

Location: Gothenburg, Sweden**Email:** leon.henderson@chalmers.se**Nationality:** New Zealand / British (dual citizenship)

Education

2009-2013: Ph.D. in Heavy Vehicle Dynamics
Graduated April 2014**University of Cambridge, UK**

These studies were focussed on the design and testing of a novel anti-lock braking system (ABS) for heavy goods vehicles (HGVs). The new system utilised a novel high-speed pneumatic valve that was developed in-house. Work was completed under the supervision of Professor David Cebon as part of the Cambridge Vehicle Dynamics Consortium (CVDC). The project involved considerable collaboration with Haldex Brake Products Ltd and culminated with full-scale vehicle tests. The prototype braking system was shown to reduce the stopping distance of the test vehicle (a tri-axle semitrailer) by 16%, when compared to a commercially available ABS system.

Skills demonstrated throughout this project include:

- Computer simulation of heavy vehicle braking dynamics and pneumatic brake hardware.
- Control system design (design, tuning and implementation of a non-linear slip-control braking algorithm for a HGV).
- Design and manufacture of a prototype ABS modulator valve (work carried out in collaboration with design engineer from Haldex Brake Products)
- Hardware-in-the-Loop testing (closed loop lab testing of quarter car braking model and slip controller, with pneumatic brake hardware in the loop).
- Electromagnetic and mechanical modelling of a pneumatic ABS valve.
- Embedded programming for real-time implementation (programming of microcontrollers in C, use of Matlab Simulink and XPC toolboxes).
- Vehicle instrumentation and testing (design and analysis of failure back-up systems, CAN communications, basic brake dynamometer testing, straight-line wet grip ABS tests, collection and post-processing of accelerometer, thermocouple, pressure transducer, GPS and other sensor data).
- Failure mode and effect analysis (FMEA)
- Project management.

2005-2008: Bachelor of Mechanical Engineering
1st Class Honours**University of Waikato, NZ**

Two projects, one design-based and one research-based, were completed as part of fourth year. The research-based project (supervised by Associate Professor Ilanko) involved modelling 2D heat transfer in a rectangular plate using a novel penalty function method to define boundary conditions and was later published in the International Journal of Numerical Methods in Biomedical Engineering (see Publications section). The second project involved the design and testing of a prototype automated animal feeding station. The system was designed for pest control and conservation applications and was carried out in collaboration with HortResearch (a New Zealand state funded research institute).

Secondary School Education**Mercury Bay Area School, NZ****2004** 6 subjects at NCEA level 3

(Calculus, Chemistry, Physics, Graphics, Painting and Photography)

Employment History

April 2014 – December 2015 **University of Cambridge, Engineering Department, UK** *Position: Research Associate in Pneumatic Brake Systems for Heavy Goods Vehicles*

This work followed directly on from Ph.D. studies and has two main goals: to install the CVDC braking system on a modern Volvo FH12 tractor unit and carry out back-to-back comparative ABS braking tests; to assess how the new braking system could satisfy European automotive legislation (UNECE Regulation 13).

This project was funded by Volvo Trucks and involved significant collaboration between the University of Cambridge, Volvo Trucks and Haldex Brake Products Ltd. The vehicle testing phase of this project was concluded with live vehicle demonstrations to Volvo and Haldex senior management, the UK Department for Transport and the BBC; footage from these demos was aired on BBC One's Breakfast News TV show, as well as their website.

While working with the CVDC, contributions have been made to several other vehicle related projects. These have included: active steering systems and autonomous reversing of multi-articulated HGVs; cyclist detection and collision prevention; hydraulic regenerative braking; tyre modelling; and stability control (ESC). This involvement has been possible due to the strong team focused environment which exists between fellow researchers in the CVDC; where group members regularly pitch-in to help each other with the hands-on testing phase of the group's broad range of projects.

Teaching experience gained during this position includes: supervising vehicle testing phases of several Ph.D. projects; providing guidance to Masters of Engineering students working with the CVDC; preparing and delivering two lectures on HGV braking systems during the UMTRI Mechanics of Heavy Vehicles short-course.

Oct 2009 - April 2012 **University of Cambridge, Engineering Department, UK** *Position: Supervisor/Tutor for Third Year Dynamics and Vibration Courses*

Tutored groups of Cambridge third year Bachelor of Engineering students as part of their vibration and dynamics courses.

May 2009 - Sept 2009 **Solenza Ltd and University of Waikato, NZ**

Position: Research and Development Engineer

Responsible for building and testing prototype solar hot-water heating system. Also prepared and manned demonstration stall at New Zealand Fieldays (5 day Agricultural Technology Event). Oversaw manufacture of Beta prototype system for swimming pool heating installation.

