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SIMULATION SOFTWARE FOR MODELING THE MOVEMENT OF MATERIAL FLOWS

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Abstract: The Computer modeling is one of the best tools for the development of a real automated warehouse system. It aims to explore and define the behavior of the system and make the evaluation of its performance. In this paper is analyzed and simulated a software for the design of logistic systems.

Keywords: *Logistics systems, computer modeling, computer simulation, automated warehousing system.*

The analysis of a significant number of software products, shows that various logistics centers are involved in simulating automated warehouse systems. Some of them are designed for large industrial concerns and the models are so good that the simulation results are accepted as rules. [1, 2].

The purpose of the research is to develop a principle mechanism for using an appropriate software products to simulate the equipment of logistics centers.

1. An overview of the used software in engineering design.

A simulation software as simulation modeling tool of engineering logistics activities is summarized in the form of programs having a different kind of practical application method. In practical terms, applicability has found:

ARENA - a simulation system defined by a complete and flexible modeling environment combined with an easy-to-use graphical user interface. For building a model, modules are provided to describe the situation. The number and type of that modules are carefully selected to produce a good, flexible combination with ease of use. [2]

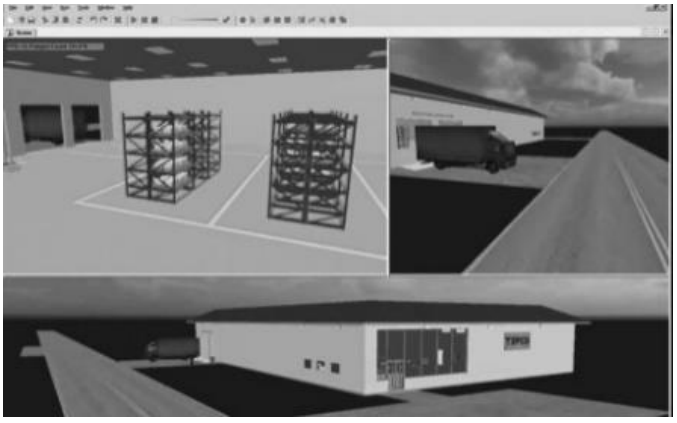

Fig.1. Arena 3D Example – Warehouse [6]

DOSIMIS-3 is a simulation software that is able to present the results of the simulation in the form of tables, graphs, diagrams and histograms. This simulation package is able to present simulated streams in a dynamic way - via animation. [3].

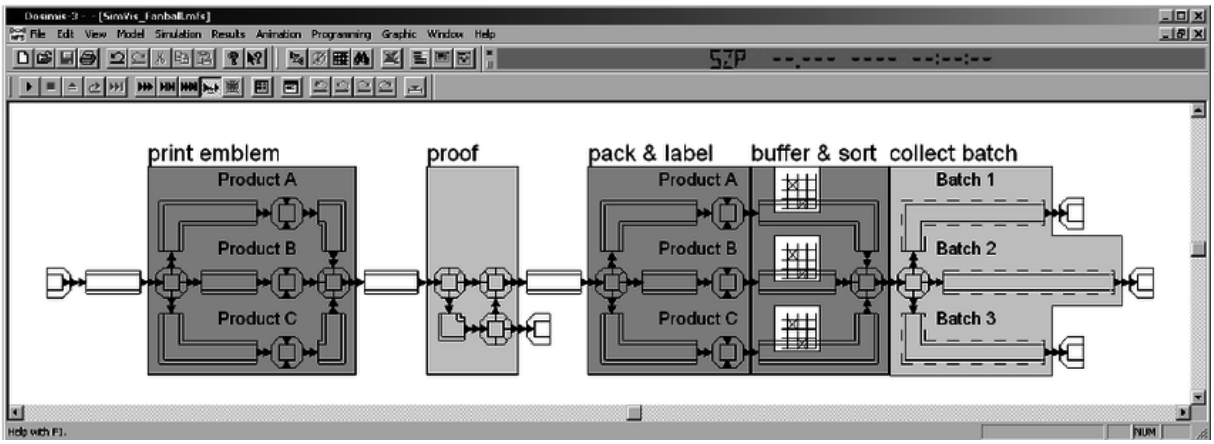

Fig. 2. DOSIMIS-3 simulation model [7]

WirthSim™ can easily create computer warehouse simulations, and the used procedure can be programmed according to the requirements of the respective warehouse system. [1].

