IPL
cdrsp - centre for rapid and sustainable product development
instituto politécnico de leiria

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Welcome

Dear Colleagues and Friends,

The Organizing Committee would like to welcome you to Leiria for the 6th International Conference on Advanced Research in Virtual and Rapid Prototyping (VRAP 2013), organized by the Centre for Rapid and Sustainable Product Development, Polytechnic Institute of Leiria. This international event aims at providing a major international forum for academics, researchers and industrial partners to exchange ideas in the field of virtual and rapid prototyping and related areas. The conference expects to foster networking and collaboration among participants to advance the knowledge and identify major trends in the field.

VRAP 2013 is focused on promoting closer links between academia and the industry. This event comprises a collection of more than 110 presentations, encompassing a wide range of topics, such as Additive and Nano Manufacturing Technologies, Biomanufacturing, Materials, Rapid Tooling and Manufacturing, CAD and 3D Data Acquisition Technologies, Simulation and Virtual Environments, and novel applications. VRAP 2013 is intended for engineers, designers and manufacturers active in the fields of mechanical, industrial and biomedical engineering.

VRAP 2013 Conference Building

+39° 44´ 3.24", -8° 49´ 18.09"

Wifi Password: eventos@2013

Acknowledgements

The Organizing Committee wishes to thank the following organizations and individuals, who contributed in preparing the Advanced Research in Virtual and Rapid Prototyping (VRAP 2013).

The Polytechnic Institute of Leiria

The Centre for Rapid and Sustainable Product Development (CDRSP)

SAS

Portuguese Foundation for Science and Technology

Sponsors

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Vaal University of Technology, South Africa

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French Association of Rapid Prototyping, France

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University of Applied Sciences St. Gallen, Switzerland

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Terry Wohlers
Wohlers Associates, USA

Tugrul Ozel
Rutgers University, USA

Xavier Fischer
ESTIA, France

Invited Speakers

Alain Bernard
École Centrale de Nantes, France

Alain Bernard, 54, graduated in 1982 and completed his PhD in 1989. He was associate-Professor, in Centrale Paris between 1990 and 1996. From September 1996 to October 2001, he was a Professor in CRAN, Nancy I, in the "Integrated Design and Manufacturing" team. Since October 2001, he has been a Professor at Centrale Nantes and Dean for Research from 2007 to 2012.

He is researcher in IRCCyN laboratory (UMR CNRS 6597) in the "Systems Engineering-Products-Performances-Perceptions" team. His research topics are KM, PLM, information system modelling, interoperability, human safety modelling and evaluation, enterprise modelling, systems performance evaluation, virtual engineering, additive manufacturing and reverse engineering. He recently supervised 23 PhD students on extended enterprise modelling, simulation and performance evaluation.

He has published more than 250 papers in refereed international journals, books and conferences. He is vice-chairman of WG5.1 of IFIP (Global Product Development for the whole product lifecycle) and chairman of CIRP STC Design.

Anath Fischer
Technion, Haifa, Israel

Professor Anath Fischer has been a faculty member in the Department of Mechanical Engineering at the Technion–Israel Institute of Technology (IIT) since 1994. She is the Vice-Dean for Graduate Studies of Mechanical Engineering and has supervised 30 graduate students. She is also currently leading a group of researchers and graduate students and her major research interests are computational metrology and virtual and rapid prototyping for engineering and medical applications. During the last ten years, she and her team have developed methods for: a) Geometric processing and surface/volumetric reconstruction of scanned data for macro- micro- structures; and b) Geometric modeling for mechanical analysis of multi-scale models.

Professor Fischer has published over 145 papers in academic journals, including IEEE CAD J., ASME Trans. JCISE, CIRP, IJNME, VPP and at international conferences. She is on the editorial boards of ASME Trans. JCISE and Virtual and Physical Prototyping journals. She has been program chair, conference co-chair and IPC member in international including the several bi-international conferences.

Professor Fischer has received the Gutwirth and Taub awards for excellence in research. She has also been involved in international scientific and industrial projects across Europe including EU projects. She was also involved in medical projects with hospitals regarding the development of diagnostic system for large-scaled micro-structures.

Dave Bourell
University of Texas at Austin, USA

Materials have always been critical to additive manufacturing (AM) technologies. Originally, materials selection for AM concentrated on the manufacturing properties and material availability in the requisite product form. As AM advanced, the focus has shifted towards part service properties. This was accelerated in the last ten years with the transition from prototyping to functional part applications.

A hierarchy of materials for AM is proposed which includes single-phase materials, alloys and composites. Post-processing routes impact service properties as well. Factors giving rise to mechanical properties of AM parts will be reviewed including specific research currently underway in the Laboratory for Freeform Fabrication at The University of Texas at Austin.

Farzad Khosrowshahi
Leeds Metropolitan University, UK

Farzad Khosrowshahi is a Professor of Construction IT and has expertise in financial forecasting, modelling and management as well as knowledge of fields associated with Construction and Engineering. He is well published and has a broad track record in collaborative and multi-disciplinary research at both national and international levels. As the director of Construct IT he has been instrumental in helping the industry to shape its strategic agenda towards innovative exploitation of ICT. He is an ambassador and Fellow member of the Chartered Institute of Building – CIOB. His national and international standing is reinforced by his membership of several scientific and industry-based committees, as well as his role as the assessor/evaluator of many international funding bodies. These include ECCREDI (European Council for Construction Research, Development & Innovation), AEEBC (Association d'Experts Européens du Bâtiment et de la Construction), CIOB (Chartered Institute of Building) Innovation & Research, CIOB Discipline Network, Innovation Focus group, CIOB Integrated Design and Construction Panel, CIOB Faculty of Architecture and Surveying Panel, CIOB Computing and IT committee, CIC (Construction Industry Council) Innovation & Research, buildingSMART – UK and CITE (Construction Industry Treading Electronically) and British Standards Bs555.

Farzad has been involved in several research projects funded by UK, EU or those form outside EU. These include leadership of two TEMPUS projects. Also, his research standing is underpinned by involvement with many research-related entities. These include serving as the chair of ARCOM (Association of Researchers in Construction Management). He was the founding member of the Information Visualisation Society (IVS), its chair and vice-chair. With financial help from DTI, he founded UCI (Uniting Construction Information), and served as its rotating chair for a year.

Gideon N. Levy
Centre for Rapid and Sustainable Product Development, Portugal

Prof D.Sc. M.Sc. Gideon N. Levy Studied at IIT (Technion Israel Institute of Technology Haifa). He completed his B.Sc. in 1966 on Mechanical Engineering (cum laude) and the M.Sc. in 1968 on Control Engineering (with distinction). He later completed a D.Sc. on Electro Physical & Chemical Manufacturing Processes, in 1972.

