

Modern Technologies in the Engineer Academic Teaching for the Transport Infrastructure Engineering Course

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The proposal of introducing new technologies in the engineer academic teaching for the transport infrastructure engineering run at the International University of Logistics and Transport in Wrocław since 2012 is presented.

The attention was given to the two main issues:

- improvement of attraction and effectiveness of professional internships,
- introduction of digital tools in education of transport infrastructure engineers.

The collaboration with research institutes and rail and road authorities in to order to realize master's theses is proposed.

The procedure of realization of the master's thesis is analysed.

The e-learning ideology was presented, in particular: the service system, the participants of e-learning system, authorization of participants, kinds of didactic materials and the manner of their preparation, the kinds of courses and evaluation systems (tests, analysis of tasks, and also the manner of assessment of participants activity, by means of e.g. a questionnaire).

Special attention was give to didactic staff's participation in courses on methods and techniques of distance education.

Keywords: engineer academic teaching, modern technologies, internships, e-learning.

1. INTRODUCTION

In 2012 at the International University of Logistics and Transport in Wrocław, Poland a new major was introduced i.e. Transport Infrastructure Engineering. This major offers both full-time and part-time courses. It includes two diploma specialties: Road-Bridge Engineering and Rail Engineering. At the same time the University successfully started educating Road and Rail Engineering specialists at post-graduate courses.

While realizing the above mentioned undertakings the necessity to modify the classic form of tuition occurred.

This article presents the suggestion for modernizing traditional techniques for engineering academic tuition, which includes introducing dynamic forms of educating which initiate students' activities and generate measurable tuition

results, indispensable for graduates while seeking employment.

The two problems were mainly dealt with:

- improving attractiveness and effectiveness of internships,
- introducing digital tools into education process for transport infrastructure engineers (e-learning).

2. INNOVATIONS IN THE FIELD OF INTERNSHIPS

2.1. GENERAL REMARKS

Cooperation with institutions operating in the area of transport infrastructure engineering was suggested – it includes delegating students (candidates for engineers) to internships which would also entail practical activities related to the given company's profile.

The activities performed by students would result in a complete diploma thesis (either engineer's or master's one) of theoretical or practical character, or an outline for such a thesis with the possibility of finalizing it at the university.

It is assumed that the suggested way of realizing internships would result in:

- improving attractiveness and effectiveness of internships (the possibility of free choice of a company for students, and no limits from the university's side as far as the topic of thesis is concerned),
- realizing diploma theses of utilitarian meaning for a given company, referring directly or indirectly to applications connected with a company's profile

Moreover, generating an effective potential should be expected, in order to obtain patents and utility patterns as topics of diploma theses could be in a way ordered i.e. they would result from the companies' needs.

Following the adopted scheme of internships, copyrights referring to possible publications of theses' contents would be within the competence of three entities: the university, the students and the company where internship took place.

The offer on the University's (MWSLiT) side especially refers to the following entities:

- those who manage transport infrastructure (e.g. internship at Roads and Bridges Authority),
- those who manage transport investments (e.g. internship at Investment Headquarters),
- those to whom investments are contracted (e.g. planning and design companies),
- those who perform investments (internships at construction sites),
- institutions who carry out scientific research.

Below are presented exemplary institutions where students can have internships along with realizing their diploma theses.

2.2. *EXPERIMENTAL TRAINING GROUND FOR THE RAILWAY INSTITUTE AND FOR ROADS AND BRIDGES RESEARCH INSTITUTE*

The Training Ground for the Railway Institute and for Roads and Bridges Research Institute is located in Żmigród (The Lower Silesia region) and consists of two sites:

- 1) complex of buildings belonging to the Railway Institute-Warsaw, branch in Żmigród,
- 2) complex of bridges belonging to the Roads and Bridges Research Institute-Warsaw, branch in Żmigród.

The complex creates an experimental track in a shape of a loop and is located in the northern part, and includes a company station with wait-time rails and rails for crash tests. Apart from the rails, the station also includes a building for laboratory and training purposes, control rooms and unit substations. The rail in a shape of a loop with the length of 7,725 km is used for surface construction research, as far as weight-bearing capacity and resistance are concerned. The experimental track consists of straight sections and 4 horizontal arcs. The rail load for the research purposes is an experimental train which aims at generating surface load.

The project assumption for the experimental ground is a research train consisting of two locomotives ET22 and 60 flat-rack wagons of mass of 97.4 tons each.

Therefore, it is possible to carry out the following research: of railway track, of contact line and crash resistance of rail cars in 1:1 scale [170].

In the southern part of the loop the station for bridge testing is located. Within a railway track a test stand is located in a form of a bridge span. It is possible to carry out research on construction bending and dynamic impacts, with assumed variable parameters referring to exploitation load.

