

DR. CALVIN RANS

CURRENT POSITION

ASSOCIATE PROFESSOR (UNIVERSITAIR HOOFDDOCENT)
DEPARTMENT OF AEROSPACE STRUCTURES & MATERIALS
Delft University of Technology, Delft, the Netherlands

EDUCATION

- 2003 – 2007 **PH.D. IN AEROSPACE ENGINEERING**
CARLETON UNIVERSITY, OTTAWA, ON, CANADA
Dissertation title: The role of rivet installation on the fatigue performance of riveted lap joints.
Supervisors: P.V. Straznicky (Carleton University) & R.C. Alderliesten (TUDelft)
- 2001 – 2003 **M.A.SC. IN AEROSPACE ENGINEERING**
CARLETON UNIVERSITY, OTTAWA, ON, CANADA
Thesis title: An experimental investigation into the fatigue performance of dimple countersunk Glare riveted lap joints
Supervisors: P.V. Straznicky (Carleton University)
- 1998 – 2001 **B.ENG. IN AEROSPACE ENGINEERING**
CARLETON UNIVERSITY, OTTAWA, ON, CANADA
Graduation project: Design of an unmanned aerial vehicle for coastal pollution surveillance.

EXPERIENCE

- 2013 – PRESENT **ASSOCIATE PROFESSOR (UNIVERSITAIR HOOFDDOCENT)**
DEPARTMENT OF AEROSPACE STRUCTURES & MATERIALS
Delft University of Technology, Delft, the Netherlands
- 2013 – 2019 **ASSISTANT PROFESSOR (UNIVERSITAIR DOCENT)**
DEPARTMENT OF AEROSPACE STRUCTURES & MATERIALS
Delft University of Technology, Delft, the Netherlands
- 2011 – 2013 **ASSISTANT PROFESSOR**
DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING
Carleton University, Ottawa, ON, Canada
- 2007 – 2011 **POSTDOCTORAL RESEARCHER**
DEPARTMENT OF AEROSPACE STRUCTURES & MATERIALS
Delft University of Technology, Delft, the Netherlands

PUBLICATIONS

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H-index: **15** (Google Scholar, 22/07/2019), **12** (Scopus, 22/07/2019)

Citations: **921** (Google Scholar, 22/07/2019), **639** (Scopus, 22/07/2019)

JOURNAL ARTICLES

1. Shahani AR, Shakeri I, **Rans CD** (2020). Effect of residual stress redistribution and weld reinforcement geometry on fatigue crack growth of butt welded joints. *International Journal of Fatigue*. 139.
2. Baldassarre A, Ocampo J, Martinez M, **Rans CD** (2020). Accuracy of strain measurement systems on a non-isotropic material and its uncertainty on finite element analysis. *The Journal of Strain Analysis for Engineering Design*. <https://doi.org/10.1177/0309324720924580>
3. Shahani AR, Shakeri I, **Rans CD** (2020). Two engineering models for predicting the retardation of fatigue crack growth caused by mixed mode overload. *International Journal of Fatigue*. 132.
4. Iliopoulos AP, Jones R, Michopoulos JG, Phan N, **Rans CD** (2020). Further studies into crack growth in additively manufactured materials. *Materials*. 13(10):2223.
5. Baldassarre A, Martinez M, **Rans CD** (2019). Residual stress evaluation of adhesively bonded composite using central cut plies specimens. *Journal of Adhesion*. <https://doi.org/10.1080/00218464.2019.1598862>.
6. Zhao T, **Rans CD**, Villegas IF (2019). On sequential ultrasonic spot welding as an alternative to mechanical fastening in thermoplastic composite assemblies: A study on single-column multi-row single-lap shear joints. *Composites: Part A*. 120:1-11.
7. Ribeiro FN, Martinez M, **Rans CD** (2019). Evaluation of mode II fatigue disbonding using Central Cut Plies specimen and distributed strain sensing technology. *The Journal of Adhesion*, 95(4):259-285.
8. **Rans CD**, Michielssen J, Walker M, Wang W, 't Hoen-Velterop L (2018). Beyond the orthogonal: on the influence of build orientation on fatigue crack growth in SLM Ti-6Al-4V. *International Journal of Fatigue*. 116:344-354.
9. Wang W, **Rans CD**, Benedictus R (2018). Theoretical analysis of fatigue failure in mechanically fastened Fibre Metal Laminate joints containing multiple cracks. *Engineering Failure Analysis*. 91:151-164.
10. Hedayati R, Ahmadi SM, Lietaert K, Pouran B, Li Y, Weinans H, **Rans CD**, Zadpoor AA (2018). Isolated and modulated effects of topology and material type on the mechanical properties of additively manufactured porous biomaterials. *Journal of the mechanical behavior of biomedical materials*. 79:254-263.
11. Wang W, **Rans CD**, Benedictus R (2018). Analytical solutions for crack opening displacements of eccentric cracks in thin-walled metallic plates. *Thin Walled Structures*. 123:371-381.
12. Ahmadi SM, Hedayati R, Li Y, Lietaert K, Tümer N, Fatemi A, **Rans CD**, Pouran B, Weinans H, Zadpoor AA (2018). Fatigue performance of additively manufactured meta-biomaterials: the effects of topology and material type. *Acta biomaterialia*. 62:292-304.
13. Wang W, **Rans CD**, Zhang Z, Benedictus R (2017). Prediction methodology for fatigue crack growth behaviour in Fibre Metal Laminates subjected to tension and pin loading. *Composite Structures*. 182:176-182.

