

International Conference on
Clean, Efficient & Safe Urban Transport

CESURA'03, Gdansk, June 4 – 6, 2003

Paper Abstracts

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Info Day

Ferdinand Kaser

6th Framework Programme for RTD

No abstract available.

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Info Day

Piotr Świątek

EU-funded projects / Co-operation with Germany

No abstract available.

KoWi, Germany

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Info Day – Welsh Workshop 1

Martyn Jeffries, Gregg Jones

**Experience of Wales and the University of Glamorgan in
obtaining EU funding / Co-operation with Wales**

PowerPoint presentation. No abstract available.

University of Glamorgan, Wales, UK

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Info Day – Welsh Workshop 1

Gregg Jones

The Wales European Centre

PowerPoint presentation. No abstract available.

University of Glamorgan, Wales, UK

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Info Day

Jos Zuallaert

The Mobility Covenant Programme in Flanders: concept, implementation and evaluation

In 1996- 97 the Government of Flanders introduced the mobility covenant as a new organisational instrument to enhance a local and urban sustainable mobility policy. This new policy aims at traffic safety, liveability, selective accessibility and environmental concerns. Early 2003, almost all 309 Flemish municipalities are in the process of drawing a sustainable mobility scheme and an important number of mobility schemes are being implemented. The mobility covenant structures an innovative partnership between the Flemish road administration, the municipalities and the public transport agency (De LIJN) under the umbrella of a so-called taskforce 'mobility covenant programme'. The paper elaborates on the content of the covenant, basically the mobility scheme and the (project) modules. In 2001 the Flemish Administration carried out a SWOT analysis. The analysis showed a growing support of the different stakeholders for the mobility covenant policy. In general the municipalities see the instrument as an added value with respect to the earlier fragmented and instrumental planning process. We refer to the main features of some of the best practice examples of Hasselt, Gent, Mol and Geel, cases that are dealt with in a separate workshop.

MobiMind, Belgium

Brendan Finn*, Giorgio Ambrosino**

FAMS: Developing a Flexible Agency for Flexible Mobility Services (FAMS FP5 project)

This paper presents developments in the domain of flexible mobility services for citizens, mostly being demand responsive transport (DRT) services. It describes the different degrees of freedom for such services – route, timing, vehicles – and describes the emerging service concepts and how Intelligent Transport Systems (ITS) have emerged to allow effective and efficient DRT. The FAMS project moves beyond stand-alone DRT services to create a new concept of a 'Flexible Agency' which is designed to meet the needs of a collective of flexible mobility services, and is based on an e-business platform. The paper shows how the Agency has a "Customer Acquirer" role through a series of B2C function, and a "Resource Integrator" role through a series of B2B functions. Both the technological and the business case dimensions of these value-adding agencies are considered from the perspective of operators, the agencies and technology suppliers.

* European Transport and Telematics Systems Ltd, Ireland / **ATAF S.
P.a., Italy

Marcel Huschebeck

The BESTUFS project: a Thematic Network towards the efficient movement of goods in urban areas

PowerPoint presentation. No abstract available.

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Info Day

Antoni Szczyt

The Strategy of Popularising Cycling as a Means of Transport

The City of Gdańsk lies on the crossroads of two major European cycling routes, the "Baltic Sea Circuit" and the "Baltic Sea to Adriatic Sea" route. Thanks to the endeavours of the municipal authorities in 1992-2002 the city gained about 30 km of cycle tracks, including a very attractive route running along the seashore all from Gdańsk through to and including Sopot. The role of the bicycle transport can become more prominent in Gdańsk so that it may account for up to 10% of the city traffic over the next 10 years. This is the goal woven into the Gdańsk 2010 Development Strategy. To reach it, however, the cycling track network must be expanded to at least 150 km in total. The projects completed to date were undertaken either as self-standing ventures (e.g. Jana Pawła II Street through to Jantarowa Street) or included in larger road-building works (Potokowa Street). Gdańsk is also a stop on the way of two routes of the EuroVelo European Cycle Route Network, the Baltic coast "ring route" (R-10) called the „Hanseatic Route”, and the route leading from Gdańsk to Trieste / Pula on the Adriatic Sea, called the „Amber Route”. „The Concept of a Cycling Track Network in the City of Gdańsk and the Conceptual Plan of a Cycling Thoroughfare along the Main Traffic Route across Gdańsk” envisages that the Hanseatic Route will follow the shoreline crossing the Main City on the way, while the Amber Route will cut across the Main City from the terminal in Nowy Port and onwards south along the Radunia Canal. The venture currently in progress is the „Gdańsk Cycling Investment and Promotion Project” pursued under the operational programme No. 11 of the Global Environment Facility. Our aim is to build ca 30 km of separate cycling tracks in the city within the next two years. The secondary objective is to slow down the car traffic along ca 70 km of streets and roads.

Gdańsk City Hall

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Info Day

Maciej Warszawski

CIVITAS/Tellus FP5 project

Opening the EU aid programmes for Poland created a large opportunity for the cities which may apply to growing number of agencies for co-financing their duties. There is a large number of European programmes and initiatives through which Polish cities may try to implement their ideas. In the future after joining the EU those possibilities will increase significantly. However to be able to compete on the European market with other entities in applying for co-financing the Polish cities should be more experienced in this field. In spite of the typically scientific character of the 5th EU Framework Programme there are many issues of interest for the cities itself. In the framework of this programme The Commission has established its initiative called CIVITAS. CIVITAS (“City-Vitality-Sustainability”), a major urban transport initiative supporting demonstration projects in a number of laboratory cities across Europe, is a key element of the new strategy on Clean Urban Transport prepared by the European Commission’s Directorate-General for Energy and Transport. Fifty million Euro have been allocated to co-finance innovative and ambitious city-wide packages of measures.

City Hall of Gdynia

Frédéric Davanture*, Brendan Finn**

New Organisation and Management Model for the Public Transport in Gdansk – suggested solutions and implementation conditions

The City of Gdańsk is considering new Organisation and Management models for the urban public transport in Gdańsk. This is needed both to improve the public transport, and to meet forthcoming EU regulations on the market for public transport services. This paper describes the development process. After setting the context within Gdańsk, the international trends in public transport and markets are described, including the new EU regulation. Five alternative organisational models have been considered for Gdańsk, with the recommended option being to separate the planning and operation functions and move to competitive tendering where the City of Gdańsk becomes the 'Client' for public transport services. After describing the elements of the Organisational Model, the authors consider a number of practical issues confronting the implementation. In fact, these are issues of policy and of balancing diverse interests, and will require either good balance or firm decisions in order to progress.

