

1. INTRODUCTION

1.1 PROJECT OVERVIEW

- The New Product Development (NPD) System is a comprehensive platform designed to streamline and enhance the jewellery design process by effectively managing the workflow between the Sketch Department and the CAD Department. This system is essential for ensuring smooth project execution, tracking individual designer contributions, and maintaining an organized process from initial concept to final product development.
- The jewellery design industry requires a well-structured approach to handle new design projects efficiently. Traditionally, jewellery sketches were manually created, transferred to CAD designers for modelling, and then reviewed for final production. This manual approach often resulted in miscommunication, inefficiencies, and delays.
- The NPD System aims to eliminate these issues by automating and digitizing the workflow, ensuring better collaboration between designers, real-time tracking of design progress, and a structured approval process. The system allows designers to create, update, and manage designs effectively, ensuring that high-quality products are delivered to clients within the required timeframe.

The **key modules** of the NPD system include:

1. **Sketch Module:** Allows jewellery designers to create and manage initial sketches, assign tasks, and monitor progress.
2. **CAD Module:** Converts approved sketches into detailed computer-aided design (CAD) models for production.
3. **Performance Tracking:** Tracks the efficiency and contributions of individual designers.

4. **Project Management:** Assigns design tasks, manages workflows, and ensures smooth progression of projects.
5. **Approval Workflow:** Ensures that each design is reviewed and finalized before proceeding to production.

The implementation of this system significantly enhances the efficiency, accuracy, and collaboration within the jewellery design process, making it easier for companies to manage projects and ensure timely delivery of high-quality designs.

1.2 Objective

- The primary objective of the New Product Development (NPD) System is to create a centralized digital platform for managing jewellery design projects efficiently. The system aims to:

1. Automate the Workflow:

- Digitally manage the transition of jewellery designs from sketches to CAD models.
- Eliminate manual tracking and paperwork.

2. Enhance Collaboration and Communication:

- Provide real-time updates on project status to all team members.
- Enable seamless coordination between designers, project managers, and production teams.

3. Improve Design Tracking and Performance Monitoring:

- Assign tasks to individual designers and track their performance.
- Ensure accountability in project execution.

4. Reduce Errors and Ensure Quality:

- Minimize errors caused by miscommunication and manual handling.
- Implement a structured approval process for design finalization.

5. Ensure Secure Data Management:

- Store all designs securely with role-based access control.
- Prevent unauthorized modifications or data loss.

6. Increase Productivity and Efficiency:

- Allow designers to focus on creativity rather than administrative tasks.
- Speed up the jewellery design process, leading to faster product delivery.

By achieving these objectives, the NPD system improves the overall efficiency of jewellery design companies and ensures that high-quality designs are delivered within the required timelines.

1.3 Scope

- The scope of the New Product Development (NPD) System includes a wide range of functionalities to support the jewellery design lifecycle, from concept creation to final approval.

Features Covered in the Scope:**1. Jewellery Design Lifecycle Management:**

- The system provides a structured workflow for handling jewellery designs from sketching to CAD modelling and finalization.

2. Project Management and Task Assignment:

- The system enables project managers to create design tasks, assign them to designers, and track their progress.

3. Sketch Module:

- Designers can create, edit, and submit jewellery sketches for approval.

- The module categorizes designs based on style, metal type, and carat weight.

4. CAD Module:

- Once sketches are finalized, they are transferred to the CAD module for further development into digital models.
- The CAD module ensures accuracy and precision before production.

5. Approval Workflow:

- Designs go through an approval process before they are finalized for production.
- Project managers and stakeholders can review and approve/reject designs.

6. Performance Tracking and Reporting:

- The system tracks designer contributions and generates reports on project status and productivity.

7. Role-Based Access Control:

- Different user roles (Admin, Project Manager, Sketch Designer, CAD Designer) have specific access rights to ensure data security and workflow integrity.

8. Integration with Existing CAD Tools:

- The system is compatible with industry-standard CAD software to streamline the digital modelling process.

Limitations and Exclusions:

- The NPD system does not include physical jewellery manufacturing processes.
- It is limited to managing the design and approval workflow, with no direct control over production machinery.

- The system is customized for jewellery design firms and may not be suitable for other product development industries without modifications.

The system ensures efficient design management, better collaboration, and high-quality output, making it an essential tool for modern jewellery design firms.

1.4 Tools & Technology Used

- The New Product Development (NPD) System is developed using modern software tools and technologies to ensure high performance, security, and scalability.

Table 1.1 Tools Used

| Tool | Purpose |
|------------------------------|------------------------------------|
| Visual Studio Code | Backend and frontend development |
| SQL Server Management Studio | Database management and queries |
| Postman | API testing and validation |
| IntelliJ IDEA | Java-based backend development |
| TestNG, Jenkins, Selenium | Automated testing |
| Google Chrome | Web application access and testing |

Table 1.2 Technologies Used

| Technology | Purpose |
|------------------------|-------------------------------|
| Angular.js | Frontend development |
| .NET Core | Backend development |
| SQL Server | Database management |
| Java, Selenium, TestNG | Testing and quality assurance |

Why These Technologies Were Chosen?

1. .NET Core provides a secure and scalable backend architecture.

2. Angular.js ensures a dynamic and responsive user interface.
3. SQL Server offers a robust and reliable database for storing project data.
4. Postman is used for API testing to ensure smooth communication between system components.
5. Jenkins and Selenium facilitate automated testing, improving system reliability.

2. PROJECT MANAGEMENT

2.1 PROJECT PLANNING

- The New Product Development (NPD) System is designed to streamline the jewellery design process by managing the workflow between the Sketch Department and the CAD Department. It ensures that designs move efficiently from the initial concept stage to final production while tracking the contributions of individual designers.

2.1.1 Project Development Approach and Justification

- Workflow Process
 - The Sketch Department initiates new projects, assigns designers, and tracks their progress.
 - Once the sketches are finalized, they are transferred to the CAD Department, where they are converted into detailed CAD models.
 - The system provides real-time updates, ensuring smooth communication and project tracking.
- Key Functionalities
 - PD Entry Form: Maintains a record of finalized designs for reference and quality assurance.
 - Card Movement History: Tracks the step-by-step progress of each design, ensuring transparency.
 - Family Grouping: Organizes related designs into structured categories for easy retrieval.
- Performance Tracking & Role Management

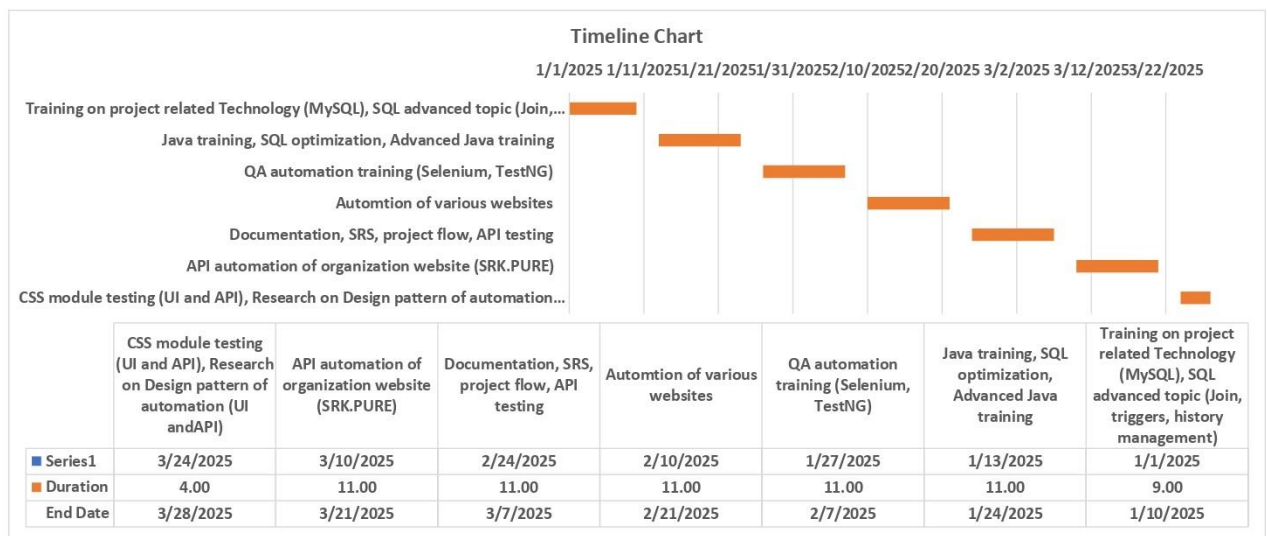
- A points-based system is implemented to monitor designer performance and ensure accountability.
 - Role-based access control ensures that designers, managers, and production teams have appropriate access, maintaining data security.
- Data Security & Integration
- The system ensures secure storage of proprietary jewellery designs.
 - It seamlessly integrates with existing CAD tools to facilitate efficient transitions between design stages.
- Collaboration & Efficiency
- The NPD System enhances workflow efficiency by enabling real-time project tracking and structured task assignments.
 - It reduces errors, improves team collaboration, and ensures timely completion of projects.

2.2 PROJECT WORK SCHEDULING

Table 2.3 Work Scheduling

| Week No. | Duration | Tasks Scheduled |
|----------|--------------------------|---------------------------------------------------------------------------------------------------------|
| Week-1 | 01/01/2025 to 10/01/2025 | Training on project related Technology (MySQL), SQL advanced topic (Join, triggers, history management) |
| Week-2 | 13/01/2025 to 24/01/2025 | Java training, SQL optimization, Advanced Java training |

| | | |
|--------|--------------------------|----------------------------------------------------------------------------------------|
| Week-3 | 27/01/2025 to 07/02/2025 | QA automation training (Selenium, TestNG) |
| Week-4 | 10/02/2025 to 21/02/2025 | Automation of various website |
| Week-5 | 24/02/2025 to 07/03/2025 | Documentation, SRS, project flow, API testing |
| Week-6 | 10/03/2025 to 21/03/2025 | API automation of organization website (SRK.PURE) |
| Week-7 | 24/03/2025 to 28/03/2025 | CSS module testing (UI and API), Research on Design pattern of automation (UI and API) |



3. SYSTEM REQUIREMENT STUDY

3.1 USER CHARACTERISTICS

3.1.1 Role-Based Access & Security

- The system restricts access based on user roles:
 - **Sketch Designers** can create, edit, and submit designs.
 - **Project Managers** can assign tasks, approve/reject designs, and monitor progress.
 - **Admin/Management** oversees the entire system and has access to all **project data**.
 - **Sales Personnel** can input client requirements for new jewellery designs.

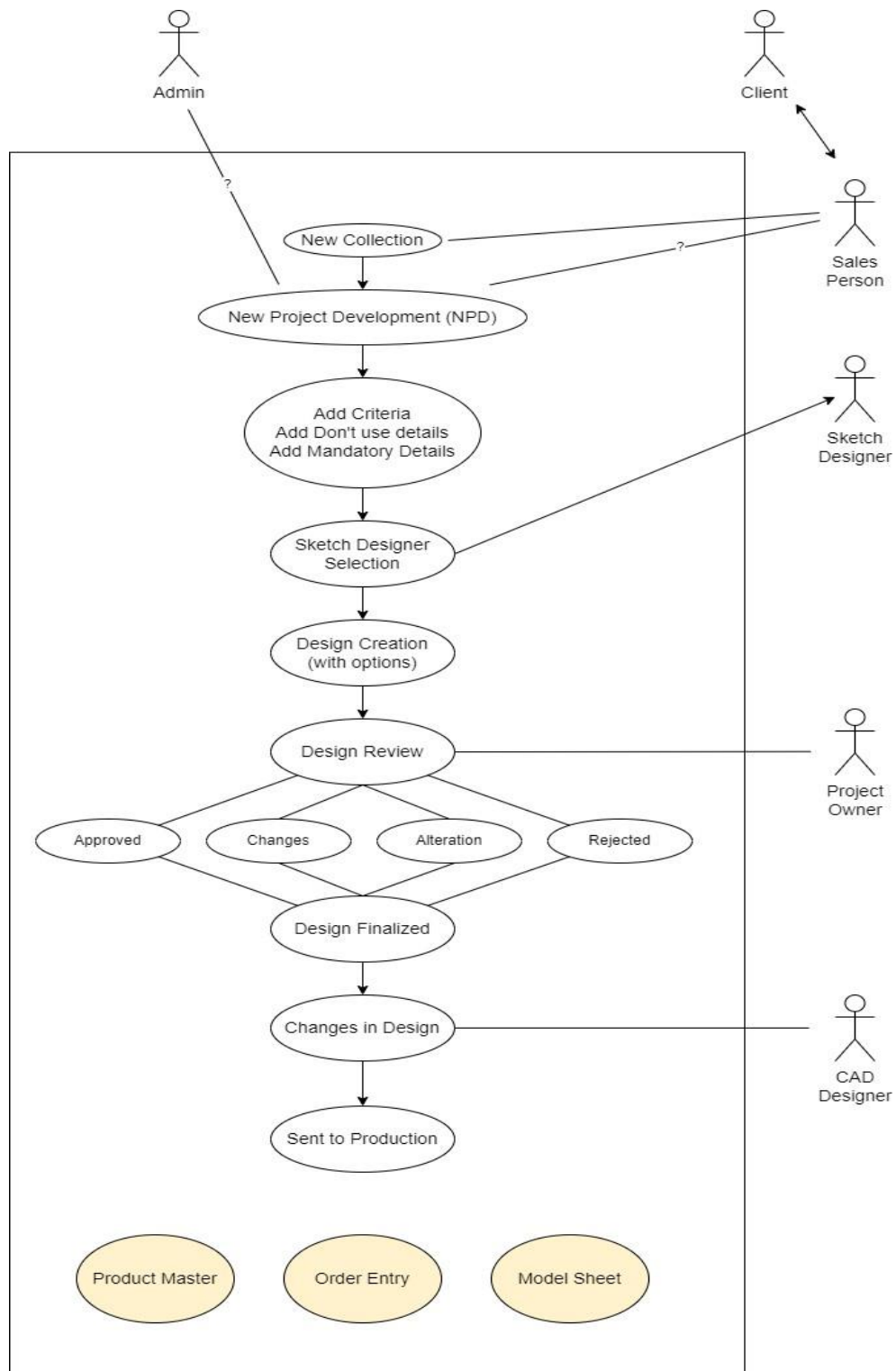


Fig 3.1 Use Case Diagram

3.2 HARDWARE AND SOFTWARE REQUIREMENTS

- To ensure the successful deployment and optimal performance of the system, the following hardware and software requirements are defined. These specifications guarantee that the system operates efficiently while maintaining compatibility across different environments.

