

Final Inspection and Customer Quality Optimization in Centrifugal Casting

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Abstract: *The final inspection process in the metal casting industry is crucial to produce defect-free product delivery and customer satisfaction. This study analyses the final inspection and customer quality assurance process employed at Vijay Spheroidal Pvt Ltd (VSPL), a centrifugal casting industry leader. The paper describes the inspection process, tools, and quality documentation-related practices and their importance in achieving zero customer complaints and enhancing product reliability. The study illustrates how a tough final inspection process generates product excellence and enables the achievement of strategic goals, including reducing the Cost of Poor Quality (COPQ).*

Keywords: Final Inspection, Customer Quality, Centrifugal Casting, Visual Inspection, NDT, Dimensional Inspection

1. INTRODUCTION

Centrifugal casting industry giant in providing defect-free, high-quality castings for engineering applications of a critical nature. Metallurgy, design, machining, and quality control being its specialized domains, the company provides top-grade output designed to the specifications of various industries. The paper presented here deals with a specific study on the company's final inspection and customer quality processes and how they utilize Industry 4.0 tools.

Final Inspection Methodology

Final inspection is the concluding phase of the quality control cycle, ensuring that each component meets defined specifications before dispatch.

At VSPL, they involve:

- Visual Inspection: Detects surface defects like cracks and inclusions.
- Hardness Testing: Uses dynamic hardness testers mainly to confirm surface integrity.
- Dimensional Inspection: Conducted with tools such as Vernier calipers, bore gauges, thread gauges and other quality tools.
- Die Penetrant Testing: Detects surface discontinuities using capillary action.

- Ultrasonic Testing (UT): Identifies internal flaws, porosity, or inclusions.

These methods collectively ensure comprehensive evaluation before product release

Quality Documentation

Each product must pass the following documented checks:

- Chemical Composition Analysis
- Microstructure Evaluation
- Tensile Strength Test
- Ultrasonic Test Certificate
- Die Penetrant Test Certificate
- Dimensional Certificate

These documents serve as traceable records of compliance with industry and customer standards.

Results and Discussion

Inspections during this study revealed

- 100%-Dimensional Accuracy
- Zero Visual Defects
- All Mechanical Properties Within Specified Limits
- Successful Compliance with All Quality Reports

Final products were cleared for dispatch, demonstrating high reliability and process efficiency.

Conclusion

The final assessment system adopted by VSPL provides a comprehensive framework for defect identification and quality standard validation. By leveraging visual inspection, mechanical testing, and non-destructive testing methods, VSPL maintains higher product quality. Such a method ensures compliance with customer specifications, thus promoting long-term partnerships and maintaining a competitive advantage.

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