



MNTFUTUREVISION

Mapping the future of Micro and Nano Manufacturing in Europe

October 2007

A bulletin produced by MicroSapient, with contributions by IPMMAN, 4M, MINAM and Fp6 projects

TIME FOR EUROPE TO PROFIT FROM RESEARCH!

Micro- and nano-technology in its multi-sectorial and multi-disciplinary nature is considered a major enabler in transforming European industry.

The European Commission has recognised this and has, alone in the field of nanotechnology, allocated €1.4 billion to 550 projects under the EU's 6th Research Framework Programme, putting the EC in front as the world's largest public investor in this field. Industrialising and profiting from the results remains a major challenge.

The NMP programme

The Nanosciences, nanotechnologies, materials and new production technologies (NMP) programme has a long tradition of supporting industrial research projects with strong industrial participation, with the objective to improve the competitiveness of European

industry and support its transformation from a resource-intensive to a knowledge-intensive base by generation of enabling technologies which impact all industrial sectors.

However, when it comes to industrial participation, private investment in the field remains behind that in the US and Japan!

The MINAM "micro- and nano-manufacturing" community has therefore, an important role to play in meeting these objectives, through the joint efforts of industry, research organisations and consumers, and in collaboration with national, regional and European programmes, including the NMP and Information Society Technologies (IST) programmes.

7th Research Framework Programme

The 1st calls of the IST and NMP programme saw a number of topics published with relevance for the MINAM community, and the 2nd call is expected to include topics like:

- Pilot lines introducing nano-technology-based processes in existing industries
- Processing and upscaling of nanostructured materials
- Volume production process chains for high throughput micro-manufacturing
- Volume production of nano-structured surfaces for the manufacturing equipment industry

An ERA-NET is expected to coordinate member states' efforts on implementing MNT within industry.

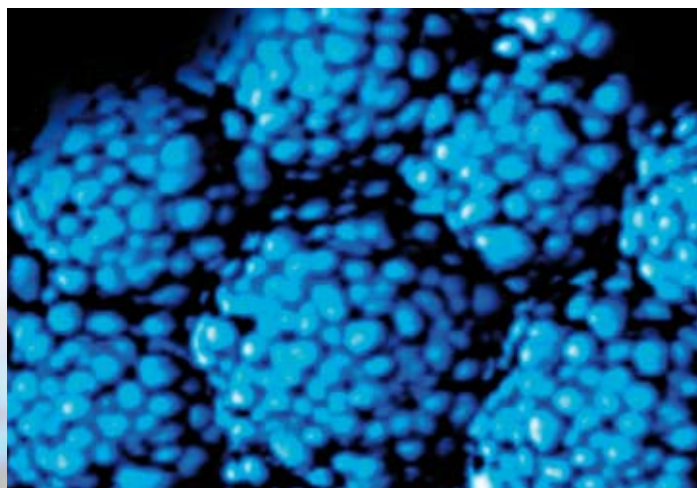
Improving the competitiveness through transformation of our industry is high on the European research agenda. MINAM can contribute, as an independent and transparent platform, by better organising and strengthening the efforts of the micro- and nano-manufacturing industry.

Hans Hartmann Pedersen

New Generation of Products

DG Research

European Commission



Photographs courtesy of BASF

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A powerful platform for the MNT industry in Europe

Micro and nano manufacturing represents a strategically important area for the future competitiveness of European industry. European leadership in this key area will require effective co-operation of industry, research institutions and universities in the definition of pathways to commercialize emerging micro and nano technologies into established processes and products.

With a primary objective to enhance European industrial competitiveness, MINAM aims to address the definition of a Strategic Research Agenda setting out medium to long term objectives for this area as well as its subsequent implementation. MINAM's target is to become the European network in these fields.

The MINAM European Technology Platform will be launched in January 2008 with the support of the European Commission. More than 400 organisations have joined Minam so far. Four operational support groups are taking care of the areas microcomponents, materials, system integration and strategic research agenda. An Industrial Management group is active to link all the R&D activities with industry needs. The Industrial Management Group Board was elected in June 2007.

