

# **XIII Conference *Modern Electrified Transport* MET'2017**

**5–7 X 2017**

## **Report**

The series of MET – Modern Electrified Transport International Conferences (for more information visit <http://ztu.ime.pw.edu.pl>) is held every second year and brings together scientists, engineers, specialists, managers and representatives of institutions working for electric traction. The Conference was initiated 26 years ago by a famous researcher in the field of electric traction, Professor Jan Podoski (1904-1998), a graduate, Professor and Doctor Honoris Causa of the Warsaw University of Technology. This year MET'2017 was organised in Warsaw (more info: <http://met2017.infotransport.pl>) under the Honorary Patronage of the Committee on Electrical Engineering of the Polish Academy of Sciences, Warsaw University of Technology, Ministry of Infrastructure and Construction and Ministry of Energy.

The organising institutions were: Electric Traction Division, Warsaw University of Technology, Railway Institute (Warsaw), Gdańsk University of Technology – Department of Electrical Engineering of Transport, and Faculty of Transport and Traffic Sciences, University of Zagreb.

The participants of MET'2017, which in this year was held in Warsaw, had the opportunity for exchanging views and ideas with other specialists involved in the technical aspects of electrified transport, both rail and road modes, as well as presenting and sharing the most recent scientific and technical as well as industrial developments.

In this year's edition, the topics covered were extended to include issues related to economic efficiency and safety of transport systems, planning, managing and implementation of project investments. The organisers received support from the following industry partners: main partner Grupa Trakcja, and additional partners: Bezpól, PESA Bydgoszcz S.A, CORAIL, SIEMENS, ALSTOM, Woltan. Media partners included Autobusy and TTS (Transport Technology Systems), while simultaneous interpretation was provided by Bireta – professional translations.



Photo 1: Welcome speech by the Vice-Rector of the Warsaw University of Technology, Prof. Stanisław Wincenciak, during an opening ceremony of MET'2017 in Mała Aula (the Main Building of WUT)

The Opening Ceremony, which gathered together approximately 90 participants and guests, took place on 5<sup>th</sup> October 2017, 10:30 a.m., in Mała Aula – the Main Building of the Warsaw University of Technology. The welcome speeches were delivered by the representatives of the main organising Institution, Warsaw University of Technology (WUT):

- Prof. Adam Szelaĝ – Chairman of the International Steering Committee – Warsaw University of Technology, Electric Traction Division, POLAND,
- Prof. Stanisław Wincenciak – Vice-Rector of WUT (Photo 1),
- Prof. Sylwester Robak – Director of Power Engineering Institute, Faculty of Electrical Eng., WUT,
- Prof. Marianna Jacyna – Dean of Faculty of Transport, WUT,

as well as

- Prof. Josip Tomislav Mlinarić – representative of University of Zagreb, Vice-Dean of Faculty of Transport and Traffic Sciences (Photo 2),

- Prof. Krzysztof Karwowski – Co-Chairman, Gdańsk University of Technology (Photo 3),
- Dr Andrzej Żurkowski – Co-Chairman, Director of Railway Research Institute (Photo 4),
- Mr James Harkins – Head of Secretariat of the All Party Parliamentary Group LRT of Great Britain, Member of the Honorary Committee of MET'2017 (Photo 5),
- Mr Krzysztof Celiński, Director of Siemens.



Photo 2: Welcome speech by the representative of the University of Zagreb, Vice-Dean of Faculty of Transport and Traffic Sciences, Prof. Josip Tomislav Mlinarić



Photo 3: Welcome speech by the Co-Chairman Prof. Krzysztof Karwowski, Gdańsk University of Technology



Photo 4: Welcome speech by the Co-Chairman, Dr Andrzej Żurkowski, Director of Railway Research Institute



Photo 5: Welcome speech by Mr James Harkins – Head of Secretariat of the All Party Parliamentary Group LRT of Great Britain

Prof. Andrzej Demenko, Chairman of the Committee on Electrical Engineering of the Polish Academy of Sciences sent an address to the participants of MET'2017.



Photo 6: Presentation made by Prof. Grzegorz Skarpetowski

Next, during the Plenary Session I, chaired by Director Andrzej Żurkowski, five invited papers were presented:

- *Life cycle assessment: assessing the environmental impact in the railway maintenance* – authors: M. Hegedić, N. Štefanić, M. Nikšić (University of Zagreb), presented by M. Nikšić,
- *Track insulation verification and measurement* – authors: J. Bongiorno (University of Genoa), A. Mariscotti (ASTM Sagl), presented by A. Mariscotti,
- *Realization of the mechanical characteristic of a series-excited DC machine in a drive with converter-fed induction machine* by G. Skarpetowski (Switzerland) (Photo 3)
- *Novel analysis methods of dynamic properties for vehicles pantographs* by A. Wilk (Gdańsk University of Technology),
- *Electrodynamics of electric power transmission and losses in devices of electric transport* by N. Kostin (Ukraine).

