



Faculty of Automotive  
and Construction  
Machinery Engineering  
Warsaw University of Technology



University of Žilina



Armed Forces Academy  
of general M. R. Štefánik  
in Liptovský Mikuláš



Faculty of Mechanical  
Engineering  
Lublin University of Technology

# XV International Technical Systems Degradation Conference



Liptovský Mikuláš, 30 March - 2 April 2016



SDS Slovenská  
dopravná spoločnosť  
pri Slov. akadémii vied,  
Žilina



Polish Society  
of Tribology



The Maintenance  
Fundamentals Section  
of the Committee  
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Polish Society  
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## 15<sup>th</sup> INTERNATIONAL TECHNICAL SYSTEMS DEGRADATION CONFERENCE

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15<sup>th</sup> INTERNATIONAL TECHNICAL SYSTEMS DEGRADATION CONFERENCE

## CONFERENCE PROGRAMME of 15<sup>th</sup> ITSDC

### 30.03.2016 (Wednesday)

13<sup>00</sup>-14<sup>30</sup> – Registration (Armed Forces Academy of General M. R. Štefánik)

14<sup>30</sup>-14<sup>35</sup> – Opening ceremony of XV ITSDC

14<sup>35</sup>-16<sup>15</sup> – Plenary session – VEHICLES – S1

16<sup>15</sup>-16<sup>30</sup> – Coffee Break

16<sup>30</sup>-18<sup>30</sup> – Plenary session – STUDENTS SOCIETES – S2

### 31.03.2016 (Thursday)

14<sup>30</sup>-16<sup>10</sup> – Plenary session – IN MEMORY OF PROF. LIŠČÁK – S3

16<sup>10</sup>-16<sup>20</sup> – Coffee Break

16<sup>20</sup>-17<sup>00</sup> – Plenary session – DIAGNOSTICS – S4

17<sup>00</sup>-18<sup>30</sup> – Poster session of „*IN STATU NASCENDI*” works

### 01.04.2016 (Friday)

14<sup>30</sup>-16<sup>10</sup> – Plenary session – PASSIVE AND ACTIVE MAGNETIC METHODS  
IN TECHNICAL DIAGNOSTICS – S5

16<sup>10</sup>-16<sup>30</sup> – Coffee Break

16<sup>30</sup>-17<sup>50</sup> – Plenary session – RECONFIGURATION AND SELF-HEALING – S6

### 02.04.2016 (Saturday)

9<sup>00</sup>-12<sup>00</sup> – Summarizing session and closing of the Conference



15<sup>th</sup> INTERNATIONAL TECHNICAL SYSTEMS DEGRADATION CONFERENCE

## **SESSION 1 - VEHICLES (S1)**

**(Chairmen: doc. P. Spilý / prof. S. Radkowski)**

14:35 **Peter PERUN**

COMPARISON OF SMALL ARMS BARREL VIBRATION WITH SIMULATION

14:55 **Michal MOKRÝ, Peter DROPPA**

POSSIBLE WAYS OF MODERNIZING DRIVE SYSTEM OF IFV-2

15:15 **Marcin JASIŃSKI, Jędrzej MACZAK, Przemysław SZULIM**

CONCEPTION OF THE COLLISION AVOIDANCE SYSTEM FOR AUTONOMOUS AGRICULTURAL ROBOT

15:35 **Stanisław RADKOWSKI, Krzysztof SZCZUROWSKI, Damian WALCZAK, Łukasz ZIELIŃSKI**

SPECTRAL ANALYSIS OF VIBRATION GENERATED BY THE KNOCK IN DUAL FUEL ENGINE

15:55 **Roman POPROCKÝ, Jana GALLIKOVÁ**

FMEA AND CONDITION BASED MAINTENANCE



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## **SESSION 2 - STUDENT SOCIETIES (S2)**