Prof Dr Levy's career is in advance R&D in the Mechanical / Electronic / Manufacturing technologies with leading Swiss OEM. Here he served in executive positions and academia institutions. He specialized in Manufacturing technologies, primarily Electro Physical & Chemical Processes (e.g. EDM ECM, AM, Laser etc.). Additionally, he focuses on Technology management, Market – Product strategies, key customers, industrial, scientific, technical and practical aspects of product design and manufacture, products market launch and technology transfer. His academic activities disembogued in the appointment as Professor at the University of Applied Sciences St. Gallen. He served as builder and head of the IRPD (Institute for Rapid Product Development). The institute merged in 2008 with Inspire AG a Technology Transfer unit at the ETH Zurich. Prof. Levy is currently serving as visiting professor at several universities, industrial consultant (TTA Technology Turn Around) , as well as Advisory Board since 2005 at the Centre for Rapid and Sustainable Product Development (CDRsp), Polytechnic Institute of Leiria (IPL) Portugal.

Prof Dr. Levy holds 30 Patents. He published around 170 scientific and technical publications, over the half are dealing AM (Additive Manufacturing) technologies. His major contribution to the field was the development of a successful line of polymers for SLS (DuraForm™, DuraForm™ Flex, DuraForm™ HST, CastForm™ and others), with a Swiss industrial partner. Furthermore, research on systematic process enhancements in SLS SLM and comprehensive TQM quality management methodologies was done.

Dr. Levy is a long time Fellow of the prestigious Academy for Production Engineering (CIRP) and a very early advocator promoting Rapid prototyping to become an important manufacturing method (AM or 3DP today) . Has received numerous awards for his contribution to the AM field (2007 VR@P career Award and Honorary Chairman, 2008 The AMUG (former 3DSUG) "Dinosaur "Award, 2008 TCT 2008 among the Top 25 Most Influential People in RPD&M, 2008 first ever SME RTAM's 2008 Industry Achievement Award, 2010 FAME award University of Texas).

Ian Gibson
National University of Singapore, Singapore and
Centre for Rapid and Sustainable Product Development, Portugal

Ian Gibson has been working with (what is now commonly referred to as) 3D Printing for over 20 years. A well-known figure in the field, he helped establish the Rapid Prototyping Journal, GARPA, the best-selling book "Additive Manufacturing: from Rapid Prototyping to Direct Digital Manufacturing", and numerous other initiatives. Recently, he has been heavily involved in establishing a new Design-Centric Programme at the National University of Singapore and is about to undertake a similar task at Deakin University in Australia in 2014.

Heng Li
Hong Kong Polytechnic University, China

Heng Li is a Chair Professor of Construction Informatics at The Hong Kong Polytechnic University. Heng started his academic career in Tongji University in 1987. He then researched and lectured at the University of Sydney, the James Cook University and the Monash University, before joining the Hong Kong Polytechnic University. During this period, Heng has also worked with engineering design and construction firms and provided consultancy services to both private and government organizations in Australia, Hong Kong and China. He has conducted many funded research projects related to the innovative application and transfer of construction information technologies. Heg Li has published 2 books, more than 200 journal papers in major journals of his field and numerous conferences papers in proceedings.

Ian Harris
Additive Manufacturing Consortium, USA

Ian Harris is the Founding Director of the Additive Manufacturing Consortium (AMC), a group formed in the USA around the needs of the aerospace market for increasing the manufacturing readiness of powder bed and other additive manufacturing technologies. Today, this 32-member group continues to develop projects funded by both government and industry members. He is an active member of ASTM F42, working primarily on directed energy deposition processes. Dr. Harris has more than 30 years of comprehensive experience in arc welding including applied research, consulting, and in-plant trouble shooting. His PhD research was in hybrid laser arc welding. With degrees in metallurgy and welding engineering, his primary area of expertise is gas-shielded arc welding processes and his research has resulted in more than 200 technical reports, papers, book chapters and he holds two joint patents with industrial companies. As a Technology Leader, Ian is responsible for EWI's arc welding business development, technology innovation and technology growth.

Jean-Pierre Kruth
Catholic University of Leuven, Belgium

Jean-Pierre Kruth is full time professor at the Catholic University of Leuven (KU Leuven, Belgium), where he is responsible for Production Engineering research and education at the M.E. Department (Recipient of the 1998 CASA/SME University LEAD Award). His activities involve: CAD/CAPP/CAM, production processes, metal cutting, sheet metal manufacturing, non-traditional machining (EDM and laser machining), rapid prototyping and manufacturing, reverse engineering, dimensional metrology and quality control.

After obtaining his PhD in 1979, he worked at the Institut Technologi Bandung (ITB, Indonesia, 1979-1982). He was a research engineer at the Scientific and Technical Center of the Belgian Metalworking Industry (CRIF/WTCM/Sirris) and half-time consulting engineer at the national 'CAD/CAM Stand-By' service for industry (IWONL), untill he was nominated full-time professor at KU Leuven in 1987.

He is a founding board member of several companies involved in RP and AM, including Materialise (1990-1997), Metris (1995-2009, now Nikon Metrology) and LayerWise (2008-today). He has been awarded among others the F.W. Taylor Medal (CIRP) and the Knight of the Laser Technology Award (Erlangen, Germany), the Industrial and Academic Career Award in Virtual and Rapid Prototyping (Leiria, Portugal), the International Freeform and Additive Manufacturing Excellence (FAME) Award (Austin, USA).

Juan Carlos Torres
University of Granada, Spain

Juan Carlos Torres is a full time professor of Computer Graphics at the University of Granada (Spain). He received a MA in Physic in 1982 and the Ph.D. in 1992. He is responsible for the Computer Graphics Group in the Software Engineering Department and director of the Virtual Reality Laboratory of the University of Granada. His current research interests include volume and solid modelling, virtual reality, octree representation, 3D digitizing, haptic interaction, cultural heritage applications, GIS and geometric algorithms. He has been active in the Computer Graphics area for more than 20 years.

He has been responsible for the design of the Virtual Reality Laboratory at the University of Granada. He is author of more than one hundred scientific papers. He is the project leader of the "Cultural Heritage Information System" project developed with the Alhambra monument that developed a 3D information system for cultural heritage. He has participated in several digitizing projects of cultural heritage sites including the Alhambra Palace and the roman city of Italica. He has received grant awards totalling over €1 Million as Principal Investigator.

He has served as chairman of the Eurographic's Spanish Chapter from 1995 to 2002. Torres has been the Chairman of the EG Spanish Conference in 1993, the EG DSVIS '97 workshop, short paper co-chair at EG'2000 and co-chair of EUROGRAPHICS 2003 conference, held at Granada.

Jun Ni
University of Michigan, USA

Dr. Jun Ni is the Shien-Ming (Sam) Wu Collegiate Professor of Manufacturing Science and Professor of Mechanical Engineering at the University of Michigan, USA. He serves as the founding Dean of the University of Michigan – Shanghai Jiao Tong University Joint Institute located in Shanghai, China since 2006. He is also the director of the S. M. Wu Manufacturing Research Center and the co-director of a National Science Foundation sponsored Industry/University Cooperative Research Center for Intelligent Maintenance Systems at the University of Michigan.

Professor Ni's expertise is in advanced manufacturing research, including quality control, precision manufacturing, machining processes and intelligent maintenance systems. Professor Ni has published over 400 technical papers and supervised 83 PhD graduates and 58 MSc gradutes.

