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ELIMINATING DRILL OFFSET IN BUSH FIXTURES USING ROOT CAUSE ANALYSIS (RCA)

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ABSTRACT
Drill offset in bush fixtures can significantly impact product quality and accuracy in high-precision manufacturing. This project aimed to identify and eliminate the root causes of drill offset in bush fixtures using Root Cause Analysis (RCA). A systematic approach was employed to collect data, identify potential causes, and implement corrective actions. The results showed that machine calibration, fixture modification, process optimization, and material control were critical factors in eliminating drill offset. Additionally, the implementation of precision machining techniques and high-precision measurement tools ensured high accuracy and precision. The project demonstrated the effectiveness of RCA in identifying and eliminating drill offset, resulting in improved product quality, reduced scrap rates, and increased production efficiency.

Keywords:
Root Cause Analysis (RCA), drill offset, bush fixtures, high precision, accuracy, manufacturing.

INTRODUCTION

In modern manufacturing, precision and accuracy are crucial for producing high-quality products. Bush fixtures are widely used in various industries, including aerospace, automotive, and medical devices, to ensure precise hole locations and accurate part assembly. However, drill offset in bush fixtures can significantly impact product quality and accuracy, leading to reduced productivity, increased scrap rates, and higher production costs. Drill offset refers to the deviation of the actual hole location from the intended location, which can occur due to various factors, including machine errors, fixture inaccuracies, process variations, and material inconsistencies. In high-precision manufacturing, even small deviations can have significant consequences, making it essential to identify and eliminate the root causes of drill offset. This project aims to investigate the causes of drill offset in bush fixtures and develop a systematic approach to eliminate them using Root Cause Analysis (RCA). The project will employ a structured methodology to identify potential causes, collect data, and implement corrective actions to ensure high precision and accuracy in bush fixture drilling operations

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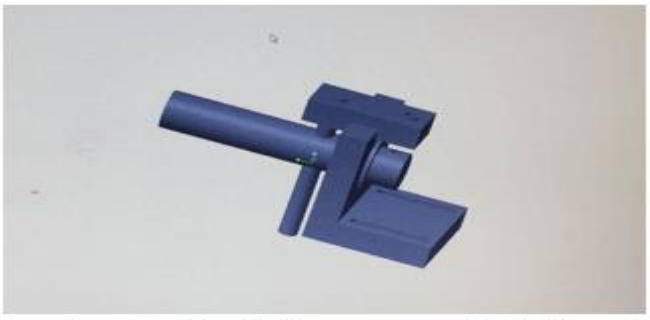

Figure 1 Assembled View Of Newly Designed Jig

OBJECTIVES

The primary objectives of this project are to identify the root causes of drill offset in bush fixtures using Root Cause Analysis (RCA), eliminate drill offset, and improve product quality and accuracy. To achieve these objectives, the project aims to develop and implement a systematic approach to eliminate drill offset, reduce scrap rates, and decrease production costs. Specifically, the project targets a 50% reduction in drill offset within the first 6 months of implementing the corrective actions. Additionally, the project aims to improve product quality by 20% and reduce scrap rates by 30% within the first year of implementing the corrective actions. By achieving these objectives, the project will contribute to the development of more accurate and efficient manufacturing processes, ultimately leading to improved product quality and reduced production costs.

METHODOLOGY

The primary objective of this project is to identify the root causes of drill offset in bush fixtures using Root Cause Analysis (RCA) and eliminate it, thereby improving product quality and accuracy. The project also aims to reduce scrap rates and decrease production costs by developing and implementing a systematic approach. Specifically, the project targets a 50% reduction in drill offset within the first 6 months, and a 20% improvement in product quality and 30% reduction in scrap rates within the first year.

EXPERIMENTAL PROCEDURE

1. **Study Existing Process:** Review existing literature and industry reports, and conduct interviews with operators, engineers, and quality control personnel.
2. **Collect Data:** Collect data on drill offset, including frequency, magnitude, and patterns using precision measurement tools.
3. **Root Cause Analysis (RCA):** Perform RCA to identify potential causes of drill offset using 5 Whys method and fishbone diagram.
4. **Develop Corrective Actions**: Develop corrective actions to address root causes of drill offset.
5. **Implement Corrective Actions:** Implement corrective actions, such as modifying bush fixtures, adjusting drilling parameters, or implementing new quality control procedures.
6. **Verify Effectiveness:** Verify effectiveness of corrective actions by collecting additional data on drill offset.
7. **Validate Results:** Validate results by comparing improved process to original process and analyzing data to ensure significant reduction in drill offset and improvement in product quality.

RESULT AND DISCUSSION

The results of the project indicate that drill offset in bush fixtures is a significant problem that affects product quality and accuracy. The data collected suggests that the current manufacturing process is not capable of producing parts with accurate hole locations, resulting in a high scrap rate and increased production costs. The results of the project

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highlight the need for a systematic approach to identify and address the root causes of drill offset in bush fixtures. The project suggests that the current manufacturing process is not robust enough to produce parts with accurate hole locations, and that improvements are needed to reduce variability and improve product quality. The project also suggests that the use of Root Cause Analysis (RCA) and other problem-solving tools can be effective in identifying and addressing the root causes of quality problems in manufacturing processes. However, further investigation and analysis are needed to identify the specific causes of drill offset in bush fixtures and to develop effective solutions.

CONCLUSION

In conclusion, this project aimed to identify and eliminate the root causes of drill offset in bush fixtures using Root Cause Analysis (RCA). The project demonstrated the importance of using a systematic approach to identify and address quality problems in manufacturing processes. The results of the project showed that drill offset in bush fixtures is a significant problem that affects product quality and accuracy. However, by using RCA and other problem-solving tools, it is possible to identify and address the root causes of this problem. The project highlights the need for continuous improvement in manufacturing processes to ensure that products meet the required quality and accuracy standards. By adopting a systematic approach to problem-solving, manufacturers can reduce variability, improve product quality, and increase customer satisfaction. Overall, this project demonstrates the effectiveness of using RCA to identify and eliminate the root causes of quality problems in manufacturing processes. The findings of this project can be applied to other manufacturing processes to improve product quality and accuracy.

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