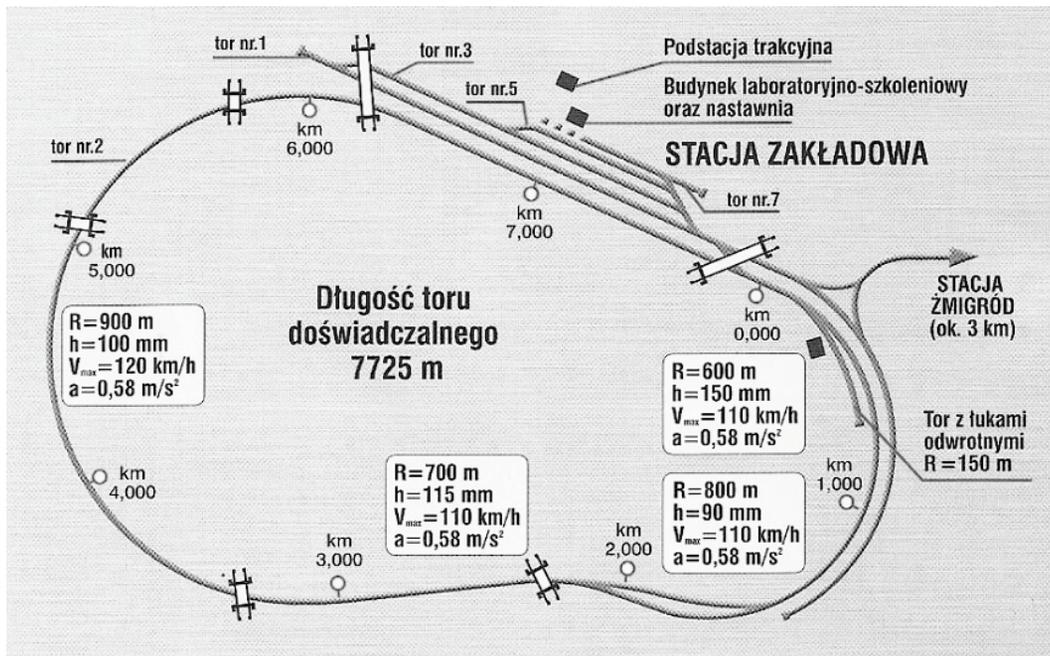


Fig. 1. General plan of the experimental railway in Żmigród. [2]

2.3. TRANSPORT INFRASTRUCTURE REPAIRS COMPANY DOLKOM

Lower Silesia Transport Infrastructure Repairs Company DOLKOM Sp. z o.o. in Wrocław is a company with long tradition. They realize e.g. the following types of investments [3]:

- modernizing, revitalizing and repairs of main railway tracks, junctions and stops,
- current repairs of railway tracks and maintenance works for rail transport infrastructure,
- modernizing, rebuilding and repairs of the existing rail complexes for non-public usage (sidings) and construction of new sidings,
- repairing machines for railway tracks works, machines for repairing tracks and rail cars.

The company's management was interested in accepting students for internships that would result in diploma theses.

2.4. EKSPERT SP. Z O.O., UL. PRZEMYSŁOWA 6, 64-130 NOWA RUDA

The company that specializes in mounting bridges in ground-membrane technology.

The company ensures accepting students for internships connected with carrying out research on railway track surface or road surface, located within a ground-membrane bridge construction.

The surface would undergo exploitation load. As the result of research for the railway track surface it would be possible to estimate tension and deformation for the railroad ties and in a steel surface of the bridge construction, in parameter function (random) variables, referring to:

- railroad tie,
- base (sub-base concentration under a railroad tie, location of concentration areas along the railroad tie, thickness and endurance features of ground backfill material within the membrane),
- bridge construction (geometric characteristics of the membrane and endurance features of the membrane).

2.5. VIA CON POLSKA SP. Z O.O., UL. PRZEMYSŁOWA 6, 64-130 RYDZYNA/LESZNO

The company that realizes (the same as the above mentioned company) bridges made of corrugated sheets, on the territory of Poland and the EU. They are also the producers of components for ground-membrane objects and they have scientific and research potential. The cooperation of Via Con Polska with the university that educates transport infrastructure engineers will be of special importance for students and may help in generating recruitment to studies.

3. E-LEARNING AS AN EFFECTIVE DIGITAL TOOL IN EDUCATING TRANSPORT INFRASTRUCTURE ENGINEERS

The system that supports education at the International University of Logistics and Transport in Wrocław, Poland is an e-learning platform MOODLOG. It is a version available on a GPU licence (General Public Use Licence) of a MOODLOG software for creating on-line education courses. The name comes from the words Modular Object-Oriented Dynamic Learning Environment. It allows an efficient management of distance teaching. [4]

The basic feature of the system is an exceptionally easy and intuitive navigation, although really complex functions are offered. The interface is characterised by a simple menu and navigation allows to focus on the contents of courses. The systems designed in this way is the most popular and the most widely used education platform in the world.

The teacher creates the course project (he/she is an administrator). At their disposal they have elements such as classes, exercises, workshops. It is possible to post educational materials in any form (folders, texts, references to websites). Work done by students is evaluated directly by the system and then can be exported into a Excel program sheet. Additional elements may include questionnaires, forums and others (20 activities in total). [1].

All materials posted in MOODLOG system are available for registered users only (students) or for visitors.

MOODLOG system provides a flexible set of educational tools. Being available on-line, it allows the use at any place in the world, and at any time. Effective use of learning time and attractive form of courses act as motivators for students. E-learning develops at such pace, that it is not only an extra for traditional education process, but can be treated as parallel methods [5].

4. SUMMARY

It is assumed that the proposed method of implementation of internships contributes to:

- improving attractiveness and effectiveness of internships (the possibility of free choice of a company for students, and no limits from the university's side as far as the topic of thesis is concerned),

- realizing diploma theses of utilitarian meaning for a given company, referring directly or indirectly to applications connected with a company's profile.

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