

CURRICULUM VITAE – ALBERT ZAPKE

PERSONAL AND CONTACT DETAILS

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Address: Am Ruhrstein 56 **Citizenship:** South Africa
45133 Essen, Germany
Date of birth: 14.05.1970 **Permanent residence permit:** Germany

EDUCATION AND QUALIFICATIONS

1989-1992 B. Eng (Mechanical Engineering) Cum Laude Stellenbosch University, South Africa
1993-1994 M. Eng (Mechanical Engineering) Cum Laude Stellenbosch University, South Africa
1995-1997 Ph. D (Mechanical Engineering) Stellenbosch University, South Africa

Postgraduate specialization: Heat transfer and flow mechanics with the emphasis on cooling plants for the power industry.

2000-2002 Master of Business Administration University of the Witwatersrand, South Africa

MBA project specialization: Scenario planning exercise on the future use of energy sources such as coal, gas, renewable energy, and nuclear energy for the generation of electrical power

CAREER HIGHLIGHTS

2016-2020: Project Lead for the development of advanced thermal performance simulation software for large-scale cooling systems as a basis for a thermal digital twin:

- Define project scope to replace existing cooling system thermal rating legacy software programs with a new fully integrated thermal rating platform for indirect and direct dry-cooling, as well as wet-cooling and combined dry/wet cooling systems.
- Define platform for integrated thermal rating software and CFD based meta-models to increase speed and accuracy of calculations, with the goal of improving the competitiveness of the organisation and the creation of a thermal digital twin.
- Comprehensive review of thermal performance evaluation know-how which forms the basis of the cooling system thermal rating legacy software.
- Identify gaps in existing thermal rating know-how and define and execute R&D projects to eliminate know-how gaps.
- Create and manage a thermal performance rating software development team.
- Define R&D projects related to wind effects and other adverse air flow conditions, so that such 3D flow phenomena can be investigated via CFD.
- Manage the implementation of a linear algebraic thermo-fluid solver for cooling systems.

2016-2018: Technical Coordinator of the European Commission H2020 funded project MinWaterCSP:

- Project idea development, consortium building, proposal writing and funding agreement conclusion with the EU.
- Definition of the ENEXIO technical scope and objectives: Development of a combined dry-wet direct condensing system for the condensation of turbine exhaust steam, through the use of deluge cooling, to reduce the water consumption of a CSP plant, while maintaining cycle efficiency.
- Management and guidance of R&D project engineers.
- Project planning, budget planning and monitoring, financial reporting to the EU.

- Inventor and responsible for the patent application process of the Deluge ACC (deluge air-cooled condenser) concept developed within the project.

2007-2016 Lead Engineer for the Medupi air-cooled condenser manufacturing, supply, installation, commissioning and performance testing:

- Manage project engineering scope of the Medupi air-cooled condenser.
- Interface between internal engineering team based in Germany, client engineering team based in France, and project location and end user based in South Africa.
- Technical contract negotiations and contract management with suppliers and client.
- Supporting site team during construction and commissioning project phases.
- Providing technical support to the project director for claims management and arbitration processes.

EMPLOYMENT HISTORY

September 2016 – September 2020: ENEXIO Management GmbH / ENEXIO Germany GmbH (part of the Kelvion group of companies)

1) Global Head of Research and Development:

- Reporting to the Head of Operations / BU Dry-Cooling CEO.
- Responsibilities included the definition of product market needs together with Sales and Marketing.
- Analysis of competitor technologies and product offerings on the market.
- Definition of scope, timeline and budget for R&D projects, execution of R&D projects, implementation of R&D project outcomes, R&D department and personnel management (group of up to 10 colleagues).
- Cooperation with external institutions (RWTH Aachen, TU Berlin, Stellenbosch University) and suppliers in product and know-how development projects.
- Attendance of conferences and trade fairs.
- Operation of wind tunnel test equipment.
- Development of in-house thermal sizing and rating software tools together with internal and external developers, development of CFD tools in support of product development.

January 1998 – August 2016: GEA Aircooled Systems (Pty) Ltd (now Kelvion Thermal Solutions (Pty) Ltd)

1) Senior Thermal Design Engineer (January 1998-June 2000):

- Reporting to the General Manager Engineering.
- Responsibilities included the thermal design of heat transfer equipment, namely air-cooled condensers for the power and the petrochemical industries, air-cooled process coolers, shell and tube heat exchangers and plate heat exchangers.

2) Manager Contracts and Engineering (July 2000 – September 2011):

- Reporting to the Managing Director and part of management team.
- Main responsibilities included managing the Contracts Department, as well as the Engineering and Drawing Office Departments and personally managing construction and equipment supply projects.

3) Director Contracts and Engineering (October 2011 – August 2016):

- Reporting to the Managing Director and part of Management team.
- Responsible for up to 30 direct/indirect reports related to engineering and project execution of heat exchangers and large-scale cooling systems for the power industries.

