

FURTHER TENDENCIES IN DEVELOPMENT OF THE RAILWAY VEHICLES CENTRE OF THE FACULTY OF MECHANICAL ENGINEERING IN KRALJEVO

Ranko Rakanovic, Vesna Brasic

rakanovic.r@mflv.kg.ac.rs

*Faculty of Mechanical Engineering Kraljevo, Dositejeva 19
SERBIA*

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Abstract: *This paper presents tendencies in development of the Railway Vehicles Centre of the Faculty of Mechanical Engineering Kraljevo realized within the FP7 project “Strengthening Railway Vehicles Centre of the Faculty of Mechanical Engineering Kraljevo”.*

INTRODUCTION

During its work so far, the Railway Vehicles Centre of the Faculty of Mechanical Engineering Kraljevo has tended to become the leading institution in the field of research and development of freight railway vehicles, where the accent is placed on testing and development of railway vehicles for the leading Serbian manufacturers as well as for the national operator – Serbian Railways. Its role in such frameworks has also enabled cooperation with international regional centres for development and testing of railway vehicles, such as the RRTC, so that in the course of time it has gained a significant place as a research institution on a wider territory of the Balkans.

The very process of testing railway vehicles as well as the procedures and methodologies in experimental testing of quasi-static and dynamic properties of railway vehicles are exposed to constant improvement of testing conditions, measurement equipment and technical indicators-parameters, credible estimation of the quality of transport in the sense of safety, speed and comfort of work of railway vehicles. Modern testing of railway vehicles is based on the need for testing fatigue of railway vehicles and their components as well as on testing dynamic

behaviour of railway vehicles with the most modern measurement equipment.

For the purpose of developing its own capacities, improving the so far used testing methods and providing new, modern equipment, the Railway Vehicles Centre of the Faculty of Mechanical Engineering has joined the Seventh Framework Programme of the European Union (FP7 EU), which plays the key role in achieving the goals of growth, competitiveness and employment connected with the EU initiatives in research activities. Within this programme, under the name Capacity, the EU supports, coordinates and funds the improvement of research and innovative capacities in whole Europe, providing their optimal use. Thus, in the domain of development of research infrastructures, the Railway Vehicles Centre of the Faculty of Mechanical Engineering has received funds for the realization of the project named “Strengthening Railway Vehicles Centre of the Faculty of Mechanical Engineering Kraljevo (SeRViCe)”. The goal of this project and all projects of the European Union within this programme Capacities is to help the establishment of new research infrastructures of pan-European interest in the field of science and technology. In that sense, our views are directed

toward the future of the Serbian railway vehicle factories and the tendency of scientific-technological development of European railways. One of the current tasks is the establishment of a new and unique Centre for Testing Railway Vehicles, which would enable better development of railway vehicles on the territory of southern Europe.

Within the FP7 project “SeRViCe“, the laboratory which is a part of the Railway Vehicles Centre of the Faculty of Mechanical Engineering Kraljevo will be strengthened from the aspects of:

- ◆Improvement of knowledge and skills of those employed in the research jobs in the Laboratory through the exchange of know-how and experiences with prominent research centres in the EU and through the development of a series of workshops.

- ◆Employment of young and experienced researchers whose future work would be mostly directed toward a selected research field

- ◆Procurement of new research equipment which will be added to the existing equipment for testing quasi-static and dynamic properties of railway vehicles

- ◆Establishment of common research programmes with the leading European research centres in the corresponding area – strategic partnerships with prominent European research institutions in the field of railway engineering.

MEASUREMENT EQUIPMENT

Within the planned activities on the realization of the international project “SeRViCe“, the Railway Vehicles Centre of the Faculty of Mechanical Engineering in Kraljevo finished its activity on the procurement of a measurement wheel set for estimation of dynamic behaviour of railway vehicles.

Two measurement wheel sets were delivered to the Railway Vehicles Centre and they will, in addition to the estimation of dynamic behaviour of railway vehicles, enable investigation of wheel-rail contact phenomena.

Together with the measurement wheel sets, a calibration stand was delivered. In addition to the calibration of the measurement wheel set, its purpose is to enable research into wheel-rail forces in laboratory conditions.



