



INSIDE THIS ISSUE:

AfriRock 2017	2
Gauteng Branch Feedback	4
Free State Mini Symposium	8
SANIRE Birthday's	9
Personality of the Quarter	10
Rock Star of the Quarter	14
History	16



President's Corner

Monkey see, monkey do



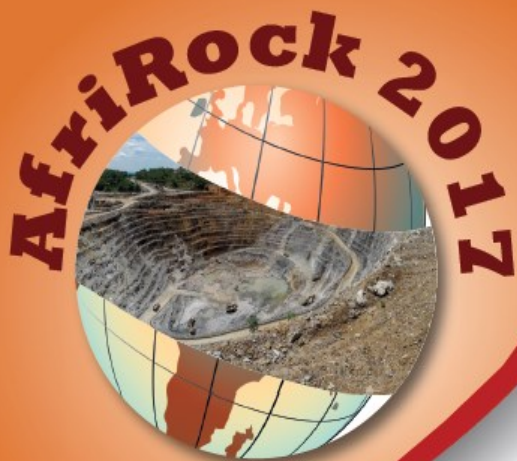
My son Lihan has just turned 2 and every day I am astonished at how he is able to absorb and adapt to his surroundings. Although he is entering the "terrible twos" and verbally expresses his frustration with life, we need to understand that he is struggling between his reliance on us as parents and the desire for independence. At this stage, he absorbs everything said and done around him, and also acts this out. The photograph above was taken at Raka Winery. While I was tasting wine, he was tasting the corks. Whether this was a hint for food or a way of sampling the wine remains a mystery.

In our working environment, we typically form ourselves based on our mentors, managers, their work ethic, and strengths and weaknesses. In some cases, this allows us to thrive and excel in what we do. However, in some areas, mentorship is a luxury and a Rock Engineer could be operating on an isolated operation. As a result, he or she can only rely on his or her own experience and expertise.

On many operations, the design and layout parameters were put in place many years ago and by "respected" Rock Engineers. Consequently, we presume that these designs are correct and cast in stone. However, in this lies a flawed approach. Although these designs were adequate at the time, we have to challenge their continued applicability, based on our knowledge of the environment, new research findings, technology, methodologies and best practices.

I would want to equip my son Lihan with tools which will provide him with the ability to grow and recognise the strengths, weaknesses, limitations and opportunities in every situation. At some stage in his life, he will value the example set by his parents, but will start to mould himself on a new set of criteria, whether it be a role model or his environment. As Rock Engineers, we have the choice to continue to use a copy-and-paste approach (monkey see, monkey do) or we can equip ourselves with the necessary tools to ensure that we excel. As Engineers, we should design for purpose, optimise designs and eliminate risk.

Michael du Plessis - SANIRE President



ISRM International Symposium 'Rock Mechanics for Africa'

2-7 October 2017
Cape Town Convention Centre, Cape Town



BACKGROUND

The first African Regional Rock Mechanics Symposium is to be held in Cape Town 2017. Mining has traditionally been a mainstay of African economies, while Oil and Gas industries are rapidly growing throughout Africa. Infrastructure is being developed to support these industries. Rock engineering design is and therefore will continue to be essential for the growth of the continent.

EXHIBITION/SPONSORSHIP

Sponsorship opportunities are available. Companies wishing to sponsor or exhibit should contact the Conference Co-ordinator.

WHO SHOULD ATTEND

- Rock engineering practitioners
- Researchers
- Academics
- Mining engineers
- Civil engineers
- Petroleum engineers
- Engineering geologists.

TECHNICAL VISITS

The following technical visits are proposed for the conference:

- Chapman's Peak
- Structural Geological
- Platinum Mine
- Deep Gold Mine
- Diamond Mine.



TENTATIVE PROGRAMME

Sunday 2/10/2017	Monday 3/10/2017	Tuesday 4/10/2017	Wednesday 5/10/2017	Thursday 6/10/2017	Friday 7/10/2017
ISRM Board Meeting	ISRM Commission Meetings	Technical Session Morning Refreshments Technical Session Lunch Technical Session Afternoon Refreshments Technical Session			Technical Visits
	ISRM Council Meeting				
Board Dinner	Council Reception	Function	Conference Opening	Conference Dinner	

For further information contact:

Raymond van der Berg, Head of Conferencing
SAIMM, P O Box 61127, Marshalltown 2107
Tel: +27 (0) 11 834-1273/7 · E-mail: raymond@saimm.co.za
Website: <http://www.saimm.co.za>



SAIMM
THE SOUTHERN AFRICAN INSTITUTE
OF MINING AND METALLURGY

First Announcement and Call for Papers

AfriRock 2017

ISRM International Symposium
'Rock Mechanics for Africa'

2-7 October 2017 · Cape Town Convention Centre, Cape Town

Call for papers

CALL FOR PAPERS

The Symposium is being organised by the Southern African Institute of Mining and Metallurgy, and individuals are invited to submit papers for the Symposium. Titles and short abstracts (no more than 500 words) should be submitted in **English** to Head of Conferencing, Raymond van der Berg, via e-mail: raymond@saimm.co.za

Enquiries may be made at: Tel: +27 11 834-1273/7

Facsimile: +27 11 838-5923 or

E-mail: raymond@saimm.co.za

Website: <http://www.saimm.co.za>

TOPICS

- Fracture and damage of rocks
- Numerical modelling
- Constitutive models

- Rock mechanics data
- Deformable rock
- Instrumentation and monitoring
- Ground consolidation
- Specialised blasting to minimise rock damage.

