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Report on the implementation of the LLL program “Basic level of industrial pneumatic automation and mechatronics" in KEnEU

ACTIVITY PERIOD 20/02/2023-24/02/2023

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Project full title:	Dual education in industrial automation and robotics in Kazakhstan
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Abstract	This is a narrative report on the implementation of the LLL program for current professionals in the field of industrial automation and robotics in KEnEU from February 20 to February 24, 2023, which also includes the results of feedback after training.

Title of document:	Report on the implementation of the LLL program “Basic level of industrial pneumatic automation and mechatronics" in KEnEU
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VERSIONING AND CONTRIBUTION HISTORY

Version	Date	Revision description	Partner responsible
1.0	28/02/2023	First draft	KEnEU

Activity Report

In the period 20/02/2023-24/02/2023 on the basis of the Kostanay Engineering and Economics University named after M. Dulatov the LLL program for employees of enterprises of the Kostanay region was organized and conducted on the topic “Basic level of industrial pneumatic automation and mechatronics" in the amount of 36 hours.

Within the framework of the course, the topics of lectures and practical work were considered according to Table 1.

Table 1. Content of the LLL program

№	The content of the discipline (topic or section)	Number of hours		
		Total	including	
			Lecture	Practice
1 module				
1	Introduction to FluidSIM - overview of components and functions Symbols of pneumatic devices, creation of circuit diagrams. International Standards	2	1	1
2	Control system: pneumatic distributors of various types (structure, types and purpose of pneumatic distributors), sensors, throttles, logic elements. Pneumatic systems using multiple cylinders.	6	1	5
3	Schemes with one actuator. Schemes with multiple actuators	4		4
4	Block diagram of work, communication FluidSim with the controller	4		4
2 module				
1	Culture of safe work. Basics of safe work and effective organization of the workplace in accordance with the WorldSkills standards and the WorldSkills standards specification for the Mechatronics competency	4	4	
2	Assembly of an electrically operated material transfer station with a magazine module	4		4
3	Programming and commissioning of an electrically driven material handling station with a magazine module	6		6
4	Maintenance of electrically driven material transfer station with magazine module	4		4
5	Final examination	2	0	2
Total		**36**	**6**	**30**

The list of trained specialists is presented in Table 2.

Table 2. List of LLL students.

№	Full name	Organization	Position
1	Tristan Andrey Alexandrovich	Service Center Rostselmash LLP	Engineer
2	Roslov Konstantin Alexandrovich	Service Center Rostselmash LLP	Engineer
3	Zhaltenov Alimzhan Aidarbekovich	Service Center Rostselmash LLP	Service Engineer
4	Abdullayev Miras Bahatzhanovich	Service Center Rostselmash LLP	Service Engineer
5	Myrzatai Meiramkhan Serikuly	Service Center Rostselmash LLP	Engineer 2nd category
6	Tokarev Ivan Vladimirovich	KB "SPC Agroengineering" LLP	Researcher
7	Satov Zhanat Karbayevich	KMK - PIONEER	Chief Power Engineer
8	Sakhalov Eldar Maratovich	JSC SSGPO	electrician for repair and maintenance of electrical equipment
9	Petlya Dmitry Vladimirovich	LLP "Leader 2010"	Mechanic of instrumentation and automation
10	Nuzhny Semyon Andreyevich	Zlak Plus M LLP	Mechanic of instrumentation and automation
11	Bekzhanov Aibat Adilbayevich	BK-BETON LLP	Deputy Director
12	Tleugabulov Serik Amirovich	BK-BETON LLP	Electrician
13	Almatov Zhanat Bakedzhanovich	BK-BETON LLP	Electrician
14	Boranbayev Serik Mutarlapovich	JSC "NC "KTZ"	Engineer
15	Nikityuk Alexandr Igorevich	RealtyKST LLP	Electrician

16	Grechikhin Mikhail Sergeyevich	RealtyKST LLP	Electrician
17	Arnold Oleg Gennadyevich	Kostanay Heat and Energy Company LLP	Electrician-mechanic of instrumentation and automation
18	Khamidullin Yury Arturovich	DEP LLP	Instrumentation engineer
19	Kambarov Valery Alexandrovich	Kostanay Heat and Energy Company SOE	Electromechanic of instrumentation and automation
20	Saueken Nursultan Daurenuly	Kostanay Heat and Energy Company LLP	Electrician-mechanic of instrumentation and automation
21	Bekpayev Marat Alexandrovich	Kostanay Heat and Energy Company SOE	Head of the Occupational Safety and Health Service
22	Khatuntsev Sergey Vyacheslavovich	JSC "Kostanay minerals"	Electrician
23	Esmukhambetov Alikhan Seitovich	JSC "Kostanay minerals"	Electrician
24	Vengerskaya Yelena Vladimirovna	EP Mart	Supervisor
25	Kalinin Vladislav Miroslavovich	Kostanay Heat and Energy Company SOE	Electromechanic of instrumentation and automation
26	Konovalov Pavel Anatolyevich	Kostanay Heat and Energy Company SOE	Electromechanic of instrumentation and automation
27	Zhabayev Timur Baurzhanovich	Kostanay Heat and Energy Company SOE	Electrician for the repair and maintenance of automation and measuring instruments Vp
28	Vandayev Vladislav Olegovich	DEP LLP	Mechanic of instrumentation and automation
29	Tuebaev Askar Zhanelovich	DEP LLP	Mechanic of instrumentation and automation

During the analysis and consolidation of theoretical and practical skills, students mastered the FluidSim and TIAPortal software packages - an overview of components and functions, creating projects, setting up equipment and networks.

