

## Robot-aided manufacturing and its impact on the future of the furniture industry in Egypt

Amina Abdel-Gawad Abdel-Baky Emam

Interior Design & Furniture Dept., Faculty of Applied Arts, Benha University,,  
Amina.emam@fapa.bu.edu.eg

### Abstract:

Smart robots are one of the most important outputs of the digital revolution; many of them have taken part in industrial fields, including the furniture industry, It is now the technology of the present, and it will have a significant impact on the industry in the future. Robot-aided manufacturing has now become the criterion for measuring the progress of countries, especially the major industrial countries such as the United States of America and Japan, and reports have showed that we estimate the global robotics industry in 2020 at one hundred billion dollars. In addition, that after nearly 45 years, artificial intelligence will outperform humans in performing many tasks, like the field of industries that require humans to deal directly with cutting and sawing machines, such as the furniture industry, in order to reduce the risks of accidents to which workers are exposed. **Research problem:** The absence of the culture of robot-aided manufacturing in the furniture industry in Egypt, especially considering the technological development that we are experiencing now, which leads us to the importance of testing the possibility of applying some robotic control systems in the furniture industry in Egypt. **Research Queries:** - What are the most important features of robotic manufacturing that can affect factories' decision to move towards robotic manufacturing? - What are the robotic manufacturing techniques that can be used in the furniture industry in Egypt? - Is there an impact of the application of robotic manufacturing in the furniture industry? - Is Egypt ready to implement robotic manufacturing systems in furniture factories in Egypt?

**Research Objectives:** - Highlighting the long-term benefits that can be derived from robot-aided manufacturing in performing dangerous tasks in the furniture industry in Egypt. - Measuring the extent to which the Egyptian factory is ready to deal with the help of the robots. **Research importance:** - Filling the gap in the furniture industry related to the culture of robot-assisted manufacturing in Egypt? **Research sample:** We conducted the study through a questionnaire that was sent to 61 furniture factories in the Arab Republic of Egypt, and the response rate of potential respondents was 44% or 27 respondent factories, who were the closest to the possibility of adopting robotic manufacturing techniques.

**Research Methodology:** - The analytical and descriptive approach in the theoretical aspect - Analytical and statistical approach in field research. **Results :** By analyzing the factors of applying Robot-aided manufacturing, we found that the desire to increase production capacity, increase exports, and the cost involved, were the highest motives. The results revealed that panel-based frame furniture manufacturers were more responsive to adopting robotic technologies than other types of product. The study also revealed that furniture manufacturers are not ready to adopt robotic manufacturing systems, and that any efforts by the government to drive this transformation will require the provision of incentives and other tangible economic benefits.

### Keywords :

Robot-aided manufacturing - furniture industry - robots

### References:

- 1- Colima, Ana & Nuno Sousab & Paula Carneiroa & Nelson Costaa & Pedro Arezesa and Andr e Cardoso (2019) - Ergonomic intervention on a packing workstation with robotic aid - case study at a furniture manufacturing industry - ios press - DOI: 10.3233/ WOR-203144
- 2- Dongpu, Jin & Eric, Garlock & Andrew, Mittleider (2021) - Maverick Interface for MAVs - Nimbus Lab. <http://nimbus.unl.edu>
- 3- Frederick, Schodt, (1988) Inside the Robot Kingdom: japan, Mechatronics, and the Coming Robotopia (New York Kodansha international Ltd., 1988) pp.37-39
- 4- Jegatheswaran, Ratnasingam, Hazirah Ab Latib & Lee Yan Yi & Lim Choon Liat, and Albert Khoo (2021) - Extent of Automation and the Readiness for Industry 4.0 among Malaysian Furniture Manufacturers - Ratnasingam et al. (2019). "Automation in furniture," BioResources 14(3)
- 5- Landscheidt, S., Kans, M. (2017) Automation Practices in Wood Product Industries: Lessons Learned, Current Practices and Future Perspectives. In: The 7th Swedish Production Symposium SPS, 25-27 October, 2016, Lund, Sweden Lund, Sweden: Lund University
- 6- Pei-Chi, Huang & Yi-Hsuan, Hsieh & Aloysius, K. Mok (2018) - A Skill-Based Programming System for Robotic Furniture Assembly- The University of Texas magazine at Austin, Austin, TX, US {peggy, yihuan, mok}@cs.utexas.edu-
- 7- PRMR 2021- <https://doi.org/10.1051/mateconf/202133801028>
- 8- Steffen, Landscheidt & Mirka, Kans & Mats, Winroth (2017)- Opportunities for robotic automation in wood product industries: The supplier and system integrators' perspective - 7th International Conference on Flexible Automation and Intelligent Manufacturing, FAIM2017, 27-30 June 2017, Modena, Italy
- 9- Suhan, Park & Haeseong, Lee & Seungyeon Kim (2022) - Robotic furniture assembly: task abstraction, motion planning, and control - intelligent Service Robotics volume 15, pages441-457
- 10- Tom, Logsdon, (1984), the Robot Revolution. (New York Simon & Schuster, 1984) p. 19.

