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Economic Justification of High-Rotational Submersible Pumps Development for Water Supply Facilities

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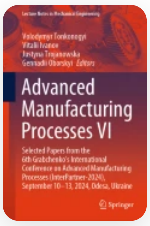

Advanced Manufacturing Processes VI

(Interpartner 2024)

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Abstract

The amount of pumping equipment energy consumption is critical in various industries, as it directly affects operating costs, efficiency, and environmental friendliness. The required energy can be a significant part of the total energy consumption (up to 20% or more) in industrial and commercial settings. As the industry strives for sustainability and reduced environmental impact, optimizing energy use in pumping operations remains a crucial area of focus, critical to achieving the UN Sustainable Development Goals (SDGs). Therefore, the main aim of the research is to increase the market competitiveness of pumping equipment for the needs of the water supply sector by reducing its life cycle cost. In the research, the authors considered and divided the line of existing submersible pumps into groups. The average pump energy consumption indicator and material capacity indicator were calculated for these groups. A new promising submersible pump ZN 8-63-150 with an increased rotation frequency from 3000 rpm to 6000 rpm has been developed to replace the existing ECV 10-63-150 pump. The economic effect of the developed ZN 8-63-150 pump introduction compared to the existing ECV 10-63-150 pump was determined to be ≈ 28 thousand EUR during the complete pump life cycle (30 years). The payback period for measures to replace the existing ECV 10-63-150 pump with the developed ZN 8-63-150 is calculated, which ranges from 4 months to 1 year.

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