Selected honors and awards that Professor Ni received include the 2013 Gold Medal from Society of Manufacturing Engineers, the 2013 S. M. Wu Research Implementation Award from North American Manufacturing Research Institute, the 2013 International Cooperation Award from Shanghai Government, the 2010 Magnolia Gold Medal from Shanghai Government, the 2009 Ennor Manufacturing Technology Award from American Society of Mechanical Engineering (ASME), the 1994 Presidential Faculty Fellows Award, and the 1991 Outstanding Manufacturing Engineers Award from SME. He is an elected Fellow of International Society of Engineering Asset Management (ISEAM), International Society for Nanomanufacturing (ISNM), American Society of Mechanical Engineers (ASME), and Society of Manufacturing Engineers (SME).

Professor Ni has been invited to serve as a guest/advisory professor at many institutions, including Shanghai Jiao Tong University, Tsinghua University, Xi'an Jiao Tong University, Huazhong University of Science and Technology and 10 other institutions. He also served as a member in the Expert Advisory Board of the Ministry of Science and Technology of PRC to consult for the mid to long-term strategic planning of the advanced manufacturing. He also served as a consultant for Korea Institution of Materials and Machinery, and South African's Department of Science and Technology's Advanced Production Roadmap. He has served as a member of the External Advisory Board at Taiwan's Industrial Technology Research Institute and as a member of the International Advisory Board of the State of Michigan.

He served as the Chairman of ASME's Manufacturing Engineering Division during 2003/2004. He has served as a Vice Chairman of Global Agenda Council on Advanced Manufacturing at the World Economic Forum since 2010 and is very active in various national and international studies of policy recommendations for advancing manufacturing competitiveness globally.

Lihui Wang
KTH Royal Institute of Technology, Sweden

Lihui Wang is a Professor and Chair of Sustainable Manufacturing at KTH Royal Institute of Technology, Sweden. His research interests are focused on cloud manufacturing, web-based real-time monitoring and remote control, human-robot collaborations and adaptive process planning. The ultimate goal of his research is to achieve sustainability in human society with better living environment. Professor Wang is actively engaged in various professional activities. He is the Editor-in-Chief of International Journal of Manufacturing Research, Editor of Robotics and Computer-Integrated Manufacturing, Editor (Europe) of Journal of Intelligent Manufacturing and Associate Editor of Journal of Manufacturing Systems. He is a Fellow of SME (Society of Manufacturing Engineers), a Board Director of North American Manufacturing Research Institution and a registered Professional Engineer in Canada.

He has published seven books and authored in excess of 250 scientific articles in books, archival journals and refereed conference proceedings. His accomplishment has won him 12 international and institutional awards.

K. P. Karunakaran
Indian Institute of Technology Bombay, India

K. P. Karunakaran is presently a Professor in the Department of Mechanical Engineering of the Indian Institute of Technology Bombay.

He has about 29 years of professional experience. He worked as a CNC programmer in Hindustan Aeronautics Limited for about 9 years since his graduation in 1984. He has been teaching and researching at IIT Bombay in the areas CNC technology, Rapid Manufacturing (RM) and Computer Graphics for the last 19 years. He was a consultant to Mercedes-Benz Technology Centre in Summer 2000. He has been associated with Fraunhofer institutes in Stuttgart and Darmstadt since 1998 through Summer visits as a Humboldt Fellow. He was a Visiting Professor in the University of Metz in Winter 2005 and in Ecole Centrale de Nantes since 2006.

He launched OptiLOM, a pre-processor for LOM-RP in collaboration with DaimlerChrysler and Materialise during EuroMold 2002. He is presently developing two RM processes, Hybrid Layered Manufacturing (HLM) and Segmented Object Manufacturing (SOM). 5-axis HLM has been developed for arc weld deposition which can produce complex geometries such as an impeller. The same will be extended for laser deposition using a differentially fed multi-wire/strip stocks to achieve gradient matrix through an Indo-UK project with the partnership of Cranfield and Nottingham Universities that starts on January 1, 2014. SOM is a RP machine to produce EPS objects in thick segments using a combination of hot wire slicing, machining and gluing.

Olivier Jay
Danish Technological Institute, Denmark

Product development, industry consultant, project leader and speaker, Olivier Jay is the head of the section of Additive Layer Manufacturing activities in the Danish Technological Institute.

For the past 13 years, he has focused on the product design for rapid manufacturing and prototyping. President of the Danish RPT association, member of the GARPA community. Olivier has also focused on the research and to educate industry. He has given conferences in most of Europe and he is making courses on RM to the Danish industry and Engineering school.

He is the Project leader of the Compolight project under the FP7 MNP programs and from 2 Danish Projects on RM. Member of the management board of the European RM working group under the MANUFUTURE platform. He is also the project leader for the Danish F-Mat project about functional materials. He works in the development of high end product for the industry and has been working in the area, from design for manufacturing to virtual reality or reverse engineering.

Richard Bibb
Loughborough Design School, UK

Richard Bibb graduated from Brunel University with a BSc in Industrial Design in 1995 and then moved to the National Centre for Product Design & Development Research (PDR) to undertake doctoral research in Rapid Prototyping. After obtaining his PhD, he remained at PDR to conduct research into the medical applications of product design and development technologies such as 3D scanning, 3D CAD, Rapid Prototyping and Additive Manufacturing. He established the Medical Applications group at PDR, which developed a medical modelling service for hospitals that continues to supply the vast majority of the UKs medical models. He moved to Loughborough University in June 2008 to teach industrial design and continue his research.

His collaborative applied research has been presented at international conferences in the UK, Belgium, Germany, Spain, Japan, South Africa, Egypt, Canada and the USA and published in more than 60 peer-reviewed papers.Advisory Board of the State of Michigan.

He served as the Chairman of ASME's Manufacturing Engineering Division during 2003/2004. He has served as a Vice Chairman of Global Agenda Council on Advanced Manufacturing at the World Economic Forum since 2010 and is very active in various national and international studies of policy recommendations for advancing manufacturing competitiveness globally.

Ryan Wicker
University of Texas at El Paso, USA

Ryan Wicker is a Professor of mechanical engineering and director and founder of the W.M. Keck Center for 3D Innovation at the University of Texas, El Paso, where he also holds the endowed Mr. and Mrs. MacIntosh Murchison Chair I in Engineering.

The Keck Center represents a world-class research facility that focuses on the use and development of additive manufacturing technologies for fabricating 3D objects that are plastic, metal, ceramic, of bio-compatible materials, composite materials, or that contain electronics. Major research efforts are underway at the Keck Center in the areas of additive manufacturing technology development; closed-loop process control strategies for additive manufacturing; additive manufacturing of various powder metal alloy systems and 3D structural electronics in which electronics, and thus intelligence, are fabricated within additive manufacturing-fabricated mechanical structures.

Tim Woodfield,
University of Otago Christchurch, New Zealand

Tim Woodfield leads the Christchurch Regenerative Medicine & Tissue Engineering (CReATE) Group in the Department of Orthopaedic Surgery, University of Otago Christchurch and was awarded a Rutherford Discovery Fellowship in 2012. He is also currently Regenerative Medicine Theme Leader within the University's Centre for Bioengineering & Nanomedicine and is an adjunct Assoc Prof at the Institute of Health & Biomedical Innovation, Queensland University of Technology, Brisbane, Australia.

