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# Curriculum Vitae

**Dr Francois Malan**

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## **1. Academic history and qualifications**

**1995-1998:** University of the Witwatersrand, Johannesburg  
**December 1998:** Ph.D. (Mining Engineering)

**Industry/  
Governmental  
qualifications:**

- 1) Chamber of Mines strata control certificate, 2003, no. 337
- 2) Chamber of Mines Rock Mechanics Certificate, 2004 no. 393
- 3) Registered Professional Engineer with ECSA (Engineering Council of South Africa), no 20040274

**Publications/  
Reports:**

15 publications in refereed journals (list attached)  
22 publications in conference proceedings  
1 Booklet and author of chapters in two other books  
Co-editor: Proceedings: 2008 Ground Support Symposium  
Large number of rock engineering consultancy reports on monitoring projects, bord and pillar layouts and numerical modeling of these layouts.

**Management  
courses:**

Leaders and Leadership, Groman, 1997  
Hay Guide Chart Course, Hay Management Consultants, 1998  
CSIR Advanced Leadership Programme (ALP), 1999

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## **2. Professional Affiliations**

Member - South African National Institute of Rock Engineering (SANIRE)  
Member - South African Institute of Mining and Metallurgy (SAIMM)

2001 - 2003 Vice-president, South African National Institute of Rock Engineering (SANIRE)  
2003 -2005 President, South African National Institute of Rock Engineering (SANIRE)  
2005-2007 Immediate Past President, South African National Institute of Rock Engineering (SANIRE)  
2007- Vice President and Board member, International Society of Rock Mechanics (ISRM)

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### **3. Awards**

- 1997: Salamon prize for best paper in Rock Mechanics  
1998: South African Institute of Mining and Metallurgy silver medal  
1998: CSIR Outstanding Achiever Award – Team Award, Scientific excellence, Fracture zone behaviour group  
2001: ISRM Rocha Medal for best PhD in the world  
2001: CSIR Outstanding Achiever Award: Technical Scientific Excellence  
2001: CSIR Outstanding Achievers Award: Presented to Miningtek Management Team, Drive towards KITO and Excellence in Transformation  
2008: South African Institute of Mining and Metallurgy silver medal  
2008: South African Institute of Mining and Metallurgy gold medal  
2009: Stan Kaplan trophy for excellence in Numismatics (The National Numismatic Society of South Africa)
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### **4. Employment**

**1993 - 1997: Research Engineer**  
**CSIR Division of Mining Technology, Johannesburg**

During this period, Dr Malan worked in the fields of numerical modelling and rock mass behaviour physics. This work mainly focused on research into micro-mechanical rock behaviour, the use of boundary element codes and laboratory models. Extensive expertise was also gained in the time-dependent behaviour of rock. This work involved underground closure monitoring, design of laboratory creep equipment and experiments and numerical simulation of the time-dependent processes.

**1997 - 2000: Project Manager**  
**CSIR Division of Mining Technology, Johannesburg**

During this period Dr Malan was responsible for the managing of a large research project on the fundamental behaviour of the rockmass around deep stopes. The work entailed management of 5 researchers, financial management, handling of invoicing, report writing and regular feedback to the project sponsors. The technical work he conducted during this period included the monitoring of continuous closure behaviour of stopes and using this information as a diagnostic measure of rock behaviour.

**2000 - 2001 Research Area Manager**  
**CSIR Division of Mining Technology, Johannesburg**

His responsibility in this area was the management of a research area containing 12 researchers, 8 research projects and a rock testing facility. The budget of this area exceeded R 8 million. Specific duties included administration and financial management of all the projects, dealing with staff issues and liaison with important customers in the mining industry.

**2001 - 2004 Programme Manager : Rock Engineering  
CSIR Division of Mining Technology, Johannesburg**

In this position, Dr Malan was responsible for the management of 35 researchers, underground technicians and laboratory personnel. The annual budget of this programme is R 30 million. Reporting to the Director of CSIR Miningtek happened on a weekly basis. One of the main tasks was setting annual budgets and monitoring secured income on a regular basis. Also important in this position was the liaison and lobbying of the various research bodies namely SIMRAC, PlatMine and CoalTech. The programme was divided into 4 main research areas with the 4 Research Area Managers reporting to me on a weekly basis. Further responsibilities include attracting talented researchers into the group and maintaining scientific excellence. As part of the Miningtek Management Team, an important role was to ensure the financial health and scientific excellence of the entire Division. During the period October-November 2003, he was also acting Director of CSIR Miningtek.

