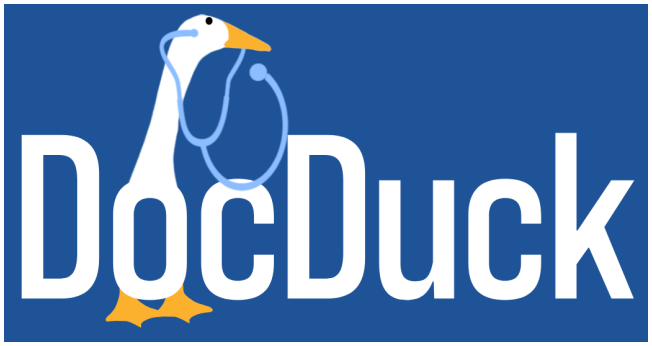


DocDuck Functional Specification

SWEng Group 1

November 21, 2023

Contents

1 Introduction

1.1 Product Overview

- To provide an affordable versatile product for upcoming businesses as well as set up longstanding local businesses.
- To increase efficiency of the maintenance engineering sector by saving time on documentation.
- To provide a long lasting ever evolving product.
- To be the most customer friendly product of its genre on the market.
- To become versatile enough for multiple sectors of engineering and multiple business types.

1.2 Project Scope

By the time of project completion the project should be able to accomplish the following as a summary:

1.2.1 User roles and permissions

Operator The operator will be able to:

1. View and book machines
2. Report broken machines (blocks out booking system)
3. Upload media with the breakdown report
4. Access limited search functionality (machines only)
5. Utilise operator specific tutorial

Engineer The engineer will be able to:

1. Inherit operator permissions
2. Create and manage machine lists
3. Access each machines parts list
4. View repair history and replaced parts
5. Repairs and adds machines
6. Override blocked booking system for repairs
7. Set machine in a repair state and override said repair state
8. Access the full search system, allowing the engineer to search for particular machines as well as particular parts
9. View the booking state of machines whether active or inactive
10. Check machine part stock

Admin The admin will be able to:

1. Inherits engineers permissions
2. Manage accounts, including password recovery
3. Update parts list and stock availability
4. Search functionality

1.2.2 Booking System:

here is the specific scope of the booking systems

1. Can check machine availability
2. Can book specific machines and times
3. Can block out machines for repairs
4. Can check a database for history of machine use and breakages
5. Will notify engineer of frequently breaking parts or machines

1.2.3 Machine Maintenance:

1. Monthly/set period notifications for diagnostics and re-calibrations
2. Audit dates recorded will give advanced notifications before the deadline
3. Engineers can book out service time

1.2.4 Breakdown report system:

here is the operations of the breakdown report system

1. Report machine failure or broken part
2. Add description and machine part code
3. Drop down section of all registered machines
4. Upload media showing the issue
5. Option to report without specifying an issue

1.2.5 Repair Logging System:

1. Engineers can describe and fix problems
2. Specify repaired or replaced parts
3. Request parts for fixing machines

1.2.6 Extra features:

These are extra features to be completed

1. Operators can request help from online engineers or admins
2. Notifications for online status changes for users
3. Engineers can announce when a machine has been fixed

2 Solution Overview

The product will be written in Java and will be provided as a desktop application, and the possibility of an additional web-app for portability is to be considered as well.
The application will access a cloud database so that it is not restricted to being used in one location (providing you have internet access), however, it also enables users to store files temporarily offline until they have a network connection and can then sync any data.
The application will be tailored for engineering labs and work spaces by providing a service which will allow users to track all the updates and fixes to machines as well as report any new faults. This is the general purpose of the software application.