He is vice president of the Australasian Society for Biomaterials & Tissue Engineering (ASBTE), and sits on the editorial board for the Biofabrication journal.

He obtained an MSc from University of Toronto (2000) followed by a PhD degree (2004) and postdoctoral positions (2005) from the University of Twente, The Netherlands. This included significant commercial experience within the Dutch tissue engineering company IsoTis Orthobiologics.

Dr. Woodfield returned to New Zealand in 2005 and subsequently established the CReaTE Group, which is developing stem cell and biomaterial-based strategies for tissue regeneration, focussing on additive manufacturing/3D Printing of scaffolds.

Tom Craeghs
Materialise NV, Belgium

Tom Craeghs (Materialise) obtained his masters in Mechanical Engineering at the University of Leuven in 2006 and a PhD degree on the topic of developing a monitoring system for Selective Laser Melting in 2012.

He was awarded in 2010 with the Erlangen Innovation Award Optical Technologies for the industrial adoption of his work. Tom is currently research project manager at Materialise, and is among others leading the Flemish STREAM program, which is a 10-year national research program on materials for Additive Manufacturing.

Axel Demmer
Fraunhofer Additive Manufacturing Alliance, Germany

Axel Demmer studied mechanical engineering at RWTH Aachen University, majoring in automotive engineering. From 1995 to 1999 he worked as a research assistant in the Process Technology Department at Fraunhofer IPT. His research areas were laser-assisted spinning, laser applications with high power diode lasers and the development of a testing method to investigate temperature shock behaviour of metal materials. From 1998 to 2000 he was head of the Laser Technology group.

From 2000 to 2008 Axel Demmer was head of the Process Technology department at Fraunhofer IPT. In this connection he was responsible for the technical and scientific performing of national and international research projects. Furthermore he takes the responsibility for the research fields in human resources, content and budget issues as well as the set-up and fulfilment of strategic objectives.

Since 2008 Axel Demmer is responsible for the development and planning of Fraunhofer IPT's common research activities and strategy planning. In this context he takes also responsibility for an overall human resource management.

Furthermore Axel Demmer is head of the office of the Fraunhofer Group for production, a cooperative venture by seven Fraunhofer Institutes with the aim of collaborating on production-oriented research and development. In this function he coordinates a range of services that covers the entire product life cycle or value chain by means of the latest findings in industrial engineering and information science.

Since 2012 Mr. Demmer is spokesman of the Fraunhofer Additive Manufacturing Alliance. The Alliance encompasses eleven Fraunhofer institutes which are based throughout Germany to form the entire additive manufacturing process chain, comprising the development, application and implementation of additive manufacturing methods and processes.

October 1. 2013
Auditorium 1

13:30 | 14:30 Conference Registration

14:30 | 14:45 Opening Session

14:45 | 15:30 Additive Manufacturing Technologies, Known Also as 3D Printing, Represent the Next Major Movement in Cyber Manufacturing
Gideon Levy | Centre for Rapid and Sustainable Product Development, Portugal

15:30 | 16:15 Virtual Prototyping Research and Applications in Hong Kong Construction Industry
Heng Li | Hong Kong Polytechnic University, China

16:15 | 16:30 Coffee Break

17:00 | 18:00 Visit to the Centre for Rapid and Sustainable Product Development

18:00 | 19:00 **Welcoming Reception**

CDRSP – Centre for Rapid and Sustainable Product Development

2430-028 - Marinha Grande, Portugal
http://cdrsp.ipleiria.pt/

October 2 . 2013
Auditorium 1

08:30 | 09:00 Conference Registration

09:00 | 09:45 New Developments for Additive Manufacturing of Metals
Ian Harris | Additive Manufacturing Consortium, USA

09:45 | 10:30 The Design Implications of Additively Manufactured Medical Products
Richard Bibb | Loughborough Design School, UK

10:30 | 10:45 Coffee Break

10:45 | 12:45 **Additive and Nano Manufacturing Technologies**
Chair: Richard Bibb | Loughborough Design School, UK

Quality Assurance and Process Monitoring of Fused Deposition Modelling Made Parts
A.O. Stephen, K.W. Dalgarno & J. Munguia

Development of an Interchangeable Head Based on Variable Section Screw Applied to Desktop 3-D Printers
M. S. Freitas, Z. C. Silveira, P. I. Neto, P. Y. Noritomi & J. V. L. Silva

Additive Manufacturing as a Cost-effective Way to Produce Metal Parts
E. Atzeni, L. Iuliano, G. Marchiandi, P. Minetola, A. Salmi, E. Bassoli, L. Denti & A. Gatto

Nanocomposites and Additive Manufacturing
I. Khan, A. Mateus & G. R. Mitchell

3D Printing In Graphic Design Education: Educational Experiences Using Fused Deposition Modeling (FDM) in a Brazilian University
C. P. de Sampaio; R. M. de O. Spinosa; J. Vicentin; D. Y. Tsukahara; J. C. da Silva; S. L. S. Borghi & F. Rostirolla

Surface Roughness Investigation and Prediction Models for Poly-jet 3D Printed Parts
G. S. Kumar & K. Kumar

12:45 | 14:00 Lunch Break at Campus-3 Restaurant

October 2 . 2013
Auditorium 1

14:00 | 14:45 Evolutions of Additive Manufacturing: From Rapid Prototyping to 3D Printing
Alain Bernard | École Centrale de Nantes, France

14:45 | 15:30 Realising Sustainability through Cloud Manufacturing
Lihui Wang | KTH Royal Institute of Technology, Sweden

Generate the Future – Concepts and Solutions for Additive Manufacturing of Tomorrow
Axel Demmer | Fraunhofer Additive Manufacturing Alliance, Germany

15:30 | 15:45 Coffee Break

15:45 | 18:00 **Simulation and Virtual Environments**
Chair: Stefano Petrò | Politecnico di Milano, Italy

Additive Manufacturing and Topology Optimization to Support Product Family Design
N. Lei, S. K. Moon & G. Bi

On a Three-Dimensional Lattice Boltzmann Model of Droplet Impingement for Ink-Jet Deposition
W. Zhou, D. Loney, A. G. Fedorov, F. L. Degertekin & D. W. Rosen

Heat Transfer Modeling in Fused Deposition Techniques
F. M. Duarte, S. F. Costa & J. A. Covas

Structural and Modal Analysis of a Desktop 3-D Printer Considering an Interchangeable Mini Screw Extrusion Head
G. dos. S. Ribeiro & Z. C. Silveira

Danish Innovation Consortium "F-MAT"
J. Byskov-Nielsen & O. Jay

20:00 Welcoming Reception Dinner at Leiria's Castle

October 2 . 2013
Auditorium 2

10:30 | 10:45 Coffee Break

10:45 | 12:45 **Materials**

Chair: Pedro Martinho | School of Management and Techology, Portugal

Qualification and Modification of New Polymer Powders for Laser Beam Melting Using Ulbricht Spheres
T. Laumer, T. Stichel, M. Sachs, P. Amend & M. Schmidt