Figure 1. The stand for wheel calibration

In the second phase of realization of the project of strengthening the Railway Vehicles Centre, the so-called S-curve for testing characteristics of torsional stiffness will be built – the S-curve will be a unique test stand on the territory of southern Europe and it will enable the estimation of behaviour of new railway vehicle structures.

SOFTWARE PACKAGES

Within the activities “Knowledge“ on strengthening the Railway Vehicles Centre, software packages for design - SolidWorks and FEM calculation– ANSYS were provided. These software packages represent the basic tools for a modern approach to research in all fields of mechanical engineering in general.



Figure 2. Software packages for design and FEM calculation

The activity “Knowledge“ covers procurement of specialized software packages which will enable simulation of dynamic behaviour of railway vehicles, such as “SIMPACT”, “Vi Grade” – “VI Rail” or “VAMPIRE”.

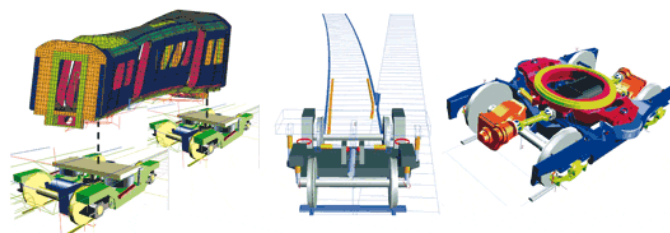


Figure 3. Multi-body simulation software

HUMAN RESOURCES

Besides the procurement of software packages and specialized software packages, strengthening the Centre is also seen in the employment of young and experienced researchers, who will begin their research in the field of railway vehicles as well as in the capacity building of the existing staff of the Centre.

The knowledge of the existing staff of the Centre is increased through:

1. Visits to the leading research centres in Europe: VUKV, Szolnok, Minden,

2. Secondments – exchange of staff with the European universities: DIEM, Bologna, Italy, in the field of fatigue of railway vehicle components, KTH – Royal Institute of Technology, Stockholm, Sweden, in the field of theoretical methods of railway vehicle dynamics,

3. Attending the prominent conferences:

◆”31st International Spring Seminar on Electronics Technology, Reliability and Life-Time Prediction 08”- ISSE 2008, Budapest, Hungary,

◆“The Second International Symposium and Trade Exhibition”- IRS Istanbul, Turkey '08,

◆“21st IAVSD Symposium on Dynamics of Vehicles on Roads and Tracks” - IAVSD09 – Stockholm, Sweden.

INSTEAD OF CONCLUSION

With the successful realization of the FP7 project “SeRViCe“, the Railway Vehicles Centre will become a unique centre on the territory of southern Europe, which will have sufficient capacities and resources to join current research activities in the field of railway vehicles, on an equal footing with the leading European research centres.

The available potentials of the Railway Vehicles Centre, its experiences gained in testing, its available staff and starting the accreditation process for the new laboratory will be a significant lever for starting the production of railway vehicle factories on the territory of the Balkans.

REFERENCES:

[1] FP7 Project “Strengthening Railway Vehicles Centre of Faculty of Mechanical Engineering Kraljevo” (SeRViCe)

[2] FP6 Project “Regional Railway Transport Research and Training Centre Foundation”- RRTC

БЪДЕЩИ ТЕНДЕНЦИИ В РАЗВИТИЕТО НА ЦЕНТЪРА ЗА ЖЕЛЕЗОПЪТНИ ВОЗИЛА КЪМ ФАКУЛТЕТА ПО МАШИННО ИНЖЕНЕРСТВО В КРАЛЈЕВО

Ранко Раканович, Весна Брасич

rakanovic.r@mfkv.kg.ac.rs

*Факултет по машинно инженерство, Кралјево, ул. “Доситејева” 19
СРБИЈА*

Клучови думи: *развитие, център, FP7*

Анотация: *Тази статия представя тенденциите в развитието на Центъра за железопътни возила към факултета по машинно инженерство в Кралјево, осъществявано в рамките на проект по FP7 на тема “Консолидиране на Центъра за железопътни возила към факултета по машинно инженерство в Кралјево”.*