2.1 Context Diagram

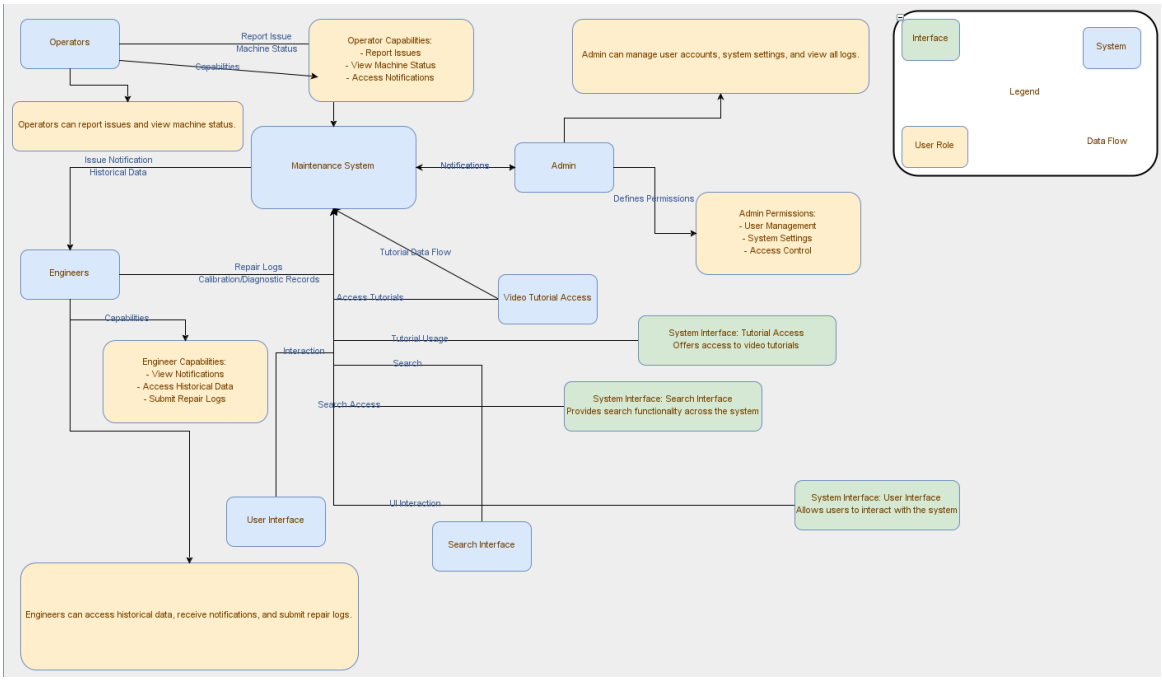


Figure 1: This is the context diagram

2.2 System Actors

2.2.1 User Roles and Responsibilities

User	Role	Frequency of use	Features used
Operator	Individual machine operator	Occasional, only when there is a machine fault	Minimal Access, logging machine faults and receiving confirmation when fixed
Engineer	Machine engineer	Frequent, notified when maintenance is required	Receiving maintenance requests, machine part lists, maintenance video watching. Making part purchase requests
Admin	System/company administrator	Occasional	Setting up accounts. Viewing machine statistics. Receiving part purchase requests.

2.3 Dependencies and Change Impacts

2.3.1 System Dependencies

1. Access to the internet for a cloud server or a local server to store data such as machine status, logs, login details, images and videos.
2. Computers that are capable of running the software and are compatible with Java.

2.3.2 Change Impacts

1. How issues with machines are reported.
2. How maintenance/repair is recorded.
3. How machine statistics are handled.

4. How administration manages the engineers and operators.
5. Customers may require transferring across a lot of past machine log history that has been stored in another format
6. Customers may previously have been using no form of maintenance system prior to DocDuck or may have been using a manual method with a log book or similar

2.4 Risks and Mitigations

Risk Description	**Likelihood (1-5)**	**Impact (1-5)**	**Priority (1-25)**	**Mitigation**
Lack of productivity & communication	3	4	12	minimum of 1-2 weekly meetings and attendance recordings.
Incomplete requirements; may lead to incorrect implementation.	2	5	10	Conduct thorough requirement analysis and include detailed use cases, user stories, and prototypes.
Changes to the scope made after the initial scope is established.	2	4	8	Clearly define the scope of the project and implement a change control process in order to assess/approve any changes.
Ambiguous descriptions of functionalities may result in differing interpretations by developers	3	3	9	Ensure to use clear and concise language, providing examples and diagrams and mock-ups to illustrate complex ideas.
Critical method solutions & Problem diagnostics	5	5	25	Research on design implementation prior to semester 2. Plan additional meetings for software development and have an active communication across the team.
Learning/Education Disruptions	4	5	20	Communicate with the team online and include dynamic workloads for co-workers. Address future problems before they can occur so the team is able to react.
high spending/overspending budget	2	2	4	Plan meetings and work ahead of time and stick to the financial plan laid out beforehand wherever possible.

