



ROCKtalk

A BI-ANNUAL NEWSLETTER WITH THE LATEST BUZZ AMONG ROCK ENGINEERS

VOLUME 1, ISSUE 2

JULY 2015

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New SANIRE President

Michael du Plessis is the Group Rock Engineering Manager for Lonmin Platinum. He has an advanced Rock Engineering certificate, MEng (Rock Engineering) and is currently busy with a PhD.



Michael's portfolio includes SANIRE membership and awards. The portfolio seeks to promote, protect and continuously add value to the different membership groups in the organisation. Furthermore, members and practitioners who continuously strive to make a positive contribution towards the industry are identified and given recognition or awards.

Michael says: "I want to make sure that SANIRE is recognised as the professional organisation representing rock engineers. We, as an organisation, need to be recognised in the industry (DMR, AMMSA, etc).

"Furthermore, we have to ensure that our members get the maximum benefits from attending their local branch meetings. It is key that we create a forum where pertinent industry related information is shared with practitioners and new leading practices, research and development and so on is shared with all members. Our members are the key component in branding SANIRE and each respective branch. We therefore need active participation and info sharing sessions.

"In a changing environment, this will create a platform where rock engineers can again be rewarded for the work they are doing by sharing it with their colleges and be awarded or recognised for an active and ongoing contribution to the industry."



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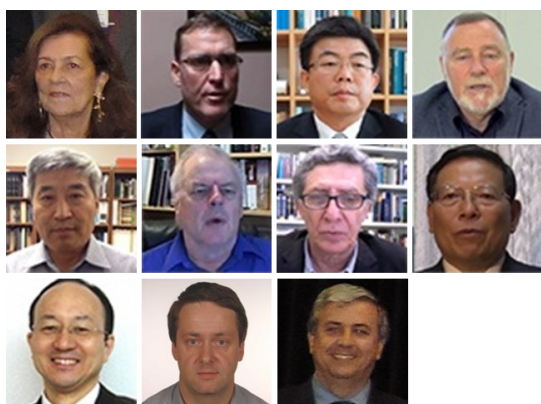


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ISRM Conference 2015 - Montreal, Canada

ISRM News

Jacques Lucas attended his final ISRM Board meeting as VP Africa on Saturday 2015/05/09 prior to the ISRM 2015 Congress in Montreal. During his term from 2011 to 2015 two new African ISRM National Groups (Tunisia and Zimbabwe) were established. He also played a significant role in co-ordinating the Young Member's Presidential Group. The ISRM Council meeting was held the following day Saturday 2015/05/10. Jacques presented the status of the African region and William Joughin represented SANIRE. William presented SANIRE's bid for the AfriRock 2017 in Cape Town, at the 2017 ISRM International Symposium, which was successful, competing against Eurock 2017 in Ostrava, Czech Republic. William was elected as VP Africa for the new ISRM Board 2015-2019. Michael Du Plessis will represent SANIRE, as the new SANIRE president, at the ISRM Councils during 2016 and 2017.



ISRM Board 2015-2019 (left to right, top to bottom) President: Eda F. Quatros (Brazil); VP Africa: William Joughin (South Africa); VP Asia: Seokwon Jeon (Singapore); VP Australasia: Stuart Read (New Zealand); VP Europe: Charlie Chunlin Li (Sweden); VP North America: Doug Stead (Canada); VP South America Sérgio Fontoura (Brazil); VP at Large: Manchao He (China); VP at Large: Norikazu Shimizu (Japan); VP at Large Petr Konicek (Czech Republic); Secretary General: Luís Lamas (Portugal).

The ISRM now comprises 59 National Groups, 7 797 individual members and 147 corporate members.

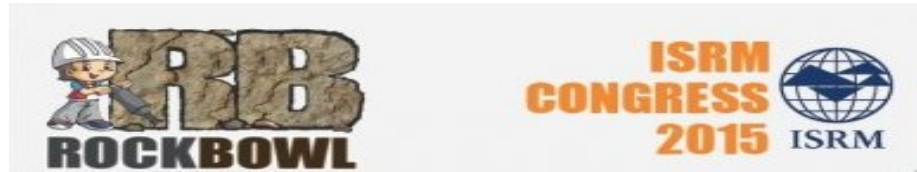
The planned ISRM Conferences are:

International Congress:	2019, Foz de Iguacu, Brazil
International Symposia:	Eurock 2016, Cappadocia, Turkey
	AfriRock 2017, Cape Town, South Africa
Regional Symposia:	Eurock 2015, Salzburg, Austria
	SARMC 2015, Buenos Aires, Argentina
	ARMS9 2016, Bali, Indonesia
	Eurock 2017, Ostrava, Czech Republic
	ARMS10 2018, Singapore
Specialized Conferences:	GeoProc2015, Salt Lake City, USA
	Vietrock2015, Hanoi, Vietnam
	Shale Gas 2015, Wuhan, China
	4th Workshop on Volcanic Rocks and Soils 2015, Ischia, Italy
	7th In-Situ Rock Stress Symposium 2016, Tampere, Finland
	Recent Advances in Rock Engineering 2016, Bangalore, India

Professor John Hudson, received the 2015 Muller award, which the most prestigious ISRM award and is awarded every four years. He presented the Muller Lecture at the ISRM 2015 Congress.

The Rocha medal is awarded to the best PhD thesis in Rock Mechanics annually. The 2015 Rocha Medal was awarded to Andrea Lisjak Bradley of Italy, who also presented a lecture on his thesis at the Congress. The 2016 Rocha Medal winner (Chia Weng Boon from Malaysia) was announced. Submissions for the 2017 Medal remain open until 31 December 2015.

The 9th online ISRM Video Lecture was presented by Professor Dick Stacey on "Risk in Rock Engineering Design and Practice".



On the 12th May 2015 in Montreal Canada the first Rock Bowl Team from South Africa took part in the first International Society for Rock Mechanics (ISRM) Rock Bowl Challenge. The team consisted of 4 members who were chosen according to the following requirements:

- The Rock Bowl team must consist of 4 members who's ages must be 35 and younger.
- Four young graduates working in the rock engineering field (with BSc or MSc and one PHD)
- There is no cost to participate in the Rock Bowl.
- The participating teams are responsible for all costs associated with registration and travel to the ISRM Congress 2015. There is no subsidy or sponsorship for the participating teams.

On the 12th May 2015 at 15:00 the competition began. In true South African style a quick "regmaaker" was gulped down and they were ready to compete against Brazil, China, South Korea and Canada.



Continued



The competition was structured in a similar “flink dink” way whereby a Rock Engineering related question is asked by a presenter and each team sitting opposite to each other needs to tap a buzzer which secures the question. They then have 10 seconds to answer the question. If it is answered correctly the team is awarded 10 points as well as a bonus question. If the bonus question is answered correctly, 20 points are awarded to the team. All the teams competed against each other in a pool setup, whereby the final was decided.

The first round was South Africa Vs. Canada. Unfortunately South Africa lost the first round, whereby we had one more round left in the pool which was against Brazil. South Africa narrowly lost this round as well and therefore forfeited the final position to Brazil. Brazil entered two teams which both made it to the final. The winners for the Rock Bowl 2015 was Brazil.

