

# UNIVERSITY OF PRETORIA

## CURRICULUM VITAE – Dr Carl Martin Becker

(Updated 22 May 2022)

### 1. BIOGRAPHICAL SKETCH

1.1 GENERAL INFORMATION									
<b>Surname</b>	Becker								
<b>First names</b>	Carl Martin			<b>ID Number</b>					
<b>Citizenship</b>	RSA			<b>Title</b>	Dr	<b>Female</b>		<b>Male</b>	X
<b>Place of birth</b>	Roodepoort, South Africa			<b>Date of birth</b>			7 Augustus 1982		
<b>Population group</b>	<b>African</b>		<b>Coloured</b>		<b>Indian</b>		<b>White</b>	X	<b>Other</b> <i>(Please specify)</i>
<b>Department</b>	Mechanical and Aeronautical Engineering			<b>Position</b>			Researcher		
<b>Direct Telephone</b>	012-420-2928			<b>Direct Telefax</b>					
<b>E-mail</b>	carl.becker@up.ac.za								
<b>Date of appointment</b>	01/04/2010			<b>Permanent full-time</b>			X	<b>Temporary full-time</b>	

1.2 ACADEMIC QUALIFICATIONS OBTAINED				
Degree/ Diploma	Field of study	Higher education institution	Year	Distinctions
PhD.Eng	Mechanical Engineering	University of Pretoria	2022	
M.Eng	Mechanical Engineering	University of Pretoria	2008	Cum Laude
B.Eng Honors	Mechanical Engineering	University of Pretoria	2006	Cum Laude
B.Eng	Mechanical Engineering	University of Pretoria	2005	1 <sup>st</sup> class

<b>1.3 WORK EXPERIENCE TO DATE</b>		
<b>Name of employer</b>	<b>Capacity and/or type of work</b>	<b>Period From (mm//yy to mm//yy)</b>
University of Pretoria	Researcher	09/15 to present
University of Pretoria	Senior Research Officer	04/10 to 08/2015
Land Mobility Technologies	Test Engineer	03/08 to 03/10

## 6. RESEARCH FUNDING

<b>6.1 Obtaining research funds (Optional)</b>			
<b>Origin of research funds (e.g. contract research, THRIP, international funding organizations, other(s))</b>	<b>Title of research project or program</b>	<b>Duration</b>	<b>Money allocated (R)</b>
John Deere	Characterizing Large Agricultural Vehicle Tires	Dec2016-Oct2017	\$120K (R 1 680 000)
Caterpillar	Characterizing Large Construction Equipment Tire	Sept 2017-Dec 2017	\$40k (R 560 000)
Caterpillar	Characterizing Large Construction Equipment Tire	Dec 2021-April 2022	\$98k (R1.5m)

## 7. RESEARCH OUTPUTS

<b>7.1 Publications in peer-reviewed or refereed journals</b>
<p><b>Publications published in peer-reviewed or refereed journals:</b></p> <ol style="list-style-type: none"> <li>1. Becker, CM and Els, P.S, 2022, Agricultural Tyre Stiffness Change as a Function of Tyre Wear, International Journal of Terramechanics, Vol 102, pp. 1-15, ISSN 0022-4898.</li> <li>2. Becker, CM and Els, P.S, 2020, Motion resistance measurement on large lug tyres, International Journal of Terramechanics, Vol 88, pp. 17-27, ISSN 0022-4898.</li> <li>3. Stallmann, M.J., Els, P.S. and Becker, C.M., 2014, Parameterization and Modelling of Large Off-Road Tyres for Ride Analyses: Part 1 - Obtaining Parameterization Data, Journal of Terramechanics, Vol 55, pp. 73-84, ISSN 0022-4898</li> </ol>

4. Becker, C.M. and Els, P.S., 2014, Profiling of rough terrain, International Journal of Vehicle Design, Vol. 64, Nos. 2/3/4, pp. 240-261, ISSN: 0143-3369.

