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*Odessa National Academy  
of Food Technologies*



International Competition of Student Scientific Works

**BLACK SEA SCIENCE 2020**

Information Technology, Automation and Robotics

Proceedings

Odessa, ONAFT 2020

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INTELLIGENT AGENT OF ACCESS MANAGEMENT AND CONTROL SYSTEM Author: <b>Denys Vysoven</b> Supervisor: <b>Artem Kovalchuk</b>	251
EMPLOYEES NOTIFICATION SYSTEMS IN THE EVENT OF EMERGENCY SITUATIONS THROUGH PUBLIC WIRELESS ACCESS POINTS Authors: <b>Oleksii Patlaichuk, Hlib Serbulov</b> Supervisor: <b>Sergii Bozhatkin, Victorya Guseva-Bozhatkina</b>	259
MONITORING AND CONTROLLING AGENT OF MICROGRID CLUSTER Author: <b>Tetiana Pyrohovska</b> Supervisor: <b>Artem Kovalchuk</b>	270
HEAT LOSS MONITORING OF MULTI-STORY BUILDINGS USING MULTI-AGENT APPROACH Author: <b>Iryna Simakova</b> Supervisor: <b>Ivan Burlachenko</b>	276
STATUS AND PROSPECTS FOR THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN GERMANY Author: <b>Yevheniia Norenko</b> Supervisor: <b>Liudmyla Dybkova</b>	285
ROBOTIC SEARCH SYSTEM FOR PEOPLE Authors: <b>Dmitry Derman, Anna Derman</b> Supervisor: <b>Sergiy Tereshchuk</b>	294
IMPLEMENTATION OF ROBOTICS FOR OCEANS AND SEAS CLEANING Author: <b>Anna Perederii</b> Supervisor: <b>Iryna Muntian</b>	299
DEVELOPMENT OF MODELS AND SOFTWARE SOLUTION For THE PROBLEM OF DIAGNOSTIC OF FINANCIAL STATES OF IT-ENTERPRISE Author: <b>Dariia Tkachenko</b> Supervisor: <b>Oleksandr Goloskokov</b>	305
DEVELOPMENT OF A PROTOTYPE OF AN ACTIVE TRACTION PROSTHESIS Author: <b>Nataliia Panha</b> Supervisors: <b>Yevgen Mykhaylov, Oleksandr Kniukh</b>	317
SYSTEM FOR STORING AND ANALYZING DATA OF THE WATER HEATERS PLANT Author: <b>Kyryl Nebyvailov</b> Supervisor: <b>Helen Bodul</b>	328
DEVELOPMENT OF A MONITORING SYSTEM SEYSMOAKTYVNOSTI CONSTRUCTION WORKS Author: <b>Andrii Tsobenko</b> Supervisor: <b>Denis Popkov</b>	337
MODELLING OF THREATS OF ECONOMY DIGITALIZATION Author: <b>Sergi Rudyk</b> Supervisor: <b>Iryna Nikolina</b>	346

## SYSTEM FOR STORING AND ANALYZING DATA OF THE WATER HEATERS PLANT

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**Abstract.** The given project of this system of data storage and analysis for generating reports. The system has interfaces for users and interfaces for changing the plan and production time. The database system stores information regarding finished products at the plant for the production of water heaters..

**Keywords:** database, reporting, barcode scanning, production automation, production parameters

### I. Introduction

Scanners for barcodes are devices that allow you to get various information about the product, which was originally laid down in the database of the information system. When scanning, the device emits a sound signal, every inhabitant of the planet, standing at the checkout counter in the nearest store or supermarket, hears about the successful reading of product information from the storage medium.

The reason for the appearance of scanners can be considered an increase in the range at retail outlets and customers. If before the seller knew the information about each product and its value, then as a result of the growing diversity of positions, it was already impossible to keep this information in mind. Scanners identifying the cost came to the rescue, as well as other details about the product, when holding the reader to the barcode.

A database is information structures containing interconnected data about real objects.