Ryszard Krystek, Joanna Żukowska

National Road Safety Programme GAMBIT 1999

In 1989 Poland gained political and economic independence and moved from a centralised economic system to a free market one. The new social and economic conditions facilitated Poland's quick economic growth and the rate of motorisation is one of its indicators. Unfortunately, the growing motorisation was not accompanied either by preventive action or road network construction. As a result, the number of road accidents and casualties soared. It was only after the World Bank published its 1992 report "Road Safety in Poland" that the government appointed the National Road Safety Council, followed by a 1994 decision of the Minister of Transport to commission the "Integrated Road Safety Programme", under the acronym of GAMBIT'96. The Technical University of Gdansk was asked to co-ordinate work on the multidisciplinary project. In 1999 the World Bank initiated Global Road Safety Partnership, a world-wide project which in Europe was to be carried out by three countries: Hungary, Romania and Poland. The main reason why Poland was selected for the GRSP Europe project was no doubt the Integrated Programme GAMBIT'96, a network of regional road safety councils and several regional implementations of the GAMBIT Programme. The start of the Polish GRSP coincided with a contract for a new version of the road safety programme called GAMBIT 2000 commissioned by the Minister of Transport. The programme was approved by the Council of Ministers in May 2001 as the National Road Safety Programme for Poland for the period 2001-2010. By virtue of the decision the programme has received the status of a national programme that would enable allocation of funds from the central budget in the top-down budget line.

Katarzyna Hebel, Olgierd Wyszomirski

The organizational framework of clean, efficient and safe urban transport

The transformation of urban public transport in Poland began in 1992. The most difficult problem was to find the model of organization and management of the urban transport sector in which it would be possible to introduce competition and to maintain the role of the local authorities as the main one. Gdynia is one of the best examples of introducing competition in to the urban transport system. The restructuring process of the urban transport system in Gdynia has been divided into some stages and is still going on. The results of introducing competition in Gdynia's urban public transport system are the improvement of both quantity and quality of service. The passenger postulates are estimated in marketing research. They assign the directions of the development of the urban transport system.

Martyn Jeffries, Gregg Jones

Experience of Wales and the University of Glamorgan in obtaining EU funding / Projects Overview

PowerPoint presentation. No abstract available.

Marcel Huschebeck

The BESTUFS project: Conclusions and Recommendations

PowerPoint presentation. No abstract available.

Giorgio Ambrosino*, Walter Scapigliati**, Marco Boero***, Henrik Jess Jensen****,

**The European Project eDRUL: a B2B platform for freight
distribution in city areas**

eDRUL is a relevant European Project founded by the EU FP5 IST R&D Programme, started on April 2002 spanning to 2004 and coordinated by Siena Parcheggi SpA, the Mobility Agency of the Siena City (Italy). The overall objective of eDRUL Project is to investigate, develop and validate an innovative B2B/B2C architecture / IST platform for improving the freight/ parcels distribution and supporting logistic processes in urban/city area. The eDRUL solutions/architecture will be demonstrated, tested and validated, at different levels, in 4 cities/sites (Italy, Portugal, Netherland and Denmark) with different area characteristics and well-defined mobility policies and ITS transport infrastructures/mobility services. The paper will describe the overall context, the concept and system approach and innovation in eDRUL respect to the City mobility schemes and organization.

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Special Workshop on Mobility Management 1

Bruce James

Nottingham Partnerships - The Big Wheel Experience

There are a wide range of public-private sector partnerships established in Nottinghamshire with very different levels of cohesion and influence covering a variety of social, economic and environmental issues. Some are of a temporary nature, only established for the lifetime of a specific project while others are much more long lasting but with a wide remit and limited influence. The Greater Nottingham Transport Partnership (GNTP) seeks to be permanent in nature, to influence a wide range of transportation activities but to focus on those in which it can really make a difference. The aim of the GNTP is "to create a dynamic conurbation where people and goods flow speedily and economically". The GNTP supported the development of a campaign to raise awareness to support the need for developing a more sustainable transport system for Nottingham. The campaign operates under the brand of "Big Wheel".

Transport Investment Consultant, City of Nottingham, UK

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Special Workshop on Mobility Management 1

Godrun Uranitsch

MOBILE - Innovative Communication Strategies and Experiences learnt in the EU Life Project in the City of Linz, Austria

For 3 years (1997 – 2000) the City of Linz (in co-operation with Austrian Mobility Research) had worked on a sustainable urban mobility programme designing and implementing various "communication packages". This project was called 'MOBILE' (Innovative Mobility Concept for a Medium-sized European City to Improve the Quality of Living and of the Environment) and was co-financed by the European Union (DG XI, Life Environment project). To achieve a lasting improvement of the inhabitants' travel patterns MOBILE attempted to show that mobility and quality of living are no mutually excluding phenomena but can be experienced as one common phenomenon. MOBILE included 6 modules which offered a wide range of alternatives to motorised traffic and which aimed at promoting environmentally sound patterns of mobility for various target groups.

Austrian Mobility Research, Gratz, Austria

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Special Workshop on Mobility Management 1

Bruce James

Involving Local Communities in Mobility Management - The TravelSmart Lessons in Perth, Australia

This paper provides a brief outline of the TravelSmart Individualised Marketing programme undertaken in Perth Western Australia. The information is embedded within a campaign framework that the programme was sold to key decision makers. The most up to date results of the latest large scale application are also presented.

Manager, Balanced Transport Systems, Department for Planning and
Infrastructure, Western Australian Government, Australia

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Special Workshop on Mobility Management 1

Jos Zuallaert

Effective communication strategies and packages in the cities of Hasselt, Gent, Mol and Geel, Flanders

The introduction of the mobility covenant programme in Flanders created a demand for innovative communication strategies and packages with the public in general, and with target groups or stakeholders in particular. To avoid the pitfall of technocracy and 'dead'-end costly exercises in sustainable mobility schemes, public support becomes indispensable. Information and communication initiatives, mobility management packages, interaction with stakeholders on the demand-side were launched as an integrated and essential part of the new urban mobility policies. In this paper some Flemish best practice cases in effective communication are presented. The successful and popular Hasselt SAM case is characterised as a multi targeted action campaign to support the overall municipal mobility policy. The Gent case is an effective top – down campaign and actionprogramme for a liveable city. The success factor in the Gent case is the political commitment, willingness and leadership. The two small-scale city cases, Mol and Geel, are characterised as an effective and interactive partnership with the educational community.

