

UNIVERSITY OF PRETORIA

CURRICULUM VITAE – DR COR-JACQUES KAT

(Updated 25 Jan 2021)

1. BIOGRAPHICAL SKETCH

1.1 GENERAL INFORMATION									
Surname	Kat								
First names	Cor-Jacques			ID Number					
Citizenship	RSA			Title	Dr	Female		Male	X
Place of birth	Johannesburg, South Africa			Date of birth			12 September 1983		
Population group	African		Coloured		Indian		White	X	Other <i>(Please specify)</i>
Department	Mechanical and Aeronautical Engineering			Position			Senior Lecturer		
Direct Telephone	012-420-3205			Direct Telefax			012-362-5087		
E-mail	cor-jacques(dot)kat(at)up(dot)ac(dot)za								
Date of appointment	01/01/2012			Permanent full-time			X	Temporary full-time	

1.2 ACADEMIC QUALIFICATIONS OBTAINED				
Degree/ Diploma	Field of study	Higher education institution	Year	Distinctions
Ph.D	Mechanical Engineering	University of Pretoria	2012	Not applicable
M.Eng	Mechanical Engineering	University of Pretoria	2009	Cum Laude Sasol Merit Medal – Best Master's degree student in Mechanical Engineering Nominated for the S2A3 Bronze medal for best Master student
B.Eng (Hons)	Mechanical Engineering	University of Pretoria	2008	
B.Eng	Mechanical Engineering	University of Pretoria	2007	

1.3 PROFESSIONAL REGISTRATION			
Pr Eng	Professional registration as professional engineer (20140286)	ECSA (Engineering Council of South Africa)	2014

1.4 WORK EXPERIENCE TO DATE		
Name of employer	Capacity and/or type of work	Period From (mm/yy to mm/yy)
University of Pretoria	Senior lecturer	01/2014 to present
University of Pretoria	Lecturer	01/2012 to 12/2013
Afrit	Research and development engineer	01/2009 to 12/2011

2. TEACHING ACTIVITIES

2.1 Courses presented		
Course	Level (e.g. second year, Masters)	Self developed (Yes or No)
MSD 210 – Dynamics	Second year (2012 – 2020)	No
MVR 320 – Vibration and Noise	Second year (2019 – 2020)	No
MVE 420 – Vehicle Engineering	Fourth year (2012 – 2020)	No
MGV 732 – Advance Vehicle Dynamics	Honours (2012 – 2015)	No
MVI 780 – Vehicle Dynamics	Honours (2016 – 2020)	No

2.2 Other education and pedagogic courses presented		
Course	Year	Institution
Vehicle dynamics	2009	Ismans, Le Mans, France

3. TEACHING OUTPUTS

3.1 Educational publications and products
<i>None</i>

4. OTHER TEACHING CONTRIBUTIONS

4.1 Membership of national and international bodies
<i>None</i>

4.2 Visits to local and overseas universities as guest professor or lecturer in regard to teaching
<i>Guest lecturer teaching a vehicle dynamics course as part of a “Masters degree and race car vehicle engineering” at Ismans in Le Mans, France (2 weeks in 2009)</i>

5.1 Participation in national and international teaching associations, bodies, committees
<i>Guest speaker at the Science Teaching and Learning (SCITAL) Forum on “My five principles for teaching large classes” held at the University of Pretoria on 19 March 2015</i>

