

The Future of Additive Manufacturing

11th Annual International Wohlers Conference

Date and Time: Friday 4 December 2009, 09:30 – 17:00 (9:30 am – 5:00 pm)

Location: Exhibition Center Frankfurt/Main, Germany, Hall 8.1, Room Symmetrie 2

Organizer: DEMAT GmbH (Frankfurt, Germany)

Chairman: Terry Wohlers, Wohlers Associates, Inc. (USA)

Conference Language: English

Registration Fee: €150 + 19% VAT (half day). €250, plus VAT (full day). Includes entrance into the conference and exhibition, technical papers, and lunch.

Registration: A registration form is available at www.euromold.com

More Information: Contact Verena Frenkler at 49 69 27 40 03 30, verena.frenkler@demat.com, or fax 49 69 27 40 03 40.

Conference Overview

Additive manufacturing (AM) technology is making impressive advances. Significant enhancements in machines and materials are expanding the range of applications across many industrial sectors. Companies in aerospace, defense, medicine, dentistry, and other industries are applying AM systems to the production of high-quality parts and products. Also, a large and impressive number of custom consumer products made by AM are available for purchase from multiple sources.

AM systems will provide a means for reconfigurable manufacturing and give organizations unprecedented capability and flexibility. Also, entirely new and unthinkable business models, distribution strategies, and supply chains are developing. Opportunistic individuals will provide manufacturing services in the most unlikely places, such as a spare room in their home.

Plan to attend this conference and discover the opportunities, challenges, and lessons learned from experts who use AM technology for part production applications. Understand when it makes sense to consider it and when conventional manufacturing methods are more suitable.

Organizations in the additive-manufacturing business are optimistic about the future growth of AM for part production applications. Companies representing thousands of users and customers of AM technology from around the world responded to a recent survey conducted by Wohlers Associates. They believe that part production from AM will represent 35.9% of their business in five years. In 10 years, the same companies believe that it will represent more than half (50.5%) of their business. The survey respondents said that AM part production was 15.6% of their business in 2008.

AM is having a profound impact on the way some companies manufacture products. These organizations—some very small—are successfully applying the technology to the production of finished goods. Consequently, some large and interesting trends are becoming apparent that will impact the future of product development and manufacturing worldwide. Attend this conference and discover how you and your organization could be impacted by these trends.

The Future of Additive Manufacturing

11th Annual International Wohlers Conference

Session I: Morning



09:30

Welcome Address

Dr. Eberhard Döring, Chief Executive
DEMAT GmbH (Germany)

Dr. Döring is a mechanical engineer with a PhD in plastics processing. He created the EuroMold exhibition concept and has been CEO of DEMAT and exhibition manager since 1996.



09:45

Endless Possibilities Abound

Mr. Terry Wohlers, Principal Consultant and President
Wohlers Associates, Inc. (USA)

Mr. Wohlers has authored 350 books and articles and has given 65 keynote presentations on five continents. In 2007, he was voted the #1 most influential person in rapid product development worldwide by readers of *TCT Magazine*.

Presentation Summary: Organizations of all types and sizes are considering how they might apply additive manufacturing (AM) technology to the production of parts. Established companies are evaluating it for products that are complex, expensive, and difficult or impossible to manufacture any other way. Some are exploring how they might consolidate multiple parts into one to reduce manufacturing cost, inventory, assembly, and product maintenance costs. Already, startup companies are using it to create new businesses that before were impractical using conventional methods of manufacturing. Attend this presentation to discover how organizations are cashing in on an amazing wave of activity inspired by the creative freeform capabilities and production flexibility of AM technology. Also, hear about important new industry standards that are being developed by organizations worldwide.



10:15

Additive Metals Manufacturing: Successes, Failures, Opportunities

Mr. Curt Taylor, President
Rapid Quality Manufacturing, Inc. (USA)

Mr. Taylor is a mechanical engineer and has worked in operations, manufacturing, process development, reliability engineering, and equipment design for more than 20 years—including 13 years at Proctor & Gamble.

Presentation Summary: Rapid Quality Manufacturing, Inc. (RQM) was launched in 2007 as a direct expansion of the prototyping efforts of Morris Technologies, Inc. Since that time, RQM's focus has been on direct part production using the EOS M 270 direct metal laser sintering platform. Over the past two years, projects have been completed in aerospace, medical, dental, art, and jewelry. RQM's strategy is to work with the customer to define the best part design and build set-up for large-volume production. This may include combining parts for assemblies and improving support structures. The reality of this strategy, has in some cases, unleashed new product potential, while in other areas, created a less than optimal supply chain. The focus of this presentation will be to capture successes and failures, along with the opportunities in the coming 2–3 years.

10:45 am

Break and Refreshments



11:15

Reconfigurable and Flexible Production using AM

Prof. Deon de Beer, Executive Director: Technology Transfer and Innovation
Vaal University of Technology (South Africa)

Dr. de Beer has published extensively on product development, technology transfer, innovation, and commercialization. He is the founder of the Centre for Rapid Prototyping and Manufacturing at Central University of Technology.

Presentation Summary: Reconfigurable Manufacturing Systems (RMS) is receiving international attention as a manufacturing paradigm. It encapsulates methodologies that enable manufacturing systems to effectively cope with market and product changes. RMS is able to quickly adjust its production capacity and functionality within a part family in response to sudden market changes or intrinsic system changes. According to Wikipedia, the ideal RMS has six core characteristics: modularity, integrability, customized flexibility, scalability, convertibility, and diagnosability. This presentation will evaluate the outcome of additive manufacturing case studies against RMS characteristics and requirements and will show how AM fits the RMS profile.



