

Curriculum vitae

1. General information

Title	Prof
Name	Johan
Full name	Sybrand Johannes
Surname	van der Spuy



2. Contact details

Organisation	Stellenbosch University
Department	Mechanical and Mechatronic Engineering
Work telephone number	+27 21 8084127
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3. Qualifications

Degree	Ph.D.
Topic	Perimeter Fan Performance in Forced Draught Air-cooled Steam Condensers
Institution	Stellenbosch University
Year obtained	2011
Supervisors	Prof. T.W. von Backström and D.G. Kröger

Degree	M.Eng. (Cum Laude)
Field of study	Axial flow fan design
Institution	Stellenbosch University
Year obtained	1998
Supervisor	Prof. T.W. von Backström

Degree	B.Eng. (Cum Laude)
Institution	Stellenbosch University
Year obtained	1994

4. Membership of professional bodies

ECSA, Engineering Council of South Africa, Registered Professional Engineer, registration nr 20010076

SAIMechE, South African Institute of Mechanical Engineers

ASME, American Society of Mechanical Engineers

AeSSA, Aeronautical Society of South Africa

ISABE, South African representative

5. Previous employment

Billiton S.A. (Pty) Ltd. (now BHP Billiton)
Palmiet Ferrochrome, Krugersdorp
Western Chrome Mines, Rustenburg
Junior Engineer (engineer-in-training)
1997 to 1998

MegChem Engineering and Draughting
Sasol plant, Secunda
Design Engineer
1998 to 2001

Stellenbosch University
Department of Mechanical Engineering, Stellenbosch
Research Assistant
2001 to 2002

Stellenbosch Automotive Engineering
Atlantis, Cape Town
Engineering Manager
2003 to 2005

Stellenbosch University
Department of Mechanical and Mechatronic Engineering,
Stellenbosch
Senior Lecturer, Associate professor (since January 2016)
2006 - present

6. Management experience

Departmental management committee, deputy head, Thermofluids Division
2015, 2016, 2017, current

Undergraduate program committee, Mechanical and Mechatronic Engineering
2015, 2016, 2017, current

Solar Thermal Research Group, Manager
2017

7. Teaching experience

Attended PRONTAK/PREDAC 2006

Subjects taught:

Fluid Mechanics 314/244	2006 to 2009 and 2014 to present
Advanced Fluid Dynamics 814	2014
Thermofluids 344	2009 to 2013 (turbomachinery section)
Energy Systems 414	2006 to 2008 (turbomachinery section)
Computer programming 143	2011 to 2013 and 2017

External examiner:

Fluid Mechanics I	North West University
Thermofluids III	University of Cape Town

8. Research interest

Turbomachinery

- Axial flow fans
- Air-cooled condensers (air-side)
- Centrifugal compressors
- Micro gas turbines

9. Student supervision

Completed

Dr F.G. Louw Ph. D. Co-supervised with Prof. T. von Backström
Title: Investigation of the flow field in the vicinity of an axial flow fan during low flow rates

Dr J. Muiyser Ph. D. Co-supervised with Dr. D.N.J. Els
Title: Investigation of Large-Scale Cooling System Fan Vibration

Mr. R. Böck	M. Eng.	Co-supervisor: Dr D. Els
Mr. M. Wilkinson	M. Eng.	Co-supervisor: Prof. T. von Backström
Mr. F. Smit	M. Eng.	Co-supervisor: Prof. T. von Backström
Mr. M. Kock	M. Eng.	Co-supervisor: Prof. T. von Backström
Mr. F. Oppong	M. Eng.	Co-supervisor: Prof. T. von Backström
Mr C. Burger	M. Eng.	Co-supervisor: Prof. T. von Backström
Mr N. Basson	M. Eng.	Co-supervisor: Prof. T. von Backström
Mr C. Homann	M. Eng.	Co-supervisor: Prof. T. von Backström
Mr O. Diener	M. Eng.	Co-supervisor: Prof. T. von Backström
Mr J. Geldenhuys	MSc. Eng.	Co-supervisor: Prof. T. von Backström
Mr D. Struwig	MSc. Eng.	Co-supervisor: Prof. T. von Backström
Mr B. De Villiers	MSc. Eng.	Co-supervisor: Prof. T. von Backström
Mr N. Fourie	M. Eng.	Co-supervisor: Prof. T. von Backström
Mr J.D. Brandsen	MSc. Eng.	Co-supervisor: Prof. G. Venter
Mr O.H. Augustyn	MSc. Eng.	Co-supervisor: Prof. T. von Backström
Mr B.B. van der Merwe	MSc. Eng.	Co-supervisor: Prof. T. von Backström
Mr G. Raubenheimer	MSc. Eng.	Co-supervisor: Prof. T. von Backström
Mr P.J.F. Conradie	MSc. Eng.	Co-supervisor: Prof. T. von Backström
Mr J.P. Kotze	MSc. Eng.	Co-supervisor: Prof. L. Lorenzen
Mr F.N. le Roux	MSc. Eng.	Co-supervisor: Prof. T. von Backström
Mr. C. Peters	M. Eng.	Supervisor: Dr D. Els
Mr. S. Jivan	M. Eng.	Supervisor: Prof. G. Venter
Mr R. Hamman	MSc. Eng.	Supervisor: Prof. G. Venter
Mr R. Luiten	M. Eng.	Supervisor: Prof. T. von Backström
Mr J Basson	MSc. Eng.	Supervisor: Prof. T. von Backström
Mr D.J. Krige	MSc. Eng.	Supervisor: Prof. T. von Backström
Mr J. Muiyser	MSc. Eng.	Supervisor: Dr D. Els
Mr A.L. de Wet	MSc. Eng.	Supervisor: Prof. T. von Backström
Mr D. Palmer	MSc. Eng.	Supervisor: Prof. L. Lorenzen
Mr J.M Jidayi	M. Eng.	

