be of interest and it appears worthwhile to discuss mechanized mining technologies with a potential to achieve gains in this respect.

Further improvements can be derived from (as a result of reduced dilution) a reduction in tons broken, tons transported to surface, tons refined and tons dumped as tailings. All these activities require resources, in terms of personnel, equipment, and materials and last but not least there is some adverse impact on the environment by each ton of rock handled.

Mechanized technologies for low seam platinum mining: board-and-pillar

In recent years there has been little mechanization progress in the extraction of platinum ore from the Merensky and UG2 reefs. In fact, as industry statistics indicate, the average productivity per stoping and cleaning employee is still near 40 square metres per month, and average face advance is approximately 10 m per month, basically the same performance as was achieved in 1998. In 2001 Anglo Platinum extracted approximately 4% of its underground production by mechanized methods. This is to increase three-fold in 2002.

The present mechanized mining method is exclusively board-and-pillar. The first systems were introduced into platinum mining in 1998 consisting of diesel powered LHDs and face drill rigs. Today, there are approximately 30 such mechanized sections in operation in platinum and chrome mines of the Bushveld complex. Mechanization technology consist of diesel powered LHDs and blast hole drill rigs. This equipment requires a minimum extraction height of 1.6–1.8 m. Mechanized roof bolting was introduced at a slower pace. The minimum operating height for roof bolting rigs fitted with rotary percussive drifters is 1.7–1.8 m.

Board-and-pillar operations in 1.6–1.8 m extraction height have facilitated to use existing equipment with relatively few modifications, and also should have a positive effect on performance and cost per square metre of reef extracted. However, as explained earlier, this has come at the expense of grade dilution with its inherent detrimental effect on overall cost per ounce of platinum produced .

A board-and-pillar concept with a planned mining height of 1.1–1.2 m has been introduced at the Bafokeng Rasimone Platinum Mine (BRPM) of Anglo Platinum. The Merensky reef, 0.8 m thick and dipping 12 to 15 degrees is being extracted with battery powered LHDs and roof bolting rigs fitted with rotary drills. Rooms are 12 metre wide, pillars have 4 x 4 metre dimensions. Blast holes are drilled with conventional compressed air stoper drill hammers. 32 mm diameter holes are 1.2 m deep, an average advance per blast of 1 m is achieved.

Battery powered LHDs

Battery powered LHDs, Figure 3, originate from coal mining in the USA. Known as 'scoops', these machines were widely used as haulage (LHD) vehicles in board-and-pillar operations when coal was mined mainly by drill and blast methods. DBT have supplied approximately 2000 scoops since 1985. These machines are available with an overall height profile as low as 800 mm with 28" tyres. At BRPM, 35" tyres with protection chains are installed which raises machine profile to 990 mm. Ground clearance is 300 mm. The ejector (as opposed to tilting) type bucket does not require additional headroom to be discharged, resulting in a more stable hangingwall.

Certain design features are provided to facilitate operation of the vehicles in rolling reefs. The overhanging portions of the vehicle, battery compartment and bucket, can be vertically articulated by hydraulic cylinders controlled from the driver cab while moving. This ensures that clearance to hanging and footwall is maintained when going through reef rolls or over footwall steps. A heavy duty ball bearing centre section with ± 40° articulation ensures 4-wheel ground contact in extreme floor conditions. The driver's cab is extended beyond the vehicle width profile to provide space and vision for the driver. To be accommodated in a 'space craft' like position, lying, rather than sitting and has been well accepted by drivers.

