

COMPARISON OF FUNCTIONAL CAPABILITIES OF CLASSIC MANIPULATOR ROBOTS AND COLLABORATIVE ROBOTS

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Annotation: Analysis of the functional capabilities of classical manipulator robots and collaborative robots shows key differences in their areas of application, interaction with people, and flexibility in performing tasks. Classic robots are focused on high productivity in an isolated environment, while collaborative robots ensure safe and effective collaboration with people in a shared workspace. This opens up new opportunities for automation, especially in the context of flexible and adaptive manufacturing processes.

Key words: Industry 5.0, collaborative work, classic work, functionality.

Comparing the functional capabilities of classic manipulator robots and collaborative robots (cobots) is important because of their different fields of application and technological features. Classic robot manipulators are usually used in heavy industrial environments where monotonous or high-speed operations need to be performed with high precision. They work in conditions of isolation from humans due to the high level of risk, but are able to perform tasks that require a large carrying capacity. At the same time, collaborative robots are optimized for safe interaction with people, making them ideal for use on production lines where flexibility and adaptability to different processes are required. Cobots are easy to set up and operate, which allows them to be used in small and medium-sized enterprises, as well as in scientific research. Therefore, comparing these types of robots allows you to better understand their strengths and weaknesses, which is key to choosing the optimal solution for specific production tasks. A comparison of the functional capabilities of a classic manipulator robot and collaborative robots (Cobot Fanuc CRX-25iA, KUKA LBR iisy 15 R930) is shown in Table 1.

Table 1 – Comparison of the functional capabilities of a classic manipulator robot and collaborative robots

Functional capabilities	A classic manipulator robot	Cobot
1	2	3
Appointment	Mainly for heavy industrial tasks, repetitive operations in an environment with a high degree of automation	For collaboration with people, easy automation of tasks in different environments
Security	Requires fencing, sensors and safety barriers to prevent accidents	Integrated force, moment and safety sensors allow you to work alongside people without additional barriers
Programming	More complex programming systems require knowledge of robot programming languages	Intuitive programming via tablets or HMI, easy setup for non-professional users
Repeatability of operations	High accuracy and repeatability for similar tasks	High accuracy, but designed for more diverse and flexible tasks

Continuation of table 1

1	2	3
Flexibility of use	Limited, intended for narrow tasks and programmed operations	Flexible, easily integrated into various production processes, possibility of quick reconfiguration
Speed of work	Usually faster, for high-speed production	Less fast, optimized for safe collaboration with people
Sensors and sensors	Limited or absent safety sensors, optional equipment possible	Integrated sensors for force and moment control, ensuring safety and adaptability
Mobility	Usually stationary, heavy installation	Compact, easy installation, possibility of use in different places
Cooperation with a person	Requires complete isolation from people due to high risk of accidents	Specially designed for safe collaboration with a person (collaboration)

Table 1, comparing the functionality of classic manipulator robots and collaborative robots, shows that each type has its own unique advantages and limitations. Classic manipulator robots are more suitable for large productions, where high speed, accuracy and the ability to work with heavy loads are important. However, their use requires additional safety measures, as they cannot work next to people without isolation. Collaborative robots, on the other hand, are optimized for safe human interaction, making them more flexible and convenient to implement in environments that require rapid adaptation to changes in production processes. They have lower load capacity and speed, but offer greater flexibility and ease of programming, making them ideal for small and medium-sized businesses.

CONCLUSIONS. A comparison of classic manipulator robots and collaborative robots shows that collaborative robots offer greater flexibility and safety when working with humans, making them more adaptable in modern production environments. At the same time, classic robots remain effective for tasks that require high precision and speed in an isolated environment.

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