In progress

Miss T Abrahams	Ph. D.	Sole supervisor
Mr. B. Ssebabi	Ph. D.	Co-supervised with Prof. F. Dinter
Mr. R. Engelbrecht	Ph. D.	Co-supervised with Dr C. Meyer

Mr. T Meissner	M. Eng.
Mr. C. Swanepoel	M. Eng.
Mr. T. du Toit	M. Eng.
Mr. G Bekker	M. Eng.
Miss C du Plessis	M. Eng.
Mr. D. Louw	M. Eng.
Mr. M. Jan	M. Eng.
Mr. T Schommarz	M. Eng.
Mr. J. Rohwer	M. Eng.
Mr. M. Bindeman	M. Eng.

10. Ph D's examined

Dr. E. Joubert

Supervisor: Prof. T.M. Harms

Stellenbosch University

Title: Numerical and experimental investigation of one-way fluid structure interaction of a vertical cantilever beam in an air stream

Dr. J. van Rooyen

Supervisor: Prof. A.G. Malan

University of Cape Town

Title: Computational Fluid Dynamic Based Optimization of an axial fan for rapid Prototyping

Dr. S. Castegnaro

Supervisor: Prof. M. Massi

University of Padova, Italy

Title: An Aerodynamic Method to Design Low-speed Axial Fans with Imposed Diameter and Rotor speed

11. Research Projects

Project MinWaterCSP

Minimisation of CSP plant water consumption

2016 to 2018

Funded by European Union, H2020 project

Project BALLAST

Research to develop local expertise in aero engine technology

2007 to 2017

Funded by South African Air Force

Project FLUXION

Research to develop local expertise in computer aided engineering

2007 to 2008 and 2012

Funded by ARMSCOR

Project FUTURE

Flutter-Free Turbomachinery Blades

2007 to 2013

Funded by European Union, FP7 project

Eskom contract research

Reverse engineering and testing of axial flow fans for air-cooled condensers

2011 to 2013

Funded by ESKOM

Eskom TESP

The performance of axial flow fans under adverse inlet flow conditions

2007 to 2015 and 2017

Funded by ESKOM

NRF Focus area grant

Axial fan development

2007

Funded by NRF

NRF Thuthuka

Fan Test Facility for Adverse Inlet Flow

2008 to 2010

Funded by NRF

NRF THRIP
Improving axial fan performance prediction methods
2011 to 2013
Funded by NRF
Industrial partner: Eskom

NRF Thuthuka
The flow pattern surrounding an axial flow fan blade
2014 to 2016
Funded by NRF

NRF THRIP
Investigation of air-cooled steam condenser fan blade vibration
2014 to 2015
Funded by NRF
Industrial partners: GEA air-cooled and Howden Fan Industries

NRF Rated Researcher
Axial flow Fan Development
2017
Funded by NRF

12. Publications

ASME conference publications (published in proceedings)