Figure 3—Battery powered scoop

Batteries

Electric power is provided by an on-board mine duty battery with sufficient capacity for 4 to 5 hours of operation as a hard rock LHD vehicle at the BRPM Mine. Battery change is accomplished by the operator within 15 minutes, assisted by an on-board handling system, Figure 4. Three to four battery sets are needed per vehicle, depending on mining conditions, as re-charging requires 8 hours per set. Charging stations are presently located at the mine portal and will later be moved to section entrances. Underground charging stations must be ventilated to dilute hydrogen gas emitted during the charging process. Number of charging stations required per vehicle is one less than batteries per vehicle. Connected load is 40 kVA maximum, this drops gradually to 8 kVA during the last hour of an 8-hour charging cycle. Battery life span is equivalent to 1500–1800 charging cycles. This equates to approximately 3-years life based on 260 workdays/year and 2 charge cycles per workday. Battery maintenance consists of water refilling and monitoring of voltage in single cells in prescribed intervals. 6 non-artisan plus 1.5 artisan man-hours per week per vehicle are allotted to battery maintenance. This activity takes place during charge cycles and does not affect machine availability. As power drain on the battery is highest during bucket loading, time to re-charge is only approximately 50% compared to what is customary for scoops used as a utility vehicle in similar terrain and drive duty cycle conditions. Power conservation has been optimized in current DBT designs. In this respect microprocessor and IGBT (Integrated Gated Bipolar Transistors) based controllers have achieved significant benefits in improving control and battery efficiency.

Figure 4—Scoop batteries

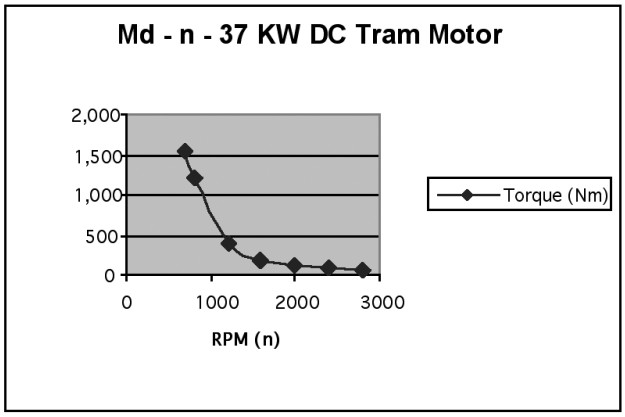

Fig. 5—Torque diagram battery scoop

Power train

The power train comprises a 37 kW series-wound 110 volt DC motor, reduction gear box, and 4-wheel drive by heavy duty axles. Total reduction ratio is 72:1 giving the vehicle a top speed of 8 km per hour, Figure 6. The series wound motor generates an impressively high torque and tractive effort at low speed. The maximum 8 t load capacity bucket can be filled in 'one pass' and 15 to 18 degree climbs with fully loaded bucket are accomplished, Figure 5. The combination of high traction and relatively small diameter wheels requires chains to be fitted to prevent wheel spin.

As the power train is exclusively electro-mechanical, there are no torque converters or hydrostatic wheel motors with associated hosing and hydraulic controls. Hydraulic power is only used for bucket loading and discharge, steering, battery change and to operate the wet type disc breaks. Related user benefits are improved equipment availability, less maintenance requirements for hydraulic components and, for platinum mining, considerably reduced chances of ore contamination by leaks of hydraulic oil or diesel fuel.

In addition battery powered scoops have an environmental advantage. There are no exhaust fumes and there is minimal increase in ambient temperature, offering the benefit of less ventilation needs than would be required to dilute diesel exhaust fumes. Vehicle noise levels do not exceed 85 dB. The cost of electric power for battery re-charge is much lower than the cost for diesel fuel, under South African cost situations by a factor of at least 20. This translates into annual fuel savings of R150 000 per vehicle based on two-shift operation. Some design changes were made to cater for the more demanding duty cycle in hard rock mines, however, the basic concept has remained.

