Program of the 6TH International Conference on Laser Peening and Related Phenomena South Africa, 6-11 November 2016

Sunday, 6 November	
Morning	International flights landing at O.R. Tambo International Airport, Johannesburg http://www.airports.co.za/airports/or-tambo-international/the-airport/about-or-tambo
11:00	Registration Desks open at Hotel Foyers, Rosebank, Johannesburg http://www.sa-venues.com/maps/gauteng/rosebank.php http://www.rosebankmall.co.za/
Early Afternoon	Individual activities: rest or visit of Rosebank Craft Market / Moyo Zoo Lake/ Emmarentia Dam https://www.inyourpocket.com/johannesburg/Rosebank
16:30	Buses to collect delegates at Holiday Inn Rosebank Hotel, Oxford Road, and departure for Rand Club, Johannesburg http://randclub.co.za/
17:00-22:00	**6TH ICLPRP CONFERENCE OPENING RECEPTION AT RAND CLUB** **Rand Club Heritage Tour** **Mr Adam Golding**, Johannesburg Heritage Foundation **Welcome** **Prof. Zeblon Vilakazi**, Wits Deputy Vice-Chancellor (Research & PG Affairs) **Prof. Ian Jandrell**, Dean of the Wits Faculty of Engineering and the Built Environment **Prof. Robert Reid**, Head of School of Wits School of Mechanical, Industrial and Aeronautical Engineering *Venue: Main Bar* **Welcome Dinner** *Venue: Main Ballroom*
Monday, 7 November	
07:00	Buses to collect delegates at Holiday Inn Rosebank Hotel, Oxford Road, and departure for CSIR International Convention Centre, Pretoria http://www.csiricc.co.za/
08:00	Registration Desk at Central Foyer CSIR International Convention Centre
08:30-09:05	**WELCOME AND OPENING REMARKS** **Prof. Claudia Polese**, University of the Witwatersrand, South Africa, Conference Chairwoman **Mr Beeuwen Gerryts**, Chief Director: Technology Localisation, Beneficiation & Advanced Manufacturing, South African Department of Science and Technology **Mr Delon Mudaly**, NLC Director, CSIR National Laser Centre **Prof. Mike Fitzpatrick**, Coventry University, Conference Secretary and Technical Chair

09:05	**PLENARY KEYNOTE PRESENTATION: "LSP: THE ORIGIN"** **The Origins and Development of an Industrial Process** **Prof. Seetha Ramaiah Mannava**, University of Cincinnati, Cincinnati, United States
09:45- 10:20	**INTRODUCTION & ACKNOWLEDGMENTS** **Who made Laser Peening possible in South Africa?** **Prof. Claudia Polese**, University of the Witwatersrand, South Africa **CSIR NLC Rental Pool Enabling Program for Laser Based Technologies** **Mr Hardus Greyling**, Manager Commercialisation and National Programs **Dr Francois Prinsloo**, Programme Manager, CSIR **We Have a Dream: LSP in Africa (Airbus AirNet Development Program in SA)** **Mr Dale King**, Senior Manager, Emerging Technologies & Concepts, Airbus UK **Mr Philip Haupt**, Director, National Aerospace Centre, South Africa *Venue: Ruby Auditorium*
10:20	Coffee Break
10:40- 12:05	**SESSION 1: RESIDUAL STRESS & PROCESS PERFORMANCE** *Chair: **Prof. Michael E. Fitzpatrick**, Coventry University, Coventry, United Kingdom* **Oral Presentations:** **Invited: Mark Newby**, Eskom Holdings SOC Ltd, South Africa ID 022: Laser Shock Peening Process Development for Turbine Blade Refurbishment Applications Using a Commercial "Mid-Range" Energy Laser **Niall Smyth,** Coventry University, United Kingdom ID 050: A Parametric Study of the Effect of LSP Processing Parameters on the Induced Residual Stress and Fatigue Life of Al 2624-T39 **Guillaume Lafoy**, AlPhANOV Technology Center, France ID 045: Laser Parameters Influence on Laser Shock Peening Induced Residual Stress Profiles and Fatigue Strength Performance on Al-5083 **Marco Pavan**, Coventry University, United Kingdom ID 014: Evaluation of Residual Stress in a 2050-T84 Aluminium plate after Laser Shock Peening *Venue: Ruby Auditorium*
12:05	**Mr Juha Siiriäinen**, Stresstech Oy, Vaajakoski, Finland Instruments and Services for Residual Stress Measurements
12:15	**Dr Vito Roppo**, OptoSigma Europe, Les Ulis, France High Energy Pulsed Lasers: the Challenge of the Beam Transport
12:20	Conference Group Photo 1 – Front Steps, CSIR International Convention Centre
12:30	Lunch at CSIR International Convention Centre Deck