Features of this data set are:

- sufficiently large amounts of information;
- maximum possible compactness of data storage;
- the ability to extract from the database various information in a specific subject area;
- user-friendly appearance and form of information is drawn;
- high speed access to data;
- reliability of information storage and the ability to provide authorized access to data for individual users;
- convenience and simplicity of user designing of queries, forms and reports for data sampling. Creating a database, its support and ensuring user access to it is carried out using a special software tool - database management system

Databases are very simple and convenient way to have access to information that you need to work with every day. No need to record large data sizes by hand and keep information in mind. This is very important for enterprises, since the time saved is always cost-effective.

## **II. Analytical review of the literature**

The history of databases in the narrow sense considers databases in the traditional (modern) sense. This story begins in 1955 when programmable recording equipment appeared. The software of this time supported a file-based record-processing model. Punch cards were used to store data.

Online network databases appeared in the mid-1960s. Operations on operational databases were processed interactively using terminals. Simple index-sequential record organizations quickly evolved to a more powerful set-oriented record model. For his leadership of the Data Base Task Group (DBTG), which developed a standard language for describing data and manipulating data, Charles Bachmann received the Turing Prize.

At the same time, the concept of database schemas and the concept of data independence were developed in the Kobil database community.

## **III. Object, subject and research methods**

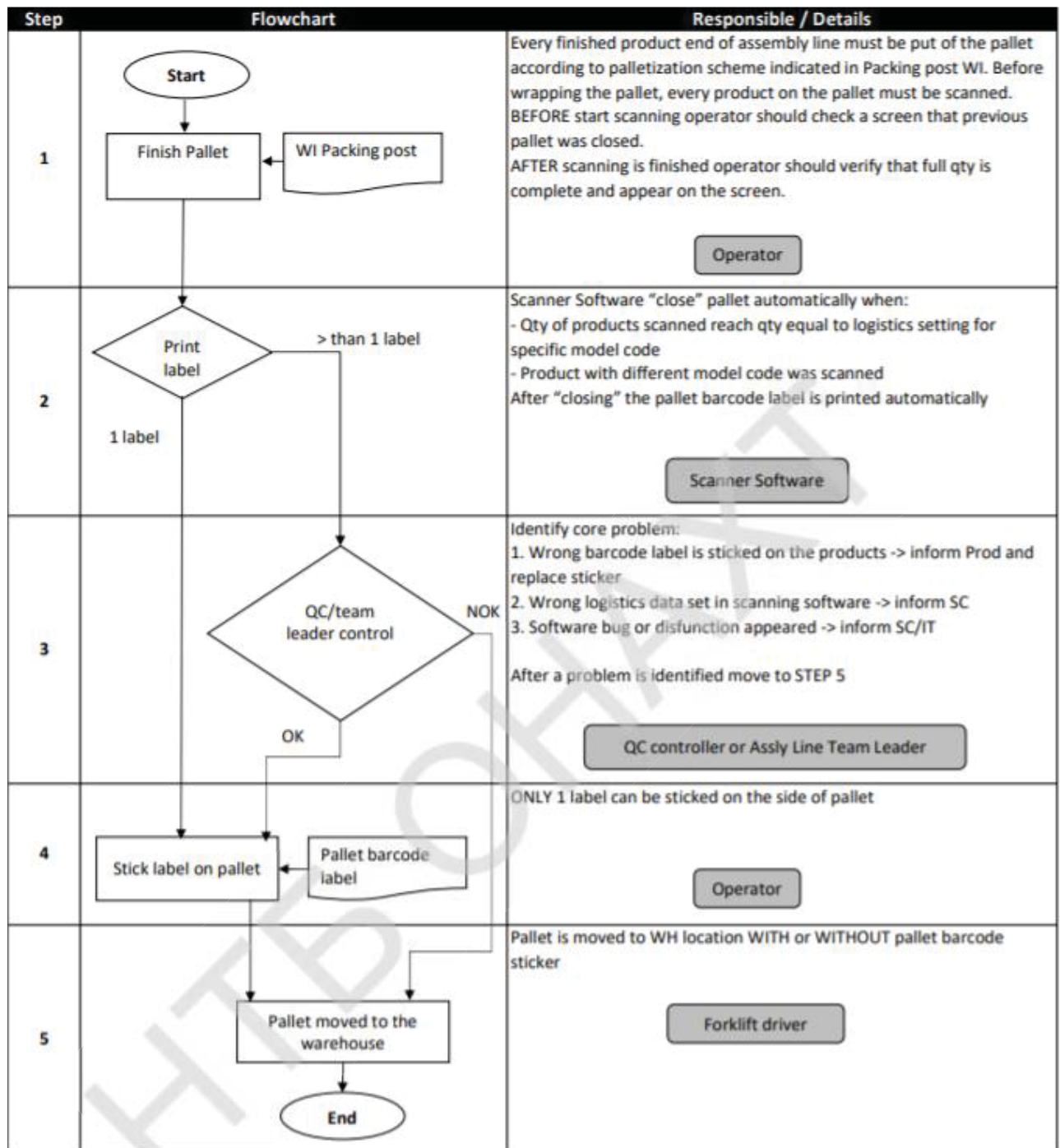
The main reason for creating a data storage system and its analysis is the need to reduce the time for accounting for finished products, as using traditional accounting with paper and pen inconvenience and a big loss of time. Also, the human factor that forget can be unprofitable for the enterprise.

