

***Manufacturer Management System Project***

*Software Requirements Specification*

***Present By Shahil Hossain, ID 221 044 038***

Table of Contents

1. Introduction

* 1. Purpose
  2. Scope
  3. Definitions, Acronyms and Abbreviations
  4. References
  5. Overview

1. System Overview
   1. Product Perspective
   2. Product Functions
   3. User Characteristics
   4. Operating Environment
   5. Design and Implementation Constraints
   6. Assumptions and Dependencies
2. System Requirements
   1. Functional Requirements
      1. Raw Material Procurement
      2. Inventory Management
      3. Production Planning and Scheduling
      4. Quality Control
      5. Logistics and Distribution
   2. Non-Functional Requirements
      1. Performance
      2. Security
      3. Usability
      4. Reliability
   3. Technical Requirements
      1. Hardware
      2. Software
      3. Integration
   4. Assumptions and Constraints
3. External Interface Requirements
   1. User Interface (UI)
   2. Hardware Interface
   3. Software Interface
   4. Communication Interface
   5. External Database Interface
4. System Features
   1. Inventory Management
   2. Production Management
   3. Quality Control
   4. Supplier Management
   5. Order Management
   6. Reporting and Analytics
5. System Architecture
   1. Overview
   2. Architectural Components
   3. System Integration
6. Validation and Verification
   1. Overview
   2. Validation
   3. Verification
7. Documentation Requirements
   1. Overview
   2. User Documentation
   3. Technical Documentation
   4. Maintenance Documentation
8. Appendices
   1. Overview
9. Glossary
   1. Overview
   2. Key Terms

**1.** **Introduction**

**1.1 Purpose**

This document serves as an overview of the Manufacturer Management System (MMS) Software Requirements Specification (SRS) that was created specifically for SH Express, a well-known transportation manufacturing company. The goal of this system is to improve the supply chain operations, manufacturing procedures, and raw material management that are essential to the production of buses and associated parts.

**1.2 Scope**

The Manufacturer Management System will oversee all aspects of SH Express's manufacturing lifecycle, including inventory control, production workflows, distribution of final goods, and the acquisition of raw materials (such as aluminum, iron, plastic, and leather). The system will function as an all-inclusive instrument to enhance manufacturing process optimization, minimize expenses, and augment overall efficacy.

**1.3 Definitions, Acronyms, and Abbreviations**

* **MMS**: Manufacturer Management System
* **SH Express**: The transport manufacturing company for which this SRS is being developed
* **Raw Materials**: Aluminum, Iron, Plastic, Leather, and other materials used in the manufacturing process

**1.4 References**

* Industry Standards for Manufacturing and Supply Chain Management
* SH Express Company Policies on Material Procurement and Production

**1.5 Overview**

Leading company in the transportation manufacturing sector, SH Express, gets its necessary raw materials (plastic, leather, iron, and aluminum) from a complicated network of suppliers. These materials are essential for building engines, bus bodies, and other important parts. Through the MMS, SH Express will be able to effectively manage these resources, expedite production, and guarantee the prompt supply of premium transport solutions to its customers.

To help with the creation and execution of a strong software solution for SH Express, the specific needs of the Manufacturer Management System—both functional and non-functional—will be covered in detail in the parts that follow.

**2. System Overview**

**2.1 Product Perspective**

Made exclusively for SH Express, the Manufacturer Management System (MMS) is a stand-alone software program. It will easily interface with the current supply chain management (SCM) and enterprise resource planning (ERP) systems. The management of SH Express's whole manufacturing lifecycle, from the acquisition of raw materials to the ultimate production and distribution of buses, depends heavily on the MMS.

The purpose of this system is to automate and centralize several parts of the manufacturing process so that SH Express can keep an eye on inventory levels, production schedules, and supplier relationships in real time. It is anticipated that the MMS will greatly improve SH Express's capacity to precisely manage its manufacturing operations, increasing operational effectiveness, cutting waste, and guaranteeing on-time delivery of completed goods.

**2.2 Product Functions**

The key functions of the Manufacturer Management System include:

* **Raw Material Procurement**: Facilitates the sourcing and purchasing of materials such as aluminum, iron, plastic, and leather, ensuring that procurement is aligned with production needs and cost efficiency.
* **Inventory Management**: Provides real-time tracking of raw materials, semi-finished goods, and finished products, helping to maintain optimal inventory levels and reduce the risk of shortages or overstocking.
* **Production Planning and Scheduling**: Automates the scheduling of manufacturing activities based on real-time data, optimizing resource utilization and ensuring that production targets are met on time.
* **Quality Control**: Incorporates quality assurance checks at various stages of production, ensuring that all products meet SH Express’s stringent quality standards before they are dispatched to customers.
* **Supplier Management**: Manages relationships with suppliers, including monitoring supplier performance, managing contracts, and ensuring timely delivery of raw materials.
* **Logistics and Distribution**: Coordinates the distribution of finished buses to clients, including managing transportation logistics and ensuring timely delivery.