### **7.3 Published full-length conference papers/keynote addresses**

#### **International conferences of high standing**

1. Becker, C.M and Els, P.S., Motion Resistance Measurements on Large Lug Tyres, 15th ISTVS European-African Regional Conference, 8-11 Sept 2019, Prague, Czech Republic, ISBN 978-1-942112-xx-x
2. Becker, C.M., Els, P.S., Static and Dynamic Parameterization Test Rigs for Large Tyres, The joint 10<sup>th</sup> Asia-Pacific Conference of ISTVS and 39<sup>th</sup> Annual Meeting of Japanese Society for Terramechanics, 11-13 July 2018, Kyoto, Japan. ISBN 978-1-942112-45-7
3. Botha, T., Becker, C.M., Els, P.S., Sopher, A. and Shoop, S., Three-Dimensional Rut Profile Measurement in Snow, 8th ISTVS Americas Conference, 12-14 Sept 2016, Detroit, Michigan, USA. ISBN 978-1-942112-48-8
4. Guthrie, A.G., Botha, T.R., Becker, C.M., Els, P.S., Sopher, A., and Shoop, S., Measurement of Tire Carcass Inside Deformation, 8th ISTVS Americas Conference, 12-14 Sept 2016, Detroit, Michigan, USA. ISBN 978-1-942112-48-8
5. Shoop, S., Els, P.S., Becker, C.M., Botha, T.R., and Sopher, A., Evaluation of Digital Image Correlation Technique for Off-Road Mobility in All-Season Conditions, 8th ISTVS Americas Conference, 12-14 Sept 2016, Detroit, Michigan, USA. ISBN 978-1-942112-48-8
6. Shoop, S., Sopher, A., Stanley, J., Els, P.S., Becker, C.M., and Botha, T.R., Instrumentation and Testing of a High Mobility Multipurpose Wheeled Vehicle, 8th ISTVS Americas Conference, 12-14 Sept 2016, Detroit, Michigan, USA. ISBN 978-1-942112-48-8
7. Els, P.S., Botha, T.R., Becker, C.M, Shoop, S., Sopher, A., Digital Image Correlation for Off-Road Mobility, NDIA Ground Vehicle Systems Engineering and Technology Symposium, 2-4 August 2016, Novi, Michigan, USA.
8. Becker, C.M., and Els, P.S., The applicability of the friction circle concept to off-road tyres, 13th ISTVS European Conference, 21-23 Oct 2015, Rome, Italy. ISBN 978-1-942112-46-4
9. Els, P.S., Botha, T.R., Hamersma, H.A., Becker, C.M., Savitski, D., Heidrich, L. and Höpping, K., The Effect of Controllable Suspension Settings On the ABS Braking Performance of An Off-Road Vehicle On Rough Terrain, ISTVS 7th Americas Regional Conference, 4-7 Nov 2013, Tampa, Florida. ISBN 978-1-942112-44-0
10. Becker, C.M. and Els, P.S., 2012, Wheel Force Transducer Measurements on a Vehicle in Transit, Proceedings of the 12<sup>th</sup> European Regional Conference of the ISTVS, Pretoria, South Africa, 24 to 28 September 2012 (peer reviewed). ISBN 978-1-942112-28-0