<table>
<tr><td>14:00-
17:00</td><td colspan="4">TECHNICAL TOUR

Technical Tour of CSIR National Laser Centre facilities for Group 1, Group 2 and Group 3 guided by Prof. Sisa Pityana, Mr Daniel Glaser, Dr Hencharl Strauss, Mr Chris McDuling. Groups 1, 2, and 3 will rotate.

<table><tr><th>Tour A</th><th>Tour B</th><th colspan="2">Tour C (select either C or D)</th></tr><tr><td>Laser Enabled Manufacturing

Laser Welding, Cutting & Cladding
Mr H Burger

Additive Manufacturing: LENS
Prof. S Pityana

Aeroswift
Mr H Greyling</td><td>SA LSP Facility

LSP System
Mr D Glaser

VISAR System
Dr B Masina

Residual Stress Measurement Lab – XRD and IHD
Dr J Siiriäinen
Prof. JP Nobre</td><td>Novel Lasers

IR Lab
Dr H Strauss
Dr D Naidoo</td><td>Materials Science and Manufacturing

Fatigue Facility
Mr C McDuling
Ms M Khodja
Mr E Guldenpfenning
Mr J Jordaan</td></tr></table>
Venue: CSIR Buildings</td></tr>
<tr><td>17:00</td><td colspan="4">Coffee Break</td></tr>
<tr><td>17:15-
18:30</td><td colspan="4">LSP FEM OPTIMIZATION WORKSHOP

Mr Francesco Pietra, Marenco South Africa, Pretoria, South Africa
Mr Francesco Franchini, EnginSoft S.p.A., Florence, Italy
Mr Daniel Correia, Qfinsoft (Pty) Ltd, Pretoria, South Africa

Venue: Ruby Auditorium</td></tr>
<tr><td>18:30</td><td colspan="4">Buses to take delegates back to Holiday Inn Rosebank Hotel, Johannesburg</td></tr>
<tr><td>19:30-
22:00</td><td colspan="4">Free evening at Rosebank Mall Area</td></tr>
<tr><td colspan="5">Tuesday, 8 November</td></tr>
<tr><td>06:30</td><td colspan="4">Bus transfer from Rosebank Hotels, Johannesburg, to Skukuza Main Camp, Kruger National Park: https://www.sanparks.org/parks/kruger/

Lunch Box provided

Alternately flight from OR Tambo to Skukuza Airport: http://skukuzaairport.com/</td></tr>
<tr><td>13:00</td><td colspan="4">Arrival at Skukuza accommodations and Skukuza Nombolo Mdhluli Conference Centre

(http://www.sanparks.org/parks/kruger/groups/conferences.php#two)</td></tr>
</table>

