

ARM Power – Smart Manufacturing & Inventory Management Platform

Client

ARM Power is a pioneer in the solar energy industry, operating one of the world's most advanced assembly lines for batteries and inverters. With a strong focus on quality, innovation, and manufacturing efficiency, ARM Power required a digital solution to improve inventory accuracy and production traceability.

Executive Summary

A centralized manufacturing and inventory management platform was developed to eliminate inventory discrepancies during production, improve BOM management, and provide complete visibility into material consumption throughout the manufacturing lifecycle.

The solution enables production teams to identify excess material usage immediately, maintain accurate inventory records, and improve operational transparency through automated discrepancy detection and audit logging.

Business Challenge

As production volumes increased, the organization faced several operational challenges:

- Manual verification of material consumption during manufacturing.
- Inventory mismatches between warehouse stock and assembled products.
- Difficulty identifying the root cause of excess component consumption.
- Lack of historical records for production discrepancies.
- Limited visibility into production and delivery status.

These issues increased operational overhead and made inventory audits both time-consuming and error-prone.

Proposed Solution

A manufacturing execution platform was designed to integrate inventory management with the production workflow.

The application continuously validates the actual material consumed against the predefined Bill of Materials (BOM). Whenever additional materials are consumed beyond the expected quantity, the system automatically generates a discrepancy record and maintains a complete audit trail for investigation.

The platform also synchronizes stock levels, tracks battery charging status, and provides visibility into delivery progress.

Core Features

Bill of Materials (BOM)

- Create and manage product BOMs.
- Support BOM revisions and updates.
- Standardize manufacturing requirements across products.

Inventory Synchronization

- Automatic stock deduction based on approved BOM.
- Inventory remains synchronized with manufacturing activities.
- Prevents inconsistent stock records.

Manufacturing Discrepancy Detection

- Compare actual component usage with expected BOM quantities.
- Detect overconsumption of raw materials.
- Generate discrepancy alerts automatically.
- Maintain historical discrepancy logs.

Inventory Management

- Real-time inventory updates during production.
- Material availability tracking.
- Stock reconciliation support.