Even though the South African team did not win, it was an experience of a life time. We would all like to



thank SANIRE and the associated sponsors for making this possible and to TEAM SOUTH AFRICA for a great experience on an international stage.



For more information on ISRM and the Rock Bowl 2015 please visit the ISRM website.

www.isrm.net

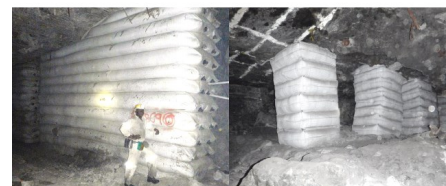
Special thanks to the Sponsors



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ROCKY JOKES



Mining Engineer



What society thinks I do.



What my great great grandparents thinks I do.



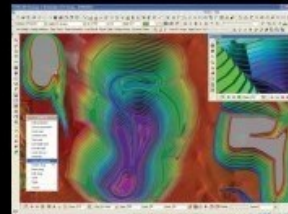
What geologists think I do.



What liberal arts think I do.



What I think I do.



What I actually do.

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Word Search - Stope Support

A L K H E X U V T I K R P C D
S C A P A C I T Y N O Z G I T
H R T I R I N I V I F E Z T E
E S Y I J R T A V Q O T M S N
A W U U V W Q A T L Z X E A S
R S X P Y E H D O S D W C L I
E J B U P E Z G F G I N I E L
A V O H B O Y N E Z O S T N E
N O I T A M R O F E D Y E I G
C I T S A L E T M U G F N R F
C S D N S E U I B R Q M I K R
L C N T E A J L E W N N K T X
D E S I G N P N K C R I A T O
Q M M G D K E U I Z V U Q L O
M D K M N A E I Z Z K O Q V L

ACTIVE
DEFORMATION
ENERGY
KINETIC
SHEAR
DESIGN
GEOLOGY
PASSIVE
SUPPORT
CAPACITY
ELASTIC
INELASTIC
RESISTANCE
TENSILE

Engineers Rock!!!!!!

One afternoon, an engineering student was riding across campus on a shiny new bike. He ran into a friend of his, also an engineering student, who said, "Wow! That sure is a great bike. Where did you get it?"

"Well, the darndest thing happened," said the first engineering student. "A girl came riding up to me and got off the bike, threw off all her clothes, and said that I could have anything that I wanted."

"Wow," remarked his friend. "That's great. Good move. Her clothes probably wouldn't have fit you anyway."



Dr Michael Roberts

**26 January
1950 –
5 February
2015**

Kim, Lindsay and Georgie, family and friends, I want to honour Mike's contribution to the science and practice of rock engineering in South Africa. I first met Mike when I joined the Rock Engineering Programme at CSIR in 1993. Mike was initially my mentor, as he was for many other young (and not so young) scientists and engineers. Over the next 15 years he became my colleague and friend.

Mike completed his BSc Honours in Geology at Wits in 1974 and his MSc in structural geology and rock mechanics at the Royal School of Mines, Imperial College in 1977. He then joined Randfontein Estates Gold Mine. He became the Rock Engineering Manager in 1981 at the age of 31, after getting his Rock Engineering Certificate.

Mike joined the Chamber of Mines Research Organisation, also known as COMRO, in 1985 (which became the Mining Technology Division of the CSIR, aka Miningtek, in 1993) and began a career in research that lasted 23 years. Mike's tenure at CSIR was during a period that was something of a golden age for rock engineering research in South Africa. During this time:

Mike made major contributions to the research conducted under the auspices of the Mine Health and Safety Council's SIMRAC programme and the DeepMine Collaborative Research Programme, particularly with respect to the support of the face area of the stope, the most dangerous area of the mine. Stope support was the subject of his PhD in Mining Engineering, which he completed through Wits in 1999. The methodology he developed became the industry standard.

He authored or co-authored more than 50 papers, chapters in three rock engineering textbooks, and many research reports.

He was an NRF-rated researcher.

He was the Manager of the Rock Engineering Programme at CSIR for four years (1996–2000), with a staff of between 70 and 90 scientists, engineers and technicians. Thereafter, he stepped back onto the research track as a Research Fellow. He left CSIR in 2008 to join the consultancy firm, TWP.

That's the data, but let me tell you more about Mike, the rock engineering researcher.

Engineering may be defined as "the art or science of making practical application of the knowledge of pure sciences (such as physics, chemistry and geology)", for example, to construct machines or to mine ore. Rock is often used as a metaphor for

something that is strong and enduring. We who work in deep mines (and South African gold mines are, by far, the world's deepest) know that highly stressed rock can be unstable and dangerous. Rock engineering is the discipline that seeks to master rock: to design and construct shafts, tunnels and stopes so that the ore can be mined safely and profitably. And this is the discipline of which Mike was a master.

Predicting the behaviour of rock is as much an art as a science, and we rely on "rock engineering principles" and often appeal to "engineering judgement". One of the cardinal rock engineering rock principles is to "mine away from danger". Mike was a key member of the Rockburst Task Force, which conducted forensic investigations into rockburst accidents. During a four-year period (1995–1998), we investigated over 30 rockbursts that had claimed the lives of more than 100 mine workers. In order to gather fresh evidence, we would go underground as soon as possible after the rockburst. Often the rescue teams were still digging for survivors or recovering bodies, the rock mass would not yet have been stabilised, or the ventilation restored. Mike had an incredible instinct for the underground environment. He usually went underground without clinorule, tape measure, camera, or compass. Like Sherlock Holmes, he would spot clues that most of us would miss (evidence of damage to rock, props, packs and bolts), and reconstruct the sequence of events, and recognise the sins of omission and commission that had contributed to the event. This took courage, endurance, and common sense. Mike calculated the risks carefully with a cool head.

A second rock engineering principle is "don't resist an irresistible force with an immovable object". Rather yield, absorb the excess energy, and keep capacity in reserve for "another day". Mike did not only apply this principle when dealing with rock and stope support, but also to people. Mining is a tough industry, but Mike was always quietly spoken, and sought to persuade and encourage, rather than to command or intimidate.

While I have focused on his work achievements, we were very aware that rock engineering was not his sole priority. There were the four Fs: Family, Fishing, St Francis and Fast cars. Mike worked hard and smart, but seldom late.

Mike, as a representative of your friends and colleagues at involved in rock engineering research, I salute you for:

Your contribution to the science and art of rock engineering in South Africa;

For developing methods and technologies that have helped to make mining safer and more profitable – there are probably hundreds, if not thousands, of mine workers who owe their lives to the technologies that you helped to develop;

- For training and mentoring a generation of rock engineers; and
- For being a true scholar, gentleman and friend.
-

Ray Durrheim,

South African Research Chair in Exploration, Earthquake & Mining Seismology;

Mineral Resources Competency, Natural Resources & the Environment Unit, CSIR; and School of Geosciences, The University of the Witwatersrand, Johannesburg

PERSONALITY OF THE FIRST QUARTER



Philosophy of Life:

*“Surely it can’t be
that difficult”*

Full Name: Temogo Itholeng

Position: Rock Engineer (Unisel and Joel, Welkom, Free-State) and Chairman of the Free State SANIRE Branch

Company/ Organisations: BLA Harmony/ SANIRE

Date and Place of Birth: 1983 May 01

Education: BSc Hons Mining-Wits University

First Job: Leaner Miner Rustenburg Townlands shaft

Personal Best Achievement/s: Getting to sign that legal appointment you realise “this is it”.