Table 3.4 Hardware and Software Requirements

| Component | Minimum Specification |
|------------------|------------------------|
| Processor | Intel Core i3 or above |
| RAM | 4 GB |
| Hard Disk | 100 GB |
| Operating System | Windows 10 or above |
| Browser | All latest browsers |

3.3 ASSUMPTIONS AND CONSTRAINTS

3.3.1 Assumptions

- The following assumptions are considered during the development and deployment of the system:
1. **Users Have Basic Computer Knowledge:** It is assumed that users interacting with the system have basic knowledge of operating a computer and web applications.
 2. **Stable Internet Connection:** The system is expected to function with a stable internet connection, especially for cloud-based features and updates.

3. **Latest Web Browsers Are Used:** It is assumed that users will access the system through modern and updated web browsers for security and performance reasons.
4. **User Authentication Is Required:** All users must have valid login credentials to access system features based on their roles.
5. **Regular Software Updates Will Be Applied:** The system assumes that security patches and updates will be installed periodically to maintain system integrity.
6. **Data Backup Practices Are Followed:** It is assumed that regular backups of the database and system files will be maintained to prevent data loss.

3.3.2 Constraints

- The following constraints must be considered during system development and deployment:

1. **Hardware Limitations:**

- The system may experience slow performance on older hardware configurations that do not meet the minimum specifications.
- Limited storage capacity may restrict data retention and system expansion.

2. **Software Compatibility:**

- The system is designed to run on Windows 10 and above or macOS 10.15 and above. Older operating systems may not be supported.
- Some advanced features may require specific browser versions or additional plugins.

3. **Security Restrictions:**

- Users must have authorized access to view, modify, or delete certain data.
- Data encryption and security measures must be enforced to prevent unauthorized access.

4. Internet Dependency:

- The system requires an active internet connection for cloud-based operations, real-time updates, and remote access.
- Offline functionality is limited, and data synchronization may be required when the connection is restored.

5. Performance Constraints:

- System response time should be optimized to ensure a smooth user experience.
- High traffic or large database queries may impact processing speed and efficiency.

6. Regulatory Compliance:

- The system must adhere to data protection and privacy laws such as GDPR or other applicable regulations.
- Certain security measures, like two-factor authentication (2FA), may be mandatory for sensitive data access.

4. SYSTEM ANALYSIS

4.1 STUDY OF EXISTING SOLUTION

- Before developing the New Product Development (NPD) system, it is essential to evaluate existing solutions in the jewellery design industry. The majority of existing systems are disjointed, with minimal integration between departments such as Sketch and CAD. These systems typically lack seamless communication, have manual tracking of designs, and don't allow for real-time progress tracking.
 - Current Challenges in Existing Solutions:
 - Lack of integration between design and production teams, leading to errors and inefficiencies.
 - No centralized system for managing design workflows, tracking progress, or evaluating performance.
 - Limited scalability and difficulty in handling large design files and multiple designers.
- Existing Solutions' Shortcomings: Many existing systems are either too complex or too simplistic, failing to address the specific needs of jewellery design processes. The primary weakness is that these systems often rely on external tools for CAD work and use separate platforms for project management, leading to confusion and delays.
- Opportunity for Improvement: The NPD system seeks to bridge this gap by integrating the Sketch and CAD departments into a unified platform that allows for seamless project management, task assignment, real-time updates, and tracking of performance metrics.

4.2 REQUIREMENTS OF PROPOSED SYSTEM

4.2.1 Functional Requirements

➤ Functional requirements define the core capabilities the NPD system must provide to meet the needs of users and stakeholders. The system needs to be flexible, efficient, and integrated across both Sketch and CAD departments to streamline the design workflow.

- Sketch Module Functionalities:

1. **Design Creation:** Designers must be able to create initial sketches for new jewelry pieces, defining aspects such as metal type, carat weight, and design category.
2. **Design Assignment:** Projects are assigned to designers, with each designer's contributions tracked using a points-based system.
3. **Design Progress Tracking:** The system should track the progress of designs, showing their current status (e.g., in progress, completed).
4. **Design Upload & Transition:** Sketches must be uploaded into the system and transitioned to the CAD department for further processing.

- CAD Module Functionalities:

1. **Design Conversion:** CAD designers receive finalized sketches and convert them into detailed 3D models, ensuring accuracy and consistency.
2. **Approval Workflows:** There should be structured workflows for approving/rejecting CAD designs, with feedback mechanisms.
3. **Card Movement History:** Maintain detailed logs of design changes, approvals, and transitions from Sketch to CAD.

- **Project Management & Monitoring:**
 1. **Progress Monitoring:** Project managers should be able to assign tasks, monitor progress, and generate reports.
 2. **Performance Tracking:** The system must support performance tracking for designers, giving managers insights into designer productivity and completion timelines.
- **Sales Person Involvement:**
 1. **Customer Requirements:** Salespersons should be able to accept customer requirements and create design projects based on client needs.

4.2.2 Non-Functional Requirements

- **Accessibility:** Accessible on all major browsers.
- **Reliability:** Ensure 99.9% uptime with regular backups.
- **Performance:** Handle multiple users and large files without delay.
- **Security:** Secure data with SSL encryption and role-based access control.

4.3 SYSTEM WORK FLOW

- The Sketch Module is responsible for managing the initial jewellery design process. It allows designers to create sketches, assign projects, and track progress until the design is finalized for the CAD department.

4.3.1 Create New Design Portfolio

- Designers can create and manage multiple jewellery design portfolios.
- Portfolios categorize designs based on design type, metal type, gemstone type, and carat weight.

- The system provides a dashboard where project managers can assign design tasks and monitor progress.

4.3.2 Add/Modify Sketch Designs

- Designers can upload and edit sketches while maintaining a revision history.
- All modifications are logged to track changes and avoid duplication of effort.
- The system ensures version control for each design.

4.3.3 Submit Sketch for Approval

- Once a sketch is completed, it is submitted for approval by the project manager.
- The system provides structured workflows for approval, revision requests, or rejection with feedback.
- Approved sketches move forward to the CAD department.

4.3.4 Track Sketch Progress

- Card Movement History records each sketch's journey through different design stages.
- Project managers and designers can view real-time updates on each sketch's status.
- The system categorizes designs as In Progress, Approved, or Sent for Revision.

4.3.5 Organize Designs into Collections

- The Family Grouping feature allows grouping related sketches into collections.
- Helps organize designs for large-scale projects or collections with similar themes.