**2004 – 2006 Principal Consultant  
Groundwork Consulting**

To broaden his technical expertise base, he joined Groundwork Consulting in February 2004. Initial tasks involved mine instrumentation work, development of new instrumentation, quality assurance of support products and the use of stope closure measurements as a diagnostic measure of rock behaviour.

**2006 - Current Director  
Groundwork Consulting**

In March 2006, Dr Malan became Operations Director and is currently responsible for managing the staff, achieving financial targets and managing a number of projects dealing with geotechnical instrumentation, monitoring projects and numerical modeling of mine layouts. Technical responsibilities are focused on numerical modelling, interpretation of instrumentation data and writing reports, fall of ground investigations and providing solutions to these falls. Extensive experience was also gained on the design of hard rock room and pillar mines and optimizing pillar sizes in these mines.

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**5. Conference Organizing Committees and Keynote Lectures**

- 1) Chairman of the organizing committee: SARES2005, 3<sup>rd</sup> Southern African Rock Engineering Symposium, October 2005
  - 2) Co-chairman of the organizing committee: 6<sup>th</sup> International Symposium on Ground Support in mining and Civil Engineering Construction, Cape Town, April 2008
  - 3) Presented a Keynote lecture at the East Australian Ground Control Group symposium and workshop in Brisbane during May 2010
  - 4) Invited to present a keynote lecture at The Second Australasian Ground Control in Mining Conference in Sydney during November 2010
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## **6. Teaching and other academic experience**

- 1) Presented lectures on the mining of tabular ore deposits to third year engineering geology students at the University of Pretoria (from 1999 to 2003).
  - 2) Presented a number of courses to mining personnel over the years. Examples of these were courses in elasticity theory and courses on statistical methods for the quality assurance of mine support products.
  - 3) Regularly being used a reviewer of rock engineering papers submitted to the Journal of the South African Institute of Mining and Metallurgy.
  - 4) Previously served as an external examiner of a MSc Thesis at the University of Pretoria (2005). Currently serving as an external mentor for post graduate students in Rock Engineering at the University of Pretoria.
  - 5) Currently the Moderator of the Theory paper (paper 1) for the Chamber of Mines Rock Mechanics Certificate (2009- )
  - 6) Part of the responsibility of serving on the ISRM Board is to adjudicate the PhD thesis's submitted for the annual award of the Rocha medal. This typically involves the reviewing of up to 10 thesis's and ranking them. This function has being fulfilled from 2008 to date.
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## **9. References**

1. Prof. Dick Stacey, Mining Engineering Faculty, University of the Witwatersrand, Tel no. (011) 7177405
  2. Dr John Napier, CSIR Fellow and School of Computational and Applied Mathematics, University of the Witwatersrand. Tel no. (011) 7832611
  3. Dr Guner Gurtunca, Director, NIOSH Laboratories, Pittsburg, USA, Tel no. 0014123866601, Cell no. 0014127807503
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## **9. List of publications**

### **1. Books**

Guidelines for measuring and analyzing continuous stope closure behaviour in deep tabular excavations. SIMRAC publication, ISBN 1-919853-10-3, Creda publishers, 2003

Joint author of Chapter 4 Analytic Elasticity and Inelasticity in: Ryder, J.A. and Jager, A.J. A textbook on Rock Mechanics for tabular hard rock mines, Published by SIMRAC, ISBN 0-7988-5547-9, 2002.

Chapter 33 "Stope Closure as a Diagnostic Measure of Rock Behaviour in Deep Level Mines" in the "Deep and high stress mining" book, Editors Y. Potvin, T.R. Stacey, J. Hadjigeorgiou, ISBN 978-0-9804185-1-4, pp. 287-295

Co-editor: 6<sup>th</sup> International Symposium on Ground Support in mining and Civil Engineering Construction, Cape Town, April 2008

### **2. Journal publications**

Malan, D.F., Lacquet, B.M. and Swart, P.L. Diffusion-limited model of pore formation in non-degenerate n-type silicon. *S. Afr. J. Phys.* vol. 16, pp. 127-130, 1993.

Lacquet, B.M. and Malan, D.F. Emission of visible light from porous silicon during anodic oxidation. *Optical Engineering*, vol. 33 pp. 2898-2902, 1994.

Malan, D.F., Napier, J.A.L. and Watson, B.P. Propagation of fractures from an interface in a Brazilian test specimen. *Int. J. Rock Mech. Min. Sci. & Geomech. Abstr.* vol. 31, pp. 581-596, 1994.