14:30-16:10	**SESSION 2: FATIGUE LIFE EXTENSION** *Chair:* ***Dr Kristina Langer****, Air Force Research Laboratory, Dayton, United States* **Oral Presentations:** **Micheal Kattoura**, University of Cincinnati, USA ID 058: Room and Elevated Temperature Fatigue Life Improvement of ATI 718Plus Using LSP Treatment **Dean van Aswegen**, University of the Witwatersrand, South Africa ID 028: Laser Shock Peening for Fatigue Crack Retardation in Airframe Structures: an Analytical and Experimental Study **Zou Shikun**, Huazhong University of Science and Technology, China ID 069: Fatigue performance of TC17 Blades with Laser Peening **Muhammad Kashif Khan**, **Mike Fitzpatrick**, Coventry University, United Kingdom ID 051: Effect of Laser Shock Peening on Very High Cycle Fatigue of Ti6Al4V **Kiyotaka Masaki**, Okinawa College, Japan ID 034: Effects of Laser Peening on Plane Bending Fatigue Properties of Dissimilar Friction Stir Welded Aluminium Joints
16:10	Coffee Break
16:30-17:50	**SESSION 3: SHOCK WAVES & PROCESS VISUALIZATION METHODS** *Chair:* ***Dr Laurent Berthe****, PIMM Laboratory, Paris, France* **Oral Presentations:** **Hitoshi Soyama**, Tohoku University, Japan ID 009: Effect of Bubble Collapse Impact on Submerged Laser Peening **Daniel Glaser**, CSIR National Laser Centre, South Africa ID 019: Essential Considerations for Water as a Confinement Medium during the Laser Shock Peening Process **Bathusile Masina**, CSIR National Laser Centre, South Africa ID 018: The Velocity Interferometer System for any Reflector (VISAR) at the CSIR-NLC in South Africa **G. Gómez-Rosas, César Augusto Vázquez Jiménez**, Universidad de Guadalajara, México ID 001: Experimental Measurements of Shock Waves produced by a Q-Switched Nd:Yag Laser using a Piezo Film Sensor
18:30	**Cocktail Function at Skukuza Boma** https://www.facebook.com/events/1017069655033758/

Wednesday, 9 November	
04:00 - 07:30	Morning Drive for Group 1
08:30- 09:00	**KEYNOTE PRESENTATION: "LSP: THE ORIGIN"** **LSP: The Origin – "French" Contribution** **Dr Remy Fabbro**, PIMM Laboratory, Paris, France
09:00- 10:20	**SESSION 4: PROCESS MODELING & SIMULATIONS** *Chair:* ***Mr Francesco Pietra****, Marenco South Africa, Pretoria, South Africa* **Oral Presentations:** **Benjamin Klusemann**, Helmholtz-Zentrum Geesthacht, Germany ID 007: Experimental and Numerical Study of Laser Shock Peening Process of AA2198-T3 and AA2198-T8 **Mohammad I. Hatamleh**, The University of Texas at Dallas, USA ID 024: Effect of Damping Profiles on Laser Peening Simulation Time **Stefano Coratella**, University of Dayton Research Institute, USA ID 035: Residual Stress Distribution Prediction after LSP Treatment for Aerospace Structures **Rujian Sun**, Beihang University, China ID 044: Dynamic Response and Residual Stress Field of Ti6Al4V Alloy under Shock Wave Induced by Laser Shock Processing
10:20	Coffee Break
10:40- 12:20	**SESSION 5: MATERIAL HARDENING & MICROSTRUCTURAL CHARACTERIZATION** *Chair:* ***Prof. Vijay K. Vasudevan****, University of Cincinnati, Cincinnati, OH, USA* **Oral presentations:** **Junfeng Wu**, Southeast University, China ID 091: Microstructure Characteristic of TC17 Alloy under Laser Peening **Shuai Huang**, Beihang University, China ID 005: Laser Shock Peening Effects on Isothermal Oxidation Resistance of Ti-17 Titanium Alloy **Helena Rossouw**, University of Pretoria, South Africa ID 042: Laser Transformation Hardening of 26NiCrMoV14-5 LP Rotor Disc and X20CrMo13 LP Blade Steels **Mitchell Leering**, University of the Witwatersrand, South Africa ID 056: Influence of Laser Shock Peening on the Impact Toughness of AA7075-T651
12:20	**Dr Christophe Simon-Boisson**, THALES OPTRONIQUE S.A.S, Elancourt Cedex, France High Energy Short Pulse Lasers for Laser Shock Peening and Innovative Non Destructive Testing Methods
12:25	Lunch