MobiMind, Belgium

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Special Workshop on Transport Planning and Land Use

Carlo Sessa

Integrated transport and land use strategies to achieve sustainable transport: the experience of the TRANSPLUS project

The paper discusses the contribution that integrated land use and transport planning can give to the goal of a more sustainable urban transport across Europe. It presents the basic concepts of mobility and accessibility planning, and the potential benefits and challenges that integration of transport and land use poses to policy makers and experts. These are the core subject of the Land Use and Transport Research (LUTR) cluster of projects, funded under the European Commission's City of Tomorrow and Cultural Heritage key action. The paper will focus in particular on the experience matured in one of the LUTR projects – TRANSPLUS: Transport Planning, Land Use and Sustainability - and on the ways to identify successful policies and the potential successful transfer between contexts. Deliverables of the TRANSPLUS project are available on request from the project site www.transplus-net.com

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Special Workshop on Transport Planning and Land Use

Wojciech Zalewski*, Jan Bogusławski**

Transport and Land Use Planning: the example of Tri-City (Gdansk, Sopot, Gdynia) area

The Institute of Environmental Protection in 2002 joined the 5th FP TRANSPLUS Project. The target of the TRANSPLUS Project is to develop planning tools and best practices aimed at managing future transport demand through integrated land-use and transport planning, reducing individual motorised vehicle movements and encouraging greater use of collective and other sustainable transport modes. The Institute of Environmental Protection in the Project is responsible for the analysis of Tri-City (Gdansk, Gdynia, Sopot) Case Study. The paper presents in a very shortened form the results of the work concerning the Case Study analysis, which has been done up to the present, including following main elements: general information on Tri-City area, identification and assessment of problems, the context of the spatial and transport policies of the cities, spatial and transport policies in Tri-City area, implementation programmes and projects in Tri-City area, tools and processes supporting policies and projects, barriers in planning and implementation, conclusions.

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Plenary Session

Maciej Berendt*, Jan Friedberg**

**Changes in Transport Related Behaviour of Gdansk Inhabitants
in the Period 1998 - 2002**

The Gdansk Urban Transport Project – an undertaking sponsored by EBRD and organised by the City of Gdansk – have brought an occasion to provide new edition of comprehensive transport behaviour survey in 2002. The aim of these surveys within the GUTP Programme was to investigate market opportunities in current and foreseeable future of public transport services in Gdansk. A previous such a survey (1998) have brought wide range of data and methodology, this time it has been a case to observe time related phenomena. The survey was conducted in three parts: (i) home interview on overall transport behaviour, (ii) home and on-street interview on transport preferences, (iii) traffic counts on the network. These three surveys allowed to present wide range of information on transport market and provided data for forecasts. The main results of these surveys show that there is a constant mobility in general terms while significant changes are within the structure of this. Due to unemployment the mobility related to work trips have decreased as those related to non-home based trips increased.

* BIK Gdańsk / ** Systra Gdańsk, Poland

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Plenary Session

Stuart Cole

Provide and Promote: Transport In Wales 2040

No abstract available.

University of Glamorgan, Wales, UK

Jean Paul Richard

Development of Supra-National Regulations and their Impact - Urban Guided Transport Management System (UGTMS project)

Many urban rail systems have over the last thirty years been equipped with transport management system covering train supervision, automatic train protection, automatic train operation and, more recently, driverless or unattended operation. The main suppliers have developed individual systems and each operator mainly uses products built in his own country. Several initiatives (European UGTMS research project, UGTMS IEC WG40 working group, ...)aim to improve this situation in the field of research, standardisation and rules and contribute to create a range of innovative, interoperable and interchangeable technological solutions. On one hand supply industry will rationalize production, achieve economy of scale and promote Win/Win strategies. On the other hand operators will offer more attractive, user friendly, flexible, safer and secure public transport.

Mariusz Kołkowski

Improvement of Safety on Polish roads by use of Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) are regarded in EU, USA and other countries as the most efficient way to improve quality of transport: improve its safety and efficiency, reduce negative environmental impact etc. ITS helps to make full use of existing infrastructure. Instead of spending billions on new roads decision makers in developed countries very often prefer to spend millions on ITS and achieve similar goals. The presentation shows a concept of a automatic enforcement system based on ITS systems: such as speed, red light and overweight enforcement and its impact on traffic safety. Revenue from tickets from violating drivers might be used for transport investments and in this way improve its quality too. Traffic Management System is a next example of ITS system, used in this presentation, which significantly improves transport quality.

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Plenary Session

Paul Riley

Achieving a new quality of urban and regional public transport in Central and Eastern Europe (VOYAGER project findings)

VOYAGER is an initiative of the European Commission's Directorate General for Transport & Energy, Clean Transport Unit and managed by UITP. The objective of the project is to create a vision and make recommendations (to the EU, national, regional and local government and other key stakeholders) for the development of sustainable high quality European local and regional public transport systems for the year 2020. This paper summarizes initial findings on current issues identified within VOYAGER for the Accession countries. A state of the art study and expert meeting in Bristol has shown that despite many positive examples, most Accession countries are making relatively slow progress towards implementing new and renewed infrastructure, modern measures, technologies and policy ideas in their public transport systems. Particular problems are found in the areas of sustainable financing, know-how and the will for change.

Babtie spol. s.r.o., Prague, Czech Republic

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Plenary Session

D L Hawkes*, J Maddy*, S Cherryman*, F R Hawkes**, R M Dinsdale**, A J Guwy**, G C Premier*, S Cole*

Sustainable Hydrogen in Wales as a Clean Fuel for Urban Transport

The paper examines the drivers towards using hydrogen as a Clean, Efficient & Safe Urban Transport fuel in the future. It briefly reviews the major hydrogen production routes at present and examines some possibilities for sustainable production in the future together with costs of production either actual or estimated. Problems of storage and distribution are discussed and research into promising developments are examined at. Examples of some modern demonstration transport projects are given.