- Malan, D.F. and Napier, J.A.L. Computer modelling of granular material microfracturing. *Tectonophysics*, vol. 248, pp 21-37, 1995
- Malan D.F. A viscoelastic approach to the modelling of transient closure behaviour of tabular excavations after blasting. *J. S.Afr. Inst. Min. Metall.*, vol. 95, pp. 211-220, 1995
- Malan, D.F., Vogler, U.W. and Drescher, K. Time-dependent behaviour of hard rock in deep level gold mines. *J. S.Afr. Inst. Min. Metall.*, vol. 97, pp. 135-147, 1997.
- Napier, J.A.L., Daehnke, A., Dede, T., Hildyard, M.W., Kuijpers, J.S., Malan, D.F., Sellers, E.J. and Turner, P.A. Quantification of stope fracture zone behaviour in deep level gold mines. *J. S. Afr. Inst. Min. Metall.*, vol. 97, pp 119-134, 1997.
- Napier, J.A.L. and Malan, D.F. A viscoplastic discontinuum model of time-dependent fracture and seismicity effects in brittle rock. *Int. J. Rock Mech. Min. Sci. & Geomech. Abstr*, vol. 34, pp. 1075-1089, 1997.
- Siebrits, E., Smit, J.L., Ruther, H. and Malan, D.F. The mapping of blast-induced deformations in deep gold mines by digital photogrammetry. *Fragblast*, vol. 1, pp. 233-242, 1997.
- Malan, D.F. and Basson, F.R.P. Ultra-Deep Mining: The increased potential for squeezing conditions. *J. S. Afr. Inst. Min. Metall.*, vol. 98, pp. 353-363, 1998.
- Malan, D.F. Time-dependent behaviour of deep level tabular excavations in hard rock. *Rock Mech. Rock Engng.*, vol. 32, no. 2, pp. 123-155, 1999.
- Malan, D.F. Manuel Rocha Medal Recipient: Simulating the time-dependent behaviour of excavations in hard rock. *Rock Mech. Rock Engng.*, vol. 35, no. 4, 2002.
- Napier, J.A.L and Malan, D.F. The computational analysis of shallow depth tabular mining problems, *J. S. Afr. Inst. Min. Metall.*, vol. 107, pp. 725-742, 2007.
- Malan, D.F. Napier, J.A.L and Janse van Rensburg, A.L. Stope deformation measurements as a diagnostic measure of rock behaviour: A decade of research, *J. S. Afr. Inst. Min. Metall.*, vol. 107, pp. 743-765, 2007.
- Malan, D.F. and Napier, J.A.L. Numerical modelling of tunnel liner and fracture interaction, *J. S. Afr. Inst. Min. Metall.*, vol. 108, n0. 6, pp. 339-344, 2008.

### 3. Publications in conference proceedings

- Malan, D.F. and Spottiswoode, S.M. Time-dependent fracture zone behaviour and seismicity surrounding deep level stoping operations. In: S.J. Gibowicz and S. Lasocki (ed.) *Proc. 4th Int. Symp. Rockburst and Seismicity in Mines*, Krakow, Poland, pp. 173-177, 1997.
- Malan, D.F. and Bosman, J.D. A viscoplastic approach to the modelling of time-dependent rock behaviour at Hartebeestfontein gold mine, In: G.Gürtunca and T.O. Hagan (eds.) *Proc. of the 1st Southern African Rock Mech. Symp.*, (SARES97) Johannesburg, pp. 117-130, 1997.
- Malan, D.F. Drescher, K. and Vogler, U.W. Shear creep of discontinuities in hard rock surrounding deep level excavations. In: H.P. Rossmannith (ed.) *Proc. Mechanics of Jointed and Faulted Rock 3*, Balkema, pp. 473-478, 1998.
- Vogler, U.W., Malan, D.F. and Drescher, K. Development of shear testing equipment to investigate the creep of discontinuities in hard rock. In: H.P. Rossmannith (ed.) *Proc. Mechanics of Jointed and Faulted Rock 3*, Balkema, pp. 229-234, 1998.
- Napier, J.A.L., Malan, D.F. and Sellers, E.J. Implications for fracture zone behaviour in deep level gold mines. *Proc. SIMRAC Symp*, Johannesburg, 1998.
- Malan, D.F. and Napier, J.A.L. The effect of geotechnical conditions on the time-dependent behaviour of hard rock in deep mines. In: Amadei, B., Kranz, R.L., Scott, G.A. and Smeallie, P.H. (eds.) *37th U.S. Rock Mechanics Symposium*, Vail Rocks '99, pp. 903-910, Balkema, 1999.
- Malan, D.F. Implementation of a viscoplastic model in FLAC to investigate rate of mining problems. In: Detournay, C and Hart, R. (eds) *FLAC and Numerical Modelling in Geomechanics, Proc of the Int. FLAC Symp on Num. Modelling in Geomech.*, Minnesota, Balkema, pp. 497-504, 1999.
- Malan, D.F. Closure measurements in tabular excavations: Avoiding the pitfalls. In: Hagan, T.O. (ed.) *Proc. of the 2st Southern African Rock Mech. Symp.*, (SARES99) Johannesburg, pp. 238-250, 1999.
- Bosman, J.D., Malan, D.F. and Drescher, K. Time-dependent tunnel deformation at Hartebeestfontein Mine. In : Stacey, T.R. (ed), *Proc. AITES – ITA 2000 – World Tunnel Congress, Tunnels under Pressure*, 13-18 May 2000, pp. 55-62, 2000 (reprinted in *J. S. Afr. Inst. Min. Metall.* vol. 100, no. 6, 2000, pp. 333-340).
- Malan, D.F. and Drescher, K. Modeling the post-failure relaxation behaviour of hard rock. In: Girard, J., Liebman, M., Breeds, C., Doe, T. (eds) *Proc. 4<sup>th</sup> North American Rock Mech. Symp.*, Pacific Rocks 2000., Seattle, pp. 909-917, 2000.

