

11th NOLAMP Conference in Laser Processing of Materials

Lappeenranta, Finland
Student Union House, Laserkatu 10

August 20 – 22, 2007

Programme



Monday, August 20th

- 09:00** Buses to the university (at 09.00 Scandic Hotel Patria - at 09.10 Sokos Hotel Lappee / ground floor - at 09.20 Karelia Park)
- 09:30** Registration and coffee

<p>Plenary session A Room: Student Union House, auditorium Chair: Prof. V. Kujanpää, Lappeenranta University of Technology</p> <p>10:20 Opening of the conference and Welcome</p> <p>10:40 EARLY DATES OF LASER CUTTING Invited lecturer: Paul Hilton, TWI Ltd, United Kingdom</p>
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- 11:20** Lunch Student Union House, Aalef Restaurant

<p>12:10 Session 1: Laser welding 1 Auditorium</p>	<p>Session 2: Laser cutting and drilling 1 Class 213</p>	<p>Session 3: Commercial industrial laser applications Class 209</p>
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- 13:50** Coffee break Student Union House, Aalef Restaurant

<p>14:10 Session 4: Laser welding 2 Auditorium</p>	<p>Session 5: Laser micro processing 1 Class 213</p>	<p>Session 6: Laser surface treatment 1 Class 209</p>
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- 16:10** Break

- 16:30 Opening of the exhibition, cocktails**
Student Union House,
Lobby

Sponsored by **HT Lasertekniikka Oy**

- 18:00** Bus to the Lappeenranta centre and hotels
- 18:30 Exhibition closes**
- 18:40** Bus to the Lappeenranta centre and hotels

Monday, August 20th

Session 1:

Room: Student Union House, auditorium

Laser Welding 1

Chair: Prof. J.K. Kristensen, Force Technology, Denmark

- 12.10 ANALYTICAL-EXPERIMENTAL TECHNIQUE FOR CALCULATING THE TEMPERATURE FIELDS IN LASER WELDING**
V.A. Karkhin¹, P.N. Homich¹, V.G. Michailov²
¹St. Petersburg State Polytechnic University, Russia
²Cottbus University of Technology, Germany
- 12.30 PLASMO POSITION CONTROLLER NEW SOLUTION FOR AN UNSOLVED TASK**
J. F. Trbola¹, T. Grünberger²
¹TRBOLA engineering Stuttgart
²Plasmo Industrietechnik GmbH, Wien
- 12.50 STATE-OF-THE-ART OF MONITORING AND IMAGING OF LASER WELDING DEFECTS**
P. Norman, H. Engström, A. F. H. Kaplan
Luleå University of Technology, Luleå, Sweden
- 13.10 QUALITY ASSURANCE IN LASER WELDING**
A. Salminen, A. Fellman
Laboratory of welding technology and laser processing, Lappeenranta University of Technology, Lappeenranta, Finland
- 13.30 LASER-LASER-HYBRID WELDING OF COLD ROLLED FORMABLE STEEL SHEETS**
T. Väisänen
HAMK University of Applied Sciences, Riihimäki, Finland

Monday, August 20th

Session 2:

Room: Student Union House, lecture room 213

Laser Cutting and Drilling 1

Chair: Mr. H. Engström, Luleå University of Technology, Sweden

- 12.10 WILL THE NEW LASER SOURCES OUTPERFORM THE CO₂-LASER IN METAL CUTTING?**
F. Olsen
 Department for Manufacturing Engineering and Management, Technical University of Denmark, Denmark
- 12.30 CUTTING OF STAINLESS STEEL WITH FIBER AND DISK LASER**
C. Wandera¹, A. Salminen¹, F. O. Olsen² and V. Kujanpää¹
¹Laser Processing Laboratory, Lappeenranta University of Technology, Finland
²Technical University of Denmark, Denmark
- 12.50 LASER CUTTING OF SUPERIMPOSED LAYERS OF PAPER MATERIALS**
H. Malmberg¹, V. Kujanpää^{1,2}
¹Lappeenranta University of Technology, Lappeenranta, Finland
²VTT, The Technical Research Centre, Lappeenranta, Finland
- 13.10 AN OUTLOOK INTO THE LASER CUTTING OF AERONAUTIC ALUMINUM ALLOYS**
A. Riveiro, B. Davila, F. Quintero, F. Lusquiños, R. Comesaña, J. Pou
 Departamento de Física Aplicada, ETS Ingenieros Industriales, Universidad de Vigo, Spain
- 13.30 INCREASE OF STABILITY GEOMETRICAL PARAMETERS OF MICROHOLES**
V. Serebryakov¹, M. Volkov¹, V. Zverev²
¹Research Institute for Laser Physics, St.Petersburg, Russia
²SPb SU ITMO, St.Petersburg, Russia