Electro-Discharge Drilling on DMLS Parts in Co-Cr-Mo Alloy
A. Gatto, E. Bassoli, L. Denti, E. Atzeni, L. Iuliano, G. Marchiandi, P. Minetola, A. Salmi & F. Calignano

Influence of Post-Processing Operations on Mechanical Properties of AlSi10Mg Parts by DMLS
M. Krishnan, E. Atzeni, R. Canali, D. Manfredi, F. Calignano, E. Ambrosio & L. Iuliano

Aluminium Matrix Composites (AMCs) by DMLS
D. Manfredi, R. Canali, M. Krishnan, E. P. Ambrosio, F. Calignano, M. Pavese, L. Miranti, S. Belardinelli, S. Biamino & P. Fino

Custom-Built Implants Manufacture in Titanium Alloy by Direct Metal Laser Sintering (DMLS)
M. A. Larosa, A. L. Jardini, L. F. Bernardes, M. R. Wolf Maciel, R. Maciel Filho, C. A. C. Zaváglia, F. Zaváglia, D. R. Calderoni & P. Kharmandayan

12:45 | 14:00 Lunch Break at Campus-3 Restaurant

15:45 | 18:00 **Biomanufacturing**

Chair: Chua Chee Kai | Nanyang Technological University, Singapore

Rapid Manufacturing of Collagen Scaffolds for Cardiac Tissue Engineering
K. Ragaert, S. Van de Velde, L. Cardon, F. De Somer, G. Van Nooten & P. Somers

Ceramics-Filled 3D Porous Biopolymer Matrices for Tissue-engineering on the Stem Cell Culture: Benchmark Testing
I. V. Shishkovsky & S. E. Volchkov

Overview on Additive Manufacturing Techniques for Scaffold-Based Cartilage Tissue Engineering
A. R. C. Santos, H. A. Almeida & P. J. Bartolo

Bovine Collagen Extraction for Tissue Engineering Applications
I. Sousa, A. Mendes, P. J. Bártolo & D.Vaz

A Multi-Physic Approach to the Design of 3D Rapid Prototyped Scaffolds for Tissue Repair and Regeneration in Orthopaedic Trauma
U. D'Amora, A. Gloria, T. Russo, R. De Santis & L. Ambrosio

Using Biofidelic Phantom Organs for Design Stage Usability Testing of Endovascular Delivery Systems
K. J. O'Sullivan, L. Kiernan, L. O'Sullivan & E. Canavan

October 2 . 2013
Auditorium 3

10:30 | 10:45 Coffee Break

10:45 | 12:45 **CAD and 3D Data Acquisition Technologies**
Chair: Henrique Almeida | Centre for Rapid and Sustainable Product Development, Portugal

Process Chain for Design, Optimisation and Production of Open-Porous Lightweight Structures
P. Sembdner, R. Weggässer, C. Schöne & R. Stelzer

Using AM Feature and Multi-Attribute Decision Making to Orientate Part in Additive Manufacturing
Y. Zhang & A. Bernard

Reference 3D-Tumour Models from CT-data for Evaluation of Contouring Algorithm Based on the PET/CT Imaging
I. Jonuschies & K. Broekel, J. Kurth & B. Krause

BioFab Toolbox – Software Tools for Biofabrication
N. Alves, P. Bártolo, N. Ferreira, M. Gaspar & A. Mateus

Non-Invasive Image Technologies and Biomimetic Research Applied on the Design of Innovative Projects
J.R. Lopes dos Santos

12:45 | 14:00 Lunch Break at Campus-3 Restaurant

15:45 | 18:00 **Rapid Tooling and Manufacturing**
Chair: Geoffrey Mitchell | Centre for Rapid and Sustainable Product Development, Portugal

Ressource-Efficient Hot Sheet Metal Forming by Innovative Die Cooling with Laser Beam Melted Tooling Components
B. Mueller, M. Gebauer, S. Polster, R. Neugebauer, R. Malek, M. Kotzian & R. Hund

Digital Fabrication of Physical Models to Analyze Unbuilt Projects Using Laser Cutter
A. Tagliari & W. Florio

Use of External Facilitator to Choose Optimal Rapid Tooling Method – A Case Study
A. Håkansson & J. Lundberg

Tool Concept for Prepreg Fabric Overmould
P. Carreira, N. Alves, C. Ramos & P. Bártolo

A Review Paper on Rapid Prototyping and Rapid Tooling Techniques for Fabrication of Prosthetic Socket
A. Aherwar, A. Singh & A. Patnaik

October 2 . 2013
Auditorium 4

15:30 | 15:45 Coffee Break

15:45 | 18:00 **Applications**

Chair: Heng Li | Hong Kong Polytechnic University, China

A Thermo-Mechanical Modeling Reduction Approach for Calculating Shape Distortion in Slm Manufacturing for Aero Engine Components
L. Papadakis & A. Loizou, J. Risse & S. Bremen

Evaluation of Shaped Metal Deposition (SMD) for Applications in the Energy Industry
U. Woy, S. Jones, R. Gault, K. Ridgway & R. McCluskey

Additive Manufacturing of Architectural Models Using Fused Layer Modeling and 3D-Printing
S. Junk & S. Côté

Evaluation of FDM Options for Fashion Shoe Heels Manufacturing
A. Armillotta, M. Cavallaro & S. Minnella

Shape Analysis in the Design Process of Products with embedded Microelectronics
Á. M. Sampaio, R. Simões & A. Pontes

Virtual/Real, Rapid/Slow, Prototype/Model in Jewellery artist Practice
H. Dilkes

October 3 . 2013
Auditorium 1

08:30 | 09:00 Conference Registration

09:00 | 09:45 3D Multi-Scale Geometric Modeling and FE Analysis of porous structures for design of scaffold porous structures
Anath Fisher | Technion, Israel

09:45 | 10:30 Additive technologies: a roadmap towards manufacturing
Tom Craeghs | Materialise NV, Belgium

10:30 | 10:45 Coffee Break

10:45 | 12:45 **Additive and Nano Manufacturing Technologies**
Chair: Tom Craeghs | Materialise NV, Belgium

Price Benchmark of Laser Sintering Service Providers
M. Baldinger & A. Duchi

Generic Build Time Estimation Model for Parts Produced by SLS
Y. Zhang & A. Bernard

Size, Shape and Flow Of Powders for Use in Selective Laser Sintering SLS
S. Berretta, O. Ghita, K. E. Evans, A. Anderson & C. Newman

Experimental and Numerical Modelling of Function-Graded Porous Filter Elements, Synthesized by the SLS Method
I. V. Shishkovsky & I. Volyansky

Flowability of Powders for Selective Laser Sintering (SLS) Investigated by Round Robin Test
M. Schmid & F. Amado, G. Levy & K. Wegener

Additive Manufacturing in the Spare Parts Supply Chain: A Case Study in Aerospace Industry
S. Khajavi, J. Holmström & J. Partanen

12:45 | 14:00 Lunch Break at Campus-3 Restaurant

14:00 | 14:45 Combining Additive and Subtractive Laser Manufacturing: Selective Laser Melting, Ablation and Remelting
Jean-Pierre Kruth | KU Leuven, Belgium

