SECTION 5. SHIPBUILDING

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ARTIFICIAL INTELLIGENCE IN MARINE POWER-PLANT ENGINEERING

ШТУЧНИЙ ІНТЕЛЕКТ В СУДНОВОМУ ЕНЕРГОМАШИНОБУДУВАННІ

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Modern power-plant engineering is undergoing significant transformations, and one of the key factors driving its development is the

integration of artificial intelligence (AI) into various aspects of the industry. The use of AI in marine power-plant engineering enhances the efficiency and safety of production processes to optimize the ship hull design, monitor the condition of ship engines, predict the spread of oil spills, prevent ship collisions, model ocean or wave circulation, and open up new prospects for innovation and development. Specialized machine learning and deep learning algorithms allow for the analysis of large volumes of data, considering numerous parameters such as material strength, geometric shape, etc. This makes it possible to analyze and process recurring patterns and respond accordingly, allowing manufacturers to produce high-quality parts with low reject rates.

When machine learning is implemented in shop machines, the performance potential increases exponentially. Machine learning means that machines do not just respond to a single set of data. AI is always dynamic, meaning machines learn as instructions from operators and data sets are received. This flow creates an environment where machines continuously learn how to process orders. Machine learning improves overall efficiency and performance.

Artificial intelligence and programming software that support machine learning provide more than just short-term benefits. Machine learning is a long-term investment that will bring advantages during CNC (computer numerical control) machining, enhance operational capabilities, and include machines that respond to voice commands, intelligent learning, and machine scheduling to optimize performance and downtime, as well as better data analysis, programming, and testing [1].

Moreover, AI-driven machines can handle more complex tasks. For instance, toolpaths (the path a tool takes through a workpiece) can be optimized by analyzing AI data. This allows the machine to adjust the toolpath to achieve the highest level of productivity with minimal wear, thereby increasing the overall efficiency of the machining process [2].

Conclusions:

1. Artificial intelligence contributes to creating a safer working environment by taking on tasks that can be dangerous for humans. With machine learning and deep learning systems, machines can perform risky operations without human intervention.
2. AI and machine learning continue to improve the quality, precision, and overall efficiency of CNC machining, with more industries recognizing its potential.
3. AI will become advanced enough to connect to design software and automatically modify designs to improve results. Generative design is an interactive design process that automatically optimizes designs for use with software like Autodesk Dreamcatcher and is directly related to additive manufacturing processes (3D printing), etc;

4. Leveraging the capabilities of AI algorithms is essential for unlocking the full potential of ship repair, ensuring that ships remain in optimal condition, operations run smoothly, and the industry thrives in an increasingly technologically advanced world.

Bibliography:

1. Xinbo Qi, Guofeng Chen, Yong Li, Xuan Cheng, Changpeng Li Applying Neural-Network-Based Machine Learning to Additive Manufacturing. *Current Applications, Challenges, and Future Perspectives.* 2019. Volume 5, Issue 4. Pages 721–729; https://doi.org/10.1016/j.eng.2019.04.012

2. Caiazzo F and Caggiano A 2018 Laser direct metal deposition of 2024 Al alloy: trace geometry prediction via machine learning: Materials 2018, 11(3), 444. https://doi.org/10.3390/ma11030444

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METHODS OF RESEARCHING ENGINEERING PROBLEMS

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