Quality Improvement In Cutting Process of Window Tint Using DMAIC Approach

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Abstract: In this study the DMAIC (Define, Measure, Analyse, Improve and Control) technique is applied at a company producing window tint film forming and cutting in Malaysia. It is a company initiative for continuous improvement. The study's goal is to reduce the number of faults during the film cutting process, which has a significant impact on the company's overall profit margin and also affects production lead time. The research looks at the cutting process production line with the greatest defect rate. Quality Control (QC) methods such as brainstorming, process mapping, fish bone diagram, Pareto chart, and FMEA were used in the study. At the analysis stage, the key contributors to the defect problems can be identified, and action or solutions can be implemented. The study demonstrates that the DMAIC process is a successful approach for resolving what appears to be a huge problem with simple approaches. DMAIC has the ability to provide high returns to the company if implemented appropriately and effectively.

Keywords: DMAIC, Lean Management, Lean Principle, OEM;

1. Introduction

The Six Sigma DMAIC processes (Define, Measure, Analyze, Improve, Control) is an improvement system for existing processes falling below specification and looking for incremental improvement. The Six Sigma DMADV process (Design, Measure, Analyse, Design, Verify.) is an improvement system used to develop new processes or products at Six Sigma quality levels. if a current process requires more than just incremental improvement then also DMADV can be employed. In 1989 Bill Smith defined Six Sigma as ―Organized common Sense [1].

Lean Six Sigma implements many businesses improvement approaches, whether in the service or manufacturing sector, to boost levels of customer satisfaction in the company's competitive market. Clients want their chosen items to be delivered on schedule and without additional quality charges [2]. To overcome such issues, manufacturers seek to develop innovative methodologies/technologies or other quality improvement strategies in order to deliver value to customers. It is a data-driven approach that improves corporate performance by decreasing waste, eliminating non-value-added tasks, and lowering variation in processes [3][4], allowing for operational excellence at a lower cost [5][6]. One of the best techniques to minimize COPQ is a project-based approach based on Six Sigma DMAIC methodology [7]. Six Sigma DMAIC methodology is used to upgrade current processes [8] and has been proven to be successful in reducing costs, improving cycle times, eliminating defects, boosting customer satisfaction, and significantly increasing profitability in every industry and many global organizations [9][10]. A variety of research studies illustrate the successful implementation of Six Sigma DMAIC methodology in the automobile sector [11], industrial processes [12], and services like as healthcare [13], and retail.

2. Case Study

Company A is facing a high-quality problem on the cutting process of their product. The final cutting product of window tint film is found with defects at Cutting Process section. The defects are detected at Cutting Process by visual inspection during in process checking activity. The quality inspector conducted 100% visual inspection on the final product after finish cutting. The defects are dust, line mark, discoloration, fur, bubble, scratch, dirt, glue, stain, straw line and others. The defect on the product mostly cannot be removed, it will be waste and need to perform scrap activity. Huge operation cost loss for the company due to high rejection after cutting process and frequently line stop which it effects production efficiency. Incoming inspection cannot be performed for early detection due to lack of facilities and man power which can increase operational cost. Mostly defect come from raw material which is window tint film manufacturer. The window film manufacturer is one of subsidiary group company and the defect mostly 40% defect of their supply. Due to same group, Company A still need to run production with potential high loss without returning the defect material to supplier (loss absorb by Company A). To reduce the loss and increase the quality, the defect must be capture at Cutting process. If defect go through to next process which is installation, more cost will involve and potential effected company performance to OEM. It can cause Company A reputation in the market drop drastically. Therefore, it is important for the Company A to filter the defects at the cutting process by improving the quality to improve overall cutting quality and reduce cost through systematic approach. Highest defect (dust, Figure 1) was plot and summarize using quality tool as Figure 2. Pareto chart.

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