

Anriëtte Bekker

Abbreviated curriculum vitae

1. Personal details

Full Name: **Anriëtte Bekker**
Maiden name: **Van der Westhuizen**
Date of Birth: **13 August 1979**
Age: **38**
Nationality: **South African**
Gender: **Female**
Marital status: **Married**
Home language: **Afrikaans**
Working language: **English**



2. Tertiary education (degree, institution, year)

B.Eng (Mechanical) – Stellenbosch University – 2001
MSc.Eng (Mechanical) Cum Laude – Stellenbosch University – 2004
PhD.Eng (Mechanical) – University of Cape Town - 2008

3. Professional experience (2008 to 2011, Optimal Energy Pty. Ltd., Mechanical Engineer)

Optimal Energy is a privately owned South African company, which is currently aspiring towards designing and engineering Africa's first commercial battery electric vehicle: Joule. The company has successfully developed 3 generations of electric prototypes (PT-1, PT-2 and PEV) using small scale production techniques and has exhibited Joule concept vehicles at the Paris motor show (October 2008) as well as the Geneva International Motor Show (February 2010).

March 2011 – Promoted to Senior Engineer and granted a performance related increase of 18%.

March 2010 – Granted a performance increase of 33%:

- Initiated a project on the measurement of interior and drive-by noise of four vehicles with a German 7th semester engineering student from the Hochschule Ingolstadt in collaboration with Professor Jörg Bienert.
- Lectures on automotive NVH at SciFest Africa in March 2010 titled: "Joule Imagineering Mobility" as well as a talk on "Emerging from the ICE age" at the "Changing Lives" lecture series at the University of Cape Town (November).
- Program master schedule and project administration on the Prototype Electric Vehicle (PEV) project.
- Attend lecture week on Electrochemistry and Battery Technology delivered by Dr. Walter van Schalkwijk (EnergyPlex Corporation & the University of Washington) as well as the LMS Software training at the University of Stellenbosch.
- Full vehicle NVH measurements on the Prototype Electric Vehicle (PEV) fleet.
- Identification of the cause of a problematic motor whine in an electric motor control algorithm.
- Participate in contract discussions for vehicle mass production with EDAG (Germany) and IDIADA (Spain).

May 2009 – Promoted to Chassis Engineer – Mechanical Development.

- Appointed as the responsible engineer for Joule NVH (Noise and Vibration Harshness).
- Create a project plan for NVH for the purposes of mass production.
- Conduct full vehicle measurements and analysis (with self-written software in MATLAB) on Joule Prototype 2 (PT-2)
- Measurement and Analysis (with self-written software in MATLAB) of electric motor orders.
- Design (CATIA) and modal analysis (Cosmos Works) of a battery carrier frame for mounting a battery pack in the cargo space of a small pick-up which was converted to electric drive for testing purposes.

- Supervise and assist a contract measurement of vibration life-cycle fatigue on a Li-ion battery module and its mountings at the Sasol Laboratory at the University of Pretoria.

July 2008 – Appointed as an Engineer in Training – Body and Chassis.

- Write a draft specification document for a prototype vehicle wafer structure.
- Static force analysis (hand calculation) of vehicle front suspension forces under different load cases.
- 3-D scanning and data processing of the Joule Paris Show Car (hand built) vehicle geometry for surfacing and styling refinement by Zagato Total Design Centre, Italy.

4. Research and teaching experience

July 2011 – Senior Lecturer in the Department of Mechanical and Mechatronic Engineering

Teaching

1. Teach under-graduate Mechanical & Mechatronic Engineering students in Strength of Materials (second year mechanical engineering students)
2. Teach Noise and Vibration 354 course (third year mechanical engineering students).
3. Serve as an external examiner for the University of Pretoria and University of Cape Town on unde-graduate courses relating to Vibration and Dynamics.
4. Served as an examiner for post-graduate theses at Stellenbosch University, Pretoria University and Tshwane University.
5. Teach post-graduate courses in Whole-body vibration, Modal Analysis and Psycho-acoustics.
6. Regular scientific speaking engagements at schools, alumni functions and conferencing events.
7. Professional courses on Occupational Whole-body Vibration, Modal Analysis and Fundamentals of Sound and Vibration.