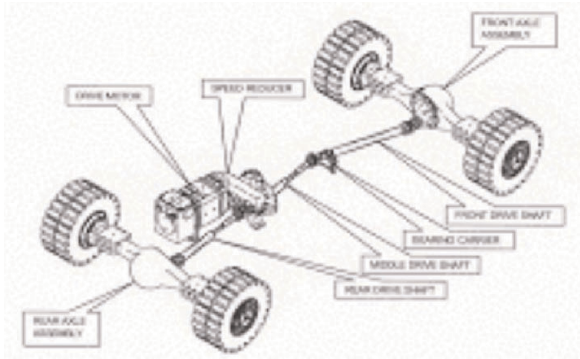

Figure 6—Scoop power train

Results

A fleet of 6 scoops has been in operation at BRPM since September 2001. A judgement of the performance results must consider the following specific circumstances. The mine is still in the construction phase and production sections are under development. This means that belt loading stations are temporary and without plate feeders. Tramming distances have been rather long, up to 100 m. Manual blast hole drilling has resulted in rather unfavourable conditions for bucket loading. Steps in the footwall are frequent due to inadvertent variations in drill hole orientation and by the short advance of only 1 m per blast. Also, this is having an adverse effect on loading efficiency. Only 40 t of muck are provided per blast, compared to approx. 180 t in a 10 x 1.8 m rig drilled room with 3 m advance per blast. At BRPM only a few cycles can be loaded from a full pile with less efficient sweeping required for the balance of the clean up, which is 4 times as frequent. Average bucket loads of 3.5 t per cycle and machine performance of 100 t per shift are being achieved. Average in section extraction height is 1.1–1.2 m. There will be some improvements as the mine is further developed, however, blast-load cycle inefficiencies can only be improved by mechanized blast hole drilling, which in a planned 1.2 m extraction height should have the potential of at least 2 m effective advances.

The need to further upgrade the present scoop concept has become apparent. The ejector bucket was found to require better resistance against wear. This is being addressed by a heavier design and by use of more wear resistant material. The present single cylinder operated ejector blade has some problems to handle bucket fills concentrated on one side. In future, buckets will be fitted with 2 ejector cylinders, one on each side, to ensure proper operation under any type of fill conditions, Figure 7.

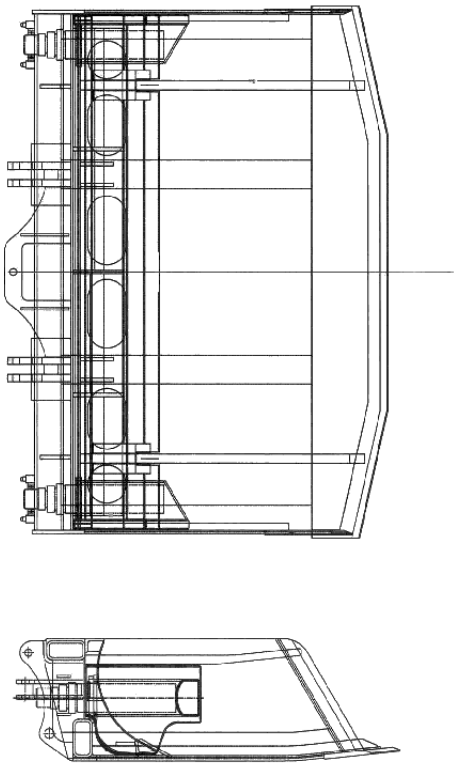

Figure 7—Scoop bucket with 2 ejector cylinders

On certain occasions physical damage to batteries has been experienced due to some difficulty to operate the vertical battery compartment articulation. As a result batteries were making contact with the hangingwall when driving through rolls or over footwall steps. This has since been fixed by providing substantial protective guards and by a hydraulic 'float control' for the articulation cylinders.

Overheating has been experienced with the single motor drive train. DBT's new hard rock scoop model will have 2 drive motors, one per axle, Figure 8. Motors and controllers can be fitted with fans for forced air cooling. Torque rating of the mechanical drive train will be improved. The twin motor version will significantly boost performance and productivity for the given duty cycles at BRPM. Battery usage to re-charge will remain at 4–5 hours. This is achieved by maintaining lower motor temperatures with resulting efficiency benefits. Operational results from these new scoops will be available in 6 months.

