

## **Vacancy 3mE-PME-MNE for a PhD student in micro- and nanoengineering**

The Precision and Microsystems Engineering Department, has a young and fast-growing section on Micro and Nano Engineering (MNE). In this section, there is a vacancy for a PhD student in the project 'Nanoscale multi-asperity contact adhesion/friction/wear measurements with MEMS devices'.

Description of the project:

MEMS/NEMS (micro-/nano-electromechanical systems) are small, moving mechanical microstructures, like micrometer scale motors, accelerometers or chemical sensors. Although there have been scientific and commercial successes, reliability problems related to friction and wear prevent designers from taking full advantage of this technology.

In this project, we delve deep into the fundamentals of friction, by researching the differences between single contact point sliding such as in an AFM (atomic force microscope) and low-load multi-asperity contact such as in MEMS. Both theoretical and practical skills are required. The research is part of a larger project, in which the limitations of atomic scale friction-reducing effects, such as superlubricity and thermolubricity, are investigated.

The main questions to be answered are: What are the super-low friction limits, and, at higher forces, the physical and chemical surface damaging mechanisms? How does a multi-asperity surface deform upon contact? Can we avoid friction and/or wear by choosing/engineering our material carefully? We can think of hard Ti and Cr nitrides, aluminum oxide, 'gum metal', diamond-like carbon and the deposition of graphene sheets. How can we take advantage of the low friction/wear coatings in real MEMS device processing?

The objective is to provide the breakthrough solution for a fully new class of MEMS devices: those with sliding surfaces.

Successful candidates must have a degree in engineering, physics or a related discipline; skills in microfabrication, testing of microsystems, tribology and/or physical modeling are an advantage. Applicants should include: a detailed resume (curriculum vitae), a clear statement of specific research interest and the names of two persons able to provide a reference in support of their application. Evaluation of candidates will begin January 30, 2012. The call stays open until the position is filled. Additional information on the position, the department or faculty can be obtained from the head of the project, Dr. Ir. Merlijn van Spengen, W.M.vanSpengen@tudelft.nl.

Faculty: Mechanical, Maritime and Materials Engineering

The 3ME Faculty trains committed engineering students and PhD candidates in groundbreaking scientific research in the fields of mechanical, maritime and materials engineering. 3ME is the epitome of a dynamic, innovative faculty, with a European scope that contributes demonstrable economic and social benefits.

The Precision and Microsystems Engineering (PME) division conducts cutting edge research and delivers scientific education in the field of precision mechanical engineering. It focuses on the application in high tech systems and micro system technology by combining a multitude of physics principles with fundamental mechanical research and computational engineering. The vision is to integrate the new domains of micro- and nano-science into mechanical engineering to create devices that serve society, environment and mankind. This is achieved through engineering of and for systems on an extreme scale with sub-nanometer details, both by the study of the micro-devices themselves, as well as the study of the high technology tools required to create them.

