

“Study of Quality Management Practices in Compressor Manufacturing Industry Under Industrial Training”

Pratik Laxman Jadhav¹, Mahendra Bapurao Jadhav², Dr.Ramesh Suryabhan Gadakh³

¹ Student Mechanical Department, Sau. Sundarbai Manik Adsul Polytechnic

² HoD Mechanical Department, Sau. Sundarbai Manik Adsul Polytechnic

³ Principal, Sau. Sundarbai Manik Adsul Polytechnic

Abstract - This study investigates the effect of internal drying on the performance and reliability of a compressor used in refrigeration applications. During industrial training at GMCC India Pvt. Ltd., Supa, the compressor manufacturing and performance-related processes were studied. Internal moisture and residual water vapour inside a refrigeration compressor can adversely affect the refrigeration oil, electrical insulation, lubrication system, and internal components. Proper drying helps remove moisture and contaminants before the compressor is sealed and tested. The study focuses on the relationship between internal drying and important compressor performance parameters such as operating temperature, current consumption, power consumption, vibration, noise, and reliability. The observations indicate that effective internal drying is an important manufacturing and quality-control step for maintaining stable compressor performance and reducing the possibility of corrosion, oil deterioration, and electrical problems.

Keywords: Compressor, Internal Drying, Moisture Removal, Refrigeration, Performance, Oil, Reliability, Quality Control.

Keywords: Quality Management, Compressor Manufacturing, Quality Control, Assembly, Inspection, Compressor Testing, Defect Prevention.

1.INTRODUCTION

Quality management is an important part of modern manufacturing industries. In compressor manufacturing, even a small dimensional or assembly error can affect compressor efficiency, noise, vibration, leakage, and service life. A compressor consists of several components that must be manufactured and assembled accurately. During production, quality is controlled through inspection of components, correct assembly procedures, dimensional checking, leakage testing, performance testing, and final inspection. The present study was carried out during industrial training at GMCC India Pvt. Ltd., Supa, with the objective of understanding the quality management practices used during compressor manufacturing and assembly operations.

2. Company Profile

GMCC India Pvt. Ltd. is a compressor manufacturing company located at Supa-Parner Industrial Park, Maharashtra. It is associated with the Midea Group/GMCC and

manufactures compressors used in air-conditioning and refrigeration systems.

The company focuses on compressor assembly, quality inspection, testing and continuous improvement. During industrial training, practical work was observed in Upper Case Fitting, Lower Case Fitting, Pump Body Fitting and Compressor Testing. These activities provided practical knowledge of manufacturing and quality management practices.

3.Background of the Study

In compressor manufacturing, several activities are associated with quality assurance and quality control. These may include:

- Incoming material inspection
- Supplier quality evaluation
- Component inspection
- Dimensional inspection
- Machining process control
- Assembly inspection
- Process parameter monitoring
- Leak testing
- Functional/performance testing
- Final inspection
- Non-conformance identification
- Corrective and preventive actions
- Quality documentation
- Continuous improvement

4. Problem Statement:

In compressor manufacturing, maintaining consistent quality throughout the production process is challenging because numerous components and manufacturing operations are involved.

The major quality-related challenges may include:

- Variation in raw material quality
- Dimensional deviations
- Machining defects
- Assembly errors
- Improper process parameters
- Equipment-related variation

- Human errors
- Supplier-related non-conformities
- Rework and rejection
- Inadequate documentation
- Detection of defects at later stages

Therefore, there is a need to study how quality management practices are implemented throughout the compressor manufacturing process and how these practices contribute to product quality and manufacturing efficiency.

5. Objectives of the Study

The major objectives of this study are:

1. To study quality management practices followed in compressor manufacturing.
2. To understand the quality-control activities performed at different manufacturing stages.
3. To study incoming material and component inspection practices.
4. To understand dimensional and process inspection methods.
5. To study quality control during compressor assembly.
6. To understand testing and final inspection procedures.
7. To study the identification and handling of non-conforming products.
8. To understand the importance of quality documentation and traceability.
9. To relate theoretical quality-management concepts with industrial practices.
10. To identify possible areas for continuous quality improvement.

