

# Dr Danie Els



## Snr Lecturer : Design and Mechatronics Division

Dr Danie Els is currently a Senior Lecturer in the Design and Mechatronics Division. He did his MEng on the design and analysis of the dynamics of an impact fuze for a 40 mm high explosive grenade, and his PhD on the effectiveness of particle dampers under centrifugal loads. His fields of specialty are in, granular dynamics, infantry weapons and ammunition development.

## Academic Qualifications

BEng (Mechanical), Pretoria University, 1983.

MEng (Mechanical) (Cum Laude), Stellenbosch University, 1995.

PhD (Mechanical Eng), Stellenbosch University, 2009.

## Professional Experience

- 1996 - present: **University of Stellenbosch, Dept Mechanical and Mechatronics Engineering**  
*Snr Lecturer (Design and Mechatronics Division)*
- 1994 - 1996: **Swartklip Products, Division of Denel**  
*Research and Development Engineer*  
Design of a new mechanical impact fuze for 40mm grenade system. Work on self-destruct fuzes, automatic weapons and artillery systems and internal and external ballistics.
- 1992 - 1994: **Houwteq, Division of Denel**  
*Research and Development Engineer*  
Satellite orbit and constellation design. Satellite dynamics.
- 1989 - 1991: **Houwteq, Division of Denel**  
*Systems Engineer: Rocket Performance Predictions*  
Responsible for performance software and performance database. Recalculations of rocket motor prediction models after test firings. Predictions of normal trajectories for flight tests. Data analysis.
- 1987 - 1988: **Swartklip Products, Division of Denel**  
*Research and Development Engineer*  
Qualification and industrialisation of the 40mm grenade. Design and development of 155mm carrier shells and mortars. Work on internal, external ballistics software, test equipment and production tooling design.
- 1985 - 1986: **South African Defence Force (Technical Services Corps)**  
*Technical Officer: Lieutenant (National Service and Citizen Force)*  
Completed Junior Leader's course (Infantry), Technical Officer's course and Workshop Officer's course (Captain's course)
- 1983 - 1986: **Arm Scor, Small Arms Division**  
*Research and Development Engineer*  
Member of a team that did the design, development and qualification of a multi shot 40mm grenade launcher for the SADF Infantry.

## Fields of Research

Fluid-structure interaction, Granular Dynamics, Particle Dampers, Field measurements on large systems, gearboxes

## Fields of Interest

Infantry weapons and ammunition development, Design Optimization

## Journal Papers

- 1 **Muiyser, J., Els, D. N. J., Van Der Spuy, S. J. and Zapke, A.:** Measurement of air flow and blade loading at a large-scale cooling system fan, *R&D Journal of the South African Institution of Mechanical Engineering*, **30**: 30-38, 2014.
- 2 **Van Wyk, G., Els, D.N.J., Akdogan, G., Bradshaw, S.M. and Sacks, N.:** Discrete element simulation of tribological interactions in rock cutting, *International Journal of Rock Mechanics & Mining Sciences*, **65**: 8-19, 2014.
- 3 **Els, D. N. J.:** Damping of Rotating Beams With Particle Dampers: Experimental Analysis, *AIAA Journal*, **49**(10): 2228-2238, 2011.
- 4 **Coetzee, C. J. Els, D. N. J. and Dymond, G.F.:** Discrete element parameter calibration and the modelling of dragline bucket filling, *Journal of Terramechanics*, **47**(1): 3-44, 2010.
- 5 **Coetzee, C. J. and Els, D. N. J.:** Calibration of discrete element parameters and the modelling of silo discharge and bucket filling, *Computers and Electronics in Agriculture*, **65** (2): 198-212, 2009.
- 6 **Coetzee, C. J. and Els, D. N. J.:** Calibration of granular material parameters for DEM modelling and numerical verification by blade-granular material interaction, *Journal of Terramechanics*, **46** (1): 15-26, 2009.
- 7 **Coetzee, C. J., and Els, D. N. J.:** The numerical modelling of excavator bucket filling using DEM, *Journal of Terramechanics*, **46** (5): 217-227, 2009.