14. Zhao T, Palardy G, Villegas IF, **Rans CD**, Martinez M, Benedictus R (2017). Mechanical behaviour of thermoplastic composites spot-welded and mechanically fastened joints: A preliminary comparison. *Composites Part B: Engineering*. 112(1):224-234.
15. de Krijger J, **Rans CD**, van Hooreweder B, Lietaert K, Poursan B, Zadpoor AA (2017). Effects of applied stress ratio on the fatigue behavior of additively manufactured porous biomaterials under compressive loading. *Journal of the Mechanical Behaviour of Biomedical Materials*. 70:7-16.
16. Wang W, **Rans CD**, Benedictus R (2017). Analytical prediction model for non-symmetric fatigue crack growth in Fibre Metal Laminates. *International Journal of Fatigue*. 103:546-556.
17. Wang W, **Rans CD**, Benedictus R (2017). Analytical prediction model for fatigue crack growth in Fibre Metal Laminates with MSD scenario. *International Journal of Fatigue*. 104:263-272.
18. Martinez Bueno P, Martinez M, **Rans CD**, Benedictus R (2016). Strain Monitoring using a Rayleigh Backscattering System for a Composite UAV Wing Instrumented with an Embedded Optical Fiber. *Advanced Materials Research*. 1135:1-19.
19. Zhang Z, Wang W, **Rans CD**, Benedictus R (2016). An experimental investigation into pin loading effects on fatigue crack growth in Fibre Metal Laminates. *Procedia Structural Integrity*. 2:3361-3368.
20. Wang W, **Rans CD**, Alderliesten RC, Benedictus R (2015). Predicting the influence of discretely notched layers on Fatigue crack growth in fibre metal laminates. *Engineering Fracture Mechanics*. 145:1-14.
21. Woelke PB, Rutner MP, Shileds MD, **Rans CD**, Alderliesten RC (2015). Finite Element Modeling of Fatigue in Fibre Metal Laminates. *AIAA Journal*. 53(8):2228-2236.
22. **Rans CD**, Atkinson J, Li C (2015). On the onset of the asymptotic stable fracture region in the Mode II fatigue delamination growth behaviour of composites. *Journal of Composite Materials*. 49(6):685-697.
23. Bürger D, **Rans CD**, Benedictus R (2014). Influence of fabric carrier on the fatigue disbond behavior of metal-to-metal bonded interfaces. *The Journal of Adhesion*. 90(5-6):482-495.
24. Pascoe JA, **Rans CD**, Benedictus R (2013). Characterizing fatigue delamination growth behaviour using specimens with multiple delaminations: The effect of unequal delamination lengths. *Engineering Fracture Mechanics*. 109(1):150-160.
25. **Rans CD**, Rodi R, Alderliesten RC (2013). Analytical prediction of Mode I stress intensity factors in cracked panels containing bonded stiffeners. *Engineering Fracture Mechanics*. 97(1):12-29.
26. Pärnänen T, Alderliesten RC, **Rans CD**, Brander T, Saarela O (2012). Applicability of AZ31B-H24 magnesium in Fibre Metal Laminates - An experimental impact research. *Composites Part A*. 43(9):1578-1586.
27. **Rans CD**, Morinière FD, Rodi R, Alderliesten RC, Benedictus R (2011). Fatigue behaviour of Fiber Metal Laminate panels containing internal carbon tear straps. *Journal of Aircraft*. 48(6):2122-2129.
28. **Rans CD**, Alderliesten RC, Benedictus R (2011). Predicting the influence of temperature on fatigue crack propagation in Fibre Metal Laminates. *Engineering Fracture Mechanics*. 78(10):2193-2201.