**(Chairmen: prof. B. Żółtowski / prof. P. Droppa)**

- 16:30 **Maciej FOREMNY, Szymon GUDOWSKI, Michał MALESZA,  
Henryk BĄKOWSKI**  
TRIBOLOGICAL WEAR ESTIMATION OF THE ENGINE OILS USED IN  
DRIFTING
- 16:50 **Grzegorz SŁUŻALEK, Joanna ZAWADZKA**  
EMDRIVE WITHIN REACH
- 17:10 **Piotr MRÓZ, Sebastian BROL**  
SIMULATION MODEL OF PNEUMATIC-HYDRAULIC DRIVE
- 17:30 **Henryk BĄKOWSKI**  
THE TEST OF THE COOLING FLUID WEAR USED IN MOTOR VEHICLES
- 17:50 **Mateusz WĄSIK, Ryszard SKOBERLA, Michał SZMAJDUCH,  
Wojciech SKARKA**  
DESIGN OPTIMIZATION OF FRONT WHEEL RIM FOR ENERGY EFFICIENT  
CAR
- 18:10 **EC Test Systems**  
EC TEST SYSTEMS COMPANY PRESENTATION



15<sup>th</sup> INTERNATIONAL TECHNICAL SYSTEMS DEGRADATION CONFERENCE

## **SESSION 3 - IN MEMORY OF PROF. LIŠČÁK (S3)**

**(Chairmen: prof. P. Drożdziel/ prof. P. Droppa)**

- 14:30 **Lubomír KAŠIAR, Peter ZVOLENSKÝ, Dalibor BARTA,  
Paweł DROŹDZIEL**  
DIAGNOSIS LOCOMOTIVE CLASS 757
- 14:50 **Paweł DROŹDZIEL**  
THE INVESTIGATION OF VEHICLE AND ITS ENGINE MAINTENANCE
- 15:10 **Tomasz FIGLUS, Jozef GNAP, Tomáš SKRÚCANÝ, Branislav ŠARKAN,  
Andrzej WILK**  
DIAGNOSIS OF DAMAGE TO THE TENSIONER OF THE TIMING CHAIN  
BASED ON MEASUREMENTS AND ANALYSES OF VIBRATION SIGNALS
- 15:30 **Zbigniew MATUSZAK, Piotr TREICHEL, Marek JAŚKIEWICZ,  
Rafał JURECKI**  
DIAGNOSTIC MEASUREMENT OF A MARINE POWER PLANT  
GENERATING SET
- 15:50 **Adam GAŁĘZIA, Robert GUMIŃSKI, Marcin JASIŃSKI, Jędrzej MAĆZAK**  
DIAGNOSING TRAIN POWER UNITS - A CASE STUDY



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## **SESSION 4 - Diagnostics (S4)**

**(Chairmen: prof. B. Łazarz / prof. T. Figlus)**

**16:20 Mariusz ŻÓLTOWSKI, Branislav HADZIMA, Bogdan ŻÓLTOWSKI**

RESEARCH OF THE CHANGES STATE OF CRITICAL OBJECTS BY THE  
USE OF VIBROACOUSTICS

**16:40 Władysław ORŁOWICZ, Marek MRÓZ, Mirosław TUPAJ, Bogdan KUPIEC,  
Andrzej TRYTEK, Kazimierz SONDEJ, Leszek KOZAK**

A DEVICE FOR EVALUATION OF SCRATCH RESISTANCE OF DIE  
INSERTS USED TO FABRICATE STAMPINGS OF REFRACTORY  
MATERIALS



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## POSTER SESSION

### *„IN STATU NASCENDI” works*

(Chairmen: prof. J. Mączak / prof. S. Radkowski)