* School of Technology University of Glamorgan, Pontypridd, Wales, UK
CF37 1DL / ** School of Applied Sciences University of Glamorgan,
Pontypridd, Wales, UK

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Special Workshop on Mobility Management 2

Guido Müller

Mobility Centres as Key Elements for Multi-Modal Services – Results from the MOST Project

Mobility centres provide multi-modal services to the customer and are a central instrument of a mobility management approach. Being developed in the 90's in Germany they have now spread to several countries. With their evolving operation, their effect within a sustainable transport policy is an important issue. The EU-project MOST has evaluated existing data of several mobility centres with regard to use, customer satisfaction or their influence on travel behaviour. The mobility centres experience rising customer numbers and generally a good customer satisfaction. There are slight indications about positive impacts on travel behaviour but more evaluation work is certainly needed. For support MOST has developed a specific Monitoring and Evaluation Toolkit. Overall multi-modal mobility centres have by now demonstrated their value for a sustainable transport policy. Their integrative nature, however, poses practical challenges regarding co-operation and secure financing.

Research Institute for Urban and Regional Development of the Federal
State of North Rhine-Westphalia (ILR), Dortmund, Germany

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Special Workshop on Mobility Management 2

Gudrun Uranitsch

Mobility Management in Schools - New Teaching Methods for a Sustainable Mobility Education Using Creative Media

For more than eight years Austrian Mobility Research has been breaking new ground in terms of project development and project implementation. We attempt to apply Action Research approaches rather than methods of Basic Research for collecting and analysing data on people's personal attitudes towards different means of transport and their travel behaviour. Thus, the key element of our educational projects in Austrian Schools is to stimulate an awareness-raising process by using creative media and new teaching material like competitions and mobility games. The approach is one of the promising techniques, which are currently being applied in the field of urban mobility management in general and in the field of home-to-school travel in particular.

Austrian Mobility Research, Gratz, Austria

Sarah Wixey

Developing Mobility Management Strategies for Different Target Groups: Evidence from the MOST Project

Mobility Management can be applied to a wide range of circumstances. The aim of the paper is to show that different Mobility Management services are suited to different target groups. The paper will use the experiences drawn from the MOST project to show which services suit which target groups best. The paper begins by introducing the need for mobility management. It goes on to explain the MOST project and the different target groups, namely staff and employees; pupils and students; tourists and visitors; disabled people; the unemployed and residents. Each discussion about the target groups will look at a) the specific services that suit each group and b) how individuals from each group can be included in the Mobility Management process. The paper concludes with a set of comparisons between the different target groups and offers some lessons for the future.

Andreas Lieberum

The role of Car-Sharing as an alternative mobility service to improve the quality of life in urban areas (with the example Bremen)

Several co-operations have been established between Public Transport and Car-Sharing, mainly in Germany, Switzerland, Austria and the Netherlands. The already existing results are promising: Car-Sharing is part of a mobility service provision, which is a full alternative to the ownership of a private car. Car-Sharing brings Public Transport out of the usual role as stopgap for car-owners - back to be a basic modal choice.

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Example transport projects sponsored by the EU's Structural Funds

Paolo Frosini*, Walter Scapigliati,
Giorgio Ambrosino**, Antonio
Liberato***, Francesca Agostini*****

**Urban Mobility and Freight Distribution Service: the 14 Cities of
MEROPE Interreg III B Project**

MEROPE is an INTERREG III B MEDOCC (Western Mediterranean) area project started on September 2002 and ending on September 2004. In particular MEROPE aims to face the following axe and measure of INTERREG III B work plan: axe 3 -Transport systems and information society; Measure 3.4 -Innovative communication and information technologies for the development of the territory.

* Regione Toscana- Area delle politiche regionali dell'innovazione e della ricerca, Firenze / ** Siena Parcheggi SpA, Siena / *** MemEx, Srl, Livorno, Italy

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Example transport projects sponsored by the EU's Structural Funds

**Umberto Bianconi*, Alessandro Alfaioli*,
Renato Bellini**, Francesca Agostini**,
Giorgio Ambrosino*****

**Increasing Harbour Efficiency and Security: the SESTANTE
Interreg III B Project**

The general objective of MEROPE project is to investigate and develop evaluation models and telematic instruments to manage and control mobility and logistic in urban and metropolitan areas in order to allow the development and application of innovative information and communication technologies (ICT) as a support of integrated transport systems. The expected impacts of the project are: a greater economic competitiveness, an improved mobility and quality of life.

Regione Toscana- Area Porti, Interporti e Centri Intermodali, Firenze / MemEx, Srl, Livorno / GA Consultancy, Livorno, Italy

**Piotr Bujło* **, Jacek Chmielowiec*,
Agnieszka Halama*, Grzegorz Paściak***

Main and basic issues connected with PEMFC's production and operation

PEMFC's (Polymer Electrolyte Membrane Fuel Cells) are very interesting on the point of view of their advantages and possibility of use as alternative energy sources and the most developing fuel cell type in recent years. In spite of uncountable advantages and many possibilities of application there are still limitations for commercialisation caused of high costs of production and relatively short life time. Better understanding of electrochemical reactions and mechanisms of charge transfer as well as investigation of influence of working conditions on the fuel cell parameters is essential for further development of reliable energy source. Existing production process barriers should be well known and overcome as soon as possible. In order to decrease price of PEMFC's new cost effective materials for fuel cell applications are needed. Presented preliminary research of new, elaborated in IEL/OW, materials for fuel cell applications are promising and tests results present influence of working conditions on the fuel cell parameters.

**Denis Candusso, Elisabeth
Rulliere, Ianko Valero**

A fuel cell hybrid power source for a small electric vehicle

Proton Exchange Membrane Fuel Cells (PEMFC) can be used in a variety of power-train configurations ranging from an exclusively fuel cell engine to hybrids that utilise some ratio of fuel cell and other sources such as batteries, flywheels, supercapacitors... which provide the peaks of power. We show the interest of a hybrid PEMFC source by comparing two power-train configurations for a small Electric Vehicle providing an average power of 2 kW and a maximum power of 9 kW. The first configuration includes a 9 kW PEMFC as an electric source and the second one associates a 4,5 kW Fuel Cell and supercapacitors able to provide 5 kW for a few seconds. The comparison is performed by simulating the two configurations thanks to ADVISOR software (ADvanced VehIcule SimulatOR). We have also been able to test different power control strategies. The simulation is performed on a traditional urban cycle as well as on another one corresponding to long distance running.

