

New Era Manufacturing Management System

Montaño, Chleo Nicole

Dela Cruz, Beatriz

Libunao, Trixia Nicole

Paat, Margarete

CCSFEN2L: Software Engineering 2

Mr. Eliseo Q. Ramirez

February 2025

Table of Contents

1. Cover Page
Project Title
Team Members
Course Information
Date of Submission
2. Executive Summary
Brief Overview of the Project
3. Introduction
Background of the Problem
Project Objectives
Scope and Limitations
4. Requirements Analysis
Stakeholder Identification
Functional and Non-functional Requirements
Use Case Diagrams and Descriptions
5. System Design
Vision Statement
Architectural Design
Design Patterns Applied
Entity-Relationship Diagrams (ERD)
User Interface Mockups
6. Project Management
Agile Practices and Sprint Planning
Gantt Chart or Project Timeline
7. Development Process
Coding Standards and Best Practices
Tools and Technologies Used
Implementation Details
8. Testing
Test Case Documentation
Results of Test Execution
User Guide for the System
9. Conclusion
Summary of Project Outcomes
Challenges Faced and Lessons Learned
Recommendations for Future Work
10. References
Cited Books, Articles, and Online Resources
11. Appendices
Meeting Minutes
Screenshots
Other Supporting Documents

Executive Summary

Brief Overview of the Project

The New Era Manufacturing Management System (MMS) is an advanced software solution designed to optimize production efficiency, inventory control, and overall operational processes at the New Era Cap Philippines SM Grand Central Branch. This system seamlessly integrates a range of critical functions, including Production Management, Inventory Tracking, Work Order Management, Production Tracking, and Quality Control, ensuring a streamlined and efficient manufacturing workflow.

With real-time data analytics, automated reporting, and predictive maintenance capabilities, the MMS enhances decision-making processes and minimizes production bottlenecks. Its user-friendly interface allows for easy navigation, while role-based access ensures security and accountability across departments.

Introduction

Background of the Problem

The absence of a comprehensive Manufacturing Management System (MMS) has led to inefficiencies in tracking materials, managing work orders, and monitoring production. Without real-time tracking, delays in material procurement, inventory inaccuracies, and uncoordinated work orders increase costs and quality issues. Manual tracking further results in errors, making data-driven decision-making difficult.

Additionally, inefficient task assignment and employee monitoring contribute to workforce mismanagement, affecting productivity. The lack of a centralized quality control system also risks product standards.

Furthermore, the inability to generate automated reports and analytics hinders strategic planning, making it difficult for management to forecast demand, optimize production schedules, and maintain efficient workflow operations. Without a robust MMS, the overall manufacturing process remains vulnerable to operational bottlenecks, increased costs, and compromised product quality.

Project Objectives

The primary objective of this project is to develop a well-structured Manufacturing Management System (MMS) for New Era Caps that addresses the inefficiencies in production, inventory, and quality management. Specifically, it aims to:

1. Develop an Efficient Production Management Module

- Maintain detailed records of products, including their product ID, description, status, and its quantity.
- Streamline the production workflow to reduce downtime and enhance overall efficiency.

2. Support the Management of Bills of Materials (BOMs)

- Ensure accurate allocation of products for each Bill of Materials cycle request.
- Automate BOM request based on real-time inventory changes to prevent shortages and overstocking.

3. Implement an Effective Inventory Management System

- Integrate automated threshold for low stock levels to prevent disruptions in production.
- Enhance decision-making with a straightforward dashboard that provides insights into inventory levels. With intuitive data visualization, key metrics and trends are easily accessible, allowing easy bottleneck management.

4. Create a Work Order Management System

- Generate work orders that include product details, required quantities, necessary materials, and scheduled production timelines.
- Enable real-time tracking and updates to ensure adherence to schedules.

5. Monitor Production Progress

- Track the status of each work order and identify any delays or production bottlenecks.
- Provide analytical insights to enhance production efficiency and workflow optimization.

6. Develop an Employee and Task Management System

- Assign tasks efficiently and track employee work hours and performance.
- Maintain employee records to support HR functions and workforce optimization.

7. Integrate Quality Control Checks

- Establish a structured quality assurance process by documenting and monitoring quality outcomes.
- Identify and address defects promptly to ensure high product standards.

Scope and Limitations

Scope: This project encompasses the development of a comprehensive Manufacturing Management System (MMS) designed for New Era Caps, to improve production efficiency, inventory tracking, and overall operational management. The system will include the following key components:

1. **Production Management:** A database-driven module for recording product details, including ID, name, description, and quantity. The orders will be also made based on the BOM and reflected in the inventory.
2. **Bill of Materials (BOM) Management:** A structured approach to defining and managing BOMs, ensuring accurate production allocation for each production batch.
3. **Inventory Management:** Real-time tracking of products, their description, and finished goods, with automated threshold for low stock levels to prevent production halts.
4. **Work Order Management:** A system for creating and managing detailed work orders, specifying product details, required materials, quantities, and scheduling information.
5. **Production Tracking:** A module to monitor work order progress, identify potential delays, and enhance workflow efficiency.
6. **Task and Resource Management:** Assignment and tracking of employee tasks, work hours, and workforce optimization.

7. **Quality Control Checks:** Logging and monitoring of quality assurance data to maintain high product standards.

Limitations: While the MMS aims to provide a comprehensive solution, the following limitations exist:

1. **Integration with Existing Systems:** The MMS may require additional customization or middleware to integrate seamlessly with pre-existing ERP or accounting software used by the client.
2. **Hardware and Infrastructure Dependencies:** The system's performance will depend on the client's available hardware and network infrastructure, which may require upgrades for optimal efficiency.
3. **User Training Requirements:** Employees and managers will need adequate training to efficiently utilize all MMS functionalities, which may involve a learning curve.
4. **Payment and Transactions:** Any activities and functionalities that may require exchange of payments and transactions are not covered. The system is especially designed for storing data, retrieval, tracking, and deletion.
5. **Connection directed to the company:** The system is for the SM Grand Central Users only. Using the system to connect directed to company is not possible yet, system mainly focuses on the managers decision-making actions. If the managers decided to communicate directed to the company, the current system is not capable of such request.

Requirements Analysis

Stakeholder Identification

The new Manufacturing Management System at New Era Caps will be employed by several key personnel, each contributing significantly to improving operational efficiency and optimizing production workflows:

1. Production Manager

- Responsible for overseeing the creation and maintenance of product details and ensuring all resources are available for efficient manufacturing.
- This includes creating, generating, exporting, and editing Bills of Materials (BOM) to define production components, specifying required materials, and assigning product variations to meet customer needs.
- They utilize the system to search for products by various attributes, view product photos and related items, and maintain detailed records in organized tables.
- Tracks production progress, provides regular updates, and marks stages as complete, ensuring smooth and accurate workflows throughout the production process
- For monitoring current inventory levels to ensure stock is properly maintained, accurate, and accessible.
- Performs detailed searches for inventory data, set status quantity threshold, and updating inventory records in real time by adding stock details such as size and quantity.
- They conduct regular audits to identify and resolve discrepancies and generate detailed reports that provide insights into stock trends and requirements.
- Manages Bills of Materials, ensuring accurate allocation of products for production cycles.
- Accurate allocation of Orders and their quantity.

2. Work Order Manager

- Responsible for creating and editing work orders, as well as storing order details in a table
- Allows to search product details

3. Task Assignment Manager

- Receives work orders and assigns them to inventory workers. The start and end date of work will also be set.
- Maintains detailed records of all tasks being assigned

4. Quality Control Manager

- Responsible for maintaining the highest product quality standards throughout the production process.
- Schedules and tracking inspections, logging detailed records of quality results and issues, and prioritizing issues based on severity.
- They analyze trends to identify areas for improvement, ensuring that any quality concerns are addressed promptly.
- Maintaining customer satisfaction, ensuring product reliability, and preserving the brand's reputation

5. Production Tracking Manager

- Focuses on monitoring order progress and ensuring timely updates to order statuses.
- Accesses order details such as assigned workers, quantities, and status while searching for specific orders using order numbers.

Functional and Non-Functional Requirements

1. Functional Requirements

- **User Management**
 - The User (Production Manager) must be able to log-in, view the dashboards, and implement a database for recording product details, including Product ID, Product name, Quantity, Sizes, Price, and its Quantity. Access Inventory, Bill of Materials, Stock Threshold, and Export for documenting.

- Work Order Managers will handle the record of the time-in, time-out of the employees efficiently. This record will also show if the employee is on leave, absent, or day-off for the organized logging.
- Quality Control Manager must be able to set a date for a specific group of products and materials to ensure the quality of the products. Any defect will be also recorded thoroughly.
- Orders must be modified and updated based on their completeness status.

- **Database Management**

- Our users will be able to create, read, update, and delete the basic CRUD requirement for the database.
- Users will be able to access the products, employees, inventory, and order tracking.

- **Stock Threshold**

- Users will be able to set a threshold corresponding to the stocks of the inventory (e.g., when a product reaches a certain quantity, the status of the Product will update based on the threshold.)

- **Recording and Tracking**

- Users will have full access to the products, items, and employee records and manipulate the data accordingly.