1. **Krzysztof BISKUP, Robert MRÓZ**  
MODIFIED ELECTRONIC CONTROL MODULES USED TO VEHICLE THEFTS
2. **Krzysztof BOGDZIŃSKI, Kamil LUBIKOWSKI, Jędrzej MAĆZAK, Stanisław RADKOWSKI**  
THE TEST BED FOR TESTING THERMOELECTRIC CELLS
3. **Krzysztof BORKOWSKI, Krzysztof ĆWIK, Krzysztof BISKUP**  
PASSIVE MAGNETIC METHODS - INTRODUCTION TO FORENSIC RESEARCH
4. **Anna BZYMEK**  
SURFACE DEFECT DETECTION WITH APPLICATION OF LINE SCAN CAMERA
5. **Lukáš BRIDIK**  
FEM MODEL OF 7.62 MM BULLET IMPACT WITH ARMOX 600T
6. **Jacek CABAN, Paweł DROŹDZIEL, Paweł KORDOS**  
THE TEST STAND FOR RESEARCH OF THE START-UP OF SINGLE-CYLINDER DIRECT-INJECTION DIESEL ENGINE
7. **Adrian CHMIELEWSKI, Robert GUMIŃSKI, Szymon GONTARZ, Jędrzej MAĆZAK, Łukasz SZABŁOWSKI, Marcin WOŁOWICZ, Łukasz SARNIAK**  
PROGRESS IN ENERGY SCIENCE: PROPOSITION OF HYBRID COGENERATION SYSTEM
8. **Adrian CHMIELEWSKI, Robert GUMIŃSKI, Jędrzej MAĆZAK**  
COMBINED DYNAMIC AND THERMODYNAMIC MODEL OF THE STIRLING ENGINE
9. **Adrian CHMIELEWSKI, Robert GUMIŃSKI, Jędrzej MAĆZAK, Przemysław SZULIM**  
RESEARCH ON ELECTROCHEMICAL BATTERY





15<sup>th</sup> INTERNATIONAL TECHNICAL SYSTEMS DEGRADATION CONFERENCE

**10. Rafal CZOK, Sebastian BROL**

THE USE OF A SIMULATION MODEL OF VEHICLE WITH PNEUMATIC-HYDRAULIC DRIVETRAIN FOR ESTIMATION OF SELECTED CHARACTERISTICS

**11. Tomasz FIGLUS, Jozef GNAP, Tomáš SKRÚCANÝ, Branislav ŠARKAN**

ASSESSMENT OF THE INFLUENCE OF SPEED ON CHANGE IN THE NOISE LEVEL GENERATED BY A TRUCK WITH A SEMI-TRAILER

**12. Tomasz FIGLUS, Mateusz KOZIOL**

VIBRATION METHOD FOR EARLY DETECTION OF DAMAGE TO POLYMER - GLASS FIBRE COMPOSITE LAMINATES

**13. Marcin FRAN CZUK, Łukasz TRZEWIK, Piotr SKAWIŃSKI**

CONCEPT OF DEVELOPMENT OF THE TRANSMISSION IN THE ULTRALIGHT VEHICLE HUSSAR

**14. Tomasz GAŁKA**

A NEW APPROACH TO DIAGNOSTIC SYMPTOM ASSESSMENT

**15. Norbert IZDEBSKI, Łukasz MIERNIK, Maciej KOWAL**

ULTRA - LIGHT URBAN ELECTRIC VEHICLE. CONCEPT AN INNOVATIVE CONTROL SYSTEM OF AN ELECTRIC CAR "PIAST" WHICH AIMS TO MINIMIZE CONSUMPTION OF ELECTRIC ENERGY