Christophe Turpin, Rémi Saisset, Didier Flumian, Stéphan Astier

Design and Simulation of a Fuel Cell Hybrid Electricity Generating Unit

The authors are interested in the realisation of the function "electricity generator" starting from a PEM fuel cell. As they show it, reflections and methodologies proposed in this paper are applicable to numerous applications different from the considered system. Their aim is to develop a low power electricity generating unit structured around a 200W PEM fuel cell (energy source) and ultracapacitors (power source) delivering a standardised single-phase voltage. Firstly, the authors describe the properties of a PEM fuel cell : its operation principle, its technology and its implementation, its dimensioning and its electrical use. Secondly, they present the design, the energy management and the simulation of the studied electricity generating unit. An original control of the fuel cell voltage is proposed.

Denis Candusso*, Elisabeth Rulliere*, Ianko Valero*, Jean-Philippe Poirot- Crouvezier**

A demonstration vehicle with a proton exchange membrane fuel cell hybrid energy source

The aim of this realization is to provide a demonstrator fed by a modular hybrid source and validate the simulation work, which highlighted the interest of hybridization. We used a small robot shown on figure 1; its mass is 30kg and its dimensions on the ground are 400x400 mm². A 60W DC brushless motor drives each front wheel; there are also two free rear wheels, so that the robot can move forward, backward and turn round. The robot is controlled thanks to a manual joystick. The energy source is composed of a battery and the fuel cell (FC). The fuel cell has been realised by the Commissariat a l'Energie Atomique - C.E.A. Pure hydrogen and oxygen supply it. Its gross power is 250W and it is composed of 14 cells. The battery is a 7 Ah Pb battery. A DC/DC converter has been inserted between the FC and the DC bus in order to control the DC bus voltage, which should be 24V or so. We give experimental results (current, voltage in the different components of the source) and compare them to the simulated curves. The Matlab/Simulink model of the hybrid source is different depending on the frequency of the phenomena that are considered. At last, we present some prospects such as validating energy management strategies or optimising hybridisation according to the driving profile.

Jacek Januszewski

GPS and other satellite navigation systems in urban transport

In urban transport the knowledge of the actual position of the car is one of the most important elements, which determines the economic aspect and the safety. At present (April 2003) this position can be obtained by the use of satellite navigation systems, in particular GPS system. In urban area the possibility of fix position and its accuracy depend on the number of satellite visible above masking elevation angle, the geometry of the system, the dimensions and location of the obstacles, like the heights of the buildings (B), the width of the street (L) and the angle between the North and street axis (?). The calculations were made for the observer situated in the middle of the street for different values of B, L and ? at different latitudes for two systems – GPS and Galileo, new system under construction in Europe. The resulting of position fix and overall accuracy are greater for Galileo than for GPS system.

Pawel Zylka

Piezoelectric cable sensors in traffic monitoring

Velocity and the load of vehicles are factors important not only from the point of road transport safety view but also the ones that strongly affect road quality and durability. Other factors influencing the safety are related to observing some important traffic regulations like red-light-no-entry or ban on continuous white line crossing. Therefore, easy to install and low-priced means of control are urgently needed for monitoring of those quantities and objectively monitor violation of the Highway Code. Applicable devices should conform to a concept of decentralised automated system auditing the traffic and documenting violation of its regulations.

Mariusz Kołkowski

Integrated System for Automatic Speed/Red Light Enforcement of Road Vehicles

Speed and red light enforcement systems are used in EU, USA and other countries as key factor to enforce drivers to obey traffic regulation and in this way to reduce number of accidents, injuries and casualties. Such systems dramatically improves traffic safety, since less drivers brakes speed limits and passes red lights. Moreover efficient enforcement systems provides income from tickets from violating drivers, which might leverage safety by additional safety investments. The presentation shows speed and red light enforcement system, which might be easily implemented in Poland.

Kazimierz Jamroz, Jacek Oskarbski

Tri-City intelligent transportation system -TRISTAR

Intelligent Transportation Systems provide many tools such as advanced management traffic systems or emergency systems to improve transportation systems. Towns of Tri-City Agglomeration started to work out conceptions of traffic management systems according to agreement established in Sopot in 2002. The paper concerns description of agglomeration system - the first stage of conception works.

Renato Rizzo

Hierarchized digital control of logistics systems: handling and tracing applied to the railway transport case

In intermodal systems there are some logistic problems due to the handling and monitoring of loads. In such a framework the railway transport could represent a good alternative to road transport if some improvements are introduced to make it more attractive and competitive for end users. Some critical aspects in transport logistics organization are analysed in the paper. These aspects are, in particular, the system for individuation and location (monitoring) of the loads, the current logistic procedures and referred regulations. A Hierarchized Digital Control of logistics systems for handling drives and tracing of goods is proposed.

Zygmunt Szymański

Intelligent twin rotor drive system for hybrid vehicles with random modulation techniques and with fixed switching frequency

The paper presents a survey of the wheel vehicles driven with electric and hybrid drive system. A theoretical analysis of the wheel hybrid vehicle drive system consisting of: a petrol motor cooperating with two induction motors, fed by transistor pulse feeder, or by transistor voltage inverter based on Intelligent Power Module (IPM), are presented in the paper. An alternating solution of the two induction motor drive system is application of twin rotor induction motor TRIM in a hybrid wheel vehicles. An original machine TRIM has a single stator and two rotors. Each core being a disc geometry, with stator sandwiched between two rotors. The rotors carry squirrel cage windings, and are mounted on individual, independent shaft, driving two wheels of an electric part of vehicles. The torque generated by each motor depends on the slip of each rotor and the dimensions of the cores, particularly the stator yoke depth which controls the magnitude of any differential flux in the two section of the machine. An analytical model of the machine is developed, based on a traveling wave model and taking into account the high harmonics, generated in the TRIM windings by saturation of magnetic circuits in the various parts of the TRIM cores. The mathematical model of the TRIM supplied with IPM inverter with random modulation technique is described in the paper. The techniques are based on adjusting the duration of the zero vectors or adjusting the three pulse positions in the switching period. The new method control of induction motor in hybrid vehicles are also compared with random switching frequency modulation and with fixed switching frequency modulation. Some variants of the adaptive control system: speed and current adaptive control system and also sliding adaptive control system are applied in the wheel hybrid vehicles. Adaptive controller are realised based on DSP controller. Modern

Slim Tnani, Patrick Coirault, G rard Champenois

Active flywheel control for hybrid vehicle

In the paper, the authors propose a novel control strategy of torque ripple on hybrid vehicle. The combustion engine ripples are reduced by using an active filter and an AC machine which is mounted on the crankshaft to generate an inverse torque sequence. The control strategy is based on a multi-objectives state feedback synthesis. A complete modelling of the hybrid propulsion of the vehicle is achieved. Simulation results highlight the interest of the control scheme.