11. Botha, T.R., Els, P.S. and Becker, C.M., 2012, Measuring Tyre Contact Patch Deformation using Stereography, Proceedings of the 12<sup>th</sup> European Regional Conference of the ISTVS, Pretoria, South Africa, 24 to 28 September 2012 (peer reviewed). ISBN 978-1-942112-28-0
12. Els, P.S. and Becker, C.M., 2011, Characterisation and modelling of off-road tyres, Proceedings of the 17<sup>th</sup> International Conference of the ISTVS, Blacksburg, USA, 18 to 22 September 2011 (peer reviewed). ISBN 978-1-942112-16-7
13. Becker, C.M. and Els, P.S., 2011, Modal analysis on a large off-road tyre using Scanning Laser Vibrometry, Proceedings of the 17<sup>th</sup> International Conference of the ISTVS, Blacksburg, USA, 18 to 22 September 2011 (peer reviewed). ISBN 978-1-942112-16-7
14. Becker, C.M. and Els, P.S., 2010, Profiling of Rough Terrain, Proceedings of the Joint 9th Asia-Pacific ISTVS Conference and Annual Meeting of the Japanese Society for Terramechanics, 27 to 30 September 2010, Sapporo, Japan. ISBN 978-1-942112-37-2
15. Els, P.S. and Becker, C.M., 2010, Characterisation and Modelling of Off-road Tyres, Proceedings of the Joint 9th Asia-Pacific ISTVS Conference and Annual Meeting of the Japanese Society for Terramechanics, 27 to 30 September 2010, Sapporo, Japan. ISBN 978-1-942112-37-2
16. Els, P.S. and Becker, C.M., Profiling of rough terrain, 2009, Proceedings of the 11<sup>th</sup> European Regional Conference of the International Society for Terrain Vehicle Systems (ISTVS), 5 to 8 October 2009, Bremen, Germany. ISBN 978-1-942112-27-3

## 8. OTHER SCHOLARLY RESEARCH-BASED CONTRIBUTIONS

### 8.1 Participation in conferences, workshops and short courses - specify type of contribution

*Provide full details of participation in national and international conferences etc*

#### 8.121. National

1. Attended the TandM Community Connect, TandM TCC 2021, Future Africa, November 2021.
2. Presenter at the ESTEQ Engineering Community Conference, ECC 2016, CSIR, March 2016.
3. Presenter at the ESTEQ Engineering Community Conference, ECC 2013, CSIR, March 2013.
4. Presenter at the ESTEQ Engineering Community Conference, ECC 2012, CSIR, October 2012.
5. Presenter at the ESTEQ Engineering Community Conference, ECC 2011, CSIR, October 2011.
6. Presenter at the ESTEQ Engineering Community Conference, ECC 2010, CSIR, November

2010.

### 8.1.2 *International*

1. Attended 20th International and 9th Americas Regional Conference of the ISTVS, Virtual meeting, 27-29 September 2021.
2. Attended 5th FTire User Conference, Virtual meeting, 5 May 2021.
3. Presented at the 15th ISTVS European-African Regional Conference, 8-11 Sept 2019. Prague, Czech Republic.
4. Attended 26th IAVSD Conference, Gothenburg, Sweden, 12-16 August 2019.
5. Presented at the Joint 10th Asia-Pacific ISTVS Conference and 39th Annual Meeting of the Japanese Society for Terramechanics, 11-13 July 2018, Kyoto, Japan.
6. Attended 19th International & 14th European-African Regional Conference of the ISTVS, Budapest, Hungary, 25-27 September 2017.
7. Attended 25th IAVSD Conference, Rockhampton, Queensland, Australia, 14-18 August 2017.
8. Presented a paper at the 8th ISTVS Americas Conference, 12-14 Sept 2016, Detroit, Michigan, USA.
9. Presented a paper at the 13th ISTVS European Conference, Rome, Italy, 21-23 October 2015.
10. Attended 24th IAVSD Conference, Graz, Austria, 17-21 August 2015.
11. Presented two papers at the 12th European Regional Conference of the ISTVS, Pretoria, South Africa, 24 to 28 September 2012.
12. Presented two papers at the 17th International Conference of the ISTVS, Blacksburg, USA, 18 to 22 September 2011.
13. Presented two papers at the Joint 9th Asia-Pacific ISTVS Conference and Annual Meeting of the Japanese Society for Terramechanics, 27 to 30 September 2010, Sapporo, Japan.