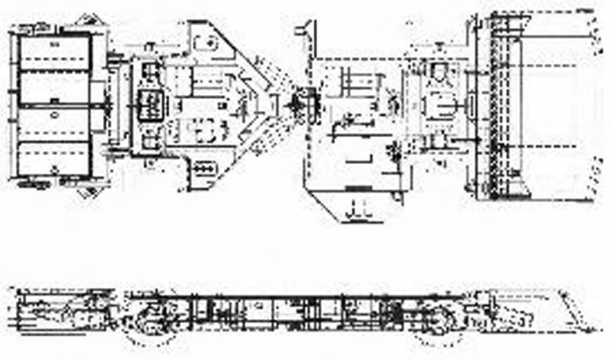

Figure 8—Scoop with twin tram motors

Roof bolting

It certainly presents a challenge to develop technology for mechanized roof bolting in 1.2 m board-and-pillar excavations. In this respect, mechanized roof bolting rigs have been used in USA coal mining since the 1970s, also in coal seams as narrow as 1 m.

Low seam roof bolting technology in USA coal mining

Roof layers over coal seams, generally termed as soft rock, mostly consist of shale and sandstone with compressive strengths being normally below 50 MPa. Rotary drilling has proven to be a reliable and cost effective method in such conditions. The bolting technology is not fully mechanized, respectively, remote controlled from the operator cab. Drill steel, roof bolts and resin cartridges are handled by an operator who is positioned directly at the point of bolting. Protection against roof and stone fall is provided by an automated temporary roof support (ATRS), an integral part of the roof bolting rig which the operator can activate (set) from the machine while he is positioned under previously bolted roof. The ATRS system supports the roof 'in by' of the next roof bolts to be installed, Figure 9. In addition the operator, when positioned at the drill controls, is protected by a substantial steel canopy. ATRS and operator canopy must meet stringent statutory safety regulations. This technology is also used in seams as high as 4–6 m, then assisted by operator platforms which can be raised as required to reach bolting positions. Reasons for not using fully mechanized, remote controlled technology are (1) Insufficient head room for carousels in low seams. (2) The fact that carousel based automated systems are slower than the manhandling of drill steels, bolts and cartridges. Bolting speed in coal mining is at a premium because bolting densities are generally high. (3) Coal mine roofs frequently require planks and/or wire mesh to be simultaneously installed with roof bolts. H.J. Fletcher, represented in South Africa by DBT, is the leader in this technology segment.

Figure 9—Bolting rig

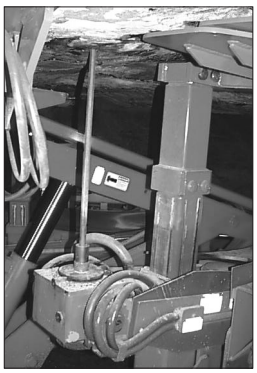

Figure 10—Roof bolter with rotary drill

Feasibility and ease of mechanized roof bolting, under low ceiling are determined by the head height of the drill mechanism. The Fletcher rotary drill is only 290 mm high., Figure 10. This facilitates the use of 800 mm long extension drill steels in a 1.2 m high excavation. Rotary percussive hammers have at least twice the head height, which limits the practical ceiling limit for mechanized roof bolting as the required hole depth can only be achieved by using multiple drill rod extensions. The drill boom in which the rotary drill mechanism is supported can generate upward thrusts of up to 4 t. The rotary mechanism generates a torque of up to 400 Nm. A high torque is required to spin the inserted bolt for proper resin mixing.

Rotary drilling and roof bolting in hard rock

Drill bit wear and associated costs had been of concern when the decision was made to test a Fletcher rotary bolting rig in BRPM board-and-pillar operations. Compressive strength (UCS) of the hanging wall is between 140–180 MPa. However, an advantage of rotary drilling with extension steels is that holes can be drilled with a diameter as small as 25 mm.

