

Abstract

Economic Analysis and Justification for Automated Welding Systems

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This report looks at designing a new welding process for a company in the Oil & Gas industry, ensuring method consistency and performance quality of their steel drill bit while increasing overall production. The current product is welded manually with a flux core wire, resulting in high cycle times and numerous cases of required rework.

The use of automation systems will be analyzed for their increased consistency, quality, safety, and production estimates. Specifically robotic cell design will be considered, since it can work on more parts with fewer operators, adding efficiency and flexibility to the production floor. Other areas of researched covered in this report include welding parameters and methods, fixture use in relation to automation, preheating and material properties of steel, and investment justification of automated systems.

The design will be modeled and simulated in a 3D environment, and analyzed with economic considerations in the form of payback period and return on investment. All calculations, given values and assumed values will be stated and explained. Results include an estimated payback period of 2.14 years, a 34% ROI, and savings of \$ 13,140.00 per year from the robot alone, with capacity for additional savings analysis based on use of the design.

Recommendations to go forward with prototype testing on actual weld quality and efficiency improvements as well as cell design finalization.