



Reduction of Welding Porosity Rate in Manual Butt Joint Welding Process in a Boiler Manufacturing Company

Nemy H. Chavez¹ and Ryan Jeffrey P. Curbano²

¹College of Engineering, Lyceum of the Philippines University, Capitol Site, Batangas City, Philippines

²Planning and Quality Assurance, Lyceum of the Philippines Laguna, Calamba City, Laguna, Philippines

*Corresponding author, E-mail: nhchavez@lpubatangas.edu.ph

Abstract

This study aimed to reduce the welding porosity rate in the manual butt joint welding process in a boiler manufacturing company. The researcher used the applied method of research. The research was carried out on the application of the Lean Six Sigma method. The goals were to improve the product excellence to no greater than 3.4 DPMO and assist businesses to make leaner industrial processes. The participants of the study were a team from the company and the researcher of this study. The porosity defect was given the highest priority of study based on the Pareto Chart. The goal was to reduce the welding porosity defect from 68 DPM to 45 DPM or 33% improvement by January 2018. The porosity was mainly due to lack of preventive maintenance schedule; DOE on parameters was performed 2 years ago, lack of formal certification for welders, and lack of supplier selection specification. The team's roadmap to develop the process was through the Define, Measure, Analyze, Improve, and Control (DMAIC) principle. Preventive maintenance and calibration for all welding machines were completed immediately. The result of the DOE on all machines was used. The welders were retrained and updated the control plan. The incoming inspection of all materials was instantly achieved. It was concluded that after the application of the DMAIC approach, the number of porosity defects of 68 DPM was reduced to 41 DPM. The target weld rejection rate of 5% per manual welders was reduced after the improvement from September 2017 to January 2018. The processing capability after the improvement is 2.21. The sigma level of the porosity defect was improved from 4.57 to 4.71. The recommended contingent measures were confirmed effective. The team must ensure that the implementation of countermeasures will constantly develop welding procedures.

Keywords: Welding porosity rate, Lean six sigma, DMAIC, DPMO, DOE, Manual butt joint welding process