3 Functional Specifications

3.1 Purpose

This section covers the use cases of the software, the user environment, specifies the minimum and the recommended specifications for a user's system and software to ensure optimal software performance and user experience. These specifications aim to create a standardized, user-friendly, and secure environment for the software, ensuring compatibility, reliability, and an optimal user experience across diverse hardware and software configurations.

3.2 Use Case

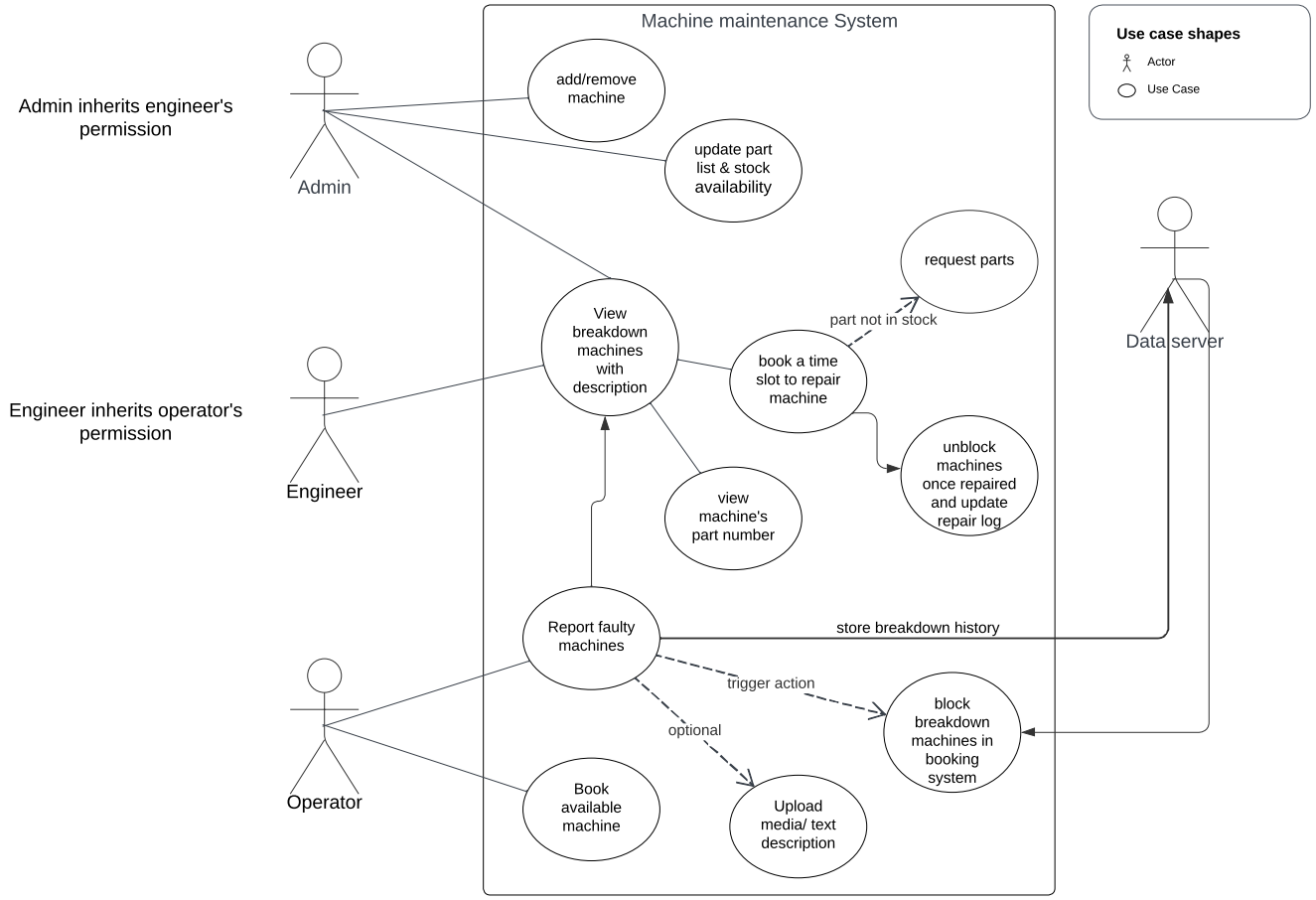


Figure 2: Machine maintenance use case

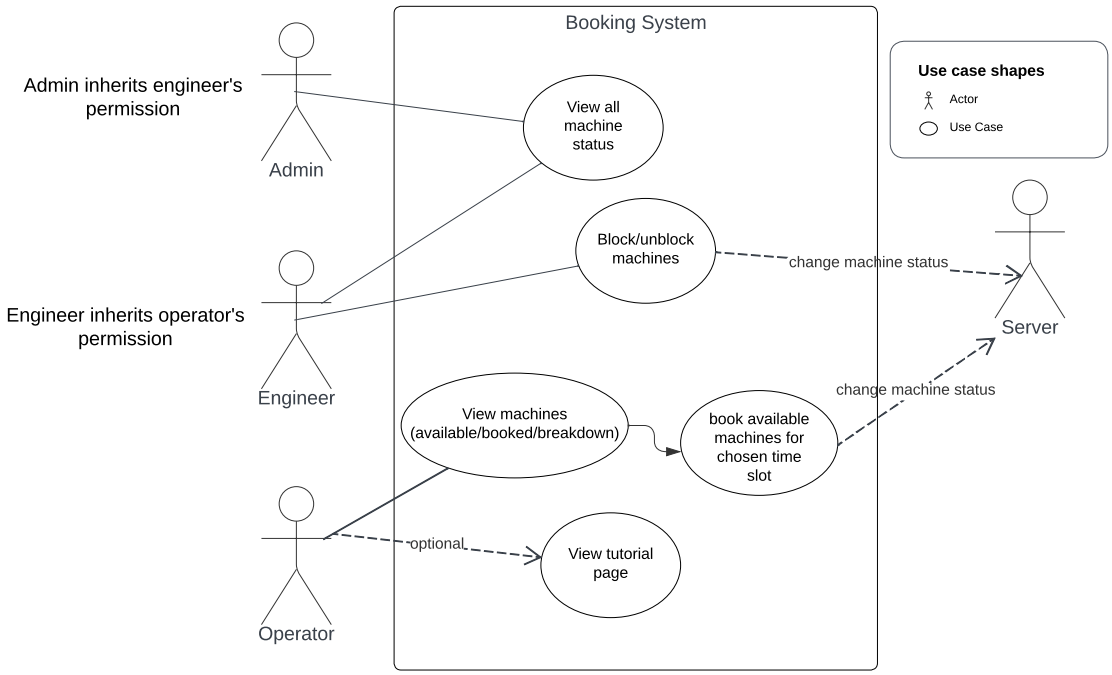


Figure 3: Booking use case

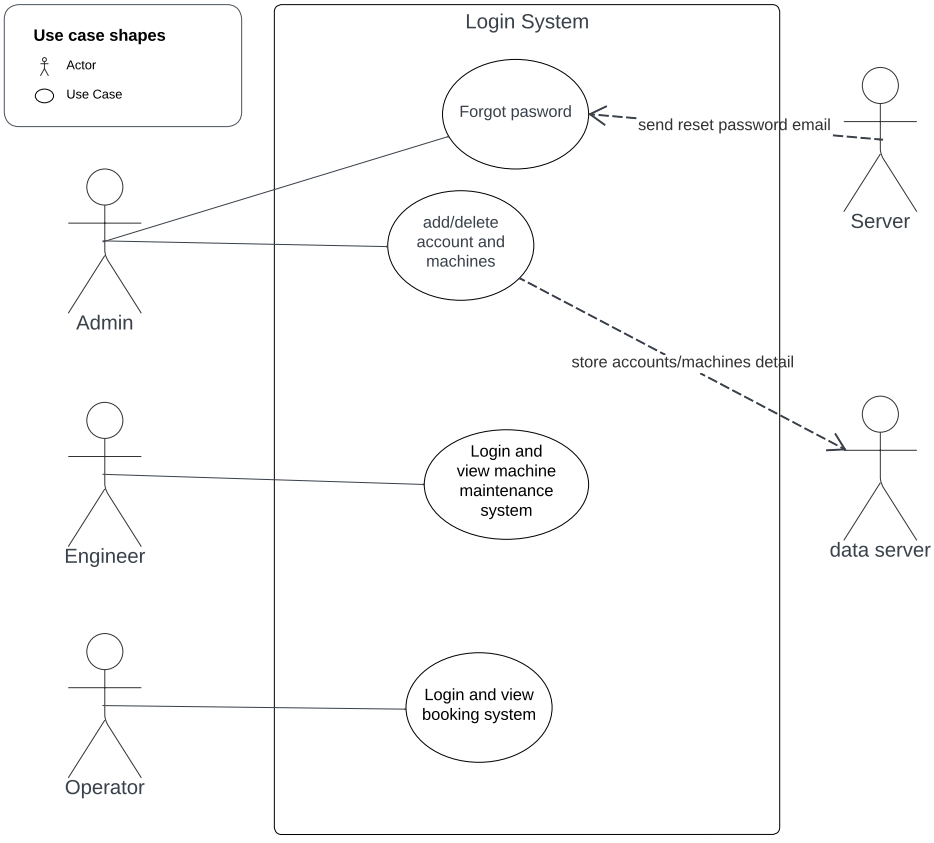
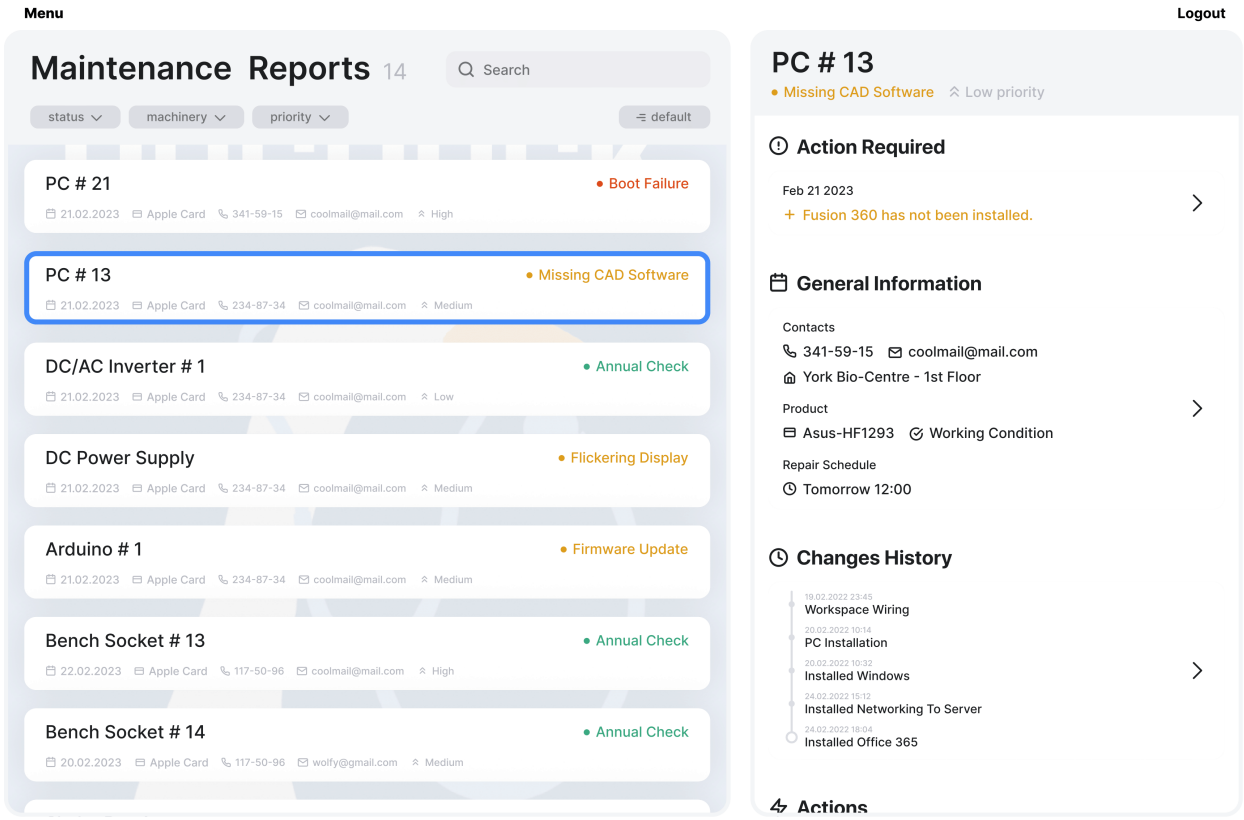