Philosophy of Life: “Surely it can’t be that difficult”

Favourite Food/Drink: Some braaivleis and beer

Favourite Sport: Not really into sport, but enjoy some superbike racing



All I can say is, “surely it can’t be that difficult”; the ‘butt on the chair’ type of approach has worked for most people (who are committed to studying).

1. How did your career in the mining industry begin and where are you now?

It began when I got a scholarship with Wits to do Mining Engineering in 2002, and 13 years later, I am the appointed Rock Engineer at Joel and Unisel shafts.

2. Why did you choose Rock Engineering?

Actually, it was unplanned and purely coincidental. Anglo-Platinum was in a drive to recruit for their Rock Engineering Department, run by Dougall Fraser, whereby they gave presentations at Wits as part of the drive. I attended one of those presentations and have been interested since then.

3. Please tell us a bit more about your career journey.

I started off as a Leaner Miner at Townlands shaft as part of a requirement for the Mining Engineering Degree, and realised soon enough I was not cut out to be a “Miner”. Following completion of my degree (under the Rock Engineering Department, ADC), I started as a trainee in 2006, pursuing my Strata Control Officers (SCO) Certificate. I became a SCO at Boschfontein and then moved to the Free State to work for Brentley, Lucas and Associates (BLA) in 2008. Two years later, I acquired my COMREC, in 2010, and was appointed Rock Engineer at Target 3 shaft 2012, until its closure in 2014.

4. In your opinion, what are some of the challenges that the fraternity is currently facing?

Being involved in the operations and all the associated responsibilities, we tend to lose touch with the technical side associated with the Engineering. We have become guardians against DMR in our attempts to maintain compliance, unlike Geotechnical Consultants who are only involved for a part of the project (design phase).

5. What are some areas that you believe will become of increasing importance in the near future for the rock engineering discipline?

As mines become depleted, commodity prices fall, mines go deeper and become difficult and more dangerous. Consequently, the DMR becomes stricter and we need to look at what can the Rock Engineers do to assist in the survival of the industry.

6. What advice would you offer people aspiring to be in your position?

All I can say is, “surely it can’t be that difficult”; the ‘butt on the chair’ type of approach has worked for most people (who are committed to studying).

7. Who is your role model/mentor?

I think Deon Louw, particularly for his laid-back demeanour in times of heightened stress.

8. What is the best advice you have ever been given?

If you are confident that you have done what can possibly be expected of you, by your peers and critics, then you don’t have to worry.

ROCK STAR OF THE FIRST QUARTER



*Good judgement
comes from
experience;
experience comes
from bad
judgement – Jim
Horning*



New Concept Mining

Full Name: Heinrich Greeff

Position: Rock Engineer

Company/Organisations: New Concept Mining

Date and Place of Birth: 23 September 1984, Parys (Free State)

Education: Tertiary level Physics and Mathematics, Rock Engineering Certificate

First Job: Assistant Strata Control Officer at AngloGold Ashanti Moab Khotsong Mine

Personal Best Achievement/s: Still have to achieve something of note

Philosophy of Life: Good judgement comes from experience; experience comes from bad judgement –
Jim Horning

Favourite Food/Drink: I think it's a tie between biltong and wine gums

Favourite Sport: Anything that takes you into nature

*Don't take shortcuts,
just study the entire
syllabus – it's worth it.*

*'You have two ears, two
hands and one mouth;
use them in that ratio.'*

1. How did your career in the mining industry begin and where are you now?

I started working as an Assistant Strata Control Officer at AngloGold Ashanti on Moab Khotsong mine in 2009. I worked in the deep level gold mines until 2013 and then relocated to the diamond fields under De Beers Consolidated Mines. I am currently working as a Rock Engineer for New Concept Mining.

2. Why did you choose Rock Engineering?

Lourens Scheepers came to recruit Physics students at the North-West University in my final year of studying. His passion for the discipline was contagious and there was an opportunity to further develop the science through research. I joined because I wanted to make a difference and be part of that development.

3. Please tell us a bit more about your career journey?

Most of my time in Rock Engineering was spent on deep level gold mines. There, I learned to understand stress and rock movement a lot better than I imagined being possible anywhere else. I enjoyed linking theory and actuals and that made it apparent to me that there is room for improvement in our current understanding. Moving away from the gold mines to the diamond fields unearthed my understanding, because all of the sudden, stress was insignificant and gravity called the shots. Looking back over the few years that I've been part of our fraternity, I am excited over what the future might hold.

4. In your opinion, what are some of the challenges that the fraternity is currently facing?

Our mines are some of the best laboratories (worldwide) for research and exploring our understanding of mining; however, the Rock Engineering guys on the mines are often consumed by the amount of paperwork that they are responsible for. This stops them from having the time and energy to explore and be creative in their understanding. It is a challenge to not let work obstruct you from doing your work

5. What are some areas that you believe will become of increasing importance in the near future of the rock engineering discipline?

I believe that in future we will come to understand stress and rock movement better and that this will drastically change the way we perceive quasi-static and dynamic events. I believe that Rheology will come into play and that a distinction will be made between what portions of each occurrence might be related to stress stimulus, and what might just be a result of rock mass movement.

6. What advice would you offer people aspiring to be in your position?

Don't take shortcuts, just study the entire syllabus – it's worth it.

Make time to look at and monitor the small things in your mining environment. Make time for those interesting trips, just to remind yourself of how cool mining actually is.

7. Who is your role model/mentor?

Johan Hanekom is my role model and I strive to achieve his understanding of physics, mathematics and how to apply this every day.

I have had many mentors through my career this far, but none as influential as Gary Williams has been. He forever changed the way I look at mining and the role we play in it.

8. What is the best advice you have ever been given?

You have two ears, two hands and one mouth; use them in that ratio.

Hein is running for the Youth Representative Council Member of SANIRE, whereby he will take over from the predecessor Jannie Maritz.



Dr Harald Cahnbley

Harald was born in 1932 in Hamburg Germany. He went to school there until he was sent to Southern Germany to avoid the bombing during World War 2. Toward the end of the war he returned to Hamburg to help support his family in the aftermath of the war. After school he joined the Post Office in Hamburg and worked there for a short time. In about 1953 Harald came to South Africa, to join the Government Mines Training School and worked at Daggafontein and in the Klerksdorp area. He hoped to study mining at the University of the Witwatersrand, but eventually returned to Germany and studied at the Clausthal University of Technology. While there he was reunited with his best friend's widow, Else, and on graduating, returned with her and her son Jens to South Africa, where they married.