Role of the Industrial Management Group

The Industrial Management Group (IMG) of MINAM was created to represent the industries involved in the platform. All industries joining the platform have significant interests in the area of nano and micro manufacturing. The Platform, through IMG, assures the necessary industrial lead to the elaboration of visions, roadmapping and implementation and other activities of the platform. This ensures that industrial views on the key manufacturing issues, open in the area and constituting critical bottlenecks for the next generation of technologies, will be translated into research actions indications for regional, national and EU authorities.

Industries involved in the Management Group Board

Four companies are part of the Board. Prof. Paolo Matteazzi chairs IMG board, his company MNB Nanomaterialia SPA is a SME company based near Venice and he was one of the co-founder of the platform. Global player Umicore AG is a material technology company based on specialty metals. Umicore has a long history with nano products in catalysis and recently started three pilot lines for different applications. It has been doing intensive and increasing research and development work in nano technology. Umicore is active in several European Platforms such as SusChem, HFP, Photonics21 and Photovoltaics. MINAM represents one of its main activities. microTEC Gesellschaft für Mikrotechnologie mbH located in Germany is an SME active in industrial applications of nanomaterials and microsystems since 1996. The company is active in MINAM and EPOSS, also linked with networks like Euspen, IVAM, SPIE and ZIRP. Microelectronica's core business is production of

energy efficient light solutions, particular LEDs. The company is located in Romania, active in the platform of MANUFUTURE too and will take care at IMG board particular about fast growing Eastern European areas.

MINAM OFFICIAL LAUNCH

The official launch of the European Technology Platform MINAM will take place in Brussels on January 23, 2008. SMEs and large companies interested in the activities of the platform are invited to participate.

Ambitions for the Minam Platform

One of the main goals of MINAM is to involve all players in the area of micro-and-nano-manufacturing and especially to attract as many industries as possible from all over Europe. There are many questions to solve, in particular how to organize future education, how to use and produce new materials in a safe way and, most important, how to have every region in Europe participating in growth based on new technologies.

Strong from the involvement of large European companies, Minam would like to bring the European micro and nano industry into a global leading position. A close communication between European industries and the European authorities is expected to establish the best political environment to achieve the challenging goals.

This interest is shared with the Minam industry members, wishing to have their industrial views reflected in medium to long term strategic actions under the various programs at regional, national and especially European level.

Industrial Management Group

Secretariat:

Klaus Zimmer and Eric Maiser – VDMA, Germany
Theresa Burke - euspen

Operation Support Group

Secretariat:

Wolfgang Schäfer and Johann Dorner – Fraunhofer IPA, Germany

MINAM BROKERAGE EVENT

This event will be held together with the launch of Minam on January 24, 2008. It is aimed at European companies, research institutes and universities wishing to:

- Understand how the field of micro and nano manufacturing is addressed in the EU 7th Framework Programme
- Meet up with organisations interested in participating in Fp7
- Identify opportunities for research collaboration and proposal submission

Registration and information on <http://www.micronanomanufacturing.eu>



Special Interest Groups on Microfactory, Additive & Subtractive Laser Processes and Process Design launched by MicroSapient

The μ -Sapient project links different national and EU initiatives and projects with aim to help European industry to adopt and integrate the newly developed technologies. The μ -Sapient project plays an active role in MINAM, being responsible for the coordination of the MINAM Strategic Research Agenda. Another contribution was a MNT roadmap, available on the MINAM website.

The μ -Sapient project also promotes the formation of clusters of industrial experts and researchers in particular areas of strategic development, called Special Interest Groups (SIGs).

These Interest Groups support the formulation and execution of short to mid-term EU research agenda in their specific fields. Their views are then channelled to the European Commission via Minam, the European Technology Platform for micro and nano manufacturing.

Special Interest Groups were launched during the EuroNano-Forum in Dusseldorf last June. The meeting was attended by fifteen persons from eight countries, including nine from industry. Discussions were held on micro-actuator & micro-factories, additive & subtractive laser processes and process design.

