

УДК 629.8+621.3

Tarashchuk Yevhen¹

¹ PhD student NU «Zaporizhzhia Polytechnic»

AUTOMATION AND REMOTE MANAGEMENT OF INDUSTRIAL PROCESSES

The swift progress of technology has profoundly impacted numerous industries, including the manufacturing sector. Integrating automation and remote control into manufacturing processes has become crucial in modern industrial operations, driving enhanced flexibility, efficiency, productivity, and safety. This presentation explores the benefits, challenges, and future potential of automation and remote control within the manufacturing sector's operating processes.

Automation involves using technology to perform tasks without human intervention, while remote control enables managing and operating processes from afar. In the manufacturing sector, these advancements have transformed production lines, enhancing accuracy, speed, and cost-effectiveness.

Advantages of Automation and Remote Management:

- increased Productivity: automation and remote control enable continuous operation, minimizing downtime and greatly boosting output. These technologies also reduce errors, ensuring high-quality product manufacturing.

- cost Reduction: by automating repetitive tasks, companies can significantly cut labor expenses. Remote control further contributes to savings by reducing the need for on-site personnel.

- improved Safety: automation lowers the risk of workplace accidents by handling hazardous tasks, while remote control allows operators to manage processes from a secure location.

- enhanced Flexibility: automation and remote-control systems can be quickly reprogrammed to accommodate new product designs or evolving production requirements in the manufacturing sector.

Despite the many advantages, implementing automation and remote control in the manufacturing sector presents challenges. These include substantial initial investment costs, the requirement for a skilled workforce to oversee automated systems, and potential cybersecurity risks linked to remote control in operating processes.

The future of the manufacturing sector lies in 'Industry 4.0', which combines automation, remote control, and other advanced technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and machine learning. This integration will foster the development of 'smart factories' that offer enhanced flexibility through self-optimization, predictive maintenance, and real-time adaptability in operating processes.

Automation and remote control in manufacturing processes provide substantial advantages, such as boosted productivity, reduced costs, improved safety, and greater flexibility. Although challenges remain, the future of manufacturing hinges on adopting these technologies and integrating them into a unified, interconnected system. As we transition to Industry 4.0, it is essential for companies to invest in these advancements to stay competitive and maintain operational efficiency.

REFERENCES

1. Kagermann, H., Wahlster, W., & Helbig, J. (2013). Recommendations for implementing the strategic initiative INDUSTRIE 4.0: Final report of the Industrie 4.0 Working Group. Forschungsunion.

2. Brettel, M., Friederichsen, N., Keller, M., & Rosenberg, M. (2014). How virtualization, decentralization and network building change the manufacturing landscape: An Industry 4.0 Perspective. *International Journal of Mechanical, Aerospace, Industrial, Mechatronic and Manufacturing Engineering*, 8(1), 37-44.

3. Lasi, H., Fettke, P., Kemper, H. G., Feld, T., & Hoffmann, M. (2014). Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries. *Procedia CIRP*, 17, 537-542.

4. Chryssolouris, G. (2013). *Manufacturing Systems: Theory and Practice*. Springer.

5. Hermann, M., Pentek, T., & Otto, B. (2016). Design Principles for Industrie 4.0 Scenarios: A Literature Review. 49th Hawaii International Conference on System Sciences.

6. Shrouf, F., Ordieres, J., & Miragliotta, G. (2014). Smart Manufacturing for Industry 4.0: State of the Art and Future Challenges. 15th IFAC Symposium on Information Control Problems in Manufacturing.
7. Kiel, D., Müller, J. M., Arnold, C., & Voigt, K. I. (2017). Sustainable industrial value creation: Benefits and challenges of Industry 4.0. *International Journal of Innovation Management*, 21(08), 1740015.
8. Wang, S., & Xu, C. (2018). Internet of Things in Manufacturing: A Comprehensive Review of Research and Applications. *International Journal of Advanced Manufacturing Technology*, 96(9), 3799-3821.