KEY DATES

- | | |
|-------------------------|----------------------------|
| 3 October 2016 | Submission of abstracts |
| 10 October 2016 | Acceptance of abstracts |
| 13 January 2017 | Submission of final papers |
| 2-7 October 2017 | Symposium |

The Southern African Institute of Mining and Metallurgy

Head of Conferencing, Raymond van der Berg

AFRIROCK 2017

P.O. Box 61127, Marshalltown, 2107, Tel: +27 11 834-1273/7

THE DETAILS OF THIS FORM CAN BE E-MAILED TO: raymond@saimm.co.za
or FAXED TO: +27 11 838-5923 / 833-8156

☐

I am interested in attending the conference

☐

I intend to submit an abstract of the proposed paper entitled:

Title of paper:

Personal Details: Name

Address

Tel: Fax:

E-mail:

A very successful technical evening was held by SANIRE's Gauteng Branch on 30 June 2016 at WITS University's Digital Mine facility, in conjunction with New Concept Mining. Prof Fred Cawood and his team of postgraduate students facilitated the event in the superb mine design laboratory, which was put together through sponsorship from Anglo American. Two talks were presented; the first talk was by WITS postgrad student, Prince Mulenga (SRK) on coal squat pillar design using numerical modelling, followed by Prof Cawood's overview of the WITS digital mine facility and of the state of the art in mining technology, as well as of history and a vision for the future.

After the talks, which were attended by some 45 rock engineering practitioners and students from Gauteng, Prof Cawood led a tour through the digital mine setup in the Faculty of Engineering and the Built Environment (School of Mining Engineering). The "mine" comprises physical mock-ups



representing typical underground operations in South Africa, including a shaft built into the main stairwell, a



development tunnel complete with ventilation pipes and digital monitoring systems (funded by Gold Fields of South Africa and Sibanye), a lamproom, and a stope, the latter being constructed with funding from New Concept Mining. The digital mine and mock-up facilities provide students with a location in which to familiarise themselves with the 3D world of underground mining, while overcoming the challenges of underground communication and monitoring.

To wrap up the evening before the last cage out to surface, we were treated to the usual round of drinks and delicious catering from Olives and Plates, courtesy of NCM (thanks, Brendan ☺).



The visit to WITS' Digital Mine Facility forms part of a revitalisation initiative by the Gauteng Branch to regenerate interest and participation from rock engineering practitioners in the Gauteng region. In contrast with operational branches, Gauteng represents mostly office-based consultants and academics, which provides a unique focus to the content of technical talks and opportunities for "site" visits. 2016 started off with the most fortuitous presentation by Dr Nick Barton at SRK in April, and will follow up the WITS' evening in September with a visit to the University of Pretoria's 3D virtual reality centre. A year-end function has been suggested at the Walter Sisulu

Botanical Gardens, which includes a geological walk containing exposures of Orange Grove Quartzites along the JCI hiking trail, put together in 1997.

We have many more initiatives up our sleeve. Look out for the SANIRE Gauteng Branch Facebook page, "like", "share" and suggest posts. Looking forward to our next evening of networking and new ideas!



(P.S. – if members have gone "missing" or new members need to be added, please contact Prince at PMulenga@srk.co.za).