APPENDIX

TECHNICAL PUBLICATIONS

- 1) Zapke, A. and Kröger, D. G., The influence of fluid properties and inlet geometry on flooding in vertical and inclined tubes, International Journal of Multiphase Flow, Vol. 22, No. 3, pp. 461-472, 1996.
- 2) Zapke, A. and Kröger, D. G., The effect of fluid properties on flooding in vertical and inclined rectangular duct and tubes, ASME Fluids Engineering Division Conference, FED-Vol. 239, Vol. 4, pp. 527-532, 1996.
- 3) Zapke, A. and Kröger, D. G., Pressure drop during gas-liquid countercurrent flow in inclined rectangular ducts, 5th International Heat Pipe Symposium, Melbourne, 1996.
- 4) Zapke, A. and Kröger, D. G., Vapor-condensate interactions during counterflow in inclined reflux condensers, ASME National Heat Transfer Conference, HTD-Vol. 342, Vol. 4, pp. 157-162, Baltimore, August 1997.
- 5) Zapke, A. and Kröger, D. G., Countercurrent gas-liquid flow in inclined and vertical ducts – I: Flow patterns, pressure drop characteristics and flooding, International Journal of Multiphase Flow, Vol. 26, pp. 1429 - 1455, 2000.
- 6) Zapke, A. and Kröger, D. G., Countercurrent gas-liquid flow in inclined and vertical ducts – II: The validity of the Froude-Ohnesorge number correlation for flooding, International Journal of Multiphase Flow, Vol. 26, pp. 1457 - 1468, 2000.
- 7) Zapke, A., Goldschagg, H. and Kröger, D. G., Flow limitations in a dephlegmator and modifications for the performance improvement of the Matimba Power Station air-cooled steam condensing system, Presented at the 13th IAHR Cooling Tower Conference in Poitiers, France, June 2005.
- 8) Jacques Muiyser, Danie N. J. Els, Sybrand J. van der Spuy, Albert Zapke, Measurement of air flow and blade loading conditions at a large-scale cooling system fan, R & D Journal of the South African Institution of Mechanical Engineering 2014, 30, 30-38.
- 9) Jacques Muiyser, Danie N. J. Els, Sybrand J. van der Spuy, Albert Zapke, Investigation of large-scale cooling system fan blade vibration, Proceedings of the ASME 2014 Turbine Technical Conference and Exposition, TE2014, June 16-20, 2014, Düsseldorf, Germany.
- 10) Chris Meyer, Albert Zapke, A modeling strategy for large-scale mechanical draught air-cooled systems, 10th International Conference on CFD in Oil & Gas, Metallurgical and Process Industries, SINTEF, Trondheim, Norway, 17-19th June 2014.
- 11) Jacques Muiyser, Danie N. J. Els, Sybrand J. van der Spuy and Albert Zapke, The determination of fan blade aerodynamic loading from a measured response, Proceedings of the ASME 2015 Turbine Technical Conference and Exposition, TE2015, June 15-29, 2015, Montreal, Canada.
- 12) Wilhelm Beyers, Albert Zapke and Gerhard Venter, Improved Cover Type Header Box Design Procedure, R & D Journal of the South African Institution of Mechanical Engineering 2015, 31, 76-85.
- 13) Wilhelm Beyers, Albert Zapke and Gerhard Venter, Modelling the structural behaviour of a round nozzle to flat plate interface in pressure vessels, 10th South African Conference on Computational and Applied Mechanics at Potchefstroom South Africa, October 2016.
- 14) Charles H. O. Lombard, Daniel N. J. Els, Jacques Muiyser and Albert Zapke, Analysis of a Large-Scale Cooling System Fan Gearbox Loads, ASME Turbo Expo 2017: Turbomachinery Technical Conference and Exposition, June 2016.
- 15) Ruan A. Engelbrecht, Johan van der Spuy, Chris J. Meyer, Albert Zapke, Numerical investigation of the performance of a forced draft air-cooled heat exchanger, Proceedings of ASME Turbo Expo 2017: Turbomachinery Technical Conference and Exposition GT2017 June 26-30, 2017, Charlotte, NC, USA.

- 16) Daniel Els, Jacques Muiyser, Johan van der Spuy, Chris Meyer, Francois Louw and Albert Zapke, Performance testing of a retrofitted ACC fan, Fan 2018 International Conference, Darmstadt (Germany), 18 – 20 April 2018.