29. **Rans CD**, Alderliesten RC, Benedictus R (2011). Misinterpreting the results: how similitude can improve our understanding of fatigue delamination growth. *Composites Science and Technology*. 71(2):230-238.
30. Khan SU, Alderliesten RC, **Rans CD**, Benedictus R (2010). Application of a modified Wheeler model to predict fatigue crack growth in fibre metal laminates under variable amplitude loading. *Engineering Fracture Mechanics*. 77(9):1400-1416.
31. **Rans CD**, Alderliesten RC, Straznicky PV (2009). Assessing the effects of riveting induced residual stresses on fatigue crack behaviour in lap joints by means of fractography. *International Journal of Fatigue*. 31(2):300-308.
32. Alderliesten RC, **Rans CD**, Benedictus R (2009). The meaning of threshold fatigue in fibre metal laminates. *International Journal of Fatigue*. 31(2):213-222.
33. Alderliesten RC, **Rans CD**, Benedictus R (2008). The applicability of magnesium based fibre metal laminates in aerospace structures. *Composites Science and Technology*. 68(14):2983-2993.
34. **Rans CD**, Alderliesten RC, Straznicky PV (2007). Riveting process induced residual stresses around solid rivets in mechanical joints. *AIAA Journal of Aircraft*. 44(1):323-329.
35. **Rans CD**, Straznicky PV (2005). Avoiding knife-edge countersinks in GLARE through dimpling. *Fatigue and Fracture of Engineering Materials and Structures*. 28(7):633-640.

CONFERENCE PAPERS

1. Saunders GN, **Rans CD**, Teuwen JJE, Sinke J, Alderliesten RC, van Valkenburg WF (2020). Teaching Aerospace Structures and Materials to the World: Analysis of the edX MOOC Introduction to Aerospace Structures and Materials. in *Proc. of the 2020 AIAA SciTech Forum (SciTech 2020)*, Orlando, Florida, USA
2. **Rans CD**, Melkert J, Saunders-Smits G (2019). Can design and analysis be effectively taught together? in *Proc. of the 15th International CDIO Conference*, Aarhus, Denmark.
3. Zhao T, Tsakoniatis I, **Rans CD**, Villegas IF, Benedictus R (2018). Multi-spot ultrasonic welding of thermoplastic composite single-lap joints: Effect of spot spacing and number of spots on weld strength. in *Proc. 18th European Conference on Composite Materials (ECCM 2018)*, Athens, Greece.
4. Saunders-Smits GN, **Rans CD**, Schuurman MJ, de Breuker R, van Staalduinen J (2018). A paradigm shift in teaching Aerospace Engineering: From campus learners to professional learners – a case study on online courses in Smart Structures and Air Safety Investigation. in *Proc. of the 2018 AIAA SciTech Forum (SciTech 2018)*, Kissimmee, Florida, USA.
5. **Rans CD**, Michielssen J, Walker M, Wang W, 't Hoen-Velterop L (2018). On the influence of specimen build orientation on the fatigue crack growth resistance of Selective Laser Melted Ti-6Al-4V. in *Proc. of the 2018 AIAA SciTech Forum (SciTech 2018)*, Kissimmee, Florida, USA.
6. Falaschetti MP, **Rans CD**, Troiani E (2017). On the application of metal foils for improving the impact damage tolerance of composite materials. in *Proc. 29th Symposium of the International Committee on Aeronautical Fatigue (ICAF 2017)*, Nagoya, Japan.
7. Kruse T, Körwien T, Ruzek R, Hangx R, **Rans CD** (2017). Fatigue behaviour and damage tolerant design of bonded joints for aerospace application on Fibre Metal Laminates