4.4 CLASS DIAGRAM

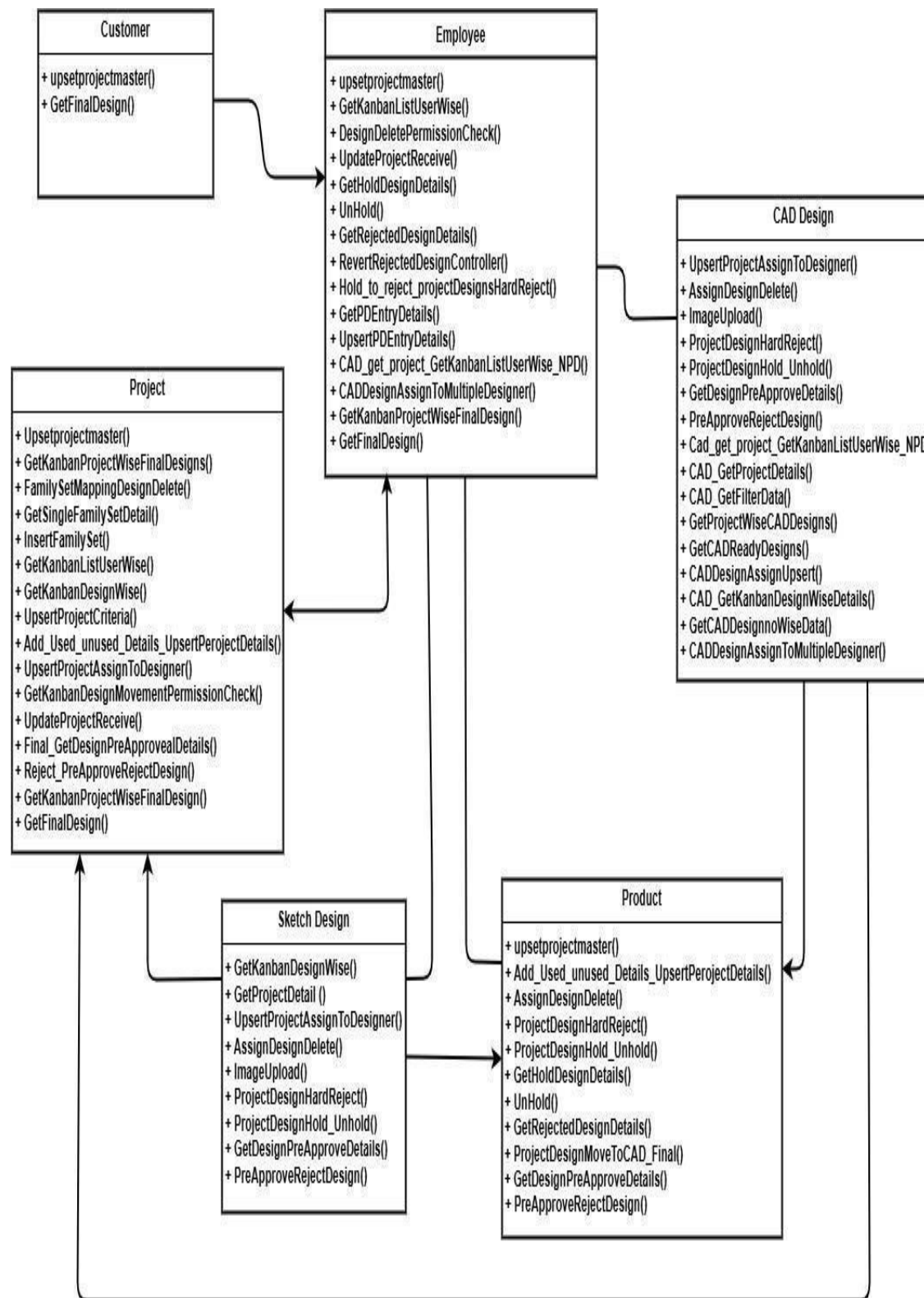


Fig 4.2 Class Diagram

4.5 ACTIVITY DIAGRAM

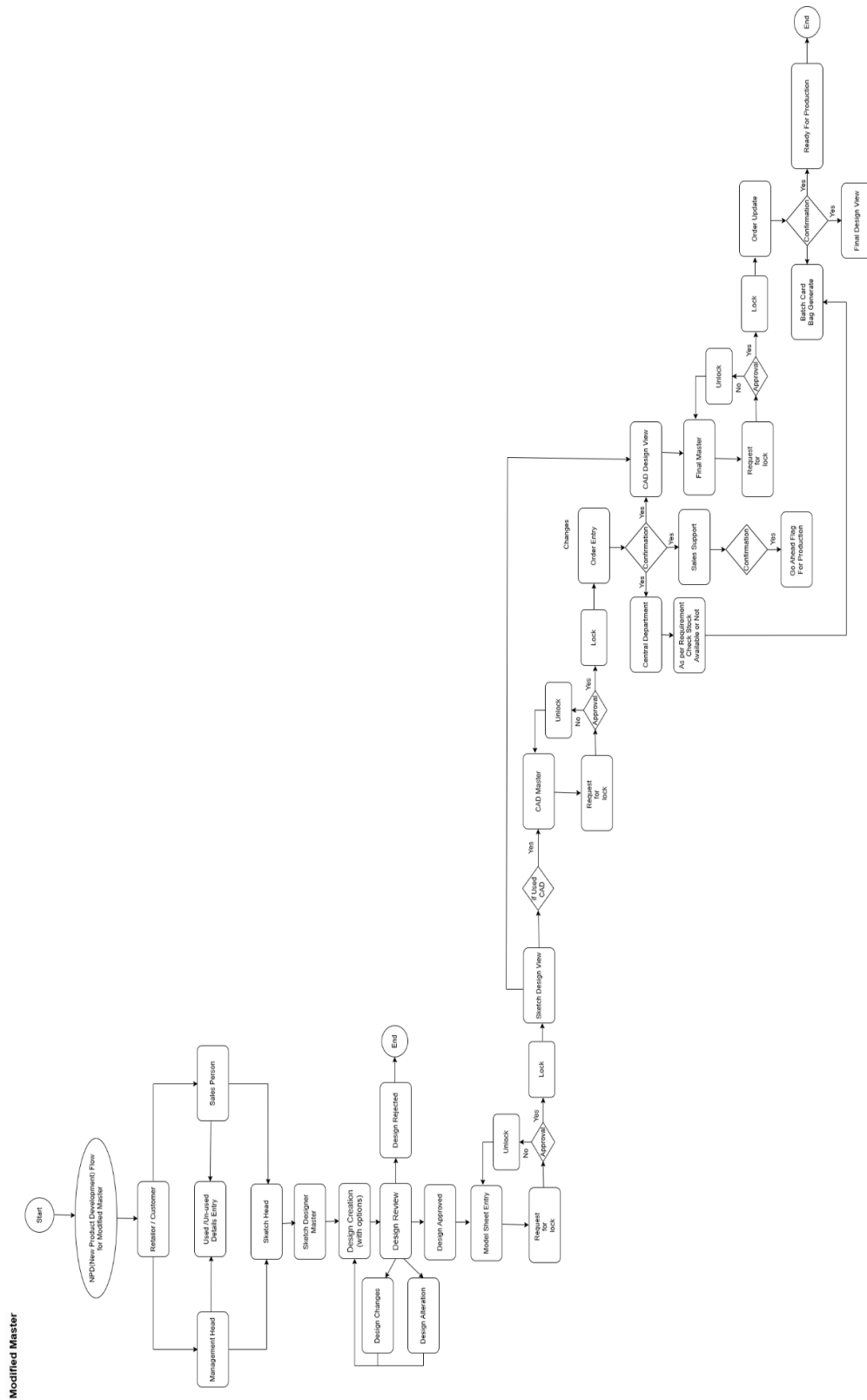


Fig 4.3 Activity Diagram

4.6 SEQUENCE DIAGRAM

4.6.1 Sequence Diagram (Full system)

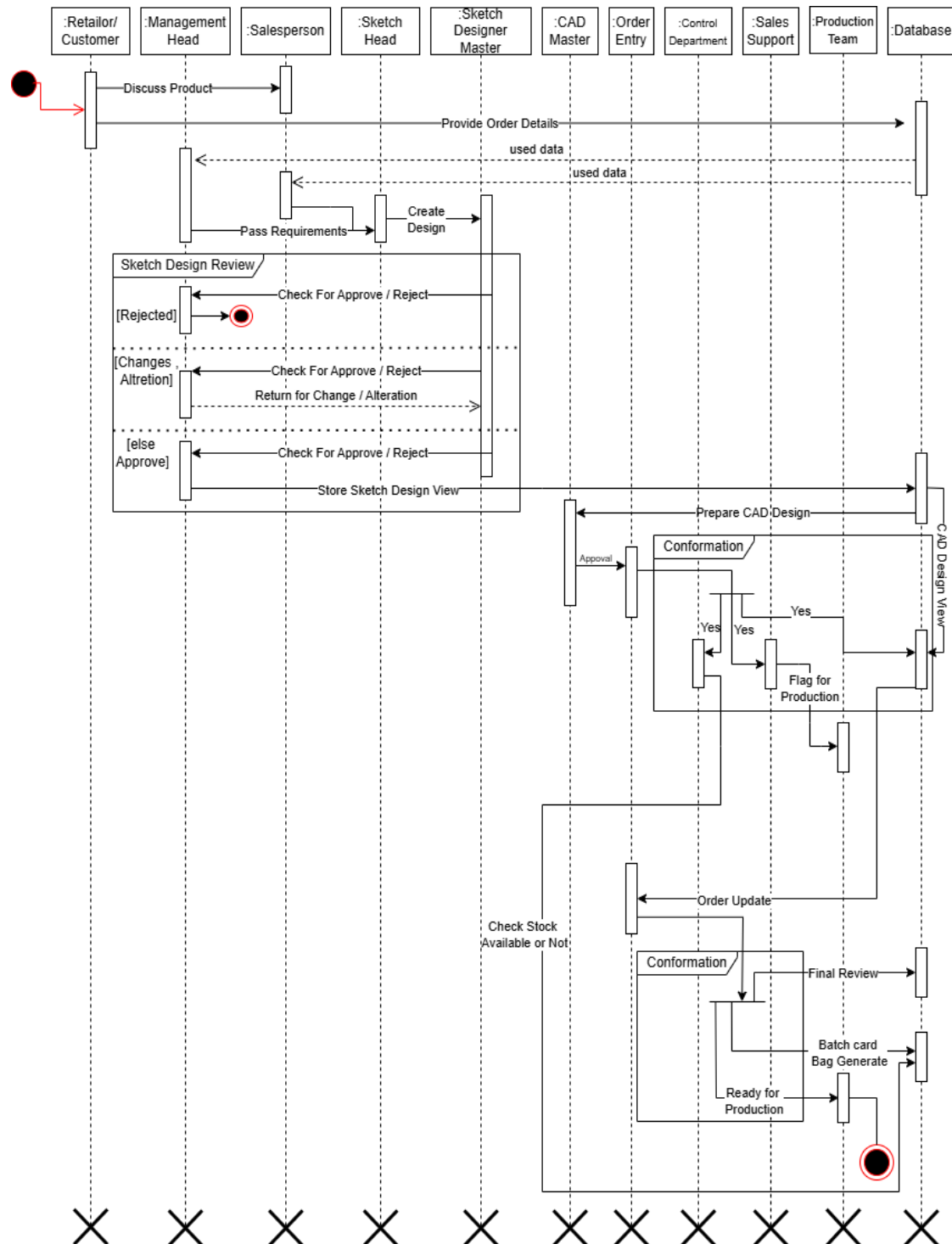


Fig 4.4 Sequence Diagram (Full System)

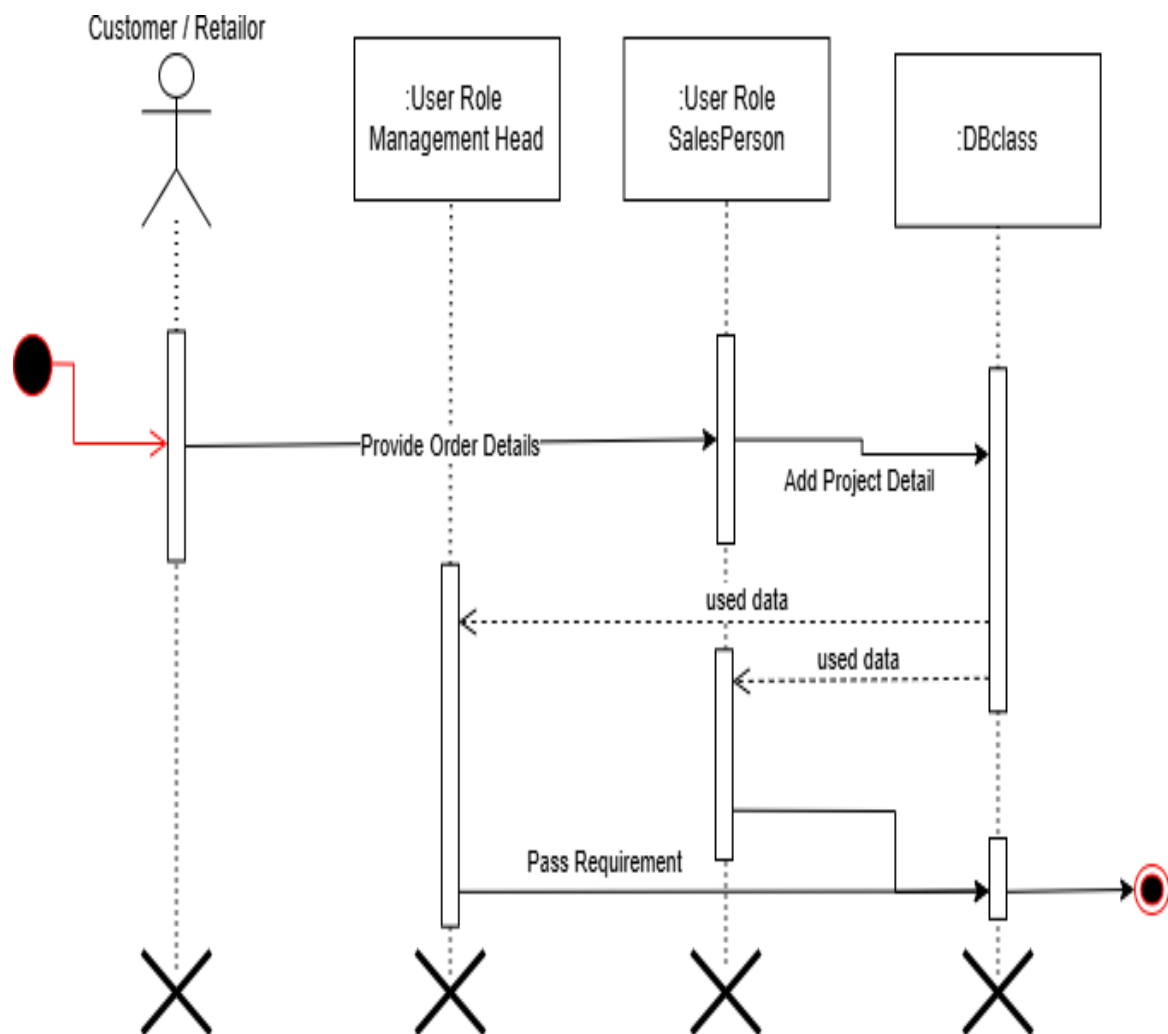
4.6.2 Sequence Diagram Module wise (New project Creation)

Fig 4.5 Sequence Diagram Module wise (New project Creation)

4.6.3 Sequence Diagram Module wise (Sketch Design)

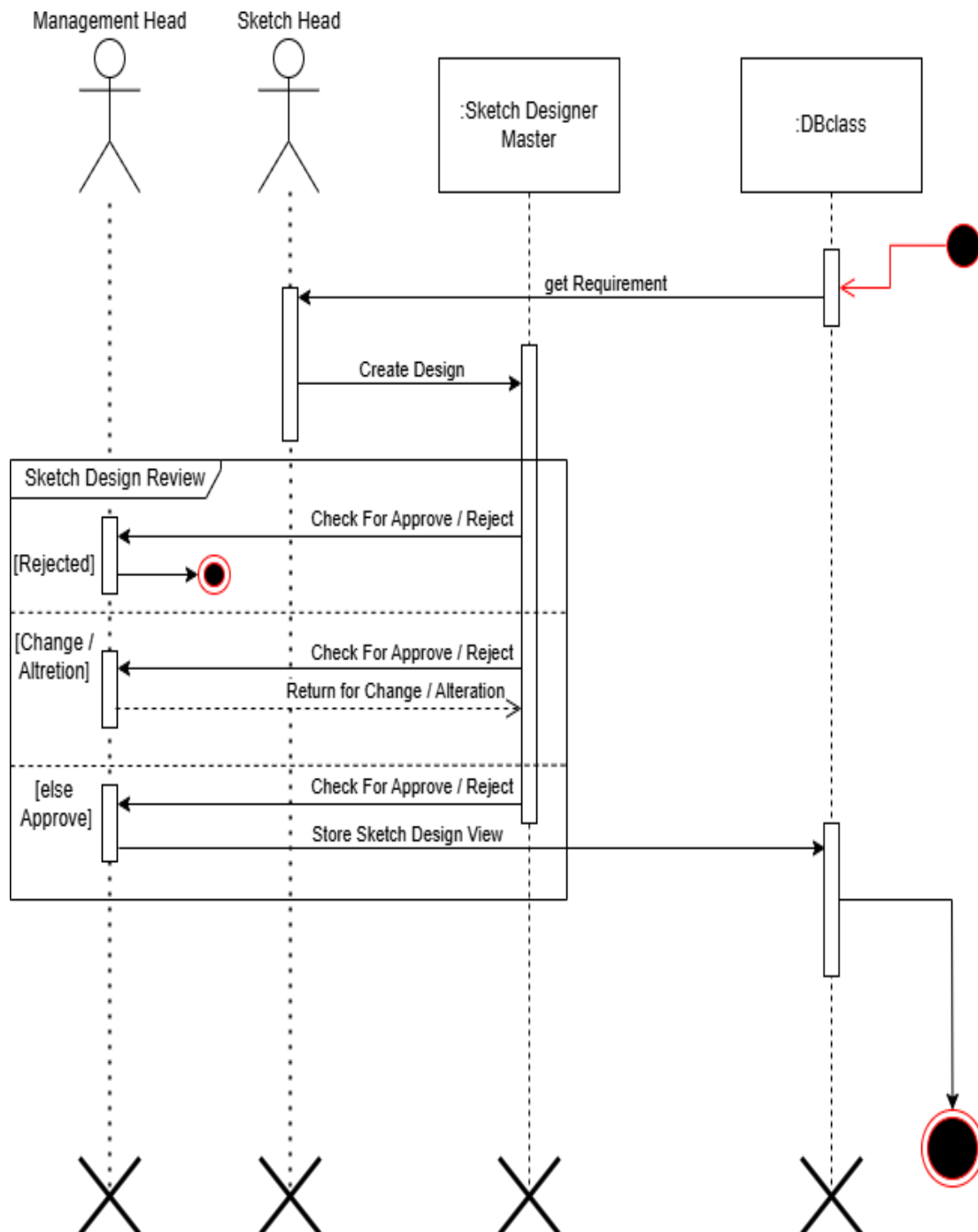


Fig 4.6 Sequence Diagram Module wise (Sketch Design)

5. SYSTEM DESIGN

- The system design for the New Product Development (NPD) System outlines the architecture and structure required to support the jewellery design process, integrating the Sketch and CAD departments. It includes a robust database schema to manage project workflows, designer contributions, and design approvals, ensuring scalability, security, and efficiency. The design leverages a relational database model to maintain data integrity and enable seamless collaboration across teams.