The object of the study is an information system that allows using additional hardware, such as a barcode scanner (Picture 1), to enter the necessary data on the manufactured products and, according to some procedures, process them to generate reports and stock accounting, print stickers and other things.



Picture 1 – External view of barcode scanner

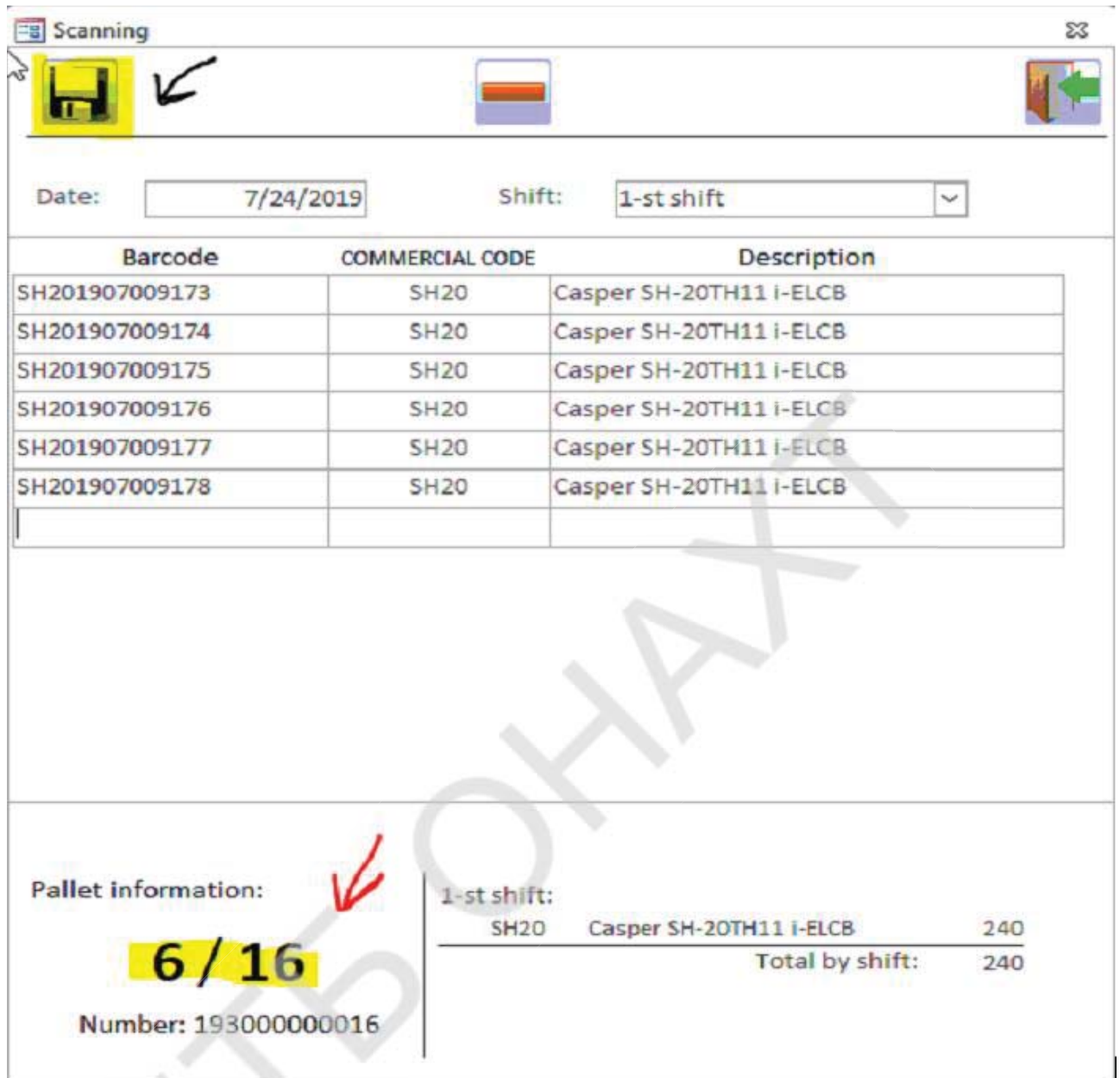
According to the scheme shown in Figure 2, production works after the introduction of this system.