**2.3 User Characteristics**

The MMS will be utilized by a variety of users within SH Express, each with specific roles and responsibilities:

* **Procurement Officers**: Responsible for sourcing and purchasing raw materials, they will use the system to manage supplier relationships and track material orders.
* **Inventory Managers**: Tasked with maintaining optimal inventory levels, they will rely on the MMS for real-time data on stock levels and material usage.
* **Production Managers**: Overseeing the manufacturing process, they will use the system for scheduling, resource allocation, and monitoring production progress.
* **Quality Assurance Teams**: Ensuring that all products meet quality standards, they will utilize the MMS to record and track quality checks throughout the production process.
* **Logistics Coordinators**: Managing the distribution of finished products, they will use the system to plan and monitor the delivery of buses to clients.

**2.4 Operating Environment**

The MMS will function within the current IT architecture of SH Express, which consists of cloud-based and on-premise servers. Key people will always have access to the system from anywhere at any time by using desktop computers and mobile devices to access the program. The following will be a part of the operational environment:

* **Servers**: On-premise and cloud servers hosting the MMS and associated databases.
* **Operating Systems**: Compatibility with Windows and Linux-based operating systems.
* **Databases**: Integration with existing SQL-based databases used by SH Express.
* **Network**: Secure, high-speed network connectivity to ensure real-time data access and system responsiveness.

**2.5 Design and Implementation Constraints**

Several constraints may affect the design and implementation of the MMS:

* **Legacy Systems**: The MMS must be compatible with SH Express’s existing legacy systems, requiring careful planning and integration efforts.
* **Regulatory Compliance**: The system must adhere to industry-specific regulations and standards, particularly concerning data security and quality control in manufacturing.
* **Resource Allocation**: The project will need to balance between cost, time, and available development resources, potentially affecting the scope and timeline of the system’s implementation.

**2.6 Assumptions and Dependencies**

* **Stable Supply Chain**: It is assumed that SH Express will maintain stable relationships with its suppliers, ensuring a consistent flow of raw materials.
* **Technological Infrastructure**: The successful deployment of the MMS is dependent on the availability and stability of SH Express’s IT infrastructure.
* **User Training**: It is assumed that adequate training will be provided to all users to ensure they can effectively utilize the MMS.

### 3. System Requirements

#### 3.1 Functional Requirements

The functional requirements outline the essential features and functions that the Manufacturer Management System (MMS) must perform to meet the needs of SH Express. These include:

##### 3.1.1 Raw Material Procurement

* **Vendor Management**: The system must allow for the registration and management of multiple vendors, tracking their performance, and maintaining contracts.
* **Purchase Orders**: The system should enable users to create, modify, and manage purchase orders for raw materials like aluminum, iron, plastic, and leather.
* **Inventory Reordering**: The MMS must support automatic reordering of materials based on predefined inventory levels to prevent shortages.

##### 3.1.2 Inventory Management

* **Real-time Inventory Tracking**: The system must provide real-time tracking of raw materials, semi-finished goods, and finished products.
* **Inventory Reports**: The MMS should generate detailed inventory reports, including stock levels, usage history, and forecasted needs.
* **Warehouse Management**: The system should manage multiple warehouse locations, tracking the movement and storage of materials.

##### 3.1.3 Production Planning and Scheduling

* **Production Workflow**: The system must allow the creation and management of production workflows, detailing each step of the manufacturing process.
* **Resource Allocation**: The MMS should optimize the allocation of resources (e.g., labor, machinery) based on production schedules.
* **Production Monitoring**: The system should enable real-time monitoring of production processes, including progress tracking and bottleneck identification.

##### 3.1.4 Quality Control

* **Inspection Management**: The MMS must include features for scheduling and managing quality inspections at various stages of production.
* **Non-conformance Tracking**: The system should allow users to record and manage instances of non-conformance, including root cause analysis and corrective actions.
* **Quality Reports**: The MMS should generate reports on product quality, inspection results, and trends in non-conformance.

##### 3.1.5 Logistics and Distribution

* **Shipment Management**: The system should manage the planning, scheduling, and tracking of product shipments to customers.
* **Transportation Management**: The MMS must coordinate logistics, including route planning and carrier management, to ensure timely delivery.
* **Delivery Confirmation**: The system should track and confirm the receipt of goods by customers, including handling returns and exchanges.