Andreas Lieberum

First results of our campaign in promoting CNG-cars in Bremen

PowerPoint presentation. No abstract available.

Zbigniew Kneba

Environmental impact of planned introduction of electrically driven water pump in passenger car engines

In spite some fuel and ignition systems are very complicated recently, cooling systems remain traditional. Water pump rotational speed is linear function of crankshaft speed not depending on engine temperature or vehicle speed. The possibilities of introduction electronic control for cooling systems has been presented in the paper. In first part of the paper used methods of electronic control of cooling systems has been described. Then the structure of new generation cooling system was proposed. Additional power has influence for toxic components emissions in exhaust gases. To learn how big influence has this load some tests on chassis dynamometer have been performed. The results of investigations has been described.

Bartłomiej Szadkowski*, Piotr J. Chrzan*, Daniel Roye**

A Study of Energy Requirements for Electric and Hybrid Vehicles in Cities

This paper provides evaluation of driving power and energy requirements for automotive vehicle. A survey of most promising applications of electric and hybrid vehicles in cities with commercial line solutions is given. The simulation of small hybrid car is processed with the aid of Advisor programme, indicating profitable distribution of power sources between fuel cell and ultracapacitor bank.

Leszek Mierzejewski, Adam Szelağ

Earthing and bonding in urban electrified rail transport systems return networks

Return networks of electrified power supply systems create a vital part of their electric circuits during operating and fault conditions but may cause problems due to stray current emission. In order to fulfil all these functions specific, in some case contradicted criteria and requirements must be fulfilled. Their main characteristic parameters are: longitudinal resistance and resistance to earth, electric potential during operating and short-circuit conditions, longitudinal and short-circuit voltage drop and currents. Calculations of all these parameters allow to assess: if the return network properly fulfils its main function – power supply to electric vehicles; if the operation of the certain return network does not cause danger for the people in the zone of the electric traction network, and the last but not the least, if there is no negative influence on the surrounding environment.

Maciej Cygan

Electromechanical similarity question in the multidimensional traction processes of locomotive drives

From the point of view of traction tasks realization a repeatability of electromechanical traction processes is stipulated; also in consideration of motion disturbances - with reference to their level and meaning. Thus, considering the exploitation repeatability the electromechanical traction processes should be invariant. Within technological and operational reality the electromechanical traction processes should be sufficiently similar. They should be similar to each other especially in case of multidimensional electromechanical traction processes when the processes realized by equivalent sub-systems of electric locomotive drive are taken into consideration. Quantitative as well as qualitative evaluation of the electromechanical traction processes similarity in consideration of disturbances must be a result of comparative studies made on the base of the evaluation index values generated by means of always the same evaluation algorithm.

Renato Rizzo

Use of new technologies for air pollutionless public city transportation systems based on electrical drives

In the paper is presented the research program that a network of 4 Italian Universities (Naples, Cassino, Milan and Padova) are doing within a project supported by the Italian Ministry of University and Research. The project is focused on innovative devices for electrical energy storage and generation, like fuel cells and supercapacitors: their high availability suggests to examine the possibility of their use for fixed trial means of transportation. This use seems to be, actually, suitable for city transportation, because of repeated tracks, of the existence of fleets, of the possibility to recover at the end of the task. Dealing with experimental application, this purpose can, moreover, bear the high initial costs, because they are paid by the collectivity that is not only the user of the service, but also the indirect beneficiary of the ecological and environmental advantages connected with the use of components that have no environmental impact.

Andrzej Kałuża*, Eugeniusz Kałuża**, Andrzej Sikora**

Energy-efficient traction supply system of modern trams

Modern tram can be energy-efficient due to recuperative braking. A moving tram has kinetic energy, which can be transformed into electric energy during recuperative braking. It can be fed back into contact system free of charge. Therefore decrease in energy consumption is possible. However present supply conditions limit energy-efficiency of expensive modern tram. Reasons for modernization of existing traction supply systems in Katowice are presented. It would improve energy-efficiency, reduce voltage drops and energy losses. Since classical investment (substations, feeder cables and cross-sections) requires huge financial outlay, in the future other solution can be adopted (energy accumulator). Therefore presented technical aspects describe necessary network adaptation and the method of evaluating its real influence on supply system. This is useful to the companies negotiating the purchase of modern trams to evaluate real advantages of investing additional financial resources indispensable for buying of recuperative braking trams.

Józef Czucha, Przemysław Pazdro

Electromagnetic compatibility in urban electrified public transport.

Up to day there are no European neither National Standards on electromagnetic compatibility directly applicable to the urban electrified public transport (tramways, trolley-buses, metro). It is known very old one PN-73/E-05108 and a new one EN 50121, but they cover the EMC requirements for railway application though EN in same part is very close to urban transport conditions (especially metros). Studying the EN 50121, there are given many topics on EMC conformity of whole railway system , rolling stock, electrical apparatus, power supplying, signalling and telecommunication systems with underlining a similarities and differences EMC conditions for urban transport. There are shown many not yet solved EMC problems for urban transport. It is shown that the EMC problems in urban transport should be urgently taken under considerations.

Michel Hecquet, Marc Goueygou, Amine Ait-Hammouda, Pascal Brochet

Pole shape influence of an automotive alternator: Magnetic noise minimization

A numerical procedure to optimize the pole shape of an automotive alternator is presented. This alternator is a claw-pole machine, that is modelled by an electrically coupled permeance network. Saturation, electronic commutations and rotor movement are take into account. Noise and vibration are important quality factors of the alternator and are mostly due to electromagnetic phenomena. Some geometric parameters of the claw are investigated and the Experimental Design Method is used to find a global optimum that would minimize vibration and noise levels. Consequently, numerical simulations and measurements are carefully compared, so as to validate the numerical procedure. A correlation between radial force, torque and vibration harmonics is also established.