### 8.2 **Teamwork and collaboration with others:**

#### *Other researchers (national and international)*

1. Prof. Valentin Ivanov, Ilmenau University of Technology, Germany.
2. Dr. Barys Shyrokau at Delft University of Technology, The Netherlands.
3. Dr. Sally Shoop - Cold Regions Research and Engineering Laboratory (CRREL) of the US Army.
4. Prof. Corina Sandu – Virginia Polytechnic Institute and State University (Virginia Tech)

#### *Other research institutions (national and international)*

1. Cold Regions Research and Engineering Laboratory (CRREL) of the US Army ERDC
2. Geotechnical and Structures Laboratory (GSL) of the US Army ERDC
3. Ilmenau University of Technology, Germany
4. Cosin (Developers of F-Tire), Esslingen, Germany
5. Virginia Polytechnic Institute and State University (Virginia Tech)

6. CSIR DPSS on vehicle mobility
7. ARMSCOR on wheeled vehicle mobility

*Industry*

1. Deere and Company
2. Caterpillar
3. Liebherr
4. DCD Rolling Stock
5. Transnet
6. Bell equipment
7. VR Steel
8. Gerotek
9. Armscor
10. CSIR DPSS
11. ESTEQ Engineering

**8.3 Membership in national and international bodies**

1. American Society of Mechanical Engineers (ASME): Member (2012 to 2018)
2. International Society for Terrain Vehicle Systems (ISTVS): Member 2012 to present
3. SAE International: Member (2008 to 2018)

**8.4 Visits to local and overseas universities or research institutes as guest professor or researcher**

1. Collaborative research with Dr. Sally Shoop at the ERDC-Cold Regions Research and Engineering Laboratory, New Hampshire, USA, 2016 (2 weeks)
2. Collaborative research with Prof Valentin Ivanov at Ilmenau University of Technology, Germany, 2015 (6 weeks)
3. Collaborative research with Dr. Barys Shyrokau at Delft University of Technology, The Netherlands, 2015 (4 weeks)
4. Collaborative research with Prof Valentin Ivanov at Ilmenau University of Technology, Germany, 2013 (2 weeks)
5. Collaborative research with Prof C Sandu at Virginia Polytechnic Institute and State University, 2011 (2 weeks)

**10. MANAGEMENT AND ADMINISTRATIVE DUTIES**

*Departmental activities*

1. Vehicle Dynamics Group (VDG) Researcher (2015 to present), manage day to day requirements of the Vehicle Dynamics Group (VDG) Laboratory.
2. Assist under graduate students, post graduate students and staff members in the VDG group during testing with assigning required equipment, test setup construction and testing. (2011 to present)

3. Manage research projects/grants within VDG. (2011 to present)
4. Manage the design, manufacturing, construction, commissioning and maintenance of test equipment. (2010 to present)
5. Baja SAE Faculty Advisor for the International event in El Paso, Texas, USA (2014)
6. Baja SAE Faculty Advisor for the International event in Portland, Oregon, USA (2012)

## 11. COMMUNITY SERVICE OR PROFESSIONAL SKILLS

### 11.1 Outreach projects

*SASOL Mini Baja competition – Involves Mechanical Engineering students from Universities and Universities of Technology in South Africa, as well as international competitors from the USA, India, Iran and Botswana, Russia, Turkey.*

### 11.4 Involvement with other universities/scientific institutions

1. Collaborative research with Ilmenau University of Technology, 2011-present
2. Collaborative research with ERDC-Cold Regions Research and Engineering Laboratory, 2011- present
3. Collaborative research with Delft University of Technology, 2015
4. Collaborative research with Virginia Polytechnic Institute and State University, 2011-present.

### 11.5 Referee duties

- 1) Refereed 23 papers for Journal of Terramechanics
- 2) Refereed 1 paper for the American Society of Agricultural and Biological Engineers
- 3) Refereed 1 paper for the South African Journal of Industrial Engineering
- 4) Refereed 2 papers for the International Journal of Acoustics and Vibration