This has not only a positive impact on bit wear and bit cost, but also optimizes drill hole and roof bolt diameter with respect to cost per bolt installed as well as bolting durability. While mechanical anchor bolts are the least expensive alternative for light duty bolting requirements, the bolt of choice for a wide variety of roof conditions are fully resin grouted non-tension rebar bolts. These bolts do not require to be re-tensioned after blasting. The critical variable affecting resin bolt performance and cost is in the size of the resin annulus, being the difference between drill hole and bolt diameters. Extensive research[1] has determined a 19–20 mm rebar installed in a 25 mm hole to be optimal for interlock performance provided by the resin. As the annulus size increases, the mixing of resin paste and catalyst becomes less efficient while a too small annulus makes bolt insertion impractical. Optimum conditions are achieved with an annulus of 2.5–3.5 min. A 5 mm annulus (32 mm hole/ 22 mm bolt) will have an adverse effect on the pull out performance and durability of the bolt. Based on data provided by resin supplier Fosroc[2], resin cost for a 25/20 mm hole-bolt combination are 62 US cents per metre, this would increase to 92 US cents per metre for a 28 mm hole and 116 US cents for a 32 mm hole with 22 mm rebar. Costs in RSA are comparable with resin costs of R6.20 per metre for a 25/20 mm hole-bolt combination.

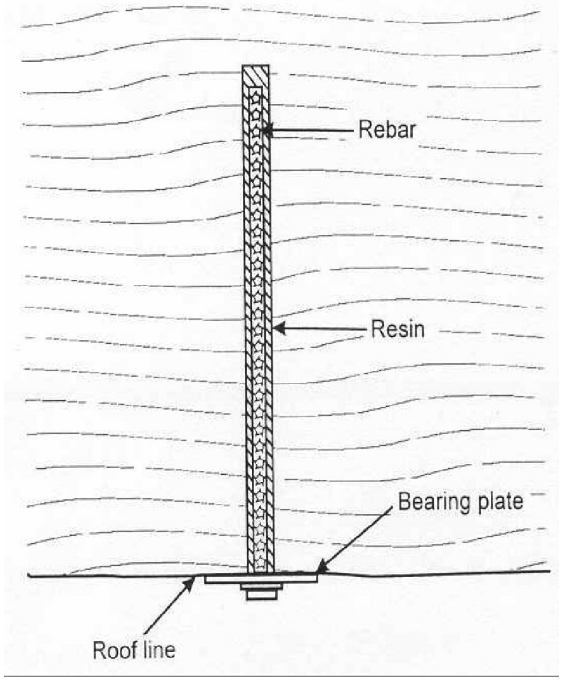

Figure 11—Rebar bolt, fully grouted

The standard rebar bolt in USA coal mines is full length grouted with forged head (unit) and plate, as shown in Figure 11. The installation process for this bolt type includes an approximate 20 sec holding time (after bolt spin) with a vertical thrust of 4 t generated by the drill feed. In this way some degree of pre-stressing of the roof skin is achieved. This type of rebar bolt has lowest purchasing cost and is simple to install. Rebar bolts fitted with a shear nut are used at BRPM. The installation sequence for these bolts is as follows: 10 sec spinning, 20 sec holding, by that time the resin has cured, then, the shear nut is broken and torqued to pre-stress the bolt and roof skin. Threading of rebar and shear nut make this bolt more expensive. Installation requires more operator attention to ensure that the shear nut does not break loose too soon. In this event resin mixing remains incomplete. Also threads can suffer damage which may preclude to tension the washer plate against the roof. Forged head bolts project only 15 mm below the washer plate, this can be as much as 70 mm with shear nut bolts, which may cause collision with mobile equipment.

Results

The present board-and-pillar system at BRPM requires one bolting rig to install 8 bolts, 1.2 m long, per room in 4 rooms, that is a total of 32 bolts, during one 7.5-hour shift. After extensive training by the supplier a performance of 8 to 12 bolts per hour is now being achieved. A typical cycle is shown in the Table II.

In time supply of bolts, resin cartridges and drill steel is critical for cycle performance. Further, as the bolting rigs have cable reel supplied electric power only, moving between rooms and provision of supply points must be well organized. Drill bit life has averaged 5–7 holes or 7–9.5 m per bit. After initial use for 5–7 holes the bits can be re-sharpened to drill 3 to 5 more holes. Cost per drill bit is R23.