- and composites. in *Proc. 29th Symposium of the International Committee on Aeronautical Fatigue* (ICAF 2017), Nagoya, Japan.
8. Zhao T, Palardy G, Villegas IF, **Rans CD**, Benedictus R (2016). Comparative analysis of in-plane and out-of-plane mechanical behaviour of spot-welded and mechanically fastened joints in thermoplastic composites. in *Proc. 17th European Conference on Composite Materials* (ECCM 2017), Munich, Germany.
 9. **Rans CD**, Teixeira De Freitas S, van Campen JM, Saunders-Smiths GN (2016). (Blended Learning)²: Blending content- and learning-oriented objectives in a blended learning environment. in *Proc. 44th SEFI Conference*, Tampere, Finland.
 10. Wang W, **Rans CD**, Alderliesten RC, Benedictus R (2015). Philosophy of multiple-site damage analysis for fibre metal laminate structures. in *Proc. 28th Symposium of the International Committee on Aeronautical Fatigue* (ICAF 2015), Helsinki, Finland.
 11. Li C, Wan Z, LaPlante G, **Rans CD**, Li G (2015). Long-term durability of adhesively bonded composite joints under quasi-static and fatigue loading. in *Proc. 28th Symposium of the International Committee on Aeronautical Fatigue* (ICAF 2015), Helsinki, Finland.
 12. Saunders-Smiths GN, Schuurman MJ, **Rans CD** (2015). Forensic engineering: Learning by accident. Teaching investigation skills to graduate students using real-life accident simulations. in *AIAA SciTech Forum*, Kissimmee, FL, USA.
 13. Ribeiro F, Martinez M, **Rans CD** (2015). Evaluation of Mode II fatigue durability of bonded composite repairs using the central cut plies specimen. in *Proc. of the Meeting on Aeronautical Composite Materials and Structures* (MACMS2015), Sao Paulo, Brazil.
 14. Bürger D, **Rans CD** (2015). Mixed-mode fatigue disbond growth: the cyclic strain energy approach. in *Proc. of the Meeting on Aeronautical Composite Materials and Structures* (MACMS2015), Sao Paulo, Brazil.
 15. Li C, **Rans CD**, LePlante G, Marsden C (2015). Environmental degradation of adhesively-bonded composite joints. in *Proc. of the Canadian Conference of Composite Materials* (CANCOM2015), Edmonton, Alberta, Canada.
 16. Desnoo R, **Rans CD**, Huang X (2015). Approach, validation, and advantages of using DIC to characterize a material quasi-static indentation test. in *Proc. 20th International Conference on Composite Materials* (ICCM 2015), Copenhagen, Denmark.
 17. **Rans CD**, Atkinson J, Li C (2014). Knowing the limits of a trend: examining the onset of asymptotic stable fracture behaviour in Mode II fatigue delamination growth. in *Proc. 16th European Conference on Composite Materials* (ECCM 2014), Seville, Spain.
 18. Li C, Teng T, Wan Z, Young NG, Li G, **Rans CD**, LaPlante G (2014). Fatigue Disbond Growth for an Adhesively Bonded Composite Joint Under Mixed Mode I/II Loading. in *Proc. SAMPE 2014 Conference and Exhibition* (SAMPE 2014), Seattle, WA, USA.
 19. Pascoe JA, **Rans CD**, Alderliesten RC, Benedictus R (2013). Fatigue disbonding of bonded repairs - an application of the strain energy approach. in *Proc. 27th Symposium of the International Committee on Aeronautical Fatigue* (ICAF 2013), Jerusalem, Israel.
 20. Bürger D, **Rans CD**, Benedictus R (2013). Characterization of mixed-mode fatigue failure on metallic bonded joints. in *Proc. 27th Symposium of the International Committee on Aeronautical Fatigue* (ICAF 2013), Jerusalem, Israel.

