Reduction of defects in a manufacturing company using six sigma methodology

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CERTIFICATE

It is to certify that this project report entitled, **"Reduction of Defects in a Manufacturing Company Using Six Sigma Methodology"** is based upon the results of experiments carried out by **QAZI ZOHAIB AHSAN, ARSLAN ZAFAR** and **SYED JALAL RAHIM**under my supervision. No material has been used in this report which is not their own work except where due acknowledgement has been made. They have fulfilled all the requirements and qualified to submit this report for the Degree of BS-Industrial Engineering

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Abstract

In this project, a case study on implementing the Six Sigma DMAIC (**D**efine, **M**easure, **A**nalyze, **I**mprove and **C**ontrol) methodology in a manufacturing company is presented. Different types of gears are manufactured in the company. Some types are cam shaft gear, Idler gear, fuel pump gear and fly wheel ring gear. The customers used these gears in tractor and fly wheel ring gear is used in car. In our case study idler gear was chosen for the implementation of DMAIC methodology. This problem will be tackled by implementation the Six Sigma DMAIC methodology. Failure to achieve the required outer diameter according to tolerance is the problem. Idler gear is the most critical component in the tractor. It is used with the combination of cam shaft gear and fuel pump gear. The purpose of these gears is to transmit the motion to the wheel. Failure to achieve in between outer diameter according to tolerance is the problem. The required outer diameter of Idler gear is 233.40 mm with a tolerance of ± 0.05 mm. So the outer diameter of the idler gear must to be between 233.35 mm and 233.45 mm.

In past Six Sigma was implemented belt based training structure, so it was most expensive approach. Today we can implement DMAIC methodology of Six Sigma with less cost. In this background, an attempt was made to find out the root causes of defects in idler gear by employing Six Sigma DMAIC Methodology. The Sigma level of existing process is just 1.22. We was determined to the root causes of the defects in gear and made some suggestions for the company. These root causes are CNC lathe machine, cutting tool geometry and choice of the best combination of speed and feed rate. For that purpose we have designed an experiment and based on results we can choose the optimal combination. By implementing these suggestions company will be able to overcome the defects in idler gear and others as well. After reduction of these defects the sigma level will be increase by improving the process capability. DMAIC methodology is an effective tool for breakthrough improvement. This will enables the company to spend less cost to obtain Six Sigma level quality. Hence, DMAIC is the promising methodology to obtain maximum productivity and efficiency with less cost.

Project Objectives

To purpose of project is to reduce the rejection rate of gears. The rejection occurs due to some major defects. These defects includes: inaccurate outer diameter , bore width, bore diameter , inadequate BTL (base tangent length), poor surface finish, improper timing mark, drilling defects and shaving defects. So our purpose is to determination of the vital few causes which contribute most to these defects. By reducing these defects in gears, the rejection rate will decrease. So throughput and efficiency will increase with the reduction in per unit cost. Thus increasing profitability.

Chapter 1

Introduction

Six Sigma

Six Sigma is currently recognized as a methodology for a breakthrough improvement. Over the past few decades small and large organizations are accepting its implementation and obtaining significance improvements.

DMAIC (**D**efine, **M**easure, **A**nalyze, **I**mprove, **C**ontrol) methodology is well organized methodology as a benchmark for comparing the performance and customer satisfaction. It establishes the baseline metric to compare improvement after implementation.