Once here he began work at Rand Mines' Durban Roodepoort Deep Mine in 1963 or 4. During the next 6 years he seems to have been involved in Rock Mechanics. At his instigation, a deep level tunnel on that mine was developed with an asymmetrically arched roof to mitigate stress effects. During the same period Harald completed a PhD at Clausthal, with research on stress measurement using overcoming. The stress regime at depth on DRD was measured as part of this research.

In 1970 he completed his thesis and was awarded his doctorate. Shortly after he left DRD and worked as an independent for a German company in

Mozambique and other areas. The endeavor came to an end due to financial problems and Harald joined JCI as its first Group Rock Mechanics Engineer. There were no rock mechanics departments on individual mines in those days.

In the next 5 years the Chamber of Mines Group Rock Engineers Subcommittee and the Rock Mechanics certificate were established. Initially the Group Rock Mechanics Engineers were the examiners for the exams. They also examined the candidates underground during the practical exam.

In 1979 and 80 Harald began building up JCI's Rock Mechanics Department, sending his selected team member to Dr Stan Patchet's Anglo American Rock Mechanics unit in Welkom for training. Several later prominent Mining and Rock Engineers went through this process.

In 1979 he also had a serious motor car accident on the way home from one of the mines and spent months in hospital. He injured his legs, walking with a stick for years afterwards.

The experience of his staff was that he was prepared to back them up against the sometimes ruthless politics of JCI's head office and management.

Harald enjoyed sailing and kept a Muira keel boat on the Vaal Dam, where he often spent the weekend with his family, sleeping on the boat. In the 80s he got his skipper's license for ocean sailing off Durban, but after a couple of experiences of ocean cruising he lost interest in long cruises due to the loneliness and tedium.

He prided himself on being a linguist often correcting the English language of reports and letters. He also participated in

Alliance Francais for many years. He was also a stickler for the correct notation of the metric system.

Harald questioned everything and loved debate. He had a wide interest in history, language and culture and loved to discuss these over a glass of wine.

He and his family explored much of Southern Africa in his Jeep Gladiator or Wagoneer, visiting remote natural areas and game reserves. They also travelled widely to Europe, Asia and America.

Harald reluctantly retired from JCI in 1992, but continued to travel and enjoy life for many years.

In the past 5 years he suffered from Parkinson's, which became increasingly debilitating. He passed away on 29 January 2015.

He is remembered fondly by many of those who worked with him, as well his family and friends.

A memorial service was held on the 15 February, attended by a very large number of friends, family and colleagues.

Eulogy by John James



Rock Engineering History

From the very beginning of mining operations on the Witwatersrand, the absence of large quantities of suitable and readily available timber in the vicinity decreed that stopes were supported by mine poles or sticks at the immediate face where necessary, and these served well into the back area. Scatter piles or shrinkage piles of broken ore, held in place by timber or metal poles hitched into the hanging and footwall, to serve as working platforms, also provided a support function in steep stopes. Hanging wall control of the back area, particularly during shrinkage recovery operations, was achieved by waste packing. Waste-filled cribs, or pig sty's, and concrete disc packs were later introduced when the reef dip started to flatten out. Sometimes intense support of the face working area with relatively little in the way of back-area support was mooted. Sand-filling was also occasionally employed as workings became deeper and flatter, but, as this was of the post-fill variety, it was of little consequence as a hanging wall support measure. More importantly, pillars of unmined ore acted as the de-facto means of local and regional hanging wall support, but the size, position and distribution of these pillars, particularly in the earlier years, was generally dictated more by grade distribution considerations than by support or rock mechanics considerations.

Nevertheless, whether by accident or design, these methods were ideally suited to the extraction of the extensive, narrow, tabular, brittle, hard-rock orebodies of the Witwatersrand at these relatively shallow depths (<1000mbs). Timber mat packs on their own, for example, would have been entirely inappropriate, and could have led to sudden, extensive back breaks, with all of the attendant ramifications of this type of stope failure.

However, there was an intrinsic drawback associated with the pillar support method, and this manifested itself very soon after the beginning of the new century. With the rapid increase in depth of the Central Rand workings mentioned above, support pillars and other pillars, such as inter-stope remnants, started to fail violently as a result of increasing rock pressure. Catastrophic pressure bursts (rockbursts) were experienced underground and severe earth tremors were felt on surface. While the effects and consequences of these incidents were clear, the underlying causes, and therefore the appropriate preventative measures to be applied, were not all that well understood at first. It was, nevertheless, eventually recognised that the phenomenon was somehow connected with depth, pressure, stoping spans, pillars and convergence, or subsidence as it was then called, and even the exacerbating role of geological anomalies such as faults and dykes was recognised. But appreciation of the key to the mystery, that of stored elastic strain energy in the rockmass giving rise to destructive compressive waves and shear waves when released by sudden failure in the rockmass, was entirely lacking in those early years.

Three separate government commissions were set up in the course of the first three decades of the new century to enquire into the causes and remedial measures to be applied by the industry. Amongst other things, the commissions suggested that the formation of under-designed on-reef pillars, and particularly of remnants, be avoided in workings, but, as mentioned, the lack of fundamental understanding prevented them from making more profound, far-reaching and definitive pronouncements and recommendations on the issue.

The Association of Mine Managers, formed in 1892 to promote the general advancement of mining in the country, and always concerned with safety, particularly underground safety, now took a dominant lead in trying to understand and prevent or ameliorate these events. The Transvaal Chamber of Mines initiated the practice of printing and distributing technical papers and discussions that were presented at regular meetings of the Association, starting in 1931. A volume entitled 'Some Aspects of Deep Level Mining on the Witwatersrand Gold Mines with Special Reference to Rock Bursts' covered the papers read before the Association on the subject in the years 1932 and 1933. At that time, more than 700 earth tremors, or mine tremors, per year were being recorded in the Johannesburg area alone (two per day!).

Continued.....

The healthy and robust debate between mine managers who were holders of various, sometimes conflicting, theories on the subject makes interesting reading, but with the benefit of hindsight it is sometimes frustrating to see how close some of the greatest names in the industry came without actually cracking the nut. But then the war years of the 1940s, however dark they may have been for the world, heralded the long-awaited breakthrough, and can be regarded as the watershed years during which mine-scale experiments in support methodologies and mining layout strategies started to yield the technical understanding and basic principles of deep-level mining that we take for granted today.

The first breakthrough came in the form of a paper presented by H.V. Curtis on behalf of the late H.W. Ardler (who featured prominently in previous work on the subject), supported by no less a personage than C.W. Biccard Jeppe, in which it was suggested for the first time that elasticity in rocks and rockmasses may probably play a fundamental causative role in the phenomenon of underground pressur bursts. It was also suggested for the first time that a permanent body should be established to deal with the question of rockbursts.