Monday, August 20th

Session 3:

Room: Student Union House, lecture room 209

Commercial Industrial Laser Applications

Chair: Mr. J. Larsson, Volvo Car Corporation, Sweden

- 12.10** **CO₂ SLAB LASERS UP TO 8 KW: TECHNOLOGY AND APPLICATIONS**
F. Bachmann, W. Rath
ROFIN-SINAR Laser GmbH, Hamburg, Germany
- 12.30** **NEW HIGH POWERED DISK LASERS FOR INDUSTRIAL WELDING APPLICATION**
K. Mann, R. Brockmann
TRUMPF Laser GmbH + Co. KG, Schramberg, Germany
- 12.50** **LASER JOINING APPLICATIONS – HIGHEST EFFICIENCY USING DIODE LASERS**
M. Nagel
Laserline GmbH, Mülheim-Kärlich, Germany
- 13.10** **INDUSTRIAL APPLICATIONS WITH FIBER LASERS- NEW HORIZONS IN SPEED, PENETRATION AND EFFIECIENCY**
B. Kessler
IPG Laser GmbH, Germany
- 13.30** **INTRINSIC LASER METAL MATERIALS PROCESSING**
S. Gorny
Laser Center Ltd., St. Petersburg, Russia

Monday, August 20th

Session 4:

Room: Student Union House, auditorium

Laser Welding 2

Chair: Dr. T. Jokinen, VTT Technical Research Centre of Finland, Finland

- 14.10 NEW POSSIBILITIES IN LASER HYBRID WELDING WITH METAL CORED WIRES**
P. Dyberg¹, A.F.H. Kaplan²
¹ ESAB AB, Gothenburg, Sweden
² Luleå University of Technology, Division of Manufacturing Systems Engineering, Sweden
- 14.30 DATLAS – A NEW APPROACH FOR MONITORING OF THE LASER WELDING PROCESS**
H. Engström, P. Norman, A. F. H. Kaplan
Luleå University of Technology, Sweden
- 14.50 STRENGTH PROPERTIES OF LASER AND LASER HYBRID WELDS OF LOW ALLOYED HIGH STRENGTH STEELS**
P. Leiviskä¹, A. Fellman², R. Laitinen¹, M. Vänskä²
¹ Ruukki Production, Raahе, Finland
² Lappeenranta University of Technology, Lappeenranta, Finland
- 15.10 HYBRIGHT – GENERIC UNDERSTANDING OF THE MECHANICAL STRENGTH OF HYBRID WELDS**
T. Ilar, A. F. H. Kaplan
Luleå University of Technology, Luleå, Sweden
- 15.30 OPTICS IMPROVE LASER BEAM WELDING INDUSTRIAL APPLICATIONS USING II-VI NOVEL OPTICS**
K.G. Hänsel, M. Benzing, H. von Rebenstock
II-VI Deutschland GmbH, Darmstadt, Germany
- 15.50 IMPROVEMENT OF THE STRENGTH OF WELDED JOINTS IN ULTRA-HIGH-STRENGTH OPTIM 960 QC USING AUTOGENOUS Yb:YAG LASER WELDING**
R. Laitinen¹, J. Kömi¹, M. Keskitalo², J. Mäkikangas²
¹Rautaruukki Oyj, Ruukki Production, Finland; ²Oulu Southern Institute, Nivala, Finland

