



# Streamlining Large-Scale Manufacturing Audits with a Mobile Inspection Solution

Replacing manual, paper-based quality control with a high-performance Android and web framework to enhance accountability and safety in rail and aircraft manufacturing.

## Overview

We developed a comprehensive web and Android-based inspection solution to digitize the Quality Assurance (QA) process for railcar and aircraft production.

- Developed a robust offline-first mobile application that allows field inspectors to conduct audits in connectivity-challenged environments and sync data once online.
- Successfully eliminated paper-based loopholes, providing the client with real-time tracking, barcode integration, and advanced graphical analysis of test results.



## Client Profile

As a global titan in the rail and aviation industries, the client manages thousands of custom orders and components with highly complex requirements. Their operations demand zero-margin-for-error quality control to ensure the safety and reliability of high-speed trains and commercial aircraft.

## Challenges: The Friction of Paper-Based Inspections

Managing quality across 62 global engineering sites required moving beyond traditional documentation:

- **Manual Data Extraction:** Identifying failed items or specific inspector comments from thousands of physical pages was slow and prone to oversight.
- **Document Management:** High costs and physical storage space requirements for years of historical test documents.
- **Workflow Bottlenecks:** A lack of structured authorization levels made it difficult to manage rework approvals and unit-level sign-offs.

- **Connectivity Gaps:** Inspection sites (such as inside railcars or hangars) often lacked stable Wi-Fi, making purely cloud-dependent tools ineffective.

## QBurst Solution: The Digital QA Framework

We engineered a multi-platform solution comprising an Android tablet application for field personnel and a centralized web interface for managers. The solution, built using Java (JEE) and the Vaadin framework, focuses on role-based access and data integrity.

- **Resilient Offline Architecture:** Using MySQL and local persistence, inspectors can complete complex checklists and capture defect photos without an active internet connection. Data is automatically synchronized to the AWS cloud once a connection is re-established.
- **Visual Evidence & Barcoding:** Integrated the tablet's camera for barcode scanning (to identify components) and defect photography, allowing inspectors to attach visual proof directly to failed line items.
- **Advanced Versioning:** Enabled the creation of multiple versions of the same checklist to accommodate evolving engineering requirements and custom component orders.
- **Statistical Analysis Engine:** Developed a reporting layer that uses bar, line, and bell graphs to analyze test results, helping managers identify recurring defects or systemic production issues.

## Technical Highlights

- **Role-Based Authorization:** Strict user management at the project and unit levels to ensure only authorized personnel approve reworks.
- **Real-Time Tracking:** Supervisors can monitor the status of inspections across various production phases via a web dashboard.
- **Automated Compliance Reporting:** One-click generation of regulatory-ready test reports and checklists.
- **Barcode Integration:** Simplifies the tracking of parts and components through automated scanning and identification.

- **Customizable Checklists:** Predefined templates for final verification rounds to ensure no safety check is missed.

## Impact

- **Enhanced Safety & Quality:** By removing loopholes in the QA process, the client can produce safer railcars and aircraft with 100% digital traceability.
- **Operational Efficiency:** Digitizing the inspection of railcars at every stage significantly reduced the time spent on record-keeping and data entry.
- **Cost & Space Savings:** The "green" paperless alternative eliminated massive physical storage needs and associated administrative costs.
- **Data-Driven Decision Making:** Real-time analytics and historical data tracking helped the management to predict and prevent production bottlenecks.
- **Global Scalability:** The solution successfully supports over 100 active user licenses across multiple international production sites.