Jeanne Walls
Principal Rock Engineer, SRK Consulting



New Concept Mining

Integrated systems of support

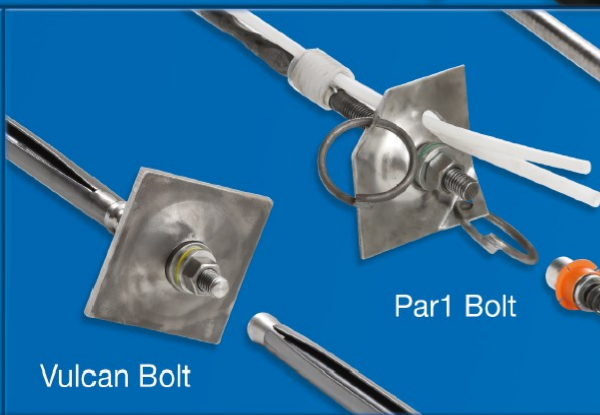
FOGStick
Early Warning
Devices



FOGLight
Early Warning Devices



Vulcan Bolt



Par1 Bolt



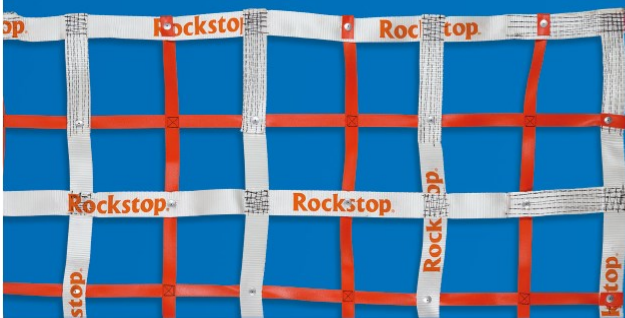
MP1 Bolt



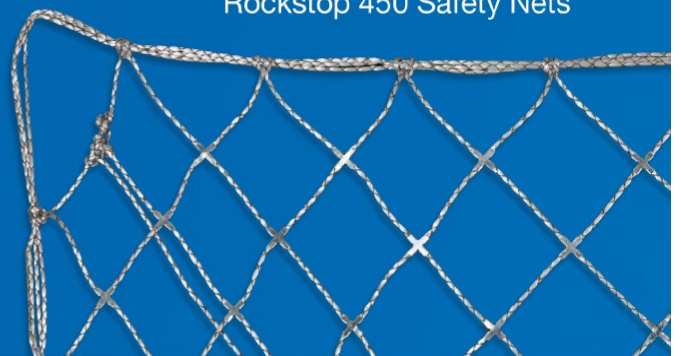
MG Bolt



Rockstop Safety Nets



Rockstop 450 Safety Nets



Patents Apply © New Concept Mining 2016

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www.ncm.co.za

SANIRE Free State Branch Mini Symposium 2016

A Strata Control Mini Symposium was organised and held by the SANIRE Free State Branch at Diggers Inn in Welkom on the 9th June 2016. The day was opened with a keynote address from the SANIRE President, Mr Michael Du Plessis.

The following presentations were presented on the day during two sessions which were led by Dr Jaco Le Roux and Mr Paul Couto:

- I. Thinking Beyond Set Installation – JC Bann (Masimong)
- II. Installation of Temporary Support in a Restricted Face as a Result of Ore Accumulation After a Blast and the Possible Solutions – Juan Littl (Bambanani)
- III. The Effect of Ultra-High or Low Stress on the Stability of Long Hole Stopping – Leonard Vernooy (Target)
- IV. The Mosquitos of the Mining Industry – Ian Crozier (Tshepong)
- V. Ground Control Districts and Rock Mass Behaviour – Louis Lochner (Phakisa)
- VI. Coal Squat Pillar Design using Numerical Modelling – Prince Mulenga (SRK)
- VII. Ground Control Challenges in the Tshepong Decline – Niven Makhubele (Tshepong)
- VIII. Structurally-Related Hangingwall Alterations Contributing to UG2 Stope Instabilities at – Alida Hartzenberg (Lonmin)

The symposium was inspiring, with exceptional presentations being presented on the day. The hard work from these individuals serves as a reminder of what value the rock engineering community offers the mining industry.

The victor of the 2016 Mini Symposium, with his work on Coal Squat Pillar Design, was Prince Mulenga. He was followed by Alida Hartzenberg and Ian Crozier.



A special note of thanks goes to the presenters, judges, organizers, attendees and sponsors.



On behalf of all the SANIRE Members and Council we would like to wish the following members a very happy birthday.....



AUGUST

<i>J W Klokow</i>	<i>E Makhubu</i>
<i>J E Keen</i>	<i>J Chinyadza</i>
<i>D Rakometsi</i>	<i>J S Mpofu</i>
<i>R J Durrheim</i>	<i>A Gwenhure</i>
<i>F Essrich</i>	<i>O T Tsetsewa</i>
<i>D Geyser</i>	<i>D G Mhlanga</i>
<i>K R Brentley</i>	<i>O S Masinge</i>
<i>PA Holtz</i>	<i>L Kawali</i>
<i>A R Leach</i>	<i>D Nyungu</i>
<i>G P Dyke</i>	<i>P J Spies</i>
<i>T M Fobo</i>	<i>M J Masufi</i>
<i>R A Lamos</i>	<i>M L Shongwe</i>
<i>W C Joughin</i>	<i>T D Mangali</i>
<i>M J Dunn</i>	<i>M P De Moliner</i>
<i>G L Hungwe</i>	<i>F Kwangwari</i>
<i>K Drescher</i>	<i>Q Enslin</i>
<i>R Carstens</i>	<i>J.J. Matthysen</i>
<i>P J Wessels</i>	<i>NL Nene</i>
<i>W M Bester</i>	<i>R S Matonana</i>
<i>P A Greyling</i>	<i>H N Makhubele</i>
<i>G J Keyter</i>	<i>M W Pretorius</i>
<i>I B Paton</i>	<i>A Makungo</i>
<i>R K Jele</i>	<i>O Pillay</i>
<i>J S van Buuren</i>	<i>B A Hales</i>
<i>C P Fietze</i>	<i>S Smith</i>
<i>M Mahlangu</i>	<i>R H Kemp</i>
<i>J N Ekkerd</i>	

SEPTEMBER

<i>C Muirhead</i>	<i>S F C van der Wath</i>
<i>KL Riemer</i>	<i>M V Moraba</i>
<i>I Wermuth</i>	<i>M E Mphaki</i>
<i>A F Odendaal</i>	<i>N W Meyer</i>
<i>A M Milev</i>	<i>N Harijhan</i>
<i>K D Balt</i>	<i>H M Kgole</i>
<i>G Macnab</i>	<i>N V Manganye</i>
<i>O P McMahon</i>	<i>E Mathonsi</i>
<i>L van Aswegen</i>	<i>G Driemeyer</i>
<i>S Poczik</i>	<i>L Thomson</i>
<i>V Lenkoe</i>	<i>T Q Selete</i>
<i>GDT Judeel</i>	<i>A Janse van Rensburg</i>
<i>M D Riley</i>	<i>Y Arunachellan</i>
<i>R S McDougall</i>	<i>M Mojaelo</i>
<i>F A Koen</i>	
<i>M G Bampa</i>	
<i>L Cilliers</i>	
<i>H C J Esterhuizen</i>	
<i>G J van Hout</i>	
<i>T Rangasamy</i>	
<i>Dr M Ruest</i>	
<i>G N Motshwane</i>	
<i>G M H N Jansen van Vuuren</i>	
<i>Y Bester</i>	