Monday, August 20th

Session 5:

Room: Student Union House, lecture room 213

Laser Micro Processing 1

Chair: Prof. A. Kaplan, Luleå University of Technology, Sweden

- 14.10 THERMOHYDRODYNAMICS ANALYSIS OF LASER DRILLING
CONSIDERING MULTIPLE REFLECTION OF LASER AND
EVAPORATION**
E. Ohmura, S. Noguchi, Y. Hirata
Osaka University, Suita, Japan
- 14.30 HIGH POWER AND REPETITION-RATE LASERS FOR
MICROFABRICATION**
**M. Grishin^{1,2}, S. Jacinavičius¹, G. Andriukaitis¹, M. Brikas², G.
Račiukaitis²**
¹Ekspla Ltd, Vilnius, Lithuania,
²Laboratory for Applied Research, Institute of Physics, Vilnius, Lithuania
- 14.50 THE APPLICATION OF MICRO-FOCUS X-RAY AND COMPUTER
TOMOGRAPHY TO CHARACTERISE INCONEL 625 COMPONENTS
FORMED USING DIRECT METAL LASER DEPOSITION**
P. Brown¹, P. A. Carroll¹, S. Kenny²
¹TWI Technology Centre, Yorkshire, United Kingdom
²TWI Technology Centre, Wales, United Kingdom
- 15.10 PROCESSING OF THIN-FILM MATERIALS FOR OLED AND RFID WITH
PICOSECOND LASERS**
G. Račiukaitis, M. Brikas, G. Darčianovas
Laboratory for Applied Research, Institute of Physics, Vilnius, Lithuania
- 15.30 MICROMACHINING USING FLEXIBLE PULSED FIBER LASERS**
H. Pantsar¹, H. Herfurth², T. Lauterborn², S. Heinemann²
¹VTT Technical Research Centre of Finland, Finland
²Fraunhofer CLT, USA
- 15.50 PROBLEMS OF PRECISE LASER MICROALLOYING AND
MICROREMELTING IN SUBMILIMETER SCALE**
R. Pawlak, F. Kostrubiec, M. Walczak, M. Tomczyk
Technical University of Lodz, Lodz, Poland

Monday, August 20th

Session 6:

Room: Student Union House, lecture room 209

Laser Surface Treatment 1

Chair: Prof. E. Halmøy, Technical University of Norway, Norway

- 14.10 HYBRID LASER CLADDING BY WIRE**
J. Nurminen¹, J. Riihimäki¹, J. Näkki¹, Petri Vuoristo^{1,2}
¹Technology Centre Ketek Oy, Kokkola, Finland
²Tampere University of Technology, Tampere, Finland
- 14.30 LOCAL LASER HEAT TREATMENTS IN BENDING ULTRA-HIGH STRENGTH STEEL**
K. Mäntyjärvi¹, A. Leiviskä², J. A. Karjalainen², M. Keskitalo¹, J. Heikkala², J. Mäkikangas¹
¹University of Oulu, Oulu Southern Institute, Nivala, Finland
²University of Oulu, Department of Mechanical Engineering, Oulu, Finland
- 14.50 WEAR BEHAVIOUR OF LASER HARDENED QUENCHED H13 STEEL**
M.A. Montealegre, J.L. Arias, G. Castro, L. Mera, J. Vázquez
 Asociación de Investigación Metalúrgica del Noroeste (AIMEN), Porriño, Spain
- 15.10 NOVEL MACHINE SYSTEM FOR SIMULTANEOUS HEAT TREATMENT WITH DYNAMIC BEAM SHAPING**
S. Bonss, J. Hannweber, M. Seifert, S. Kühn, U. Karsunke, B. Brenner, E. Beyer
 Fraunhofer IWS, Dresden, Germany
- 15.30 LOCAL LASER HEAT TREATMENTS IN MAKING TAILORED STRENGTH STEEL CONSTRUCTIONS**
K. Mäntyjärvi¹, J. A. Karjalainen², A. Leiviskä², J. Mäkikangas¹, M. Keskitalo¹, J. Niemelä¹
¹University of Oulu, Oulu Southern Institute, Nivala, Finland
²University of Oulu, Department of Mechanical Engineering, Oulu, Finland
- 15.50 INFLUENCE OF THE THERMAL STRESS IN THE SOLID ACTIVE LASER MEDIUM ON THE TECHNOLOGICAL PARAMETERS OF THE LASER BEAM**
O. Dontu¹, S. Ganatsios², I. Voiculescu¹, V. Geanta¹
¹Politehnica University, Bucharest, Romania
²Technological Education Institute – TEI, Kozani, West Macedonia, Greece