**16. Łukasz JEDLIŃSKI**

A NEW DESIGN OF GEARBOXES WITH REDUCED VIBRATION AND NOISE LEVELS

**17. Mateusz KALISCH, Piotr PRZYSTAŁKA, Anna TIMOFIEJCZUK**

A CONCEPT OF META-LEARNING SCHEMES FOR CONTEXT-BASED FAULT DIAGNOSIS

**18. Henryk KAŻMIERCZAK, Tadeusz PAWŁOWSKI, Krzysztof ZEMBROWSKI**

A NEW METHOD FOR DESCRIPTION OF CONSTRUCTIONAL MATERIALS STRUCTURAL DEGRADATION

**19. Maciej KOLBE, Wojciech SKARKA, Ryszard SKOBERLA**

DESIGN AND CONSTRUCTION OF LIGHTWEIGHT VEHICLE FRONT SUSPENSION SYSTEM

**20. Łukasz KONIECZNY**

SOME ASPECTS OF MODELING THE DAMPING CHARACTERISTICS OF CAR SHOCK ABSORBERS



15<sup>th</sup> INTERNATIONAL TECHNICAL SYSTEMS DEGRADATION CONFERENCE

21. **Lech KNAP, Michał MAKOWSKI, Adam GAŁĘZIA, Marcin JASIŃSKI**  
AN INVESTIGATION OF THE SOUND PRESSURE LEVEL GENERATED BY WATER FLOWING THROUGH NOZZLES
22. **Štefan KUNÁŠ, Peter DROPPA**  
PROPOSALS FOR INCREASE THE TENSILE CHARACTERISTIC OF THE VEHICLE ALIGÁTOR 4X4
23. **Łukasz KURKUS, Krzysztof SZCZUROWSKI**  
COMPARISON OF THE CONTROL ALGORITHM ENGINE FREE- PISTON WITH TWO-STROKE ENGINES
24. **Łukasz KURKUS, Michał TROJGO, Łukasz ZIELIŃSKI**  
DESIGN OF AUTONOMOUS PLATFORM USING A REMOTE CONTROL
25. **Jakub LORENCKI, Stanisław RADKOWSKI**  
SWITCHED RELUCTANCE MOTOR MECHANICAL FAULTS
26. **Kamil LUBIKOWSKI, Jędrzej MAĆZAK, Krzysztof SZCZUROWSKI**  
TEST BED FOR DEMONSTRATION THE SEEBECK PHENOMENON
27. **Bogusław ŁAZARZ, Tomasz MATYJA**  
MODELING OF BENDING-TORSIONAL VIBRATIONS IN SYSTEMS OF ROTATING SHAFTS CONTAINING A TRANSVERSE CRACKS
28. **Jarosław MAC, Jacek WOJCIECHOWSKI, Roman ROGACKI, Marcin SZCZEPANIAK**  
MODELING KINEMATIC AND DYNAMIC OF WHEELED MOBILE FIELD ROBOT
29. **Zbigniew MATUSZAK, Marek JAŚKIEWICZ, Józef STOKŁOSA**  
EXERGY LOSSES IN A MARINE BOILER
30. **Michał OLSZEWSKI, Wojciech SKARKA, Mateusz WĄSIK**  
DESIGN AND CONSTRUCTION OF LIGHT VEHICLES STEERING SYSTEM
31. **Irena OZIMEK, Dominika BUZEK, Krzysztof BISKUP, Robert MRÓZ**  
PULSATING MAGNETIC FIELD FOR THE PRESERVATION OF FOOD
32. **Irena OZIMEK, Julita SZLACHCIUK, Krzysztof BISKUP, Grzegorz OZIMEK**  
PROTECTION OF THE RIGHTS OF CONSUMERS USING THE SERVICES OF TRANSPORT
33. **Piotr SADOWSKI**  
ACQUISITION OF INFORMATION ENCODED IN ELECTRONIC COMPONENTS



15<sup>th</sup> INTERNATIONAL TECHNICAL SYSTEMS DEGRADATION CONFERENCE

34. **Grzegorz SŁUŻALEK, Piotr TELEPKO, Łukasz WOŹNIAK**  
BOLID NOT ONLY FOR RACETRACK
35. **Krzysztof SZCZUROWSKI, Damian WALCZAK, Łukasz ZIELIŃSKI**  
THE PROPOSAL OF MODEL APPROACH OF COMBUSTION PRESSURE CHANGES DURING KNOCK IN DUAL FUEL ENGINE
36. **Agnieszka SZEGDA, Sebastian BROL**  
WHEEL SPEED DETECTION PNEUMATIC ON BASED THE MAGNETIC FIELD
37. **Przemysław SZULIM, Marcin JASIŃSKI, Jędrzej MAĆZAK**  
OVERVIEW OF THE VISION SYSTEMS USED IN A SMART AGRICULTURE
38. **Michał TROJGO, Krzysztof SZCZUROWSKI, Łukasz ZIELIŃSKI**  
ANALYSIS OF THE POSSIBILITY OF VEHICLE POWERTRAIN CONFIGURATION WITH CVT TRANSMISSION
39. **Michał TROJGO, Łukasz ZIELIŃSKI, Damian WALCZAK**  
MODIFICATION OF THE CONTROL MAPS OF DIESEL ENGINE DUE TO INCREASING THE SHARE OF LPG
40. **Dominik WACHLA, Anna BZYMEK, Mateusz KALISCH, Wojciech MOCZULSKI, Piotr PRZYSTAŁKA**  
DISESOR.DIAG AS A TOOL FOR ACQUISITION OF DOMAIN KNOWLEDGE OF MACHINERY AND PROCESSES
41. **Damian WALCZAK, Łukasz ZIELIŃSKI, Michał TROJGO**  
ANALYSIS OF EMISSION DUAL FUEL ENGINE IN A VARIETY OF CONFIGURATIONS CONTROL THE ADDITION OF LPG
42. **Damian WALCZAK, Łukasz ZIELIŃSKI**  
THE CONTROL STRATEGY OF LPG ADDITION BASED ON A NUMBER OF INPUT SIGNALS
43. **Mateusz WĄSIK, Wojciech SKARKA**  
AERODYNAMIC OPTIMIZATION OF DRONE PROPULSIONS FAIRING COVER
44. **Przemysław WINIARSKI, Sebastian BROL**  
CONCEPTION OF RECOVERY ENERGY SYSTEM IN PNEUMATIC HYDRAULIC HYBRID VEHICLE
45. **Maciej ZAWISZA**  
SENSITIVITY OF VIBROACOUSTIC SIGNAL MEASURES OF MECHANICAL FAULT NOT-DETECTED BY THE OBD SYSTEM OF DIESEL ENGINES