- 11- Wojciech, Turbański & Łukasz, Matwiej, Krzysztof Wiaderek and Maciej Sydor (2021) - Comparative analysis of the manual and robotic upholstery frame assembly processes. Study based on many years of research- MATEC Web of Conferences 338, 01028
- 12- Youngwoon, Lee & Edward S. Hu & Zhengyu Yang, Alex Yin, and Joseph J. Lim (2019)- IKEA Furniture Assembly Environment for Long-Horizon Complex Manipulation Tasks- arXiv:1911.07246v1 [cs.RO] 17 Nov
- 13- Zahran. Ahmedkhaled (March 2022) - The Role of Industry 4.0 Technologies in Design Process Management - *international Design Journal*, Vol. 12 No. 2, pp. 299-311
- 14- Al-Hamrawi. Hassan Muhammad Omar (2021) - The basis of civil liability for robots between traditional rules and the modern trend - *Journal of the Faculty of Sharia and Law - Twenty-third Issue for the year 2021 AD*, second edition, "Part Four
- 15- Abu Qura, Khalil - *Attributes of Salama (2014) Challenges and Ethics of the Robot Age*, Emirates Center for Strategic Studies and Research, first edition 2014 AD, pp. 11, 12.
- 16- Safety. *Attributes of Amin (2006), robot technology, a future vision with Arab eyes*, the Academic Library, Cairo, first edition 2006 AD, p. 10.
- 17- Muhammad. Amr Taha Badawy (2022) - *The Legal System for Smart Robots - Journal of Legal and Economic Studies - Faculty of Law - Cairo University - 2020*
- 18- *The Arab Robot Magazine*, a magazine published by the Arab Robotics Society, the first issue, October 2015, p. 6
- 19- Hamdi. Youmna (2022) - *Application of Artificial Intelligence in the Development of Interior Design Operations Management - Journal of Design Sciences and Applied Arts - Volume 3 - Issue 2*
- 20- <https://industrialrobotics.lt/2022/04/22/advantages-of-a-robot-carpenter-for-the-furniture-industry/>
- 21- <https://robodk.com/blog/7-robotic-applications-for-furniture-industry/>
- 22- <https://www.alroeya.com/5-0/90815>
- 23- <https://robodk.com/blog/robot-machining-vs-cnc/>
- 24- [https://industrialrobotics.lt/robotic\\_sanding\\_milling\\_grinding/](https://industrialrobotics.lt/robotic_sanding_milling_grinding/)
- 25- <https://industrialrobotics.lt/robospray-2/>
- 26- <https://ronchinimassimo.com/en/milling-robots/robocut/>
- 27- <https://www.homag.com/en/products/packaging-technology>
- 28- (<https://robodk.com/blog/electronic-product-testing/>)
- 29- (<https://robodk.com/blog/electronic-product-testing/>)

### ***Paper History:***

**Paper received 10th November 2022, Accepted 15th January 2023, Published 1st of March 2023**