5. POSTGRADUATE SUPERVISION

5.1 Supervision or co-supervision of students who have completed degrees				
Name of student	Degree¹/Title of dissertation/ thesis and date completed	Supervisor	Co-supervisor(s)	Duration of studies (years)
Ms M van der Westhuizen	MEng / Cardiorespiratory effect of vehicle vibration on healthy term infants / 2020	Dr C Kat	Prof PS Els	1
Dr IJC Steyn	MMed (Orthopaedics) / Biomechanical comparison of two different configurations of the TrueLok Hex and Taylor Spatial Frame external fixators / 2020	Prof E Hohman Dr F Birkholtz	Dr C Kat	5 (Part time)
Mr J.S. Jooste	MEng / Cardiovascular response to whole-body vibration / 2019	Dr C Kat	Prof PS Els	2
Ms M van der Westhuizen	BEng (Hons) / Cardiorespiratory effect of vehicle vibration on healthy term infants / 2018	Dr C Kat	Prof PS Els	1
Mr RP Gräbe	MEng / Ride comfort difference thresholds for a vehicle on a 4-poster test rig / 2018	Dr C Kat	Prof PS Els	1.5
Mr R v/d Merwe	BEng (Hons) / Using a Finite Element model of a Human Lumbar spine to evaluate vertical vibration exposure in the vehicle environment / 2016	Dr C Kat		2 (Part time)
Mr J.S. Jooste	BEng (Hons) , 2016	Dr C Kat	Prof PS Els	1
Dr JJ Nel	MMedVet (Chir)(Small Animal Surgery) / Canine lumbosacral fracture-luxation stabilised with the String of Pearls interlocking plate system or pins with polymethylmethacrylate: A biomechanical comparison / 2016	Prof GL Coetzee	Dr C Kat	3 (Part time)
Ms Anya König	BSc (Hons) Neuroanatomy / Biomechanical analysis of different fixation techniques used during arthroscopic rotator cuff repair: A systematic review / 2016	Dr N Keough	Dr C Kat	1
Mr RP Gräbe	BEng (Hons) / 2016	Dr C Kat	Prof PS Els	1.5
Mr TP Löwe	MEng / Modelling of a Passive Hydraulic Steering for Locomotives / 2014	Prof PS Els	Dr C Kat	1
Mr TP Löwe	BEng (Hons) / 2013	Prof PS Els	Dr C Kat	1

5.2 Current post-graduate students					
Name of student	Degree²enrolled for and date of first registration	Project title	Supervisor	Co-supervisor(s)	Year of registration
Ms Anya König	PhD, 2019	The effects of whole-body vibration on the lumbar spine in the seated position using a rat model	Dr N Keough	Dr C Kat Dr J Myburg Prof N Oberholzer Dr N Keough	2019

¹ Indicate whether Honours, Masters research, Masters coursework with dissertation or Doctorate

² Indicate whether Honours, Masters research, Masters coursework with dissertation or Doctorate

6. RESEARCH FUNDING

6.1 Obtaining research funds (Optional)			
Origin of research funds (e.g. contract research, THRIP, international funding organisations, other(s))	Title of research project or programme	Duration	Money allocated (R) (Opt.- exact amounts not required)
<i>University of Pretoria's Research and Development Program (RDP)</i>	Validation of three dimensional (3D) musculoskeletal models	1 year (2013)	R45 000
<i>University of Pretoria's Research and Development Program (RDP)</i>	Validation of three dimensional (3D) musculoskeletal models	1 year (2014)	R45 000
<i>University of Pretoria's Research and Development Program (RDP)</i>	Validation of three dimensional (3D) musculoskeletal models	1 year (2015)	R50 000

7. RESEARCH OUTPUTS

7.1 Publications in peer-reviewed or refereed journals

Publications published in peer-reviewed or refereed journals:

1. Gräbe, R.P., Kat, C., Van Staden, P.J. and Els, P.S., 2020, Difference thresholds for a vehicle on a 4-poster test rig. *Applied Ergonomics*, 87, 103115. DOI: <https://doi.org/10.1016/j.apergo.2020.103115>
2. Ivanov, V., Savitski, D., Augsburg, K., Els, S., Kat, C., Botha, T., Dhaens, M., Sandu, C., He, R., McBride, S., Vazquez, A.G. and Victorino, A.C., 2019, Challenges of Integrated Vehicle Chassis Control: Some Findings of the European Project EVE, *IEEJ Journal of Industry Applications*, Vol.8, No 2, pp.218-230 DOI: 10.1541/ieejia.8.218
3. Bayne, H. and Kat, C., 2018, The influence of foot position on scrum kinetics during machine scrimmaging. *Journal of Sports Sciences*, Vol 36, No 24, pp.2836-2842. DOI: 10.1080/02640414.2018.1479102
4. Hohmann, E., König, A., Kat, C., Glatt, V., Tetsworth, K. and Keough, N., 2018, Single- versus double-row repair for full-thickness rotator cuff tears using suture anchors. A systematic review and meta-analysis of basic biomechanical studies. *European Journal of Orthopaedic Surgery & Traumatology*, Vol.28, pp.859-868. <https://doi.org/10.1007/s00590-017-2114-6>
5. Nel JJ, Kat C, Coetzee GL, van Staden PJ., 2017, Biomechanical comparison between pins and polymethylmethacrylate and the SOP locking plate system to stabilize canine lumbosacral fracture-luxation in flexion and extension. *Veterinary Surgery*, Vol. 46, pp.789-796. <https://doi-org.uplib.idm.oclc.org/10.1111/vsu.12673>
6. Kat, C-J., Johrendt, J.L. and Els, P.S., 2017, Methodology for developing a neural network leaf spring model, *Int. J. Vehicle Systems Modelling and Testing*, Vol. 12, Nos. 1/2, pp.94-113.

7. Kat, C. and Els, P.S., 2012, Validation metric based on relative error, *Mathematical and Computer Modelling of Dynamical Systems: Methods, Tools and Applications in Engineering and Related Sciences*, Vol 18, No. 5, October 2012, pp.487-520.
8. Kat, C. and Els, P.S., 2011, Elasto-plastic leaf spring model, *International Journal of Engineering Systems Modeling and Simulation*, Vol. 3, Nos. 3/4, 2011.
9. Kat, C. and Els, P.S., 2009, Interconnected air spring model, *Mathematical and Computer Modelling of Dynamical Systems*, Vol. 15, No. 4, August 2009, pp. 353–370.

Publications accepted for publication in peer-reviewed or refereed journals:

None

Publications submitted for publication in peer-reviewed or refereed journals:

1. Kat, C., Jooste, J.S., Grant, C.C., Becker, P.J. and Els, P.S., Cardiovascular Response to Whole-Body Vibration on an Automobile Seat, Submitted to *Ergonomics* on 2019/02/15. Revision submitted on 2019/11/14

7.2 Books and/or chapters in books

None

7.3 Published full-length conference papers/keynote addresses

International conferences of high standing

1. Kat C.J., Els P.S., 2020, Effect of Tyre Pressure on Ride Comfort from an Integrated Chassis Control Perspective. In: Klomp M., Bruzelius F., Nielsen J., Hillemyr A. (eds) *Advances in Dynamics of Vehicles on Roads and Tracks. IAVSD 2019. Lecture Notes in Mechanical Engineering*. Springer, Cham (peer reviewed)
2. Van der Westhuizen, M., Kat, C.J. and Els, P.S., 2020, Quantification of infant car seat vibration over a mission profile. In: Klomp M., Bruzelius F., Nielsen J., Hillemyr A. (eds) *Advances in Dynamics of Vehicles on Roads and Tracks. IAVSD 2019. Lecture Notes in Mechanical Engineering*. Springer, Cham (peer reviewed)
3. Gräbe, R.P., Kat, C. and Els, P.S., 2016, Ride comfort sensitivity to speed over different roads for an off-road vehicle, *Proceedings of the 10th South African Conference on Computational and Applied Mechanics*, October 3 – 5, 2016, Potchefstroom, South Africa (peer reviewed)
4. Kat, C., Mendez, E., Els, P.S. and Dhaens, M., 2016, Vehicle ride evaluation on a four-post rig: Is the vertical seat component sufficient?, *ASME 2016 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference IDETC2016*, August 21-24, 2016, Charlotte, NC, USA (peer reviewed)
5. Löwe, T.P., Els, P.S. and Kat, C., 2015, Modelling of a Passive Hydraulic Steering for Locomotives, *Proceedings of the 24th International Symposium on Dynamics of Vehicles on Roads and Tracks*, August 17-21, 2015, Graz, Austria

