

Six Sigma DMAIC project to improve the performance of an aluminium die casting operation

Pedro Alexandre Marques (pamarques78@gmail.com)

ISQ – Instituto de Soldadura e Qualidade

Av. Prof. Doutor Cavaco Silva, 33, Taguspark, Oeiras, 2740-120 Porto Salvo, Portugal

Robert Matthé (robert.matthe@sofi.pt)

STA – Sociedade Transformadora de Alumínio, S.A.

Rua Terramonte, 771, Maia, 4470-122 Gueifães, Portugal

Abstract

Purpose The purpose of this paper is to illustrate an application of the Six Sigma DMAIC problem-solving methodology in a Portuguese industrial enterprise, aimed at reducing the rejection rate of a specific manufactured product due to defects generated in the aluminium die casting operation.

Design/methodology/approach Along the five-stage roadmap, a set of analytical tools was structurally employed to better characterize the problem, define the product's critical to quality characteristics, estimate the process baseline, determine the relevant cause-and-effect relationships, identify the significant root causes for the high rejection rate, and implement an improvement plan.

Findings To the successful execution of the Six Sigma project greatly contributed the belief and support of top-management and the active involvement of team members. Another key finding is that not all die casting defects were caused by factors inherent to the die casting operation itself, but also by incorrect procedures adopted in other areas of the process.

Research limitations/implications The project is not fully completed, since some of the improvement actions are being implemented.

Practical implications The findings demonstrate the importance of adopting the systems approach principle in a Six Sigma project.

Originality/value Few Six Sigma case studies are described in such detail in the literature, mainly practical applications in Portugal. The paper proves the advantages of combining advanced quality engineering techniques with Lean tools, and demonstrates the importance of conducting a Six Sigma project using the systems approach principle.

Keywords: Design of Experiments, Die casting, DMAIC, Lean, Six Sigma