Ing. Luděk Pilmann

Dějiny, současnost a budoucnost železničního výzkumu
The History, Present and Future of the Railway Research

The railway research, development and testing considerably contribute to the advancement of mobility of both people and goods in Europe. In the beginning of railways, the research gained recognition for the preparation of research and development methods in general, recently the research performs tasks which are important for success of railways on the free transport market. The Czech railway research was successful in these activities and strives after being successful also in the future.

The Railway Research Institute of Prague, being a representative of the railway research and testing, maintains the long tradition, human resources, apparatus and testing background and cooperates with railways and industries all over the Europe. Its qualification for certification tests and experiments for research works is demonstrated by EN 45 000 certificate and licenses granted by national certification authorities - see enclosed documents.

Ing. Pavel Janoušek et al.

Přínos VÚŽ v oblasti kolejových vozidel a vozby
Contribution of the Railway Research Institute in the Area of Rail Vehicles and Traction

Traction Tests - Dynamometric Measuring Wagon

The history of the dynamometric measuring wagon - its present employment including a list of locomotives tested using the dynamometric measuring wagon. Load locomotives used for traction tests. Branch tasks being solved in the area of Diesel rail-vehicles, a list of certified tests conducted by ČD VÚŽ - ZL 3 laboratory, department of Diesel rail-vehicles.

Measurements of Acoustic Parameters and Noise

The paper presents a brief summary of activities of ČD VÚŽ in the area of measurements of noise, acoustic parameters of rail vehicles and mentions also the cooperation in international noise projects.

Research and Tests of Train Brakes

The orientation and objects of the department of train brakes. The department solves tasks from the branch of technical design of rail vehicle brakes, their application in the operation, issues of train braking in relation to the transport process technique and operating safety. Considerable part consists in tests for verification of brake

parameters and functionality and in tests for verification or determination of the braking effect. A survey of activities in individual areas, including participation in international research projects in a historical prospect, illustrate the mission and results achieved in this professional branch.

Running Properties of Rail Vehicles - Verification of Operation and Safety Against Derailment

A description of the research activities of the department of rail vehicle dynamics. Described are issues in the branches of power measurements, operation measurements, safety against derailment, service life of cars and contributions of the department. The paper mentions ORE and UIC reports and decrees which are obligatory for car tests and problems which appeared in the solution of tasks pursuant to these decrees. The paper mentions in the conclusion some typical tasks which were solved by the dynamics department and briefly describes the procedure of their solving and achieved pieces of knowledge.

Railway Traction Technique

The paper informs point-by-point the railway public about the contents of work of the Railway Research Institute, section of rail vehicles, department of railway traction technique. The paper lists basic activities of the department in the area of implementation of automating systems in the subsystem of locomotive management and in the area of automating devices for rail vehicles. More than 500 traction cars have been fitted with the system of automatic speed control which had been developed by the Railway Research Institute.

State Testing

An explanation of the establishment of the State Testing Laboratory No. 223, its work in past years, main objectives, effects of legislation changes in the Czech Republic to the transformation of the State Testing Laboratory into the authorized entity No. 223, non-obligatory certification, winding-up of the authorized testing laboratory No. 223, present situation in the demonstration of compliance of railway technology products (cars and components).

Ing. Ivan Kemr et al.

Přínos VÚŽ k rozvoji elektrotechniky a energetiky v kolejové dopravě
Contribution of the Railway Research Institute for the Development of Electrical Engineering and Power Engineering in Rail Transport

The paper is a collective work of authors who all have spent many years in the branch of railway and railway research. They specialize on railway electrical engineering, as applied both in rail vehicles or stable devices designed for the railway transport. Therefore, the paper both describes a general history of the electrical

engineering penetrating into the railway transport and gives a survey of basic works and activities in the past fifty years in the institution the name of which was subject to numerous modifications, but always maintained the word research.

”Electrical Engineering Research” had been one of five working sections of the first ČSD Research and Testing Institute founded in 1950 and still forms its integral part. The seat of the official electrical engineering research of railway - ČSD had not always been only in Prague, the capital of VÚŽ electrical engineers had been for twenty years the town of Vrútky, Slovakia, a town with important and long railway history. The paper presents information about works and their results regardless of the places of their origin providing that such places were any VÚŽ site. The paper follows both a time line and material classification. The paper stresses the contribution of research in the electrification of lines at first using the DC 3kV traction system, later on AV 25kV, 50Hz system. A chapter dealing with locomotives with controlled converters follows. Otherwise, electric locomotives are mentioned throughout the text. A short mention of semi-conductor converters is also included, which converters replaced rotation ones for the power supply of railway security devices. A separate chapter deals with the subject of power savings, especially in connection with issues of energy-optimal train running. The final chapter deals with activities of VÚŽ electrical engineers in another type of track transport - Prague subway, where their knowledge and experience were used both in the development and tests of cars and power supply system.

Tens, maybe hundreds of research tasks in the field of railway electrical engineering are represented in the paper by a description of the most important moments of some of them, which have impacted, due to different reasons, the authors' memory more than the others.