Tuesday, August 21st

- 08:00** Bus to the University (at 08.00 Scandic Hotel Patria - at 08.10 Sokos Hotel Lappee / ground floor - at 08.20 Hotel Karelia Park)
- 08:30** Bus to the university (at 08.30 Scandic Hotel Patria - at 08.40 Sokos Hotel Lappee / ground floor - at 08.50 Karelia Park)

Plenary session B Auditorium

Chair: Prof. V. Kujanpää, Lappeenranta University of Technology, Finland

- 09:00** **TOWARDS THE LIMITS OF LASER PROCESSING - HIGHEST PRECISION USING ULTRASHORT LASER PULSES -**
Invited lecturer: Andreas Ostendorf, Laser Zentrum Hannover e.V., Germany

- 10:00** Coffee break Student Union House, Aalef Restaurant

10:30	Session 7: Laser welding 3 Auditorium	Session 8: Laser cutting and drilling 2 Class 213	Session 9: Laser processing applications Class 209
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- 12:10** Lunch Student Union House, Aalef Restaurant

13:10	Session 10: Laser welding 4 Auditorium	Session 11: Laser micro processing 2 Class 213	Session 12: Laser surface treatment 2 Class 209
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- 14:50** Coffee break Student Union House, Aalef Restaurant

- 15:10** Bus to the hotels

- 15:20** Bus to the hotels

- 16:30** **Reception of the Lappeenranta city**, City Hall, Villimiehenkatu 1

- 17:30** Bus from City Hall to Passanger Harbour (700 m)

- 18:00** **Cruise on the M/S Camilla, Dinner on boat**

Passenger Harbour, Lappeenranta

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 AG**

- 21:00** Bus to the Hotels (Scandic Hotel Patria - Sokos Hotel Lappee - Karelia Park)

Tuesday, August 21st

Session 7:

Room: Student Union House, auditorium

Laser Welding 3

Chair: Dr. Antti Salminen, Lappeenranta University of Technology, Finland

- 10.30 STUDY OF LASER WELDING OF ZINC COATED STEEL SHEETS IN OVERLAP CONFIGURATION**
Y. Pan¹, I. M. Richardson^{1, 2}
¹Netherlands Institute for Metal Research, Delft, Netherlands
²Delft University of Technology, Delft, Netherlands
- 10.50 LASER WELDING OF COATED SHEET METAL CONSTRUCTIONS**
**Jarmo Mäkikangas¹, Kari Mäntyjärvi¹, Markku Keskitalo¹,
 Jussi A. Karjalainen², Juha Niemelä¹, Jari Ojala³**
¹University of Oulu, Oulu Southern Institute, Nivala, Finland
²University of Oulu, Department of Mechanical Engineering, Oulu, Finland
³CENTRIA Research and Development, Ylivieska, Finland
- 11.10 LASER HYBRID WELDING OF ZINC-COATED ULTRA HIGH STRENGTH STEEL**
G. Wiklund¹, T. Nilsson², A. F. H. Kaplan¹
¹Luleå University of Technology, Sweden
²SSAB Tunnpått, Bolänge, Sweden
- 11.30 PRELIMINARY INVESTIGATION OF CO₂ LASER WELDING OF AZ31-H24 MAGNESIUM ALLOY**
A. Ahmad¹, V. Kujanpää^{1,2}
¹Lappeenranta University of Technology, Laser Processing Laboratory, Lappeenranta, Finland
²VTT Industrial systems, Lappeenranta, Finland.
- 11.50 LASER WELDING OF HIGHLY REFLECTIVE MATERIALS**
**H. Jia¹, H. Bingyuan¹, T. Funder-Kristensen², A. Leth Vonsild²
 W. Jiang, P. Youdong**
¹Danfoss, China, ²Danfoss, Denmark