Table II

Bolting cycle at BRPM

Activity	Time (seconds)
Drill 1.2 m deep hole	180
Insert resin and bolt	30
Spin bolt until resin is mixed	10
Hold bolt with upward thrust to cure resin	20
Move rig to next bolt position	120
Total	**360**

Further potential applications of low profile trackless technology

A disadvantage of the board-and-pillar method in low excavation height is reduced efficiency of the drill-blast-load cycle. Even with blast hole drill rigs, performance per blast will not exceed 100 t, also, square metre per blast will remain less than in 1.6–1.8 m excavation height. This efficiency problem will come more in focus as pillar dimensions must be increased as mining operations progress to deeper levels. Concepts are now under discussion to use trackless vehicles in a stope rather than board-and-pillar layout, Figure 12. The goal is to significantly increase tons and square metres per blast. Blasting can take advantage of the free face and with an effective advance of 2 m, performance per blast will be 60 m^2 in a 30 m long stope, equivalent to approximately 250 t in an excavation height of 1.2 m. Space restrictions in the stope would permit to use only one scoop, however, the short distance to the gully would ensure high loading performance. Further, the short travel distance would offer the alternative to provide electric power by cable reel rather than by battery.

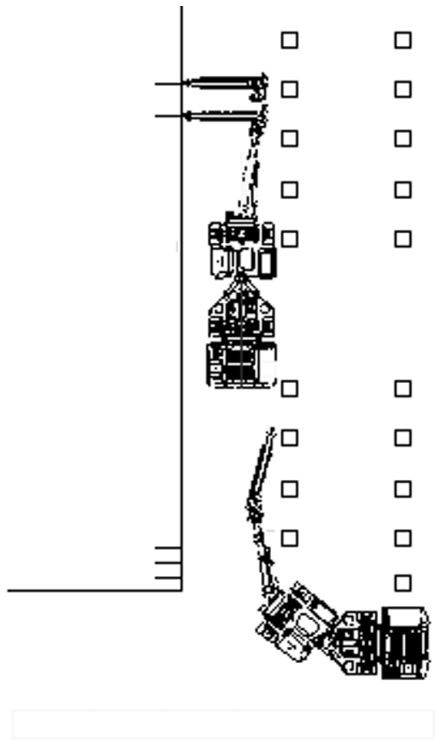

Figure 12—Concept: stope with trackless vehicles

Rock cutting

There is industry consensus that non-explosive rock breaking methods are the ultimate goal to mine hard rock minerals. Advantages of non-explosive rock breaking can be summarized by attributes such as continuous process, automation and a high potential to improve productivity and enhance safety. Such claims would specifically apply to narrow vein mining.

Rock cutting would best be applied in a longwall type mode which, compared to board-and-pillar methods is easier to automate, allows better continuity of the ore production process and also is best suited for the undercutting principle to be applied .

Anglo Platinum and DBT have entered into an agreement to continue rock cutting development. With respect to cutting technology it is DBT's opinion that the Bechem activated tool technology holds best prospects. Activated tool trials pursued in the past have relied on known conventional disc cutter concepts with activation superimposed by vibrating forces[3]. However, there has been no breakthrough to date. While cutting capability has been demonstrated, the tool carrier systems developed so far have had problems to demonstrate desired durability and reliability. DBT has therefore under the agreement with Anglo Platinum conducted laboratory tests with a variety of activated cutting tools as an alternative to the previously used disc cutters. The objective has been to develop a cutting tool suited for a rock cutting machine which would be part of an integrated stope mining system for bi-directional cutting. In this respect the goal is to develop a system based as much as possible on industry standards in order to fit and be manageable in an underground hard rock environment. Further testing and an underground trial are scheduled to take place during the 2nd half of 2002.

Conclusions

There are significant benefits to be derived from low profile mining to restrict excavation height as much as possible to reduce mining of waste rock. Processing and refining efficiency is improved, as ore dilution is reduced and head grade is increased.

Equipment comprising trackless LHD battery vehicles and roof bolting rigs with rotary drill devices has demonstrated the feasibility to maintain a drill and blast extraction height of 1.1–1.2 m in the Merensky reef.

For non-explosive extraction, rock cutting, new cutting tools are being developed. The objective is to facilitate rock cutting in a longwall mode.

