

CONFERENCES

NORDTRIB 2016

One of the major international conferences in the field of tribology in Europe – Nordtrib 2016 took place in Hämeenlinna, Finland, from the 14th to 17th of June 2016. Nordtrib is organised every two years and hosted by one of the Nordic countries (Denmark, Finland, Norway, and Sweden). The 17th Nordtrib was attended by a record number of more than 200 participants, who presented the latest research from all areas of tribology. Members of TINT attended the conference with 3 contributions, which presented the results of research on boundary lubrication film on the DLC coatings, the properties of composite polymeric nano-materials and the effects of graphene as an additive for improving the lubricating properties of oils. All 3 lectures were accepted with great interest and positive responses. The conference was concluded with a discussion on the 50th anniversary of the “Jost Report”, in which the importance of tribology for global society has been highlighted for the first time.

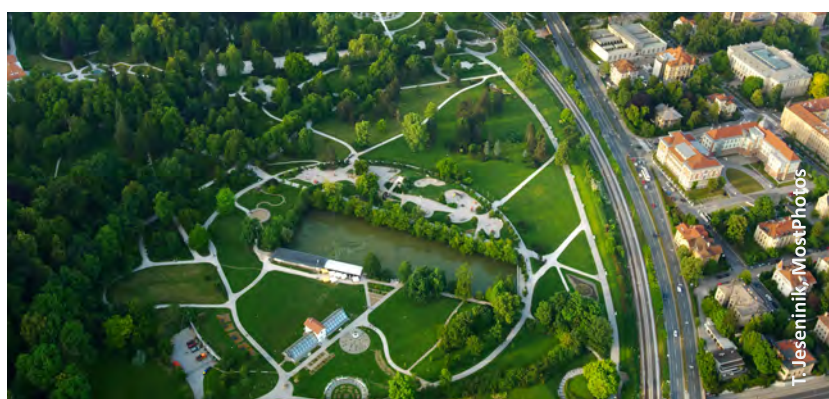


SLOTTRIB 2016, 17th November 2016

The Slovenian Society for Tribology is organising the traditional conference SLOTRIB 2016, which will take place in Ljubljana, in Radisson Blu Plaza Hotel on the **17th of November 2016**. The one-day event will see industry and academic experts present current issues related to tribology, lubricants, technical diagnostics, alternative fuel and ecology. For more information please visit: www.tint.fs.uni-lj.si

ECOTRIB 2017, 7th–9th June 2017

The 6th European Conference on Tribology, ECOTRIB 2017 will take place **between the 7th and 9th of June 2017** in Cankarjev dom in Ljubljana, Slovenia. ECOTRIB is organised every two years by the Slovenian Society for Tribology in collaboration with tribological societies from Austria, Italy and Swiss. ECOTRIB 2017 will cover topics related to all aspects of tribology, including biotribology, surface characterization, contact mechanics, wear, friction, tribology of machine elements and manufacturing processes. For more information please visit: www.tint-ecotrib.com



TINT IS ORGANISING

POLYTRIB 2016, 15th–16th September 2016

The 2nd International Conference on Polymer Tribology, POLYTRIB 2016 will take place on the **15th and 16th of September** at the Grand Hotel Union in Ljubljana, Slovenia. The programme of the conference will be focused on topics such as tribology of polymers, composites and nano-composites, lubrication and tribochemistry of polymers, adhesion, boundary layers, surface energy of polymers, their ecological aspects and relation to tribology, testing techniques and methodology etc. Over 30 contributions from 13 different countries have been accepted for the conference. For more information visit: www.tint-polytrib.com

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Tribology
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Tint



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STAMPING GOES GREEN

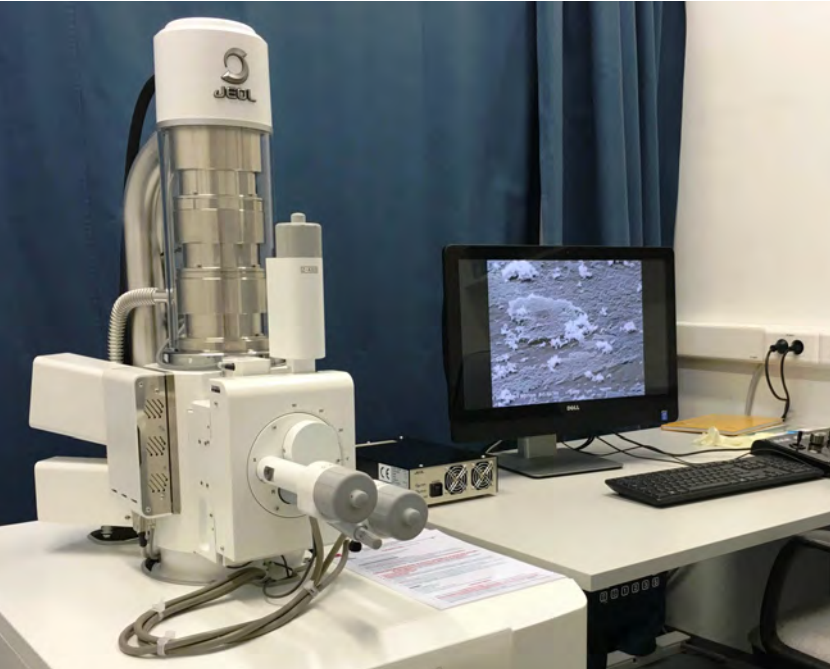
Because of its societal and economic impact, stamping is exposed to severe global competitiveness and increasing demand on technological improvements for higher productivity, cost-efficiency, performance and customer satisfaction. In addition, today exists another crucially important and contemporary requirement, which is inevitably enforced by national and international legislation; namely to reduce environment pollution, CO₂ emissions and hazardous materials with less post-process cleaning and waste, lower wear and lower friction. In order to comply with these trends, new green stamping solutions are needed, which require incorporating tribology-related surface science, tribochemistry and nano-technology, together with appropriate experimental laboratory facilities, field-validation tests and technology innovation. TINT is heading in this direction to work together with industrial partners and provide both the expertise and facilities.

