PRODUCTION COST CALCULATOR

Software Requirements Specification (SRS)

Project: Production Cost Calculator
Version: 1.0
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Tech Stack:
- **UI:** Next.js (.js / .jsx)
- **Styling:** CSS Modules (.module.css / .css)
- **Backend:** Node.js + Express.js
- **Database:** MySQL
- **Authentication:** JWT

1. Introduction

1.1 Purpose
The Production Cost Calculator is a web-based application designed to enable manufacturers to **accurately calculate the cost of production** per batch and per unit, incorporating raw materials, labor, machine usage, overheads, wastage, packaging, transportation, and profit margins. The system will generate **reports, dashboards, historical comparisons, and scenario simulations** to support pricing and strategic decision-making.

1.2 Scope
- Web-based platform for manufacturers.
- Core modules: Product Management, Material Management, Labor, Machines, Overheads, Batch Cost Calculation, Reports, Dashboards, Scenario Simulation, User Management.
- Secure JWT-based authentication and role-based access.
- Exportable reports in PDF/Excel format.
- Scalable for future integration with ERP/inventory, mobile app, AI cost prediction, multi-currency, and tax calculations.

1.3 Definitions, Acronyms, and Abbreviations
- **FR:** Functional Requirement
- **NFR:** Non-Functional Requirement
- **ERP:** Enterprise Resource Planning
- **MVP:** Minimum Viable Product
- **JWT:** JSON Web Token

2. Overall Description

2.1 Product Perspective

This system is a **standalone web application** with a **modular architecture**. All data is stored in a relational database (MySQL) to facilitate batch-wise calculations and historical comparisons. Future scalability is considered for AI cost predictions, mobile app integration, and ERP connectivity.

2.2 Product Functions

1. User authentication and role-based access.
2. Product and raw material management.
3. Labor, machine, and overhead input and calculations.
4. Batch cost calculation (total cost, unit cost, break-even).
5. Profit margin application and selling price suggestion.
6. Scenario simulation ("what-if" analysis).
7. Reports, dashboards, and export functionality.
8. Historical tracking and comparison between batches/products.

2.3 User Classes and Characteristics

User Role	Access Level	Responsibilities
Admin	Full	Manage users, configure system, manage all modules
Production Manager	Medium	Create batches, input costs, view reports, dashboards
Accountant / Finance	Medium	Access reports, approve costs
Staff / Operator	Limited	Input batch data, view limited dashboards

2.4 Operating Environment

- Web browsers: Latest Chrome, Edge, Firefox, Safari.
- Backend: Node.js + Express.js.
- Database: MySQL.

2.5 Design and Implementation Constraints

- Must support 50+ concurrent users.
- All sensitive data encrypted.
- Database must handle 100,000+ batch records efficiently.
- Modular architecture to allow future enhancements.

3. Functional Requirements (FRs)

3.1 User Management
- **FR1:** User registration, login, logout (JWT-based).
- **FR2:** Role-based access: Admin, Production Manager, Accountant, Staff.
- **FR3:** Admin can add/edit/delete users.
- **FR4:** Password reset functionality.
- **FR5:** JWT token refresh and expiration handling.

3.2 Product Management
- **FR6:** Add/Edit/Delete products: name, SKU, batch size, description.
- **FR7:** Support multiple batch sizes per product.
- **FR8:** Search/filter products by name, SKU.
- **FR9:** Product list pagination and sorting.

3.3 Raw Material Management
- **FR10:** Add/Edit/Delete raw materials: name, unit price, unit type, vendor, stock quantity.
- **FR11:** Auto-calculate total material cost = quantity × unit price.
- **FR12:** Save frequently used materials for reuse.
- **FR13:** Search/filter raw materials.
- **FR14:** Track stock quantity and alert when low.

3.4 Vendor Management
- **FR15:** Add/Edit/Delete vendors: name, contact, email, address.
- **FR16:** Link vendors to materials for cost tracking.

3.5 Labor Management
- **FR17:** Add/Edit/Delete labor entries: direct/indirect, rate per hour, overtime rate.
- **FR18:** Input hours worked per batch.
- **FR19:** Auto-calculate total labor cost.
- **FR20:** Filter labor entries by type, name, or rate.