Microfactory Session

Michele Turitto, University of Nottingham, led the SIG Microfactory discussion. "Microfactory" means a small-size production system suitable for fabrication of small size parts and products. Philosophy is to optimise energy requirements, set-up time and response to changes in customer requirements. Simultaneously it ensures the precise manufacturing of miniaturized products on a very local level geographically and even allowing manufacturing on the spot. A lack of coordination was observed in the development of the microfactories elements, resulting in isolated solutions, e.g. for microactuation or microfactory planning software.

Additive & subtractive laser processes Session

Jouni Holsa, Tampere University of Technology, chaired the session

on Additive & subtractive laser processes Possible ways to use lasers were discussed: ablation, polymerisation, cleaning, material transfer, deposition, sintering, microbending. The SIG will look into how an integrated laser technology system / cell could contribute to high throughput micro-fabrication. This will include listing state of the art techniques and their projection forward in the next five years..

Process design Session

The third session on Process design for microfabrication was led by Dirk Ortloff from Process Relations GmbH. A parallel was drawn between the development of micro-electronics and especially IC-industry in the sixties. A growing market, shorter product cycles and designers no longer being able to keep up with changes have all led to the development of design methodologies and standards. Micro-nano development is rather like history repeating itself, but now it has the possibility of avoiding the mistakes of IC industry 30 years ago. The importance of knowledge management in academia was stressed for speeding up knowledge transfer and linking their work to industry.

Industries and researchers can join the above Special Interest Group on the μ -Sapient website www.microsapient.org. New groups can also be created. Ideas and comments are taken into account by the Minam Technology Platform and at a higher level by the European Commission.

For information, contact Pieter Bolt at TNO. Email: pieter_jan.bolt@tno.nl or visit www.microsapient.org



IPMMAN – MINAM Expert discussion forum now open!

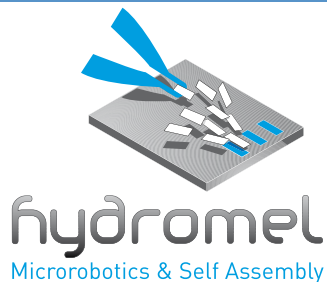
A new web-based forum was launched at the beginning of August 2007 on www.ipmman.eu/ipmman_forum/.

The FORUM provides experts from all Nano- and Micro technology related areas a platform to discuss issues of special interest for the MINAM vision and Strategic Research Agenda, its ongoing update of roadmaps and future research strategies, as also provided to the EC in preparing the objectives for Nano- and Micro-technology research under FP7. First topics have already been posted in the Forum which provides experts in Nano- and Micro technology an excellent opportunity to raise topics which should be included in the next calls and influence the decisions of the Commission. All experts in the Nano- and Micro technology are invited to register at www.ipmman.eu/ipmman_forum/.

COLLABORATION WITH EAST EUROPEAN COMPANIES

IPMMAN put considerable effort in promoting the integration of new member States and associated countries in MINAM. Beyond the strong contribution of partners in Israel, Russia, Romania, Hungary, specific MINAM dissemination activities have taken place, like MINAM presentation at the MINOS Brokerage meeting in Bucharest, MINOS-Euronet Strategie Forums in Vilnius and Krakow. These events raised a strong interest from a large number of participants from Eastern Countries and new member States. All these activities stimulated and facilitated the participation of new member States to the micro and nanomanufacturing European Community.

Contact: Udo J. Mannes, MATIMOP Israeli Industry Center for R&D. Email: udo@matimop.org.il



Hybrid Ultra Precision Manufacturing Process Based on Positional- and Self-Assembly for Complex Micro-Products

Today, emerging highly complex micro-devices with applications in mechanics, electronics, biological engineering, microfluidics and IT request ultra precision manufacturing processes. To answer these needs, **HYDROMEL** aims at developing a new versatile 3D automated production system with a positioning accuracy of 100 nm for complex micro-devices. This radical breakthrough in micro assembly will become possible through the innovative combination of positional- and self-assembly.

The objectives of the project can be described according to the following:

Scientific & Technical short-term objectives

- To improve part handling manufacturing systems in terms of positioning accuracy (down to the nm range), reliability, flexibility (interchangeable grippers, tools, etc.) and reduced production setup time to reach optimised yield.
- To produce extended knowledge in self-assembly for (i) surface treatments and surface patterning, (ii) surface reconfigurability, (iii) hierarchical self-assembly, (iv) modelling of forces and (v) dynamics of self-assembly.