The FluidSIM program is designed to simulate pneumatic and electro-pneumatic systems at the stage of making a circuit design solution, the simulated system is represented by a diagram in conventional graphic symbols (symbols).

As a result of passing the 1st module were:

- Studied pneumatic automation systems, which are one of the main classes of industrial automation systems.
- the integration of electrical and pneumatic automation devices, which play an important role in solving many problems associated with the development and implementation of modern mechatronic technology, has been worked out.

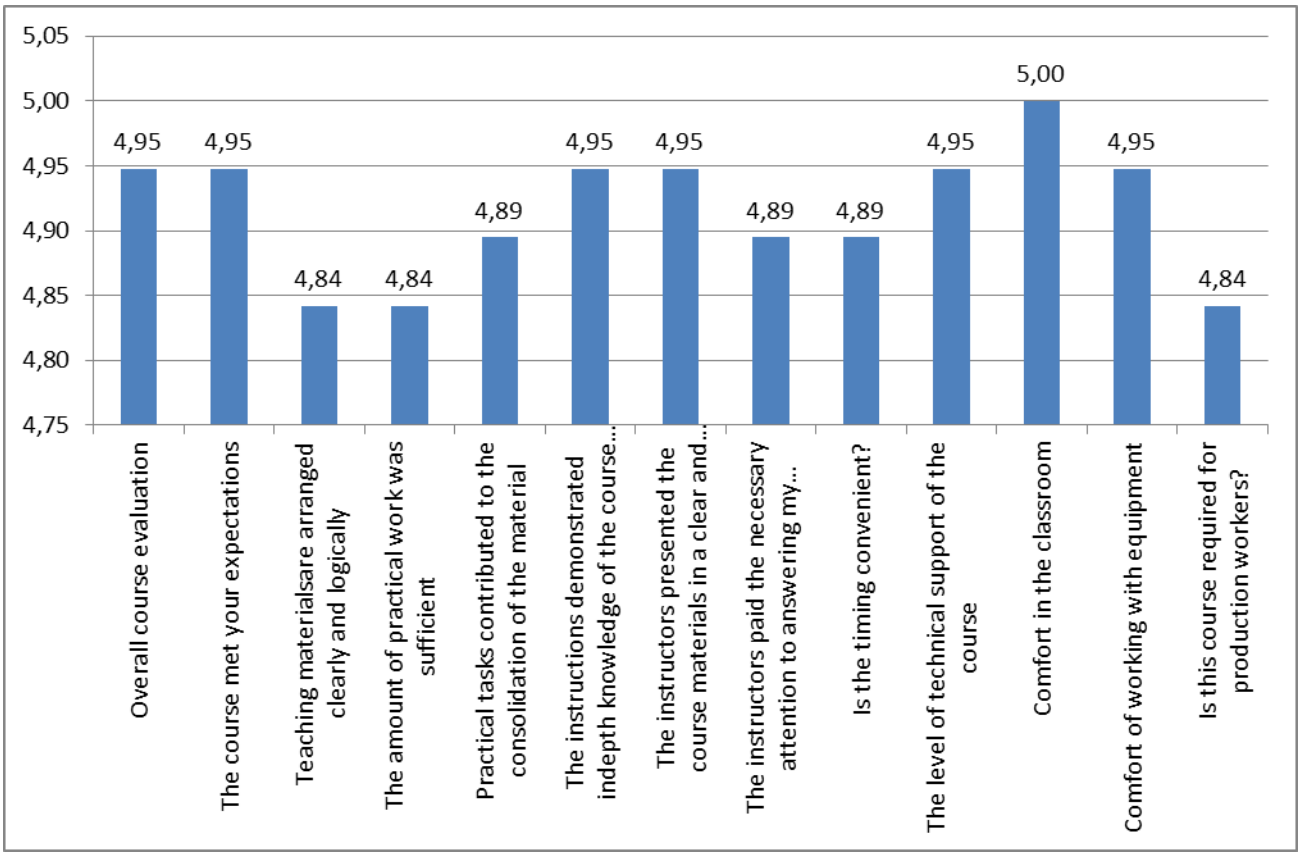
The system architecture of the new generation of SIMATIC S7-1200 and S7-1500 controllers has been updated and, using the TIA Portal, these innovations bring advantages in programming and configuring the controllers.

The TIA Portal not only integrates the basic software STEP 7, WinCC, SINAMICS StartDrive, SIMOCODE ES and SIMOTION SCOUT TIA, but also new functionalities such as Multiuser Engineering and energy monitoring in one interface. In this course, recommendations and tips for efficient programming of S7-1200/1500 controllers are worked out, as well as new features in programming.

Feedback results

At the end of the course, a survey was conducted, in which the students proposed to increase the duration of the program, differentiate courses according to the level of complexity, and make additional purchases of consumables for practicing the practical tasks of the course.
The questionnaire contained questions on 13 criteria for evaluating the program on a 5-point scale. The average score for each criterion is shown in Diagram 1.

Diagram 1. Evaluation of the LLL program by students.



Based on the results of the survey, we can conclude that the LLL program is implemented with high quality, is relevant and in demand by professionals in the field of industrial automation and robotics.