

УДК 656.2

Luchko M., Slesaryonok E.

Perspectives of Using Warehouse Robots

Belarusian National Technical University

Minsk, Belarus

The efficiency of the logistics system depends not only on the improvement and intensification of industrial and transport production, but also on warehousing. An important role is also played by warehouses in industrial organizations (at the production level). They affect the organization of the main production processes, the placement and operation of internal and external transport, the cost of production and other indicators of the efficiency of production and the activities of organizations. Warehouses of various types can be created at main stages of transport cargo flows or production processes for the temporary accumulation of goods and the timely provision of production with materials in the right quantities. The incentive for active warehouse robotization is space optimization, acceleration of operations, exclusion of a person from warehouse operations. Thus, the cost of the final product is reduced, which makes the robotization process attractive for owners of warehouses, terminals and distribution centers. -Cart robots are able to autonomously move pallets around the warehouse. Some of them are able to automatically remove the necessary goods from the shelf and place them in containers or on pallets, and, conversely, lay out the goods on the shelves. Palletizing robots are industrial manipulators, powered by servo motors, designed to automatically pick up and palletize products. Sorting robots (otherwise known as picking robots), ideally, they should be able to handle the task of sorting items from a pile with their exact identities. This can be done, for

example, if we have a digital database of three-dimensional images of all objects manipulated by the robot. An automated system is indispensable when sorting goods in a warehouse. Robotic stacking greatly simplifies many processes using artificial intelligence, speeds up the assembly, packaging and shipment of goods. Drone robots flying along the racks, scanning commodity items and transferring them to the system or directly to picking robots, have great prospects. Exoskeletons, also known as assistant robots or external skeletons, are electromechanical support devices that are worn on the human body. In addition to performing work on ergonomically designed automatic line machines, assistant robots are also involved in warehouses. They are used in the implementation of loading and unloading operations, if employees need to lift and move heavy objects. The use of such devices helps to limit the load on the lumbar spine and back muscles of the warehouse employee. The main components that ensure the functioning of the complex: high-capacity wheeled mobile robots equipped with a manipulator, performing mechanical actions traditionally performed by warehouse personnel - loading, unloading, delivery of cargo from the location to the loading area and back, movement of cargo on the territory; a control system responsible for coordinating the interaction of mobile robots, setting a goal, optimizing related logistics processes within a warehouse. The main disadvantages of warehouse robotization are: high initial costs for the purchase and installation of equipment; the need to purchase a warehouse management system integrated with these types of robots; the need to improve the skills of the warehouse staff, as well as the skills of repair workers; or increased costs for the repair of robotic warehouse equipment due to the use of high-tech devices; the need to introduce a new system of labels and identification marks with which warehouse robots are integrated.