21. Li C, Teng T, Wan Z, Li G, **Rans CD** (2013). Fatigue delamination growth for an adhesively-bonded composite joint under mode I loading. in *Proc. 27th Symposium of the International Committee on Aeronautical Fatigue (ICAF 2013)*, Jerusalem, Israel.
22. Rodi R, **Rans CD**, Di Somma G, Solo A(Jr.), Benedictus R (2011). Application of bonded metal and hybrid straps for improving the damage tolerance of thin metallic skin. in *Proc. SAMPE Europe Technical Conference 2011 (SETEC 11)*, Leiden, the Netherlands.
23. Alderliesten RC, **Rans CD**, Beumler T, Benedictus R (2011). Recent advancements in thin-walled hybrid structural technologies for damage tolerant aircraft fuselage applications. in *Proc. 26th Symposium of the International Committee on Aeronautical Fatigue (ICAF 2011)*, Montreal, Canada.
24. Goto DT, Faraz MI, **Rans CD**, Groves RM (2011). Low energy impact damage detection using shearography. in *Proc. 2011 Photomechanics Conference*, Brussels, Belgium.
25. Alderliesten RC, **Rans CD**, Benedictus R (2010). Evolution of FML fatigue & damage tolerance assessment: moving from damage tolerant metal to hybrid composite. in *Proc. SAMPE 2010 Conference and Exhibition (SAMPE 2010)*, Seattle, WA, USA.
26. Alderliesten RC, **Rans CD**, Khan SU, Benedictus R (2009). Understanding the fatigue behaviour of FML structures and materials under complex variable amplitude loading. in *Proc. 2009 Aircraft Structural Integrity Program Conference (ASIP 2009)*, Jacksonville, FL, USA.
27. Paletti L, Campoli G, **Rans CD**, Benedictus R (2009). On Adapting the Hertz Contact Model for Application to Contact in Mechanically Fastened Joints. in *Proc. 7th EUROMECH Solid Mechanics Conference (ESMC2009)*, Lisbon, Portugal.
28. **Rans CD**, Alderliesten RC (2009). Formulating an effective strain energy release rate for a linear elastic fracture mechanics description of delamination growth. in *Proc. 17th International Conference on Composite Materials (ICCM17)*, Edinburgh, Scotland.
29. Khan R, **Rans CD**, Benedictus R (2009). Effect of stress ratio on delamination growth in unidirectional carbon/epoxy under Mode I and Mode II fatigue loading. in *Proc. 17th International Conference on Composite Materials (ICCM17)*, Edinburgh, Scotland.
30. **Rans CD**, Alderliesten RC (2009). The influence of temperature on crack growth in fibre metal laminates. in *Proc. 12th International Conference on Fracture (ICF12)*, Ottawa, Canada.
31. **Rans CD**, Alderliesten RC (2009). Damage tolerance philosophy for bonded aircraft structures. in *Proc. 25th Symposium of the International Committee on Aeronautical Fatigue (ICAF 2009)*, Rotterdam, the Netherlands.
32. Paletti L, **Rans CD**, Benedictus R (2009). An analytical model for load transfer in a mechanically fastened double-lap joint. in *Proc. 25th Symposium of the International Committee on Aeronautical Fatigue (ICAF 2009)*, Rotterdam, the Netherlands.
33. **Rans CD**, Alderliesten RC, Straznicky PV (2007). Effects of rivet installation on residual stress and secondary bending in a riveted lap joint. in *Proc. 48th AIAA Structures, Structural Dynamics, and Materials Conference*, Honolulu, HI, USA.
34. Brown AM, **Rans CD**, Straznicky PV (2007). On achieving an optimal riveted lap joint design for fibre metal laminates. in *Proc. 6th Canadian-International Composites Conference (CANCOM 2007)*, Winnipeg, Canada.

35. **Rans CD**, Alderliesten RC, Straznicky PV (2005). Residual stresses in Glare laminates due to the cold expansion process. in *Proc. 5th Canadian-International Composites Conference (CANCOM 2005)*, Vancouver, Canada.
36. **Rans CD**, Alderliesten RC, Straznicky PV (2005). Modelling of the rivet forming process in aluminum and Glare for design against fatigue. in *Proc. 23rd Symposium of the International Committee on Aeronautical Fatigue (ICAF 2005)*, Hamburg, Germany.

THESES

1. **Rans CD**, "The role of rivet installation on the fatigue performance of riveted lap joints," *Ph.D. dissertation*, Dept. of Mechanical and Aerospace Engineering, Carleton University, August 2007.
2. **Rans CD**, "An experimental investigation into the fatigue behaviour of dimple countersunk Glare riveted lap joints," *M.Sc. thesis*, Dept. of Mechanical and Aerospace Engineering, Carleton University, September 2003.

OTHER PUBLICATIONS

1. **Rans CD**, "Bolted joints in glass-reinforced aluminium (Glare) and other hybrid fibre metal laminates (FML)", in *Composite joints and connections: Principles, modelling and testing*, P. Camanho and L. Tong, Editors. Woodhead Publishing Ltd: Cambridge, 2011.
2. **Rans CD**, "Damage tolerant design: a relic of metallic aircraft or the future of composite aircraft?" article in *Leonardo Times*, Delft University of Technology magazine
3. **Rans CD**, "Evaluation of the fatigue crack propagation and delamination growth behaviour of Titanium-Carbon Laminates", Report B2v-08-06, Structural Integrity Group, Delft University of Technology, 2008.