5.1 DATABASE SCHEMA DESIGN

- The NPD System's database is organized into multiple schemas to separate concerns and ensure modularity. The primary schema, Npd, contains tables related to the jewellery design process, while the Audit schema tracks historical changes, and the Control_Center schema manages system permissions and configurations. Below is an overview of the key schemas and their purposes:

- **Schema Name: Npd**

- **Description:** Contains all tables related to the new product development process, including project management, designer assignments, design uploads, and product details.
- **Key Tables:** Npd.Project, Npd.Project_Designs, Npd.Project_CAD_Designer_Mapping, Npd.Project_Design_Uploads, Npd.CARD_Movement_History.

- **Schema Name: Audit**

- **Description:** Manages audit trails for key tables, recording actions such as insertions, updates, and deletions to ensure traceability.

- **Key Tables:** Audit.PD_Component_Mapping, Audit.Pd_Guide_Entry.

- **Schema Name: Control_Center**

- **Description:** Handles system-wide configurations, user roles, permissions, and stage management to enforce access control and workflow progression.
- **Key Tables:** Control_Center.Stages, Control_Center.User_master, Control_Center.User_Role_Mapping.

The database uses foreign key relationships to maintain referential integrity and triggers for audit logging. Common fields (e.g., is_active, created_by) are standardized across tables for consistency.

Description: common fields that will be used in all tables.

Table 5.5 Some Common Fields

| Column Name | Data Type | Constraints | Description |
|---------------|-----------|-------------|----------------------------------------------------------------|
| is_active | bit | NULL | Indicates if the mapping is active (1) or inactive (0). |
| is_deleted | bit | NULL | Indicates if the mapping is marked as deleted (1) or not (0). |
| is_locked | bit | NULL | Indicates if the mapping is locked for editing (1) or not (0). |
| created_by | smallint | NULL | ID of the user who created the mapping record. |
| created_date | datetime | NULL | Date and time when the mapping was created. |
| modified_by | smallint | NULL | ID of the user who last modified the mapping record. |
| modified_date | datetime | NULL | Date and time when the mapping was last modified. |

| | | | |
|------------------------|-----|------|----------------------------------------------------------|
| modified_iplocation_id | int | NULL | ID of the location from where the modification was made. |
| created_iplocation_id | int | NULL | ID of the location from where the mapping was created. |

Description: Project table stores new project entry and also manage old project details.

Table 5.6 NPD.Project

| Column Name | Data Type | Constraints | Description |
|--------------------------|--------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| project_id | smallint | PRIMARY KEY, IDENTITY | Unique identifier for the project. |
| project_key | int | NOT NULL | Key for the project, used for internal tracking. It is unique key that is not change after allocation |
| project_name | varchar(100) | NOT NULL | Name of the project. |
| project_head_id | int | Foreign key references Auth.Users(User_code) | ID of the project head, he is responsible for overall management. |
| start_date | datetime | NULL | Start date of the project. |
| final_end_date | date | NULL | Final end date of the project.(expected) |
| proposed_completion_date | datetime | NULL | Proposed completion date of the project. |
| collection_id | smallint | Foreign key references Product.Collections(Collection_id) | ID of the collection the project belongs to the Project. |
| sub_collection_id | smallint | Foreign key references Product.collections_type(Collection_type_id) | ID of the sub-collection the project belongs to the project. |
| project_coordinator_id | int | Foreign key references Auth.Users(User_code) | ID of the project coordinator. |

| | | | |
|----------------------|---------------|-----------------------------------------------------------------|---------------------------------------------------------|
| actual_complete_date | datetime | NULL | Actual completion date of the project. |
| head_designer_id | int | Foreign key references Auth.Users(User_code) | ID of the head designer. He manages all designing works |
| project_status_id | smallint | Foreign key references npd.Project_status(project_status_id) | Status ID of the project, indicating the current stage. |
| remark | varchar (256) | NULL | Additional remarks or comments about the project. |
| priority_id | smallint | Foreign key references Master.Priority_Master(Priority_id) | Priority level ID of the project. |
| customer_id | smallint | Foreign key references Master.Customer_Master(Customer_id) | ID of the customer associated with the project. |
| display_order | int | NULL | Display order for sorting purposes. |
| stage_id | smallint | Foreign key references control_center.stages(Stage_id) | ID of the current stage of the project. |
| component_id | smallint | Foreign key references Control_center.components(component_id) | ID of the main component of the project. |
| metal_type_id | smallint | Foreign key references Product.Metal_Type_master(metal_Type_id) | ID of the type of metal used in the project. |

Description: Project Designs will store detailed information about the designs within a project, including their status, related designers, and relevant dates.

Table 5.7 Npd.Project_Designs

| Column Name | Data Type | Constraints | Description |
|-----------------------------|--------------|----------------------------------------------------------------------------------|-----------------------------------------------------|
| project_design_id | smallint | PRIMARY KEY, IDENTITY | Unique identifier for the design record. |
| project_designer_details_id | smallint | Foreign key references npd.project_designer_details(project_designer_details_id) | ID of the associated project designer details. |
| project_design_name | varchar(256) | NOT NULL | Name of the design. |
| total_design | int | NULL | Total number of designs. |
| submit_point | int | NULL | Points awarded for the submission. |
| receive_date | datetime | NULL | Date and time when the design was received. |
| receive_by | smallint | NULL | ID of the user who received the design. |
| approved_date | datetime | NULL | Date and time when the design was approved. |
| approved_by | smallint | NULL | ID of the user who approved the design. |
| approved_remark | varchar(256) | NULL | Remarks about the approval. |
| status | varchar(64) | NULL | Status of the design. |
| is_reverse | bit | NULL | Indicates if the design is reversed (1) or not (0). |
| stage_id | smallint | Foreign key references control_center.stages(stage_id) | ID of the stage the design is in. |

| | | | |
|-------------------------------|-------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| component_id | smallint | Foreign key references control_center.co mpon ents(component_ id) | ID of the component the design is for. |
| locked_by | smallint | NULL | ID of the user who locked the design. |
| locked_date | datetime | NULL | Date and time when the design was locked. |
| reverse_by | smallint | NULL | ID of the user who reversed the design. |
| reverse_date | datetime | NULL | Date and time when the design was reversed. |
| total_point | int | NULL | Total points awarded for the design. |
| is_reject | bit | NULL | Indicates if the design is rejected (1) or not (0). |
| is_pd_entry | bit | NULL | Indicates if the design is entered in PD (1) or not (0). |
| is_hold | bit | NULL | Indicates if the design is on hold (1) or not (0). |
| hold_by | smallint | NULL | ID of the user who put the design on hold. |
| hold_date | datetime | NULL | Date and time when the design was put on hold. |
| move_type | varchar(16) | NULL | Type of move associated with the design. |
| is_assign_to_CA D_designer | bit | NULL | Indicates if the design is assigned to a CAD designer (1) or not(0) |

| | | | |
|--------------------|--------------|----------------------------------------------|----------------------------------------------------------|
| pre_approve_type | varchar(32) | NULL | Type of pre-approval. |
| pre_approved_by | smallint | NULL | ID of the user who pre-approved the design. |
| pre_approved_date | datetime | NULL | Date and time when the design was pre-approved. |
| is_pre_approved | bit | NULL | Indicates if the design is pre-approved (1) or not (0). |
| pre_approve_remark | varchar(256) | NULL | Remarks about the pre-approval. |
| pre_approve_status | char(1) | NULL | Status of the pre- approval. |
| is_sketch_lock | bit | NULL | Indicates if the sketch is locked (1) or not (0). |
| is_cad_lock | bit | NULL | Indicates if the CAD design is locked (1) or not (0). |
| CAD_designer_id | smallint | Foreign key references Auth.Users(User_code) | ID of the CAD designer. |
| CAD_issue_by | smallint | NULL | ID of the user who issued the CAD design. |
| CAD_issue_date | datetime | NULL | Date and time when the CAD design was issued. |
| is_CAD_design | bit | NULL | Indicates if it is a CAD design (1) or not (0). |
| is_final_design | bit | NULL | Indicates if it is the final design (1) or not (0). |
| is_final_lock | bit | NULL | Indicates if the final design is locked (1) or not (0). |
| Is_hard_reject | bit | NULL | Indicates if the design is hard rejected (1) or not (0). |

| | | | |
|--------------------|--------------|-----------------------------------------------------------------|----------------------------------------------------|
| Hard_reject_by | smallint | NULL | ID of the user who hard rejected the design. |
| HARD_REJECT_DATE | datetime | NULL | Date and time when the design was hard rejected. |
| HARD_REJECT_REMARK | varchar(256) | NULL | Remarks about the hard rejection. |
| CAD_Software_id | smallint | Foreign key references npd.cad_software_Master(cad_software_id) | ID of the CAD software used. |
| is_sketch_design | bit | NULL | Indicates if it is a sketch design (1) or not (0). |
| HARD_REJECT_TYPE | varchar(16) | NULL | Type of hard rejection. |

Description: Project cad designer mapping table will be used for storing the cad designer entry that is given on this project.

Table 5.8 Npd.Project_CAD_Designer_Mapping

| Column Name | Data Type | Constraints | Description |
|---------------------------------|-----------|--------------------------------------------------------------|-------------------------------------------|
| project_cad_designer_mapping_id | smallint | PRIMARY KEY, NOT NULL | Unique identifier for the mapping record. |
| project_design_id | smallint | Foreign key references npd.project_design(project_Design_id) | ID of the associated project design. |
| cad_designer_id | int | Foreign key references Auth.Users(User_code) | ID of the CAD designer. |
| submit_point | int | NULL | Submission point. |
| total_point | int | NULL | Total points. |
| CAD_issue_by | smallint | NULL | ID of the user who issued the CAD. |

| | | | |
|-----------------|--------------|-----------------------------------------------------------------|------------------------------------------|
| CAD_issue_date | datetime | NULL | Date and time when the CAD was issued. |
| CAD_Software_id | smallint | Foreign key references npd.cad_software_master(cad_software_id) | ID of the CAD software used. |
| Remark | varchar(256) | NULL | Remarks about the mapping. |
| receive_by | smallint | NULL | ID of the user who received the CAD. |
| receive_date | datetime | NULL | Date and time when the CAD was received. |

Description: Project Design Uploads table will be used for storing image url, image detail that use in the project, uploaded by.

Table 5.9 Npd .Project_Design_Uploads

| Column Name | Data Type | Constraints | Description |
|--------------------------|---------------|-----------------------------------------------|---------------------------------------------|
| project_design_upload_id | smallint | PRIMARY KEY, IDENTITY (1,1) | Unique identifier for the design upload. |
| upload_url | varchar(2048) | NOT NULL | URL where the design is uploaded. |
| upload_date | datetime | NULL | Date and time when the design was uploaded. |
| upload_by | smallint | NULL | ID of the user who uploaded the design. |
| project_design_id | smallint | Foreign key references npd.project_designs(Pr | ID of the associated project design. |

| | | | |
|---------------|---------------|-------------------|--------------------------------------|
| | | object_design_id) | |
| detail_url | varchar(2048) | NULL | URL for detailed view of the design. |
| thumbnail_url | varchar(2048) | NULL | URL for the thumbnail of the design. |

Description: Card Movement history table will be used for managing the car movement history.