Picture 2 – An example of a data storage and analysis system

#### IV. Work results

An interface has been designed for the operator's, in which scanned product positions are displayed (Picture 3). Each reference has its own quantity on a pallet. The pallet closes automatically if the right amount of product is scanned. You can also close the pallet manually if you not need to keep all positions.



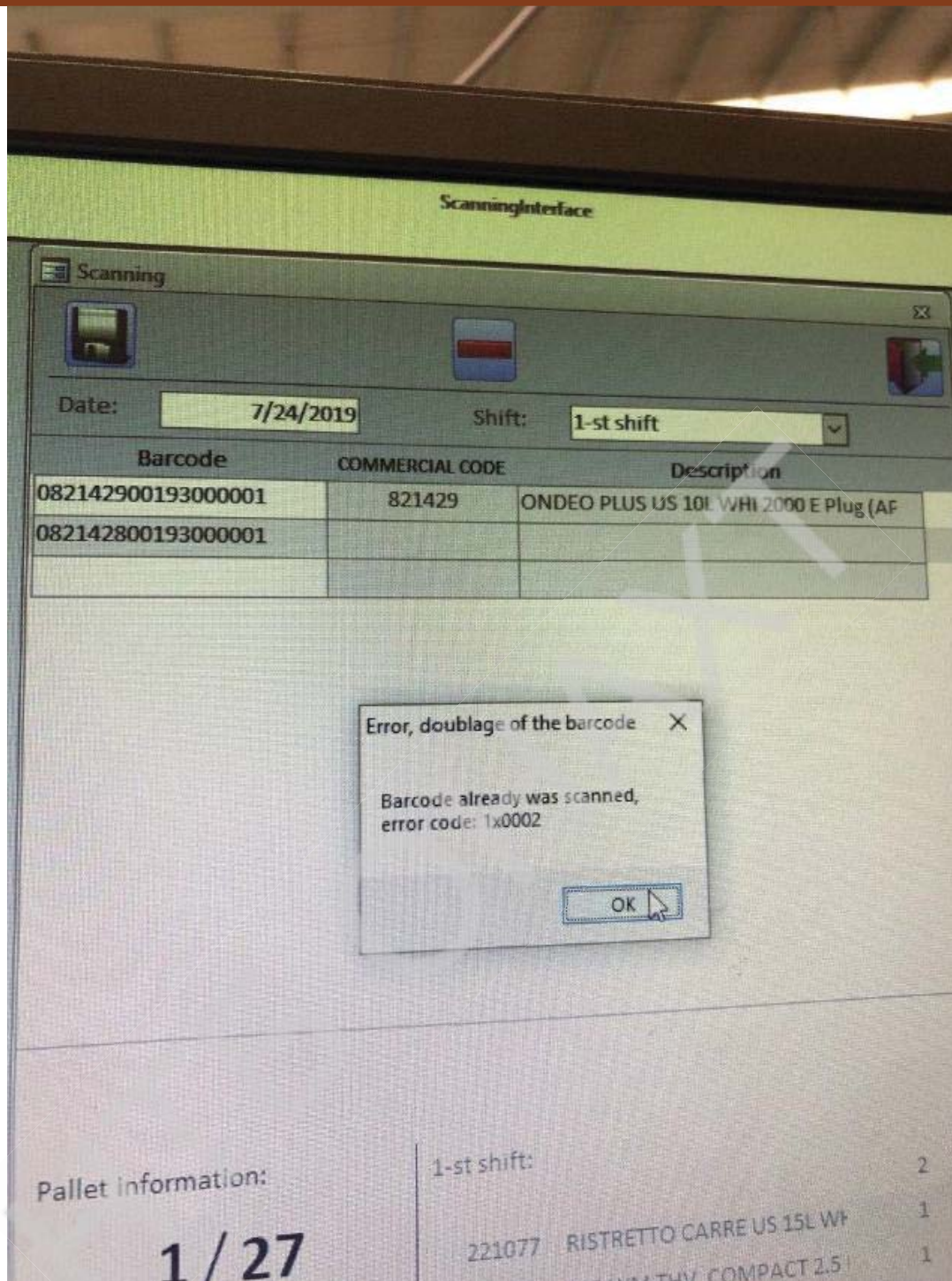
Picture 3 – Interface for operator

The operator’s workplace where the scanner and monitor with the interface for scanning are located is shown on the Picture 4.



Picture 4 – Operator's workplace

If the source barcode enters the database, then it cannot be scanned again thanks to the control system (Picture 5). Thus, you can be sure that the scanned products will not be duplicated and there will be no errors in the formation of the report.



Picture 5– Duplicate error

There is also an interface with all product positions. There you can add new positions or edit current ones. In additional tabs you can find tools for setting the working time and the start of the shift (Picture 6).