Scientific & Technical mid-term objectives:

- To create knowledge in hybrid technology: (i) to evaluate the compatibility of existing robots with self-assembly for the manufacturing of complex objects with micro- and nano-accuracy, and (ii) to develop methodologies for robot assisted self-assembly and self-assembly assisted robots.

Scientific & Technical long-term objectives:

- To validate the transferability of the hybrid approach to the industry.
- To develop five industrially relevant new demonstrators. They will be developed with considerations for flexibility (5 different application sectors), cost efficiency (applicable to a large variety of materials, high yields), positioning accuracy (μm to nm range), production rate (simultaneous assembly of large number of parts will allow increasing of yields), reliability and "measurement and control functions".
- Technology transfer to industrial sectors alternative to the ones addressed in the project: an Advisory Board is under construction and it will be constituted by end users and stakeholders outside the project consortium. Selections are open and candidatures can be sent to the project coordinator.

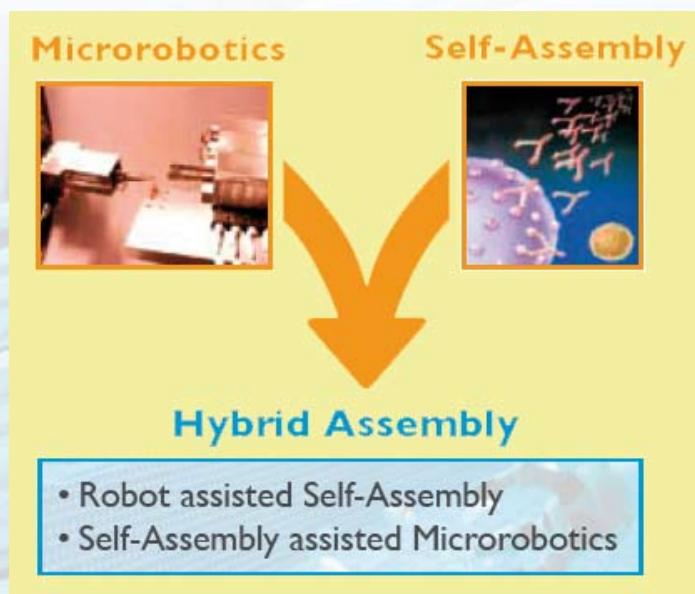
of robotics. Electronics, mechanics, biology, microfluidics, power, radio frequency, communication, IT and transport industries will all benefit from HYDROMEL's impacts.

HYDROMEL's demonstrators have been strategically chosen to prove the outstanding prospects of micro- and nano-robotics in different industrial sectors and, at the same time, show their strong potential impact in European society. Training events are periodically organized in the framework of the innovation related activities of the project both for internal and external auditors. All the information can be found on the Hydromel website.

The consortium is composed of 25 partners of 9 countries with more than 50% of industrial partners. Some of them are active member of the MINAM Platform such as CEA (Surface Engineering Operational Expert Group), DIAD (Nanomaterials Operational Expert Group) and PROFACTOR (Microcomponents Operational Expert Group).

Partners involve in the project are:

Centre Suisse d'Electronique et de Microtechnique SA (CSEM), Swiss Federal Laboratories for Material Testing and Research, Swiss Federal Institute of Technology, Zurich, Micro Precision Systems (Faulhaber group), Profactor, Datacon semiconductor equipment GmbH, Helsinki University of Technology, Modulight, Centre National de la Recherche Scientifique, Bioprédic International, Alchimie, Commissariat à l'Energie Atomique, ST Microelectronics SA, ALMA Consulting Group, ST Microelectronics (Crolles 2) SAS, FIDIA S.p.A., Hexacom, DIAD srl, Ribes Recherche, Bulgarian Academy of Science, University of Oldenburg, Nanoscale Technologies GmbH, Dr. Volker Klocke Nanotechnik, Cardiff University, Manufacturing Engineering Centre, Tyndall National Institute.