2. Non-Functional Requirements

- **Security**

- Authorized individuals are only allowed to have access on the system since employee username will be used to log in

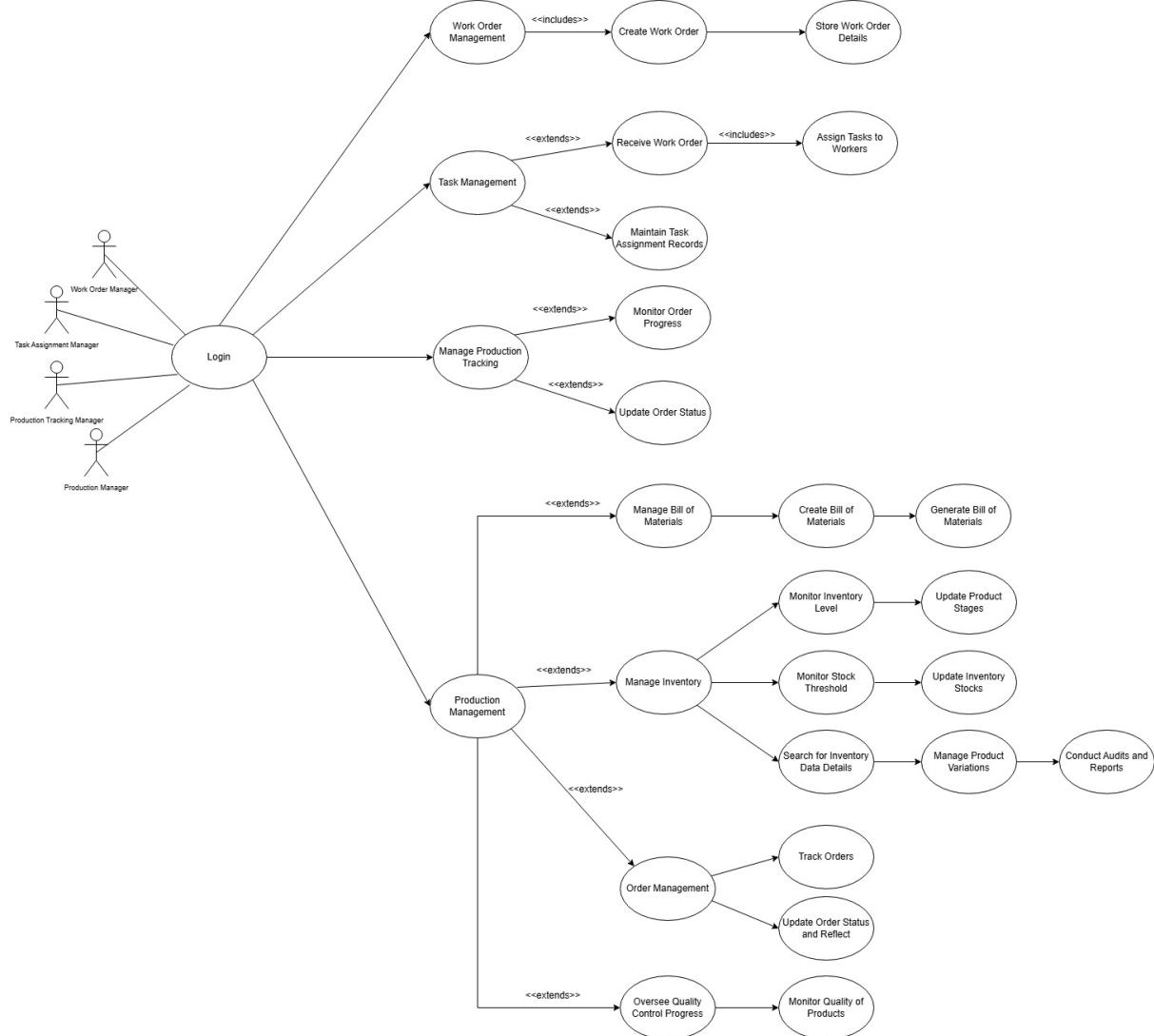
- **Design Functionality**

- Easy navigation even for individual who have little to no knowledge on computers
- Panels are labeled accordingly

- **Scalability**

- The system caters to a wide number of employees and can possibly cater to more in the future.

Use Case Diagrams and Descriptions



Descriptions

Actors

1. **Production Manager:** Oversees the entire production process for quality and efficiency.
2. **Work Order Manager:** Manages the creation and storage of work orders

3. **Task Assignment Manager:** Handles production-making assignment records.
4. **Production Tracking Manager –** Monitors production progress and updates order statuses.

Main Use Cases and Functionalities

1. Production Manager

- User Login: Allows the Production Manager to log in using a username and password.

A. Manage Bill of Materials

- Allows the BOM Manager to Create, View, and Delete BOMs for various products.

B. Manage Inventory

- View and Track Inventory: Provides records of products and stock levels
- Stock Management: Allows stock addition with its quantity.
- Set Stock Threshold: Reflects to the dashboard for the manager to view items with low stock levels by setting thresholds for product statuses.
- Can Search, View Products Catalog, and Search Inventory Products: Enables product search using product_id and product_name.
- Can Manage Product Stocks: Allows adding products with quantity specifications.
- Maintain Product Records: Enables adding and maintaining product details in a table by supporting data entry.
- Track Production Allocation: Allows tracking of production allocations per production cycle to prevent shortages or overstocking.

C. Oversee Quality Control Progress

- User Login: Grants access to quality control features.

- Schedule Inspections: Allows scheduling of product inspections.
- Track Ongoing Inspections: Displays the status of inspections.
- Log Quality Issues: Records details of product Quality Issues.
- Prioritize Defective Products: Tracks specific quality issues for prioritization.

D. Manage Orders

- Able to track the orders
- Update the Order details
- Reflect the Order Quantity to Inventory

2. Work Order Manager

- User Login: Enables authentication for work order management.
- Create Work Order: Generates a new work order.
- Store Work Order Details: Saves order information for tracking and management.

3. Task Manager

- User Login: Input needed details for login.
- Receive Work Order: Accepts and processes work orders.
- Assign Tasks to Workers: Distributes tasks among production workers.
- Maintain Task Assignment Records: Keeps logs of assigned tasks and modifications.

4. Manage Production Tracking

- User Login: Allows access to Order Tracking
- Monitor Order Progress: Tracks real-time production stages.
- Update Order Status: Modifies order statuses based on progress.

Overall System Flow

1. Work Order Creation is handled by the Work Order Manager who creates and stores a work order.

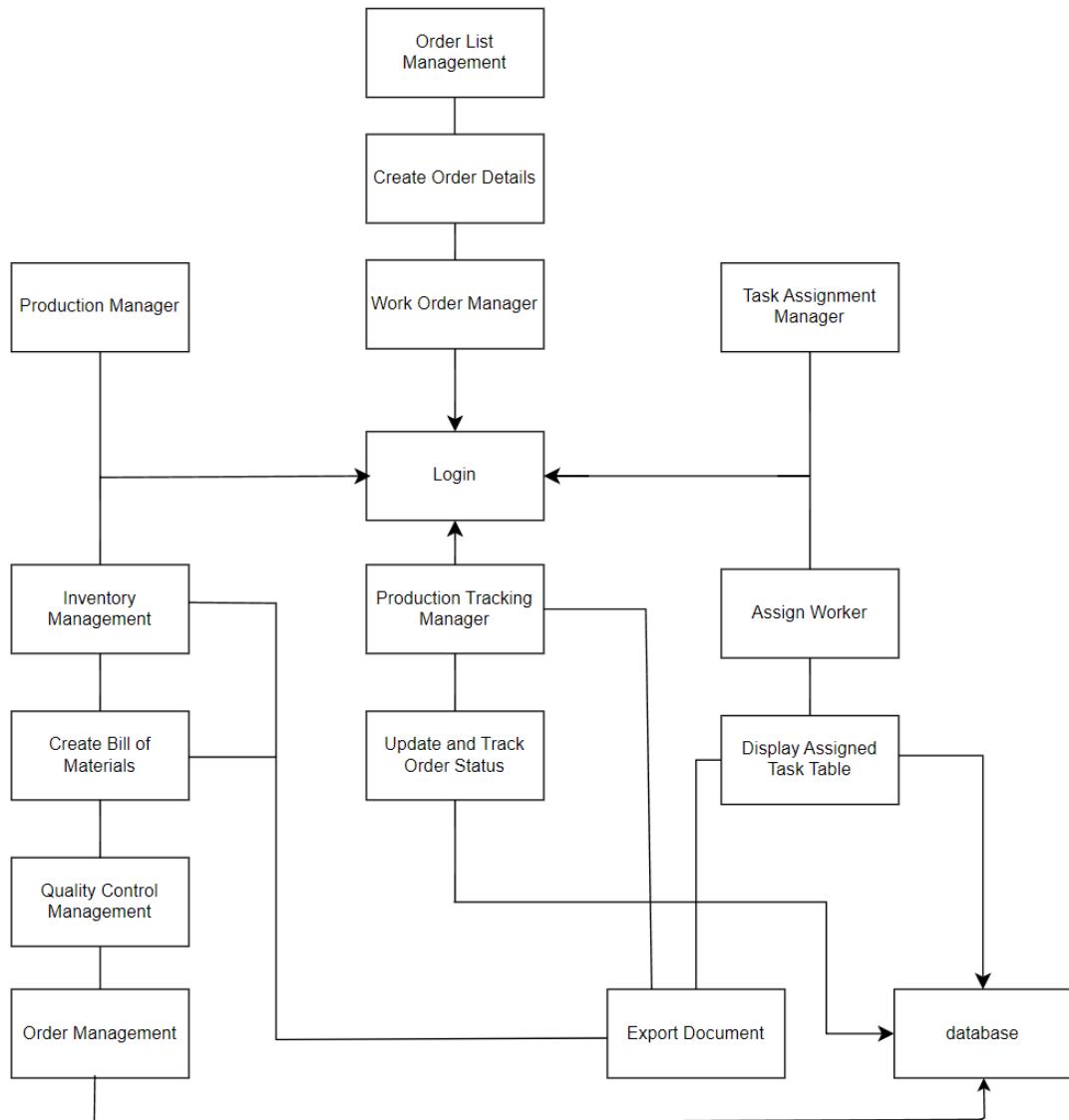
2. Task Assignment Manager receives the work order, assigns tasks to workers, and logs assignments.
3. Production Tracking Manager monitors progress and updates order status.
4. The Production Management focuses on a lot of work. It creates the correct Bill of Materials (BoM). Inventory levels are also monitored, and stock updates occur. Lastly, quality control is enforced to meet product standards.
5. Once production is complete, reports and audits are generated.

System Design

Vision Statement

FOR the New Era Cap Philippines SM Grand Central Branch **WHO** needs an efficient, organized, and user-friendly software platform. **THE** NECPH is an Inventory System **THAT** processes the materials, inventory, and tracking of the product in real-time updates for easier exchange of communication and information transmission to maximize the time efficiency of the physical and digital inventory. **UNLIKE** traditional book-based record-keeping and scattered communication methods, **OUR PRODUCT** provides an efficient, user-friendly, and less cost of materials for maximization of the products and system.

