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OPTIMIZING MANUFACTURING EFFICIENCY WITH COST-EFFECTIVE AUTOMATION: A FOCUS ON PTCA BALLOON PRODUCTION

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ABSTRACT

Harnessing human beings as an energy source not only proves inefficient but also subjects workers to tedious and monotonous tasks, often coupled with high-risk factors and a lack of skilled engagement. This research suggests a new way of thinking about Low-Cost Automation (LCA) as a better and more efficient approach. LCA incorporates automation solutions that are not only technologically advanced but also economically viable, particularly suitable for small and medium-sized enterprises (SMEs). The LCA methodology involves integrating basic mechanical, electrical, hydraulic, and pneumatic components into existing industrial setups to enhance productivity. Focusing on a case study within the medical industry, this research article highlights the implementation of LCA in the manufacturing of medical balloons, specifically at the Neck Welding Station during the outer lumen cutting process and low cost automation is also implemented on the various PE sheaths process to ease their operation of trislit cutting, peelable stretching etc. Results indicate that LCA reduces manpower requirements by half, significantly boosting productivity within a shorter timeframe. This approach contributes to the development and evolution of products, showcasing its potential impact on various manufacturing sectors. Moreover, the study presents LCA's positive influence on product accuracy and the overall growth of companies by minimizing energy consumption. The findings also extend to the application of similar methodologies in the production of different balloon protective sheaths, such as those used in angioplasty balloon catheters. In summary, LCA emerges as a transformative force in industrial processes, offering a cost-effective and efficient alternative to human-centric energy sources, thereby creating a more sustainable and productive future for manufacturing industries, particularly for SMEs.

KEYWORDS: *Low-Cost Automation (LCA), Small and Medium-sized Enterprises (SMEs), Industrial Productivity, Medical Industry and Sustainable Manufacturing*

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