Research:

1. Director of the Sound and Vibration Research Group at Stellenbosch University (Since 2012).
2. (2017) Best local presenter – High Performance Marine Vehicles (HIPER) conference, Zewenwacht, South Africa.
3. (2015) Rector's award for excellent work performance.
4. (2015) Merit bonus for distinguished efforts towards the development of ICT learning interventions in the Noise and Vibration 354 course in Mechanical Engineering.
5. Served as a reviewer for journals including the Journal of Sound and Vibration, Mechanical Systems and Signal Processing, Journal of Low Frequency Noise, Vibration and Active Control, Ocean Engineering and R&D Journal of South Africa.
6. The following grants have been successfully obtained.

A. NRF Thuthuka

- (2012) – R 98k
- (2013) – R 165k
- (2014) – R 100k

B. NRF Unrated Scientist

- (2015 – 2017) - R 660k

C. NRF THRIP

- (2015 – 2017) R 200k

D. NRF South African National Antarctic Programmes

- (2018 - 2020) R 2.5 million
- (2015 – 2017) R 1.2 million
- (2012 – 2014) R 900k

E. University Stellenbosch Sub-Committee B:

- (2012) – R30k
- (2013) – R30k
- (2014) – R50k

F. Stellenbosch University - Sub-Committee C (FINLO):

- (2013) – R40k

G. Stellenbosch University – HB Thom Sabbatical award:

- (2018) – R80k

5. Committees and societal impact

1. (2017 – present) Collaborating investigator on the Antarctic Legacy Project of South Africa. This body is responsible for the archiving of data, networking, show casing and coordination of Antarctic and Southern Ocean Research. My role is to assist in the creation of a digital museum, starting with the show casing of the SA Agulhas II and involvement in book projects.
2. Member of the SANAP research community.
 - (2014) Actively involved in drafting a national Antarctic research strategy, specifically relating to the engineering of logistical support structures and their research potential.
 - (2016) Involved in the drafting of a white paper “*Exploring South Africa’s southern frontier: A 20-year vision for polar research through the South African national Antarctic programme*” which was written by the SANAP community for the South African Journal of Science.
 - (2017) Contributor of the southern ocean community inputs towards the establishment of the new South African Polar Observatory. At present the contribution outlines the required infrastructure and associated costs which would enable Antarctic and Polar Science in the next 50 years.
3. (2017 – present) Member of APECS - Association of Polar Early Career Scientists.

6. Publications

6.1 Papers in refereed journals:

1. (Submitted) Soal, K., Govers, Y., Bienert, J. Bekker, A. *System Identification and Tracking using a statistical model and a Kalman Filter, Mechanical Systems and Signal Processing.*
2. (Submitted) Soal, K. Jelcic, G., Bekker, A., Bienert, J. *Modal Parameter Tracking and Statistical Evaluation of a Polar Research Vessel with Open Data, Ocean Engineering.*
3. (Submitted) Soal, K., Bekker, A. and Bienert, J. *openSID: Open Source Stochastic Subspace Identification Toolbox for Structural Dynamics - Implementation, Analysis and GUI, Mechanical Systems and Signal Processing.*
4. (Submitted) De Waal, R.J.O., Bekker, A. and Heyns, P.S. *Data for indirect load case estimation of ice-induced moments from shaft line torque measurements, Data in brief.*
5. (Under revision) Swart, D.J. and Bekker, A. *The Relationship between Consumer Satisfaction and Psychoacoustics of Electric Vehicle Signature Sound, Journal of the Acoustical Society of America.*
6. (In Press) De Waal, R. J.O., Bekker, A., Heyns, P.S. *Indirect ice-moment estimation of propeller-ice loads from shaft-line measurements using inverse methods, Cold Regions Science and Technology.*
7. (In Press) Bekker, A., Suominen, S., Soal, K.I., De Waal, R.J.O. and Kujala, P., *From data to insight for a polar supply and research vessel, Ship Technology and Research – Special issue: Full-scale measurements.*
8. Swart, D. J., Bekker, A. and Bienert, J. (2018) ‘The subjective dimensions of sound quality of standard production electric vehicles’, *Applied Acoustics*, 129. doi: 10.1016/j.apacoust.2017.08.012.
9. Ansorge, I.J., Skelton P., Bekker, A., De Bruyn, N., Butterworth, D., Cilliers, P., Cooper, J., Dorrington, R., Fawcett, S., Fietz S., Findlay K., Froneman, W., Grantham, G., Greve, M., Hedding, D., Hofmeyr, G., Kosch, M., Le Roux P., Lucas, M., MacHutchon K., Meiklejohn, I., Nel W., Pistorius, P., Ryan, P., Stander, J., Swart, S., Treasure, A., Vichi, M. and Van Vuuren, B., (2017) ‘Exploring South Africa’s southern frontier: A 20-year vision for polar research through the South African national Antarctic programme’, *South African Journal of Science*, 113(5–6). doi: 10.17159/sajs.2017/a0205.
10. Bekker, A., Soal, K. I. and McMahon, K. J. (2017) ‘Whole-body vibration exposure on board a Polar Supply and Research Vessel in open water and in ice’, *Cold Regions Science and Technology*. doi: 10.1016/j.coldregions.2017.06.008.
11. Kamper, M. and Bekker, A. (2017) ‘Non-contact experimental methods to characterise the response of a hyper-elastic membrane’, *International Journal of Mechanical and Materials Engineering*, 12(1), p. 15. doi: 10.1186/s40712-017-0082-6.