INVITED TALKS

1. Rans CD (2015). Skinning a Giant: a brief review of the evolution and growing pains in developing Fibre Metal Laminates for the A380. *Invited lecture at Clarkson University*. Potsdam, NY, USA. 11 September 2015.
2. Rans CD (2015). Failure by Design: a review of aircraft structural integrity philosophies and their applicability to civil infrastructure. *Invited lecture at Stevens Institute of Technology*. Hoboken, NJ, USA. 5 September 2015.
3. Rans CD (2015). Acknowledging the grey areas: how fibre metal laminates are bridging the gap between metals and composites. *Invited talk at SAMPE Benelux Spring meeting*. Papendrecht, the Netherlands. 21 April 2015.
4. Rans CD (2014). Safety doesn't happen by accident: a brief introduction into major F&DT research at TUDelft. *Invited lecture at Instituto Tecnológico de Aeronáutica*. São José dos Campos, SP, Brazil. 30 September 2014.
5. Rans CD (2014). Certification challenges for Additive Manufacturing in the aerospace sector. *Invited lecture at KULuven*. Leuven, Belgium. 4 August 2014.
6. Rans CD (2014). Evolution of FML Technology. *Invited lecture at University of Kaiserslautern*. Kaiserslautern, Germany. 4 July 2014.
7. Rans CD (2013). Acknowledging the grey areas: how fibre metal laminates are bridging the gap between metals and composites. *Invited talk at the DLR Institute of Composite Structures*. Braunschweig, Germany. 5 December 2013.
8. Rans CD (2012). Meeting the F&DT demands of future narrow-body aircraft. *Invited talk at Bombardier Aerospace*. Toronto, ON, Canada. 26 March 2012.

9. Rans CD (2011). Evolution of FML Technology. *Invited talk at Weidlinger Associates*. of Kaiserslautern. New York, NY, USA. 13 December 2011.

STUDENTS & RESEARCHERS

PH.D. RESEARCHERS

- E. Smeets (2019 – present), Damage tolerance of ultrasonically spot welded joints in composite structures
- Y. Xiao (2017 - present), Embedded distributed sensing SHM in AM parts
- M. Walker (2016 - present), Progressive failure of additive manufactured lattices
- F. Ribeiro (2013 – present), Variable amplitude fatigue of bonded joints
- W. Wang (2013 - 2017), Multiple site fatigue prediction in FML joints
- D. Bürger (2010 - 2015), Mixed-mode fatigue delamination growth modelling
- L. Paletti (2007 - 2010), Fretting fatigue in bolted aircraft joints
- R. Khan (2008 - 2013), Fatigue delamination growth in composites

M.SC. STUDENTS

- M. Beukelman (2020 – present), On the application of gas dynamic cold spray for the repair of metallic aerospace components
- M. Hofwegen (2020 – present), Design for damage tolerance in additive manufacturing
- N. van 't Hof (2019 – present), Influence of fastener properties on their effectiveness as disbond arresting features in hybrid joints
- T. Haegens (2019 – present), On the influence of crystallinity and fire additive concentrations on the strength of SLM polymer parts
- C. Houriet (2019 - 2019), Self-reinforcing additive manufactured LCP composites
- K. Ertman (2018 - 2020), Learning from Nature's Failures: Mimicking hierarchy in natural structures to create damage-tolerant lattice structures
- I. van Teeseling (2017 - 2019), Disbond arrest behaviour of hybrid bolted-bonded joints
- D. van Helvoort (2017 - 2019), Effect of nodal geometry in lattice structural behaviour
- B. Lagerweij (2017 - 2019), Topology optimization for fatigue crack growth
- B. van der Lee (2017 - 2020), Application of Genetic Algorithms for DT design
- A. Marshall (2014 - 2017), Tailoring of FML layup for post shear-buckled stiffness
- T. de Boer (2015 - 2017), Application of redundant lattices for damage tolerance
- T. Cheylus (2015 - 2017), Fatigue crack growth initiation in SLM Ti6Al4V
- J. Michielssen (2015 - 2017), Fatigue crack growth in Selective Laser Melted Ti6Al4V
- M. Bots (2015 - 2017), Energy absorption of graded AM lattice structures
- R. Hangx (2015 - 2017), Disbond arrest in bonded Fibre Metal Laminate joints
- K. Peters (2015 - 2017), Mode I KIC evaluation for Thermoplastic composites
- J. de Krijger (2014 - 2016), R-ratio effects on the fatigue of AM Ti6Al4V lattices
- E.S. Zhelyazkov (2014 - 2016), Thermally induced matrix crack evolution in RTM parts
- R. Desnoo (2013 - 2015), Quasi static indentation of hybrid and composite mat.
- J. Atkinson (2012 - 2014), Crack growth modelling in tailored FML panels
- J.A. Pascoe (2011 - 2012), Damage tolerance of bonded metal repair patches
- I. Sen (2009 - 2010), Parametric sizing tool for aircraft fuselage design
- T. van Vugt (2008 - 2013), Fatigue of composite scarf repairs