3.6 Machine & Utility Management
- **FR21:** Add/Edit/Delete machines: name, cost per hour, maintenance cost.
- **FR22:** Input machine hours per batch.
- **FR23:** Add utility costs (electricity, water).
- **FR24:** Auto-calculate total machine + utility cost per batch.

3.7 Overhead Management
- **FR25:** Add/Edit/Delete overheads: name, type (fixed/percentage), value.
- **FR26:** Apply overheads to batches automatically.
- **FR27:** Track monthly/annual overhead totals.

3.8 Wastage / Scrap Handling
- **FR28:** Input material wastage percentage per batch.
- **FR29:** Auto-adjust material cost based on wastage.
- **FR30:** Input scrap resale value to reduce net batch cost.

3.9 Packaging & Transportation
- **FR31:** Input packaging cost per unit/batch.
- **FR32:** Input transportation/logistics cost.
- **FR33:** Auto-add to total batch cost.

3.10 Profit Margin
- **FR34:** Apply profit margin (percentage or fixed).
- **FR35:** Suggest selling price automatically.
- **FR36:** Show profit per unit and per batch.

3.11 Batch Management
- **FR37:** Create production batches with all cost components.
- **FR38:** Auto-calculate total batch cost, unit cost, break-even quantity.
- **FR39:** Edit/Delete batch entries.
- **FR40:** Search/filter batch by product, date, cost.

3.12 Reports & Dashboards
- **FR41:** Generate cost breakdown charts: material %, labor %, overhead %.
- **FR42:** Batch-wise, monthly, yearly cost comparison.
- **FR43:** Export reports to PDF/Excel.
- **FR44:** Dashboard KPIs: total cost, cost per unit, profit margin, break-even points.
- **FR45:** Interactive charts with drill-down capability.

3.13 Scenario / "What-If" Simulation
- **FR46:** Simulate cost changes (e.g., raw material price increase).
- **FR47:** Auto-recalculate total and unit costs dynamically.
- **FR48:** Compare scenarios side by side.

3.14 History & Database Management
- **FR49:** Save past batch calculations with timestamps.
- **FR50:** Compare multiple products/batches.
- **FR51:** Versioning of calculations for audit purposes.

3.15 Search & Filters
- **FR52:** Global search across products, batches, raw materials, vendors.
- **FR53:** Advanced filters by date, cost range, product, batch size, vendor, labor type.

3.16 Notifications & Alerts
- **FR54:** Alert when raw material stock is low.
- **FR55:** Notify when batch cost exceeds threshold/budget.

3.17 Security & Compliance
- **FR56:** Role-based access control.
- **FR57:** JWT authentication with refresh/expiration.
- **FR58:** Audit trail of all CRUD operations.
- **FR59:** Data encryption for financial data.

3.18 Export & Integration
- **FR60:** Export batch reports to PDF/Excel.
- **FR61:** Optional future integration with ERP/inventory systems via API.

4. Non-Functional Requirements (NFRs)
1. **Performance:** Calculations <2 seconds, reports <5 seconds.
2. **Reliability:** Uptime 99.5%, transaction-safe batch calculations.
3. **Security:** HTTPS/SSL, encrypted storage, audit trails.
4. **Usability:** Intuitive UI, real-time validation, responsive design.
5. **Maintainability:** Modular architecture, automated backups.
6. **Extensibility:** Support future AI cost prediction, mobile app, multi-currency, tax integration.
7. **Compatibility:** Latest browsers (Chrome, Edge, Firefox, Safari).

5. External Interfaces
- **UI:** Next.js + CSS Modules for input forms, dashboards, charts.
- **Backend:** Node.js + Express.js REST API.
- **Database:** MySQL (normalized tables for products, batches, materials, labor, machines, overheads).
- **Authentication:** JWT-secured API endpoints.
- **Export:** PDF/Excel using libraries (SheetJS, jsPDF).

6. Assumptions & Dependencies
- Accurate user input for materials, labor, machine hours.
- Stable internet connection for web app.
- Future ERP or inventory integrations depend on client's system compatibility.