Tuesday, August 21st

Session 8:

Room: Student Union House, lecture room 213

Laser Cutting and Drilling 2

Chair: Prof. F.O. Olsen, Technical University of Denmark, Denmark

10.30 EFFECT OF KERF-WIDTH AND/OR SPOT DIAMETER ON HIGHER CUTTING SPEED IN LASER PROCESS

T. Arai and N. Asano

Chuo University Research and Development Initiative, Japan

10.50 LASER CUTTING OF CORRUGATED BOARDS

H. Malmberg¹, P. Laakso², N. Miikki³, V. Kujanpää^{1,2}

¹Lappeenranta University of Technology, Lappeenranta, Finland

²VTT, Lappeenranta, Finland

³Stora Enso/Imatra Research Center, Imatra, Finland

11.10 LASER CUTTING OF PARTICLEBOARDS AND HIGH- AND MEDIUM-DENSITY FIBERBOARDS

F. Qiu¹, H. Malmberg¹, V. Kujanpää^{1,2}

¹Lappeenranta University of Technology, Lappeenranta, Finland

²VTT, The Technical Research Centre, Lappeenranta, Finland

11.50 SHORT PULSE MICROMACHINING

R.Arbus

Laser 2000 AB, Norrköping, Sweden

Tuesday, August 21st

Session 9:

Room: Student Union House, lecture room 209

Laser Processing Applications

Chair : Paul Hilton, TWI Ltd, United Kingdom

10.30 LATEST ALUMINIUM BODY STRUCTURE DEVELOPMENT ON JAGUAR'S NEW XK8 MODEL WITH SUPPORTING LASER PROCESSING

N. Heath¹, J. K. Larsson²

¹Jaguar Cars & Land Rover, Gaydon, United Kingdom

²Volvo Car Corporation, Gothenburg, Sweden

10.50 LASER WELDING OF THERMAL SOLAR ABSORBERS

U. Dürr, R. Holtz, A. Biernaux

LASAG AG, Thun, Switzerland

11.10 ROCKET NOZZLE DESIGN AND MANUFACTURE

M. Honoré¹, M. Hallberg²

¹FORCE Technology, Brøndby, Denmark

²Volvo Aero Corp., Trollhättan, Sweden

11.30 LASER BRAZING – A NEW TECHNOLOGY FOR COSMETIC JOINTS IN THE BODY STRUCTURE

J. K. Larsson

Volvo Car Corporation, Gothenburg, Sweden

Tuesday, August 21st

Session 10:

Room: Student Union House, auditorium

Laser Welding 4 (Student Union House, auditorium)

Chair: Mr. R. Laitinen, Rautaruukki Oyj, Finland

13.10 LASER WELDING OF THERMOPLASTIC POLYMER

S. Abed, W. Knapp

Coopération Laser Franco-Allemande (CLFA), ENSMP, Paris, France

13.30 Nd:YAG LASER WELDING OF 5083 ALUMINIUM ALLOY USING FILLER WIRE

S. Grünenwald¹, A. Salminen², V. Kujanpää²

¹BIAS Bremer Institut für angewandte Strahltechnik GmbH, Germany

²Lappeenranta University of Technology, Lappeenranta, Finland

13.50 DIODE LASER WELDING OF PLASTIC COATED BOARD

P. Määttä, N. Miikki

Stora Enso Oyj, Imatra, Finland

**14.10 QUASI-SIMULTANEOUS LASER WELDING OF PLASTICS –
COMPARISON OF DIODE LASER WELDING AND FIBER LASER
WELDING**

S. Ruotsalainen¹, P. Laakso²

¹Lappeenranta University of Technology, Lappeenranta, Finland

²VTT Industrial Systems, Lappeenranta, Finland

Tuesday, August 21st

Session 11:

Room: Student Union House, lecture room 213

Laser Micro Processing 2

Chair: Prof. J. Karjalainen, University of Oulu, Finland

13.10 FORMATION OF DIFFRACTION GRATING BY LASER INDUCED SELF ORGANIZATION IN CHROMIUM THIN FILM

M. Gedvilas, G. Račiukaitis, K. Regelskis, P. Gečys

Laboratory for Applied Research, Institute of Physics, Vilnius, Lithuania

13.30 COMBINED LASER MICRO-FORMING AND MACHINING OF SHEET METAL

J. Porter, J. Heikkala, K. Mäntyjärvi, J. Karjalainen

Department of Mechanical Engineering, University of Oulu, Finland

13.50 PICOSECOND LASER PROCESSING – MATERIAL REMOVAL RATES OF METALS

R. Penttilä, H. Pantsar, P. Laakso

VTT Technical Research Centre of Finland, Lappeenranta, Finland

14.10 EXCIMER LASERS IN MATERIAL RESEARCH AND NANOSTRUCTURING

R. Delmdahl, R. Pätzelt, G. Spiecker, H.-P. Wunde

Coherent GmbH, Göttingen, Germany

14.30 DECORATIVE LASER TEXTURING OF METAL SURFACES

R. Ruusu¹, H. Pantsar¹, P. Laakso¹, M. Mårtensson²

¹VTT Technical Research Centre of Finland, Finland

²Oy Suomen EDM Ab, Finland

Tuesday, August 21st

Session 12:

Room: Student Union House, lecture room 209

Laser Surface Treatment 2

Chair: Prof. P. Vuoristo, Tampere University of Technology, Finland

13.10 LASER BORONIZING OF CARBON STEEL WITH DIRECT DIODE LASER
J. Morimoto¹, T. Ozaki¹, Y. Katoh¹,
S. Morimoto², N. Abe³, M. Tsukamoto³

¹ Faculty of Science and Technology, Kinki University, Osaka, Japan

² Nichia Steel Work, Ltd, Hyogo, Japan

³ Joining and Welding Research Institute, Osaka University, Osaka, Japan

13.30 LOCAL LASER HEAT TREATMENTS OF ULTRAHIGH STRENGTH STEEL

M. Keskitalo¹, K. Mäntyjärvi¹, J. Mäkikangas¹, J.A. Karjalainen², A. Leiviskä², J. Heikkala²

¹ University of Oulu, Oulu Southern Institute, Nivala, Finland

² University of Oulu, Department of Mechanical Engineering, Oulu, Finland

13.50 LASER-ASSISTED PROCESSES – MORE SPEED AND LESS FORCE FOR MANUFACTURING PROCESSES

K. Mäntyjärvi¹, J. A. Karjalainen², A. Leiviskä²,
M. Keskitalo¹, J. Mäkikangas¹, J. Ojala³

¹ University of Oulu, Oulu Southern Institute, Nivala, Finland

² University of Oulu, Department of Mechanical Engineering, Oulu, Finland

³ CENTRIA Research and Development, Ylivieska, Finland

14.10 RAY-TRACING ANALYSIS OF ND:YAG LASER ABSORPTION BY RANDOM ROUGH METAL SURFACES

D. Bergström^{1,2}, J. Powell^{2,3}, A. Kaplan²

¹Mid Sweden University, Östersund, Sweden

²Luleå University of Technology, Luleå, Sweden

³Laser Expertise Ltd., Nottingham, United Kingdom

Wednesday, August 22nd

- 8:30** Bus to (at 08.00 Scandic Hotel Patria - at 08.10 Sokos Hotel Lappee / ground floor
the university at 08.20 Hotel Karelia
Park)
- 08:30** Bus to (at 08.30 Scandic Hotel Patria - at 08.40 Sokos Hotel Lappee / ground floor
the university at 08.50 Hotel Karelia
Park)

09:00	Session 13: Laser welding 5 Auditorium	Session 14: Laser micro processing 3 Class 209
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- 11:00** Coffee break Student Union House, Aalef Restaurant