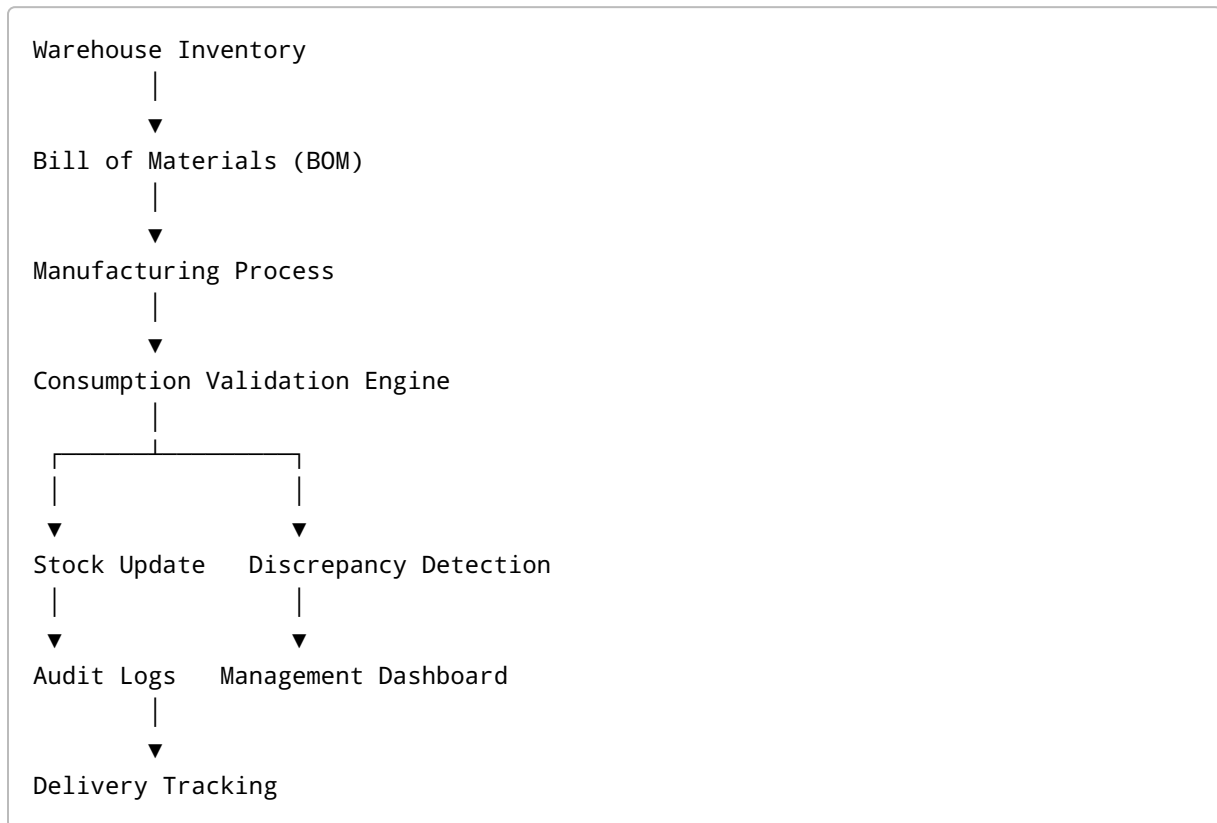
Battery Lifecycle Tracking

- Monitor charging status.
- Track manufacturing progress.

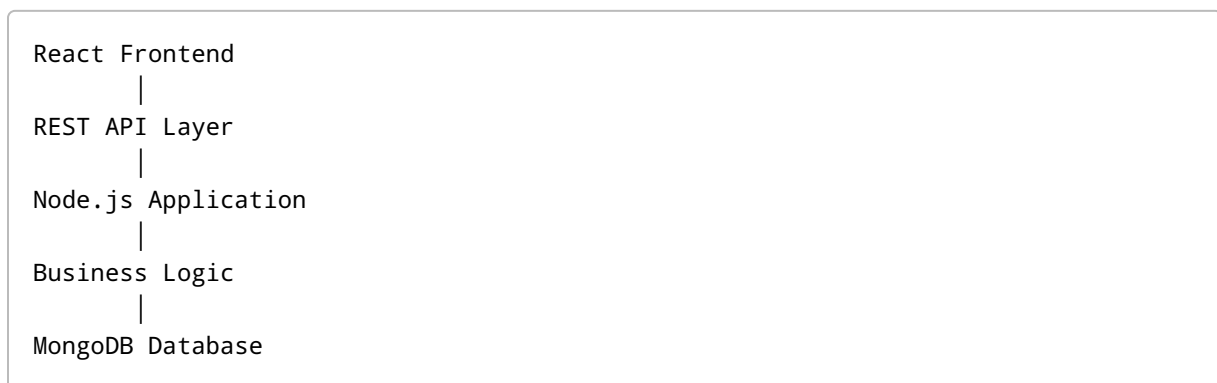
Delivery Management

- Track delivery stages from manufacturing to dispatch.
 - Provide operational visibility into product movement.
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Solution Architecture



Technology Architecture



The application follows a layered architecture separating presentation, business logic, and data persistence to improve maintainability and scalability.

Why This Technology Stack?

React

- Component-based architecture.
- Responsive and interactive dashboards.
- Reusable UI components.
- Improved user experience for production operators.

Node.js

- Handles multiple concurrent manufacturing operations efficiently.
- Lightweight runtime suitable for API-driven applications.
- Fast development cycle.

MongoDB

- Flexible schema for BOM revisions and manufacturing logs.
- Efficient storage of inventory transactions and audit history.
- Scales well with increasing production records.

REST APIs

- Clean integration between frontend and backend.
- Easy integration with ERP or third-party systems in the future.

Business Impact

The platform delivered measurable operational improvements by:

- Improving inventory accuracy throughout the manufacturing process.
- Reducing manual stock reconciliation efforts.
- Providing complete traceability of material consumption.
- Detecting production discrepancies automatically.
- Supporting faster root cause analysis through audit logs.
- Improving operational visibility across production and inventory teams.
- Standardizing BOM management across multiple product lines.
- Enabling informed inventory planning through accurate consumption records.

Engineering Highlights

- Automated discrepancy detection engine.
- Inventory synchronization with manufacturing workflows.

- BOM version management.
 - Audit logging for production traceability.
 - Modular architecture supporting future expansion.
 - Dashboard-driven monitoring for production and inventory teams.
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Future Enhancements

- Real-time IoT integration with assembly equipment.
- Barcode and QR code scanning.
- Predictive inventory forecasting.
- Production analytics dashboards.
- ERP integration.
- Mobile application for warehouse operations.
- Automated notifications for production exceptions.