Architectural Design



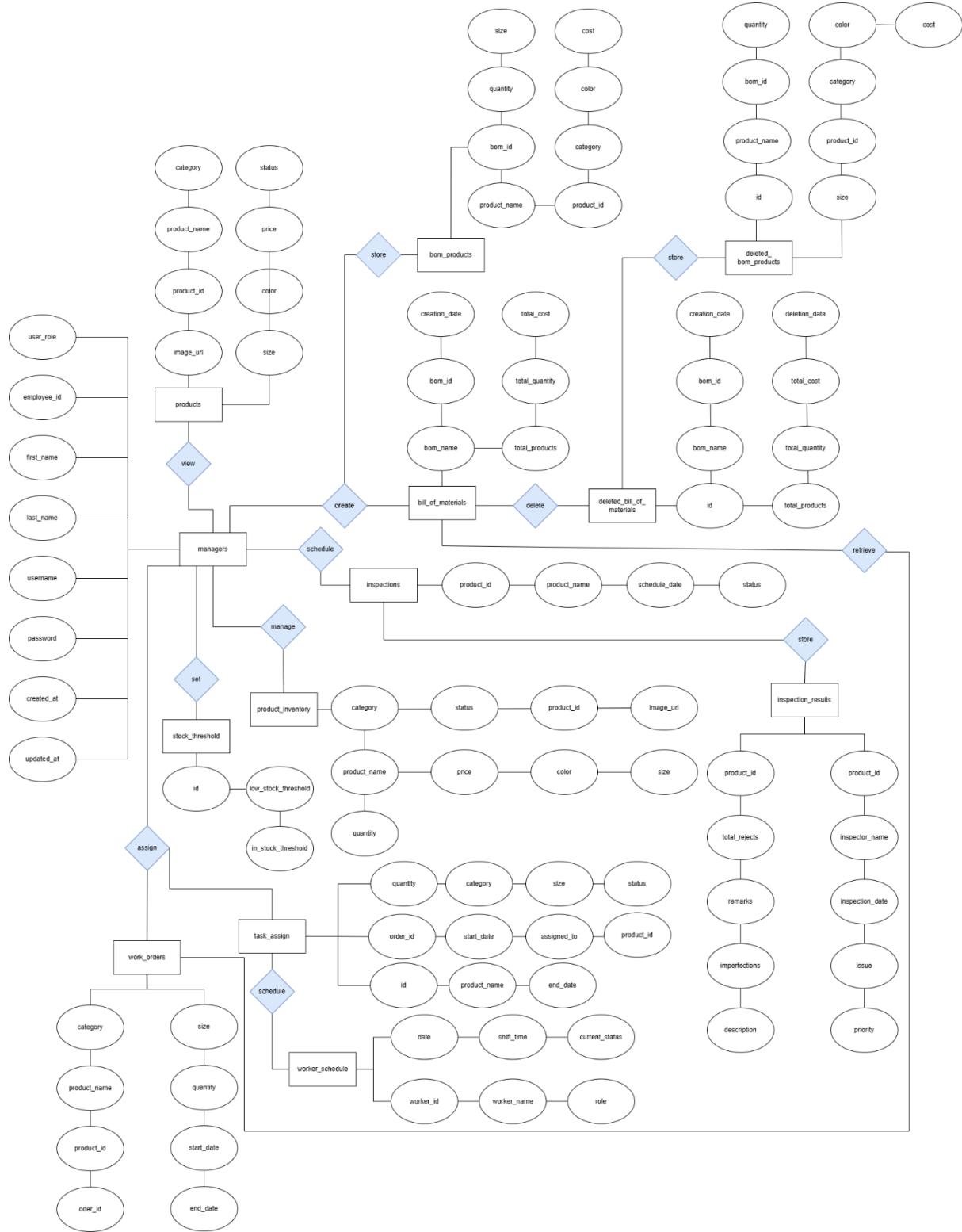
Design Patterns Applied

Our New Era Manufacturing Management System (MMS) follows the Model-View-Controller (MVC) architecture, ensuring a structured separation of concerns between the Model (MySQL database for data management), View (HTML, CSS, JavaScript for the user interface), and Controller (PHP for business logic and request handling). To enhance the system performance and maintainability, various design patterns are applied. When Improving efficiency and resource management, we implemented the Singleton Pattern for database connections to ensure that only a single instance of the connection is used throughout the application. For utilization, the create work orders, employee records, and inventory items, we used the Factory Pattern to reduce redundancy and promote scalability.

The Observer Pattern is applied in the inventory and work order modules, allowing real-time notifications when changes occur, such as stock updates affecting the production schedule. Additionally, the Strategy Pattern is integrated into work order processing and quality control, enabling dynamic selection of strategies based on production requirements.

Lastly, the Repository Pattern is used to centralize database queries, making data access more organized and reusable. The system enhances efficiency, maintainability, and scalability by incorporating these design patterns, ensuring seamless manufacturing management operations.

Entity-Relationship Diagrams (ERD)



User Interface Mockups

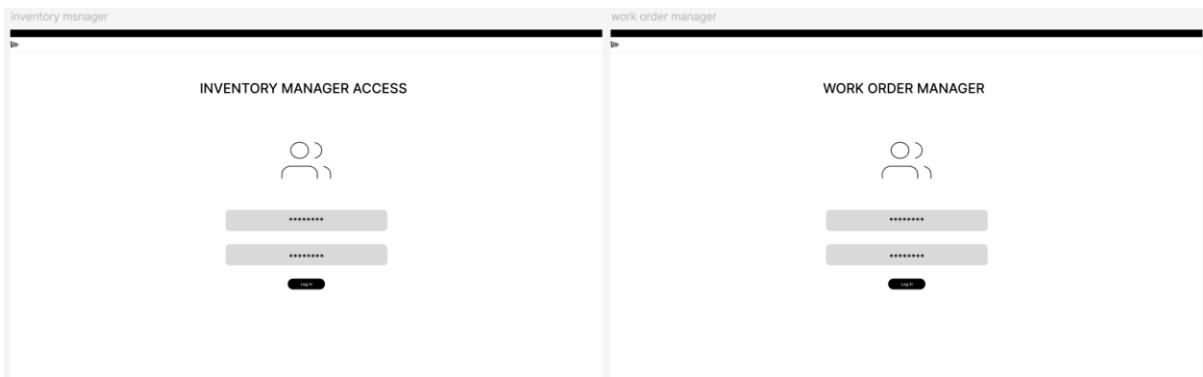


Figure 1. Inventory Manager and Work Order Manager Login Interface Mockups.

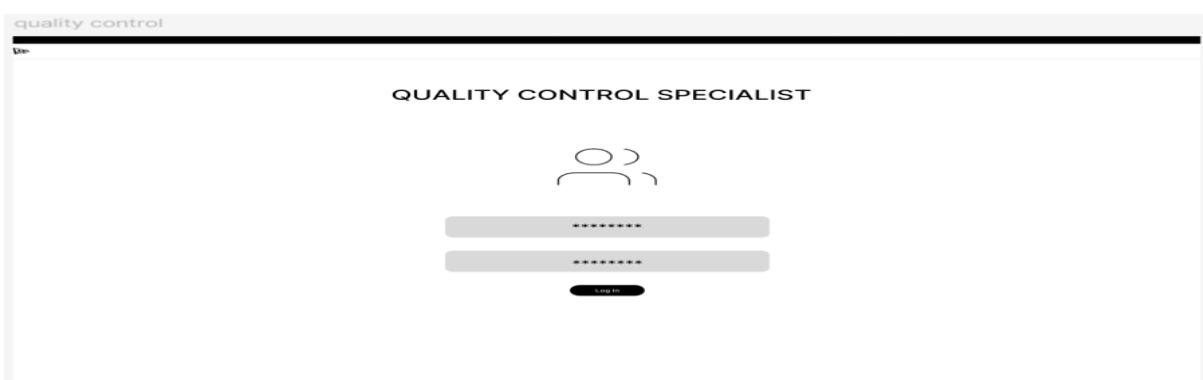


Figure 2. Quality Control Specialist Login Interface Mockups.

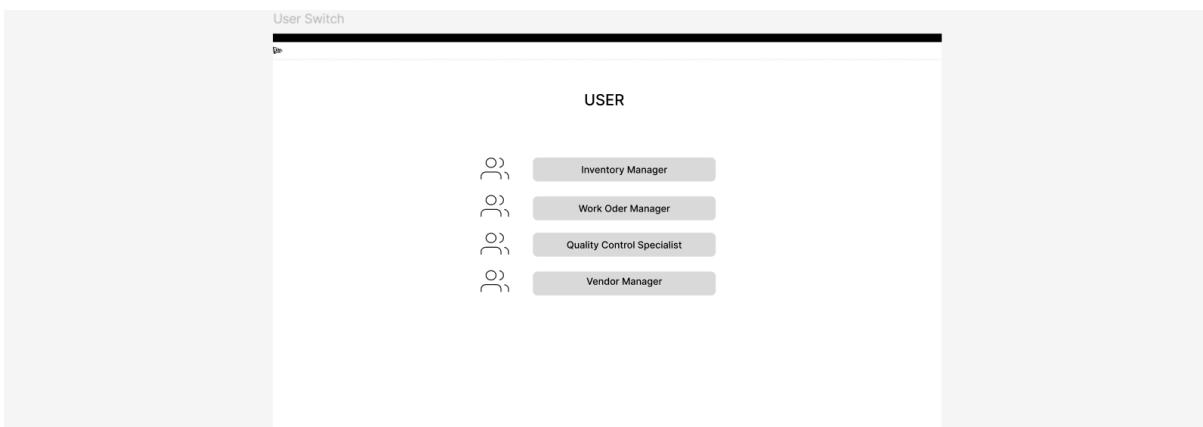


Figure 3. User Switch Login Interface Mockups.