OCTOBER

<i>K Yathavan</i>	<i>T Ntsenyana</i>
<i>R C More O'Ferrall</i>	<i>C J Brink</i>
<i>T R Stecey</i>	<i>D T Makou</i>
<i>G van Aswegen</i>	<i>O F Mmutlane</i>
<i>J J Laas</i>	<i>C P F van Rooyen</i>
<i>D P Venter</i>	<i>P Bezuidenhout</i>
<i>J van Oort</i>	<i>A. Phatela</i>
<i>L E Dietrich</i>	<i>A Cooper</i>
<i>J J Bornman</i>	<i>S J Etchells</i>
<i>C L Cronje</i>	<i>M G Magwaza</i>
<i>MK Mosehla</i>	<i>E T Mutengwe</i>
<i>BP Watson</i>	<i>S J Westley</i>
<i>Dr M Koleini</i>	<i>Z P Slithole</i>
<i>JPE Hamman</i>	<i>C Selai</i>
<i>K van der Merwe</i>	<i>D A W Lambrecht</i>
<i>J F Smit</i>	<i>D Avutia</i>
<i>S. Pretorius</i>	<i>S Khan</i>
<i>G Priest</i>	<i>C Bezuidenhout</i>
<i>F J Castelyn</i>	<i>D J Slawson</i>
<i>J D Bosman</i>	<i>P Mulenga</i>
<i>J M Jansen van Vuuren</i>	<i>S N Cebekulu</i>
<i>L M Linzer</i>	<i>D Truter</i>
<i>M T Lekau</i>	
<i>K Naidoo</i>	
<i>G J King</i>	

PERSONALITY OF THE QUARTER



Philosophy of Life:
“Always try to leave things in a better position than what you found them.”

Full Name: Riaan Carstens

Position: Manager Rock Engineering

Company/Organisations: Anglo Platinum

Date and Place of Birth: 31 August 1968, Kroonstad

Education: BSc and MSc in Mining Engineering

First Job: Stated in production as a graduate in training.

Personal Best Achievement/s: Obtaining my MSc, getting a million fatal free shifts at Mponeng Mine, surviving parenthood so far.

Philosophy of Life: Always try to leave things in a better position than what you found them.

Favourite Food/Drink: Oxtail potjie and good red wine.

Favourite Sport: Cycling

“Focus on the things that you can control and try not to worry about the things you can’t.”

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

Started my career as a graduate in training at Oryx Mine in the Free State. Started as a miner and worked my way up to Mine Overseer level before I left production and joined the rock engineering department. Currently, I am employed as Manager Rock Engineering in Anglo Platinum.

2. Why did you choose Rock Engineering?

Did some vacation work in the rock engineering department as part of my studies and was really interested in the field of study. Did not really enjoy the production environment and moved to rock engineering when the late Dr Martin Pretorius offered me a position in his department.

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

After joining Martin, I started studying towards my industry certificates and worked on projects until I was placed at Beatrix Mine as a rock engineering officer. In 1998, I joined Kloof Mine and worked at Kloof Main Shaft until I was promoted to Rock Engineering Manager at Leeudorn Mine. I held this position until 2003 when I was offered an opportunity at AngloGold Ashanti's Savuka Mine. I worked for AngloGold until 2003, working my way up to Manager Rock Engineering – Operational. In 2003, I joined Anglo Platinum as Manager Rock Engineering.

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

Huge pressure on rock engineering practitioners, and the focus seems to move from design to compliance monitoring in order to rectify compliance concerns.

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

Educating and forming key partnerships with external stakeholders in order to establish role clarity for the rock engineering discipline. We need to ensure that we keep a healthy balance between time for design/innovation and compliance monitoring.

A lot has been done in recent years on rock engineering training, but still more is required to ensure the discipline keeps growing.

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

Never stop improving both your technical and managerial skills and knowledge. As you start your career, your output depends mostly on what you can do. As you move up, it becomes more about what your team can deliver, and less about you.

7. Who is your role model/mentor?

If I have to single out a person, it would have to be the late Dr Martin Pretorius, but I have tried to learn from everyone that I have worked with in my career.

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

Focus on the things that you can control and try not to worry about the things you can't.



SANIRE Advertising



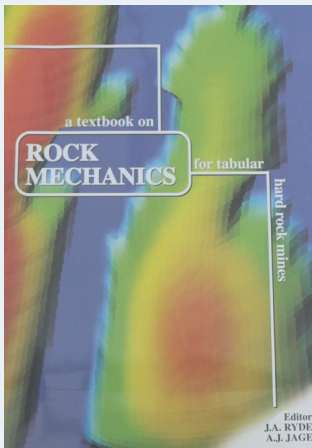
The **SANIRE** Committee has decided to increase the advertising opportunities for suppliers who would like to market their business and products in the Rock Talk.

The table below indicates the prices for different size advertisements as well as bookings for the future.