Reference	Index	Description	Quantity on Pallet
02410391	0	Thermor PC 15 SB	16
02210930	0	015 WM THV COMPACT 2.5 KW	27
02211090	0	COMPACT EVO AS 15L WHI 0350 E Plug ELCB (TID)	27
02211100	0	COMPACT AS 15L WHI 1500W E plug (THE)	27
02211120	0	RISTRETTO CARRE AS 15L WHI 2000 (TH)	30
02211140	0	RISTRETTO CARRE US 15L WHI 2000 (TH)	30
02211150	0	TH DUMMY COMPACT EVO 15L	27
02220030	0	20L HZ DUMMY THV	16
02220040	0	20L HZ 350 W E PLUG ELCB (TID)	16
02310410	0	030 WM THV COMPACT 2.5 KW	18
02310420	0	030 WM THV COMPACT DUMMY	18
02310560	0	COMPACT EVO AS 30L WHI 0500 E Plug ELCB (TID)	18
02310570	0	COMPACT AS 30L WHI 1500W E plug (THE)	18
02310600	0	RISTRETTO CARRE AS 30L WHI 2000 (TH)	24
02310610	0	TH DUMMY COMPACT EVO 30L	18
02330040	0	30L HZ DUMMY THV	12
02330050	0	30L HZ 350W E PLUG ELCB (TID)	12
03210830	0	15L AS 2000W SAUTER	30
03210840	0	15L US 2000W SAUTER	30
03210850	0	10L AS 2000W SAUTER	45
03210860	0	10L US 2000W SAUTER	45
03310230	0	30L 2000W SAUTER	24
08213750	0	ATL 15L ONDEO ACCESS 2500W AS (AVN) WHITE	27