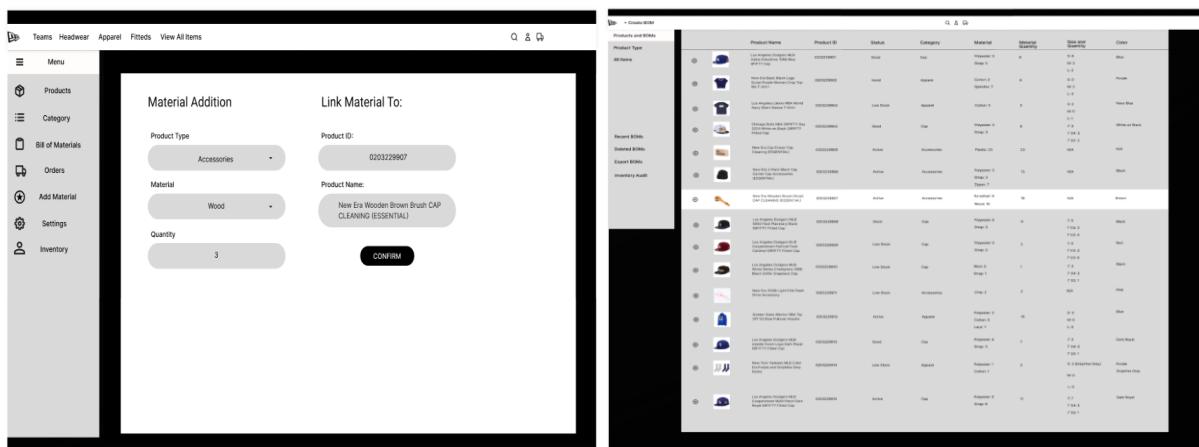


Figure 4. Production Management Mockups.

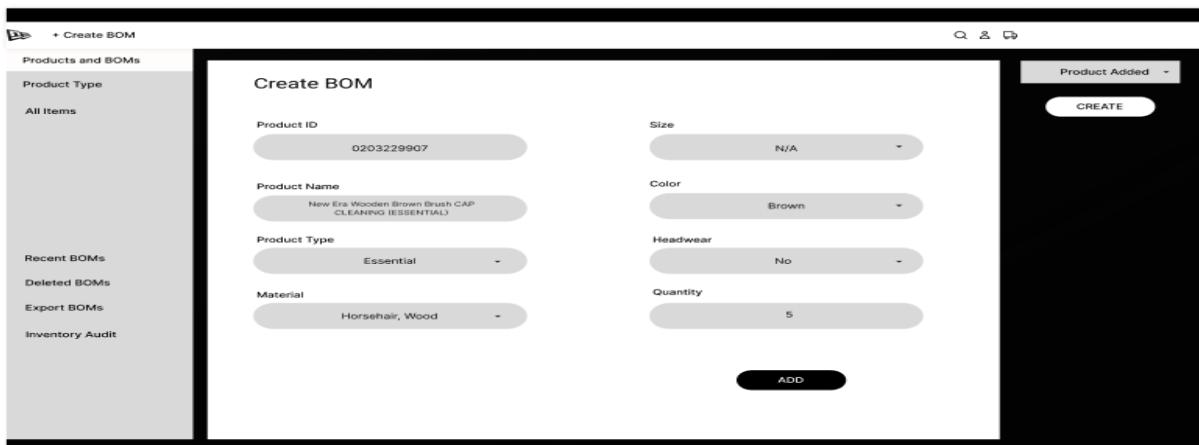


Figure 5. Bill of Materials (BOM) – Create Mockups.

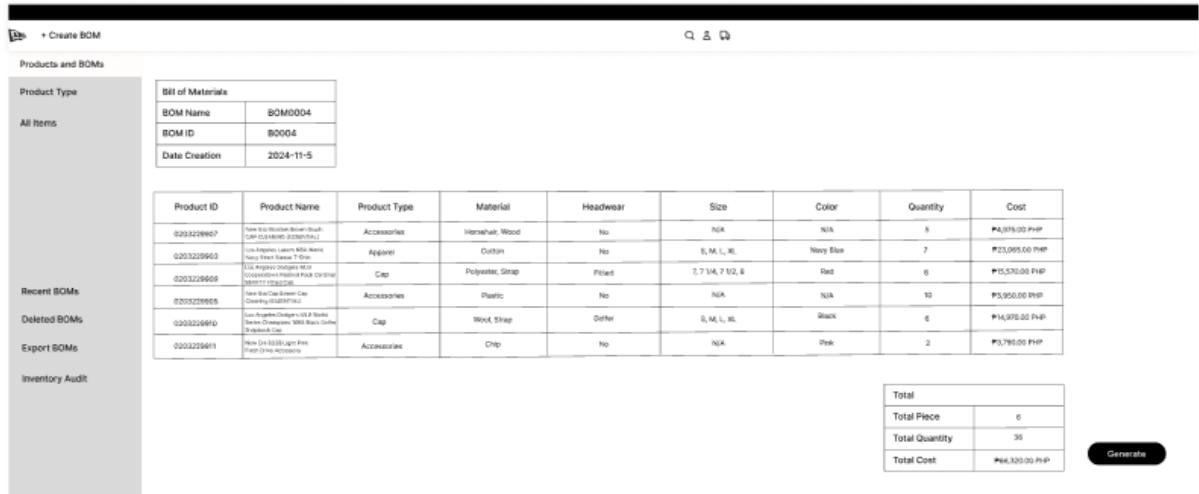


Figure 6. Bill of Materials (BOM) – Generate Mockups.

Bill of Materials								
BOM Name	BOM0003	BOM ID	B0003	Date Creation	2024-10-20			
Product ID	Product Name	Product Type	Material	Headwear	Size	Color	Quantity	Cost
0203329907	New Era Medium Brown Knit Cap	Accessories	Horsehair, Wood	No	N/A	N/A	5	₱6,975.00 PHP
0203329903	New Era Los Angeles Black Wordmark Tee	Apparel	Cotton	No	S, M, L, XL	Navy Blue	7	₱23,065.00 PHP
0203329909	New Era Los Angeles Design MIL Tee	Apparel	Polyester, Striped	Fitted	7, 7 1/4, 7 1/2	Red	6	₱15,570.00 PHP
0203329905	New Era Cap-Drawer Cap	Accessories	Plastic	No	N/A	N/A	5	₱1,975.00 PHP
0203329910	New Era Los Angeles Design MIL Wordmark Tee	Apparel	Wood, Striped	Golfier	S, M, L, XL	Black	6	₱14,970.00 PHP
0203329911	New Era 3200 Light Pink Horsehair Accessories	Accessories	Chip	No	N/A	Pink	2	₱3,790.00 PHP

Total	
Total Piece	0
Total Quantity	36
Total Cost	₱64,345.00 PHP

[Export as PDF](#)
[Export as Excel](#)

Figure 7. Bill of Materials (BOM) – Recent View Mockups.

Products and BOMs		
Product Type	Deleted Bill of Materials	
Category		
BOM Name	BOM ID	Date Creation
BOM0011	B0011	2024-5-30
Recent BOMs		
Deleted BOMs		
Export BOMs		
Inventory Audit		

Figure 8. Bill of Materials (BOM) – Delete Mockups.

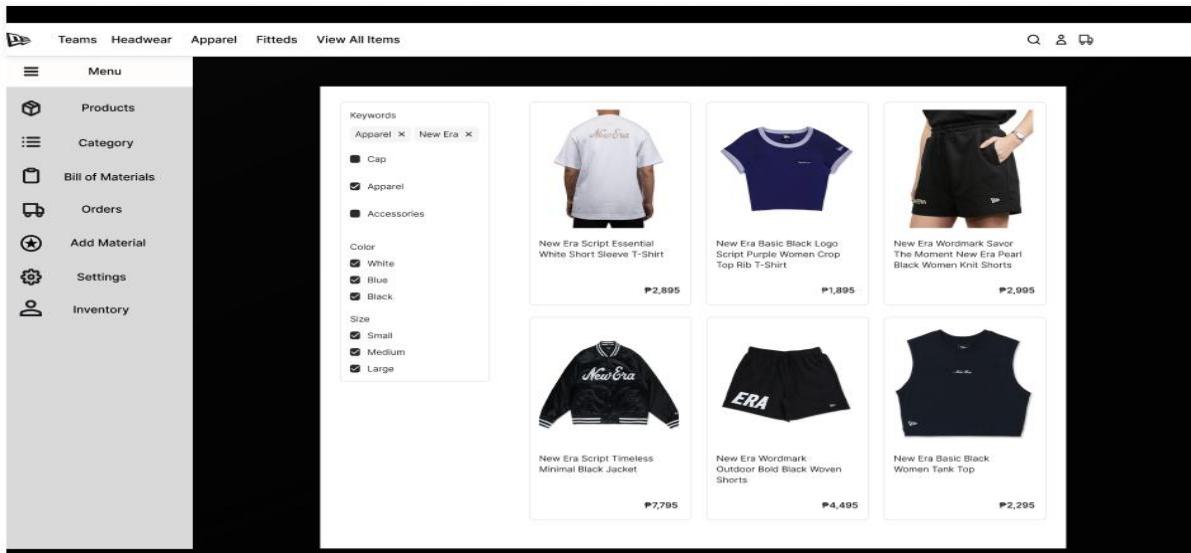


Figure 9. Inventory Management (IM) – Search Mockups.

Figure 10. Inventory Management (IM) – Stock Reflect Mockups.

Product Name	Product ID	Status	Category	Quantity
Los Angeles Dodgers MLB Alpine Winterized 100% Blue SWEATY Cap	0203229901	Active	Cap	11
New Era Basic Black Logo Sergeant Women Crop Top RIB T-Shirt	0203229902	Good	Apparel	10
Los Angeles Lakers NBA World Navy Short Sleeve T-Shirt	0203229903	Low Stock	Apparel	3
Chicago Bulls NBA SWIFTY Day 2024 Edition on Black SWEATY Fitted Cap	0203229904	Good	Cap	8
New Era Cap Fitted Cap Cleaning (ESSENTIAL)	0203229905	Active	Accessories	23
New Era 2-Pack Black Cap Cotton Jersey Accessories ESSENTIAL	0203229906	Low Stock	Accessories	5
New Era Wooden Brown Brush Cap CLEANING (ESSENTIAL)	0203229907	Good	Accessories	10
Los Angeles Dodgers MLB 2024 Edition on Black SWEATY Fitted Cap	0203229908	Good	Cap	7
Los Angeles Dodgers MLB Copperstown Festival Pack; Copperstown Fitted Cap	0203229909	Low Stock	Cap	2
Los Angeles Dodgers M.L. World Series Champions 1988 Black Short-Sleeve Fitted Cap	0203229910	Good	Cap	6
New Era 32GB Light Pink Flash Drive Accessory	0203229911	Good	Accessories	9
Golden State Warriors NBA Tip Off '23 Blue Pullover Hoodie	0203229912	Low Stock	Apparel	9
Los Angeles Dodgers MLB Update Down Logo Dark Royal SWEATY Fitted Cap	0203229913	Low Stock	Cap	4
New York Yankees MLB Color Serie Purple and Graphite Gray Socks	0203229914	Good	Apparel	8
Los Angeles Dodgers MLB Copperstown Multi Patch Dark Royal SWEATY Fitted Cap	0203229915	Active	Cap	13

Figure 11. Inventory Management (IM) – Low Stock Mockups.