Ing. Štefan Mayerberger – Ing. Hynek Krejčí

Technický rozvoj železničních staveb a konstrukcí v procesu rozvoje železniční dopravy
Technical Development of Railway Constructions and Structures in the Process of Advancement of Rail Transport

In addition to the general process of development of the "large" building industry which is employed also in railways especially in the form of construction and maintenance of buildings and artificial structures, the specific research and development appeared in the past fifty years which were aimed not only at specialized branches of the railway substructure, superstructure, long-welded rails, technique and mechanization of line construction and maintenance including checks and measurements, but also at the application of technical advancement of related branches. These include, for example, special railway geodesy and cartography or recently the ever more intensive application of environmental aspects, computing and information technology, etc. The paper mentions not only the most significant results of the technical development of major specialized fields from the W.W.II until the

nineties, but also stresses those research and development results which were implemented in manufacturing or operation organizations.

doc. Ing. Ivan Konečný et al.

Přínos VÚŽ pro rozvoj železniční dopravy v odvětví sdělovací a zabezpečovací techniky
Contribution of the Railway Research Institute for the Development of Rail Transport in the Communication and Security Technology

The paper briefly mentions the circumstances under which the field of VÚŽ communication and security technology had been formed, had worked and has been working. Certain specific features are due to that the field of security technology is a branch with its considerably own philosophy focused on the safety of transport, persons and goods. Work in this branch naturally demands long years of both professional and life experience.

The paper also very briefly lists the results of works, especially of the works which have been broadly applied in the practice. Workers achieved in their implementation valuable experience which enable them providing they have necessary conditions, to solve in a qualified manner other important and necessary tasks.

The field of communication and security technology had also been subjected to the staff reduction. In spite of leaving of, frequently top-quality, employees who were hardly replaceable in a short time, the situation has stabilized and the Institute has maintained its ability to continue its proactive approach to the improvement of railway equipment in cooperation with both national and foreign partners.

The following should be pursued and supported:

- development of knowledge in the field of new techniques and their application in domestic security systems,
- research of general compatibility of communication and security systems,
- research and application in the field of means for train detection,
- complex protection of communication and security devices against unauthorized effects,
- development of efficient diagnostics and rational maintenance of all systems, including systems with new techniques,
- development of formal methods for the preparation of specifications, modeling, testing and verification of security systems.

Ing. Jan Kout, CSc. et al.

Spolehlivost, životnost a exploatační vlastnosti materiálů a částí železničních kolejových vozidel a tratí
Reliability, Service Life and Exploitation Properties of Materials and Parts of Rail Vehicles and Lines

The presented paper describes the contribution of the Railway Research Institute of Prague, section of materials and techniques, in the area of material research and material testing for the past fifty years. This Institute covering with its activities practically the entire branch has influenced with results of its research tasks and activities implemented in the railway practice the development, safety and economic operation of the railway transport.

During the time, the material issues in the railway transport have continually developed from the material testing to the complex concept of these issues including the theoretical and experimental research of materials and operating substances, standardization, solving of defects and operating failures, renovation, non-destructive methods of material testing, determination of the service life and reliability of structural parts and units of rail vehicles and railway lines, as well as environmental issues as arising from the railway operation.

Numerous successfully solved tasks the results of which have been implemented dealt with the following subjects:

Metal Materials

- Sliding vehicle bearings and their hot-running, technique of railway wheel pressing, renovation of axle journals by weld-on, research of dynamic properties and structural changes in steels in their non-recurring loading, stress and form strength of axles, breakage of leaf springs and coiled springs and categories of causes of their breakage, failure-rate and service life of ring springs and buffers, research of the service life of buffers and pull rods as per UIC Decree and material analysis of failure causes, criteria for determination of the service life of spring materials in the refined condition, research of brake blocks made of phosphorous cast iron, new materials for passenger car friction brakes, operating and life tests of brake wheels and brake lining in disk brakes, theoretical aspects of the connection disk-tire in driving rail vehicles.

Plastic Materials

- Polyamide dowels with glass fibers for concrete sleepers, polyethylene washers for sole-plates, use of reactoplastics based on epoxy resins, sole-plate fixing with plastic distance rings.

Oils and Plastic Lubricants

- Tribotechnical diagnostics of Diesel traction engines to determine deterioration of lubricants and wear of parts, complex solution of exploitation properties of lubricants for lubrication of rolling-contact axle boxes.

Non-Destructive Testing

- Numerous, still valid technical procedures for the testing of rails and their welds, switch blades, axles, railway wheel disks, steel bridges, testing of main and supporting leaves of leaf springs, ropeway ropes including a catalogue of defects, development and production of rope defectograph for ropeways.

Service Life and Reliability of Structural Units

- Complex tests of Y 25 Lss bogie and its modifications (total of ten) using the electrohydraulic, module testing device with the operating load simulated by ITFC control system, tests of the frame of Görlitz V bogie.

Environmental Issues of the Railway Operation

- Protection of water against pollution with oil and other detrimental matters, research of protection of water sources which are endangered by the railway operation in individual Czech regions, biological degradation of lubricants.

Ing. Eduard Novák, CSc. – Ing. Jaroslav Skala

Přínos železničních zkušebních okruhů k železničnímu výzkumu
Contribution of Railway Testing Circle Lines for Railway Research

The experimental base of the Railway Research Institute and its testing lines belong to acknowledged testing centers for the railway technology and railway devices in Europe. The paper describes the history of testing circle lines and their technical equipment, including basic technical parameters and options of tests. The paper also indicates the most important contributions and experience from the many years of operation and gives illustrations of use.