1. The Design and of a Large Diameter Axial Flow Fan for Air-Cooled Heat Exchanger Applications, M.B. Wilkinson, T.W. von Backström, **S.J. van der Spuy**, Proceedings of the ASME TURBO EXPO (2017), Charlotte, USA, 2017.
2. Numerical Investigation of the Performance of a Forced Draft Air-cooled Heat Exchanger, R.A. Engelbrecht, C.J. Meyer, **S.J. van der Spuy**, A. Zapke, Proceedings of the ASME TURBO EXPO (2017), Charlotte, USA, 2017.
3. A comparison of actuator disc models for axial flow fans in large air-cooled heat exchangers, M.B. Wilkinson, F.G. Louw, T.W. von Backström, **S.J. van der Spuy**, Proceedings of the ASME TURBO EXPO (2016), Seoul, South Korea, 2016.
4. Multi-disciplinary optimization of a mixed-flow compressor impeller, O.H.F. Diener, **S.J. van der Spuy**, T.W. von Backström, T.W. Hildebrandt, Proceedings of the ASME TURBO EXPO (2016), Seoul, South Korea, 2016.
5. The Determination of Fan Blade Aerodynamic Loading from a Measured Response, J. Muiyser, D.N.J. Els, **S.J. van der Spuy**, A. Zapke, Proceedings of the ASME TURBO EXPO (2015), Montreal, Canada, 2015.
6. Experimental Investigation of the Blade Surface Pressure Distribution in an Axial Flow Fan for a range of Flow rates, F.G. Louw, T.W. von Backström, **S.J. van der Spuy**, Proceedings of the ASME TURBO EXPO (2015), Montreal, Canada, 2015.
7. Investigation of the Flow Field in the Vicinity of an Axial Flow Fan During Low Flow Rates, F.G. Louw, T.W. von Backström, **S.J. van der Spuy**, Proceedings of the ASME TURBO EXPO (2014) volume 1 part A, Dusseldorf, Germany, 2014.
8. Investigation of Large-Scale Cooling System Fan Blade Vibration, J. Muiyser, D.N.J. Els, **S.J. van der Spuy**, A. Zapke, Proceedings of the ASME TURBO EXPO (2014) volume 1 part A, Dusseldorf, Germany, 2014.
9. The Development of an air injection system for the forced response testing of axial compressors, E. Wegman, G. Snedden, **SJ van der Spuy**, F. Holzinger, HP Schiffer, H. Mårtensson and J. Ostlund, Proceedings of the ASME TURBO EXPO 2013, San Antonio, Texas, U.S.A, 2013.
10. Performance investigation of a turbocharger compressor, A.L. de Wet, T.W. von Backström, **S.J. van der Spuy**, Proceedings of the ASME TURBO EXPO (2012) volume 8 part A, Copenhagen, Denmark, 2012.
11. The design of an axial flow fan for application in large air-cooled heat exchangers, F.G. Louw, T.W. von Backström, **S.J. van der Spuy**, P.R.P. Bruneau, Proceedings of the ASME TURBO EXPO (2012) volume 3, Copenhagen, Denmark, 2012.
12. The simulation of an axial flow fan performance curve at low flow rates, Proceedings of the ASME TURBO EXPO (2011), **S.J. van der Spuy**, T.W. von Backstrom, D.G. Kroger, Montreal, Canada, 2011.

- Using computational fluid dynamics to simulate multiple axial flow fans in air-cooled steam condensers, **S.J. van der Spuy**, T.W. von Backstrom, D.G. Kroger, Proceedings of the ASME Power Conference (2011), Denver, Colorado, U.S.A., 2011.

Journal publications (accepted and or published)

- Upgrading the BMT 120 KS Micro Gas Turbine, R&D Journal, Volume 33, F. Oppong, **S.J. van der Spuy**, T.W. von Backström, 2017.
- Prediction of axial compressor blade excitation by using a two-way staggered fluid-structure interaction model, accepted for publication in IMechE Journal of Aerospace Engineering, Brandsen, JD, **van der Spuy, SJ**, Venter, G, 2017.
- Design of a compact crossover diffuser for micro gas turbine application using a mean-line code, Accepted for publication in International Journal of Turbo and Jet Engines, Burger CJ, **van der Spuy, SJ**, von Backström, TW, 2017.
- Numerical and experimental investigation into the accuracy of the fan scaling laws applied to large diameter axial flow fans, IMechE Journal of Power and Energy, O. P.H. Augustyn, **S.J. van der Spuy**, T.W. von Backström, Vol 230 (5), 2016.
- An Evaluation of Simplified CFD Models Applied to Perimeter Fans in Air-cooled Steam Condensers, accepted for publication, IMechE Journal of Power and Energy, **van der Spuy, SJ**, von Backström, TW, vol 229 (8), 2015.
- Drag and lift characteristics of an air-cooled heat exchanger axial flow fan, ASME Journal of Fluids Engineering, volume 137 (8), Louw, FG, **van der Spuy, SJ**, von Backström, TW, 2015.
- Simulating the effect of wind on the performance of axial flow fans in air-cooled steam condenser systems, ASME Journal of Thermal Science and Engineering Applications, volume 7(2), Fourie, N, **van der Spuy, SJ**, von Backström, TW, 2015.
- Simultaneous measurement of air flow and blade loading conditions at large-scale cooling system fans, R&D Journal, Volume 26, J. Muiyser, D.N.J. Els, **S.J. van der Spuy**, A. Zapke, 2014.
- Virtualisation and performance analysis of a small-scale centrifugal compressor impeller, Accepted for publication in the International Journal of Computer Aided Engineering and Technology, van der Merwe, BB, Schreve, K, **van der Spuy, SJ**, von Backström, TW., vol 8 (3), 2014.
- The use of air injection nozzles for the forced excitation of axial compressor blades, International Journal of Turbo and Jet Engines, volume 30 (1), G. Raubenheimer, **S.J. van der Spuy**, T.W. von Backstrom, 2012.
- An evaluation of simplified methods to model the performance of axial flow fans, R&D Journal, Volume 26, **S.J. van der Spuy**, T.W. von Backstrom, D.G. Kroger, 2010.
- Performance of low noise fans in power plant air cooled steam condensers, Noise Control Engineering, volume 57 (4), July 2009, **S.J. van der Spuy**, T.W. von Backstrom, D.G. Kroger, 2009.
- The development of a biofuels engine testing facility, R&D Journal, Volume (24) 3, D. Palmer, L. Lorenzen, **S.J. van der Spuy**, 2008.
- Performance of rotor-only axial fans designed for minimum exit kinetic energy, R&D Journal, Volume 18(3), **S.J. van der Spuy**, T.W. von Backstrom, 2002. (This paper received an award for best paper related to the mining industry published in the R&D Journal in 2002).