Please contact **Paul Couto** for more details

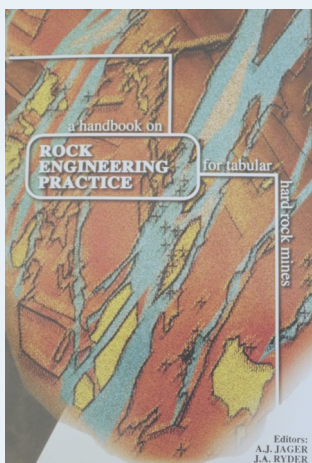
Paul.couto@harmony.co.za / paul.coutopm@gmail.com

Type of advert	Rates (Excl. VAT) Solus, Casual	Availability per newsletter	Select Publication Issue (Mark with x)	
			July 2016	November 2016
Square (Not front page)	R 1 000	4	I Booked	I Booked
Skyscraper (Front page)	R 4 000	1		
Full page (Middle)	R 8 000	2		



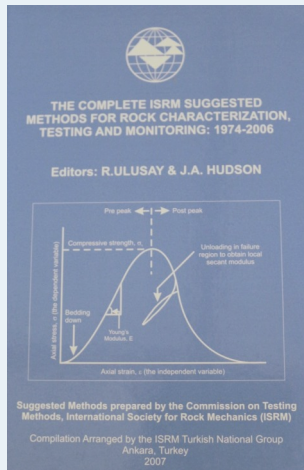
Textbook on Rock Mechanics for tabular hard rock mines –
JA Ryder & AJ Jager (Published by SIMRAC, 2002)

- Members: R150 ea. (excl. postage & handling fees)
- Non-members: R500 ea. (excl. postage & handling fees)



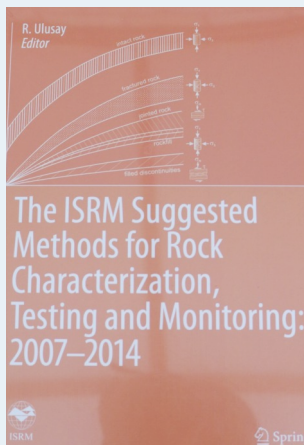
Handbook on Rock Engineering Practice for tabular hard rock
mines – AJ Jager & JA Ryder (Published by SIMRAC, 1999)

- Members & Non-members: R250 ea. (excl. postage & handling fees)



ISRM Blue Book: The complete ISRM suggested Methods for Rock Characterization, testing and monitoring – R Ulusay & JA Hudson (1974 – 2006)

- Members & Non-members: R650 (excl. postage & handling fees)



ISRM Orange Book: The ISRM suggested Methods for Rock Characterization, testing and monitoring – R Ulusay (2007 - 2014)

- Members / Non-members: R550 ea. (excl. postage & handling fees)

CHARLOTTE VAN DER WESTHUIZEN

Phone: +27 73 426 5180

E-mail: info@sanire.co.za or accounts@sanire.co.za

 **srk** consulting

ROCK STAR OF THE QUARTER



Philosophy of Life:
“Vivite Fortes (live
courageously)”

Full Name: Jacques Dewald Gerber

Position: Head of Seismological Services (Africa)

Company/Organisations: Institute of Mine Seismology (IMS)

Date and Place of Birth: 7 March 1988, Port Elizabeth

Education: MSc (Physics)

First Job: Seismologist at IMS

Personal Best Achievement: Completing my MSc

Philosophy of Life: Vivite Fortes (live courageously)

Favourite Food/Drink: Pizza

Favourite Sport: Soccer



institute
of mine
seismology

“Good judgement comes from experience, and experience comes from bad judgement.”

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

I joined the mine seismology group at IMS after completing an MSc (Physics) at the Nelson Mandela Metropolitan University. I have been involved in providing routine seismological services to the mining industry since 2012, and I was appointed as manager of the South African Seismological Services Group in 2015. During the past two years, I have also been responsible for the development of numerical modelling software.

2. Why did you choose mine seismology?

Mine seismology requires physics-related problem solving and scientific programming on a day-to-day basis, from wave theory to fluid mechanics, and this is an exciting career choice for any young, motivated scientist. Personally, I also enjoy working in the mining industry – providing services that create a safer mining environment in South Africa is very rewarding.

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

Since joining IMS, I have worked with internationally recognized experts in mine seismology and numerical modelling: Dr Aleksander Mendecki, Dr Dmitriy Malovichko, Dr Gerrie van Aswegen and Dr Assen Ilchev – to name just a few. In particular, Dr Ilchev taught me almost everything I know about numerical modelling, and Dr van Aswegen brought mine seismology to life through his knowledge of structural geology. Mine seismology has become more than a job, it has become my passion!

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

I have been involved in several research projects focusing on calibration of numerical models using seismic data, and I believe that these seismic-based models may become increasingly important in the near future. Once calibrated, the rock engineer can use the model to estimate the seismic hazard of a particular mining layout – rather than just calculate stress, strain, etc.

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

Be passionate about your career, and remember that you can never know enough to stop learning.

6. Who is your role model/mentor?

For her courage, perseverance and unconditional love: my mom.