Table 5.10 Npd.CARD_Movement_History

| Column Name | Data Type | Constraints | Description |
|---------------------------|---------------|---------------------------------------------------------|--------------------------------------------------|
| card_movement_history_id | smallint | PRIMARY KEY, IDENTITY | Unique identifier for the card movement history. |
| card_movement_description | nvarchar(max) | NULL | Description of the card movement. |
| card_action_id | smallint | Foreign key references Npd.card_action (card_action_id) | Reference to the card action ID. |
| component_id | smallint | Foreign key references product.Component(component_id) | Identifier for the component. |
| project_id | smallint | Foreign key references npd.project(project_id) | Identifier for the project. |
| project_design_id | smallint | Foreign key references npd.projects(project_design_id) | Identifier for the project design. |

| | | | |
|---------------|--------------|--------------------------------------------------------|---------------------------------------|
| from_stage_id | smallint | Foreign key references control_center.stages(stage_id) | Identifier for the source stage. |
| to_stage_id | smallint | Foreign key references control_center.stages(stage_id) | Identifier for the destination stage. |
| sp_name | varchar(256) | NULL | Name of the stored procedure. |

Table 5.11 Audit. Pd_Guide_Entry

| Column Name | Data Type | Constraints | Description |
|-------------------------|----------------|---------------------------------------------------------------|---------------------------------------------------------------------|
| audit_pd_guide_entry_id | bigint | PRIMARY KEY, IDENTITY | Unique identifier for the audit record. |
| Action | varchar(64) | NOT NULL | Description of the action performed (e.g., insert, update, delete). |
| pd_guide_entry_id | int | Foreign key references npd.pd_guide_entry(pd_guide_entry_id) | Unique identifier for the PD guide entry. |
| design_id | smallint | Foreign key references npd.project_designs(project_design_id) | Identifier for the design. |
| designfolio_type_id | int | Foreign key references npd.designfolio_type(design_folio_id) | Identifier for the designfolio type. |
| product_size | decimal(12, 3) | NULL | Size of the product. |
| product_type_id | smallint | Foreign key references product.product_type(product_type_id) | Identifier for the product type. |

| | | | |
|------------------------|---------------|----------|--------------------------------------|
| refrence_no | varchar(128) | NULL | Reference number for the product. |
| product_length | varchar(64) | NULL | Length of the product. |
| product_width | varchar(64) | NULL | Width of the product. |
| product_height | varchar(64) | NULL | Height of the product. |
| product_guage | varchar(64) | NULL | Gauge of the product. |
| gender_id | smallint | NOT NULL | Identifier for the gender. |
| design_source | varchar(256) | NULL | Source of the design. |
| design_mechanism | varchar(64) | NULL | Mechanism used in the design. |
| remark | varchar(1024) | NULL | Remarks or notes. |
| stud_part_length | varchar(64) | NULL | Length of the stud part. |
| customer_exclusive | varchar(64) | NULL | Customer-specific exclusive details. |
| customer_not_allowed | varchar(64) | NULL | Customer-specific restrictions. |
| is_invalid | bit | NULL | Indicates if the record is invalid. |
| invalid_remark | varchar(1024) | NULL | Remarks for invalid records. |
| is_locked | bit | NULL | Indicates if the record is locked. |
| is_photo_locked | bit | NULL | Indicates if the photo is locked. |
| is_video_locked | bit | NULL | Indicates if the video is locked. |
| changes_json | text | NULL | JSON data representing changes |
| image_remark | varchar(2048) | NULL | Remarks related to images. |
| hallmark_qty | smallint | NULL | Quantity of hallmarks. |
| other_specification_id | varchar(64) | NULL | Identifier for other specifications. |
| is_request | bit | NOT NULL | Indicates if a request was made. |
| is_approved | bit | NOT NULL | Indicates if the record is approved. |
| is_rejected | bit | NOT NULL | Indicates if the record is rejected. |

| | | | |
|-------------------|--------------|------|-----------------------------------------------------------|
| approved_date | datetime | NULL | Timestamp when the record was approved. |
| approve_reject_by | smallint | NULL | Identifier for the user who approved/rejected the record. |
| reject_remark | varchar(256) | NULL | Remarks for rejection. |
| request_by | smallint | NULL | Identifier for the user who made the request. |
| request_date | datetime | NULL | Timestamp when the request was made. |

Description: Stages is mater table. It's provided different types of stages of project and product.

Table 5.12 Control_Center.Stages

| Column Name | Data Type | Constraints | Description |
|-----------------|--------------|------------------------|----------------------------------------|
| stage_id | smallint | PRIMARY KEY, IDENTIT Y | Unique identifier for the stage. |
| stage_type | varchar(255) | NOT NULL | Type of the stage. |
| stage_name | varchar(255) | NOT NULL | Name of the stage. |
| display_order | int | NULL | Order in which the stage is displayed. |
| stage_key | varchar(128) | NULL | Key for the stage. |
| color_code | varchar(16) | NULL | Color code for the stage. |
| text_color_code | varchar(16) | NULL | Text color code for the stage. |

Description: User master table is a master table that stores a user information.

Table 5.13 Control_Center.User_master

| Column Name | Data Type | Constraints | Description |
|-------------------|--------------|--------------------------|---------------------------------|
| user_id | smallint | PRIMARY KEY, IDENTITY | Unique identifier for the user. |
| employee_code | varchar(128) | NOT NULL | Code for the employee. |
| first_name | varchar(32) | NOT NULL | First name of the user. |
| middle_name | varchar(32) | NULL | Middle name of the user. |
| last_name | varchar(32) | NULL | Last name of the user. |
| user_name | varchar(512) | NOT NULL | Username of the user. |
| date_of_birthdate | date | NULL | Date of birth of the user. |
| user_email | varchar(256) | NULL | Email of the user. |
| contact_number | varchar(10) | NULL | Contact number of the user. |
| date_of_joining | date | NULL | Date of joining of the user. |
| user_password | varchar(512) | NULL | Password of the user. |

5.2 SCREEN LAYOUT

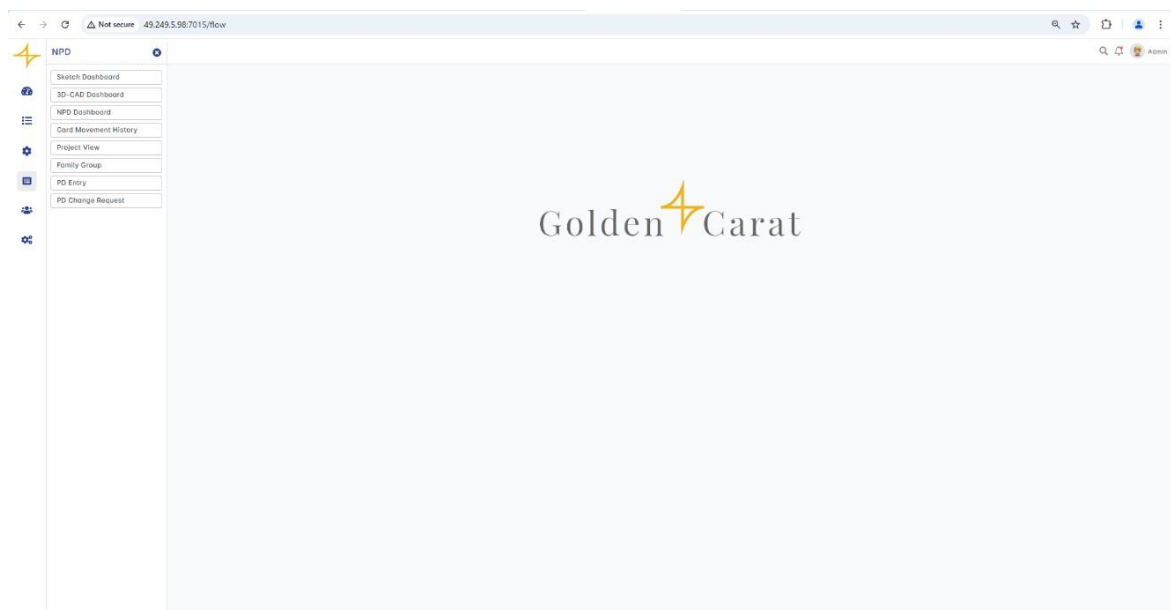


Fig 5.7 Dashboard

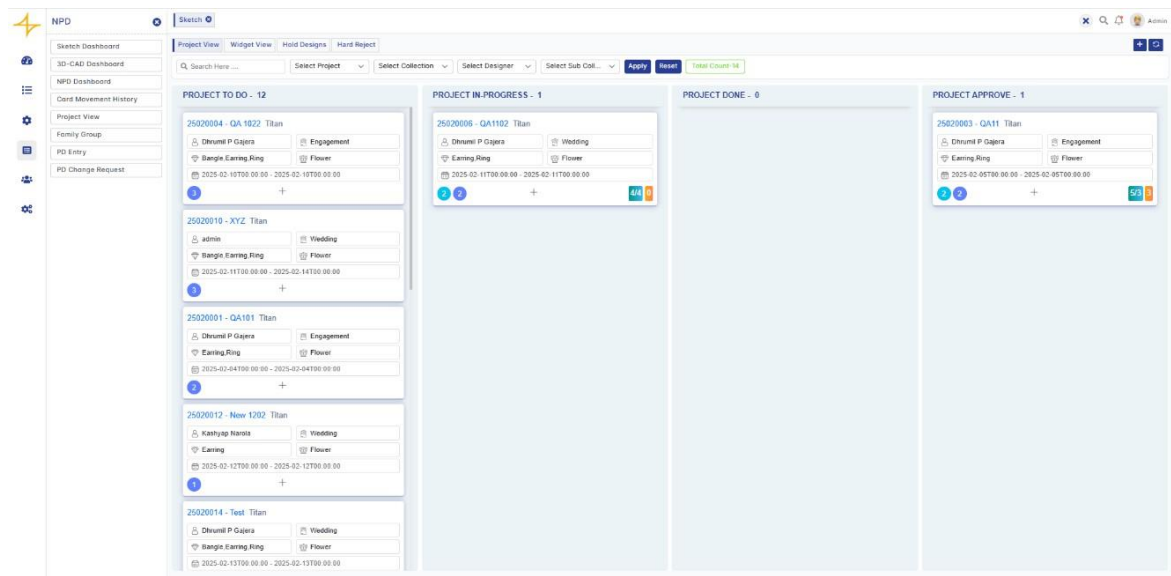


Fig 5.8 Sketch Dashboard

Record saved successfully

Project Master

Project Key: 25020015

Project Name: Test NPD

Head Name: Dhruv P. Gajera

Project Coordinator: Kashyap Narola

Collection: Wedding

Sub Collection: Flower

Category: Ring, Earring

Metal Type: Gold

Remark:

Start Date: 13-02-2025

Proposed Complete Date: 18-02-2025

Final End Date: 18-02-2025

Actual Complete Date: 20-02-2025

Priority: Urgent

Metal Carat: 24KT (9980), 24KT (9999)

Project Details Master

Category: Select...

Fig 5.9 New Project Detail

Record saved successfully

Project Master

Project Key: 25020015

Project Name: Test NPD

Head Name: Dhruv P. Gajera

Project Coordinator: Kashyap Narola

Collection: Wedding

Sub Collection: Flower

Category: Ring, Earring

Metal Type: Gold

Remark:

Start Date: 13-02-2025

Proposed Complete Date: 18-02-2025

Final End Date: 18-02-2025

Actual Complete Date: 20-02-2025

Priority: Urgent

Metal Carat: 24KT (9980), 24KT (9999)

Project Details Master

Category: Ring

From Price: 20000

To Price: 30000

From Metal Weight: 15.90

To Metal Weight: 20.90

From Diamond Weight: 30.15

To Diamond Weight: 35.90

Remark:

Project Details

Stone Component Material

Stone Detail

| Sr. | Size Type | Stone Type | Shape | Cut | Size | Is Used | Action |
|-----|-----------|------------|-------|-------------|----------------|-------------------------------------|--------|
| 1 | P | Diamond | ROUND | Single Cut | 0.80*0.00*0.00 | <input checked="" type="checkbox"/> | |
| 2 | P | Diamond | ROUND | Diamond Cut | 0.80*0.00*0.00 | <input type="checkbox"/> | |