There were many insightful mining men of that era, but one name stands out above all of the rest. Following well documented experimentation at ERPM, F.G. ('Pinkie') Hill presented and published a number of ground-breaking papers during the course of the decade on subjects as diverse as destressing inclined shafts by over-stoping (prompted by his description of the complete closure of 100m of the Driefontein Tertiary Incline Shaft by a rockburst); using sticks as the dominant means of hanging wall control in stopes (prompted by previous work on the theory of using 'incompressible' support to prevent bending and sag of hanging wall strata); and, of course, his pioneering introduction of the longwall stoping system in the Hercules Section at ERPM in 1940. Typically he did not take credit for this innovation which he said had been practiced for generations, but he did assert his belief that on the mines of the Central Rand where payability was over 65% some form of longwall stoping would be necessary at depths below 8500 feet (2500m) below surface.

Pinkie Hill must, without doubt, be regarded as one of the foremost thinkers, doers and leaders in the field of rock engineering. He remained actively involved well into the 1960s. Not only did he introduce and champion the now familiar and indispensable concepts of longwalling and over-stoping in deep mining environments, he was also the first to harness the expertise within the engineering research institutions of the Council for Scientific and Industrial Research, from which flowed his work on pre-conditioning blasting. He was instrumental in persuading authorities of the need to establish research facilities within the Chamber of Mines dedicated to solving deep-level and other mining problems (from which the CoM Research Organisation evolved). And it was he who initiated the introduction, recruitment and training of dedicated rock engineering practitioners assigned the task of establishing and expanding the discipline within each of the large mining groups. The cliché of being able to see far into the future only because one is standing on the shoulders of the giants of the past is usually associated with the world of physics, but it can perhaps be applied with equally veracity to the mining engineers and managers of this time.

This story was written by Dave Arnold. Please feel free to contact Dave with any historical stories for the next edition.

davmae@iafrica.com



SANCOT Conference - April 2015

MECHANISED UNDERGROUND EXCAVATION IN MINING AND CIVIL ENGINEERING

The SANCOT conference for mechanised underground excavation in mining and civil engineering was recently held in Durban in April 2015. The conference was compact; however delegates and stakeholders from as far afield as Germany, Switzerland, Turkey and Lesotho were represented, drawing from the consulting through to manufacturing and government arenas. The conference was presented over two days followed by a site visit to the Durban Harbour tunnel (pictures, inset) which was constructed with the use of a tunnel boring machine. Jeanne Walls and William Joughin represented SANIRE and SRK at the conference.

In the mining sector, tunnelling is integral to establishment of accesses and ore handling facilities. Whereas conventional drill and blast methods have historically dominated tunnel development and support installation, particularly in South African mines, the move to mechanisation in shaft sinking, horizontal and vertical raiseboring and support installation is rapidly entering the area of conventional practices. Presentation topics included mechanised installation of support (Geobrugg, SMEC), tunnel boring technology from an EPCM (WorleyParsons) and manufacturing (Master Drilling and Petra Diamonds) perspective and geotechnical considerations for large-scale projects (SRK).

In the civil sector, managing the risk of boring tunnels for infrastructure in developed urban areas, beneath airports (Herrenknecht), suburbs (GIBB, Gautrain) and the Durban harbour (eThekwin Municipality) made for some enlightening discussions. Microtunnels (Hatch), sea outfalls (Herrenknecht) and asset management (GIBB) completed the technical topics.

Going forward, SANCOT is in the process of revitalising its portfolio under the chair of Ron Tluczek (AECOM) who attended the annual ITA conference in May in Dubrovnik, Croatia. Included in the portfolio is several working groups commissioned under the ITA to develop guidelines for tunnelling in various areas of interest, including vertical tunnelling and asset management, amongst others. The Young Professionals' Forum (YPP) is a new initiative that falls under the ITA and intends to engage with SAICE, SANIRE and SAIMM to develop new talent while bridging the gap with seasoned experience. SANCOT expects to become increasingly involved in projects including the Lesotho Highlands Phase II and uMkhomazi Water Project in KwaZulu-Natal.

Finally, in case anyone thought the conference was all business, well, it was considered by some to be my greatest achievement to remain pink-faced and cheery with a hangover while negotiating a boat cruise out to open water on the last morning.



For more information, contact jwalls@srk.co.za or visit the webpage at <http://www.saimm.co.za/sancot>
SANCOT was formed in 1973 and is a founding member of the [International Tunnelling Association](http://www.intertunnel.org)

Article by Jeanne Walls, SRK Consulting

PERSONALITY OF THE SECOND QUARTER



Philosophy of Life:

*“Respect other
people’s way of
thinking.”*

Full Name: Lucille Cilliers

Position: Rock Engineer

Company/Organisations: Open House Management Solutions

Date and Place of Birth: 7 September 1968, Welkom Free State

Education: COMRE, AREC

First Job: Clerk at Senwes Co-operative, Klerksdorp

Personal Best Achievement/s: Obtaining my Rock Engineering qualifications in 7 years (of which, 2010 was a gap year after I had obtained the COMRE certificate, and 2012, during which I looked after my father who suffered brain cancer and passed away in the same year. Strictly speaking, 5 years of studying)

Philosophy of Life: Respect other people’s way of thinking. $6+3=9$, but so does $5+4$ produce the same answer. Your way of doing things is not necessarily the best or only way it can be done.

Favourite Food/Drink: Anything that my mother dishes up! Especially if it is oxtail!

From my
father –
budget and
don't buy on
credit.

1. How did your career in the mining industry begin and where are you now?

My career in the mining industry started on 21 August 1990 when I was appointed as a clerk at the Trade Accounts Department of Hartebeestfontein Gold Mine. I worked in various sections of the mine's Accounts Department, but was then retrenched during 1999 when the mine downscaled, just before DRD closed down. At the very same time as my retrenchment occurred, a new door opened at the Rock Engineering Department, where I started working as Secretary in October 1999. In February 2000, Open House Management Solutions was established and the mine's Rock Engineering Department was outsourced to the newly founded company. I transferred as secretary to the new company and then acted as Personal Assistant to Koos Bosman, the then Managing Director of Open House.

Working in the same position for almost eight years eventually became non-challenging and this began to frustrate me. After complaining to Koos about my frustration, he encouraged me to start studying and directed me in the direction of becoming a Rock Engineer. On 7 August 2007, I undertook my first "experimental" underground visit and this was the beginning of a new life for me.

2. Why did you choose Rock Engineering?

Rock Engineering chose me! I do believe that this was directed by God who opened new doors, and who also gave me the strength to start and to prevail in this career.

3. Please tell us a bit more about your career journey?

My Rock Engineering career started when someone else believed in my abilities – that I could do it, even before I thought so myself. I remember 6 August 2007 very well. I once again was complaining about my frustration and Koos suggested that I should consider a career in Rock Engineering. An hour later, an underground visit for the next day was organised. After returning from the underground trip the next day, with a "en was dit nou so erg?", Koos handed the Jager and Ryder's Handbook to me. This posed an exciting challenge that I grabbed with both hands.

Since then, I studied on and worked in different mining environments, such as deep level gold mines, multi-reef chrome mines, and open pit mines. I obtained the Chamber of Mines Rock Engineering Certificate in 2009 and the Advanced Rock Engineering Certificate during 2014. I'm currently part of the consulting team at Open House.