Product Name	Product ID	Status	Category	Material	Materials Quantity	Size and Color Quantity	Color
Los Angeles Dodgers MLB Alpine Winterized 100% Blue SWEATY Cap	0203229901	Good	Cap	Polyester: 3 Shirt: 3	8	S: 0 M: 3 L: 3	Blue
New Era Basic Black Logo Sergeant Women Crop Top RIB T-Shirt	0203229902	Good	Apparel	Cotton: 2 Spandex: 7	9	S: 1 M: 2 L: 3	Purple
Los Angeles Lakers NBA World Navy Short Sleeve T-Shirt	0203229903	Low Stock	Apparel	Cotton: 5	4	M: 2 L: 1	
Chicago Bulls NBA SWIFTY Day 2024 Edition on Black SWEATY Fitted Cap	0203229904	Good	Cap	Polyester: 3 Shirt: 3	8	M: 3 L: 3 XL: 2	White on Black
New Era Cap Fitted Cap Cleaning (ESSENTIAL)	0203229905	Active	Accessories	Polyester: 15	15	XS: 1 S: 1 M: 1	NAK
New Era 2-Pack Black Cap Cotton Jersey Accessories ESSENTIAL	0203229906	Active	Accessories	Polyester: 3 Glove: 3 Poplin: 7	13	NAK	Black
New Era Wooden Brown Brush Cap CLEANING (ESSENTIAL)	0203229907	Active	Accessories	Hemp/Hemp: 9 Wood: 10	19	NAK	Brown
Los Angeles Dodgers MLB Slate Blue Short-Sleeve Fitted SWEATY Fitted Cap	0203229908	Good	Cap	Polyester: 6 Shirt: 3	9	M: 2 L: 1 XL: 2	Black
Los Angeles Dodgers MLB Copperstown Multi Patch Dark Royal SWEATY Fitted Cap	0203229909	Low Stock	Cap	Polyester: 10 Shirt: 4	14	M: 4 L: 4 XL: 2	NAK
New Era 32GB Light Pink Flash Drive Accessory	0203229910	Low Stock	Accessories	Glove: 2	2	NAK	Pink
Golden State Warriors NBA Tip Off '23 Blue Pullover Hoodie	0203229911	Active	Apparel	Polyester: 13 Shirt: 5	18	M: 6 L: 6	Blue
Los Angeles Dodgers MLB Update Down Logo Dark Royal SWEATY Fitted Cap	0203229912	Good	Cap	Polyester: 4 Shirt: 3	7	2: 3 2: 2 L: 2	Dark Royal
New York Yankees MLB Color Serie Purple and Graphite Gray Socks	0203229913	Low Stock	Apparel	Polyester: 1 Glove: 1	2	S: 1 M: 1 L: 1	Graphite Gray Graphite Gray
Los Angeles Dodgers MLB Copperstown Multi Patch Dark Royal SWEATY Fitted Cap	0203229914	Active	Cap	Polyester: 16 Shirt: 6	21	M: 7 L: 5 XL: 3	Dark Royal

Figure 12. Work Order Management – Message and Notification Mockups.

Material Shortage: Cap Materials

We have been informed that our supplier of materials needed for the Summer Cap will arrive later than expected. Please adjust production schedules.

Material Shortage: Cap Materials

Material Shortage: Cap Materials

Production Delay: Caps

Supply Disruption: Shift

Los Angeles Dodgers

Figure 13. Work Order Management – Add and List Mockups.

Figure 14. Work Order Management – Edit and Details Mockups.

Figure 15. Task and Resource Management – Assignment and Employee Status Mockups.

Figure 16. Task and Resource Management – Track and Employee Records Mockups.

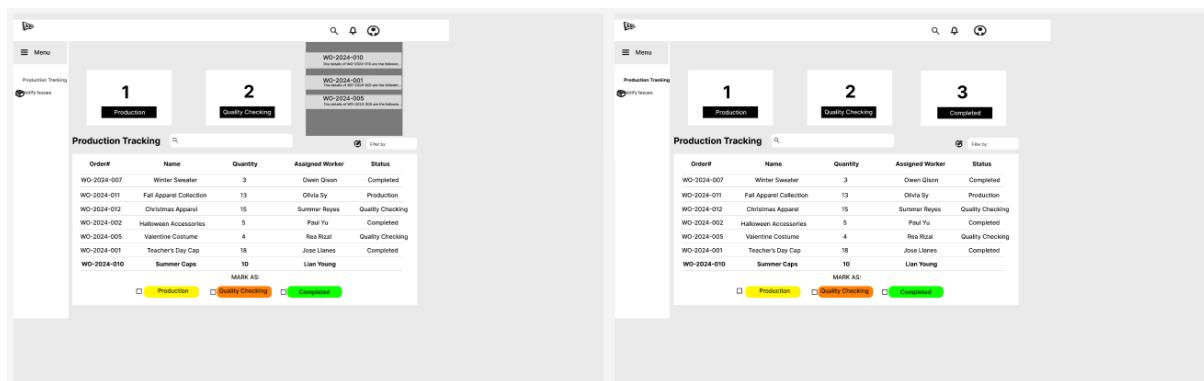


Figure 17. Production Tracking – Notification Mockups.

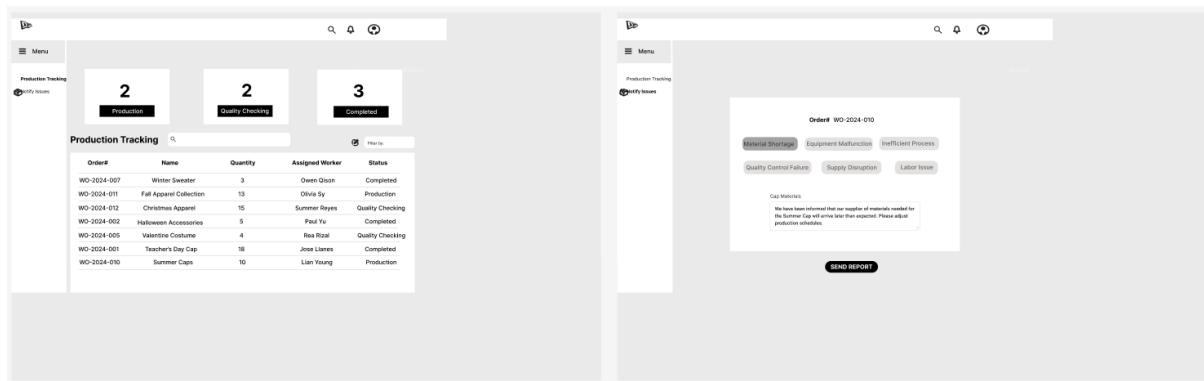


Figure 18. Production Tracking – Tracking Details and Report Mockups.

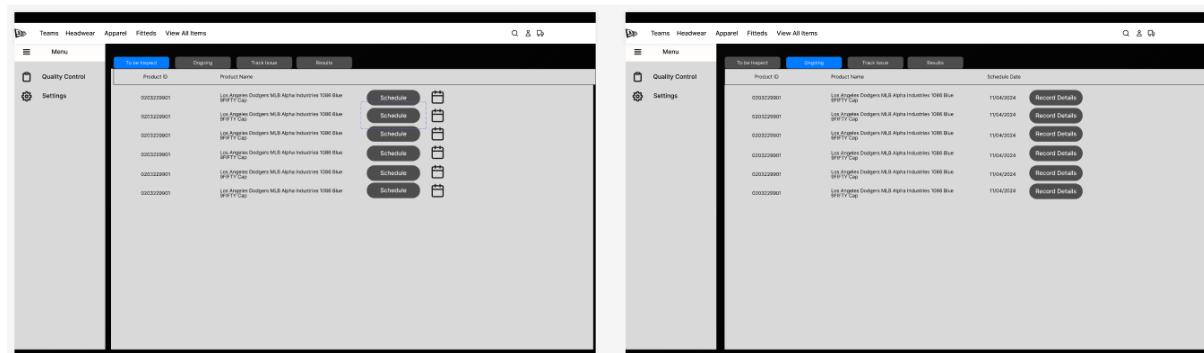


Figure 19. Quality Check Control – Schedule Inspection and Record Details Mockups.

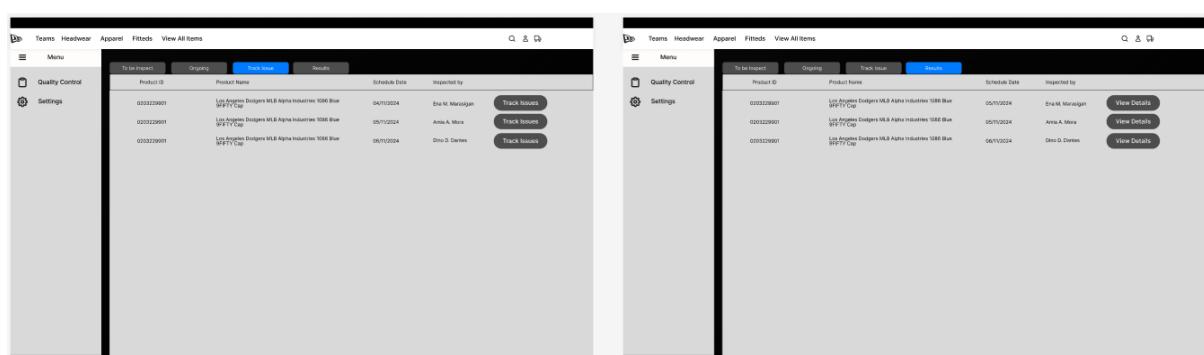


Figure 20. Quality Check Control – Track Issue and View Results Mockups.