Fig 5.10 Enter Details

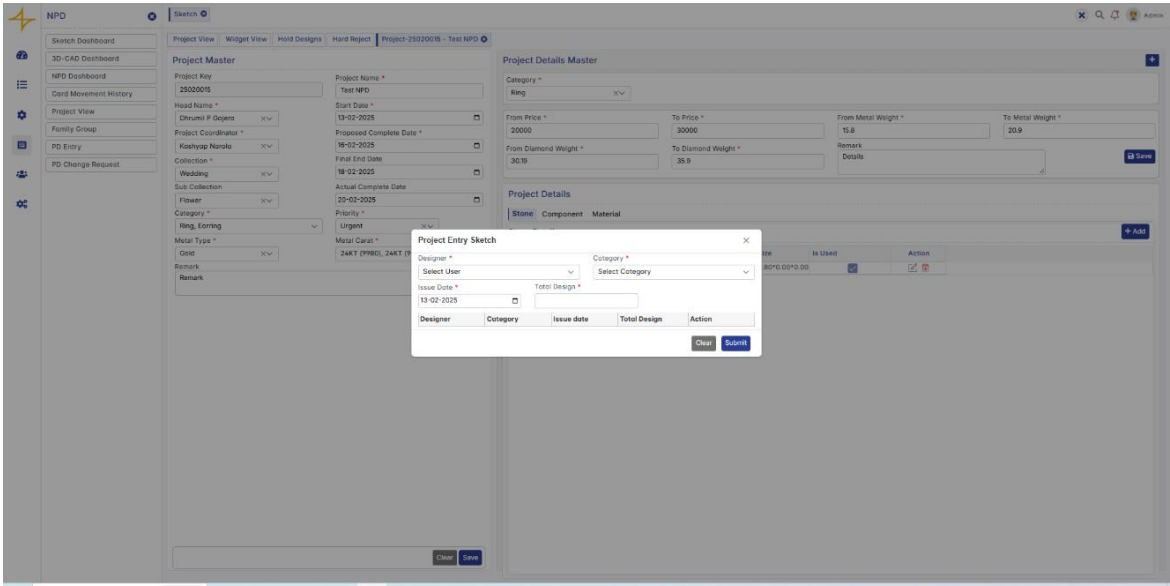


Fig 5.11 Designer Assign Page

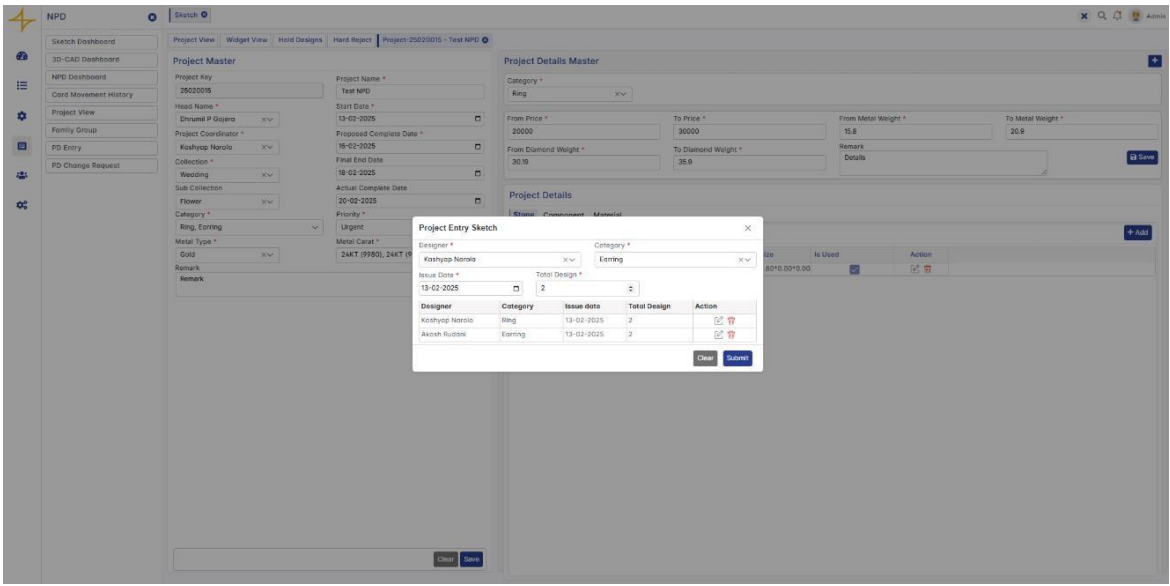


Fig 5.12 Enter Designer Assign Detail

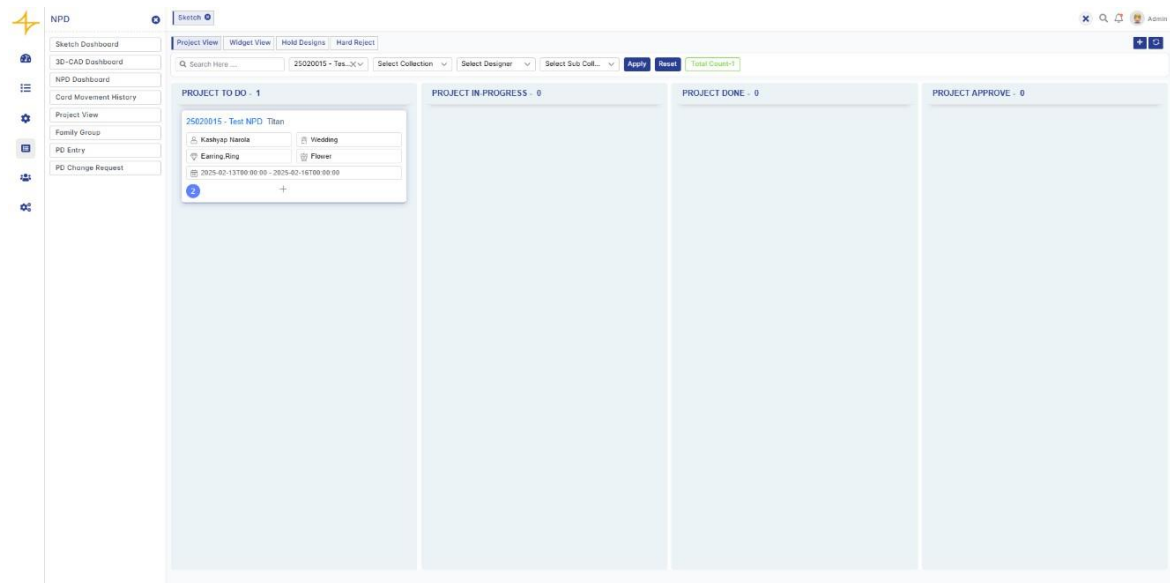


Fig 5.13 Sketch Dashboard Show New Project

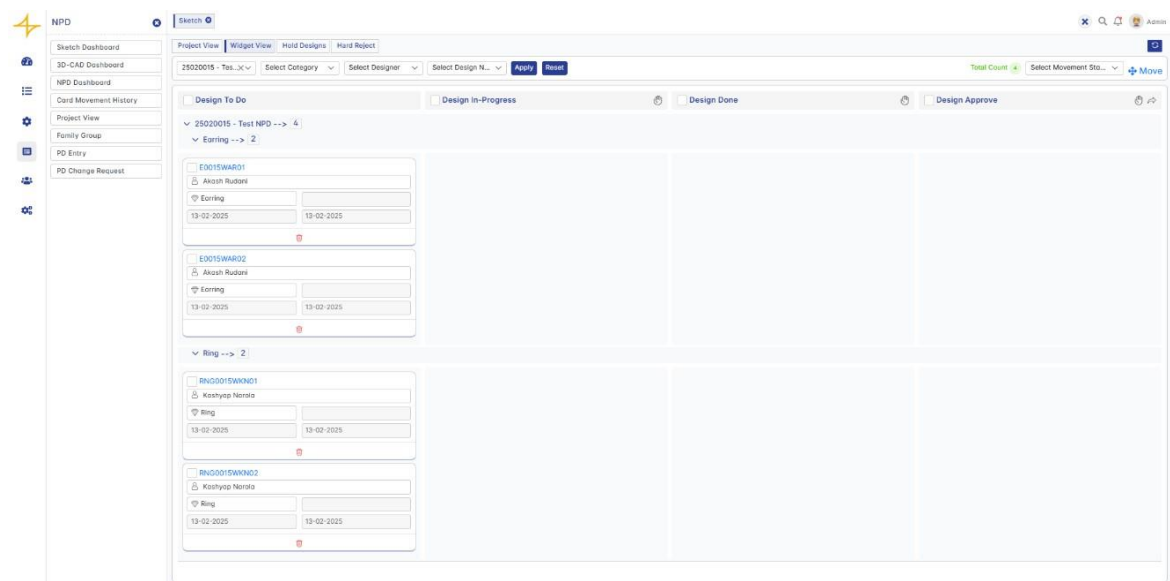


Fig 5.14 Widget View

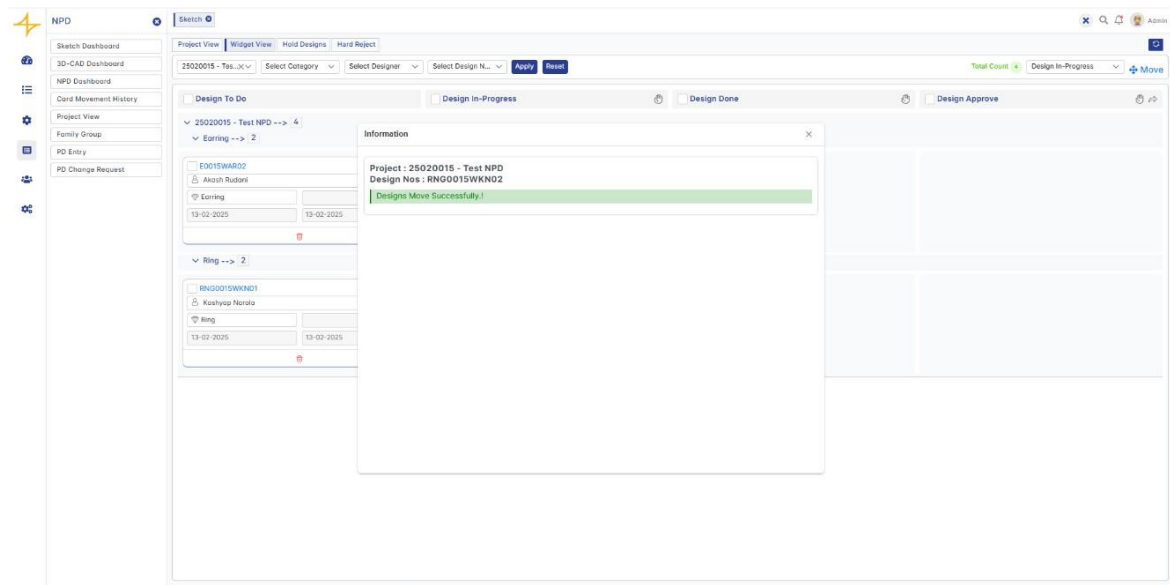


Fig 5.15 Card Move in Progress Stage

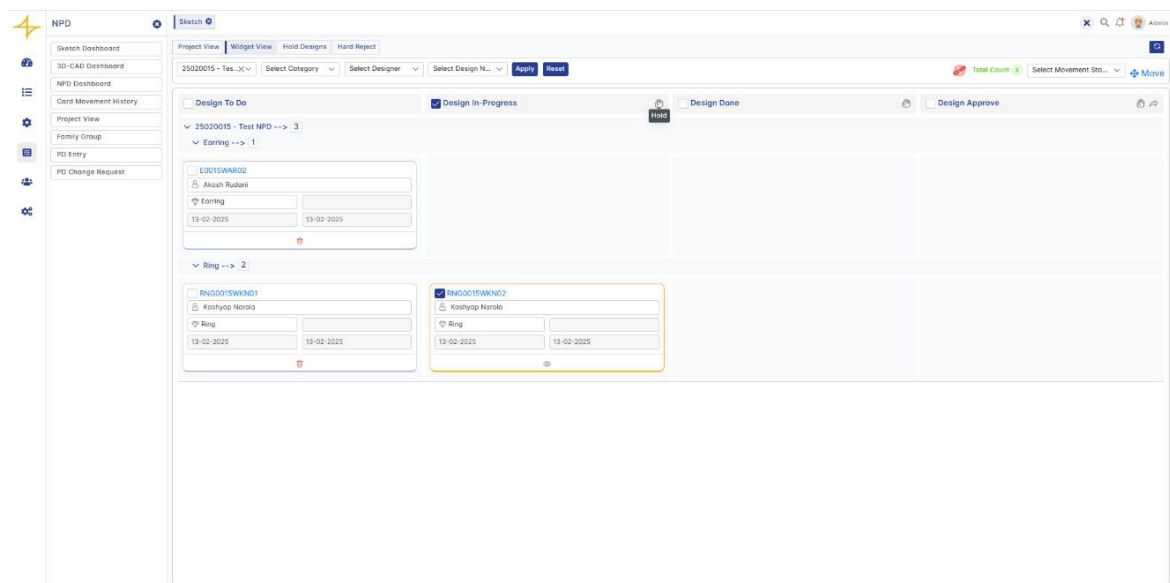


Fig 5.16 Card Move in Hold Stage