14:45 | 15:30 The Industrialization of Additive Manufacturing
Olivier Jay | Danish Technological Institute, Denmark

15:30 | 16:15 Digitizing and prototyping for Cultural Heritage
Juan Carlos Torres | University of Granada, Spain

16:15 | 16:30 Coffee Break

16:30 | 18:30 **Simulation and Virtual Environments**
Chair: Juan Carlos Torres | University of Granada, Spain

Teaching of Additive Manufacturing Technology – A Case Study in the Use of Multimedia Learning Aids
C. H. Ng, C. K. Chua & K. F. Leong

The Disclosure of the BIM Concept in Civil Engineering Training
A. Z. Sampaio

Maintenance of Painted Interior Walls within a Virtual Environment
A. Z. Sampaio & D. P. Rosário

H.O.G.A.R. Project – a Tool for Efficient House Design Plus an Immersive User Experience
R. Rubio, S. Martin, S. Martin-Laguna & J. C. Fernández

Integrating Shop-Floor Virtual Environments with Real Machining Cell Data
H. M. C. Vale, C. Oliveira & A. J. V. Porto

19:30 Musical Event

October 3 . 2013
Auditorium 2

10:30 | 10:45 Coffee Break

10:45 | 12:45 **Materials**

Chair: Ludwig Cardon | Hogeschool Ghent, Belgium

Single Track and Single Layer melting of Silica by Selective Laser Melting
C. Y. Yap, C. K. Chua, Z. Dong, Z. H. Liu & D. Q. Zhang

Preparation and Flowability Characterization of Ceramic Powders for Selective Laser Melting
M. Mapar, D. Q. Zhang, Z. H. Liu, W. Y. Yeong, C. K. Chua, B. Y. Tay, O. Geramifard, S. Maleksaeedi & F. E. Wiria

Study of the Surface Quality in Multi Track to Selective Laser Melting with CoCrMo Powders
Y. Pupo, L. Serenó, J. Delgado & J. Ciurana

Melt Characterisation of M2 High Speed Steel in Selective Laser Melting
Z. H. Liu, D. Q. Zhang, K. F. Leong & C. K. Chua

Investigation on Forming Process of copper Alloys via Selective Laser Melting
D. Q. Zhang, Z. H. Liu & C. K. Chua

Thermal Analysis of Polystyrene Coated Alumina Powder for Indirect Laser Sintering During Different Process Steps
L. Delva, A. Verberckmoes, K. Ragaert & L. Cardon

12:45 | 14:00 Lunch Break at Campus-3 Restaurant

16:15 | 16:30 Coffee Break

16:30 | 18:30 **Biomanufacturing**

Chair: Elena Bassoli | Università degli studi di Modena e Reggio Emilia, Italy

Investigation of Applying Electrospinning in Fused Deposition Modeling for Scaffold Fabrication
K. Auyson, P. Koomsap, A. Chanthakulchan & P. Supaphol

Chitosan Microlayer on the Photografting Modified Surface of PLA, PCL and PLA/PCL Bioextruder Scaffolds
M. Loaiza, R. A. Rezende, J. V. L. da Silva, P. J. Bártolo & M. A. Sabino

Adhesion, Proliferation and Distribution of Human Mesenchymal Stem/Stromal Cells (MSCs) in Poly(e-caprolactone) (PCL) Scaffolds with Different Pore Sizes
C. S. Moura, S. Biscaia, T. Viana, P. J. Bártolo, C. L. da Silva, J. S. Cabral & F. C. Ferreira

Biofabrication of Three-Dimensional Scaffolds of Polycaprolactone with Eggshell Powder for Bone Regeneration
S. Biscaia, T. Viana, H. A. Almeida & P. J. Bártolo

Effect of TCP20 Bioglass Addition on the Morphological and Mechanical Properties of 3D Bioextruded Poly (e-caprolactone) Scaffolds
A. C. Videira, T. Patrício, R. Pereira, J. M. F. Ferreira & P. Bártolo

Mechanical Requirements of Biomaterials: Approach to Some Characterization Techniques Applied to Scaffolds, their Constitutive Materials, Aspects of Comparison or Interaction with Live Tissues
J. Laudinet

October 3 . 2013
Auditorium 3

10:30 | 10:45 Coffee Break

10:45 | 12:45 **CAD and 3D Data Acquisition Technologies**
Chair: Olivier Jay | Danish Technological Institute, Denmark

Open-source STL Library and Application for Android Mobile Devices
W. T. Ide, J. V. L. Silva & G. C. S. Ruppert

Automatic Cutting Edge Detection for a Cylindrical Mill
G. Moroni & S. Petrò

A Planar Fractal Analysis of the Arterial Tree of the Human Thyroid Gland: Implications for Additive Manufacturing of 3D Ramified Scaffolds
E. Bassoli, L. Denti, A. Gatto, G. Spaletta, M. Sofroniou, A. Parrilli, M. Fini, R. Giardino, A. Zamparelli, N. Zini, F. Barbaro, E. Bassi, S. Mosca, D. Dallatana & R. Toni

Rise of the Machines: Has Rapid Prototyping Evolved Faster than the Software Used to Create it?
E. Curtis, K. J. O'Sullivan, E. White & A. de Eyto

12:45 | 14:00 Lunch Break at Campus-3 Restaurant

15:45 | 18:00 **Rapid Tooling and Manufacturing**
Chair: Gideon Levy | Centre for Rapid and Sustainable Product Development, Portugal

Rapid Prototyping and Tooling Technologies to Produce Moulding Elements of Injection Moulds for Large Parts
A. Freitas, R. Soares, A. Selada, P. G. Martinho & A. S. Pouzada

Controlling Real Time Processing Variables in a Hybrid Injection Mould
D. Bjorn, L. Ferreira, C. Ribeiro & P. G. Martinho

Design, Manufacture and Testing of Titanium EBM Insert for Injection Molding
A. K. Borg & A. Rochman

Rapid Tooling for Individualized Silicon Aesthetic Prosthesis Manufacturing: A Case Study
G. P. Marenda, A. Fiorentino, E. Ceretti & A. Manenti

Development of Bioabsorbable PCL/Ibuprofen Mesh For Maxillofacial Repair Using Prototype Injection Mold
G. V. Salmoria, V. G. Henschel, L. F. Vieira, C. R. M. Roesler, F. Sibilia, S. Fare & M. C. Tanzi

October 3 . 2013
Auditorium 4

15:30 | 15:45 Coffee Break

15:45 | 18:00 **Tooling Edge - Workshop**
Chair: Joaquim Ciurana | University of Girona, Spain

Materials, Technology and Product Integration
A. Pontes

Customized Permanent Implants
J. Lino

Comparative Study of Costs of Powder Steel Micro Manufacturing Techniques in a Life-Cycle Perspective
E. Henriques

Porous Structures for Tissue Engineering Applications
H. Almeida

October 4 . 2013
Auditorium 1

08:30 | 09:00 Conference Registration

09:00 | 09:45 Materials Issues in Additive Manufacturing
Dave Bourell | Texas University, USA