4. In your opinion, what are some of the challenges that the fraternity is currently facing?

In my opinion, South Africa faces some of the most severe rock engineering challenges in the world, with ageing mines and new developing mines creating a diverse scope of rock engineering demands. This ever-changing landscape requires people who are pro-active in their approach, and therefore Rock Engineers should be encouraged to equip themselves with unceasing knowledge in order not to stagnate – especially those on shafts who have become accustomed with what they have been doing for so long.

5. What are some areas that you believe will become of increasing importance in the near future of the rock engineering discipline?

I do believe that technology and new or better modelling programmes will become increasingly advanced and that the future of any professional rock engineer will depend on how technologically advanced his or her approach to design development will be.

6. What advice would you offer people aspiring to be in your position?

Making a career change took hard work, dedication, determination and a positive attitude, and I must admit that I wouldn't have achieved this if it were not for those people who stood by me. Ensure that you have relatives, friends and colleagues that support you! People made a difference – people who believed in me, and people who gave me the chance and supported me. This also makes me believe that I can make a difference in other people's lives.

7. Who is your role model/mentor?

Koos Bosman, CEO of Open House Management Solutions. If it were not for his understanding, positive support and motivation, not to mention the Saturdays and public holidays he sacrificed helping me with the studies, I would most probably still be complaining about the disheartening office work.

8. What is the best advice you have ever been given?

From my father – budget and don't buy on credit.



ROCK STAR OF THE SECOND QUARTER



Philosophy of Life:

'Limitations are those you set in your mind, or permit others to set up for you.'

Full Name: Thokozani Sidwell Habile

Position: Senior Rock Engineering Officer

Company/Organisations: AngloGold Ashanti

Date and Place of Birth: 30 April 1986, Piet Retief, Mpumalanga

Education: BSc Honours, Computational and Applied Mathematics (Wits)

First Job: Promoting Saturday Star at Clearwater Mall (Roodepoort)

Personal Best Achievement/s: Achieving my honours degree at Wits and Rock engineering ticket.

Philosophy of Life: Limitations are those you set in your mind, or permit others to set up for you.

Favourite Food/Drink: Pap and braai meat with gravy, and spinach with that.

Favourite Sport: Soccer, Cricket

*Do not take a decision
that you won't be able
to defend when
problems arise in future.*

*"When in doubt, say
no".*

1. How did your career in the mining industry begin and where are you now?

My career began at Wits University (2004–2008) where I completed my applied maths degree. In 2009 I started in the Rock Engineering Department as an assistant strata control officer, where I was doing the numerical modelling for West Wits Mines, and doing instrumentations for projects in place. Then I felt a need for underground exposure, which then directed me to Nostrada Rock Mechanics in the Rustenburg area, where I was worked as a Strata Control Officer for a year. A year later, I moved to BLA (Harmony Kusasaletu mine) which was my first time working as a Rock Mechanics Officer in a gold mine, and I learned a lot there, I must say. Due to personal reasons and the desire to move closer to my family in Mpumalanga, a year later I joined Great Basin Gold and by that time I had just passed all my 3 Rock Mechanics papers. I was retrenched after a month of working there, and then I returned to AngloGold Ashanti in October 2012, where I got my Rock Engineering ticket after 5 attempts. I was appointed as Senior Rock Engineering Officer in 2015.

2. Why did you choose Rock Engineering?

Rock Engineering is technical and it involves a lot of mathematics for most of the decisions being made in the industry, so that makes it easy for me to understand the concepts used.

3. Please tell us a bit more about your career journey.

My career journey from high school to university was nice and smooth, although it started to become challenging when I failed my practical 4 times. That frustrated me a lot, because it had never happened before in my life. But that never stopped me from becoming a Rock Engineer, and in fact I became a better Rock Engineer because I started reading articles and researching into mining. Failing has helped me not only to understand my mine, but also to understand the principles of Rock Engineering, and accordingly I can apply my knowledge at any mine.

4. In your opinion, what are some of the challenges that the fraternity is currently facing?

There are 3 challenges I think rock engineering is facing.

Rock Engineers in the shafts don't have enough time to research and design, as shaft work requires them to carry out underground visits and routine rock engineering work. We rely too much on work done by previous Rock Engineers.

There is a lack of transfer of knowledge from experienced Rock Engineers to the new, up and coming ones.

The Strata Control Officers have to write reports for the Rock Engineering Practical with content, but they are not exposed to this on a daily basis.

5. What are some areas that you believe will become of increasing importance in the near future for the rock engineering discipline?

Understanding seismicity and Modelling will become more important as the mines go deeper.

The legal responsibilities will be stricter, as government is heading for zero harm in the mine industry.

6. What advice would you offer people aspiring to be in your position?

Do not take a decision that you won't be able to defend when problems arise in future.

7. Who is your role model/mentor?

Mr Gary Dukes

8. What is the best advice you have ever been given?

"When in doubt, say no".

TECHNICAL CORNER

INFLUENCE OF STRESS AND STRAIN ON OPEN STOPE HANGINGWALL STABILITY

Jaco le Roux

Brentley, Lucas and Associates Mining Consultants

A design criterion called the Dilution Stress-Strain Index (DSSI) was developed by Le Roux (2015) allowing the user to determine the possible failure into the hanging wall and sidewalls of an open stope. Using the following design criterion:

$$DSSI = \frac{\sigma_m}{q \varepsilon_{vol}}$$

where q is the slope of the linear trend line,

σ_m = mean stress and can be mathematically expressed as follows:

$$\sigma_m = \frac{1}{3}(\sigma_1 + \sigma_2 + \sigma_3)$$

where σ_1 , σ_2 and σ_3 represents the major, intermediate, and minor principal stress, respectively (Ryder and Jager, 2002).

ε_{vol} = volumetric strain and can be mathematically expressed as follows:

$$\varepsilon_{vol} = (\varepsilon_1 + \varepsilon_2 + \varepsilon_3)$$

where ε_1 , ε_2 and ε_3 represents the major, intermediate, and minor principal strain, respectively (Ryder and Jager, 2002).

By applying the Dilution Stress-Strain Index (DSSI) where $\sigma_m = 85\text{MPa}$, which is the maximum allowable mean stress for open stope hanging wall failure as determined from the back analyses on Target Mine. Using Map3D, areas within the open stope hanging wall or sidewall can be identified where instability may occur. Figure 1 below indicates such areas in light grey around the open stope whereby the criterion was applied. The predicted failure corresponded very well with the actual observed failure in the hanging wall as shown by the Cavity Monitoring system (CMS) of the open stope plotted in red on Figure 1.