13:30	**KEYNOTE PRESENTATION: "LSP: THE ORIGIN"** **The Origin and Future of Laser Peening in Japan** **Dr Yuji Sano**, ImPACT, Tokyo, Japan
14:00-15:20	**SESSION 6: EXPERIMENTAL RESIDUAL STRESS & PROCESS PERFORMANCE** *Chair: **Dr Mark Newby**, Eskom, Johannesburg, South Africa* **Oral Presentations:** **David Eisensmith**, Air Force Institute of Technology, USA ID 064: Residual Stress Evaluation of Laser Shock Peening Over a Partial Through the Thickness Crack **Sean van Staden**, University of the Witwatersrand, South Africa ID 062: Determination of Laser Shock Peening Residual Stresses in Thin Aluminium Alloy Plates by the Incremental Hole-Drilling Technique **Andrew Venter**, NECSA Limited, South Africa ID 037: Depth-Resolved Residual Stress Studies of Laser Shock Peen Treated Aluminium Plates Using High-Resolution Neutron Diffraction **Yongxiang Hu**, Shanghai Jiao Tong University, China ID 052: Experiments on the Feasibility of Double Side Laser Peening of Thin Section with Alternate Side Laser Scanning
15:20	Coffee Break
15:40-17:20	**SESSION 7: INNOVATIVE & ALTERNATIVE LASER PEENING APPLICATIONS** *Chair: **Ms Elke Hombergsmeier**, Airbus Group Innovations, Munich, Germany* **Oral Presentations:** **Pratik Shukla**, University of Chester, United Kingdom ID 004: Laser Shock Peening of Alumina Ceramic for Ballistic Armour Plating **Romain Ecault**, Airbus Group Innovations, France ID 015: Laser Shock Adhesion Test for Bonding Quality Assessment: Development and Optimization **Rodney Genga**, University of the Witwatersrand, South Africa ID 023: Laser Shock Peening of NbC-based Cermets for Improved Face-milling of GCI (BS 1452) **Norihito Shibuya**, Sintokogio, Japan ID 097: Laser Peening for Cold Working of Tool Steel **Horst Bansemir**, Consulting for Composites, Germany ID 063: Composite Sandwich Structures for Space-, Aeronautical- and Wind Energy Applications and Possible Laser Peening Improvements
17:00 – 20:00/ 20:00 – 22:00	Optional Sunset Drive / Night Drive
19:00-22:00	Dinner on own at Cattle Baron http://www.cattlebaron.co.za/stores.html

Thursday, 10 November	
04:00 - 07:30	Morning Drive for Group 2
08:30	**KEYNOTE PRESENTATION: "LSP: THE PRESENT"** **Laser Peening for Lifetime Improvement Against Corrosion-Fatigue for Navy and Commercial Ship Propulsion Shafts** **Dr Lloyd Hackel**, CWST Metal Improvement Company, Livermore, USA
09:00-10:25	**SESSION 8: FATIGUE LIFE EXTENSION** *Chair:* ***Prof. Robert Tait****, University of Cape Town, Cape Town, South Africa* **Oral Presentations:** **Invited: Elke Hombergsmeier**, Airbus Defence and Space GmbH, Germany ID 072: Enhanced Fatigue and Damage Tolerance of Aluminium Aircraft Components using Laser Shock Peening **Dean van Aswegen**, University of the Witwatersrand, South Africa ID 060: Comparison of Laser Shock Peening Effects in Clad and Unclad 2024-T3 Aluminium Alloy for Aeronautical Applications **David Osman Busse**, Cranfield University, United Kingdom ID 017: Fatigue Assessment of AA2024-T351 Laser-Peened Aeronautical Structural Riveted Lap-Joints **Nikolai Kashaev**, Helmholtz-Zentrum Geesthacht, Germany ID 002: Effect of Laser Shock Peening on Fatigue Crack Propagation Behaviour in AA2024 **Zhigang Che**, **Zou Shikun**, Beijing Aeronautical Manufacturing Technology Research Institute, China ID 083: Experiment Investigation on the Al Alloys Hole Structures by Laser Shock Processing
10:45	Conference Group Photo 2 – Skukuza Nombolo Mdhluli Conference Centre
10:50	Coffee Break