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NEW EQUIPMENT

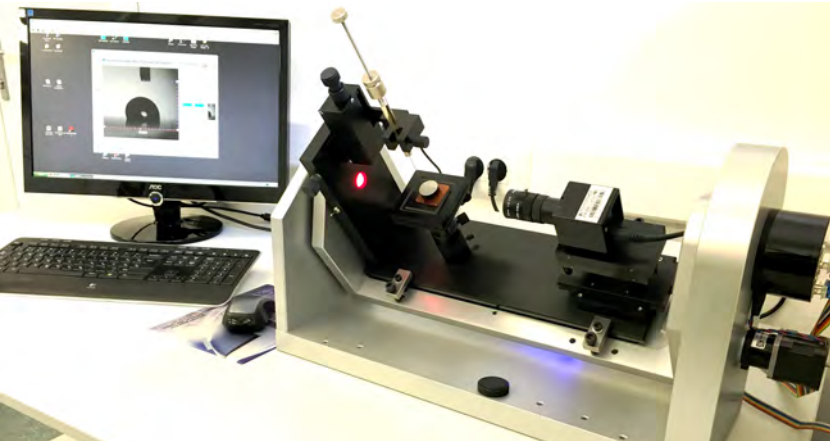
SCANNING ELECTRON MICROSCOPE JEOL JSM IT100 WITH LOW AND HIGH VACUUM MODE

Our Laboratory replaced the old scanning electron microscope (SEM) with a brand new JEOL JSM IT100. The new SEM has techniques (LV, HV, SED, BSED, EDS, etc.) which allow us to perform surface analyses on samples made of various materials at magnifications between 5x and 300.000x. The new scanning electron microscope JEOL JSM IT100 is suitable for performing surface analysis on samples in low or high vacuum mode. The low vacuum mode enables us to perform analysis on samples where traces of lubricants, wear debris and other impurities are present. Moreover, with the new SEM we can perform qualitative and quantitative analyses of chemical elements present on and in the sample's surface. Therefore, chemical composition of bulk material, wear mechanisms, presence of additives in lubricants, etc. can be specified.



TILTING CRADLE FOR DYNAMIC CONTACT ANGLE MEASUREMENTS

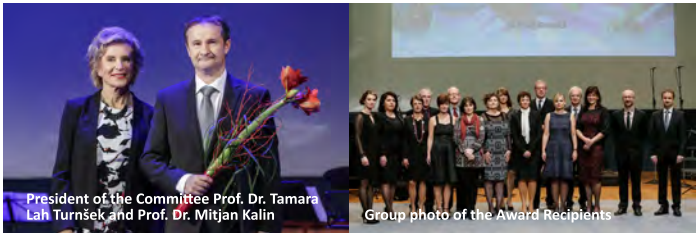
We have recently upgraded our contact angle goniometer with computer controlled tilting cradle. With own-developed software, tilting speed and final tilting angle can be controlled. The cradle also enables us to maintain contact angle goniometer at a desired tilting angle. With tilting cradle and dedicated software we can perform dynamic contact angle measurements, including advancing and receding contact angle, as well as contact angle hysteresis. Critical tilting angle when liquid droplet starts to slip can also be determined.



AWARDS

PROF. DR. MITJAN KALIN HAS RECEIVED THE ZOIS AWARD

Prof. dr. Mitjan Kalin is the recipient of the 2015 Zois Award for outstanding achievements in the field of contact nano engineering for molecular control of boundary lubrication and friction. The Zois Award is the highest national award, conferred to researchers in Slovenia for their achievements and lasting contribution to scientific, research and development activities in Slovenia.