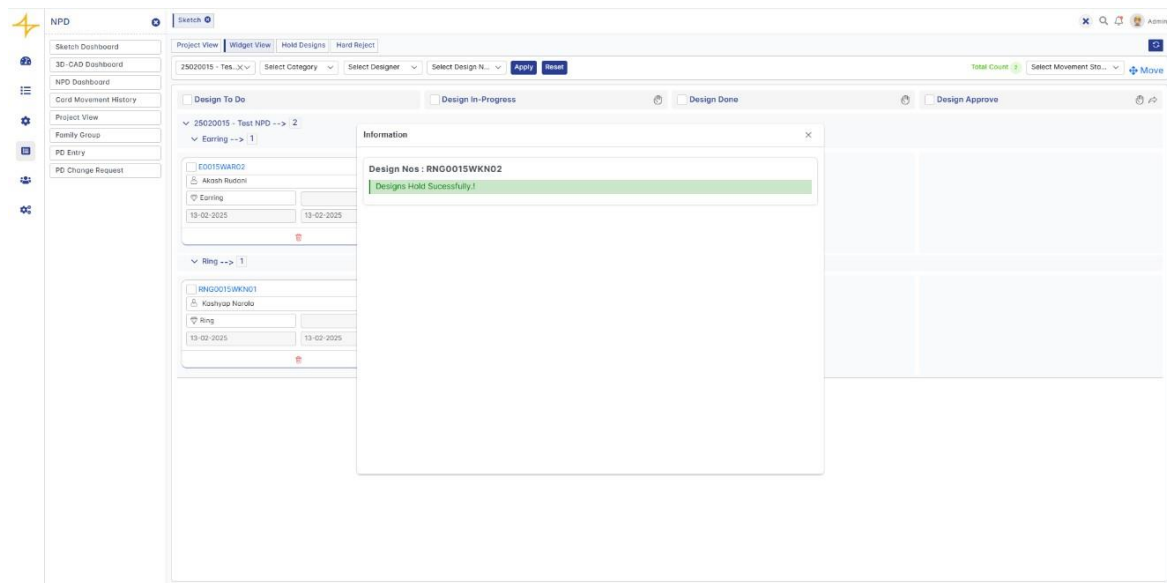


Fig 5.17 Hold Validation

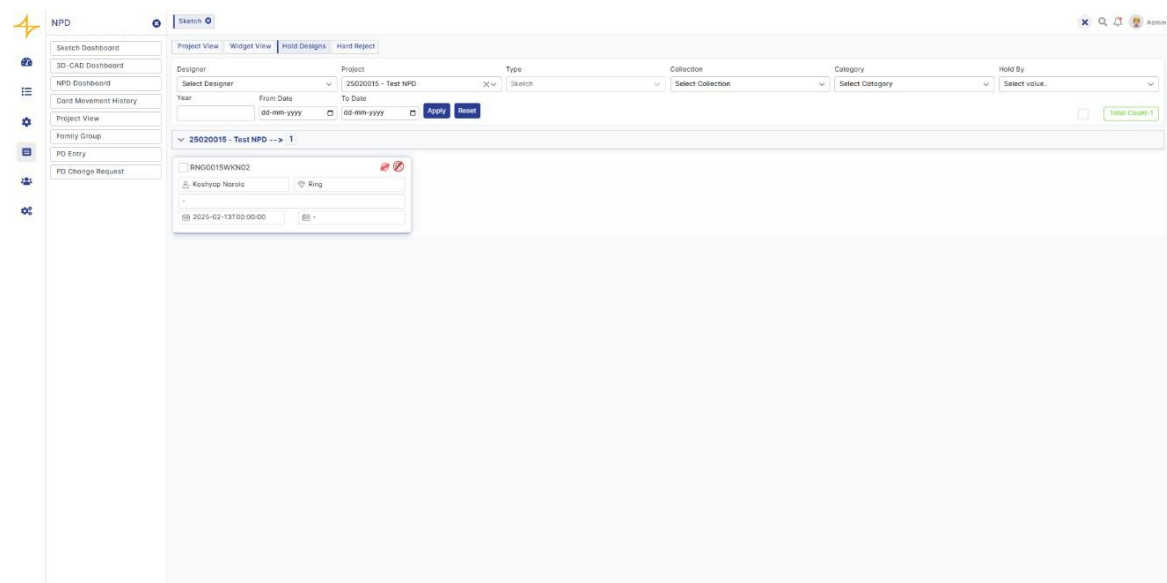


Fig 5.18 Hold Page

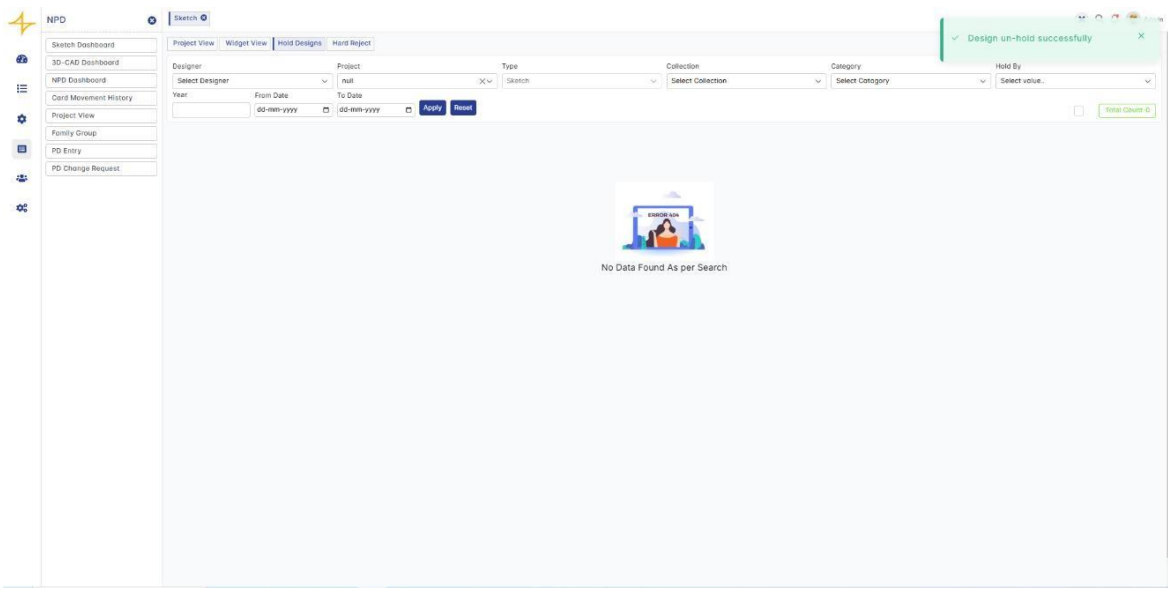


Fig 5.19 Un-hold Validation

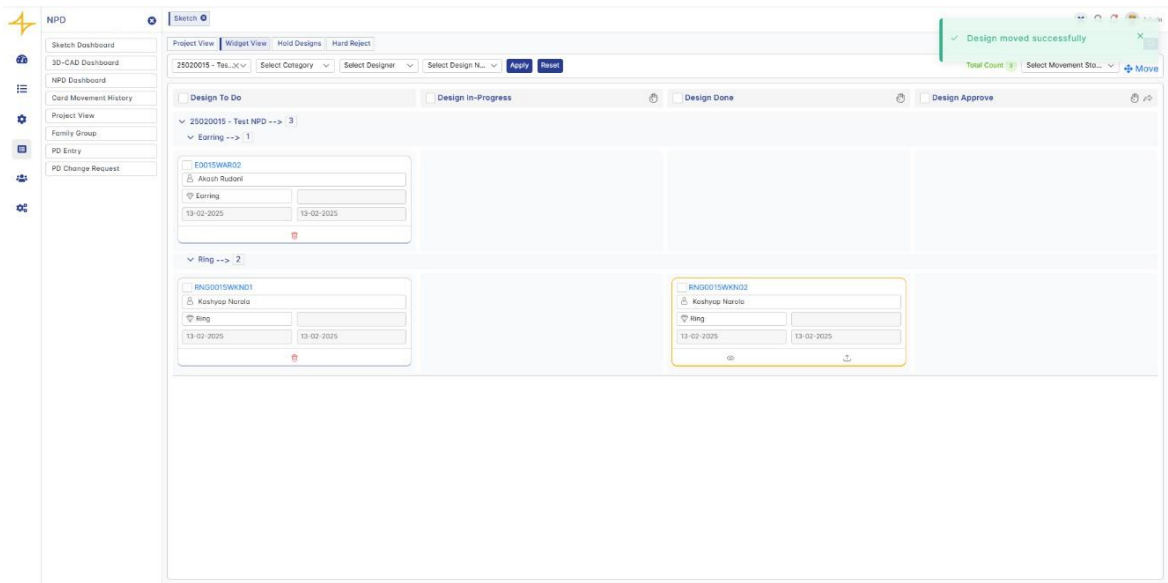


Fig 5.20 Card Move Done Stage

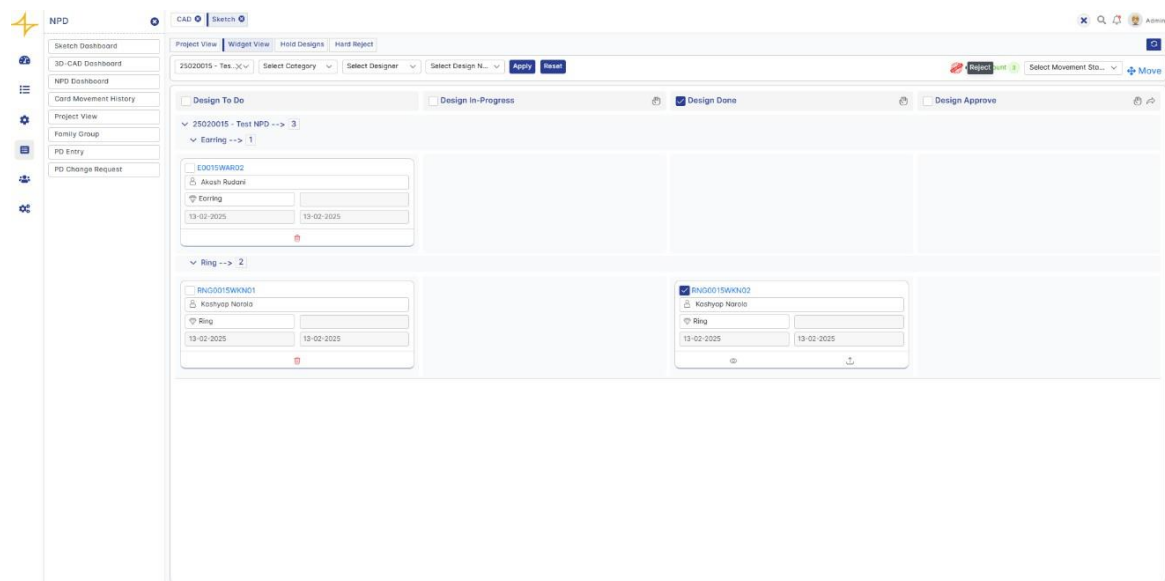


Fig 5.21 Card in Reject Stage

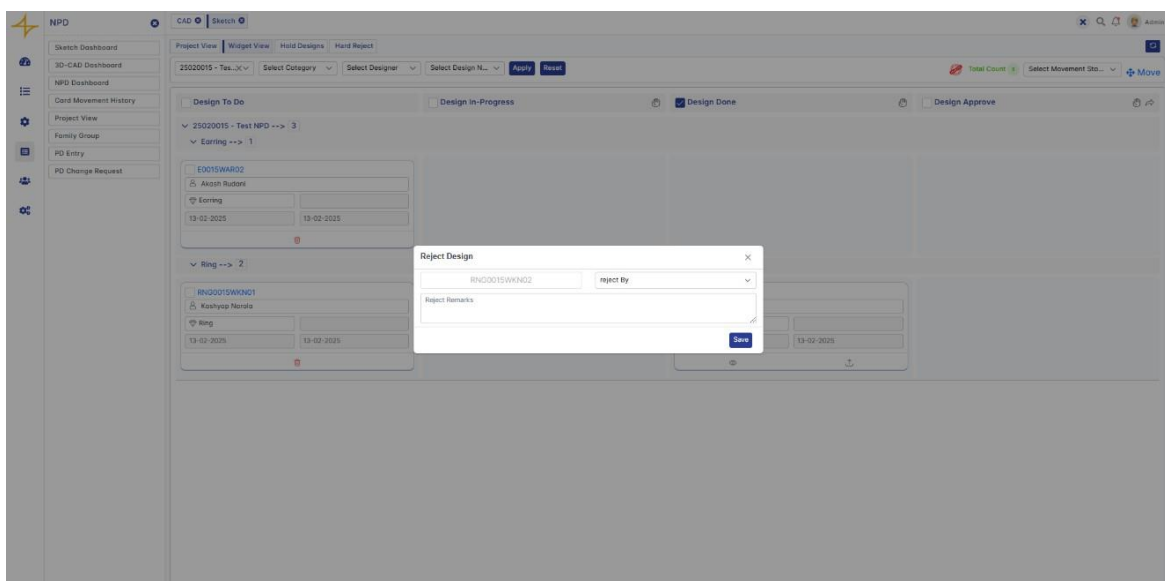


Fig 5.22 Rejected Design Popup

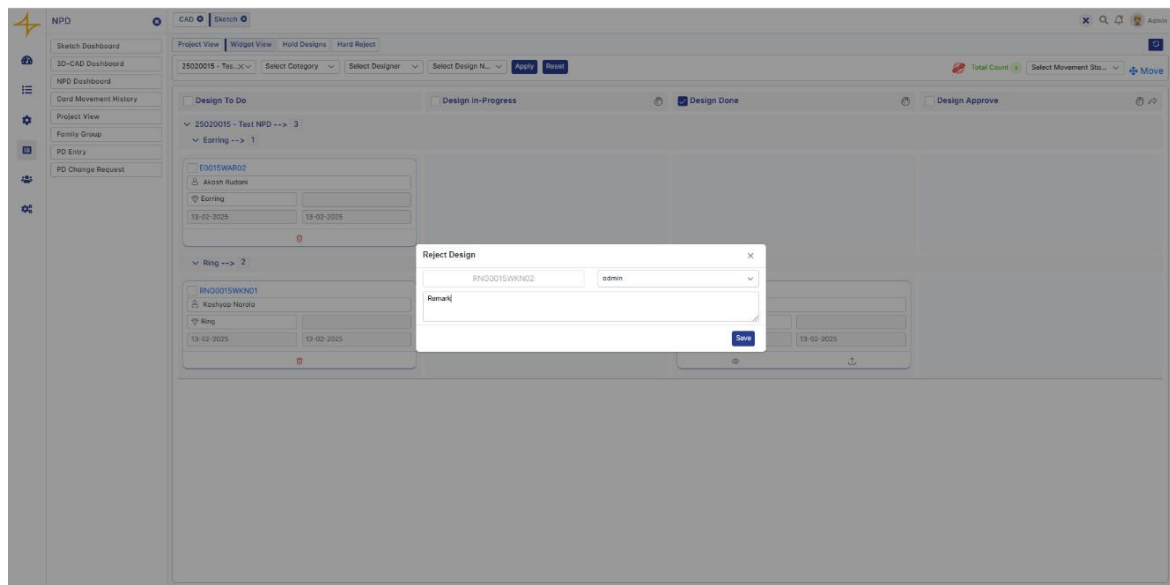