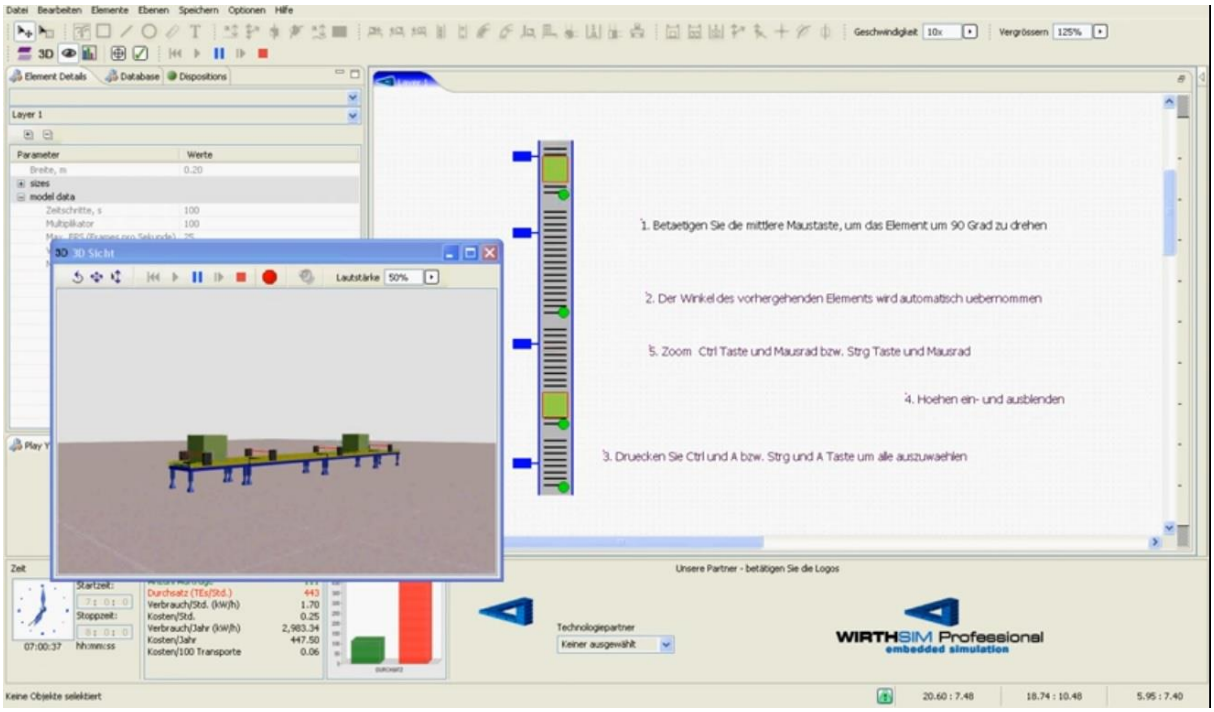

Fig. 3. WirthSim^{TM}

AnyLogic is software that supports all approaches to simulation development. AnyLogic tools and libraries allow you to quickly create models for a wide range of production, logistics and business simulation applications [4].

Fig. 4. AnyLogic

2. Optimizing the educational process technology through simulation modeling of the activities in the engineering logistics.

To implement the goal, it is necessary to solve the following main tasks: - to formulate and define the main software products in solving logistic tasks related to the warehouse and the terminal provision of the transport activities and to offer an optimization training procedure for the applied software for stimulation modeling in engineering logistics.

The adoption of the Modular Learning Model significantly improves the philosophy of the educational process. They make it relatively more flexible and adaptable to the labor market. An analysis of such an approach directs the research to developing a modular curriculum structure. In the curricula of the professional field "General Engineering" the discipline "Simulation Modeling" is used. We have adopted its base level in terms of the practical realization of the specialist. Work and functional skills and competencies are geared to measuring different logistical tasks. In order to comply with the basic principle of the theoretical and scientific statements, we divide the content of four modules: scientific, theoretical-applied, practical-applied and basic work.

The scientific module analyzes in the theoretical aspect the bases of the simulation process and provides the ability to form knowledge directed at certain mathematical models and laws.

The second module - the theoretical-applied aims to prepare the specialist in the specific professional field. The knowledge that is provided is related to the types of constructive features of the logistics systems.

Professionals are directly involved in engineering logistics issues and have a practical responsibility for accuracy. Here, certain skills related to the use of different techniques as well as the characteristics of the modeling results are formed.

The practical application bases are directly related to the design and, above all, to the design of the logistics system. It acquires all practical experience and knowledge to solve different logistics tasks. Undoubtedly, the module focuses on laboratory and seminar sessions that require the use of state-of-the-art equipment or the use of laboratory equipment by professional users of professional staff. The core work is the module in which competencies are acquired about the legal basics of engineering practice. It does not deal only with the normative acts related to the methodology for realization of the warehouse economy. In principle, the educational course in the discipline is technologically advanced according to the procedure.