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Mandela opens De Beers' Premier Mine Diamond Hub*

Former President Nelson Mandela recently opened a R3,2 million Diamond Hub at De Beers' Premier Mine, north-east of Pretoria. The opening of the Hub was the first of a number of activities planned to mark and celebrate the Centenary of Premier Mine.

Speaking at the opening of the Diamond Hub, De Beers chairman Nicky Oppenheimer said, 'As far as we are aware the opening of this facility makes Premier Mine the only place in the world where diamonds are mined, cut and polished, and incorporated into locally-designed diamond jewellery pieces. It's a world first and a wonderful example of economic empowerment and beneficiation of South Africa's diamonds.'

The Diamond Hub houses two privately owned retail diamond jewellery outlets, a diamond cutting and polishing factory with a training facility as well as a jewellery design school. The Hub was facilitated through a partnership between Premier Mine and Diamond SA—a diamond cutting company and sightholder† of De Beers—and is one of several sustainable development and economic empowerment initiatives being supported by De Beers at the mine and in the Cullinan area.

Some 150 previously unemployed and mostly unskilled young women from the communities around Cullinan have now been trained to cut and polish diamonds at the factory by Diamond SA, and have effectively been provided with employment, skills and career opportunities for the future.

Isaac Nkwe, a skilled jewellery designer, manufacturer and entrepreneur, established Imfundiso—The Cullinan Jewellery School, a jewellery design and manufacturing school situated in the Hub. The school focuses on providing young people from the local communities with basic skills to design and manufacture jewellery. Through this intervention, trainees will either be able to study further, establish their own businesses or find employment within the jewellery trade. Although Imfundiso is only in the second year of operation, it boasts enviable workshops in which the students receive practical training in many aspects of jewellery manufacturing and a focus on design that has an African signature. The school has been established through financial and material assistance from Premier Mine and the De Beers Fund (the company's social investment vehicle), and other funders. Premier Mine also continues to provide business management mentoring and training to this young entrepreneur and his students.

The Diamond Hub also forms part of the Cullinan tourism route—itself an element of the Gauteng 'Blue IQ' development initiative and a growing attraction for visitors interested in heritage and mining. The area is served by good quality restaurants and boasts some interesting wildlife conservation attractions and Boer War battle sites as well as museums reflecting the local history.

† 'Sightholder' is the term given to a major client of the Diamond Trading Company, the De Beers Group company responsible for the sales and marketing of the Group's diamonds. ◆

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De Beers and South African National Parks form a conservation partnership*

De Beers amd South African National Parks (SANParks), have today signed an agreement which will see the integration of parts of the De Beers-owned Venetia Limpopo Nature Reserve (VLNR) into the core of the proclaimed Vhembe/Dongola National Park, in the Limpopo province in South Africa. This follows the signing of a 'Heads of Agreement' in July 1999.

In addition to the company's own land, De Beers has also contributed about R10 million to Peace Parks Foundation (PPF), specifically to help fund the purchase of several other properties that will fall within the future park. In terms of the agreement, the South African National Parks will contractually manage the area while De Beers retains title to its own properties.

According to Nicky Oppenheimer, chairman of De Beers, 'The signing of the contract marks an important milestone in the development of the new National Park. De Beers is especially proud to say that this would not have been possible were it not for the discovery of diamonds at Venetia. This is another example of how responsible mining of a valuable resource can contribute to the economic, social and environmental sustainability of the area, the country and, hopefully one day, the region'.

It is hoped that the Vhembe/Dongola National Park will eventually form part of a Transfrontier Conservation Area, a nature reserve of almost 5 000 km^2 being proposed by South Africa, Botswana and Zimbabwe.

Speaking for SANParks, chairman of the Board, Murphy Morobe said, 'This major conservation area links three countries and will conserve and promote some of the most precious ecological, cultural and historical assets of the country. SANParks is grateful to De Beers for their contribution to the consolidation of the core and contractual areas.

The partnerships between De Beers, SANParks, PPF and adjoining private landowners as well as the commitment by all stakeholders have clearly contributed to the success of this project. ◆

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