09:45 | 10:30 Sustainable Global Manufacturing
Jun Ni | University of Michigan, USA

10:30 | 10:45 Coffee Break

10:45 | 12:45 **Additive and Nano Manufacturing Technologies**
Chair: Cynthia M. Gomes | BAM Federal Institute for Materials Research and Testing, Germany

Production of Overhanging Structures by DMLS
F. Calignano & D. Manfredi

State-of-the-Art Review on Selective Laser Melting of Ceramics
W. Y. Yeong, C. Y. Yap, M. Mapar & C. K. Chua

Review of Selective Laser Melting Process Parameters for Commercially Pure Titanium and Ti6Al4V
K. H. Low, K. F. Leong & C. N. Sun

Classical Lamination Theory Applied on Parts Produced by Selective Laser Melting
S. L. Sing, W. Y. Yeong, C. K. Chua, F. E. Wiria, Z. H. Liu, D. Q. Zhang & B. Y. Tay

Effect of Laser Beam Profile on Melt Track in Selective Laser Melting
L. E. Loh, Z. H. Liu, D. Q. Zhang W. Y. Yeong & C. K. Chua

12:45 | 14:00 Lunch Break at Campus-3 Restaurant

14:00 | 14:45 Frontiers in Additive Manufacturing: Printing Multi-Functionality
Ryan Wicker | University of Texas at El Paso, USA

14:45 | 15:30 Building Information Modelling and Collaborative Working: the Theory of Everything in Construction
Farzad Khosrowshahi | Leeds Metropolitan University, UK

15:30 | 15:45 Coffee Break

15:45 | 18:00 **Simulation and Virtual Environments**
Chair: Farzad Khosrowshahi | Leeds Metropolitan University, UK

Human Cranium Biomechanical Simulation
P. Perestrelo & P. Bártolo, M. P. Torres, P. Noritomi & J. Silva

Micro-CT Based Topological Optimisation Scheme for the Design of Scaffolds
H. A. Almeida & P. J. Bártolo

Computer Simulation of Stereolithographic Process Parameters
S. Campanário, P. J. Bártolo & A. C. Lemos

Take Cover: Case Study in Artisan Telephone Covers for DDM
W. Kempton & S. Killi

Development of an Ontology-Based Knowledge Methodology in Product Innovative Collaborative Conceptual Design Environment
S. J. Liang

20:00 Gala Dinner at Quinta do Fidalgo

October 4 . 2013
Auditorium 2

10:30 | 10:45 Coffee Break

10:45 | 12:45 **Materials**

Chair: António Pouzada | University of Minho, Portugal

Processing of Nickel Based Superalloy MAR M-247 by Means of High – Temperature Selective Laser Melting (HT – SLM)
Y. C. Hagedorn, J. Risse, W. Meiners, N. Pirch, K. Wissenbach & R. Poprawe

Selective Laser Melting Towards Manufacture of Three Dimensional in Situ al Matrix Composites: a Review
S. Dadbakhsh, L. Hao & J. P. Kruth

The Effect of SLM Parameters on Geometrical Characteristics of Open Porous NiTi Scaffolds
M. Speirs, S. Dadbakhsh, S. Buls, J. P. Kruth, J. Van Humbeeck, J. Schrooten & J. Luyten

Phase Change Materials as a tool for Climate Change Mitigation
A. P. Vieira, H. Bartolo, G. R. Mitchell & P. Bartolo

Structure Development During Additive Manufacturing
A. Tojeira, S. Biscaia, T. Viana, P. J. Bartolo & G. R. Mitchell

12:45 | 14:00 Lunch Break at Campus-3 Restaurant

15:45 | 18:00 **Biomanufacturing**

Chair: David Dean | Case Western Reserve University, USA

Designing Apatite/Wollastonite (A/W) Porous Scaffolds by Powder-Based 3D Printing
C. M. Gomes, A. Zocca, J. Guenster, L. Podshivalov, P. Bar-Yoseph & A. Fischer

Determination of Resin Components for Continuous Digital Light Processing (cDLP) Additive Manufacture of Resorbable Tissue Engineering Scaffolds
D. Dean, E. Mott, X. Luo, M. Busso, M. Wang, C. Vorwald, A. Siblani & J. P. Fisher

Vat Polymerization Techniques for Biotechnology and Medicine
T. F. Patrício, R. F. Pereira, A. Cerva & P. J. Bartolo

Levodopa Controlled Release from Alginate Membranes
M. R. Franco, S. Biscaia, T. Viana & P. Bartolo

Preparation of PDLLA/Bioglass58S Scaffolds by Selective Laser Sintering
G. V. Salmoria, R. V. Pereira, A. Aragones & M. C. Fredel

October 4 . 2013
Auditorium 3

10:30 | 10:45 Coffee Break

10:45 | 12:45 **CAD and 3D Data Acquisition Technologies**
Chair: André Jardini | University of Campinas, Brazil

Architecture and Parametric Design: a Prototype for a Kiosk
L. Mateus, F.Roseta & F.Vaz-Monteiro

A Tool for Computer-Aided Orientation Selection in Additive Manufacturing Processes
A. Armillotta, M. Cavallaro & S. Minnella

A Design Methodology for Parts Using Additive Manufacturing
N. Boyard, M. Rivette, O. Christmann & S. Richir

Models for Product Design and Development in Additive Manufacturing
S. Killi & A. Morrison

Reducing Repositioning Distances in Fused Deposition-Based Processes Using Optimization Algorithms
L. C. Galvão, A. O. Barboza, P. F. Benevides & L. F. Nunes, N. Volpato & R. T. Nakashima

12:45 | 14:00 Lunch Break at Campus-3 Restaurant

15:45 | 18:00 **Applications**
Chair: António Gloria |National Research Council of Italy, Italy

Printing Intervertebral Implants with a Low-Cost Additive Manufacturing Machine
L. Serenó, L. Ramon & J. Ciurana

Challenges in Design and Production of Customized Tracheal Stents
A. Fiorentino, G. P. Marenda & E. Ceretti, C. Piazza & N. Hendrichs

Forensic 3D Facial Approximation From a CT Scan Video of a Mummified Egyptian-Roman Child
C. A. da Costa Moraes, P. H. J. Amorim, T. F. de Moraes, G. C. S. Ruppert, J. V. L. da Silva & M. E. Santos

Maskless Production of Metallic Coil Structures for an Application in MRI
N. Wang, P. Bollgrün, K. Steffen, D. Mager & J. G. Korvink

Virtual and Physical Prototyping for Compression Sportswear
P. K. Collins, M. D. Johnson & D. W. Hurst

Lumbar Cage Design Concepts Based on Additive Manufacturing
O. Figueroa, C. A. Rodríguez, H. R. Siller, O. Martínez-Romero, E. Flores-Villalba, J.A. Díaz-Elizondo & R. Ramírez

October 5 . 2013
Auditorium 1

08:30 | 09:00 Conference Registration

09:00 | 09:45 Enthusing students: The role of 3D Printing within a Design-Centric Programme
Ian Gibson | National University of Singapore, Singapore