For further information, visit www.hydromel-project.eu or contact:

Project Coordinator: CSEM: Dr. Helmut F. Knapp

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Email: helmut.knapp@csem.ch

The project targets all sectors where miniaturization, micro- and nano-technologies are one of major concern. It will provide revolutionary processes and products for an extensive variety of applications in all sectors of the economy and society by bringing together a wide palette of self-assembly functionalities with the exceptional flexibility



Pushing European machine tool builders' competitiveness through micro-manufacturing

Dipl. Ing. MSc Joseba Pérez Bilbatua, International R&D Projects Director of IDEKO Research Centre in Spain, is the coordinator of LAUNCH-MICRO, a four year Integrated Project for SMEs, funded by the European Commission's Sixth Framework Programme. He tells us about the objectives of the project and the industries who should benefit from the research



Example of micro-laser ablation

For further details, news, results and link to partners, visit:

<http://www.launch-micro.org/>

or contact the project coordinator:

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What are the objectives of the project?

The IP for SMEs project LAUNCH-MICRO intends to solve the actual situation of lack of knowledge of the European SMEs machine tool builders regarding the production of machines for micro-manufacturing, the micro-machining processes, precision components and measurement systems.

Currently four different technologies for micro parts fabrication are within the scope of the project – micro milling, micro laser ablation, micro WEDM and a combination of micro sinking EDM with ECM.

Prototypes are intended for industrial application, yet highly precise at the state-of-the-art forefront, combining free-form high precision micro machining with high dynamics, in other words, quality production at high rates.

Some of the main achievements and innovations of the project (not all of them) are the following:

- Design and building of a 5-axis laser machining demonstrator with ultra-short laser pulses
- Development of an ultra-short pulse laser source for industrial applications and micro-machining
- Design and development of a micro-milling machine demonstrator for highest precision.
- Design and development of a μ -Wire-EDM machine demonstrator.
- Combined micro-sinking EDM / ECM machine demonstrator.
- Micro-cutting tool breakage detection system (Patent number P200701393)
- Micro-cutting tools with improved geometry
- Simulation models for micro-milling, micro-laser and micro sinking EDM

LAUNCH-MICRO project is collaborating with some other EU projects from the FP6 related with micromanufacturing, being also a member of the MINAM platform. Due to the high presence of SME industries in our consortium (machine tools and components manufactures as well as end-users), the LAUNCH-MICRO's contribution to MINAM will be made mainly through the Industrial Management Group (IMG), defining the requirements and future developments related with micro-manufacturing equipment, components and final applications, but also through the presentation of the technical innovations achieved in the project.

What type of industry will benefit from the technologies developed?

The great innovation of this IP is to capacitate the European machine tool sector with a knowledge-based technology to cope with the future demands of the market. This fact is even more critical when the companies gathered in the consortium are SMEs, whose research activities are limited due to their size. Therefore the RTD activities addressed in LAUNCHMICRO dealing with the integration of micro technologies in traditional machine tool builders, component manufacturers and end users, will capacitate a new and innovative industrial environment for European industry.

Most of the industrial partners involved in the project are machine tool builders, and these will be the main beneficiaries of the project's outcomes. However, as the research is dealing also with innovations on machine components and peripherals (guides, drives, control, sensors, laser, micro-tools), it is expected that a wider spectrum of European industries will be finally benefited.



Launch-Micro's demonstrator combining micro-laser and micro-milling. Photo provided by KUGLER GmbH company

What are the partners involved in the project?

The project involves 27 partners from six European countries (Spain, Germany, UK, Netherlands, Poland and Austria). The Consortium is led by SORALUCE S. Coop. company and IDEKO Research Centre. There is a significant participation of SMEs (19 partners) along with 4 universities and 4 research centres.



Micro EDM ground electrode with specially developed wire EDM grinding device, achieving electrode diameters down to 10 micrometers and aspect ratio of 100 (Cardiff University)

Manudirect

Direct Ultraprecision Manufacturing

A new platform for micro manufacturing applications

Professor Ing. Paolo Matteazzi, member of CSGI Research centre in Italy, is the coordinator of a four year Integrated Project, funded by the European Commission' Sixth Framework Programme. He tells us about ambitious research objects for innovations in micro-manufacturing and advises about impact of results on European manufacturing industries.

