Michael Janssen

Assistant Professor

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Research interests:
(Fracture) Mechanical Behaviour of Materials
Fatigue of Metals
High Temperature Mechanical Behaviour
Thermomechanical Fatigue

Mechanical behaviour through the length scales

Research

My recent research involvement is specifically on thermomechanical fatigue of different graphitic cast irons, initially in the form of supervising a PhD project (Sepideh Ghodrat) and more recently in the form of a number of graduation projects (Nils Verkleij, Nasos Zafeiropoulos, Aakarshit Kalra).

Educational Coordinator

Since 2005 I devote a significant portion of my time to coordinating the master's programme Materials Science and Engineering (MSE) and, since 2011, the track Materials Engineering and Applications within the master Mechanical Engineering. More recently I contributed to the design of a new, more flexible MSE programme, that will start in September 2016. Furthermore, I am currently coordinating the Project Materiaalkunde, a set of 10 obligatory projects annex practicals for about 400 second year mechanical engineering bachelor students.

Teaching

I am responsible for, or participate in a number of MSc and BSc courses, in which I teach on aspects related to the mechanical behaviour of materials.

- MS3442 Relation between Properties and Microstructure. In the mechanical part of this course I discuss the microstructural aspects of the growth of small fatigue cracks and the fatigue response of ultra-fine-grained metals on the basis of 3 journal publications.
- MS4015 Mechanical Behaviour of Materials. I consider basic mechanical quantities, such as stress, strain and basic fracture mechanical parameters. Using this knowledge I then discuss the effect of microstructure on fracture toughness and sub-critical crack growth phenomena that cause material failure (fatigue, environment-assisted cracking).
- ME1305 Materials for Highly Loaded Structures. I discuss the current procedures for failure assessment on the basis of both plastic and fracture behaviour.

- ME1306 Materials at High Temperature. In this course I consider mechanical behaviour at high temperatures: creep in metals and ceramics, high temperature fatigue in metal alloys, thermo-mechanical fatigue in metal alloys and thermal shock in ceramics.
- WB2331 Project Materiaalkunde. In collaboration with Ton Riemslag, I have set up the practical “Vermoeiing en Breuktaaiheid” (Fatigue and Fracture Toughness) and supervise related projects for second year mechanical engineering bachelor students.

For the new MSE programme I will define a new fracture mechanics-related course Science of Failure.

Selected Publications

Janssen, M., Evaluation of an Applied Plane-Stress Tensor Distribution Using Ultrasonic Shear Waves, Exp. Mech., Vol. 28 (1988) 226-231

Mussert, K.M., Janssen, M., Bakker, A. and Zwaag, S. van der, Modelling Fracture in an Al2O3 Particle Reinforced AA 6061 Alloy using Weibull Statistics, Journal of Materials Science, Vol. 34 (1999) 4097 - 4104

Michael Janssen, Russell Wanhill, Jan Zuidema, Fracture Mechanics, 2nd Edition, Spon Press, London, ISBN 0-415-34622-3 (2004) 365

Kuipers, N.B., Riemslag, A.C., Lange, R.F.M., Janssen, M., Bakker, A., Marissen, R., Environmental Stress Cracking of a Chemical Nature in a PBT/PBA Co-Poly(Ester Ester), Polymer Engineering and Science 44/7 (2004) 1319-1327

L. Zhao, B. Mainfroy, M. Janssen, A. Bakker and J. Sietsma, Time-dependent strain development under constant stress in TRIP steels, Scripta Materialia 55 (2006) 287-290

Xu Cheng, Roumen Petrov, Lie Zhao, Michael Janssen, Fatigue crack growth in TRIP steel under positive R-ratios, Eng Fract Mech, 75 (2008) 739-749

M. Lonyuk, M. Bosma, C.A.M. Vijverberg, A. Bakker, M. Janssen; Relation between Chip Resistance and Mechanical Properties of Automotive Coatings, Progress in Organic Coatings 61 (2008) 308-315

V.A. Popovich, M. Janssen, I.M. Richardson, T. van Amstel, I. J. Bennett, Microstructure and Mechanical properties of Aluminium Back Contact Layers, Solar Energy Materials and Solar Cells, Volume 95/1 (2011) 93-96

S. Ghodrat, M. Janssen, R.H. Petrov, L.A.I. Kestens, J. Sietsma, Microstructural Evolution of Compacted Graphite Iron under Thermo-Mechanical Fatigue Conditions, Ad-vanced Materials Research 209 (2012) 757-762