6. Kat, C. and Els, P.S., 2012, Effect of hysteresis in steel leaf springs on ride and suspension forces, 12th European Conference of the International Society of Terrain-Vehicle Systems, 27-27 September 2012, Pretoria, South Africa (peer reviewed)
7. Kat, C., Johrendt, J.L. and Els, P.S., 2012, Computational efficiency and accuracy of leaf spring modeling techniques, Proceedings of the ASME 2012 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2012, August 12-15, 2012, Chicago, IL, USA (peer reviewed)
8. Kat, C. and Els, P.S., 2011, Importance of Correct Validation of Simulation Models, Proceedings of the ASME IDETC/CIE 2011, Washington, DC, 28 to 31 August 2011 (peer reviewed)
9. Kat, C. and Els, P.S., 2011, Leaf spring modelling, Proceedings of the 17th International Conference of the ISTVS, Blacksburg, USA, 18 to 22 September 2011 (peer reviewed)
10. Kat, C. and Els, P.S., 2010, Leaf spring model based on material behavior – Preliminary study, 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.
11. Kat, C. and Els, P.S., 2009, Suspension forces on a tri-axle air-suspended semi-trailer, Proceedings of the 11th European Regional Conference of the International Society for Terrain Vehicle Systems (ISTVS), 5 to 8 October 2009, Bremen, Germany.

Conferences of lesser standing

None

Conference abstracts/papers accepted

None

Conference abstracts submitted

None

7.4 Non-refereed publications or popular articles

None

7.5 Patents

None

7.6 Technical reports

1. Assess the feasibility of developing collision management systems for South African mines, Mine Health and Safety Council Report, June 2017
2. Canine Spine Biomechanical Test rig, Design report, November 2013
3. Design methodology, Afrit internal report, April 2013
4. Experimental Characteristic Library – PDC Dampers, Afrit internal report, April 2013
5. Experimental Characteristic Library – Multi-leaf spring suspension, Afrit internal report, April 2013
6. Experimental Characteristic Library – Parabolic leaf spring suspension, Afrit internal report, April 2013

7. Experimental Characteristic Library – Tyres, Afrit internal report, April 2013
8. Model Library – Leaf springs, Afrit internal report, April 2013
9. Model Library – Tyres, Afrit internal report, April 2013
10. Tests performed on an AFRIT tandem-tandem interlink combination, BE at UP Report number MA4080, December 2007.
11. Braking and Cornering Tests Performed on a Caterpillar 793D Dump Truck, April 2007.

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

8.1.1 National

1. Engineering Community Conference, CSIR International conference centre, 16 Oct, 2013. Attended
2. ESTEQ User's conference, CSIR International conference centre, 19 Oct, 2012. Presented
3. Advanced Modeling Elements & Techniques with Adams/Solver (ADM703) presented by Esteq, 1-2 Oct 2012. Attended
4. 8th South African Conference on Computational and Applied Mechanics (SACAM), 3- 5 Sept 2012. Attended
5. ESTEQ User's conference, CSIR International conference centre, 27 Oct, 2011. Attended
6. ADAMS mobility day, Gerotek, 17 Aug 2011. Attended
7. ESTEQ User's conference, CSIR International conference centre, 11 Nov, 2010. Attended
8. MSC.ADAMS/Car introductory course (ADM740) presented by Esteq, 2010. Attended
9. 7th South African Conference on Computational and Applied Mechanics (SACAM), 10-13 Jan 2010. Attended
10. ESTEQ User's conference, CSIR International conference centre, 4 Nov, 2009. Attended
11. Mechanics of Heavy Duty Truck Systems, Stellenbosch, 7-10 April 2008. Attended
12. Linear static, normal modes, and buckling analysis using MSC.Nastran and MSC.Patran course presented by ESTEQ, 2006. Attended