What are the objectives of the project?

The project objective consists in realizing a Direct Fabrication platform for manufacturing (i.e. even beyond micro manufacturing), by way of the high productivity, high resolution, direct, one step laser sintering process, to work with metals and ceramic materials.

The main innovative feature will be the capability of building bulk, metallic solids, from powders, having spatial resolution better than $50\text{ }\mu\text{m}$ in fully dense objects. The MANUDIRECT Platform will be a unique tool to convert knowledge (for example design, or simply ideas) in one single step into products, with high productivity and competitive costs.

The main activities needed to achieve this ambitious goal are:

- Development of integrated engineering and materials design tools for direct manufacturing;
- Development of a multiple powder grades feeder for generation of gradient multifunctional materials and multifunctional components;
- Development of several powder grades for direct manufacturing as agglomerated nanophased materials, combining the required mechanical, chemical, physical or bioactive properties, as well as correct particles characteristics. Ceramics, metals (like steel, Ti based), metal/ceramic composites;
- Implementation of localized powder fluxes and laser heating systems to drive high accuracy object fabrication, on the scale of better than $50\text{ }\mu\text{m}$.
- Development of a micro powder focusing device;
- Design and fabrication of in-line geometrical and shape layer monitoring systems, ensuring geometrical accuracies.

What type of industry will benefit from the technologies developed?

The impact of the project and its success will be horizontal to many sectors and vertical in engineering methodologies. Virtual engineering concepts and design will be translated into products without the need of prototyping steps.

Industrial partners involved in the project will receive large benefits both in economical terms and increasing their competitiveness.

These partners operate in different sectors, from machine tool to motor industry, detection systems, power generation, automotive, biomedical and aeronautical. But the impact might be much wider thanks to possibility of adapting the platform according to the customer needs.

What are the partners involved in the project?

The project involves 18 partners from eight European countries (Italy, Germany, UK, Spain, Belgium, Poland, Romania and Cyprus). The Consortium is lead by CSGI. European industry is strongly present in the consortium with 3 large industries (Siemens, MTU, EADS), 1 Industry and 7 SMEs. Partnership is completed by 3 Universities and 3 RTD partners.

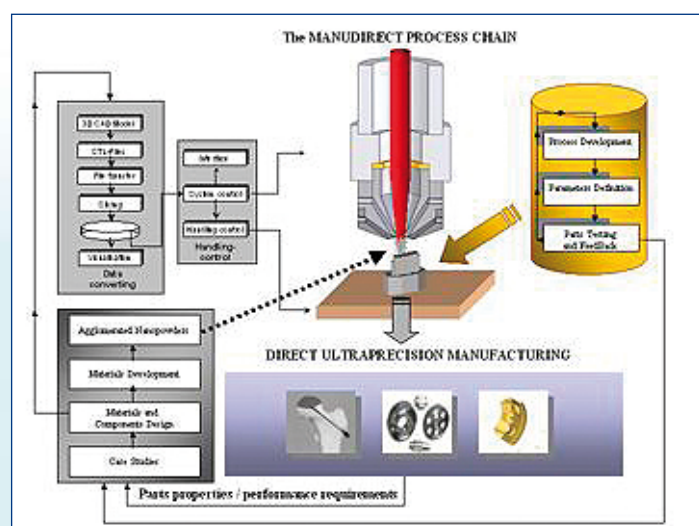


Figure 1. MANUDIRECT Platform: general scheme

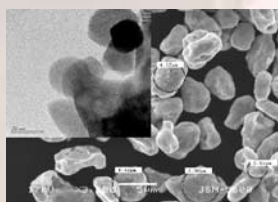


Figure 2.

Agglomerated nanopowders

Contact for further information:

Visit: www.manudirect.eu, or contact the project coordinator:

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Email: coordination@manudirect.eu



Mass-Manufacture of Miniature/Micro-Products

Masmicro is a 4-year EU FP6 Integrated Project. The overall objective of the project is to develop an integrated solution for European miniature/micro-manufacturing industry - an integrated manufacturing facility for mass-manufacture of miniature/micro-products and a technology transfer/training package for industrials.