Other conference publications (published or presented)

- The effects of solarisation on the performance of a gas turbine, C. Homann C, **S.J. van der Spuy**, T.W. von Backström, Proceedings of the SOLARPACES, Cape Town, South Africa, 2015.
- Numerical and experimental investigation into the accuracy of the fan scaling laws applied to large diameter axial flow fans, O. P.H. Augustyn, **S.J. van der Spuy**, T.W. von Backström, accepted for FAN2015, Lyon, France, April 2015.
- The effect of fan tip configuration on air-cooled condenser axial flow fan performance, M.B. Wilkinson, **S.J. van der Spuy**, accepted for FAN2015, Lyon, France, April 2015.
- Performance Investigation of a Reverse-engineered Axial Flow Fan by Numerical Simulation, O. P.H. Augustyn, **S.J. van der Spuy**, T.W. von Backström, accepted for publication, SACAM2014, Somerset West, January 2014.

5. Modelling of the flow field in the vicinity of an axial flow fan, focusing on low flow rates, F.G. Louw, **S.J. van der Spuy**, T.W. von Backström, accepted for publication, SACAM2014, Somerset West, January 2014.
6. Testing an axial flow fan designed for air-cooled steam condenser application, **S.J. van der Spuy**, T.W. von Backström, D.G. Kröger, P.R.P. Bruneau, accepted for publication, FAN 2012, Senliss, France, April 2012.
7. Simultaneous measurement of air flow and blade loading conditions in an air-cooled steam condenser, J. Muiyser, D.N.J. Els, **S.J. van der Spuy**, accepted for publication, FAN 2012, Senliss, France, April 2012.
8. The use of the actuator disc method to model axial flow fans in CFD, **S.J. van der Spuy**, T.W. von Backström, D.G. Kröger, presented, 14th IAHR cooling tower and air-cooled heat exchanger conference, Stellenbosch, November 2009.
9. The CFD simulation of a centrifugal compressor, A.L. de Wet, T.W. von Backstrom, **S.J. van der Spuy**, presented, SACAM2010, Pretoria, January 2010.
10. The CFD simulation of an axial flow fan performance curve, F.N. le Roux, **S.J. van der Spuy**, T.W. von Backström, presented, SACAM2010, Pretoria, January 2010.
11. Simulation of a Multiple Fan Installation using Computational Fluid Dynamics, **S.J. van der Spuy**, T.W. von Backstrom, D.G. Kroger, accepted for publication, SACAM2008, Cape Town, March 2008.
12. Axial fan performance in power plant air cooled condensers, **S.J. van der Spuy**, T.W. von Backstrom, D.G. Kroger, accepted for publication, FAN NOISE 2007, Lyon, France, September 2007.
13. Simulation of centrifugal compressor using computational fluid dynamics, **S.J. van der Spuy**, W.J.C. Botha, T.W. von Backstrom, presented, SACAM2004, Johannesburg, January 2004.
14. Optimizing the compressor section of a locomotive turbocharger to increase engine power output, **S.J. van der Spuy**, W.J.C. Botha, T.W. von Backstrom, accepted for publication, HEFAT2003, Livingstone, Zambia, June 2003.

Other research outputs

1. Member of local organising committee, SACAM2014, Somerset West, January 2014.
2. Session chair, Fans and Blowers track, ASME Turbo EXPO 2015, Montreal, Canada.
3. Session chair, Fans and Blowers track, ASME Turbo EXPO 2016, Seoul, Korea.
4. Best paper award, Fans and Blowers Track, ASME Turbo EXPO 2015, Montreal, Canada.
5. Stellenbosch University, Engineering Faculty, Young Researcher Award, 2016.
6. NRF C-rated researcher since 2017