Project Management

Agile Practices and Sprint Planning

Throughout the project life cycle and continuous improvement, New Era Manufacturing Management System (MMS) follows an Agile development approach to ensure flexibility and adaptability. Our team utilizes Scrum methodology to break down development into multiple sprints, each focusing on key system functionalities while incorporating feedback from stakeholders.

Agile Practices Applied:

1. Iterative Development – The system is developed in phases, allowing incremental improvements to core functionalities such as production management, inventory tracking, work order management, employee monitoring, and quality control.
2. Daily Stand-ups – Weekly progress and communication ensure team alignment, and updates on system modules.
3. Continuous Integration and Testing – Each sprint includes system testing, unit testing to ensure stability before new features are deployed.
4. Backlog Prioritization – High-priority tasks, such as inventory tracking and work order management, are developed first to align with the store's operational needs.

Sprint Planning

This project is divided into multiple sprints, each lasting two to three weeks with a clear set of deliverables:

Sprint 1 – System architecture setup, database design, and initial development of user authentication and role management.

Sprint 2 – Implementation of inventory tracking and work order management, ensuring seamless interaction between the two.

Sprint 3 – Development of production tracking and quality control, allowing real-time updates on manufacturing progress.

Sprint 4 – Integration of employee monitoring features, optimizing staff workload tracking and performance assessment.

Sprint 5 – System testing, bug fixes, and UI refinements for responsiveness and usability before final deployment.

Following this Agile approach, our team ensures that the MMS is efficient, scalable, and aligned with the needs of New Era Cap Philippines, SM Grand Central Branch, delivering a robust and well-structured manufacturing management system.

Project Timeline

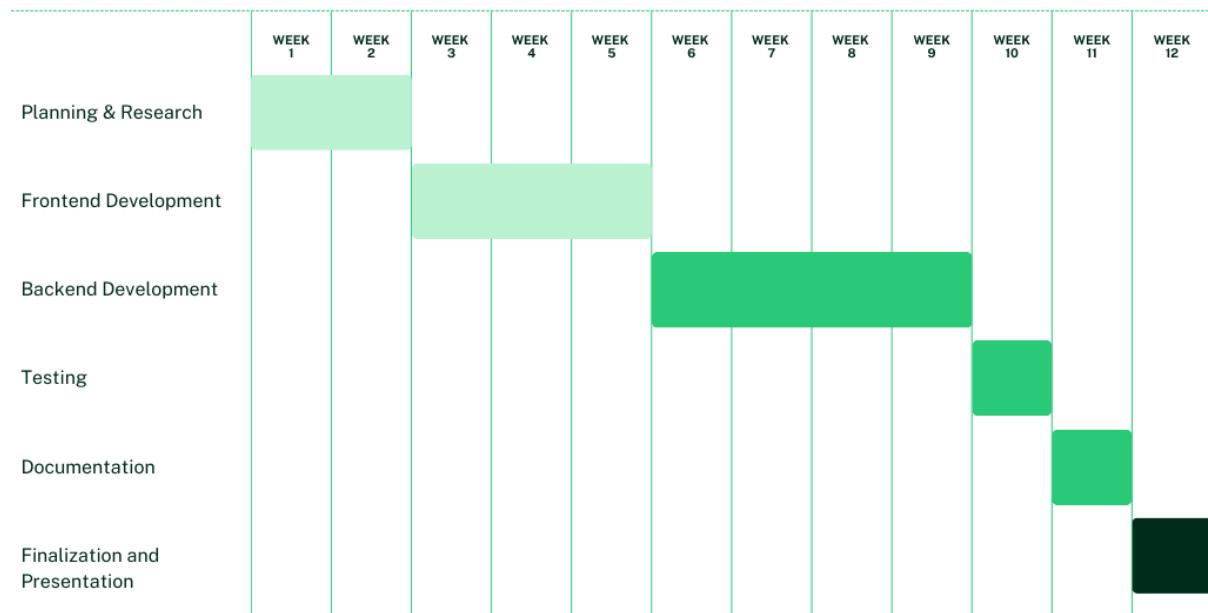


Figure 22. Project Timeline for New Era Cap Manufacturing Management System.

Development Process

Coding Standards and Best Practices

To ensure the maintainability, readability, and efficiency of the New Era Manufacturing Management System (MMS), we adhered to the following coding standards and best practices:

- In code Readability and Formatting, we used consistent indentation, followed PSR-12 coding standards for PHP, used meaningful variable and function names (e.g., \$productList, fetchInventoryData()).
- Separation of Concerns (Modular Approach), Frontend (HTML, CSS) handles the user interface and interactions. For the Backend (PHP & MySQL) manages the data processing, logic, and database interactions.
- Security Best Practices, input validation and sanitization to prevent SQL injection. Password hashing using password_hash() before storing in the database. And lastly, session management to prevent unauthorized access.
- Database Optimization, we used indexed queries to speed up data retrieval and implemented foreign key constraints for relational integrity.
- Responsive Design & User Experience used CSS Flexbox & Grid for flexible layouts. Ensured mobile responsiveness using media queries and applied JavaScript event listeners for dynamic UI updates.
- Version Control used Git for tracking code changes and collaboration.

Tools and Technologies Used

- **Frontend** – HTML, CSS, Figma
- **Backend** – PHP (8.2), JavaScript
- **Database** – MySQL (MariaDB)
- **Local Server** – XAMPP
- **Development and Debugging** – phpMyAdmin, Browser Developer Tools
- **Testing and Deployment** – Manual Testing, Local Server Testing

Implementation Details

The system was developed in multiple phases using an incremental approach, ensuring that each feature was tested and integrated before moving to the next stage.

1. Database Setup (MySQL)

- Created database for information_schema, inventory_management, mysql, performance_schema, and phpmyadmin.
- Used foreign keys to maintain relationships between tables of each database.
- Implemented CRUD operations for managing inventory and quality control.

2. Backend Development (PHP & MySQL)

- Developed API endpoints in PHP for adding, updating, and retrieving data.
- Used AJAX (JavaScript + PHP) for seamless real-time updates without page reloads.
- Implemented session-based authentication for user access control.

3. Frontend Development (HTML, CSS, JavaScript)

- Designed a clean, user-friendly interface using CSS
- Implemented JavaScript event listeners for actions like scheduling, modifying status, and navigating pages.

4. Testing and Debugging

- Verified form validation to prevent incorrect data entry
- Ensure database queries execute correctly and return expected results
- Created a debug.log file where it notifies the members if the input is sent and stored to the database correctly.
- Conducted manual testing using XAMPP and phpMyAdmin
- Debugging JavaScript interactions and UI responsiveness using browser developer tools.

Testing

Test Case Documentation

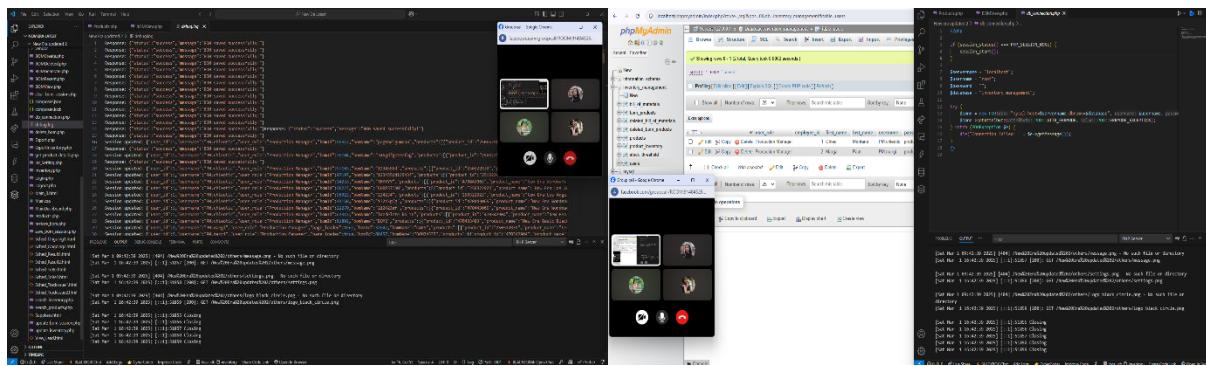
The screenshot shows a desktop environment with multiple windows open. On the left is a code editor displaying a script with various commands and logic. In the center is a video conference interface with a 'Log in' screen. To the right is a file explorer window titled 'pipMyAdmin' showing a tree view of files and subfolders. A small video preview window is visible in the bottom right corner.

This screenshot displays the 'Inventory Management' system. It features a central 'Product Catalog' section with a grid of items, each with a thumbnail, name, and details like 'Out of Stock Items' (2), 'Low Stock Items' (5), 'Total Products in Inventory' (14), and 'Total Stock Quantity' (115). Below this are sections for 'Stock Alerts' and a 'Local Stock Check'. The left sidebar includes links for Dashboard, Inventory, Bills of Materials, and Settings.

This screenshot shows the 'Bill of Materials' section of the inventory management system. It lists components with their BOM ID, Item ID, Date Entered, and Action. To the right, a 'Set Stock Threshold' dialog box is open, allowing users to set minimum and maximum quantities for specific products.

This screenshot shows the 'Add Work Order' section. It includes a table for 'Order Name', 'Size', 'Materials', and fields for 'Item Name', 'Quantity', 'Item ID', 'Start Date', 'End Date', and 'Item Color'. To the left, a list of existing work orders is shown, and the left sidebar contains links for Dashboard, Inventory, Bills of Materials, and Settings.

This screenshot shows the 'To Be Inspected' list on the left, which includes items like 'Levi's Denim Jeans' and 'Levi's Denim Jeans'. On the right, a 'Work Order' dialog box is open, prompting the user to enter details such as 'Order Name', 'Size', 'Materials', 'Item Name', 'Quantity', 'Item ID', 'Start Date', 'End Date', and 'Item Color'.



Results of Test Execution

The system was tested for core functionalities, including product management, inventory updates, and manufacturing workflow. Below are the results of key test cases.