09:45 | 10:30 Prototype Casting
K. P. Karunakaran | Indian Institute of Technology Bombay, India

10:30 | 11:15 New Frontiers in Musculoskeletal Regenerative Medicine: Biomaterials, Additive Manufacturing and Stem Cell Biology
Tim Woodfield | University of Otago Christchurch, New Zealand

11:15 | 11:30 Coffee Break

11:30 | 13:30 **Additive and Nano Manufacturing Technologies**
Chair: Jorge Vicente Lopes da Silva | CENPRA, Brazil

Implementing Additive Manufacturing for Medical Devices: A Quality Perspective
W. Y. Yeong & C. K. Chua

Direct Writing of Conductive Polymer Tracks as Part of an Additive Manufacturing Process
G. R. Mitchell & F. J. Davis

Fundamental Issues for Additive Manufacturing of Lithophanes
M. Yuan & D. L. Bourell

Investigation of Process Condition for Constructing Plaster of Paris Part with Selective Vacuum Manufacturing
P. Senanan, N. Chansri & P. Koomsap

Materials Characterization for Stereolithography
P. Camaño & P. J. Bartolo

13:30 | 14:00 Closing Ceremony

October 5 . 2013
Auditorium 2

11:15 | 11:30 Coffee Break

11:30 | 13:30 **Materials**

Chair: K. P. Karunakaran | Indian Institute of Technology Bombay, India

Influence of the Monomers Feed Ratio on the Polyurethane Reaction in RIM
N. Gomes, J. Salmazo, P. Bártolo, A. Gouveia, R. J. Santos, M. M. Dias & J. C. B. Lopes

Photopolymerization Kinetics of 2-Hydroxyethyl Methacrylate (pHEMA) Hydrogels, Effect of Different Crosslinked Agent
L. L. Lima, C. A. C. Zavaglia, V. P. Bavaresco, E. Pinto, P. J. S. Bártolo & J. M. R. Gomes

Syntesis of New Biobased Unsaturated Polyesters for Advanced Processing
F.A.M.M. Gonçalves, C.S.M.F. Costa, I.G.P. Fabela, P.N. Simões, D. Farinha, H. Faneca, A.C. Serra, P.J. Bártolo & J.F.J. Coelho

Nanocomposite Polycaprolactone/Carbon Nanotube Processed by Electrospinning Applying of AC
R. S. Almeida, M. A. d'Ávila, D. S. T. Martinez & O. L. Alves

Oxidative Treatment of Carbon Nanotubes by Hydrogen Peroxide and O_2 Plasma for Rapid Manufacturing Applications
G. V. Salmoria, , I. Michelena, G. M. O. Barra, L. F. Vieira & R. A. Paggi

October 5 . 2013
Auditorium 3

10:30 | 10:45 Coffee Break

10:45 | 12:45 **CAD and 3D Data Acquisition Technologies**

Chair: Ian Gibson | National University of Singapore, Singapore

Hand-held 3D Scanner Without Sensor Pose Tracking or Surface Markers
J. Kofman & K. Borribanbunpotkat

Calibration of a Hand-Held Multi-Line Laser-Camera 3D Scanner
K. Borribanbunpotkat & J. Kofman

Error Compensated Camera-Projector Calibration in Shape Measurement
D. Li & J. Kofman

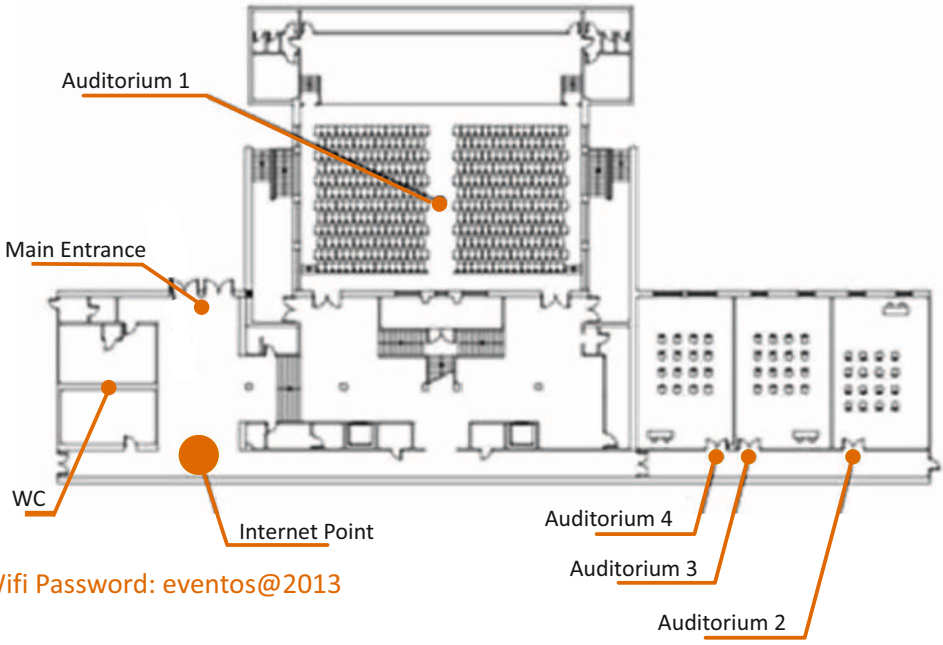
Interaction in an immersive Multi-Projection System Based on Light Wand Like Devices
C. Oliveira, H. M. C. Vale & A. J. V. Porto

Innovative Developments on Agile-CAD System
M. Gaspar, N. Alves, N. Martins-Ferreira & P. Bartolo

Conference Areas

VRAP 2013 Conference Building

Campus-3 Restaurant



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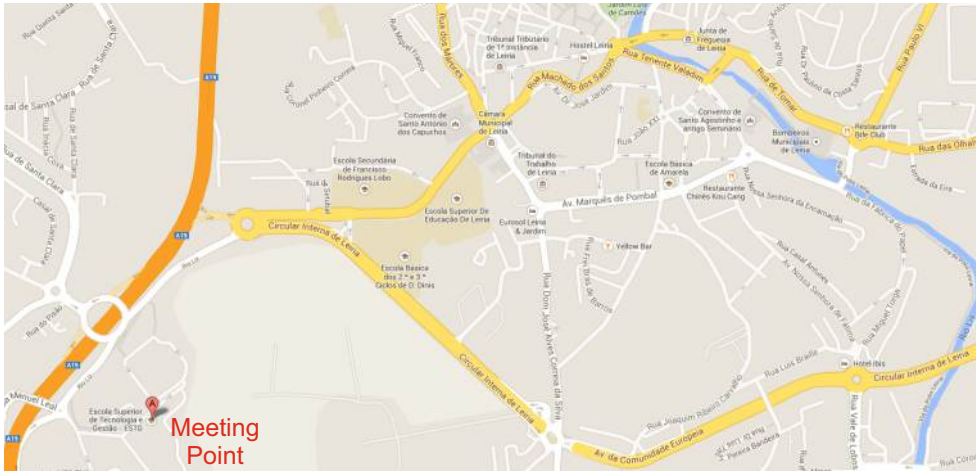

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