#### 3.2 Non-Functional Requirements

The non-functional requirements define the system's quality attributes, including performance, security, and usability.

##### 3.2.1 Performance

* **Scalability**: The MMS must be scalable to accommodate growth in SH Express’s operations, including an increasing number of users and transactions.
* **Response Time**: The system should provide real-time updates with minimal latency, ensuring that users can access accurate information without delays.
* **Data Throughput**: The MMS must handle high volumes of data, particularly during peak production periods, without degradation in performance.

##### 3.2.2 Security

* **Data Encryption**: The system must use strong encryption methods to protect sensitive data, including customer information, financial records, and production data.
* **Access Control**: The MMS must implement role-based access controls, ensuring that users only have access to the data and functions necessary for their roles.
* **Audit Trails**: The system should maintain comprehensive audit trails, logging all user activities and changes to critical data.

##### 3.2.3 Usability

* **User Interface**: The MMS should provide an intuitive and user-friendly interface, making it easy for users to navigate the system and perform tasks efficiently.
* **Training and Documentation**: The system must include comprehensive user manuals and training materials to ensure that all users can effectively utilize the MMS.
* **Localization**: The MMS should support multiple languages, including English and Bengali, to accommodate all users within SH Express.

##### 3.2.4 Reliability

* **System Uptime**: The MMS should have a high uptime rate, ideally 99.9%, to ensure continuous availability for critical manufacturing operations.
* **Data Backup and Recovery**: The system must support regular data backups and have a robust disaster recovery plan in place to prevent data loss in case of failures.

#### 3.3 Technical Requirements

The technical requirements specify the hardware and software environments in which the MMS will operate.

##### 3.3.1 Hardware

* **Servers**: The system should be deployed on high-performance servers with sufficient processing power, memory, and storage to handle SH Express’s operational needs.
* **Workstations**: Users will access the MMS via desktop computers and mobile devices with minimum specifications of 8GB RAM, 256GB storage, and modern processors.
* **Network**: A reliable, high-speed network infrastructure must be in place to support real-time data access and communication between different system components.

##### 3.3.2 Software

* **Operating Systems**: The MMS must be compatible with both Windows and Linux-based operating systems.
* **Databases**: The system should integrate with SH Express’s existing SQL-based databases, ensuring seamless data exchange and storage.
* **Cloud Integration**: The MMS should support cloud-based deployment and integration, allowing for flexible access and scalability.

##### 3.3.3 Integration

* **ERP Integration**: The MMS must integrate with SH Express’s existing ERP system to ensure a seamless flow of information across the organization.
* **API Support**: The system should include APIs for integration with third-party tools and services, enhancing its functionality and adaptability.

#### 3.4 Assumptions and Constraints

* **Assumptions**:
  + The IT infrastructure at SH Express will be upgraded as needed to support the MMS.
  + Adequate training and change management processes will be implemented to ensure smooth adoption of the system by all users.
* **Constraints**:
  + The MMS must be compatible with legacy systems currently in use at SH Express.
  + The development and deployment of the system must adhere to SH Express’s budgetary and timeline constraints.

**4. External Interface Requirements**

The "External Interface Requirements" section describes how the Manufacturer Management System (MMS) for SH Express will interact with external systems, devices, and users. These interfaces are crucial for ensuring seamless communication and data exchange between the MMS and other systems that SH Express relies on.

**4.1 User Interface (UI)**

* **Web Interface**:
  + The system must provide a web-based interface accessible via standard web browsers (e.g., Chrome, Firefox, Safari).
  + The interface should be user-friendly, with intuitive navigation and responsive design to ensure compatibility with both desktop and mobile devices.
  + The UI should support multiple languages, including English and Bengali, to cater to diverse users.
* **Mobile Interface**:
  + The system should include a mobile application or a responsive mobile-friendly version of the web interface.
  + The mobile interface must allow key functionalities, such as inventory management, order tracking, and production monitoring, to be performed on-the-go.

**4.2 Hardware Interface**

* **Barcode Scanners**:
  + The MMS must support integration with barcode scanners for real-time tracking of inventory and products within warehouses and during production.
  + The system should be compatible with standard barcode formats and allow for easy data capture and input.
* **RFID Systems**:
  + The MMS should be able to integrate with RFID (Radio-Frequency Identification) systems for advanced inventory and asset tracking.
  + The system must support both passive and active RFID technologies, ensuring accurate real-time data collection.
* **IoT Devices**:
  + The system should support integration with IoT (Internet of Things) devices used in production, such as sensors and smart machinery.
  + These devices should feed data directly into the MMS for monitoring production efficiency, machine health, and environmental conditions.