12. Omer, H. and Bekker, A. (2017) 'Human responses to wave slamming vibration on a polar supply and research vessel', *Applied Ergonomics*, 67, pp. 71–82. doi: 10.1016/j.apergo.2017.09.008.
13. Swart, D. J., Bekker, A. and Bienert, J. (2016) 'The comparison and analysis of standard production electric vehicle drive-train noise', *International Journal of Vehicle Noise and Vibration*, 12(3). doi: 10.1504/IJNVN.2016.080140.
14. Bekker, A., Cloete, T. J., Chinsamy-Turan, A., Nurick, G. N., & Kok, S. (2015) 'Constant strain rate compression of bovine cortical bone on the Split-Hopkinson Pressure Bar', *Materials Science and Engineering: C*. doi: 10.1016/j.msec.2014.10.071.
15. Omer, H. and Bekker, A. (2016) 'Detection of wave slamming sites from ship deflections', *Research and Development Journal of South Africa*, 32, pp. 50–57.
16. Bekker, A. (2014) 'Influences of electric propulsion on vehicle vibro-acoustics', *Research and Development Journal of South Africa*, 30, pp. 47–54.
17. Bekker, A. Kok, S. Cloete, T.J. and Nurick, G.N. (2014) 'Introducing objective power law rate dependence into a visco-elastic material model of bovine cortical bone', *International Journal of Impact Engineering*. doi: 10.1016/j.ijimpeng.2013.12.003.
18. Van der Westhuizen, A. and van Niekerk, J. L. (2006) 'Verification of seat effective amplitude transmissibility (SEAT) value as a reliable metric to predict dynamic seat comfort', *Journal of Sound and Vibration*. doi: 10.1016/j.jsv.2006.02.010

5.2 Refereed full length papers in the proceedings of international or national symposia:

1. (Full paper accepted) Muiyser, J., Van der Spuy, S.J. and Bekker, A. (2018) Comparison of sound-quality metrics for axial flow fans with straight and forward swept blades, In *International conference on fan noise, aerodynamics, applications and systems*, 18 – 20 April, Darmstadt, Germany.
2. (Full paper submitted) Bekker, A. (2018) Exploring the blue skies potential of digital twin technology for a polar supply and research vessel, 13th International Marine Design Conference, 10-14 June, Helsinki, Finland.
3. (Abstract accepted) Bekker, A. and Soal, K.I. (2018) The investigation of operational modal parameter variations of an ice-going vessel, 31st Conference on Condition Monitoring and Diagnostic Engineering Management, 3-5 July, North-West University, South Africa.
4. (Abstract accepted) Bekker, A., Saunders, S.F.W., Muiyser, J and Laubscher, R. (2018) Wave slamming - Measurement, detection and dynamic response of a polar supply and research vessel, 14th International conference on vibration engineering and technology of machinery, 10-13 September, Lisbon, Portugal.
5. Bekker, A. (2017). From (Big) data to insight – a roadmap for the S.A. Agulhas II, In *High-Performance Marine Vehicles*, Zevenwacht, South Africa.
6. Soal, K.I., Bienert, J. and Bekker, A. (2017). Inverse joint damping parameter estimation from experimental modal analysis, *International Conference on Structural Engineering Dynamics*, Ericeira, Portugal.
7. De Waal, R.J.O., Bekker, A. and Heyns, P.S. (2017) Bi-polar full-scale measurements of operational loading on polar vessel shaft-lines. In 24th International Conference on Port and Ocean Engineering under Arctic Conditions, Busan, Korea.
8. Suominen, M., Bekker, A., Kujala, P., Soal, K.I. and Lensu, M. (2017) Visual Antarctic sea ice observations during austral summers 2012-2016. In 24th International Conference on Port and Ocean Engineering under Arctic Conditions, Busan, Korea.
9. Kamper, M. and Bekker A. (2017). Modal analysis of a hyperelastic membrane for the development of a musical instrument, In 7th International Operational Modal Analysis Conference, Ingolstadt, Germany.