Figure 4: Login use case

3.3 Mock-up



Click on the Link for full Design and Animation
`https://drive.google.com/file/d/1sb8_izIXLOlFaYal9TYT8eB6tycwF-gW/view?usp=sharing`

3.4 Functional Requirements

This section contains the requirements of running the application. It can be split into three sections consisting of software, hardware and also user environment requirements.

3.4.1 Hardware Requirements

- Minimum processor required.
- Recommended processor to run software at its optimum.
- Minimum RAM required.
- Recommended RAM to run software at its optimum.
- Minimum storage/hard disk space.
- Recommended storage availability.
- Keyboard and mouse for user input.
- Minimum screen resolution required.
- Recommended screen resolution to run software at its optimum.
- Network connection required to update machine and user information.

3.4.2 Software Requirements

- Supported operating system (e.g. Windows 10/11).
- Required frameworks or run time environments (Java).

3.4.3 User Environment Requirements

- User Accounts consisting of Operator, Engineer and Administrator; each with different permissions depending on role.
- Login credentials containing usernames and passwords. Furthermore, two factor authentication with encryption to combat an ever-changing data protection landscape.
- Localisation support with the correct time, date and language for the user interface.
- Security embedded into the software such as a firewall to protect data as mentioned above.
- Tutorials to guide users on the functionality of the software
- Updates process for the software for patches etc.

3.5 Field Level Specifications

Field Label	**Likely UI Control**	**Users with access***	**Mandatory?**	**Editable?**	**Data Type**
User Name	textbox	All	Yes	Only by Admin once set	Alphanumeric
Password	textbox	All	Yes	Only by Admin once set	Alphanumeric
Fault Report: Machine name	textbox or auto generated	Operator	Yes	Yes	Alphanumeric
Fault Report: Machine problem	textbox	Operator	Yes	Yes	Alphanumeric
Fault Report: Problem Specifics	textbox	Operator	No	Yes	Alphanumeric
Fault Report: Media Upload	File upload to system	Operator	No	Yes	Video/ Photo
Search machines	textbox	All	No	Yes	Alphanumeric
Parts List: Search Parts	textbox	Engineer	No	Yes	Alphanumeric
Parts List: Remove Parts	textbox or decrement button	Engineer	No	Yes	Integer
Parts List: Add Parts	textbox or increment button	Admin	No	Yes	Integer

*Engineer inherits Operator permissions and Admin inherits both permissions, This column is those roles who will access this field in normal use. The formatting of this will be tweaked

4 System Configuration

Configuration of the system involves several steps. Below is an overview of the key setups and configurations, including user accounts for admin, engineers, and operators. The configuration may vary based on the needs of the organisation.