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**46. Krzysztof ZEMBROWSKI, Tadeusz PAWŁOWSKI, Henryk KAŻMIERCZAK**  
**CHARACTERISTIC OF LOAD-DEGRADING SUBSTRATE DURING WORK ON**  
**WETLANDS**



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## **SESSION 5 - PASSIVE AND ACTIVE MAGNETIC METHODS IN TECHNICAL DIAGNOSTICS (S5)**

**(Chairmen: dr. S. Gontarz / prof. S. Radkowski)**

**14:30 Szymon GONTARZ**

PASSIVE MAGNETIC METHODS AS A SOURCE OF INFORMATION ABOUT TECHNICAL OBJECTS

**14:50 Łukasz BOHDAL, Szymon GONTARZ, Dorota JACKIEWICZ, Radosław PATYK**

THE INFLUENCE OF MECHANICAL CUTTING TECHNOLOGY ON QUALITY OF CUT SURFACE AND MAGNETIC PROPERTIES OF GRAIN ORIENTED SILICON STEELS

**15:10 Szymon GONTARZ, Łukasz KURKUS, Michał TROJGO, Łukasz BOHDAL, Radosław PATYK, Stanisław RADKOWSKI**

PROJECT AND CONSTRUCTION OF THE COORDINATE MEASURING MACHINE FOR PASSIVE MAGNETIC MEASUREMENTS

**15:30 Przemysław SZULIM, Stanisław RADKOWSKI**

MODELING MECHANICAL FAULTS IN AN ELECTRIC BLDC MOTOR FOR DIAGNOSTIC PURPOSE

**15:50 Krzysztof ĆWIK, Krzysztof BISKUP, Robert MRÓZ**

PASSIVE MAGNETIC METHODS - OVERVIEW OF DEVICES AND MEASUREMENT TECHNIQUES



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## **SESSION 6 - RECONFIGURATION AND SELF-HEALING (S6)**

**(Chairmen: dr. J. Seńko / prof. J. Mączak)**

16:10 **Jarosław SEŃKO, Witold LUTY, Karol SZTWIERTNIA**

METHODOLOGY OF EXPERIMENTAL TEST FOR UNMANNED LAND PLATFORMS

16:30 **Jarosław SEŃKO, Andrzej WĄSIEWSKI, Edyta PALMOWSKA**

SELF-HEALING BEARINGS OF DRIVE SYSTEM IN UNMANNED LAND PLATFORMS

16:50 **Witold LUTY**

SPECIAL WHEELS FOR LIGHT AUTONOMOUS VEHICLES AND ROBOTS

17:10 **Michał MAKOWSKI, Lech KNAP**

NUMERICAL INVESTIGATIONS OF A VEHICLE WITH RECONFIGURABLE AND FAULT-TOLERANT SUSPENSION

17:30 **Jarosław SEŃKO, Łukasz KURKUS, Łukasz ZIELIŃSKI**

POWER SYSTEMS OF UNMANNED LAND PLATFORMS ORIENTED TO RECONFIGURATION



15<sup>th</sup> INTERNATIONAL TECHNICAL SYSTEMS DEGRADATION CONFERENCE

## PLACE OF THE CONFERENCE

Akadémia Ozbrojených Síľ generála M. R. Štefánika.

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