11:05	**SESSION 9: PROCESS MODELING & SIMULATIONS** *Chair:* ***Mr Francesco Franchini****, EnginSoft, Florence, Italy* **Oral Presentations:** **Invited: Kristina Langer**, Air Force Research Laboratory, USA ID 036: Uncertainty-Based Analysis of Damage Tolerance Effects in Laser Peened Structural Components **Dylan Armfield**, **Ricardo Ludeke**, University of Pretoria, South Africa ID 025: Conceptual Uncertainties with Respect to Finite Element Modelling of Laser Shock Peening **Mohammad I. Hatamleh**, The University of Texas at Dallas, USA ID 026: Identifying Optimum Variable Damping Profiles for Laser Peening Simulation with the SEATD Method **Manel Ayeb**, Sousse University, Tunisia ID 079: Prediction of Residual Stress Profile induced by Laser Shock Peening using Artificial Neural Networks
12:30	Lunch
13:30	**KEYNOTE PRESENTATION: "LSP: THE PRESENT"** **A Case Study on Implementation of Laser Shock Peening to Improve Force Management of Critical Structures – and Observations on Requirements for Broader Application** **Dr Jeffrey O. Bunch**, The Boeing Company, St. Louis, USA
14:00	**SESSION 10: RELATED PHENOMENA** *Chair:* ***Prof. Sisa Pityana****, CSIR National Laser Centre, Pretoria, South Africa* **Oral Presentations:** **Invited: Young-Sik Pyun**, Sun Moon University, South Korea ID 095: UNSM Capabilities and Industrial Applications **Micheal Kattoura**, University of Cincinnati, USA ID 059: Room and Elevated Temperature Fatigue Life Improvement of ATI 718Plus Using UNSM Treatment **Evgeny Guverich**, **Jan Hoppius**, Ruhr-Universitat Bochum, Germany ID 053: Strategies for Shock Peening of Stainless Steel 316 Using Femtosecond Laser **Hitoshi Soyama**, Tohoku University, Japan ID 033: Improvement of the Resistance to delayed Fracture in High-Strength Bolt made of Cr-Mo Steel by Means of Cavitation Peening
15:25	Coffee Break

15:40	**KEYNOTE PRESENTATION: "LSP: THE FUTURE"** **The Future LSP EU Programs** **Dr Laurent Berthe**, PIMM Laboratory, Paris, France
16:10-16:50	**SESSION 11: LASER PEENING FOR HIGH STRENGTH & ALTERNATIVE MATERIALS** *Chair: **Dr Domenico Furfari**, Airbus Operations GmbH, Hamburg, Germany* **Oral Presentations:** **Helena Rossouw**, University of Pretoria, South Africa ID 020: A Preliminary Approach to Laser Shock Peening Without Coating on 26NiCrMoV14-5 Rotor Disc Steel **Suraiya Zabeen**, Coventry University, United Kingdom ID 088: Characterization Of Residual Stress In Additively Manufactured Ti-6Al-4V Material After Laser Shock Peening
17:30	**6TH ICLPRP GALA DINNER** Sunset Drive and Bush Braai https://www.facebook.com/events/190961934597804/
Friday, 11 November	
04:30 - 07:30	Morning Drive for Group 3
08:30	**KEYNOTE PRESENTATION: "LSP: THE FUTURE"** **Laser Shock Peening in Aeronautical Industry – The Use of Lights for Manufacturing and Performance Enhancement** **Dr Domenico Furfari**, Airbus Operations GmbH, Hamburg, Germany
09:00-10:40	**SESSION 12: FATIGUE LIFE EXTENSION & SURFACE MODIFICATIONS** *Chair: **Prof. Waldo Stumpf**, University of Pretoria, Pretoria, South Africa* **Oral Presentations:** **César Augusto Vázquez Jiménez**, University of Guadalajara, Mexico ID 047: Influence of Swept Direction on Fatigue Life of 2205 Duplex Stainless Steel Specimens Treated by Laser Shock Processing **S. Prabhakaran**, **S. Kalainathan**, **Vijay K. Vasudevan**, VIT University, India ID076: Effect of Low Energy Laser Peening Without Coating on AISI 304 Austenitic Stainless Steel **Khanyisile Kuveya**, University of the Witwatersrand, South Africa ID 012: Laser Peening versus Shot Peening Effects on Residual Stress and Surface Modification of X12CrNiMo12 Turbine Blade **Toshiya Tsuji**, Sintokogio, Japan ID096 Influence of Shot Peening and Laser Peening on Contact Fatigue Strength of Carburized Steel **Alexander Becker**, University of Cape Town, South Africa ID 040: Effect of Shot Peening and Laser Shock Peening on the Fatigue Performance of Aluminium Alloy