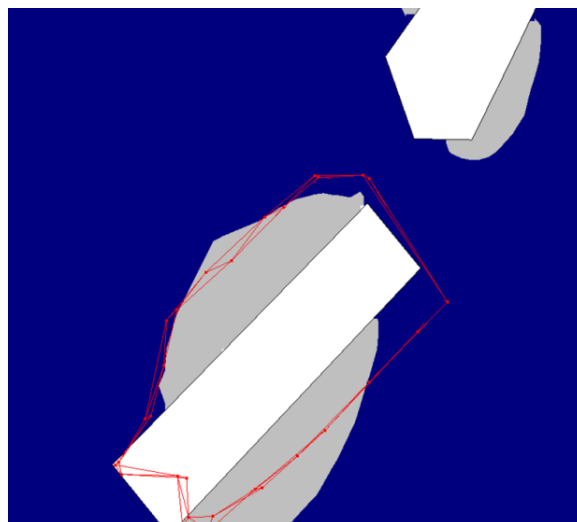


Figure 1 - Application of the Dilution Stress-Strain Index for hanging wall on a planned open stope and showing the final CMS of the open stope

When compared to the applied Mohr-Coulomb failure criterion developed for failure around open stopes using

$$\sigma_1 = 3.6 \sigma_3 + 68$$

The Mohr-Coulomb failure criterion results indicated that there will be major failure in the hanging wall and sidewalls of this stope as shown in light grey in Figure 2. When compared to the applied Hoek-Brown failure criterion developed for failure around open stopes using

$$\sigma_1 = \sigma_3 + 250 \text{ MPa} \left(1.307 \frac{\sigma_3}{250 \text{ MPa}} + 0.0483 \right)^{0.5}$$

The Hoek-Brown failure criterion results indicated that there will also be major failure in the hanging wall and sidewalls of this open stope as shown in light grey in Figure 3. These results do not correspond with the actual CMS of the open stope plotted in red on Figure 1. The results indicate that the effect of the intermediate stress and volumetric strain should not be underestimated.

Figure 2 - Application of the Mohr-Coulomb failure criterion on a planned open stope

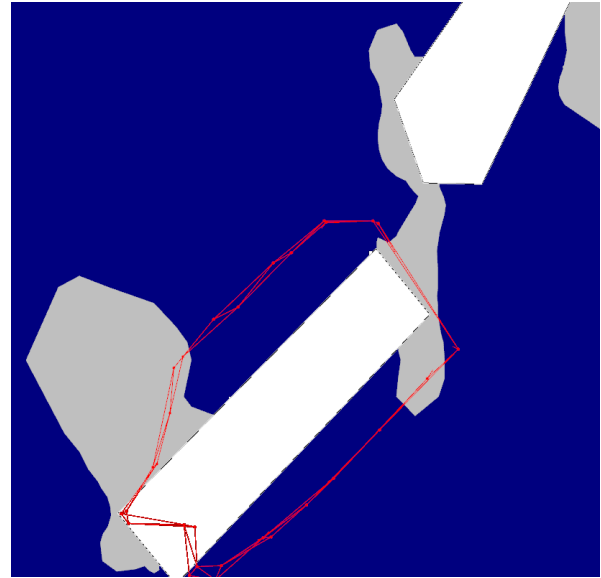


Figure 3 - Application of the Hoek-Brown failure criterion on a planned open stope

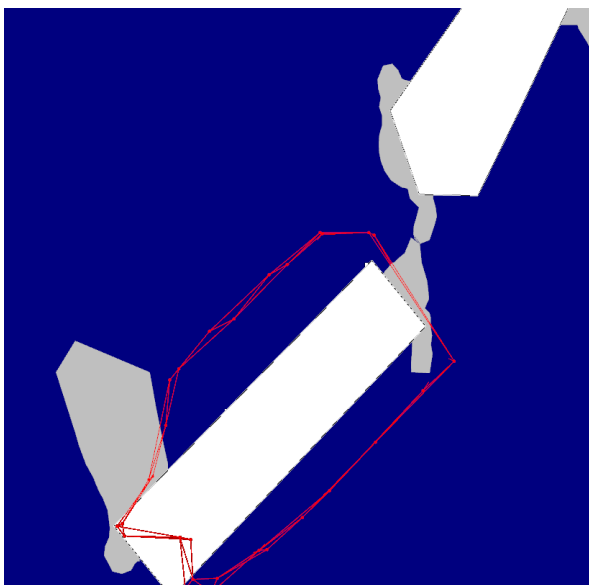
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Ryder, J.A. and Jager, A.J. (2002) A Textbook on Rock Mechanics for Tabular Hard Rock Mines, The Safety in Mines Research Advisory Committee (SIMRAC), Johannesburg, 2002.

Henning, J.G. and Mitri, H.S. (2007) Numerical modelling of ore dilution in blasthole stoping (Vol 44. 5. pp. 692-703). International Journal of Rock Mechanics & Mining Sciences.

Le Roux, P.J. (2014). Measurement and Prediction of Dilution in a Gold Mine Operating with Open Stopping Mining Methods (Unpublished Doctoral thesis). University of the Witwatersrand, South Africa.

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SANIRE Symposium 2015



SANIRE Free State is hosting a Rock Engineering Symposium:
Unpacking the Aspects

**@ Glenburn Lodge, Muldersdrift on
17 September 2015**

Sponsorship
Sponsorship would be greatly appreciated from any product and service suppliers. Suppliers have played an equal role as the rock engineers in making the industry a more productive and safer environment

Interesting topics from the entire industry: Gold, Platinum, Diamonds & Coal, etc. will be presented

Symposium Fees
SANIRE members - R1250
Non-members - R1500
Exhibition space - R5000

Closing date for registrations and payments:
10 August 2015

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Exxaro Rock Engineering Training Centre (RETC)

To ensure zero harm in underground workings it is necessary to ensure that the underground personnel understand what their actions are on the behaviour of the strata.

To achieve this normal training on Mine Standard, Codes of Practice and Work Procedures is not adequate on its own. Persons need to understand why this standard was introduced in the first place.

After Danie Snyman (Manager, Rock Engineering Support Services for Exxaro) found that too often production personnel interpret ground conditions incorrectly and then implementing control measures that was not only ineffective but also gave a false sense of security to the section personnel he decided to build a rock engineer training centre.



Exxaro RESS personnel at the entrance to the RETC

The Exxaro Rock Engineering Training Centre (RETC) is designed to help production supervisors to understand what factors affect strata stability. It also serves as an eye opener for all personnel, literate and illiterate, using practical models, photographs and sketches to demonstrate why certain control measures are effective and others not.

The first room is designed to teach underground personnel about stress effects and how to manage it



The training centre is designed to follow a storyline discussing the different modes of strata failure, specific risk associated with these failures and effective controls to combat losses. The thinking process that a person must go through when conducting a proper rock engineering risk assessment is also included in the storyline. The Training centre is also aligned with the Exxaro rock engineering risk assessment template.

Models are designed and constructed to simulate and translate the complex mathematical concepts as manifested in the rock mass under different loading conditions. These models also had to be realistic and be understood by all levels of literacy.

Months of planning and deliberations went into designing the models and many sleepless nights transpired but finally one-by-one the models took shape and very positive feedback is received from everyone who passes through the centres' doors.



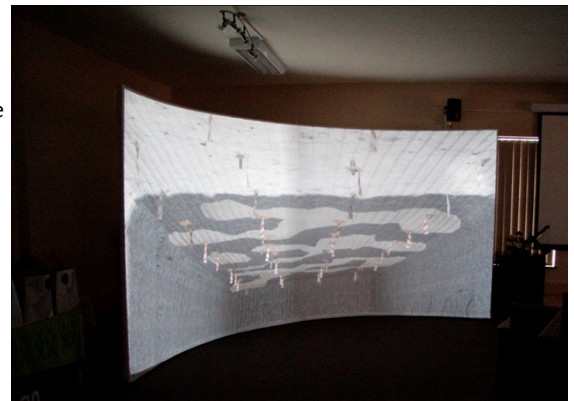
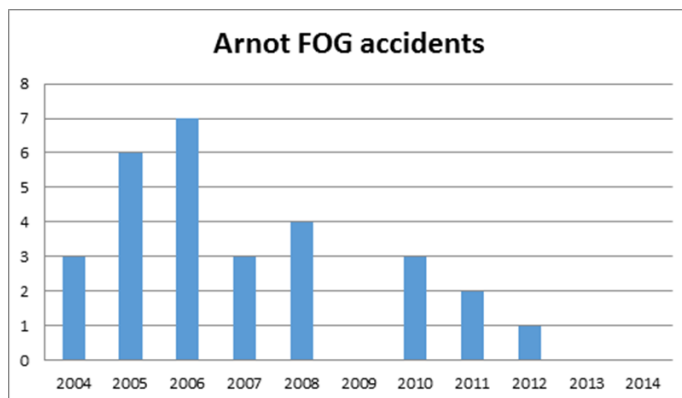
A model that explain how competent beams in the overburden results in longwall face breaks

Currently the centre houses about 60 models in four rooms but Snyman hope to increase this to at least 100 in the next few years.

The latest addition to the RETC is a six meter wide curved screen on which 3D virtual reality clips are projected

The 3D curved screen is housed in the auditorium

Was all this effort worth it? – Snyman will let Arnot's FOG accident stats do the talking



Written by: Danie Snyman
Manager Rock Engineering Support Services
Exxaro Coal





For any queries and assistance in regard to CoM Strata Control and Rock Engineering Exams please follow the website www.sanire.co.za

or alternatively contact contact Yolande Jooste.

Yolande.Jooste@Harmony.co.za



SANIRE has embarked on a new initiative to capture a series of video lectures, presented by SANIRE members and fellows who have made major contributions to the rock engineering fraternity. Our intention is to create two or three video lectures per year, which will be available for SANIRE members to download from the website. This follows the example set by the International Society for Rock Mechanics (ISRM). Currently there are nine online lectures available on the ISRM website and the most recent was presented by our very own Professor Dick Stacey (Professor Emeritus, University of the Witwatersrand) on 2015/04/16. SANIRE members are encouraged to suggest speakers and topics for future video lectures.

Professor Nielen van der Merwe presents SANIRE's first video lecture. Nielen is a past SANIRE President and a past president of the ISRM, the only South African to achieve this honour. Nielen is also a past president of the SAIMM and the Federation of International Geo-Engineering Societies amongst many other honours. He has made great contributions to rock engineering education through his roles as Professor, Centennial Chair for Rock Engineering, Wits and head of the Mining department at Tukkies. Prior to this, Nielen was the programme manager for CSIR Mining Technology and the Group head of Rock mechanics SASOL. Nielen has published numerous papers and made a major contribution to our fraternity, particularly in the field of coal rock mechanics. More recently Nielen has taken an interest in variability and risk in rock engineering, a new and important field, which is the subject of this video lecture. The lecture is entitled :

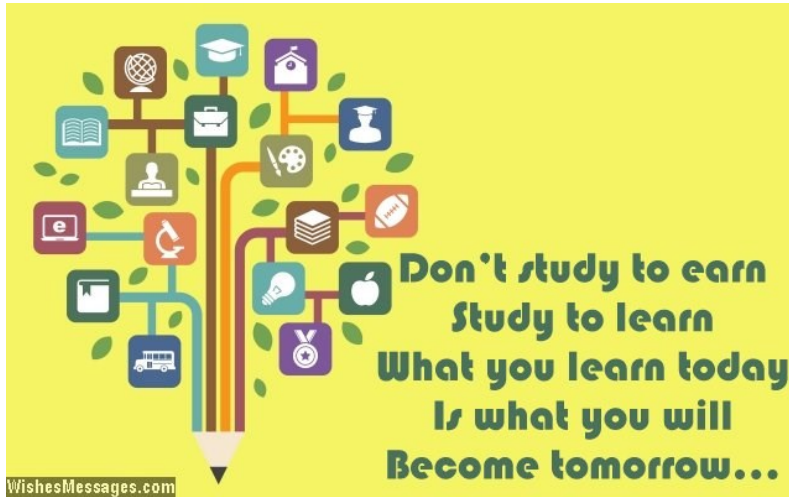
"Getting a Grip on Reality in Rock Engineering"



William Joughin

Past President of the SANIRE Council

COM Results



The results for the
**CoM Strata Control
and Rock Engineering
Exams** will be
released on the 10th
July 2015.

Good Luck!!!

STRATA CONTROL OFFICER PRACTICAL EXAM

On 5 March 2015, the SANIRE Eastern Bushveld Branch, in conjunction with Samancor, held a successful Strata Control Practical examination at Lannex Broken Hill Mine. The day began with a total of 17 candidates and 10 examiners arriving at Samancor ECM Central Offices, where a visitors' induction was conducted and underground plans provided to the candidates. The examination then proceeded to Lannex Broken Hill Mine where the candidates were taken to several underground observation points, from where the MG2 and MG3 ore bodies could be identified. After the underground portion of the practical exam, the candidates and examiners were treated to a delicious snack lunch by Samancor at the ECM Central Offices. The practical exam continued with candidates being individually tested by groups of two examiners for the entire paper, and negative marking was applied owing to the large number of candidates. Overall, the candidates did well, with 7 of the 17 passing the examination and obtaining their SCO Certificate. In general, candidates did very well in the plan reading, average in underground observations, and poor in the geological section. A big 'thank you' on behalf of SANIRE Eastern Bushveld Branch must go to Jimmy Kidd and Samancor for hosting a very well organised practical examination.

ADAM COOPER



ROCK QUIZ

The lucky winner of the
first **ROCK QUIZ** was:

Nthuba Mahloko





SANIRE

SOUTH AFRICAN NATIONAL INSTITUTE OF ROCK ENGINEERING

Vision: To promote the interests of a vibrant South African Rock Engineering Fraternity

Mission: SANIRE promotes the advancement of the Rock Engineering discipline through the following objectives:

- ◆ Encouraging interest and the advancement of education in Rock Engineering
- ◆ Maintaining professional practice and high standards of ethics
- ◆ Encouraging networking; Collaboration and information exchange
- ◆ Identifying, promoting and facilitating rock engineering related research

Values:

- ◆ **Honesty**
- ◆ **Integrity**
- ◆ **Professionalism**
- ◆ **Accountability**
- ◆ **Transparency**

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EDITORS CORNER

This is your newsletter and I would like to hear from you.

If you have any information or stories that we can use, please submit them via email to

paul.couto@norplats.co.za or paul.coutopm@gmail.com

Your feedback will be highly appreciated.

Paul Couto

