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THE USE OF ADVANCED ROBOTIC SYSTEMS IN THE AUTOMOTIVE INDUSTRYOF THE REPUBLIC OF BELARUS

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A robotic system is a system that includes robots, working elements of robots, as well as devices, equipment and sensors necessary for the correct operation of the system. A robot is an automatic, stationary or mobile mechanism, mainly consisting of an actuator and a programmable control device. An industrial robot is one of the components used to create flexible automated production.

One of the industries where robotic systems are most actively used is the automotive industry. Leading enterprises are: Minsk Automobile Plant, Belarusian Automobile Plant (the holding's management company is OJSC BelAZ), Amkodor, Belkommunmash and the newest enterprise - BelGee. The list of manufactured goods is very voluminous, it includes passenger cars, buses and electric buses, underground, road construction, special equipment, and mining dump trucks.

Using the example of the Belarusian-Chinese joint venture BelGee, we will consider the use of robotic systems as part of automated production.

The presence of all the necessary world-class certificates proves the effective and competent use of all provided tools and capabilities, so this enterprise is a good example for considering the use of a robotic system.

To meet all necessary standards, increase the quality of products and speed of production, the plant uses an automated assembly process. The entire process is carried out by robots, with quality control through data collection, which is transmitted to engineers in the quality department [1].

The first step in assembling a car is welding. This is the most robotic area in the plant, 26 KUKA robots are installed on the main welding line, this has led to the fact that about 90% of welding work is performed by robots.

The stage begins with welding the elements of the engine compartment and parts of the underbody.

The entire process is carried out manually using an adaptive welding system from Bosch. Before the body enters the main assembly line, a VIN code is applied to the future car, which is subsequently used to identify the car. Next, the body blank is transported to the main welding line (Fig. 1), where the entire body is assembled in a fully automatic mode. The last part of this stage is manual modification, due to the limited mobility of the manipulator.

Fig. 1. – KUKA robots on the main welding line

The second stage is placing the body in a protective gas environment to strengthen the main seams, using robotic welding with consumable electrodes.

The next step is preparation for painting. In the paint shop, workers hang up equipment to keep doors and hoods open. Next, a manual pressure wash is carried out to wash away the debris that is formed during the welding process. After this comes the degreasing stage, consisting of three successive stages: phosphating, applying a cataphoric coating, and ultrafiltration in a special solution. To apply the coating to the outer surfaces of the body, modern Durr (Fig. 2) robots with complex kinematics

are used, which apply a base coat of paint, then primer, then varnish, and the car is sent to the varnish drying oven [2].

Fig. 2. – Durr robots

After the drying stage, the body enters the polishing and grinding line, where the final external modification of the body takes place. Next, the car enters the assembly shop, where the installation of the car's interiors, gluing of glass, installation of the chassis, fuel and brake systems takes place. Assembly is carried out manually or using the KUKA robot.

The use of robotic systems has made it possible to achieve efficient competitive production.

References

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