

However mining is helping Ghana's economy with high revenue and employment every year [5].

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CRITERIA FOR ASSESSING THE EFFECTIVENESS OF MANUFACTURING ROBOTIZATION

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Abstract: The article discusses the process of robotization of the production process, as well as the efficiency of the production process. Criteria for the effectiveness of robotics when introduced into the production process of an enterprise are determined.

Key words: robotization, effectiveness, criteria of effectiveness, manufacturing.

Efficiency, with what the process of studying this term began and how it came to modern society. Recall Henry Ford. According to G. Ford, the rational use of resources, the organization of mass production lead to an increase in labor productivity and the creation of new jobs, reduce the cost of goods, make life more comfortable and thereby lead to the prosperity of any country. The task of the enterprise is to produce for consumption, and not for profit or speculation. In the work "My Life, My Achievements", G. Ford wrote that the goal of its production is "to produce with minimal costs both material and human strength, to realize at the lowest prices, trying to win at the expense of sales". Industry, according to G. Ford, should not only supply consumers, but also create them. Improving the model of the car, the technology of its production, introducing the scientific organization of labor and assembly lines, creating the Ford management system made it possible to reduce the price of the car from an average of \$ 950 to \$ 335 over 10 years. Since the average monthly salary was about \$ 120, Ford employee could buy a car (excluding other expenses) in about 3 months. It was he who began the process of introducing efficiency into the production process [1].

Production efficiency is the ratio of the final result of production - the product and the cost of total labor to obtain it. In other words, production efficiency is to achieve the highest results at the lowest cost.

Factories worldwide are set to install more than 1.7 million new industrial robots by 2020, according to the new International Federation of Robotics. There were about 1.8 million operating industrial robots at the end of 2016, marking an expected 14% annual growth rate between 2018 and 2020. "Robots offer high levels of precision and their connectivity will play a key role in new digital manufacturing environments," president Joe Gemma said in a press release. "Increasing availability enables more and more manufacturers from companies of all sizes to automate."

As far as technological trends are concerned, companies will, in the future, be concentrating on the collaboration of human and machine, simplified applications, and light-weight robots. Added to this are the two-armed robots, mobile solutions and the integration of robots into existing environments. There will be an increased focus on modular robots and robotic systems, which can be marketed at extremely attractive prices [2].

Why is the need for production robotics growing in such a geometric progression? There are three main factors that most contribute to the onset of such a turning point. The first is to increase the economic efficiency of robots in relation to human labor. Modern industrial robots meet the criterion of intelligence, that is, they have a number of functions that make their implementation simple and effective. Moreover, robots rule out errors due to the human factor, it can be fatigue, inability to work 24 hours, and etc. The second is to increase the speed of production. With the help of robots, any production process can be increased several times. This will in turn reduce the cost of producing goods. The third indicator is the cost of robots. The prevalence of low-cost and easy-to-use robotic systems available for small businesses. The main driving force in this direction are both new manufacturers of innovative robotic systems (UR, Rethink, Baxter), and global giants (Fanuc, Yaskawa, ABB), offering low-cost models of robots with a low payback period on the market. Also, in the long run, production robotization helps to reduce financial costs for a product [3].

Any innovative implementation has its own risks. One risk is cybersecurity. Henrik Christensen, executive director of the Institute of Robotics and Intelligent Machines, Georgia Institute of Technology, expresses serious concern about the vulnerability of connected devices. “The greatest degree of risk is associated with cybersecurity; it’s important to ensure the security of the new systems so that outsiders cannot crack them”. The robotics industry is always security oriented. And since robots are becoming an integral part of the Internet of things, every effort must be made to ensure enterprise security. The problem of cybersecurity is very relevant regardless of how it is considered as such. The next risk, job loss, is

by far the most significant opposition that often arises against the use of robots in industry. Industry workers at all levels, from entry level to veterans, worry about the security of their employment status and the ability of robots to replace them in the workplace. This panic is more common in this industry compared to others due to the closer connection of the robot and production [4]. The next risk is more important for small enterprises: the increase in investment costs is a financial counterpoint for industrial robotics, given that manufacturing companies will invest in robotic technologies. Firms that do not have financing may even go bankrupt, trying to keep up with industry trends, rather than continuing to normalize their operations [3].

All these risks can be avoided by the rational implementation of robots in production. To calculate the need for the introduction of robots, you need a formula by which you can calculate the benefits. This formula is simple and familiar to everyone: Efficiency is equal to divide the result into costs. Efficiency criteria are as follows - it is necessary to increase results and reduce costs [6]. To increase the efficiency of using robots, as they help reduce the number of defective products, increase the speed of production, increase the quality of the product as a whole. Also, robots help reduce personnel costs, reduce the threat of workers when using hazardous materials, etc. When costs are reduced, finances are returned back to production, which gives us the opportunity to increase the result and, of course, brings more profit [6]. This is a endless circle of efficiency, which gives the introduction of robotics in production.

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ОБРАЗ ЖИЗНИ – 0 ОТХОДОВ

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В современном обществе как никогда актуальна проблема экологии. Человек оказывает огромное влияние на планету. С этими последствиями мы сталкиваемся каждый день.

Уничтожение и оскудение генофонда растений и животных, сокращение полезных ископаемых, химическое загрязнение океана, загрязнение атмосферы, разрушение озонового слоя — это лишь часть пагубного воздействия на природу человеком.

Ухудшение качества водных и воздушных ресурсов является причиной 2/3 заболеваний на сегодняшний день. К таким заболеваниям можно отнести: онкологию, генетические изменения, снижение иммунитета, снижение работы детородных органов, а также болезни печени и почек. [2]

Цель исследования – выяснить альтернативные пути решения экологической проблемы.