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

Good judgement comes from experience, and experience comes from bad judgement.



institute
of mine
seismology

Rock Engineering History

A change so unexpected, and a development never known before, followed from the discovery in 1886 of the greatest gold mines of all history, ancient and modern. From 1886 (until 1940), the story of South Africa is the story of gold – C.W. de Kiewiet, 1941. The discovery of gold on the Witwatersrand in 1886 was a turning point in South African history. Far more than diamonds, this led South Africa from an agricultural society to become the largest gold-producer in the world. Gold increased trade between South Africa and the rest of the world. For the main trading nations, i.e. the Europe and the United States, gold was of value because their currencies were backed by gold. This was known as the gold standard. Under the gold standard, these countries had to keep gold in a bank vault to the value of the currency they issued. For example, if the government of a country wanted to print more money, it had to buy gold to back that money. If that country did not produce gold itself, it had to import gold from another country. Under the gold standard, the price of gold was fixed internationally. It was kept low as this benefited nations in Europe, as well as the United States, amongst others. These strong nations did not produce gold and had to buy it from elsewhere to back their own currency. In the 1930s, many countries abandoned the gold standard. The effect that this had on the South African economy will be examined later on in this feature.

THE GOLD RUSH.

On a summer's day in 1886, two prospectors discovered gold on a Transvaal farm called Langlaagte. Gold was not new to the Transvaal. Africans had mined gold, hundreds of years earlier. More recently, gold had been found in the Eastern Transvaal. In most cases this gold ran out, forcing small mining towns to close down. The gold found at Langlaagte was different. The gold discovered there ran for miles and miles underground – 'an endless treasure of gold', The Richest Gold-Mining Area in the World. Gold changed the face of the Transvaal. Before 1886 it was a poor, struggling Boer republic, but ten years later, it was the richest gold mining area in the world. As news of the gold find spread throughout South Africa and the rest of the world, men made their way to the Transvaal.

They walked, rode on horseback, or came by ox-wagon. Ships no longer passed South Africa on their way to Australia and New Zealand. Instead, boatloads of men arrived at ports and hurried to catch the next coach to the Transvaal, hoping to find the riches of their dreams.

MINING CAMPS BECOME TOWNS.

Wherever people found gold, another little mining camp grew up. Langlaagte became part of a big mining camp called Johannesburg, where many other mining camps had been set up. Soon Johannesburg became the biggest town in the Transvaal, bigger even than Pretoria, the capital. Other mining towns sprang up as well. These mining towns form the shape of a curve on the map. This curve is called the Witwatersrand, the Rand for short. As time passed, the tents disappeared and people began to build houses, offices and shops. Builders were very busy. Ox-carts and horses filled the streets with traffic, dust and noise; yet, the sound of the stamps crushing rocks in the mines around the town could be heard day and night.

PEOPLE OF THE MINING TOWNS.

Every week, hundreds of people poured into the golden Rand, all coming to seek their fortune. There were three main groups of people who hoped to make money from the mines. The first to come to the mines were the prospectors. These were the men who came to look for gold in the soil. They came with great hopes of 'striking it rich'. A growing group of people were labourers. Many of them were young African men who came to the mines in order to earn money to pay the traditional bride-price. Others hoped to find jobs so that they could pay their taxes, or buy guns or tools like hoes and ploughs for their land. For many years, most labourers did not come to stay. They went home as soon as they had earned enough money. Other people did not get their money directly from the mines; they made money from the needs of the people who mined the gold. The sellers of land, lawyers, traders, shopkeepers, ox-wagon drivers, barbers, hawkers and many more made their money in this way.

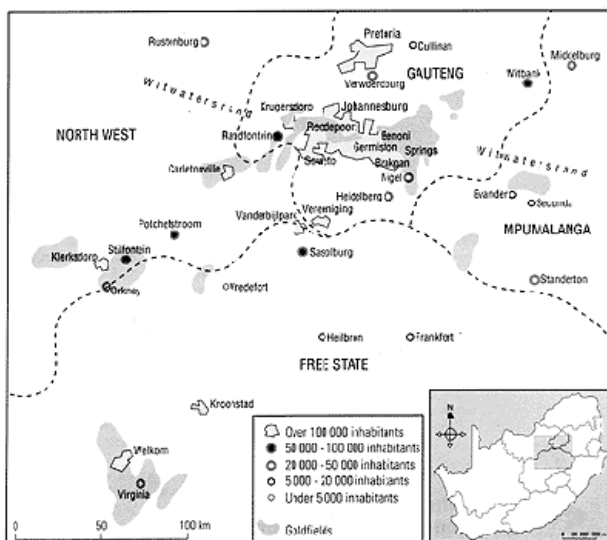
IMPROVED TRANSPORT.

More and more factory-made goods were being shipped from England to meet the demands of the mines and the communities that were developing around them. Goods had to be transported all the

way from the coast to the Rand by ox-wagon – and ox-wagons were very slow. The equipment needed for the mines was taking too long to arrive. Something had to be done to improve the system of transport. First, the governments of the Transvaal, the Cape and Natal improved the roads so that wagons could travel faster. Then railways were built. The first railways joined the ports to the mining areas. Most of the main lines went to the Witwatersrand, to the gold mines. There was also main line to the diamond mines of Kimberley. The coming of the railways to South Africa made a great difference to people all over the country. People who wanted to work in the gold mines went by train. New towns grew up around the stations. People used the railways to travel from the countryside to the towns. Farmers sent their produce by train to the larger towns. An ever-increasing number of people were leaving their land and coming to the Witwatersrand to find work. From now on, more people would work for a wage to buy their food and clothes from a shop, and live in a compound, a township or a suburb. But, of course, the majority of people were migrant workers, moving between town and countryside. Adapted from *Gold and Workers* by Luli Callinicos, 1980.