**4.3 Software Interface**

* **Enterprise Resource Planning (ERP) Systems**:
  + The MMS must integrate seamlessly with SH Express's existing ERP system, allowing for the smooth transfer of data related to finance, human resources, and supply chain management.
  + The interface should support bi-directional data exchange, ensuring that both systems are always synchronized.
* **Customer Relationship Management (CRM) Systems**:
  + The system should integrate with SH Express’s CRM to ensure that customer orders, feedback, and communication are synchronized with production and inventory data.
  + This integration will enable better customer service by providing real-time updates on order status and delivery schedules.
* **Accounting Software**:
  + The MMS should interface with accounting software to automate financial transactions related to procurement, sales, and inventory valuation.
  + The integration must support the transfer of invoices, purchase orders, and payment records, ensuring accurate financial reporting.

**4.4 Communication Interface**

* **Email Systems**:
  + The MMS must integrate with SH Express’s email system to automatically send notifications related to order confirmations, shipment tracking, and inventory alerts.
  + The system should allow users to customize email templates and set triggers for different types of notifications.
* **Messaging Systems**:
  + The system should support integration with messaging platforms (e.g., SMS, WhatsApp) for sending real-time alerts and updates to staff and customers.
  + The MMS should allow for the configuration of messaging rules and formats to ensure effective communication.

**4.5 External Database Interface**

* **Third-Party Databases**:
  + The system must have the capability to interface with external databases for importing and exporting data as needed.
  + This could include access to supplier databases for up-to-date pricing, or government databases for regulatory compliance.
* **Cloud Storage Services**:
  + The MMS should integrate with cloud storage solutions (e.g., AWS, Google Drive) to store and backup critical data.
  + The integration must support secure data transfer and ensure that backups are regularly updated to prevent data loss.

**5. System Features**

The "System Features" section outlines the key functionalities of the Manufacturer Management System (MMS) for SH Express. These features are designed to enhance the efficiency, accuracy, and overall effectiveness of the company's manufacturing processes.

**5.1 Inventory Management**

* **Real-Time Inventory Tracking**:
  + The system will provide real-time tracking of raw materials (e.g., aluminum, iron, plastic, leather) and finished products (e.g., bus bodies, engines).
  + Alerts for low stock levels, expiration dates, and reordering will be automatically generated to prevent material shortages.
* **Automated Stock Replenishment**:
  + The system will automatically generate purchase orders for raw materials when stock levels fall below predefined thresholds.
  + Integration with suppliers will allow for automated order placement, reducing the lead time and ensuring a steady supply of materials.

**5.2 Production Management**

* **Production Scheduling**:
  + The system will allow for the creation and management of production schedules, ensuring that resources are optimally allocated.
  + It will support the tracking of production milestones and timelines, helping to meet delivery deadlines.
* **Work Order Management**:
  + The MMS will generate and manage work orders for each stage of the manufacturing process, from material preparation to final assembly.
  + The system will track the status of each work order, providing real-time updates on production progress.

**5.3 Quality Control**

* **Quality Inspection**:
  + The system will include modules for quality inspection at various stages of production, ensuring that all products meet SH Express’s standards.
  + Automated quality checks will be implemented, and any deviations will trigger alerts for corrective action.
* **Defect Tracking**:
  + The system will track defects and non-conformities in the production process, allowing for quick identification and resolution of issues.
  + Historical data on defects will be analyzed to identify patterns and improve future production quality.

**5.4 Supplier Management**

* **Supplier Performance Monitoring**:
  + The system will track and evaluate supplier performance based on criteria such as delivery times, quality of materials, and cost efficiency.
  + Reports will be generated to help in making informed decisions when selecting or renewing contracts with suppliers.
* **Supplier Portal**:
  + The MMS will include a supplier portal where suppliers can log in to view purchase orders, update delivery statuses, and communicate directly with SH Express.
  + This portal will enhance collaboration and transparency between SH Express and its suppliers.

**5.5 Order Management**

* **Order Processing**:
  + The system will manage customer orders from receipt to delivery, ensuring that all orders are processed efficiently and accurately.
  + Integration with the CRM will ensure that customer orders are automatically fed into the production schedule.
* **Shipment Tracking**:
  + The MMS will track the shipment of finished products, providing real-time updates to customers and internal stakeholders.
  + Integration with logistics partners will allow for accurate tracking of deliveries and timely notifications of any delays.