**Dariusz Karkosiński, Ireneusz Mosoń,
Janusz Nieznański, Marcin Wolejko**

**Stator Deflection Shapes of Electrical Motors as a Source of
Acoustic Noise**

The natural mode shapes associated with structural resonances can differ significantly from vibration responses of a stator structure excited by a series of rotating radial magnetic force waves. The modal analysis has been used in order to obtain stator mode shapes. For acquiring operating deflection shapes of the stator structure under steady state operation of the motor, the operational deflection shapes analysis has been applied. Complex operating deflection shapes of the stator, longitudinal and circumferential, have been compared with mode shapes and the results are presented in this paper. The importance of the decomposition of stator circumferential operating deflection shapes for the purpose of acoustical calculations has been indicated. Basing on vibration measurements of a low-power induction motor, the authors show that not only natural mode shapes, but also operating deflection shapes, can have significant effect on the sound power level of the acoustic emissions of induction motors. Difficulties and recommendations concerning the measurement methodology of operating deflection shapes are also discussed in this paper.

**Krzysztof Karwowski, Mirosław
Mizan**

**DSP-Controlled Permanent-Magnet Motor Drives for Vehicle
Applications**

Several possibly applications of permanent magnet motor in rail and road vehicles are discussed in the paper. The main control principles for brushless PM motors are presented. The features of the chosen microcontroller are concluded. The controller based on the digital signal processor (DSP) has been developed. It implements the torque control using the field-oriented control (FOC) method. The results of laboratory model of the drive for a light electric vehicle are presented.

Haithem Abu-Rub*, Jarosław Guziński**

The Use of Power Measurement and Fuzzy Logic to Sensorless Vector Control of Induction Motors

In the proposed paper, the use of power measurement to realize sensorless control of the induction machine will be presented. The control system is very useful to the traction application. The proposed method is applied to the field oriented control, however, may be used in any type of induction motor control system. The method of rotor speed calculation is based on power measurement. PI and fuzzy logic controller will be used to generate the motor speed. The system control could be applied in traction drives. In presented paper, simulation results will be presented.

Adam Barylski, Władysław Koc

Peculiarity of side wearing of rails in curves of rapid city railway line

The paper presents the investigation results relevant to excessive side wear-out of rails occurring in bends of the Rapid City Railway line of Gdansk ? Gdynia. To find out the cause of the phenomenon there were carried out uninterrupted tests of the technical and geometric conditions of the rail tracks at a dozen experimental sections. Using the data it was possible to determine the wear-out progression along the circular arc and the transition curves. It has been proved that the operation of a homogeneous railway rolling stock, electrical articulated train sets, EN57 and EW58, has a significant effect on the occurrence of the phenomenon under consideration. There have been found some links between the wear-out magnitude and the measured geometric shape of the track in the horizontal plane. Various measures taken to limit the intensity of the side wear-out of rails have been discussed. Attention has been centred particularly on the worked out conception of the rail lubricator - Sm 88 whose implementation has given some favourable results.

Władysław Koc, Andrzej Wilk

Longitudinal forces in CWR track – another attempt to solve the problem

The paper presents briefly a survey of the attempts made to find an effective method for the determination of the longitudinal forces in continuous welded rails. Particular attention has been paid to the enforced lateral displacement technique applied for the first time in USA. The results of a verification of the technique carried out at the Gdansk University of Technology have been analyzed. The primary assertion which was to prove the necessity to abandon the lifting of a rail section disconnected from the sleepers and to concentrate efforts on horizontal displacements, has drawn attention to the tamping machine to be used for diagnostic purposes. The accomplished investigations have proved the correctness of the concept and indicated the necessity to take particular interest in the curvature of the rail being bent. An original measuring apparatus adapted for the tamping machine was made, and the results obtained by its use are very promising.

Miron Galewski, Marek Wołoszyk, Dariusz Świsulski, Michał Porzeziński

Revitalization of older building machines for road engineering applications

The main question of the presented paper is revitalization of older building machines, especially used in repair of old and building of new roads. The state of Polish road net is commonly known, so any help in improving it should be taken into account. The problem seems to be of real importance, since new countries entering European Community must get ready to new regulations, new requirements, which some times can be very expensive. In the paper authors would like to share their experience in really cheap and cost effective way of preparing older building machines to the new situation.

**Miron Galewski* , Marek Wołoszyk* ,
Dariusz Świsulski* , Ryszard Żulczyk****

**Automatic control system - most efficient way of revitalization
of older fleet maintenance workshops**

The presented paper concerns revitalization of an older workshop with minimal investing costs. The low costs are main agent of effective operation of every factory or workshop. One of main sources of extra costs are warranty repairing. It is especially seen in communication means, like trams, or metro trains. A failure of this kind of device results in many disturbances in public transport and high cost of transporting of the immobilized vehicle back to the workshop. The problem of revitalization is much common, as there are many small factories or workshops in Poland, that are equipped with older, simple type of tools or all production lines. Replacing the tools with new ones is mostly almost impossible from economical point of view. Authors propose very costs effective, simple method of revitalization of this kind of workshops: to equip them in modern control systems. Relative cost of such a solution is very low, but the results can be really impressive. Below the authors would like to share their experience in this kind of revitalization they have obtained for some last decades.

**Wojciech Romański* , Kazimierz
Kosmowski** , Piotr Gappa** , Andrzej
Powarunas** , Marcin Śliwiński****

**Functional safety analysis of control systems consisting of
programmable units for using in transportation**

Nowadays a trend is observed in designing the control system to equip them with programmable electronic units. The application of programmable electronic units in safety - related systems implicates the requirements for safety integrity level (SIL) and a high availability factor. A real control system for road transportation is described, which controls the signaling lights and monitors its operation. This system is designed using programmable logic controllers. In the paper the reliability analysis of the control system is carried out. Two methods have been used that are available in the CARE software system, namely FMEA (Failure Mode and Effect Analysis) and RBD (Reliability Block Diagram) to analyses potential failure modes of units and subsystems and to asses levels of safety and availability of the road transportation control system. The results of analyses and assessments enabled to formulate several conclusions how to improve the safety and availability of the system under consideration.

Frédéric Gillon, Pascal Brochet

Experimental design method: an effective tool for transport equipment design and optimization

This paper presents two examples where the experimental design method is used as a design tool. Firstly, screening activity is carried out with tests on an Electric Vehicle. Secondly response surface methodology is applied in finite element model of an electric BDC motor. The advantages appear obvious that are quickness and accuracy.