Test Description	Expected Result	Actual Result	Status
User Login with Valid Credentials	User is redirected to respective pages	Passed	✓ Pass
User Login with Invalid Credentials	Error message displayed	Passed	✓ Pass
Add New Product to Inventory	Product is stored in the database	Passed	✓ Pass
Update Item Stock in Inventory	Stock quantity is updated in the database	Passed	✓ Pass
Increase Product Quantity via Plus Button	Quantity updates in real-time	Passed	✓ Pass
Export Current Inventory Audit	Produce Generated Audit PDF File	Passed	✓ Pass
Generate Bill of Materials	Store Bill of Materials in the database connected to it	Passed	✓ Pass
View, Export, and Delete Bill of Materials	View the generated BOM, be able to export the BOM, and delete the BOM	Passed	✓ Pass
Delete and Restore Bill of Materials	Store the deleted BOM to the database and be able to retrieve it	Passed	✓ Pass
Configure Stock Threshold	Reflect the quantity threshold to the Inventory and database	Passed	✓ Pass

Search and Filters	Show verified products and inputs and filter base on the search inputs	Passed	<input checked="" type="checkbox"/> Pass
Quality Control Inspection	Add products to be inspected using Product ID and Product Name	Passed	<input checked="" type="checkbox"/> Pass
Schedule an Inspection	Schedule and pass to Ongoing for product quality issues	Passed	<input checked="" type="checkbox"/> Pass
Generate Product Quality Issues	Record issues per products that will be stored in the database for assessing.	Passed	<input checked="" type="checkbox"/> Pass
Final Inspection Status	Show Results and Priority Status of each product	Passed	<input checked="" type="checkbox"/> Pass

User Guide for the System

1. Logging in

- Login with Valid Credentials
- Ensure user role is correct
- Check the user icon for credential verification

2. Production Manager Functions

- Review the dashboard and make decisions
- Use the search and function filter for faster data retrieval
- Click Products to View all the Company Products
- Go to Inventory to Update Item Stocks and edit its quantity
- Create Bill of Materials for product request
- View, Export, and Delete Bill of Materials
- View, Update, and Reflect Orders
- Click Settings for setting stock quantity threshold
- Click the user icon for logging out

3. Quality Control

- Add products that need inspection in To Be Inspect
- Schedule an inspection and move to Ongoing
- View Products currently under inspection
- Perform necessary checks
- If an issue is found, record product quality issues
- If fixed, move products to Results
- View final inspection status
- Choose priority (Low, Medium, High)

4. Work Order Manager

- Log in using credentials
- Go to Add Work Order to create work order
- Fill the Product ID and other details will show
- Select quantity
- Click “Save” to store the details in List of Work Orders
- Navigate to List of Work Orders to see created work orders
- Use the Search bar to find specific order or product category
- Click Edit to update details such as quantity

5. Task Assignment Manager

- Navigate to Task Assignment
- Select Pending button to see created work orders
- Click Assign button and choose an available worker to assign
- Confirm assignment to finalize
- Go to Assigned button to view work orders that are assigned
- Use the Search bar to filter specific order id, date or other details

6. Production Tracking Manager

- Navigate to Production Tracking
- Go to Near Due to track nearing due work orders

- Go to All Products to see all products with their status
- Select an order and update its status
- Production: if ongoing work
- Completed: if work is finished

Conclusion

Summary of Project Outcomes

The New Era Manufacturing Management System (MMS) was successfully developed to streamline production management, inventory tracking, work order management, employee monitoring, and quality control for New Era Cap Philippines SM Grand Central Branch. By integrating Agile practices, the MVC architecture, and design patterns, the system ensures a structured, efficient, and scalable approach to manufacturing operations. The system effectively improves inventory accuracy, production workflow visibility, and employee task monitoring, reducing manual errors and inefficiencies. Additionally, database integration and system responsiveness were optimized to ensure seamless interaction across all modules. While the system meets the core requirements, further enhancements —such as mobile support, predictive analytics for inventory, and AI-driven quality control—could significantly improve functionality and scalability.

To conclude, the New Era Manufacturing Management System (MMS) project offers a more structured, automated, and illustrative approach to production management. With continuous improvements and technological advancements, the system has the potential to scale across multiple branches and set a benchmark for manufacturing efficiency in the retail industry.

Challenges Faced and Lessons Learned

Members	Lesson Learned	Challenges Faced
Montaño, Chleo Nicole C.	<p>Developing the Inventory and Management System gave me a valuable insight on how important efficiency is when it comes to handling large records and data. One of my key takeaways was the importance of a well-structured database management system which played a crucial role in ensuring smooth data retrieval and updates. Dynamic inventory management greatly improved accuracy by allowing real-time stock updates, reducing manual errors and discrepancies. Developing a user-friendly interface significantly enhances the navigation of the desired user workflow efficiency, making product, stock management, and BOM management more intuitive for the users. Additionally, while working on this project, I learned a lot of PHP scripts, how it works, and how it collects and transfers the data into a database. Through testing also proved to be essential, as it helped identify performance bottlenecks, bugs, and system vulnerabilities. Overall, I have learned to be patient, analyze, and apply all my learnings into this project as it enhances my resourcefulness greatly.</p>	<p>Despite the successful implementation, several challenges were encountered throughout the development process. A major challenge that really stressed me out was the data synchronization with multiple database tables and php files. Special mention to the Bill of Materials and BOM product database table. Implementing queries carefully to optimize the real-time updates was challenging also. Managing concurrency in BOM and stock updates was another, as the system was made for multiple users which led to conflict and confusion with myself. The error handling and system validation posed difficulties, as the system needed to prevent invalid entries.</p> <p>By addressing these challenges, the system was successfully optimized for accuracy, usability, and scalability, making it a dependable tool for managing inventory and manufacturing operations. The lessons learned from this project will be invaluable for future system development and optimization efforts. This project was full of challenges indeed.</p>
Dela Cruz, Beatriz	This project has been a valuable learning experience, especially in backend development, where I improved my skills in database management, authentication, and system	Throughout the project, several challenges emerged, particularly in time management, communication, and technical setup. Balancing multiple development tasks

	<p>logic. As the designer, translating the system into functional code deepened my understanding of both front-end and back-end development while enhancing my problem-solving abilities. Beyond technical growth, I learned the importance of time management, communication, and collaboration in overcoming challenges. Overall, the MMS project provided practical insights and technical skills that will benefit my future software development endeavors.</p>	<p>while meeting deadlines required better prioritization and scheduling. Additionally, ensuring effective communication across backend development, database integration, and UI implementation was crucial but sometimes led to delays due to misalignment in requirements. Another major challenge was implementing PHP on my computer, which caused setbacks in development and troubleshooting. Overcoming these issues required adaptability and problem-solving, reinforcing the importance of proper planning, collaboration, and technical preparedness in system development.</p>
Libunao, Trixia Nicole A.	<p>Starting from Software Engineering 1 with a healthcare system project and transitioning to an inventory and management system has been quite a shift for us. Within a few weeks of analyzing and understanding inventory management, I have gained valuable knowledge throughout the term. Reading past documentation has also helped us grasp the objectives of our project more clearly. Additionally, it has allowed me to figure things out independently by experimenting and testing different codes to improve our system. Documentation plays a vital role in our project, enabling us to track and manage our progress effectively.</p>	<p>During the whole term for working on our tasks, aside from the progress we've made as a team, there are some challenges that we have encountered all throughout the project timeline. Since we divided the tasks to make sure we cover all the project objectives, there are some difficulties on my end like other members. I had to adjust with the environment since it was my first time working on Inventory Management and making some progress in the areas, I wasn't familiar made it somehow bearable to work on. Although, it wasn't my first time using the programming language for our frontend development, I had to work on applying it again along with the backend development to guarantee that we have accomplished our parts and make our work responsive and to align with the objectives.</p>

Paat, Margarete	<p>As we continued our project from last term, I initially thought I would have a hard time with my task because inventory management involves a lot. And it was tough indeed, but along the journey, I learned a lot. It was fulfilling to see our proposed idea come to life. I explored both back-end and front-end work, and we worked as a team. Having someone to lead us helped as well as making us communicate effectively and clarify things during discussions. This project molded me to be more patient, knowing that errors will come, but you should not give up. Rather, you should continue and be content with small progress.</p>	<p>Sharing files while working from home has been challenging. Every now and then, there is an update. Connection is crucial in creating a system—both the connection among team members and the connection of database files. I encountered a challenge where data was not being retrieved, which was frustrating at times.</p> <p>Moreover, a major challenge I faced was when the database was initially working. However, at one point, I lost access to the database, and something went wrong. Nearly giving up, I did the opposite: I created commands for my part and thankfully I remembered what I had done. Issues like these are inevitable, but giving up only makes it worse.</p>
-----------------	--	---

Recommendations for Future Work

For New Era Manufacturing Management System (MMS), we should focus on areas where the system can be improved, expanded, or optimized based on our current implementation.

- System Scalability and Performance Optimization
 - Improve database efficiency by optimizing queries and indexing.
 - Implement caching mechanisms to enhance response time.
 - Scale the system to handle multiple branches of New Era Cap Philippines.
- Advanced Inventory and Production Tracking
 - Introduce predictive analytics for stock forecasting using machine learning.

- Implement real-time inventory tracking with RFID/Barcode scanning integration.
- Enhance Work Order Management
 - Introduce an automated scheduling system for work orders.
 - Optimize the tracking of production stages with Gantt chart visualization.
 - Implement AI-based work order prioritization to enhance efficiency.
- Employee Monitoring and Quality Control Improvements
 - Implement real-time performance dashboards for employees and managers.
 - Enhance the quality control module with automated defect detection using computer vision.
 - Develop a feedback system where employees can report issues or suggest improvements.
- Mobile and Cross-Platform Support
 - Develop a mobile app for on-the-go access to inventory and production tracking.
 - Ensure cross-platform compatibility for better usability on different devices.
- Integration with External Systems
 - Implement API integrations with third-party logistics and accounting software.
 - Connect the system to suppliers for automated order placements.
- Security and Compliance Enhancements
 - Strengthen role-based access control (RBAC) for user permissions.
 - Implement audit logs to track system changes and user activities.
 - Ensure compliance with data protection laws (e.g., GDPR, ISO standards).

- Agile and Continuous Improvement
 - Incorporate CI/CD (Continuous Integration/Continuous Deployment) for faster updates.
 - Conduct periodic user feedback sessions to refine system functionality.
 - Adopt automated testing to ensure system stability across updates.