## International Conference Proceedings

- 1 **Muiyser, J., Lombard, C. H. O., Van Der Spuy, S. J., Els, D. N. J., and Zapke, A.:** Dynamic response of large ACC fan systems, 2017 ACCUG Annual Conference, Las Vegas, USA, 2—5 October 2017.
- 2\* **Lombard, C. H. O., Els, D. N. J., Muiyser, J. and Zapke, A.:** Analysis of large-scale cooling system fan gearbox loads, *Proceedings of the ASME 2017 Turbine Technical Conference and Exposition TE2017, GT2017-64302*, Charlotte, USA, 26—30 June 2017.
- 3\* **Muiyser, J., Els, D. N. J., Van der Spuy, S. J. and Basson, N.:** Analysis of vibration inducing sources of a large-scale cooling system fan blade, *10th South African Conference on Computational and Applied Mechanics (SACAM)*, Potchefstroom, South Africa, 3—5 October 2016
- 4\* **Muiyser, J., Els, D. N. J., Van Der Spuy, S. J. and Zapke, A.:** The determination of fan blade aerodynamic loading from a measured response, *Proceedings of the ASME 2015 Turbine Technical Conference and Exposition TE2015, GT2015-43010*, Montreal, Canada, 15—19 June 2015.
- 5 **Van Wyk, G., Bradshaw, S.M., Els, D.N.J., and Akdogan, G.:** Discrete element simulation of rock cutting, *Application of Computers and Operations Research in the Mineral Industry - Proceedings of the 37th International Symposium, APCOM 2015*, Fairbanks, USA; 23-27 May 2015
- 6\* **Muiyser, J., Els, D. N. J., Van Der Spuy, S. J. and Zapke, A.:** Investigation of large-scale cooling system fan blade vibration, *Proceedings of the ASME 2014 Turbine Technical Conference and Exposition*, GT2014-25498, Düsseldorf, Germany, 16-20 June 2014.
- 7\* **Els, D. N. J.:** Damping of rotating beams with particle dampers: Discrete element method analysis, *Powders and Grains 2013: Proceedings of the 7th International Conference on Micromechanics of Granular Media*, Sydney, Australia, 8-12 July 2013.
- 8\* **Muiyser, J., Els, D. N. J. and Van Der Spuy, S. J.:** Simultaneous Measurement of Air Flow and Blade Loading Conditions in an Air-Cooled Steam Condenser Fan, *FAN 2012*, Senlis, France, 18-20 April 2012.
- 9 **Els, D. N. J.:** Influence of Excessive Recoil on a Rifleman, *2010 SABO National Symposium*, Overberg Test Range, Arniston, South Africa, 21-22 September 2010.
- 10 **Els, D. N. J.:** Damping of rotating beams with particle dampers, *50th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, AIAA 2009-2688, Palm Springs, California, 4-7 May 2009.
- 11 **Els, D. N. J., Pieterse, H. and De Bruin, M.:** New extended range shoulder-fired 40mm grenade system, *22nd Small Arms and Cannons Symposium DCMT*, Shrivenham, UK, 19-21 Aug 2008.
- 12 **Coetzee, C, J. and Els, D. N. J.:** Modelling excavator bucket filling with DEM, *Fifth World Congress on Computational Mechanics*, Vienna, Austria, 7-12 Jul 2002.
- 13\* **Els, D. N. J.:** Numerical analysis of the motion of a runaway escapement, *ASME 2000 International Design Engineering Technical Conference*, Baltimore, Maryland, USA, Sep 2000.
- 14\* **Crouse, P. G. and Els, D. N. J.:** A rigid Multibody dynamical description of a rope and pulley problem, *SACAM 2000*, Durban, South Africa, Jan 2000.
- 15 **Els, D. N. J. and Coetzee, C. J.:** Friction forces in a vertically pushed granular column, *International Symposium on Reliable Flow of Particulate Solids III*, Porsgrunn, Norway, Aug 1999.

