

## Systems Engineering for Micro and Nano Technologies Workshop, 11 Dec 2007, Loughborough, UK

The discipline of systems engineering will become a key enabler for the successful development and commercialisation of products characterised by their multi-parameter capability and integration potential. Prime amongst such products are multi-functional micro and nano technologies (MNT) and their associated subsystems. These will impact a wide spectrum of applications within medical, automotive, aerospace and other markets. Systems engineering can offer methodologies, tools and processes to enable the efficient integration and exploitation of such disruptive technologies within both existent and evolving systems.

The UK's Centre of Excellence in Metrology for Micro and Nano Technology (CEMNT), in collaboration with the PATENT-DfMM project and the Systems Engineering Innovation Centre (SEIC), held a one-day workshop in December 2007 at the SEIC, in Loughborough, to introduce designers utilising MNT to systems engineering, its benefits, and the techniques that underpin this discipline. The event focused on methodologies, processes and systems engineering based tools, as applied to the design, integration and evolution of products embedding MNT. PATENT-DfMM presentations were given by Andrew Richardson (Lancaster University) about "design-

for-X" (DfX) philosophies, and Mark Begbie (ISLI), with a perspective on the historical evolution of MNT from a base technology through to its current "multi-physics" level of complexity.

Discussion results raised the hope that this event will signal the start of a new collaboration between two communities who share similar challenges, albeit on divergent scales! For more information: [www.cemmnt.co.uk/news-and-events.php](http://www.cemmnt.co.uk/news-and-events.php)

Ayman El-Fatraty (BAE Systems), Patric Salomon (4M2C)

## CALL FOR PAPERS: Workshop on Reliability & DfX Engineering for System-in-Package Technologies in Conjunction with European Test Symposium, Lago Maggiore, Italy, 29 May 2008

The SiPeX workshop aims to bring together reliability and test engineers to discuss advanced design methodologies, integration technology and assembly engineering for SiP solutions that embrace heterogeneity, multiple energy domains and mixed technology platforms. The organising committee invites authors to submit both papers and

poster contributions in the above areas before 3 March 2008 by email to [nouet@lirmm.fr](mailto:nouet@lirmm.fr), Prof Pascal Nouet. SiPeX Call for Papers: [www.patent-dfmm.org](http://www.patent-dfmm.org) ETS'08 website: [www.cad.polito.it/~ets08/](http://www.cad.polito.it/~ets08/)

Andrew Richardson, Pascal Nouet, Workshop co-chairs

## Survey on Hermeticity Testing of Microsystems

The limitations of the standard helium leak test in conjunction with a gross leak test, such as the bubble test, when applied to microcavities, are well documented. MIL-STD-883G gives standards for the use of the helium leak test to detect leaks in packages under  $0.05\text{cm}^3$  although no specific values for micro-scale cavities are listed. The sensitivity of the mass spectrometer used means the minimum leak rate that can be detected is of the order  $10^{-11}\text{atm.cm}^3.\text{s}^{-1}$ . A microsystems device may be adversely affected by leak rates as low as  $6\text{e}^{-18}\text{atm.cm}^3.\text{s}^{-1}$ . The maximum leak rate detectable using the helium leak test drops to below the minimum leak rate detectable using the gross leak test, leaving a misleading gap in the detectable range. An adequately sensitive alternative test method for small-volume packages has yet to be developed.

We are conducting research to develop such a test along with a model to predict the leak rate of packages sealed using organic materials. This has the potential to provide some users with a less costly packaging method should the predicted leak rate suit the expected lifetime of the device.

To make our research relevant to industry it is essential to discover how hermeticity testing is currently being conducted and if there is a demand for a more accurate and sensitive testing method. Contributors will receive a summary of results!

The survey is available at: [www.patent-dfmm.org](http://www.patent-dfmm.org)

Suzanne Millar, Heriot-Watt University  
Email: [sm291@hw.ac.uk](mailto:sm291@hw.ac.uk)

## DfMM Contact

DfMM News is provided to mst-news readers by the project "Design for Micro & Nano Manufacture (Patent-DfMM)", a Network of Excellence funded by the European Commission DG INFSO E5 within the Information Society Technologies (IST) Programme of FP6.



The NoE Patent-DfMM aims to establish a collaborative team to provide European industry with support in the field of "design for micro nano manufacture" to ensure that problems affecting the manufacture and reliability of products based on micro nano technologies (MNT) can be addressed before prototype and pre-production.



NoE Patent-DfMM Co-ordinator:  
Andrew Richardson  
University of Lancaster, UK  
E-mail:  
[A.Richardson@Lancaster.ac.uk](mailto:A.Richardson@Lancaster.ac.uk)

NoE Patent-DfMM News Editor:  
Patric Salomon  
4M2C PATRIC SALOMON GmbH  
E-mail: [DfMM-news@4m2c.com](mailto:DfMM-news@4m2c.com)

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