4.1 User Authentication and Authorization

Intent/Purpose:
Ensure secure access to the application with appropriate permissions for different user roles.

Steps:

- Implement a user authentication system (such as username and password).
- Create user roles (admin, engineer, operator) with distinct permissions.
- Configure role-based access control.

Alternatives/Customisations:

- Integrate with LDAP or OAuth for external authentication.

4.2 User Interface (UI) Configuration

Intent/Purpose:
Design an intuitive and user-friendly interface for different user roles.

Steps:

- Create separate UIs for admin, engineers, and operators.
- Customize dashboards based on the user's responsibilities.
- Implement responsive design for various devices.

Alternatives/Customisations:

- Provide theme customization options.

4.3 Job Order and Maintenance Scheduling

Intent/Purpose: Efficiently manage job orders and maintenance schedules for machines.

Steps:

- Implement a job order creation and tracking system.
- Set up maintenance scheduling with notifications.
- Integrate with a calendar for visual representation.

Alternatives/Customisations:

- Allow recurring maintenance schedules.
- Schedule maintenance automatically upon a critical failure.

4.4 Reporting and Analytics

Intent/Purpose:
Generate reports for performance analysis and decision-making.

Steps:

- Integrate reporting tools.
- Create predefined reports for admin and engineers and operators.
- Implement data analytics features.

Alternatives/Customisations:

- Allow customization of reports.

4.5 Logging and Monitoring

Intent/Purpose:
Track machine activities and monitor performance.

Steps:

- Implement logging mechanisms for user actions and machine events.
- Set up monitoring for machine health and performance.
- Define alerts for critical events.

Alternatives/Customisations:

- Automatically detect when a machine has failed or has faults.

4.6 Notifications and Alerts

Intent/Purpose:
Inform users about important events and impending maintenance.
Steps:

- Implement alerts for machine issues or upcoming maintenance.
- Allow customization of notification preferences.

Alternatives/Customisations:

- Integrate with other messaging platforms like email or SMS.
- Provide escalation levels for critical alerts.

4.7 Integration with External Systems

Intent/Purpose:
Connect with the machines being used/monitored.

Steps:

- Define APIs for integration.
- Ensure data consistency and synchronization.

Alternatives/Customisations:

- Use middleware for seamless integration.

4.8 Backup and Recovery

Intent/Purpose:
Protect against data loss and ensure system resilience.

Steps:

- Implement regular database backups.
- Define a disaster recovery plan.
- Test backup and recovery procedures periodically.

Alternatives/Customisations:

- Use cloud-based backup solutions.
- Implement versioning for critical data.

4.9 Security Configuration

Intent/Purpose:
Safeguard the application against unauthorized access and data breaches.

Steps:

- Implement secure coding practices.
- Regularly update dependencies and libraries.
- Conduct security audits and penetration testing.

Alternatives/Customisations:

- Use encryption for sensitive data.
- Implement two-factor authentication.

5 Other System Requirements & Non-Functional Requirements

The Non-Functional Requirements can be compartmentalized into the following:

- **Performance and Scalability:** The response time of the system will be almost instant, even under higher workloads. It is designed for both small startup engineering companies as well as pre-existing companies that have a higher workforce, therefore under higher stress levels the product will continue to function at a high rate.
- **Reliability:** The software should never fail in order to create a reliable system, but in the event of failure the software team will receive an error report from the client detailing how the software has failed, and then will be able to fix the error.
- **Security:** The product is quite secure. All usernames, passwords and other sensitive data will undergo encryption, and will conduct security audits to test any vulnerabilities of the system.
- **Capacity:** There is no specific capacity as the system is designed to handle as high a workload as the client needs; it would be able to handle any additional users that an admin would wish to add.
- **Usability:** The design is very user friendly, with new users being presented with a video tutorial of how to work and use the product.

6 Reporting Requirements

text

7 Integration Requirements

text

7.1 Exception Handling & Error Reporting

text

References