After a break, during the Plenary Session II led by Prof. A. Wilk four papers were presented:

- *The Czech program of high speed railway development in the context international connections* by J. Ilik (Ministry of Transport, Czech Republic),

- *A mobile catenary power supply system for automotive vehicles* by T. Maciołek (Warsaw University of Technology),
- *Effectiveness of application of alternative drive vehicles in public transport* – authors: T. Dyr (Kazimierz Pulaski University of Technology and Humanities in Radom), K. Ziółkowska (University of Social Sciences), P. Misiurski (Opole University of Technology), presented by T. Dyr,
- *Traction power consumption as a component of maximum speed choice on high speed lines* by A. Żurkowski (Railway Research Institute).

After a lunch, the participants were transported to the Congress Center – Boss Hotel in Warsaw-Miedzeszyn, where a welcome dinner was organised.

On Friday, 6<sup>th</sup> of October, six thematic sessions were held:

- ***Energy effectiveness of transport / Efektywność energetyczna transportu – A chaired by Prof. M. Nikšić***, with 7 presented papers on energy efficiency improvement in electrified transport through modernization of power supply, charging opportunities of electric cars with solar energy, application of energy storage devices and energy consumption by modern trams.
- ***Panel Session Revitalization of urban transport – a chance for reduction environmental and transport problems in towns chaired by Prof. A. Szeląg*** with 7 papers. Particular attention should be given to the presentations delivered by J. Harkins (Head of the All Party Parliamentary Group LRT of Great Britain) and D. Giblin (Strategic Consultant of TramForward, UK All Party Parliamentary Group LRT) on the effective role of trams in tackling urban air quality (Oslo2 effect) and investments in trams in the UK. Especially interesting is how in the UK, where trams were liquidated in mid-20th century, an increasingly strong lobby for the improvement of environment in cities influences citizens and politicians to force return of trams to towns in the UK. The aforementioned presentations and subsequent papers dedicated to analysis of tram power supply systems in Poland, opportunity and conditions for the use of railway track by trams, comparison of effectiveness of different means of urban transport and batteries as sources of energy for autonomous transport constitutes a starting point for interesting discussions. There were no doubts that only electrified transport may be a solution to improve life in the cities overcrowded with cars. However, slow improvement in energy storage devices technology and driving distance of autonomous vehicles is the reason why catenary supplied vehicles, especially rail ones, will still play a leading role in the nearest

future. The number of trams (15) and trolleybuses (3) systems in Poland and 12,000 km of 3 kV DC electrified railways might help organising charging points for autonomous vehicles: electric cars and buses.

- **Parallel session *New technologies in electrified transport* chaired by Prof. M. Pawełczyk** with next 7 presentations concerning: SiC technology application in traction converters, new induction traction motors, methods of measurement of catenary and catenary-pantograph co-operation, effectiveness of new 2x25 power supply system application and wayside storage devices for rail transport.
- **Parallel session IV *Automatics, control and management in electrified transport* chaired by Prof. T. J. Mlinarić** gathered 6 papers on: influence of braking control on a timetable on energy consumption by metro vehicles, reliability of supply and risk assessment of railway traffic control system, as well as introduction of new 25 kV 50 Hz systems in Poland, methods for controlling voltage influence in 3 kV DC catenary on disturbing harmonics in a vehicle's current flowing in rails.
- **Parallel session V *Problems of construction and exploitation of transport infrastructure* chaired by Prof. P. Biczal** with 8 papers on: risk assessment of fire on-board of vehicles in tunnels, protection of pre-school children in the vicinity of suburban of railway lines, electrification criteria for railway lines and selection of high-speed rolling stock, inductive influence of 25 kV 50 Hz electrified lines, high-speed breakers in 3 kV DC traction substations, tram catenary assessment methods and implementation of new solutions in designing of railway power supply.
- **Parallel session VI *Energy effectiveness of transport- B* chaired by Prof. T. Glinka** 8 papers were presented on: LCC costs, including energy consumption as a criterion of rolling stock purchase, application of super capacitances as energy storage devices and installation of these devices in 3 kV DC power supply, electromagnetic processes during charging of on-board supercapacitance storage device, influence of increasing voltage in catenary on energy quality, equivalent values of currents calculations in the main circuits of a tram, application of modern technology, including SiC devices in drives and auxiliary converters of trams and electric busses.

**After all day-long sessions, the day was concluded with a social evening, which allowed the participants to discuss a number of various topics, not only related to technical and research issues.**

On Saturday, 7<sup>th</sup> of October, the participants of MET'2017 visited the Alstom Workshop in Olszynka Grochowska (Warsaw), where Pendolino trains operated on Polish Railway Lines are serviced (Photo 7). The interesting solution implemented there is a movable rigid catenary (Photo 8) allowing a train to enter the service track, while later, in order to perform maintenance works on the roof, the catenary is moved away, which ensures space and safety for servicing staff.

During 3-days of MET'2017 over 120 participants and guests attended sessions, meetings and the technical visit.

The one-page abstracts of the papers were published in the Conference Proceedings, whereas the authors of the selected presentations will be asked to prepare extended versions of the papers. Upon a review procedure by the members of the International Steering Committee, these papers will be included, in an electronic form, in the Proceedings of MET'2017. The Proceedings in an open-access form will be published in 2018 on the MATEC Web of Conferences, indexed in WoS. Some papers are expected to be published in Polish in our media partner journals, i.e. TTS or Autobusy.



Photo 7: Pendolino train in the Alstom Workshop



Photo 8: Movable rigid catenary with a motorised arm in the Alstom Workshop