UNDERGRADUATE STUDENTS

- 10 students (2016 - 2017), Design of an amphibious business jet
- 10 students (2015 - 2016), Design of a UAV for Air Safety Investigations
- 10 students (2013 - 2014), Design of a 3D-printed personal aircraft
- 9 students (2012 - 2013), Structural design of a geophysical survey UAV
- 8 students (2011 - 2012), Aeroelastic analysis of a low-cost UAV structure
- 10 students (2011), Conceptual design of a green bush plane
- 10 students (2009), Conceptual design of long-range airliner for 2050

TEACHING EXPERIENCE

MASTERS COURSES

AE4ASM513: FORENSIC ENGINEERING (2013 - PRESENT)

Delft University of Technology, Delft, the Netherlands

An elective course in the Aerospace faculty aimed at training students in the mindset of and process for air safety investigators. The course consists of weekly hands-on learning activities where students work in groups, learning about the various stages of an investigation. All learning activities are designed to equip the students with the skills necessary to perform an investigation of a simulated air accident scene set up as the final assessment of the course.

AE4ASM107: JOINING METHODS (2009, 2010, 2013 – PRESENT)

Delft University of Technology, Delft, the Netherlands

Profile course in the ASM Master Track. This course deals with the fundamental of various structural joining techniques, namely mechanical fastening, adhesive bonding, composite welding and metal welding, and their use in various joining applications. The focus of the course is on understanding the strengths, weaknesses and the behaviour of these different joining technologies in both structural performance and manufacturing/assembly.

AE4735: FATIGUE OF STRUCTURES & MATERIALS (2008 – 2010)

Delft University of Technology, Delft, the Netherlands

A core course in the ASM Master Track. This course provides a detailed examination of fatigue damage mechanisms, analysis methods, and aircraft fatigue design philosophies and regulations for metallic and composite structures.

AEROSPACE STRUCTURES B - MODULO 2 (2015 – PRESENT)

University of Bologna, Forli, Italy

A course offered within the Aerospace Engineering Master programme. This course is effectively an online version of AE4735 Fatigue of Structures & Materials described above with an intensive face-to-face component provided by TUDelft employees.

MECH5603: LIGHTWEIGHT STRUCTURES (2011 – 2013)

Carleton University, Ottawa, ON, Canada

A graduate level course on design and analysis of lightweight structures. Emphasis on load-path concept, simplified stress analysis and approximation techniques, and failure

prediction. The course centres around an intensive group design project where student teams have to design, build, and test a representative lightweight structure.

BACHELOR COURSES

AE1130-I: STATICS (2019 – PRESENT)

Delft University of Technology, Delft, the Netherlands

A compulsory 1st-year course for Aerospace Engineering students. This course provides an introduction to the basic concepts of Engineering Mechanics that are built upon in later courses.

AE2135-I: STRUCTURAL ANALYSIS & DESIGN (2017 – PRESENT)

Delft University of Technology, Delft, the Netherlands

A compulsory 2nd-year course for Aerospace Engineering students. This course is an advanced engineering mechanics course focused on exposing students to engineering design and decision making based on simplified and idealized structural analysis. Students are encouraged to make assumptions and simplifications while critically evaluating the consequences of those decisions on their result.

AE1108-II: MECHANICS OF MATERIALS (2008, 2009, 2013 – 2019)

Delft University of Technology, Delft, the Netherlands

A compulsory 1st-year course for Aerospace Engineering students. This is a fundamental course on engineering mechanics that examines the stresses within and deformations of simple structural elements under axial, torsion, transverse shear, and bending loading. The course is offered in a blended learning format and all teaching videos generated for this course are publicly available at: <https://www.youtube.com/c/CalvinRans>.

AE3200: DESIGN SYNTHESIS EXERCISE (2010, 2013 – PRESENT)

Delft University of Technology, Delft, the Netherlands

A compulsory 3rd-year course for Aerospace Engineering students. This course acts as the final Bachelor curriculum project. Students collaborate in teams of approximately 10 students to undertake a multidisciplinary engineering design, including strong elements of systems engineering and sustainability.

MAAE2202: SOLID MECHANICS I (2011 – 2013)

Carleton University, Ottawa, ON, Canada

An introductory course in the field of solid mechanics examining the stress and deformation behaviour of simple structural elements such as beams, shafts, columns, and cables. The course is a required course for both Mechanical and Aerospace engineering students.

AERO4608: COMPOSITE MATERIALS (2012 – 2013)

Carleton University, Ottawa, ON, Canada

An undergraduate course in analysis and design of composite structures. The course emphasises basic analysis techniques including classical laminate theory, ply failure criteria, and ply-by-ply failure of laminates. Discussion of manufacturing techniques, environmental degradation, and processing are reinforced by a group design project.