10:40	Coffee Break
11:00	**SESSION 13: PROCESS MODELING & SIMULATIONS** *Chair:* ***Prof. Arif S. Malik****, The University of Texas at Dallas, Richardson, USA* **Oral Presentations:** **Malika Khodja**, CSIR National Laser Centre, South Africa & University of Sidi Bel Abbes, Algeria ID 027: A Preliminary Assessment of Laser Shock Peening Pressure Pulse Inputs for a Numerical Investigation **Aghogho Edward**, University of Pretoria, South Africa ID 071: Modelling-Simulation of Shot Peening and Compressive Residual Stress Assessment **Sergey Chupakin**, Helmholtz-Zentrum Geesthacht, Germany ID 011: Application of Neural Network for Correction of Hole Drilling Plasticity Effect when Measuring LSP Induced Residual Stresses **Joao Nobre**, University of the Witwatersrand, South Africa ID 089: Plasticity Effect on the Residual Stresses Determined by the Incremental Hole-Drilling Technique
12:20	Lunch
13:20	**KEYNOTE PRESENTATION: "LSP: THE FUTURE"** **How Photonics Community Should Support Laser Shock Processing?** **Dr Danijela Rostohar**, HiLASE, Prague, Czech Republic
13:50	**SESSION 14: DEVELOPMENT IN LASER COMMERCIAL SYSTEMS** *Chair:* ***Prof. Seetha Ramaiah Mannava****, University of Cincinnati, Cincinnati, United States* **Oral Presentations:** **Invited: Luis E. Zapata**, Deutsches Elektronen Synchrotron, Germany ID 061: Cryogenic DPSSLs for Laser Shock Peening **Jan Brajer**, HiLASE Centre, Czech Republic ID 021: HiLASE Center: Development of Laser Shock Processing Facility and Validation of Post-Processing Characterization Methods
14:30-15:30	**PANEL DISCUSSION ON INNOVATIVE LASER DELIVERY SYSTEMS** **Dr Danijela Rostohar**, HiLASE Centre, Dolní Břežany, Czech Republic **Dr Yuji Sano,** ImPACT, Yokohama, Japan **Prof. Andrew Forbes**, University of the Witwatersrand, Johannesburg, South Africa
15:30	Coffee Break

15:50	**6TH ICLPRP PRIZE GIVING** *Chairs:* **Prof. Claudia Polese & SA LSP GROUP**
16:20	**CLOSING PANEL & ANNOUNCEMENT OF THE 7TH ICLPRP LOCATION**
17:00 - onwards	**LSP EU HORIZON 2020 PROPOSALS & RESEARCH COLLABORATIONS MEETINGS**
17:00 – 20:00/ 20:00 – 22:00	Optional Sunset Drive / Night Drive
19:00-22:00	Dinner on Own at Cattle Baron
Saturday, 12 November	
04:30 – 08:00 / 06:30-14:30	Optional Morning Walk / Full Day Game Drive, etc.
09:00	Road transfer from Skukuza to Johannesburg will depart at approx. 09:00 and arrive at O.R. Tambo International Airport at approx. 15:00. International flights all departing in the evening from O.R. Tambo International Airport, Johannesburg. Alternatively continuation of the trip to national SA destinations (Skukuza Airport or Bidvest Car Rental)

Posters on display from Tuesday 8th to Friday 11th of November 2016 at Nombolo Mdhluli Conference Centre Hall or Breakaway Venue, Skukuza Main Camp, Kruger National Park.

PROCEEDINGS OF THE 6TH ICLPRP

"Call for Abstracts" opened in February 2016:

- Full peer review process by the Conference International Committee members, the Technical Committee members and invited reviewers within the 6TH ICLPRP etouches online system.
- The Book of Abstracts of the 6TH International Conference on Laser Peening and Related Phenomena (6TH ICLPRP), *ISBN 978-0-620-73424-0*, will be delivered to all participants as a form of USB-Stick.

"Call for Papers" opened in June 2016:

- Full paper submission.
- Full peer review process by the Conference International Committee members, the Technical Committee members and invited reviewers within the Emerald ScholarOne online system.
- The 12 best papers will be published in a 2017 Special Issue of the International Journal of Structural Integrity [IJSI] (Scopus, SJR, EI Compendex, British Library, EBSCO, INSPEC, Norwegian Register for Scientific Journals, QUALIS).
  For more information regarding the IJSI, please visit:
  http://emeraldgrouppublishing.com/products/journals/journals.htm?id=ijsi