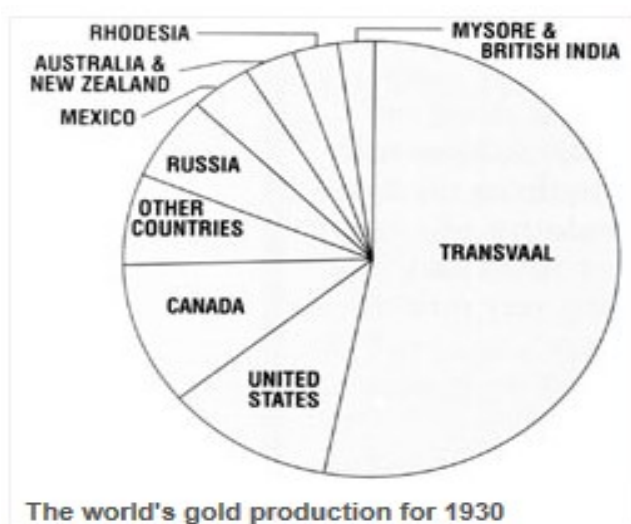
THE IMPORTANCE OF THE GOLD-MINING INDUSTRY.

The South African goldfields, 1996



A few years after the discovery of gold on the Witwatersrand, a string of mining towns marked out the gold-bearing Reef. The gold-mining towns formed a curve, starting from the East Rand in Heidelberg, extending westwards across to Krugersdorp and Randfontein. Later, more gold mines were discovered further south and east. As a result of this 'endless treasure of gold', gold mining very quickly became the largest and most important part of the economy.

The world's gold production for 1930.



Percentage of the world's gold produced in the Transvaal from 1895 to 1940

YEAR	VALUE (POUNDS)	TRANSVAAL (%)
1895	40843000	21,0
1900	52312000	2,8
1905	77756000	26,8
1910	93332000	34,3
1915	97218000	39,7
1920	69739000	49,7
1925	80817000	50,4
1935	131 680000	34,8
1940	173354000	34,4

THE NATURE OF GOLD MINING ON THE WITWATERS-RAND.

The gold mining activity on the Witwatersrand had to soon evolve. The gold that was mined was very near to the surface of the ground. As with the diamond mining in Kimberley, the first stage of gold mining took the form of outcrop harvesting. Under the supervision of a prospector, labourers would dig up the ground with picks and shovels in order to reach the gold-bearing ore.

DEEP-LEVEL MINING.

Before long, it became necessary to dig a lot deeper to reach the gold, even as much as a kilometre beneath the ground. This became known as deep-level mining. Deep-level mining required new and expensive machines. Machines were used to sink shafts hundreds of metres beneath the ground. By 1906, the Robinson Deep Mine, just off Eloff Street in Johannesburg, had become, at

800 metres, the deepest producing mine in the world. Because of the heat and the gases underground, ventilation was necessary for people working at such depths. Also, the deeper the line was, the more water was encountered. Special pumps had to be imported to remove the water.

LOW-GRADE ORE.

The rock from which the gold is extracted is called ore. The gold can be described as being 'trapped' in ore. A characteristic of the ore in the Witwatersrand is that it is low-grade. This means that a very large amount of ore always has to be dug up and crushed in order to get a small amount of gold. Even today in some mines in Gauteng, as little as 3 grams of gold is obtained from 1 ton of ore.

'AN ENDLESS TREASURE OF GOLD'.

Although the ore is low-grade, the gold reef stretches for over 400 kilometres from Evander in Mpumalanga to Virginia in the Free State. This area produces most of the gold in the world. Depending on the gold price, people could carry on mining here for years to come. The needs of the gold mines follow below. It shows the huge amount of money needed start a gold mine, along with a supply of cheap labour. Without these, gold mining in South Africa would not have been profitable.

THE NEEDS OF THE GOLD MINES.

The problem of mining, from the discovery of gold on the Witwatersrand, has been to make the poor ore product profitable. Some historians believe that if such poor ore had been found anywhere else in the world, it would have not have been mined at all. The plentiful supply of cheap labour available to the gold mines in South Africa made this viable. Who invested money in the gold mines? The amount of money needed to develop a mine was very large. Most mines were owned initially by investors who brought money in from other countries, hoping to profit from the new mining industry. This money was spent on things like importing special machines for sinking shafts in order to reach the gold-bearing ore in the depths of the earth. In addition, the mines needed people who were skilled at deep level mining. These people were mainly immigrants and their labour was expensive. Skilled workers came from Australia, America, Eastern Europe and especially Britain. In Britain, the tin mines in Cornwall were closing down at the same time as the gold mines in South Africa were starting up. So, many skilled miners from Cornwall came to work on the Witwatersrand. Because of the gold standard, the price of gold was internationally controlled and remained fixed for long periods of time. This meant that an increase in working costs could not be passed on to the buyers by increasing the price of gold. It soon became clear that the only way of mining profitably on the Witwatersrand was to secure a very large supply cheap, unskilled labour.

HOW THE MINES GOT THEIR LABOUR.

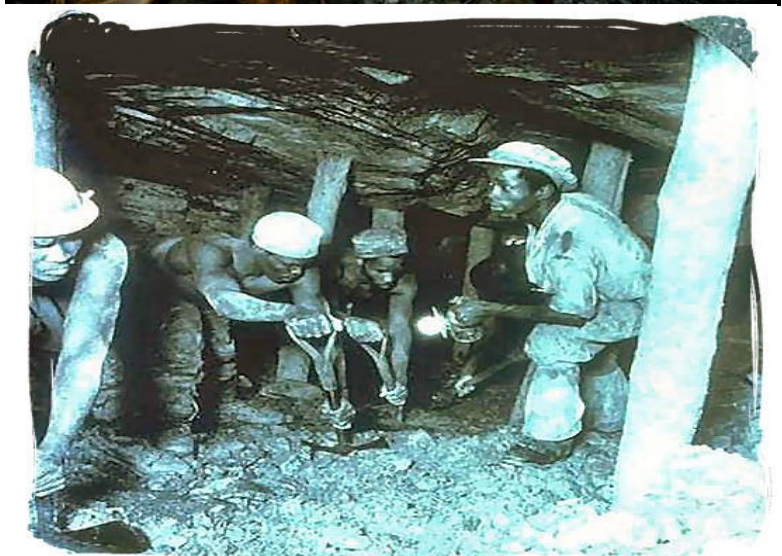
In order to be profitable, the mines needed an ongoing supply of cheap labour. The mine owners therefore had to think very carefully about where they would get labour from and how they would make it cheap. 'We must have labour. The mining industry without labour is as ... it would be to imagine that you could get milk without cows.' (President of the Chamber of Mines, March 1912). The problem that faced the mine owners was that there was no ready-made supply of workers whom they could recruit to work in the mines. They had to use many different methods to create and keep a supply of cheap labour. Workers in turn resisted these methods in various ways. Few Africans were willing to leave their fields to work underground. Most African farmers were not interested in working in the mines while they still had land. Some, like the Pedi, had been prepared to work as migrants for short periods on the diamond mines in order to get money to buy farming implements, as well as guns to defend themselves. Even mine owners had to find a way of turning the migrant system into a cheap one. In the years between 1890 and 1899, the number of African mineworkers rose from 14 000 to 100 000. This section shows how mine owners managed to recruit those 100 000 migrant workers and how the migrant labour system was turned into a cheap one. The governments (both Boer and British) and the mine owners worked together to guarantee the mines an on-going supply of cheap labour.

THE CONQUEST OF THE AFRICAN KINGDOMS.

African independence was largely destroyed by the 1880s. Two examples of this were the conquest of the Pedi and the Zulu kingdoms. The methods used to force Africans to become migrant labourers included taking advantage of internal conflicts within African kingdoms. Going to war against the African kingdoms was another method used by both the Boers and the British. Once the African kingdoms had been defeated, the Boer and British governments' taxes and land control measures left people with few options for survival except to seek work in the towns.

CONTROL OVER LAND.

By the 1880s, the Boers had formed governments in the Transvaal and the Orange Free State. The British ruled over the Cape Colony and Natal. The Boers and the British were slowly extending their control over the land and the people living in these areas. By 1900, most of the land in South Africa had been taken over by white farmers, mining companies, land companies and by the government. In the Cape, and in Natal in areas like the Transkei and Zululand, land still belonged to African farmers, but there was much less of it. There were some Africans involved in commercial farming in the Orange Free State and the Transvaal. But, Africans did not farm their own land in these provinces. Most of them farmed land that belonged to white farmers or unused land that belonged to land companies or the government. They were like the tenant farmers in Britain. R1 then would have been worth about R300 in 1996, which is about one third of a miner's monthly salary today.



THE RINDERPEST.

Another blow to those farmers who were able to hold onto their independence came with the rinderpest epidemic of 1896-7. This cattle disease reduced many herders to poverty and starvation, and many were forced to seek work on white farms or in the mines.

EXPLAINING CAUSES.

Many causes or reasons have been provided to explain why thousands of African farmers went unwillingly to work on the mines every year from the late 1880s onwards. Some of these causes may have had a greater effect on people's lives than others.

Behind the scenes of the world of the workers, **1897:** Lord Miner became governor of the Cape Colony and British High Commissioner in South Africa. He was known for his dislike of Kruger, president of the Transvaal. He also had a strong desire to expand Britain's sphere of influence in South Africa.

1899-1902: The South African War (previously called the Anglo-Boer War) broke out and lasted for three years. An important cause of the war was the struggle for control over the goldfields. The mines were forced to close during the war. Workers returned home. This affected productivity and cost the mine owners and the economy millions of Rands. Some say that the war paved the way for the Cape Colony, Natal, the Transvaal and the Orange Free State to form one state.

1904-1908: South Africa had to be rebuilt or reconstructed after the war. As part of its reconstruction programme, the government under Milner secured cheap indentured labour from China. This enabled the mines to pay lower wages and ignore the demands of Southern African workers for higher pay and better working conditions. Milner's reconstruction programme was similar in some ways to the Reconstruction and Development Programme (RDP). Milner's government had to tackle the task of rebuilding the country after the South African War. Africans did not accept the loss of their land or the imposition of taxes, passively. But it was hard for them to fight back because of the strength of the British and the Boers. The development of the mining industry largely destroyed independent farming as a way of life. It changed previous patterns of trade to produce a new economy and a new political system. This new system was controlled by whites. And, particularly during the period from the 1860s to 1910, Britain (and internationally based companies) had a great influence over the way the country was governed.

See more at:

<http://www.sahistory.org.za/archive/all-glitters-glitter-gold-emilia-potenza#sthash.byQKADuU.dpuf>



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