AT THE 50TH ANNIVERSARY OF THE “JOST REPORT” RECEPTION IN BUCKINGHAM PALACE

The 50th Anniversary of the Jost Report, which is considered as the birthday of Tribology as an independent scientific discipline, was commemorated with a celebration in the Buckingham Palace. The reception was organised by the HRH The Duke of Edinburgh KG KT, Prince Philip, who honoured the guests with warm welcome and pleasant chats, showing his great interest and broad knowledge about our field. Present at the reception was also Professor H. Peter Jost, CBE, the Chairman of the Committee that prepared the “Jost Report” on behalf of the UK government in 1966, as well as Emeritus Professor Duncan Dowson, CBE, FREng, FRS, who was also a member of the Committee. Over 100 most prominent tribologists worldwide were invited to the memorable event, among them was also prof. dr. Kalin.



FACULTY OF MECHANICAL ENGINEERING AWARD FOR QUALITY PUBLICATIONS

Dr. Maša Zalaznik and dr. Eva Oblak of the Laboratory for Tribology and Interface Nanotechnology received the Faculty of Mechanical Engineering, University of Ljubljana, Award for researchers under 35 for quality publications. They have both published 3 papers last year in internationally acclaimed SCI-index scientific journals.

CURRENT RESEARCHES

NANOSCALE ENGINEERING OF THE CONTACT INTERFACES FOR GREEN LUBRICATION TECHNOLOGY

New project, founded by Slovenian Research Agency (2016–2018), focuses on design of novel and innovative high-performance green boundary film contacts that satisfy the strict requirements on greenhouse emissions and hazardous materials, indispensably required in all future heavy loaded lubricated mechanical components. In this research we are innovatively designing efficient green contact interfaces by combining tailored diamond-like carbon (DLC) coatings that possess very low-wear and low-friction properties, with harmless organic additives (alcohols, fatty acids). This new green concept, recently initiated in our group, is getting increased attention from academic and industrial partners.



DEVELOPMENT OF THE HYDRAULICS PART OF THE PNEUMATIC-HYDRAULICS BREAK FOR THE ELECTRIC UTILITY VEHICLE

Laboratory for fluid power at the Faculty of Mechanical Engineering University of Ljubljana collaborated with the company Stoja d.o.o. within the development of the new electric utility vehicle. The laboratory developed hydraulics as part of the pneumatics-hydraulics break. The new vehicle is included in the promotion of clean energy technologies and takes part as a standard tourist offer of Ljubljana, the capital of Slovenia.

For more information visit: <http://lab.fs.uni-lj.si/lft>



PhD DISSERTATIONS

DR. MAŠA ZALAZNIK: TRIBOLOGICAL PROPERTIES OF PEEK POLYMERS AND THEIR COMPOSITES FILLED WITH MoS₂ AND WS₂ PARTICLES

The thesis presents the effect of MoS₂ and WS₂ particles in the nano and micro scale size on the dry sliding tribological behaviour when used as solid-lubricating particles in PEEK composites. A novel, compression moulding-based technique was used to prepare the PEEK composites, which allows composite manufacturing at much lower temperatures (300 °C), which is below melting. The results are compared with pure PEEK without any particles, and commercial PEEK materials. The results show that all tested particles, independently on material and size, reduce the friction (up to 30 %), however, nano scale particles require higher concentration (in analogy to longer time) to form an effective low-friction tribofilm, while MoS₂ and WS₂ particles exhibit similar friction properties.

DR. MARKO POLAJNAR: INFLUENCE OF SLIP ON THE SOLID-LUBRICANT INTERFACE ON THE TRIBOLOGICAL PROPERTIES OF LUBRICATED CONTACTS

We have studied the effect of slip between a surface and a lubricant on the friction in lubricated engineering macro-contacts. We have shown that for the evaluation of wetting of engineering surfaces with lubricating oils a spreading parameter needs to be used instead of contact angle. The spreading parameter is also a key tool for controlling the slip and consequently the friction in lubricated contacts. Furthermore, we have proposed a tentative slip model, which explains that the lack of the permanent polar interactions between the lubricant and the surface increases the slip. Subsequently, we have presented an iterative procedure for the evaluation of slip in macro-contacts by introducing a novel virtual slip parameter. We have also demonstrated how slip and friction can be affected by changing the surfaces of the contact and the contact kinematics. In this respect we can, under certain conditions, obtain similar friction-decreasing effects as in the contacts with the slip on the both contact surfaces also in the contacts with only one slipping surface, which presents an important technological contribution.



PROMINENT PUBLICATIONS

S. Akbari, J.Kovač, M. Kalin

Effect of ZDDP concentration on the thermal film formation on steel, hydrogenated non-doped and Si-doped DLC

Applied Surface Science 383 (2016) 191-199

K. Simonović, M. Kalin

Methodology of a statistical and doe approach to the prediction of performance in tribology: a DLC boundary-lubrication case study

Tribology International 101 (2016) 10-24

M. Kalin, A. Pogačnik, I. Etsion, B. Raeymaekers

Comparing surface topography parameters of rough surfaces obtained with spectral moments and deterministic methods

Tribology International 93 (2016) 137-141