ONLINE COURSES

DELFTX – AEASM1X: INTRODUCTION TO AEROSPACE STRUCTURES AND MATERIALS (2018 – PRESENT)

Delft University of Technology, Delft, the Netherlands

A Massive Open and Online Course (MOOC) covering the basic concepts of aerospace structures and materials, including materials science, manufacturing methods, structural analysis, joining methods, and fatigue. This highly interactive course not only focuses on concepts related to the subject area of the course, but focuses on teaching about the scientific method through online experiments.

TUDF-AE01X: AIR SAFETY INVESTIGATION (2016 – PRESENT)

Delft University of Technology, Delft, the Netherlands

An Online Professional Education (ProfEd) course on Air Safety Investigations. This course was developed to compliment the on-campus course of Forensic Engineering which trains students in Accident Investigation Techniques. The aim for the ProfEd course was to teach a wider audience about the process of Air Safety Investigation, targeting lawyers, media personal, and other people who interact with and encounter this process.

GRANTS & FELLOWSHIPS

EDUCATION

- Education Fellowship, TUDelft [2019 – 2020, €50,000]
- Blended Learning grant, TUDelft Extension School [2014, €20,000]
- Blended Learning studio startup fund, TUDelft faculty of aerospace engineering [2014, €10,000]

RESEARCH

- Defensie Technologie Project (DTP): additive manufacturing and certification of a flight critical part, Ministerie van Defensie [2017-2018, €70,000]
- Discovery Grant, National Science and Engineering Research Council (NSERC) [2013 - 2014, ~€18,000 per annum]
- Innovational Research Incentives Scheme - Veni grant, Netherlands Organization for Scientific Research (NWO) and Technical Science Foundation (STW) [2010 - 2014, €250,000].
- Postgraduate Scholarship, National Science and Engineering Research Council (NSERC) [May 2002 - May 2006, ~€15,000 per annum].

SCHOLARSHIPS

- Edward Bower Carty Graduate Scholarship for outstanding domestic PhD candidate [2003 - 2008 ~€5,000 per annum].
- David and Rachel Epstein Foundation Scholarship for academic excellence [2002 - 2007, €1,000 per annum]
- J.Y. and E.Y. Wong Award for research excellence [2005, €1,000]

AWARDS & HONOURS

EDUCATION

- Docent van het Jaar 2019 (Teacher of the Year for the Netherlands), Interstedelijk Studenten Overleg (ISO) [2019, €25,000]
- Best Lecturer of TUDelft 2018, TUDelft [2018, €6,000]

- Aerospace Engineering Teacher of the Year, VSV 'Leonardo da Vinci' study association [2018]

SERVICE

CONFERENCE

- **Working Group Chair** for Open and Online Education within the European Society for Engineering Education (SEFI) (2018 – Present)
- Member of the **Organizing Committee** and **Technical Committee** for the 2019 International Society of Air Safety Investigators conference (ISASI2019)
- Member of the **Technical Committee** for the 2009 International Committee on Aeronautical Fatigue conference and symposium (ICAF2009)

PH.D. COMMITTEES

- **External examiner** in Ph.D. committee for D.Z. Tamboli, Monash University, Melbourne, Australia, 2016.

TUDELFT

- **Online Education Coordinator** and member of the **Education Management Team** within the Faculty of Aerospace Engineering (2019 – Present)
- **Durability Profile Advisor** in the Aerospace Structures & Materials (ASM) Master programme (2015 – Present)
- Coordinator of the **Online Learning Studio** within the Faculty of Aerospace Engineering (2015 – Present)
- Member of the **Masters Vitalization Committee** tasked with examining the the flexibility of the Aerospace M.Sc. programme (2016)
- Member of the **Research Strategy Group** tasked with developing strategies for increasing the impact of the Faculty of Aerospace Engineering (2015)
- Organizer of the annual **ASM Bachelor Education Workshop** which evaluates and aligns the learning paths for structures and materials related topics in the Bachelor (2013 – Present)
- Member of the **MPT Committee** that facilitates and advises the Delft Aerospace Structures and Materials Laboratory (2008 – 2011)
- **Webmaster** for the Structural Integrity research group webpage (2008 – 2011)

CARLETON UNIVERSITY

- Member of the **Tenure Committee** for the Department of Mechanical and Aerospace Engineering (2012 – 2013)
- Member of the Recruitment Committee for the Department of Mechanical and Aerospace Engineering (2011 – 2013)