Masmicro is entering its final year of the research and development and significant numbers of the results have been achieved so far. During the past year, the project was focused on its developments of the detail designs as well as the prototype systems (both hardware and software).

Main achievements to-date include:

- Prototype design and analysis systems (software) for the design and analysis of miniature/micro-materials and micro-manufacturing

processes;

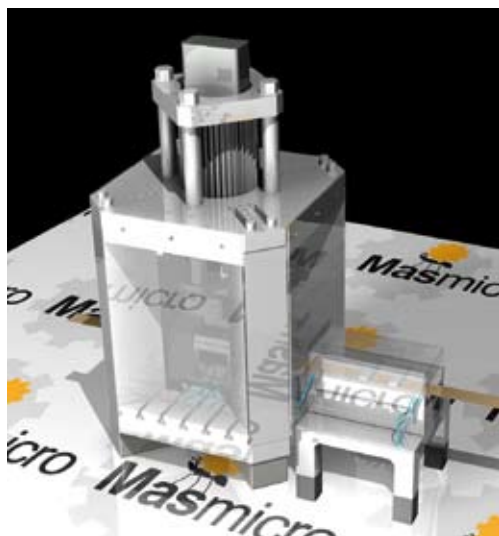
- Novel micro/nano-material testing devices and testing procedures which enable nano-scale tensile and compression tests;
- Prototype micro-forming-tools with new design concepts (flexible bulk, sheet and hydro-forming tools, intelligent and vibration-assisted forming tools);
- Three prototype micro-forming-machines as well as the design of the industrial version machines;

Micro-EDM), and integration of these into the MASMICRO process chains;

- Prototype systems for handling, assembly, testing and inspection (hardware and software) which serve for MASMICRO manufacturing processes and equipment.
- Prototype knowledge-based Decision Support System (KBDS) and Manufacturing Execution System (MES), and strategies for linking them to the manufacturing processes/equipment being developed.

The final period of the project will be focused on refining of the individual facilities developed and integrating them into the integrated manufacturing facility.

Picture: Masmicro micro-sheet-forming prototype machine (for the forming of thin sheet metal parts [20 to 100 microns thick strips])



- Prototype micro/nano-machining machine-tool as well as design of the industrial version machine;
- Optimised processes and equipment for non-traditional micro-manufacturing for mass-production (Laser-equipment, Laser-forming, Photo-chemical-machining and forming,

For further information about the project:

www.masmicro.net

or contact the Project Coordinator:

Dr. Yi Qin

University of Strathclyde, Glasgow UK

Phone: +44 121 548 3130

Email: qin.yi@strath.ac.uk

Masmicro partners will present major results to industry at the Hannover Fair, on April 21-25, 2008. Stand in the Microtechnology hall.

STOP PRESS

MINAM Participation to the EuroNanoForum 2007

The International forum about Nanotechnology in Industrial Applications was held in Düsseldorf, Germany between June 19-21, 2007 with a strong participation of MINAM, IPMMAN and MicroSapient. Besides a special industrial MINAM session with speakers from FIAT, Microtec and others relevant companies, also the MINAM Work group leaders and the relevant players from the Commission presented the status of MINAM and further steps. The EuroNanoForum was another important step to the Launch of the MINAM platform. The MINAM session had a good response and more than 80 participants were present. Details are available at <http://www.minamwebportal.eu>.

To become a Minam member, please visit: <http://www.micro-nanomanufacturing.eu/>

4M Summer School sponsored by SARIX and ESPRIT, a huge success

Sixteen international students made the trip to IPL, at the Technical University of Denmark, during the two first weeks of August 2007, to work hard and learn about micro technologies. They were treated to a combination of lectures and practical work and worked in groups on a whole-school project. The learning objectives were met and an enjoyable and rewarding time was had by all.

Further information: <http://www.4m-net.org/node/2190>

4M and MINAM

4M is supporting MINAM, most particularly by providing leadership for two of the MINAM expert groups on NanoSurfaces and on MicroComponents, drawing on the expertise of its partners and divisions. Plans for these expert groups were presented at the MINAM meeting in Brussels on 27 June 2007 and to the 4M Executive Board in Vienna on 28-29 June 2007.