Picture 6 – Interface with information about products

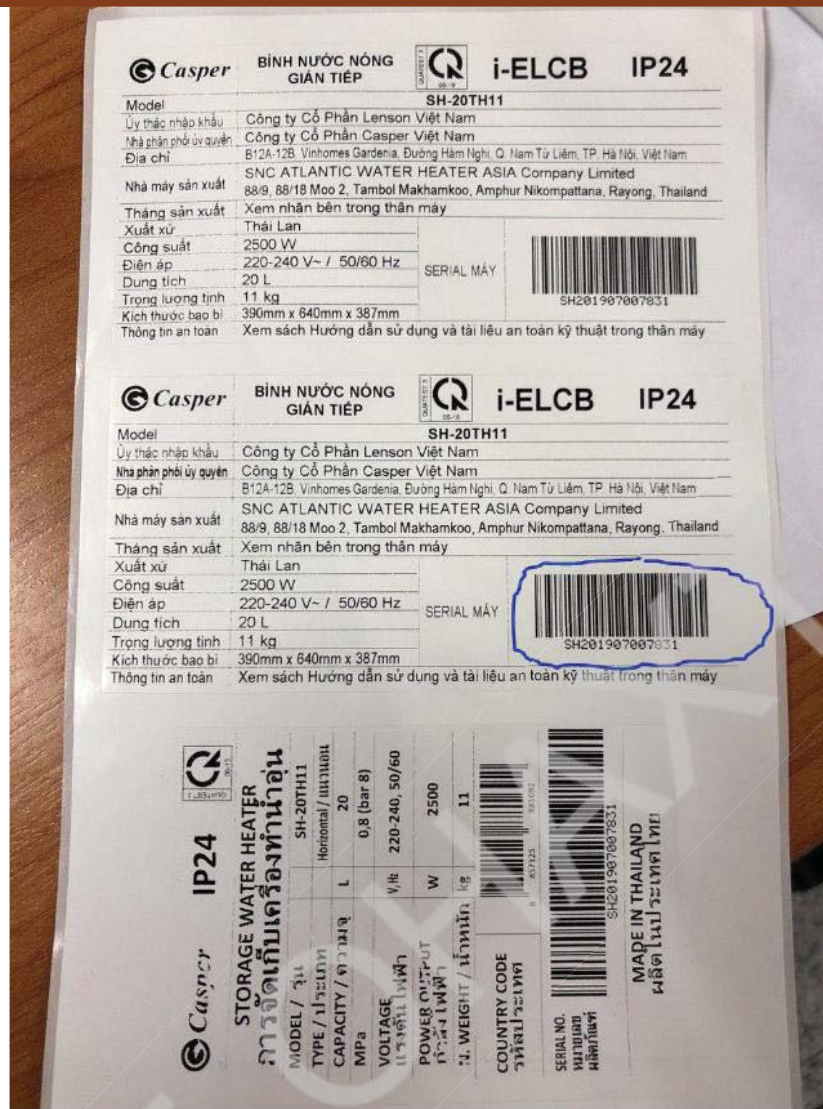
After closing the pallets, a new one is formed.

A sticker with the pallet number and product information is also printed, which is glued to the pallet and sent to the finished goods warehouse (Picture 7).

Pallet information:		1-st shift:	
<b>2 / 16</b>		SH20	Casper SH-20TH11 i-ELCB
		272	
Number: 193000000018		Total by shift:	
		272	

Picture 7– New one pallet number is formed

All barcodes are scanned from the sticker, read and verified with the database system (Picture 8).



Picture 8 – An example of sticker

If this position is not in the database or the number of characters does not match the required number, then the barcode simply will not get into the database due to mismatch errors.

The next stage in the development of the system is the addition of a panel where the operator will apply a pass card (Picture 9). This is necessary in order to identify the person who worked in this area for a certain period of time.



Picture 9 – Access card

Another important addition to the system is the replacement of a conventional monitor with a monitor with a touchscreen (Picture 10). Ordinary "mice" very often break

down in production, especially where there is a lot of dust. It will also help save time for the operator.

Philips 222B9T / 00 SmoothTouch monitors were purchased for production. They have protection against moisture and dust, and also uses a projection-capacitive sensor system.



Picture 10 – Touchscreen

## V. Conclusions

The possibilities of using an information system in production were investigated, the advantages for automating the creation of reporting documentation were shown, a database with several interfaces and a dozen different tables was developed, which stores information about the reference, logical codes and the number of products on one pallet. A separate interface has been designed for the computer in the workshop, where operators scan the finished product using a barcode scanner. A separate interface has been developed for the logistician, where based on the scanned stickers of water heaters you can make reports, thanks to which you can make operational management decisions to optimize production and stock.

The system of storage and analysis of the data of the plant for the production of water heaters, which I proposed, was successfully put into production and is now actively used at the plant in Thailand.

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