8.1.2 International

1. Review Committee, reviewed 1 paper, 19th International Conference on Advanced Vehicle Technologies (AVT), Cleveland, Ohio, USA, 6-9 Aug 2017.
2. 18th International Conference on Advanced Vehicle Technologies (AVT), Charlotte, North Carolina, USA, 21-24 Aug 2016. Presented paper
3. Review Committee, reviewed 1 paper, 8th Americas Conference of the International Society for Terrain-Vehicle Systems, 12 -14 Sept, 2016, Detroit, USA
4. Review Committee, reviewed 1 paper, 18th International Conference on Advanced Vehicle Technologies (AVT), Charlotte, North Carolina, USA, 21-24 Aug 2016.

5. 21st Congress of the European Society of Biomechanics, Prague, Czech Republic, 5-8 July 2015. Oral presentation.
6. ECCOMAS (European Community on Computational Methods in Applied Sciences) Thematic Conference on Multibody Dynamics, Barcelona, Spain, 29 June – 2 July 2015. Attended
7. 7th World Congress of Biomechanics, Boston, Massachusetts, USA, 6-11 July 2014. Presented poster
8. Review Committee, reviewed 1 paper, 15th International Conference on Advanced Vehicle Technologies (AVT), Portland, Oregon, USA, 4-7 Aug 2013.
9. 12th European Regional Conference of the International Society of Terrain-Vehicle Systems, Gerotek Test Facilities, Pretoria, South Africa, 24-27 Sept 2012. Presented paper.
10. Review Committee, reviewed 1 paper, 12th European Conference of the International Society for Terrain-Vehicle Systems, 24 -27 Sept, 2012, Pretoria, South Africa
11. 14th International Conference on Advanced Vehicle Technologies (AVT), Chicago, Illinois, USA, 12-15 Aug 2012. Presented paper
12. 17th International Conference of the International Society for Terrain-Vehicle Systems (ISTVS), Blacksburg, Virginia, USA, 18-22 Sept 2011. Presented paper
13. 13th International Conference on Advanced Vehicle and Tire Technologies (AVTT), Washington, DC, USA, 28-31 Aug 2011. Presented paper
14. 9th Asia-Pacific conference of the International Society for Terrain-Vehicle Systems and annual meeting of the Japanese Society for Terramechanics, Sapporo, Japan, 27-30 Sept 2010. Presented paper
15. 12th International Conference on Advanced Vehicle and Tire Technologies (AVTT), Montreal, Quebec, Canada, 15-18 Aug 2010. Attended
16. 11th European Regional Conference of the International Society for Terrain-Vehicle Systems, Bremen, Germany, 5-8 Oct 2009. Presented paper.

8.2 Teamwork and collaboration with others:

Other researchers (national and international)

1. Dr Helen Bayne, Head biomechanist, High Performance Centre, University of Pretoria, South Africa
2. Dr Johan J. Nel, Fourways Veterinary Hospital, Bryanston, South Africa
3. Dr. Kim Nolte, Department of Physiology (Division: Biokinetics and Sport Sciences), University of Pretoria, South Africa
4. Dr. Jennifer L. Johrendt, University of Windsor, Canada

Other research institutions (national and international)

None

Industry

1. Tenneco Automotive Europe
2. AFRIT

8.3 Membership in national and international bodies

1. American Society of Mechanical Engineers (ASME):
 - Member (2013-2014)
 - Student member (2011-2012)
 - Member of Vehicle Design Technical Committee (2012-2013)
2. SAE International:
 - Member (2012-2013)
 - Student member (2008 to 2011)
3. International Society for Terrain-Vehicle Systems (ISTVS)
 - Member (2009-2012)