October

4M Conference on micro-manufacturing capabilities

3-5 October 2007,
Borovets, Bulgaria

A forum for experts from industry and academia will share their results and engage in interdisciplinary discussions about the creation of micro-manufacturing capabilities.

Information on: <http://www.4m-net.org/conference>

SEMICON Europa 2007

9 - 11 October 2007,
Stuttgart, Germany.

SEMICON Europa provides an intense working environment, during three days under one roof, for device manufacturers, suppliers, SMEs, start-ups and R&D to investigate new opportunities in the development and commercialization of new products.

Web: www.semi.org/semiconeuropa

CAS'2007- IEEE Event

15-17 October, Sinaia, Romania.

International Semiconductor Conference-30th Edition.

Focus on developments in micro and nanotechnologies still maintaining the "traditional" connection to semiconductor electronics. An event organized by the FP6 Integrated Project INTEGRAMplus.

Please visit: <http://www.imt.ro/cas/index.htm>

MINAM International Workshop on Micro- and Nano- Technologies and Systems

17-18 October 2007,
Moscow, Russia

The International workshop intends to foster and exchange the visions, R&D and applications in the area of Micro- and Nanotechnologies and Systems. The event takes place during the 5th International Specialized Exhibition on robotics, Mechatronics, intelligent systems and micro and nano technologies.

Register on: www.ipmman.eu/moscow_workshop.htm

November

National MicroNano Conference

15-16 November 2007,
Wageningen, The Netherlands.

A conference jointly organised by MinacNed and the academic research programme MicroNed.

For more information, email: r.vervortt@fhi.nl

High Level Conference on Nanotechnologies

20-21 November 2007,
Braga, Portugal.

MINAM is contributing to the Plenary session on "European Technology Platforms" chaired by Ms. Rosalie Zobel, Director "Components and Systems" of DG INFOS with a presentation and participation to the round table by Prof. Matteazzi, MBN Materiali, chairperson of MINAM IMG. MINAM is also participating to Parallel session 6: Nanomanufacturing by a presentation by Dr. Vittorini, CRF. The focus of this session will be on the variety of applications of nanotechnologies, ranging from automotive to textile or smart materials.

ETE' 2007: "First International Symposium on Environmental Testing Engineering"

Royal Military Academy, Brussels,
22-24 November 2007.

The first 'International Symposium on Measurement and Control in Environmental Testing Engineering' is aiming to gather high quality and original contributions in the testing field and associated measurement domain, with the final goal of assessing the most recent developments in this utmost important domain of science, technology and sustainable development

Please visit: www.eneest.eu/visitor/ETE2007

Disclaimer

The **University of Strathclyde** has edited this newsletter under the MicroSapient project. It is the sole responsibility of its authors.

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Director of the publication: Svetan Ratchev (MicroSapient, University of Nottingham). In collaboration with the IPMMAN project and MINAM.

This project is financed by the European Commission under the Framework Programme 6.

February

IPAS' 2008, Fourth International Precision Assembly Seminar

10 - 13 February 2008,
Chamonix, France.

The aim of the seminar is to discuss the rapidly evolving field of micro-assembly, including the development of microfactories and microsystem fabrication.

Call for Papers started.

Please visit www.ipas2008.org

March

Mars 2008

Nanoglobe,
20-22 March 2008,
Paris, France

<http://www.vitaeurope.com/>

April

International conference: Engineering on the Nanoscale

8-9 April 2008,
Edinburgh UK.

Organised by the University of Edinburgh, with the support of the Journal of Nano-engineering and Nanosystems: Proceedings of the Institution of Mechanical Engineers Part N.

Web: www.lifelong.ed.ac.uk/nanoengineering2008

Hannover Messe, 21-25 April 2008, Germany.

Leading Trade Fair for Applied Microsystems Technology and Nanotechnology. Visit the Masmicro stand at the Microtechnology hall.

June

Actuator 2008, June 2008 Bremen, Germany.

11th International Conference on New Actuators and 5th International Exhibition on Smart Actuators and Drive Systems