11:45

Using AM for Part Production at Melotte

Mr. Mario Fleurinck, CEO
Melotte (Belgium)

Mr. Fleurinck has been active for more than 10 years in the high-tech industry, mainly defence and aerospace. During an assignment at Boeing (U.S.) in 1996, he was introduced to additive manufacturing technology.

Presentation Summary: The use additive manufacturing for the production of custom products is inspiring, but it can also be challenging. Optical scanning, high radiation (microtomography), and low radiation (Cone beam CT) scanning are becoming popular in the production of medical implants, custom freeform products, and innovative hybrid parts. From an engineering perspective, the focus at Melotte is on powder metallurgy, laser melting, and finishing techniques of AM parts. Mr. Fleurinck will concentrate on data transfer, manufacturability, product finishing, and the complete digital supply chain. He will also explain the different stages of the AM production process, all within the objective of next-day delivery of precision products.

12:15 pm

Buffet Lunch

Session II: Afternoon



13:45 (1:45 pm)

Custom Surgical Implants Using AM

Dr. Jules Poukens, MD DMD, Surgeon and Senior Researcher
University Hospital Maastricht (The Netherlands)

Dr. Poukens was trained as a cranio-maxillofacial surgeon in Leuven, Belgium and Freiburg, Germany. He is currently chairman of the board of directors of the EU-funded CUSTOM-IMD project.

Presentation Summary: CAD/CAM and additive manufacturing are getting more attention in the medical sector, especially in cranio-maxillofacial surgery where defects of the face (e.g., absence of a nose, ear, or eye) have a large psycho-social impact. Radiological, optical, and laser scans of the patient are

converted into a virtual three-dimensional patient with subsequent virtual design of the medical device. AM methods enable the production of custom implants made in a solid or resorbable material, or even in multiple materials. The introduction of AM and related technologies in medicine is a breakthrough in treatment modalities for very complex patient cases that were before untreatable. Also, they are reducing operating time and patient discomfort. This progress is serving as a “stepping stone” to the 3D printing of organs in the future.



14:15 (2:15 pm)

Custom Implants, Fixation, and Medical Devices

Dr. Stephen Rouse, D.D.S, Director of 3D Medical Applications Center
Walter Reed Army Medical Center (USA)

Dr. Rouse is a 36-year veteran of military service and a retired U.S. Army Lieutenant Colonel. He has participated in more than 1,600 medical cases from Operation Enduring Freedom and Operation Iraqi Freedom.

Presentation Summary: The advent of new manufacturing technology has opened up new opportunities in the arena of medical implants, fixation devices, and instrumentation. Direct metal fabrication devices allow a manufacturer to design and build custom devices within a timeframe that fits even trauma surgery. This presentation will focus on selecting technologies, materials, and device design, as well as discussing a selection of surgical cases that illustrate the importance of the types of cases chosen for this application. It will also cover the associated problems experienced with hardware, software, and patient complications.



14:45 (2:45 pm)

New Opportunities in Metal Part Production

Dr. Peter Mercelis, Managing Director
LayerWise NV (Belgium)

Dr. Mercelis received a PhD degree in electromechanical engineering at the University of Leuven. His PhD research focused on process control in selective laser sintering and melting technologies. In 2008, he founded LayerWise.

Presentation Summary: Recent technology developments have broadened the application of additive manufacturing techniques, from prototyping toward the production of functional end products. Today, conventional metal alloys (e.g., stainless steel, Inconel, and titanium) are used by LayerWise to produce fully dense and accurate metal products. By taking advantage of the possibilities of AM technology, very complex metal components can be manufactured that are impossible to produce conventionally. Dr. Mercelis will illustrate the primary advantages of metal-based AM, such as unlimited shape complexity, short lead times, absence of tooling, and cost reduction, with real industrial and medical examples.

3:15 pm

Break and Refreshments



15:45 (3:45 pm)

Additive Manufacturing: What's the Problem?

Mr. Graham Tromans, Manager of Additive Manufacturing Knowledge Hub
Loughborough University (England)

Mr. Tromans was previously manager of Land Rover's rapid prototyping facility in the UK. He has also worked with Ford, Jaguar, Aston Martin, Bentley, and Volvo in applications development. He became involved with AM in 1990.

Presentation Summary: Additive manufacturing is quickly becoming accepted as a feasible production process at many companies. Some industrial sectors, such as medical, dental, and aerospace, are benefiting tremendously by adopting AM. Getting it accepted in other industries is proving to be more difficult. Managers, engineers, and designers are reluctant to accept it because of the material differences and the uncertainty and risk of trying the unknown. Currently, a considerable amount of research is underway to try to ease these uncertainties. This presentation will address some of these issues and show where AM has been implemented successfully for the production of parts.



16:15 (4:15 pm)

3D Printed End-Consumer Products

Mr. Janne Kyttanen, Founder and Creative Director
Freedom of Creation (The Netherlands)

In 2000, Mr. Kyttanen founded Freedom of Creation, a company specializing in the creation and commercialization of products made by 3D printing and additive manufacturing technologies.

Presentation Summary: We believe in a future where products are represented by data and distributed like images or music over the Internet. In our future, there is only virtual storage and our tangible products are recycled to whatever your heart desires. It is believed we are doing something revolutionary in our changing world of products and services. Our journey started in 2000 by creating products for ourselves. We have come a long way and are now spreading the message to a vast array of individuals and organizations in all areas of product development around the world. This presentation will focus on showcasing 3D printed applications for commercial end-consumer applications.

16:45 (4:45 pm)

Final Questions and Closing Comments

17:00 (5:00 pm)

Conclusion of Conference