By recommending this for our future work, it is important for us as well to enhance our knowledge when it comes to producing a better inventory system. This will also be a great tool for us to continue our work and to identify the areas we can grow and improved for further enhancements.

References

Cited Books, Articles, and Online Resources

- Maharjan, A. (2016). Final year Project on Inventory Management System Retrieved from
https://www.academia.edu/26003928/Final_Year_Project_On_Inventory_Management_System_Submitted_By
- Kusiak, A. (2018). Smart manufacturing systems for Industry 4.0: Conceptual framework, scenarios, and future perspectives. ResearchGate. Retrieved from
https://www.researchgate.net/publication/322673524_Smart_manufacturing_systems_for_Industry_40_Conceptual_framework_scenarios_and_future_perspectives
- Sohail, N. (2018). A Study of Inventory Management System Case Study. Retrieved from
https://www.researchgate.net/publication/327793184_A_Study_of_Inventory_Management_System_Case_Stud
- Plinere, Darya & Borisov, Arkady. (2015). Case Study on Inventory Management Improvement. ResearchGate. Retrieved from

https://www.researchgate.net/publication/293193962_Case_Study_on_Inventory_Management_Improvement

Appendices

Appendix A: Meeting Minutes

Program/Area:	New Era Manufacturing Management System (MMS)
Meeting Date:	March 1, 2025
Meeting Time:	4:30 PM
Meeting Location:	Messenger
Attendees:	Montaño, Chleo Dela Cruz, Beatriz Libunao, Nicole Paat, Margarete
Minutes Issued By:	Nicole Libunao
Agenda:	<ul style="list-style-type: none">• System Test Run & Documentation• Task Assignments for Presentation• Finalizing Project Requirements
Discussion Points:	<ul style="list-style-type: none">• System Test Run & Documentation<ul style="list-style-type: none">- The team conducted a test run of the New Era Manufacturing Management System (MMS).- Screenshots were taken to document test cases for the test case documentation.- Issues encountered during testing were noted for final adjustments.• Task Assignments for Presentation<ul style="list-style-type: none">- Each member was assigned specific tasks for the upcoming project presentation.- Responsibilities include preparing slides, explaining system features, and demonstration functionalities.• Finalizing Project Requirements<ul style="list-style-type: none">- The team reviewed all remaining requirements for project completion.- Ensure all necessary documentation and materials are prepared.- Discussed final revisions and minor adjustments before submission.
Action Items:	<ul style="list-style-type: none">• Nicole Libunao – Compiling the minutes of the meeting and organizing documentation.

- Chleo Montaño – Reviewing system functionalities for the presentation.
- Beatriz Dela Cruz – Preparing slides and run testing the system for final presentation.
- Margarete Paat – Assisting in reviewing presentation materials and facilitating system functionalities.

Next Steps:

- Review the final presentation materials before submission and face-to-face presentation.
- Conduct a last review of the system for any remaining fixes.
- Prepare the hard copies of documentation and slides for the final project presentation.

Meeting Adjourned at 5:30 PM

Appendix B: Screenshots

Figure B1. First part of the frontend development.

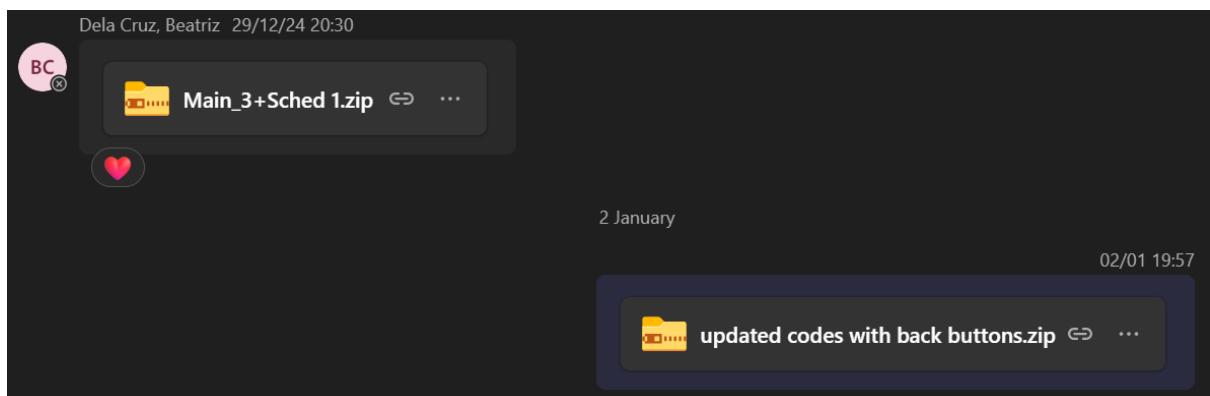


Figure B2. Second part of the frontend development.

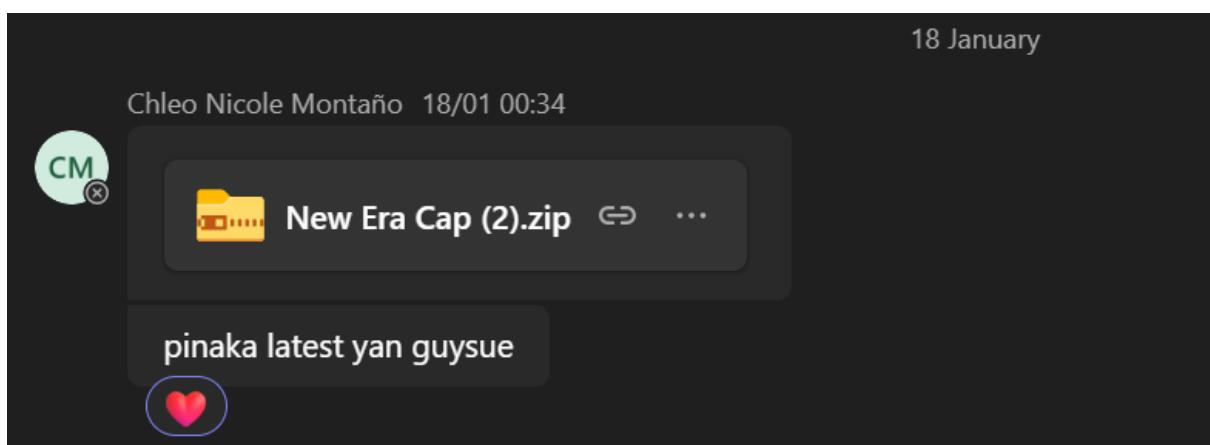


Figure B3. Last part of the frontend development.

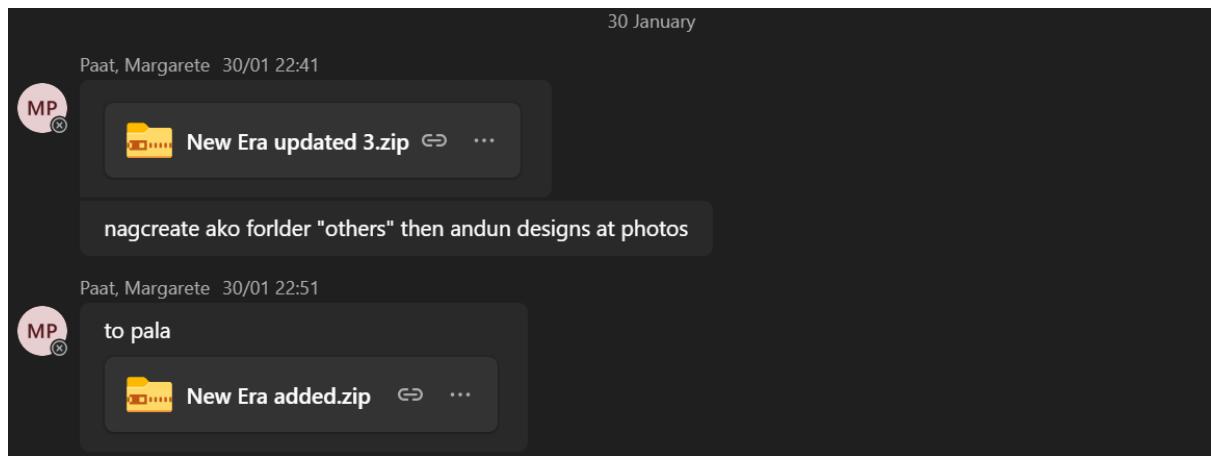
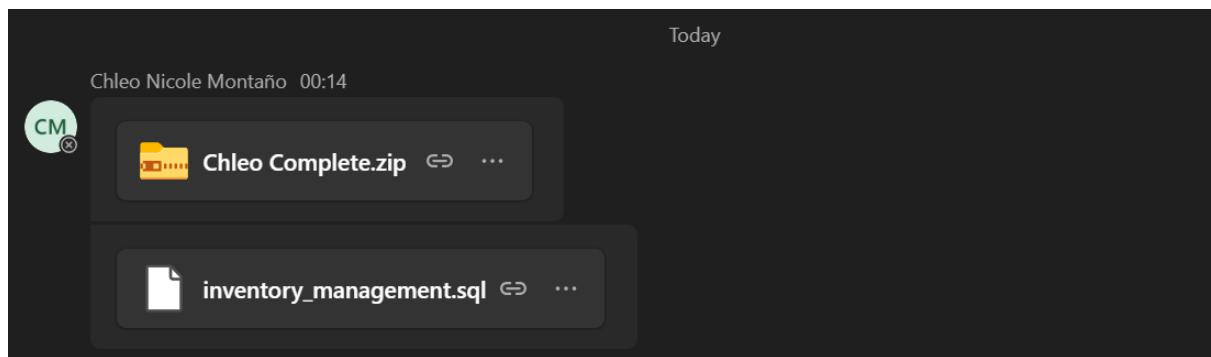


Figure B4. Latest part of the backend development.



Other Supporting Documents

Name	Role	Contact Number	Email
 Montaño, Chleo Nicole C.	Leader, Programmer	0939736970	montanocc@students.national-u.edu.ph
 Dela Cruz, Beatriz	Designer	09675300770	delacruzbs@students.national-u.edu.ph
 Libunao, Trixia Nicole A.	Documentation	09567864976	libunaota@students.national-u.edu.ph
 Paat, Margarete	Analyst	09288190645	paatma@students.national-u.edu.ph