

"Design for Micro & Nano Manufacture (Patent-DfMM)", a new Network of Excellence

"Manufacturing starts with design". This statement holds especially true in the case of micro and nanosystem technology (MNT) as there are a range of manufacturing related difficulties that can be simplified by either design enhancements or the integration of additional functions. This design for micro & nano manufacture (DfMM) methodology is however immature and is one of the main reasons why the commercialization of MNT based products is still severely limited despite a range of impressive research programmes, design innovations and initiatives across Europe.

Some of the key problems that affect manufacturability are now widely acknowledged and include difficulties in developing economic production test strategies and efficient packaging and assembly solutions. Guaranteeing robustness and reliability is also extremely difficult due to complexity and the heterogeneous nature of most MNT based products. Improved design support is also becoming a key commercial requirement with pressure on tool vendors to optimise models aimed at providing the designer with the means to predict the impact of second-order effects on the design (e.g. package induced stress and mode coupling), and verify end-use stability and subsequent reliability, especially in aggressive environments.

The need to solve these issues in MNT is hampered by the shortage of multidisciplinary, skilled engineers, and the need for major advances in simulation and modelling technology that handles hierarchical heterogeneous designs. Furthermore, many typical applications of micro & nano system technologies require very high reliability, and suitable test methodologies, standards and instrumentation are often missing. Time-to-market targets for most MNT products will therefore only be achieved if these so called "back-end" issues are addressed early in the design cycle.

The "Design for Micro & Nano Manufacture (Patent-DfMM)" Network of Excellence aims to establish a new technical community that will address the underlying engineering science to ensure that problems affecting the manufacture and reliability of products based on MNT can be addressed before prototype and pre-production.

The work will involve teams from the fields of packaging, test engineering, reliability engineering, simulation and modelling. Although the network will take an interest in all MNT fields, there will be a specific focus on MNT based products:

- That are deployed in harsh or demanding environments,
- Where reliability or dependability must be fully validated, or
- Where "right first time" manufacture is critical to meet cost and time-to-market constraints.

Patent-DfMM will also provide services to industry in the form of a one-stop shop. These services will be based on the combined skills and resources of the PATENT-DfMM technical community and will:

- provide industry with access to state-of-the-art technology and services in the underlying disciplines core to the Patent-DfMM team,
- provide industry with access to equipment and facilities,
- provide industry with commercial access to internal "Patent-DfMM" intellectual property,
- provide industry access to training and education in the Design for Micro & Nano Manufacture field.

Patent-DfMM is seeking close interaction with organisations expected to be the major beneficiaries of this new project. These include:

- **Design and Engineering Companies** or business units within companies (Design Houses) through the use of Patent-DfMM methodology in their design work,
- **Design Tool (EDA) providers** through the implementation of

Patent-DfMM methodology into their tools,

- **Small and medium-sized companies** (SMEs) through the use of Patent-DfMM methodology and services.

Patent-DfMM will work close with other projects, networks and organizations world-wide. It is linked to the NEXUS MWG Design Modelling Simulation (DMS) and will organize a range of workshops and seminars that will be open to interested parties.

Patent-DfMM will be funded by the EC for 4 years, starting in January 2004. Beyond these four years, it is planned to continue the activities on a commercial basis.

More information will be available in future editions of "Patent-DfMM News" within MST News or directly from the authors of this article. Furthermore, a bi-monthly E-mail newsletter will be published - if you are interested, please send an E-mail with your complete address details to Patric.Salomon@4m2c.com and ask to be put on the mailing list.

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Patent-DfMM News is provided to mstnews 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.

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