**5.6 Reporting and Analytics**

* **Customizable Reports**:
  + The system will offer a range of customizable reports on inventory levels, production efficiency, quality control, supplier performance, and more.
  + Reports can be generated on-demand or scheduled for regular intervals, providing SH Express with actionable insights.
* **Data Analytics**:
  + The MMS will include data analytics tools to analyze production data, identify trends, and optimize manufacturing processes.
  + Predictive analytics will be used to forecast demand, manage resources, and reduce production costs.

**6. System Architecture**

**6.1 Overview**  
The System Architecture section provides a detailed description of the structural design of the Manufacturer Management System (MMS) for SH Express. This architecture ensures that all components work together seamlessly to support the company's manufacturing operations.

**6.2 Architectural Components**

* **Client-Server Architecture**: The MMS will follow a client-server architecture where clients (users) access the system through a web-based or desktop application, while the server handles the processing and storage of data.
* **Database Layer**: A centralized relational database (e.g., MySQL, PostgreSQL) will store all data related to inventory, production, orders, and suppliers. This database will be optimized for speed, reliability, and scalability.
* **Application Layer**: The core business logic, including inventory management, production scheduling, and order processing, will reside in the application layer. This layer will interact with the database and user interface layers to execute tasks.
* **User Interface Layer**: The user interface will be intuitive and accessible via both desktop and mobile devices, providing real-time access to data and functionality.

**6.3 System Integration**  
The MMS will integrate with third-party systems such as supplier databases, logistics partners, and cloud storage solutions to ensure smooth operation and data exchange across different platforms.

**7. Validation and Verification**

**7.1 Overview**  
The Validation and Verification section outlines the processes that will be followed to ensure that the MMS meets all specified requirements and functions correctly in real-world scenarios.

**7.2 Validation**

* **Requirements Validation**: The system will be validated against the defined requirements to ensure that it meets the needs of SH Express. This will include checking that all functionalities, such as inventory tracking and order management, are implemented correctly.
* **User Acceptance Testing (UAT)**: End-users will participate in UAT to confirm that the system performs as expected in a production environment. Feedback from UAT will be used to make necessary adjustments before full deployment.

**7.3 Verification**

* **Functional Testing**: Each feature of the MMS will undergo rigorous functional testing to ensure that it works as intended. This includes testing for edge cases and unusual scenarios.
* **Performance Testing**: The system will be tested for performance under various conditions, including high load, to ensure that it remains responsive and stable.
* **Security Testing**: Security measures, such as authentication and data encryption, will be tested to protect against unauthorized access and data breaches.

**8. Documentation Requirements**

**8.1 Overview**  
The Documentation Requirements section details the types of documentation that will be created to support the development, deployment, and maintenance of the MMS.

**8.2 User Documentation**

* **User Manuals**: Comprehensive user manuals will be provided to guide users on how to use the MMS effectively. These manuals will cover all features, from inventory management to reporting.
* **Quick Reference Guides**: Short, easy-to-follow guides will be provided for common tasks, such as creating a work order or generating a report.

**8.3 Technical Documentation**

* **System Architecture Document**: A detailed document describing the system's architecture, including diagrams and descriptions of each component.
* **API Documentation**: For systems integration, detailed API documentation will be provided, outlining the available endpoints, request/response formats, and authentication methods.

**8.4 Maintenance Documentation**

* **Administrator Guides**: These guides will cover tasks related to system administration, such as user management, backups, and system updates.
* **Troubleshooting Guides**: Guides to help diagnose and resolve common issues that may arise during the operation of the MMS.

**9. Appendices**

**9.1 Overview**  
The Appendices section will contain supplementary information that supports the main content of the document. This may include:

* **Glossary**: Definitions of terms used throughout the documentation.
* **Data Dictionary**: A comprehensive list of all data fields used in the system, along with their definitions and data types.
* **Workflow Diagrams**: Visual representations of key workflows, such as the order processing or production scheduling process.
* **Regulatory Compliance Information**: Details on how the MMS complies with relevant industry regulations and standards.

**10. Glossary**

**10.1 Overview**  
The Glossary provides definitions for terms and acronyms used throughout the documentation to ensure clarity and understanding.

**10.2 Key Terms**

* **MMS (Manufacturer Management System)**: The software system designed to manage and streamline the manufacturing processes of SH Express.
* **UAT (User Acceptance Testing)**: The phase in the software development process where end-users test the system to ensure it meets their needs and functions correctly in real-world conditions.
* **API (Application Programming Interface)**: A set of rules and protocols for building and interacting with software applications, enabling different systems to communicate with each other.
* **CRM (Customer Relationship Management)**: A system that manages a company’s interactions with current and potential customers, integrating with the MMS for order management.