\* Peer reviewed

## Postgraduate Theses and Dissertations

### PhD

- 1 **Muiyser, J.:** *Numerical investigation of air-cooled steam condenser fan blade vibration and loading as a result of distorted inlet air flow conditions.* PhD (Mech Eng) thesis, Stellenbosch University, South Africa, 2016  
Study leaders: Dr D.N.J. Els, Dr S.J. van der Spuy.

### MSc (Eng), MEng

- 1 **Aggenbach, C:** *Magnetic gear design and optimization.*  
MSc (Mech) thesis, Stellenbosch University, South Africa, 2018  
Study leaders: Dr D.N.J. Els., Prof R Wang
- 2 **Böck, R.D.:** *Development and analysis of a scale model ACC.*  
MSc (Mech) thesis, Stellenbosch University, South Africa, 2017  
Study leaders: Prof S.J. van der Spuy, Dr D.N.J. Els.
- 3 **Lombard, C.H.O.:** *Analysis of large industrial gearboxes.*  
MSc (Mech) thesis, Stellenbosch University, South Africa, 2017  
Study leaders: Dr D.N.J. Els., Dr J Muiyser.
- 4 **Peters, C.D.:** *Numerical investigation of the fluid-structure interaction of a vibrating fan blade.*  
MSc (Mech) thesis, Stellenbosch University, South Africa, 2017  
Study leaders: Dr D.N.J. Els, Prof S.J. van der Spuy.
- 5 **Basson, N.R.:** *Investigation of aerodynamic damping of a vibrating fan blade.*  
MSc (Mech) thesis, Stellenbosch University, South Africa, 2015.  
Study leaders: Dr S.J. van der Spuy, Dr D.N.J. Els.
- 6 **Van Wyk, G.:** *Simulation of Tribological Interactions in Bonded Particle-Solid contacts using DEM and PFC3D with special attention to rock drilling,* MSc (Chem) thesis, Stellenbosch University, South Africa, 2012.  
Study leaders: Prof G. Akdogan, Dr D.N.J. Els.
- 7 **Muiyser, J.:** *Simultaneous measurement of air flow conditions and the resultant blade and gearbox loading at large-scale cooling system fans,* MSc (Mech) thesis, Stellenbosch University, South Africa, 2012.  
Study leaders: Dr D.N.J. Els, Dr S.J. van der Spuy.
- 8 **Van der Linde, J.:** *Discrete Element Modeling of a Vibratory Subsoiler,*  
MSc (Mech) thesis, Stellenbosch University, South Africa, 2007.  
Study leader: Mr D.N.J. Els.
- 9 **Dymond, G.F.D.:** *Creation, Optimization and Verification of a Three Dimensional Numerical Model to Simulate a Dragline Bucket During the Digging Cycle Using Modern DEM Software,* MSc (Mech) thesis, Stellenbosch University, 2007.  
Study leaders: Mr D.N.J. Els, Dr C.J. Coetzee.
- 10 **Momberg, J.J.:** *Drivability Evaluation for Engine Management Calibration,*  
MSc (Mech) thesis, Stellenbosch University, South Africa, 2006.  
Study leaders: Mr D.N.J. Els, Dr A. Taylor.
- 11 **Coetzee, C.J.:** *Forced Granular Flow,*  
MSc (Mech) thesis, Stellenbosch University, South Africa, 2000.  
Study leader: Mr D.N.J. Els.
- 12 **Crouse, P.G.:** *Modeling of Dragline Dynamics,*  
MSc (Mech) thesis, Stellenbosch University, South Africa, 2000.  
Study leader: Mr D.N.J. Els.

### Current Postgraduate Students

- 1 **Oliver, A.:** *Fatigue modelling and testing of a composite large ACC fan blade.*  
MSc (Mech) Started: 2017  
Study leaders: Dr D.N.J. Els., Prof A Groenwold
- 2 **Van Eck, J.:** *Scaling effect of large ACC fan blade performances.*  
MSc (Mech) Started: 2017  
Study leaders: Dr J. Muiyser, Dr D.N.J. Els.
- 3 **Denis C.:** *Graze impact forces on 40mm round.*  
MSc (Mech) Started: 2017  
Study leader: Dr D.N.J. Els.