Nov 2007- Feb 2008 **AgBiotech Innovators Academy, NZ**

Position: Project Development Assistant

Duties included carrying out feasibility studies on possible projects related to the NZ agricultural industry, carrying out initial market analysis, attending project brainstorming sessions, presenting results and making recommendations of projects to be pursued.

Nov 2006 - Nov 2007 **Proform Plastics Ltd, NZ** **Summer & Part time**

Position: Research and Development Assistant

Duties included basic operation of CNC router, general maintenance of CNC router, CAD design (AutoCad and PowerShape), and manual preparation of mould plugs for vacuum forming processes.

Academic Activities and Achievements

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| 2015 | Vehicle testing footage featured on BBC Breakfast show and BBC News website |
| 2014 | Delivered two lectures at the UMTRI Mechanics of Heavy Vehicles course (University of Cambridge, UK).
Completed one-day training course on Anthony Best Dynamics steering robot hardware (used for automated steering of cars and trucks). |

- 2013** Awarded Lundgren Research Award (University of Cambridge, UK).
- 2012** Completed German for Beginners Intensive Course (Engineering Language Unit, Cambridge, UK).
- 2011** Completed Simpack (multi-body dynamics simulation software) two day training course.
Completed Essential First Aid Course (certificate expired Nov 2014).
- 2009** Awarded New Zealand Top Achievers Doctoral Scholarship.
Awarded William Georgetti Scholarship for Post-Graduate Studies.
Successful University of Waikato PhD Scholarship Application (later turned down in favour of University of Cambridge PhD funding).
- 2008** New Zealand Institute of Professional Engineers (IPENZ) Final Year Project Prize
Awarded University of Waikato Bonded Merit Scholarship.

Journal and Conference Publications

L. Henderson and D. Cebon, *The effects of in-plane tyre dynamics on slip control braking performance for heavy goods vehicles*, submitted to Vehicle System Dynamics, February 2016.

L. Henderson and D. Cebon, *Full-scale testing of a novel slip control braking system for heavy vehicles*, Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering, published online on 23 September 2015.

L. Henderson and D. Cebon, *Improved emergency braking performance for HGVs*, Presented at The 13th International Heavy Vehicle Transport Technology Symposium, San Luis, Argentina, 2014.

J. Miller, **L. Henderson** and D. Cebon, *Designing and testing an advanced pneumatic braking system for heavy vehicles*, Proceedings of the Institution of Mechanical Engineers Part C: Journal of Mechanical Engineering Science, Vol 227 no.8, pp 1715-1729, 2013.

L. Henderson, J. Miller and D. Cebon, *A high performance slip control braking system for heavy goods vehicles*, Presented at The 11th International Symposium on Advanced Vehicle Control, Seoul, Korea, 2012.

L. Henderson, J. Miller, D. Cebon and B. Prescott., *Design and implementation of a high-bandwidth pneumatic actuator for heavy goods vehicles*, Presented at EuroBrake 2012, Dresden, Germany, 2012.

L. Henderson and D. Cebon, *The effects of tyre dynamics on slip control braking for heavy goods vehicles*, Presented at the 22nd IAVSD Symposium on Dynamics of Vehicles on Roads and Tracks, Manchester, UK, 2011.

L. Henderson and S. Ilanko, *The use of pseudo inertia in asymptotic modelling*, International Journal of Numerical Methods in Biomedical Engineering, Vol 27, pp 59-68, 2011.

Patents

D.Cebon, A. Odhams, N. Houghton, W. Wlaysia, J. Miller, R. Prescott, **L. Henderson** and L. Potter, *Electromagnetic Flexure*, International Patent Application No: PCT/GB2012/052241

Extra-Mural Activities and Achievements

- 2015** Member of Darwin College Cricket Team (Cambridge, UK).
- 2014** Completed the Warsaw marathon.
Member of Darwin College Cricket Team (Cambridge, UK).
- 2012** Member of Darwin College Boat Club men's 1st eight rowing boat (Cambridge, UK).
Junior Boatman of Darwin College Boat Club (Cambridge, UK).
Captain of Darwin College Pool Team (Cambridge, UK).
- 2011** Vice-Captain of Darwin College Boat Club (Cambridge, UK).
Member of Darwin College Cricket Team (Cambridge, UK).
- 2010** Health and Safety Officer for Darwin College May Ball Committee (Cambridge, UK).
Member of Darwin College Cricket Team (Cambridge, UK).
Member of Darwin College Boat Club men's 1st eight rowing boat (Cambridge, UK).
- 2009** Student ambassador at the University of Waikato, NZ.

References available upon request.