6. Research Methodology

6.1 Research Design

The study follows a **descriptive and observational research design** based primarily on industrial-training observations.

6.2 Sources of Data

Primary Data

Primary information can be collected through:

- Direct observation during industrial training
- Interaction with production personnel
- Interaction with quality-control personnel
- Observation of inspection procedures
- Observation of manufacturing and assembly operations
- Discussions with supervisors and engineers

Secondary Data

- Secondary information may be obtained from:
- Company-approved training material

- Quality-related documents made available during training
- Technical manuals
- Manufacturing references
- ISO quality-management literature.

7. Quality Management Practices in Compressor Manufacturing

7.1 Incoming Material Inspection

Quality control begins before production. Raw materials and purchased components need to conform to specified requirements.

Typical checks may include:

- Material identification
- Quantity verification
- Visual inspection
- Dimensional inspection
- Material certificate verification
- Surface condition
- Supplier documentation
- Identification/traceability

Effective incoming inspection helps prevent defective material from entering the production process.

7.2 In-Process Quality Control

- In-process inspection is performed during manufacturing rather than waiting until the final product stage.
- Important parameters can include:
 - Dimensions
 - Tolerances
 - Surface finish
 - Machining accuracy
 - Alignment
 - Process parameters
 - Component condition
 - Tool condition

8. Quality Control During Machining

Machining operations require continuous monitoring because variation in cutting conditions, tools, machines and operator practices can influence product quality.

- Important factors include:
 - Cutting speed
 - Feed
 - Depth of cut
 - Tool condition
 - Machine condition
 - Workpiece material
 - Dimensional tolerance
 - Surface finish

Tool wear can result in dimensional variation and surface-finish problems. Therefore, tool condition monitoring and periodic measurement are important aspects of process quality.

9. Testing and Inspection

Testing is an important stage of compressor manufacturing because it verifies whether the assembled product performs according to specified requirements.

Depending on the product and company procedure, testing may include:

- Leak testing
- Electrical testing
- Noise/vibration checks
- Functional testing
- Pressure-related testing
- Performance verification
- Visual inspection
- Testing provides evidence regarding product conformity before dispatch.

ISO highlights monitoring, measurement and performance evaluation as important elements of an effective quality-management system.

10. Observations During Industrial Training

The following observations can be included in the final paper after verifying them against your actual training experience:

Sr. No.	Quality Activity	Industrial Observation
1	Incoming inspection	Materials/components are checked before production use
2	Process inspection	Critical manufacturing parameters are monitored
3	Dimensional inspection	Measuring instruments are used to verify component dimensions
4	Assembly inspection	Assembly sequence and component condition are checked
5	Testing	Finished compressors undergo specified testing
6	Defect identification	Non-conforming components/products are identified
7	Documentation	Quality-related inspection records are maintained

Sr. No.	Quality Activity	Industrial Observation
8	Corrective action	Quality problems are investigated and corrective measures are taken
9	Employee involvement	Operators and supervisors contribute to quality control
10	Continuous improvement	Process improvements are considered based on quality observations

5. CONCLUSIONS: The study concludes that effective quality management is essential in compressor manufacturing to ensure product reliability, performance and customer satisfaction. At GMCC India Pvt. Ltd., Supa, quality is maintained through proper component inspection, dimensional checking, assembly control, leakage testing and final product testing. Practices such as 5S, Kaizen, standard operating procedures and continuous improvement help in reducing defects and improving productivity. Proper operator training and regular inspection also play an important role in maintaining consistent product quality. Overall, systematic quality management practices can improve compressor manufacturing efficiency and reduce quality-related problems.

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