The assessment of a professional field according to the current legislation is carried out mainly according to the accepted criteria for material facilities and habilitated teaching staff. Once only the theoretical foundations and practical applications are considered, the procedure is sometimes referred to as information. Problem is the case related to learner mobility and, in particular,

recognition of the study material. Therefore, the proposed modular system makes it possible to introduce new additional criteria that would allow for greater objectivity.

The accepted approach to modular structure of the discipline passes through the following distributed as: Module A - "Theoretical"; Module B - "Theoretical-applied"; Module C - "Practical Application"; Module D "Working". In each module, topics are grouped into two levels - functional and meaningful. Three groups are grouped into a functional level in the classroom: - Settling tools - (24%); forming the qualification - (53%); preparing the realization - (25%).

The content level contains 5 groups of topics, which may be: - theoretical-applied (12%); practical-applied (12%); engineering and technology (35%); specialized (22%); economics and management (12%);

The experiment and the summarized results show that the effectiveness of the practice has improved significantly. The results obtained are presented in Figure 1 and cover a four-year study period. The procedure was carried out in the laboratory of SHU and "Alcomed". Two study groups were used, the first being the classical program, and the second one using the second and third modules.

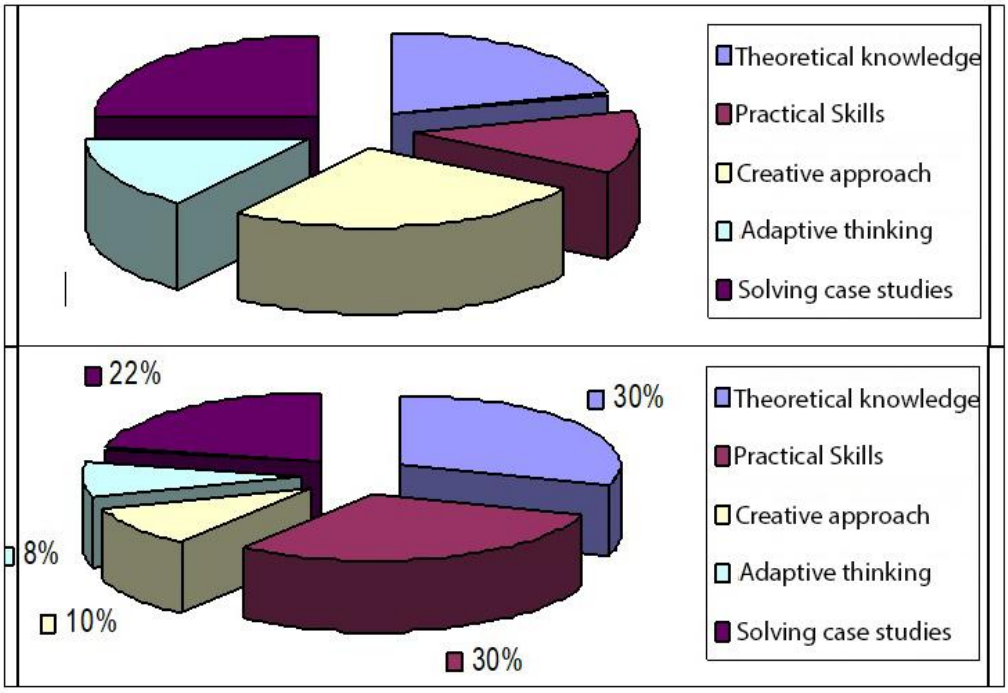

Fig. 5. Assessment of practical skills and competencies

The analysis in Figure 5 shows that the accepted evaluation criteria for assessing the level of knowledge acquisition are convenient for research and development in pedagogical activity.

References:

[1]. Krastanov, K., Computer modeling of the operation of an automated warehouse system. Scientific journal Mechanics Transport Communications, volume 10, issue 3/2, 2012 г. ISSN 1312-3823

[2]. Raykov, A., E. Raikov, P. Tomov, Computer simulation of the work of an automatic complex for dosing and packing of round toothpicks, XVII NNKK with international participation "ADP-2008"

[3]. Kisiel, P., Wykorzystanie komputerowego pakietu symulacyjnego dosimis - 3 przy podejmowaniu decyzji, VII konferencja naukowo-techniczna: Szczyrk, Logistyka, ISSN 1231-5478. — 2010 p. 1085 - 1092

[4]. http://www.anylogic.ru/

[5]. https://playtube.pk/user/UCUDqtWUX3aSSFDn51SVAPXA

[6]. https://www.researchgate.net/figure/DOSIMIS-3-simulation-model_fig1_228952613

[7]. http://www.wirthsim.com/deutsch/galerie/beispiele/

[8]. http://www.arenasimulation.com