10. Swart, D.J. and Bekker, A. (2016). Interior and Motorbay sound quality evaluation of full electric and hybrid-electric vehicles based on psychoacoustics, Inter.Noise, Hamburg, Germany.
11. De Waal, R.J.O., Soal, K.I., Bekker, A. and Heyns, P.S. (2016). Rotational dynamic characteristics of the shaft line of a polar supply and research vessel during open water, cavitation and ice navigation, International Modal Analysis conference (ISMA), Belgium, Leuven.
12. Soal, K.I., Bekker, A., and Bienert, J. (2015). Structural vibration analysis on the polar supply and research vessel the S.A. Agulhas II in Antarctica. In *23rd International conference on Port and Ocean Engineering under Arctic Conditions*. Trondheim, Norway.
13. Soal, K.I., Bienert, J. and Bekker, A. (2015). Operational modal analysis on the polar supply and research vessel the S.A. Agulhas II. In *6th International Operational Modal Analysis Conference*.
14. Swart, D.J. and Bekker, A. (2014). The subjective evaluation of interior noise produced by electric vehicles, 9th South African Conference on Computational and Applied Mechanics, Somerset West.
15. Suominen, M. Karhunen, J., Bekker, A. Kujala, P., Elo, M. Von Bock und Polach, R., Endlund H. and Saarinen, A. (2013). Full-scale measurements on board PSRV S.A. Agulhas II in the Baltic Sea. In *22nd International Conference on Port and Ocean Engineering under Arctic Conditions (POAC)*, Espoo, Finland.

7. Local and international conferences attended in the last 5 years, including current year

Year	Conference name	Location
2018	Experimental Modal Analysis Group Meeting	Wölfel, Würzburg, Germany
2017	International Conference on High Performance Shipping	Zewenwacht, South Africa
2017	Port and Ocean Engineering under Arctic Conditions	Busan, South Korea
2017	International Operational Modal Analysis Conference	Ingolstadt, Germany
2016	International Workshop on Maritime Safety and Smart Shipping	Wuhan, China
2014	Conference on Ocean, Offshore and Arctic Engineering	San Francisco, USA
2014	South African Conference on Applied Mechanics	Somerset West, South Africa
2013	United Kingdom Group Meeting on Human Responses to Vibration	Ascot, United Kingdom

8. Number of graduated postgraduate students supervised (M and D, last 5 years):

M.Eng (Mechanical Research)		First year registered	Type	Status	Role
1	K.I. Soal	2013	Full-time	Graduated	Supervisor
2	K.J. McMahon	2013	Full-time	Graduated	Supervisor
3	B.G. Boulle	2014	Full-time	Graduated	Supervisor
5	H. Omer	2014	Full-time	Graduated	Supervisor
6	R.J.O. de Waal	2015	Full-time	Graduated	Supervisor (50%)
7	E. Purcell	2016	Full-time	Graduated	Supervisor (50%)

PhD.Eng (Mechanical)		First year registered	Type	Status	Role
1	K.I. Soal	2015	Full-time	To graduate March 2018	Supervisor (50%)
2	D.J. Swart	2016	Full-time	To graduate March 2018	Supervisor
3	G.I. Koumene Taffo	2015	Full-time	Handing in Nov 2017	Co-supervisor for research exchange

9. Referees

Prof Wikus van Niekerk
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