- Malan, D.F., Napier J.A.L. and Grave M. Experiments on stope closure as a diagnostic measure of rock behaviour. In: Handley, M and Stacey, D (eds) International Society for Rock Mechanics, 10<sup>th</sup> congress, Sandton, SAIMM Symposium series S33, pp. 795-801, 2003.
- Napier, J.A.L. and Malan, D.F. Solution of shallow depth pillar design problems in tabular mining. In: SARES 2005 3<sup>rd</sup> Southern African Rock Engineering Symposium, The South African Institute of Mining and Metallurgy, Symposium Series S41, pp. 13-23, 2005.
- Malan, D.F., Janse van Rensburg, A.L. and Roberts, D.P. Closure monitoring as a design and risk assessment tool in platinum mines. In: SARES 2005 3<sup>rd</sup> Southern African Rock Engineering Symposium, The South African Institute of Mining and Metallurgy, Symposium Series S41, pp. 231-243, 2005.
- Malan, D.F. and Piper, P.S. Monitoring of rock mass behaviour as a design and hazard assessment tool in underground stopes. In: Golden Rocks 2006, The 41st U.S. Symposium on Rock Mechanics (USRMS): "50 Years of Rock Mechanics - Landmarks and Future Challenges.", Golden, Colorado, June 17-21, 2006.
- Malan D.F. and Napier J.A.L. Computational aspects of shallow depth pillar layout design problems in tabular mining. In: Golden Rocks 2006, The 41st U.S. Symposium on Rock Mechanics (USRMS): "50 Years of Rock Mechanics - Landmarks and Future Challenges.", Golden, Colorado, June 17-21, 2006.
- Malan D.F. and Napier J.A.L. Practical Application of the Texan Code to Solve Pillar Design Problems in Tabular Excavations", SANIRE Symposium "Facing the challenges", Rustenburg, pp. 55-74, 2006.
- Malan, D.F. Rock mass monitoring as a hazard assessment tool in deep Merensky and UG2 stopes. In: Sousa, L. R., Olalla, C. and Grossmann, N.F., Proc. 11th Congress ISRM, Lisbon, Portugal, 9-13 July 2007, pp. 1311-1313, 2007.
- Piper, P.S., Malan, D.F. Clements, T.N. and Janse van Rensburg, A.L. The real in-situ performance of prestressed elongates, In: SANIRE Symposium "Redefining the boundaries – Part II" pp. 15-31, 2007.
- Piper, P.S. and Malan, D.F. The in-situ performance of elongate support – Myths and Realities, In: Stacey, T.R. and Malan, D.F. (eds.) 6th International Symposium on Ground Support in mining and Civil Engineering Construction, Cape Town, April 2008, pp 299 - 315
- Malan, D.F. and Napier, J.A.L. Numerical modelling of tunnel liner and fracture interaction, In: Stacey, T.R. and Malan, D.F. (eds.) 6th International Symposium on Ground Support in mining and Civil Engineering Construction, Cape Town, April 2008, pp 91-102.
- Napier, J.A.L. and Malan, D.F. Numerical simulation of a multi-reef tabular mining layout in a South African platinum mine, In: Proceedings: SHIRMS2008, 1<sup>st</sup> Southern Hemisphere Rock Mechanics Symposium, Sept 2008.
- Malan, D.F., Piper, P.S., Potgieter, G.M. and Du Toit, M. Mine-wide panel stability monitoring at Anglo Platinum Union JV, In : Proc. 1<sup>st</sup> Hard Rock Safe Safety Conference, , Sun City, Sept 2009.