Lecture 6. Automation of management of transport vehicles.

Purpose of the lecture: simulate logistics systems and perform calculations for making management decisions for various types of transport;

Keywords: automation, mechanized, non-mechanized warehouse, cyclic machines, workflow

Types of lectures: Lecture-research.

6.1. The concept of automation of production processes

6.2. Automatic control of cyclic machines

6.3. Automation of workflow and accounting of goods in warehouses

6.1. The concept of automation of production processes

The essence of automation consists in the fact that production processes, including operations of the main technological process of production and related loading, unloading, transport and storage (PRTS) work, are performed without human intervention (or with minimal human involvement, depending on the degree of automation of operations) by automatic machines and mechanisms. The industry automates the basic technological processes of production and related PRTS work, as part of an integrated production technology. In trade and transport, reloading, picking, sorting operations, transportation and warehousing of goods, the formation of transport packages, etc. are automated.

In its development, mechanized and automated warehouses went through the following main stages or stages:

- non-mechanized warehouse (this is a warehouse in which all transshipment and storage operations are carried out manually or with the use of small-scale mechanization - hand trucks, inclined roller tracks, etc.);

- a mechanized warehouse (this is a warehouse in which the main handling operations are performed using machines and mechanisms with manual control of buttons or handles);

- a complex (or high) mechanized warehouse (this is a warehouse in which all handling and storage operations are performed by manually controlled machines and mechanisms);

- an automated warehouse (this is a complex mechanized warehouse in which part of the handling and storage operations are performed by automatic or semi-automatic machines and mechanisms);

- automatic warehouse (this is a complex mechanized warehouse in which all the main handling and storage operations are performed by automatic machines and mechanisms);

- a robotic warehouse (this is an automated warehouse in which part of the transshipment and storage operations are performed by reprogrammable robotics).

6.2. Automatic control of cyclic machines

The main automated hoisting-and-transport machines of cyclic action in warehouses are stacking machines (mainly rack-mounted stacker cranes) and floor-mounted rail and trackless automatic trolleys (transport robots).

In automatic warehouses, two main methods of automatic addressing of stacker cranes are used:

1. The position-code method, in which several sensors are installed on a moving object (when addressing along the length - on the CKSA navigation platform), and a unique combination of shunts (typical only for this address) is installed at each address position - see fig. 6.2 a. The stacker crane will stop when, when moving along the racks, a certain combination of its sensors closes, corresponding to the location of the shunts at a given address position.

2. Pulse counting method, in which on a moving object

(for addressing along the length - on the running platform of the stacker crane) one sensor is installed, and at each address position - one shunt for its closure - see Fig. 6.2 b. The stacker crane, moving along the racks, counts the pulses received when each address position is passed by the sensor and stops when the received number of pulses is equal to the number corresponding to the given address.

6.3. Automation of workflow and accounting of goods in warehouses

Automation of hoisting-and-transport vehicles, groups and systems of machines provides important information on cargo and cargo flows, which is used to record the arrival of goods at warehouses, the availability of goods and empty seats for cargo, the number of goods delivered, etc.

Information support of the technological process of cargo processing at large transshipment and storage complexes, cargo terminals and logistics centers is an important component of logistics systems for the delivery of goods and in many respects contributes to the effectiveness of these systems, the intensity of the advancement of cargo flows and the reduction of delivery times. Of complete importance is the complete, reliable and timely information on cargo and cargo flows at large logistics terminals of packaged goods, where the range of processed goods can reach tens of thousands of items.

Questions:

1. What indicators are used to assess the state of mechanization and automation of PRTS work in the warehouse?

2. What are the functions of the automatic warehouse management system?

3. What is the algorithm for the operation of an automatic rack-mounted crane?

Literature and resources

1. Zhuravlev N.P., Malikov O.B. Transport and cargo complexes: Textbook. allowance. - M .: Route, 2016 .-- 232 p.

2. Boyko N.I., Cherednichenko S.P. Transport and cargo systems and warehouses: textbook / N.I. Boyko, S.P. Cherednichenko. - Rostov n / a .: Phoenix, 2007 .-- 400 p.

3. Transport and cargo systems. Textbook / A.S. Balalaev, I.A. Baburova, A. Yu. Kostenko. - Khabarovsk: Publishing house of FVGUPS, 2015 .-- 101 p.

4. 4. Complex mechanization and automation of loading and unloading operations: Textbook / Ed. Timoshina A.A. and Machulsky I.I.-M .: Route, 2013.- 400 p.

Internet resources:

1. Abdikerimov, G.S. Logistic management of cargo transportation and terminal and warehouse activities [Text]: A textbook for specialists / G.S. Abdikerimov, S.Yu. Eliseev, V.M. Nikolashin, A.S. Sinitsyna, O.B. Malikov // M: FGBOU "Educational-methodical / center for education in railway transport". - 2013 .-- 428 p. https://e.lanbook.com/reader/book/59016/#1

2. Balalaev A.S., Leontiev R.G. Transport and logistics interaction in multimodal transportation: monograph. - M .: FGBOU "Educational-methodical center for education in railway transport", 2012. - 268 p. - http://e.lanbook.com/view/book/58896/page58/

3. Design of loading and unloading devices and warehouses: Method. instructions / compiled by V.A. Bolotin, E.K. Korovyakovsky, N.G. Yankovskaya.- SPb.: FSBEI HPE PGUPS, 2015.- 38 p.

Available online: Additional educational material and Internet sources used to complete the assignments of lectures, seminars, CDS, will be available on your page in the Univer.kaznu system.