Michel Hecquet, Stéphane Vivier, Pascal Brochet

3D optimisation of a linear eddy current brake using the experimental design method

This paper illustrates the use of the Experiment Design technique applied to the optimisation of an electromagnetic brake. In order to place this device in rolling stock application, this study shows the influence of particular characteristic dimensions on the braking and attractive forces. The aim is to determine accurately the variations of these forces especially around the optimal point using the 3D finite element method. A comparison with the experimental measurements is realised in order to validate the model.

**Rémi Saisset*, Stéphan Astier*,
Christophe Turpin*, B. Lafage****

**Characterisation of Li-Ion batteries by means of Bond Graph
modelling**

In this paper, an original model of Li-Ion battery based on Bond Graph is described. Chemical, electrical and thermal aspects are considered together. It has been developed in order to perform simulations of complex power systems including power electronics and electrochemical components. Validation tests performed on a high power 37.5Ah accumulator developed for traction applications are presented.

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Kazimierz T. Kosmowski

**Risk analysis and functional safety management in
transportation focused on human and organisational factors**

The paper addresses selected issues of the risk analysis and functional safety management of safety-related systems used in transportation that include signalling, controlling, protecting and communicating subsystems. The safety of distributed systems designed using advanced technology, including programmable electronic subsystems, are potentially dependent on human errors, rooted in organisational deficiencies. The process of risk analysis and safety management of such systems applying qualitative and quantitative methods is outlined. The role of standardisation in designing and operating of safety-related systems is emphasised. The safety management of these systems should not be oriented only on technical aspects, but also on the influence factors including the human and organisational factors.

Rafał Łaskiewicz

Application of bimodal vehicles with respect to capacity of rail lines

The paper, within the area of Multimodality, deals with adjustment (harmonization) of the transport capacity of trains - whatever traction - to the demanded capacity of lines, the multimodal Vehicles are passing through. The actual problem of multimodality is, that a variety of passenger trains, further a variety in modes of cars and of motive power, may be limited by the given capacity of line section. By introducing rail buses or other new type of rolling stock, attention should be paid not only to the technical feasibility but also to possible performance of transport tasks on each section of rail line.

Andrzej Kałuża

How the energy-efficiency can be understood? The core meaning of efficiency

The word „EFFICIENCY” is used in many publications in different meanings and purposes, sometimes even mistaken or misleading. In this paper, I attempt to show the complexity of issues described by this word, unify the scope and define its meaning and functions. Due to the lack of practical and useful (causing concrete and appropriate actions) legal definition of efficiency, I felt urge to find and present the core meaning of this word. Therefore I conducted interdisciplinary research, including philology, management theory, economy and techniques. Assessment of efficiency limited to reducing quantity and costs of used energy can be oversimplification. Every simplification creates danger of neglecting other important profit generating factors. Therefore, wider definition of efficiency seemed to be necessary before narrowing it to energy efficiency issues. The method estimating energy efficiency is proposed. Thus, efficiency issue is clarified and defined.

Dietrich Habel

The use of energy storage devices in suburban railway networks for more efficient utilisation of primary energy

Energy storage devices are a useful extension to the electrical infrastructure in suburban railway networks. Their characteristic feature - to decouple the energy output from the energy absorption with respect to time - allows energy to be saved and load peaks to smoothed out. Compared to the possible alternatives, investment and operating costs can be saved through the use of a storage device. At the same time, on the whole a more uniform electrical loading of all components is achieved in the DC voltage network, which in turn has a positive effect on the operational reliability and service life of these components.

Tadeusz Maciołek, Zbigniew Drażek

Energy-saving tram vehicle with on-board energy accumulator

Energy saving effects connected with use of energy accumulator on board of tram vehicle instead of substation are presented. Different solutions of energy on-board accumulator are presented and application of supercapacitor is suggested. Differences in results regarding weak and strong power supply system when taking into account energy losses and energy recuperation are pointed out.

Andrzej Kałuża

Energy-efficiency of tram companies can be profitable. Concretization of energy-efficiency analysis

Nowadays many tram operators are modernizing their rolling stock, investing significant sums of money into modern trams, which are capable of energy-efficient recuperative braking. Factors influencing profitability of these investments have been specified. Presented factors enable to plan energy-efficient public transport. High capital costs are presently the norm for many energy efficiency technologies and serve as a deterrent to their widespread implementation. However, only trams are the sole city transport facility, which enables profit from recuperative braking. Therefore it is worth to invest more at the beginning. Later, it is expected that economies of scale will result in lower costs. Currently the investment can be facilitated by the financial instruments designed to mobilize private capital. Public funding (loan or subsidy) has the catalytic effect stimulating economic development while improving efficiency of energy consumption. Only description of the tram as an ecological, energy-efficient transport, separated from street traffic, a public good, which cannot be replaced by buses does create the premises for additional funding.

Zbigniew Pawelski

Prototype hybrid power transmission for city bus

Work on the construction of a hybrid drive for a city bus has led to a solution in which hydropneumatic energy accumulators and a variable-speed transmission with a parallel power flow are used. In the controllable part of the variable-speed transmission there is a hydrostatic transmission operating in four quarters of the power field, owing to which it is possible to transfer energy to and from the vehicle wheels through the variable-speed transmission. A change in the direction of an energy flow results in a change in the value of pressure in the operating conduits of the hydrostatic transmission from suction to force. The hydropneumatic accumulators were connected to the operating system by means of a system of logic valves controlling the flow and pressure, irrespective of the fact which operating conduit is a pressure conduit at a given moment.

Zbigniew Pawelski

Prototype of Rexroth hybrid power transmission system

Prototype of Rexroth hybrid power transmission system

Piotr Gnaciński

Thermal Properties of Inverter-Driven Induction Cage Machines Under Condition of Energy Saving Work

One of possibilities to decrease power loss in an induction machine is energy saving work – supplying with lowered voltage when load torque is much less than nominal. Thanks to reduced power loss, temperature of windings is also decreased, and consequently, it is possible to use a machine of less rating power to the same load torque. Ability of energy saving work to lower temperature of windings depends on thermal properties of an induction cage machine, which are different in the case of a machine with own ventilation and foreign one. This paper is devoted to influence of way of ventilation on thermal effect of energy saving work. Results of experimental investigation are presented for a frequency-controlled 3-kW induction cage machine with two ways of ventilation: provided with a fan placed on a shaft and provided with a fan driven by an auxiliary motor.