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

1. Collaborative research conducted at Tenneco Automotive Europe, Belgium as part of project EVE within the Marie Skłodowska-Curie Research and Innovation Staff Exchange program,
27 Nov – 18 Dec, 2017.
Research was focused on determining Just-Noticeable-Difference in a vehicle.
Continuation of research in Aug – Oct 2017
2. Collaborative research conducted at Tenneco Automotive Europe, Belgium as part of project EVE within the Marie Skłodowska-Curie Research and Innovation Staff Exchange program,
1 Aug – 4 Oct, 2017.
Research was focused on determining Just-Noticeable-Difference in a vehicle.
Continuation of research in 2016
3. Collaborative research conducted at Tenneco Automotive Europe, Belgium as part of project EVE within the Marie Skłodowska-Curie Research and Innovation Staff Exchange program,
11 Nov – 14 Dec, 2016.
Research was focused on determining Just-Noticeable-Difference in a vehicle
4. Collaborative research conducted at Tenneco Automotive Europe, Belgium as part of project EVE within the Marie Skłodowska-Curie Research and Innovation Staff Exchange program,
1 Sep – 1 Oct, 2015.
Research was focused on vehicle ride evaluation
5. Collaborative research with Dr J.L Johrendt at the University of Windsor, Canada,
2 weeks, 2011
Research was focused on using artificial neural network to model leaf springs
6. Guest lecturer lecturing the vehicle dynamics module of the Masters degree course in Race Car Engineering, Ismans, Le Mans, France,
2 weeks, 2009

9. ARTISTIC OUTPUTS (if applicable)

Not applicable

10. MANAGEMENT AND ADMINISTRATIVE DUTIES

Departmental activities

1. Marketing Committee (2012-2017)
2. Occupational Health and Safety representative, for Vehicle Dynamics labs and offices (2017-2020)
3. Module coordinator – Design Project MOX410 (2012-2018) (Level: 4th year)
Vehicle Engineering MVE420 (2016-2020) (Level: 4th year)
Vibration and Noise MVR 320 (2019-2020) (Level: 3rd year)
Dynamics MSD210 (2012-2015) (Level: 2nd year)

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.

11.2 Professional service performed

TV appearances: e-tv Morning edition Mini Baja (2006)

11.3 Clinical service

Not applicable

11.4 Involvement with other universities/scientific institutions

1. External examiner for MEng thesis, Stellenbosch University, (2014, 2016)
2. Collaborative research with the University of Windsor, 2011

11.5 Referee duties

2020:

- 1) Reviewed rating application for National Research Foundation (NRF) (Oct 2020)
- 2) Reviewed 1 paper for Mathematical and Computer Modelling of Dynamical Systems (June 2020)
- 3) Reviewed 1 paper for Vibration (March 2020)

2019:

- 1) External examiner for MEng thesis, Stellenbosch University
- 2) Internal examiner for MEng thesis, University of Pretoria

2017:

- 1) Internal examiner for MEng thesis, University of Pretoria

2016:

- 1) External examiner for MEng thesis, Stellenbosch University

2015:

- 1) Internal examiner for MEng thesis, University of Pretoria

2014:

- 1) Reviewed 1 paper for Journal of Biomechanics (Oct 2014)
- 2) Refereed Competitive Support for Unrated Researchers proposal for National Research Foundation (NRF) (Oct 2014)
- 3) External examiner for MEng thesis, Stellenbosch University

12. AWARDS AND SCIENTIFIC/SCHOLARLY RECOGNITION

12.1 Evaluation status as scientist/scholar

None.

12.2 Research awards and prizes

1. Best presentation award for paper entitled *Effect of hysteresis in steel leaf springs on ride and suspension forces* presented at the 12th European Regional Conference of the International Society of Terrain-Vehicle Systems, Gerotek Test Facilities, Pretoria, South Africa, 24-27 Sept 2012. Authors Kat, C. and Els, P.S.
2. Sasol Merit Medal – Best Master's degree student in Mechanical Engineering for 2008

12.3 Teaching awards and prizes

1. *Engineering Build Environment and Information Technology (EBIT) Faculty House's Most Impactful lecturer award 2020*

12.4 Artistic awards and prizes

Not applicable