11:30	<p>Plenary session C Auditorium Chair: Prof. V. Kujanpää, Lappeenranta University of Technology</p> <p>PANEL DISCUSSION: WILL FIBER OR DISC LASERS REPLACE CO₂ AND Nd:YAG LASERS?</p>
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- 12:30** Welcome to Nolamp 12, Denmark
- 12:40** Closing of the Conference
- 12:50** Lunch Student Union House, Aalef Restaurant
- 13:30** Bus to the Lappeenranta
Airport
- 13:40** Bus to the LLPC from Student Union House
- 13:50** Visit to the Lappeenranta Laser Processing Center (LLPC)
- 15:00** Bus to the hotels from LLPC

Wednesday, August 22nd

Session 13:

Room: Student Union House, auditorium

Laser Welding 5

(Joint Session with 3rd JOIN)

Chair: Mr. T. Funder-Kristensen, Danfoss A/S, Danmark

- 09.00 LASER-GMA-HYBRID WELDING WITH OSCILLATING ARC AND/OR FLUX BACKING**
U. Jasnau, M. Anders, A. Sumpf
 Schweißtechnische Lehr- und Versuchsanstalt Mecklenburg-Vorpommern GmbH
 (Welding Training and Research Institute Mecklenburg-Western Pomerania Ltd.), Rostock,
 Germany
- 09.20 SHAPING OF HYBRID WELDS AND GEOMETRICAL OPERATING WINDOW**
A. F. H. Kaplan¹, K. Nilsson², J. Powell³
¹ Luleå University of Technology, Sweden
² Gleim AB, Luleå, Sweden
³ Laser Expertise Ltd., Nottingham, United Kingdom
- 09.40 VERY THICK PLATE HYBRID CO₂-LASER/MAG SINGLE- AND MULTI-PASS WELDING OF STRUCTURAL STEELS**
J. Klæstrup Kristensen, F. Rinaldo Rasmussen, S. E. Nielsen
 Force Technology, Denmark
- 10.00 STUDIES ON INDUCTION ASSISTED LASER-HYBRID WELDING**
J.S. Nielsen, M. Accorsi, F.O. Olsen
 Technical University of Denmark, Lyngby, Denmark
- 10.20 TECHNOLOGY PROGRAMMES BOOST LASER PROCESSING APPLICATIONS IN FINLAND**
J. Lassila
 Association of Finnish Steel and Metal Producers, c/o Rautaruukki Oyj, Helsinki, Finland
- 10.40 PRELIMINARY STUDY OF PHENOMENA IN FIBER LASER-MAG HYBRID WELDING OF MILD STEEL**
A. Fellman, A. Salminen
 Lappeenranta University of Technology, Lappeenranta, Finland

Wednesday, August 22nd

Session 14:

Room: Student Union House, lecture room 209

Laser Micro Processing 3

Chair: Dr. H. Pantsar, VTT Technical Research Centre of Finland, Finland

- 09.00 PRECISE PATTERNING OF THIN FILMS WITH PICOSECOND FIBER LASER**
J. Sillanpää, K. Ylä-Jarkko, H. Asonen
Corelase, Tampere, Finland
- 09.20 ACCUMULATION EFFECTS DURING PROCESSING OF METALS AND SILICON WITH REPETITION-RATE LASERS**
M. Brikas, G. Račiukaitis, M. Gedvilas
Laboratory for Applied Research, Institute of Physics, Vilnius, Lithuania
- 09.40 LASER SURFACE STRUCTURING WITH AN ULTRA SHORT PULSE FIBRE LASER**
J. Hölsä, J. Vihinen, P. Vuoristo
Tampere University of Technology, Tampere, Finland
- 10.00 CO₂-MARKING OF PRINTED PACKAGING BOARD**
N. Miikki, P. Määttä
Stora Enso Oyj, Imatra, Finland

11th NOLAMP AND 3rd JOIN SPONSORS, EXHIBITORS AND PARTNERS IN COOPERATION:

