Curriculum Vitae/Resume
Name: Lionel Prinsloo
Program: Mechanical Engineering Ph.D.
Institution: University of Michigan – Ann Arbor

1 Contact information:

Name:	Lionel Prinsloo
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2 General information:

Identity number (S.A. citizen):	8611115100089
Date of birth:	11 November 1986
Place of birth:	Sasolburg, Free State, South Africa
Gender:	Male
Marital status:	Single
Dependants:	None
Nationality:	South African
Home language:	Afrikaans
Other languages:	English (Fully bilingual)

3 Education and awards:

- Matriculated from High School Secunda (Mpumalanga, South Africa) in 2004:
  - Afrikaans [HG][1] A 80 % to 100 %
  - English [HG] A 80 % to 100 %
  - Mathematics [HG] A 80 % to 100 %
  - Physical science [HG] A 80 % to 100 %
  - Accounting [HG] A 80 % to 100 %
  - Technical drawing [HG] A 80 % to 100 %
  - Computer science [HG] A 80 % to 100 %
  - Additional mathematics [HG] B 70 % to 79 %

- Bachelor of Engineering (Mechanical Engineering) with distinction, completed at the University of Pretoria in 2008:
  - Received the merit award in years 1 through 4 of study for academic achievement.
    - Academic – 1st year 2005 (90.42 %)
    - Academic – 2nd year 2006 (91.75 %)
    - Academic – 3rd year 2007 (88.65 %)
    - Academic – 4th year 2008 (89.19 %)

[1] [HG] denotes a Higher Grade subject.

  - Best final year student in Computer Aided Structural Mechanics.
  - Shared the best final year aeronautical project.
  - Received the Sasol Merit Medal for the best final year student in Mechanical Engineering (2008, Straight distinctions[2]).
  - Received the Award of the Vice-Chancellor and Principal for excellent undergraduate academic achievement.
  - Received academic honorary colours (B.Eng Mechanical Engineering).

- Received the Sasol Golden Key Excellence Award, category: Engineering and the Built Environment (2008). In recognition of outstanding scholastic achievement and excellence.

- Received the Eskom top merit award for academic excellence, for the category: University students (2009), held at national level.

- I completed an Honours degree in Mechanical Engineering at the University of Pretoria (2009). The following courses were included as part of this degree:
  - Vibration (92 %)
  - Finite Element Methods (89 %)
  - Numerical techniques and Optimization (95 %)
  - Structural integrity (90 %)

- Received the International Fulbright Science and Technology Award. September, 2010.

- I am currently enrolled for a Master's degree at the University of Pretoria to be completed during the first semester of 2011.

4 Employment history

I was awarded a bursary by Sasol from the start of my third year of undergraduate study onwards, and have completed numerous vacation work periods on site in Secunda during 2005 through 2007. The most significant period was at the end of my third year of study (2007) which involved the characterization of plate and shell heat exchangers, as a vacation work student.

As part of my final year project, I worked part-time at the Council for Scientific and Industrial Research (CSIR) in Pretoria under the supervision of Mr. Thomas Roos. This work involved the characterization of an old 45 kW Rover turbine to be implemented as part of a solar-fired gas turbine project.

I also received a bursary for post graduate study from Sasol Technology, for the purpose of completing a Master's degree in mechanical engineering. To this end, I have been working closely with personnel at Sasol Technology. During my graduate career I have also been a teaching assistant for a number of courses within the Mechanical Engineering department at the University of Pretoria. A summary of my employment history is provided in Table 4-1.

[2] A distinction indicates a mark of 75 % to 100 %.

Table 4-1: Summary of employment history

Name and address of employer	Type of work	Working period
Mechanical Engineering, University of Pretoria, Lynnwood Road, Hatfield, 0002, Pretoria, South Africa	MKM 410 (Computational Mechanics) teaching assistant to fourth years	February to June 2011
Mechanical Engineering, University of Pretoria, Lynnwood Road, Hatfield, 0002, Pretoria, South Africa	MKM 320 (Continuum Mechanics) teaching assistant to third years	July to November 2010
Mechanical Engineering, University of Pretoria, Lynnwood Road, Hatfield, 0002, Pretoria, South Africa	MPR 212 (Programming) teaching assistant to second years	February to June 2010
Mechanical Engineering, University of Pretoria, Lynnwood Road, Hatfield, 0002, Pretoria, South Africa	MVR 320 (Vibration) teaching assistant to third years	July to November 2009
Defence, peace, safety and security, Council for Scientific and Industrial Research, Meiring Naudé Road, Brummeria, 0001, Pretoria, South Africa	Project Student, commissioning of Rover 1S/60 gas turbine	June to August 2008
Sasol Technology (Pty) Ltd, Private Bag X1034, 2302, Secunda, South Africa	Vacation work student, Characterization of Plate and Shell Heat Exchangers	November 2007 to January 2008
Sasol Synfuels, Secunda, South Africa.	Contract work, Maintenance	2005 to 2007 (See Note)
Note: Work was done on numerous occasions during vacations.		

5 Research/Project descriptions

In Sections 5.1 and 5.2 I have provided abstracts of my Master's and final year project (undergraduate study), respectively.

5.1 Master's study: A critical evaluation of the design of removable cover-plate header boxes for air-cooled heat exchangers

Study leader:	Ms. Helen Inglis (University of Pretoria)
Co study leader:	Dr. Schalk Kok (CSIR)
Mentors at Sasol Technology:	Mr. Francois Lombaard
	Mr. Ashveer Maharaj
Year:	2010

Large air-cooled heat exchangers (ACHEs) are most popularly implemented in the petrochemical and power industries at arid locations. They operate on a simple concept of convective heat transfer, whereby air in the surrounding atmosphere is caused to flow across a tube bundle, which in turn transports a process fluid. The distribution and direction of the process fluid flow may furthermore be guided via a set of appropriately located header boxes, which essentially consist of a collection of welded flat plates and nozzle attachments. Perforations on one of the faces of these boxes serve as an interface to the tube bundle.

The overall design and construction of an ACHE is commonly regulated by an American Petroleum Institute (API) standard, which is required to be used in conjunction with acceptable design codes. In spite of this, the design of certain header box configurations remains of prominent concern. It is the focus of the present study to investigate the approach adopted for a header box variant labelled as the removable cover type. In this configuration, one of the plates used to construct the header box is fastened and sealed by a collection of bolted joints and gasket, allowing it to be removed.

One appropriate design code for the header box equipment is the ASME (American Society of Mechanical Engineers) boiler and pressure vessel code. However, it provides no specific approach pertaining to the removable cover design. Instead it has been commonplace in industry for a number of aspects from this code to be synthesized, together with a collection of assumptions surrounding the header box behaviour, into an all encompassing design by rule approach. In this approach, the header box behaviour is accepted as being planar, whilst circumstances such as nozzle attachments and associated loading would suggest that a more comprehensive approach should be undertaken.

The aim of the present study is therefore to critically evaluate the current practice, and establish its adequacy. To do so, a detailed three-dimensional finite element model (FEM) of an example header box design is developed. Subsequent comparisons with the stress distribution predicted via current practice show that the existing analytical model gives inaccurate and, in cases, overly conservative results. A new analytical approach developed from rigid frame theory is demonstrated to provide improved correlation with FEM.

The linear elastic design by analysis approach, presented in the ASME code, is also utilised as a method for establishing design adequacy. Results obtained via design by analysis incorporating the finite element method are shown to be less conservative than those arising from design by rule methods. The design by analysis approach is also used to conduct a more detailed investigation of nozzle placement and external loading. In general, the effect of including a nozzle did not result in a significant increase in side plate stress, with failure more likely to occur within the nozzle wall.

5.2 Final year project: Commissioning of the Rover 1S/60 Gas Turbine

Study leader:	Mr. Thomas Roos (CSIR)
Co study leader:	Prof. Leon Liebenberg (University of Pretoria)
Year:	2008

The search for alternative forms of power generation has gained increasingly more interest over the past few years. The CSIR is currently researching one alternative, a solar-fired gas turbine, whereby energy from the sun is employed to heat the air-flow in a turbine application so as to generate clean power. Mr. Thomas Roos of the CSIR is performing a Ph.D. study in this regard at the University of Stellenbosch. As part of his research an old 45 kW Rover gas turbine is to be employed. The turbine is of a simple configuration, consisting of a radial compressor stage, reverse-flow combustion can and a single axial compressor stage.

The Rover turbine was obtained from the University of Stellenbosch, and was last used in operation during the early 1990's as a gas turbine research unit for students. The turbine has subsequently been altered, and now incorporates a tubular heat exchanger to improve its overall efficiency. The turbine is used as prime mover for a three-phase electrical generator. Since little information is available on the health of the turbine as well as its operating performance, it is the aim of this project to get the turbine up and running and to establish the performance of the engine at its design point.

A bulleted summary of the work involved can be illustrated as follows:

1. Overhaul the engine, and get it running up to specification.
2. Measure up all of the necessary components and carry out performance calculations. This includes for example the compressor, heat exchanger and turbine stage.
3. Instrument the machine to perform measurements for comparison with the stated performance calculations. This includes the design of an intake system to measure the air mass-flow rate going into the engine.

6 Community engagement

- I have attended a number of meetings held by the Turbomachinery Technology Group in South Africa through my affiliation with Mr. Thomas Roos.
- I have been a member of the Golden Key International Honour Society since 2006.
- As part of my third year of undergraduate study (2007), I completed a community-based project, for which I gave mathematics classes to less fortunate learners.

7 Select pastimes

I am enthused by outdoors activities, and am very interested in sports. I played both rugby and cricket in High School, as well as some soccer during breaks. During my undergraduate years I also entertained a brief stint of kart racing at Zwartkops raceway (Pretoria). I have a keen interest in motorsport, and have been following Formula 1 for many years now. More recently, I've taken on running, swimming and mountain biking as pastimes. I successfully completed a half marathon and a 70 km mountain bike endurance race in 2009, as well as my first triathlon at the start of 2010, accomplishments of which I am quite proud. I am convinced of the unifying power that sport has and its ability to build strong friendships.

I also have a keen interest in computing and use it for recreational purposes. I have played multiplayer computer games for many years now. My friends and I are fond of attending gaming events and expos. This interest has allowed me to develop abilities in relation to the operation and assembly of computers from a young age.