New technologies in furthering the international railway transport

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New technologies development to serve transport development (1)

> Up-to-date railway technology such as train control system by radio communication, asset management, and energy management for smart grid can be effective and helpful in terms of life cycle cost, comfort, reliability, and safety.

> Technological changes like source of fuel, improved border crossing arrangements, information systems and tracing systems will be focus areas for the development of regional rail networks and for reducing the cost of transportation and enhancing movements across the borders.
New technologies development to serve transport growth (2)

> Asian-European rail freight corridors have a high business potential as freight trains operating on these routes are considerably faster than container ships and much more cost effective than air transport. The standardization of the railway system for fostering interoperability along international railway corridors will be required.

> However, interoperability problems (both technically and operationally) in combination with legal and administrative obstacles have so far prevented rail freight transport between Europe and Asia from achieving equal economic importance as in North America.
New technologies development to serve transport growth - preconditions

> Trains should be sensitively designed to be staff and customer-friendly. This should involve the operator as a client in the early stages of development so as to ensure design specification quality that is based on common rail sector standards for quality assurance.

> The trains of the future will be built using a modular approach with components that can be easily interchanged on a ‘plug and play’ basis to maximize flexibility and reliability whilst minimizing maintenance downtime.
New technologies to serve transport growth – energy savings

> **Railenergy** results serve as a platform for an integrated development of new methodologies, techniques and technologies. Relevant baseline energy consumption figures and scenarios for selected reference systems, a system-based concept for modeling energy consumption.

> A common and standardized methodology applied to determine energy consumption by rail sub-systems and components in the development and procurement phases. An integrated simulation tool for energy consumption and LCC.
RAILENERGY European project – UIC involved

> An integrated railway energy efficiency management approach & decision support tool.

> New validated energy efficiency-oriented railway technologies for trackside and on-board sub-systems and equipment, developed in compliance with the new integrated approach.

> Inter-relationship of railway sub-systems is highly complex, especially with regard to assessing their consumption of energy. Railenergy therefore will develop a fully integrated approach as the only way to achieve true energy savings.

> Railenergy also aims to generate new validation standards for the energy performance of products and services and to contribute to the harmonization process.
Output

Standardisation

UIC/UNIFE Technical Recommendations

Energy Efficient Technologies

Railenergy Calculator

Decision Support Tool

Railenergy Website: www.railenergy.eu

Railenergy toolkit

Average relative energy savings can be more than 7% throughout the entire European railway system!
Electronic seals – UIC project

> The global purpose of the project is increasing competitiveness of international railway corridors by improving the security of the wagons and containers. The use of electronic seals should guarantee the integrity of the loading, and in addition give useful commercial indications on the position of the wagon or container in order to confirm or modify the date of delivery.

> The commitment of the UIC project is to eliminate the pointed risks and to provide a common Security and Navigation Control System based on shared standards and procedures. It will allow increasing the quality of transport services in terms of security, safety, timeliness and transportation addressing; and as a result may attract more cargo volumes onto rail routes.
Space Technologies Used in JSC “RZD”

- **Restoration trains** - 17 psc
- **Space communication and passenger train monitoring** - 8 units, 534 units
- **Fire trains** - 129 units
- **Glonas GPS**
- **Locomotives and multiple electric units**
  - Locomotives - 5663 units
  - Multiple units - 1660 units
  - ССПС 4282ед.
- **Mobile diagnostics and monitoring, 39 units**
- **Hazardous cargo** - 197 units
- **Track machines** - 4 units
- **Mobile lubrication vehicle** - 57 units
AAR example

Automated Inspection of Car Components (AISC)

- Third generation system developed and installed at FAST
  - Manual Review of images aiding algorithm development
- Algorithm testing and development will continue at FAST
- Revenue Service installation on BNSF at Gallup, NM scheduled for Nov/Dec, 2010
Rail System Technology

> Winner Christoph Tysse, Marcus Völcker (SBB, Switzerland)

> Topic ADL Project – Adaptive control of driving profile

> Achievement

- Developed an adaptive control system to optimize driving profile by minimizing unplanned halts and breaking.
Rail System Technology

> ADL – Adaptive control of driving profile
  • ADL saves energy amounts to 2.1% at current rail traffic density.
Automatic gauge changer technologies by CAF
Allows the pass of TALGO and CAF Technologies by means of two reclining platforms. To move the platforms, a complex hydraulic system is needed. Appropriate for places with space restrictions.
Automatic gauge changer technologies Polish SUW 2000
Both for SUW2000 and DB Rafil V systems. Gauge change with fully loaded wagons (picture from Polish/Lithuanian border Mockava station)
Opportunities for Railway Productivity using Collaborative IT and Data Exchange – UIC members are network business
UIC Paperless Documentation

Run it Paperless!
- 8 major actors
- 3 legal systems
- 3 customs authorities
- 2 Brokers
- 2 – 3 Carriers
- 15+ Core Documents
E-Rail Freight - UIC Development of Electronic Consignment Note (SMGS+CIM)
UIC Technology Solutions for Collaboration

- UIC International Standards (already in place) for Data Integration enabling:
  - Use of Secure Connectivity for communications over open internet
  - Tracing and Tracking of Wagons and Trains
  - Booking Systems for International Train Paths
  - Creation of Collaborative Portals for Passenger and Freight
  - Mobility Solutions
Expecting developments in railway technology

> Modular vehicle design will allow easy upgrades during a vehicle’s service life. This would respond to changing customer perceptions and requirements, business needs and usage and obsolescence mitigation - and thus be more sustainable.

> Trains need to be intelligent so that they are constantly self-monitoring (automated condition monitoring), to establish what, when and where maintenance is needed.

> Performance of the system and the interface between the train and track and between the train and control, command and communication is essential to system efficiency.
Expecting developments in railway technology (2)

> Rolling stock designs need to be cost effective and at the same time take account of the future passenger and freight requirements and be adaptable to this change.

> IT systems that enable buying and selling of capacity in wagons and a reliable door to door track and trace of loading units and goods and real time information of the actual and forecasted train position will further attract the customer to rail.

> For the freight customer, faster, flexible freight trains with performance similar to passenger trains are needed to enable rail to deliver the reliability and cost-competitiveness that are key to exploiting market segments until now largely untapped by rail.
Expecting developments in railway technology (3)

> Faster freight services would be able to use passenger quality train paths and thus enable new business propositions. They would also support improved capacity utilization of the network. On the other hand, it must also be ensured that this will not create infrastructure bottlenecks or worsen already existing ones - if necessary, by appropriate infrastructure investments.

> Technical and operational interoperability on international rail freight corridors will substantially increase the competitiveness of rail as compared to other modes. Perceived nuisance factors such as noise and vibration will be limited to tolerable levels, thanks to technical innovations, e. g. composite brake blocs retrofitting.

> The technology of coupling, power distribution and braking will facilitate long and heavy freight trains between mega hubs on main transcontinental freight corridors.
Thank you for your kind attention

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