SELECTED RESEARCH PROJECTS INITIATED BY ME OR WITH MY INVOLVEMENT

TOPIC	STUDY LEADERS / SUPERVISORS	DATE
Master Thesis (Mechanical Engineering): Pressure gradient and flooding during two-phase countercurrent flow in inclined tubes.	Prof. D. G. Kröger, Stellenbosch University	1993 - 1994
Ph. D Thesis (Mechanical Engineering): Characteristics of gas-liquid counterflow in inclined ducts with reference to reflux condensers.	Prof. D. G. Kröger, Stellenbosch University	1995 - 1997
Large air-cooled condenser CFD, carried out by PhD student Francois Louw.	Prof. D. G. Kröger, Stellenbosch University	2011
Performance and thermo-mechanical cost evaluation of API 661 air-cooled heat exchanger, S. Ackers.	Prof. H. C. R. Reuter, Stellenbosch University	2012
Large scale air-cooled condenser mechanical equipment loading, M. Sc. Thesis Jacques Muiyser.	Dr. Danie Els and Dr. Johan van der Spuy, Stellenbosch University	2009 - 2011
Large scale air-cooled condenser mechanical equipment loading, PhD Thesis Jacques Muiyser.	Dr. Danie Els and Dr. Johan van der Spuy, Stellenbosch	2012 - 2015
Bridge effect on fan performance and blade vibration in air-cooled heat exchangers, N. R. Basson.	Dr. Danie Els and Dr. Johan van der Spuy, Stellenbosch University	2013 - 2015
OpenFoam CFD modelling of large-scale air-cooled condensers.	Prof. C. Meyer, Stellenbosch University	2012 - 2016
API air-cooled heat exchanger cover-type header FEA and design methodology project, M. Sc. Thesis W. Beyers.	Prof. G. Venter, Stellenbosch University	2013 - 2014
API air-cooled heat exchanger plug-type header FEA and design methodology project at PhD level, W. Beyers.	Prof. G. Venter, Stellenbosch University	2015 - 2017
Gearbox loading project with reference to air-cooled condenser applications at M.Sc. level, Osche Lombard.	Dr. Danie Els and Jacques Muiyser, Stellenbosch University	2015 - 2016
Reduction of water consumption in large-scale cooling systems. A 3-year research and development project funded by the European Union under its H2020 programme.	Technical coordination by A. Zapke, participating organisations from South Africa, Morocco, Germany, Spain, Italy and Belgium.	2016 - 2018
Cooling system related noise calculation methodology development.	Prof. Dr.-Ing. E. Sarradj, Technical University Berlin	2018 - 2019
Axial flow fan scale model performance testing.	Prof. Johan van der Spuy, Stellenbosch University	2019 - 2020
Large-scale air-cooled condenser CFD study to quantify the effect of wind on induced draft systems and concept design for wind mitigation.	Dr. Ruan Engelbrecht, Therm Development (Pty) Ltd.	2019 - 2020

TOPIC	STUDY LEADERS / SUPERVISORS	DATE
Air-cooled condenser air-side resistance calculation methodology development.	Prof. Johan van der Spuy, Stellenbosch University	2019 - 2020

ROLE AS EXTERNAL EXAMINER FOR POST GRADUATE STUDENTS

TOPIC	CANDIDATE	STUDY LEADERS	YEAR
Evaluation of the performance characteristics of a hybrid (dry/wet) induced draft dephlegmator.	Neil Raymond Anderson (MSc Engineering candidate)	Prof. H. C. R. Reuter, Stellenbosch University	2014
Air-cooled condenser steam flow distribution and related dephlegmator design considerations.	Michael Owen (PhD Engineering candidate)	Prof. D. G. Kröger, Stellenbosch University	2013
Inlet manifold tests and performance evaluation of dephlegmators in air-cooled condensers.	Leslie van Zyl Smit (MSc Engineering candidate)	Prof. D. G. Kröger, Stellenbosch University	2000

AWARDS AND OTHER ROLES

SAIMegl medal for the best final year project presentation, Stellenbosch University, 1992.

SAIMegl plate for the best final year project, Stellenbosch University, 1992.

Mechanical Engineering Chairman's prize for contributions and achievements during the final year, Stellenbosch University, 1992.

Proposal reviewer for US Electric Power Research Institute (EPRI) and National Research Foundation's (NSF) joint research program on Advanced Dry-cooling for Power Plants, 2013.

Consultant for US Electric Power Research Institute (EPRI) on large-scale cooling systems used in the power industry, 2014 – 2017.

ASME International Gas Turbine Institute, Fans & Blowers 2015 Best Paper Award, Jacques Muiyser, Daniel N.J. Els, Sybrand J. Van der Spuy & Albert Zapke, 'The Determination of Fan Blade Aerodynamic Loading from a Measured Response', ASME Paper GT2015-43010.

Appointment as Associate Professor Extraordinary in the Department of Mechanical Engineering at Stellenbosch University, January 2015 to December 2017.

Appointment as Professor Extraordinary in the Department of Mechanical Engineering at Stellenbosch University, January 2018 to December 2020.

Appointment as Professor Extraordinary in the Department of Mechanical Engineering at Stellenbosch University, January 2021 to December 2023.