Fig 5.23 Add Rejected Detail in Popup

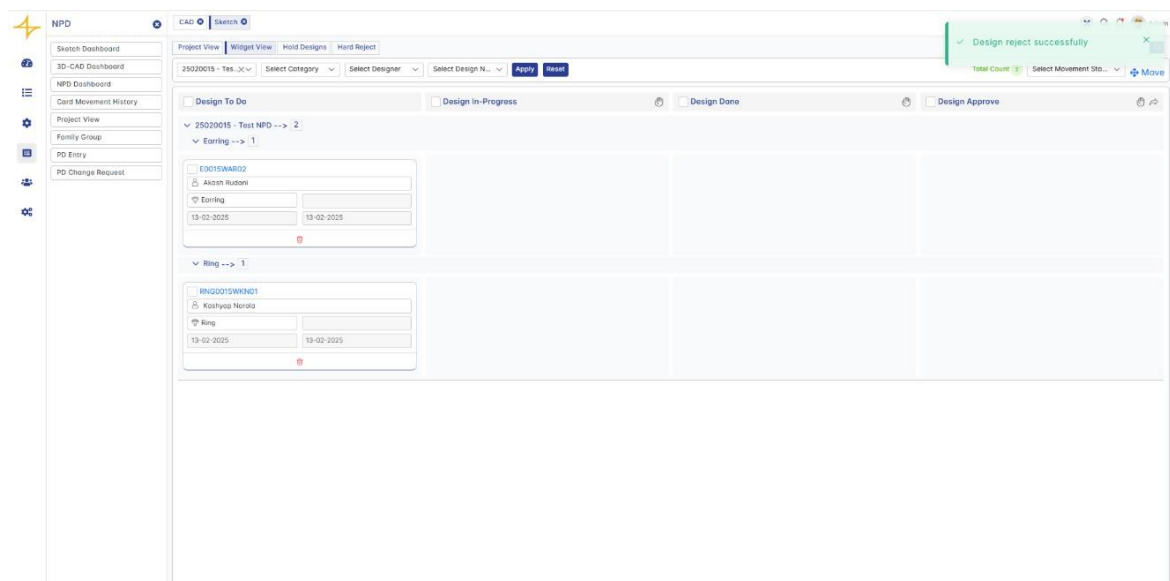


Fig 5.24 Reject Design Validation

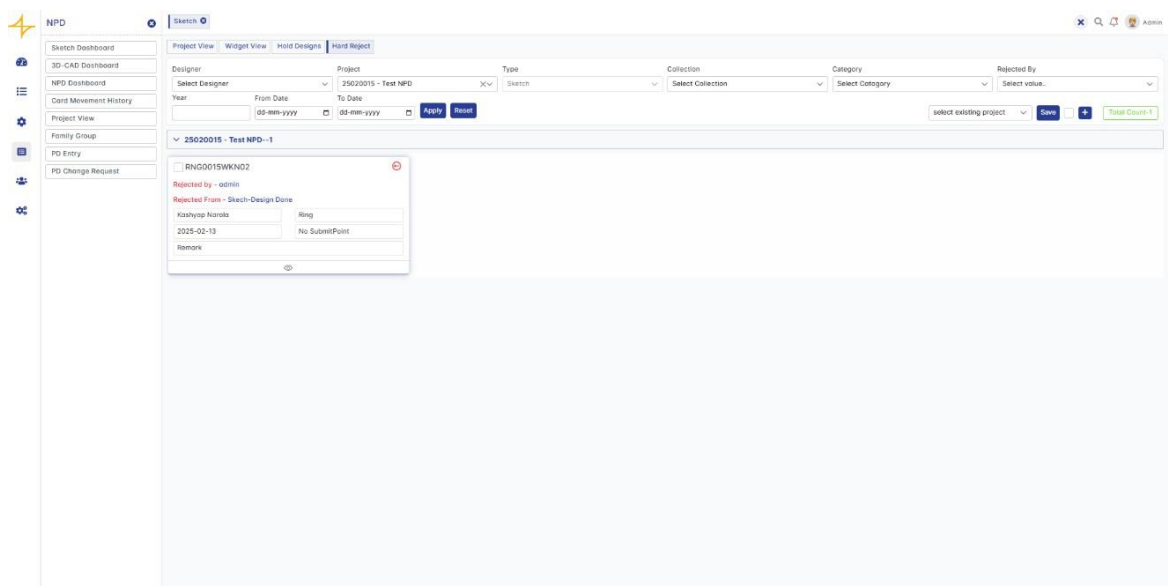


Fig 5.25 Hard Reject Page

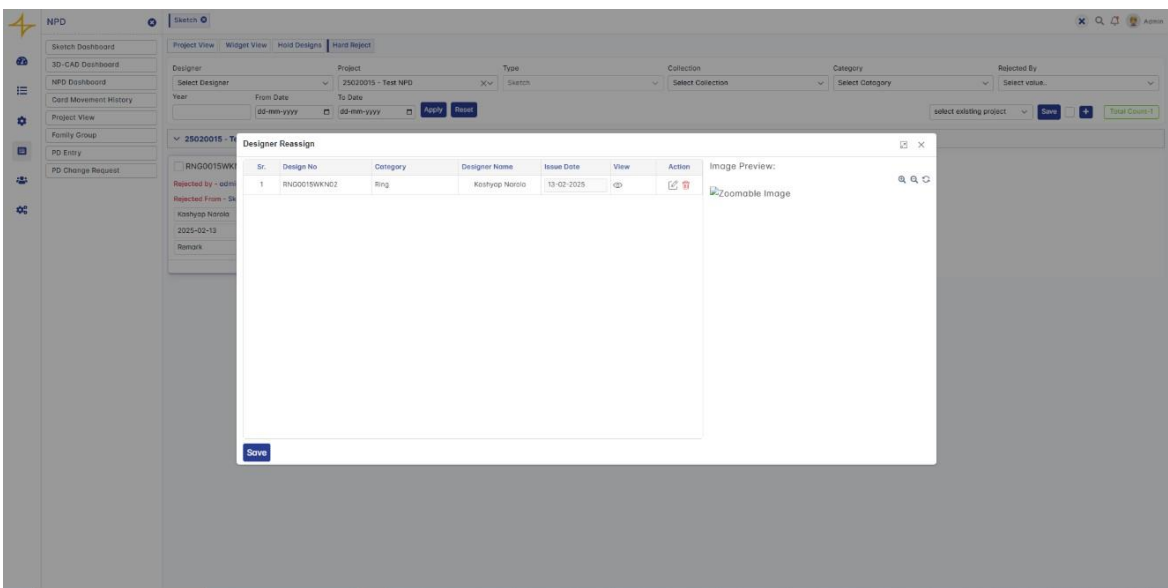


Fig 5.26 Un-Rejected Page

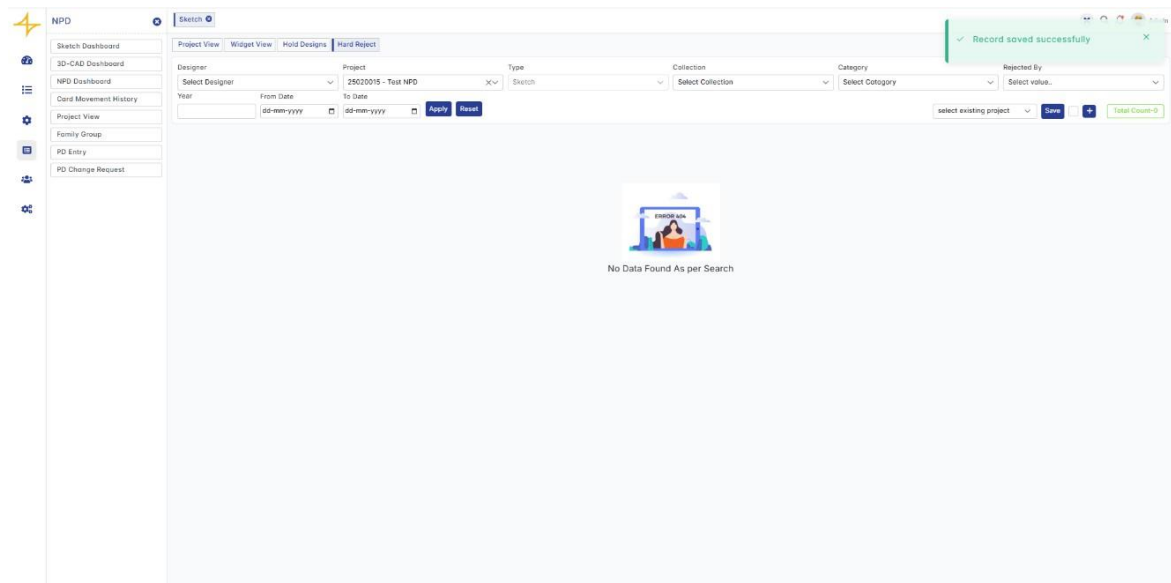


Fig 5.27 Unrejected Validation

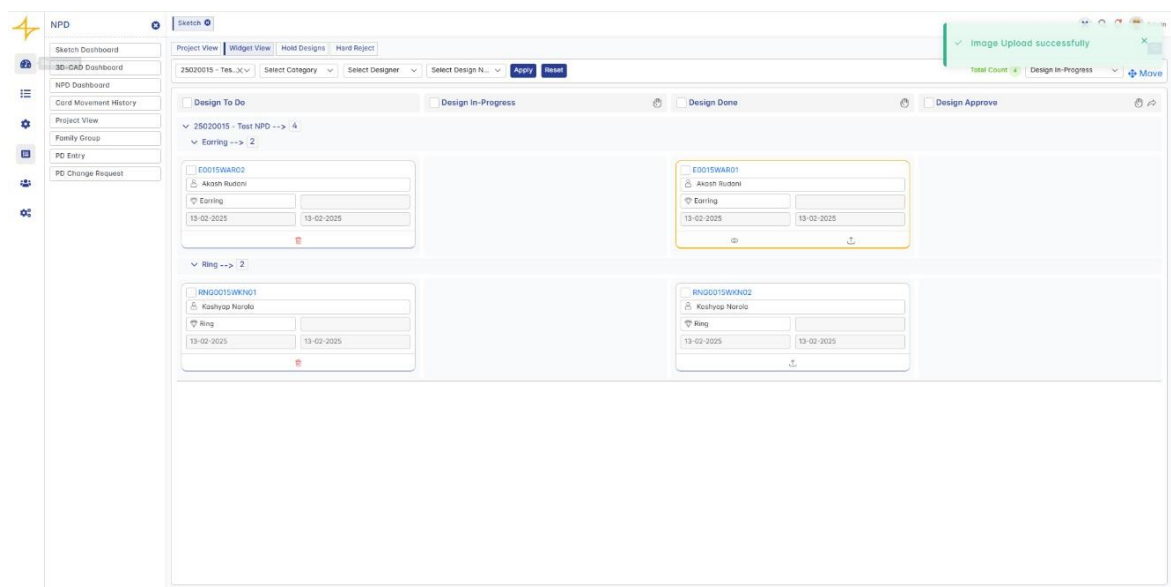


Fig 5.28 Image Upload

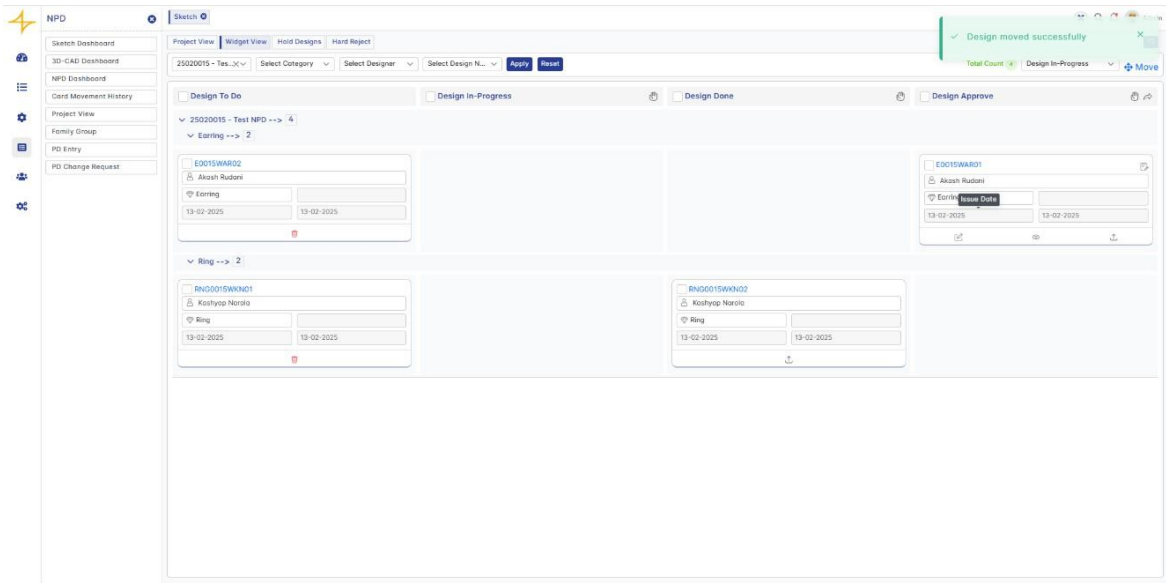


Fig 5.29 Card Move to Approved Stage

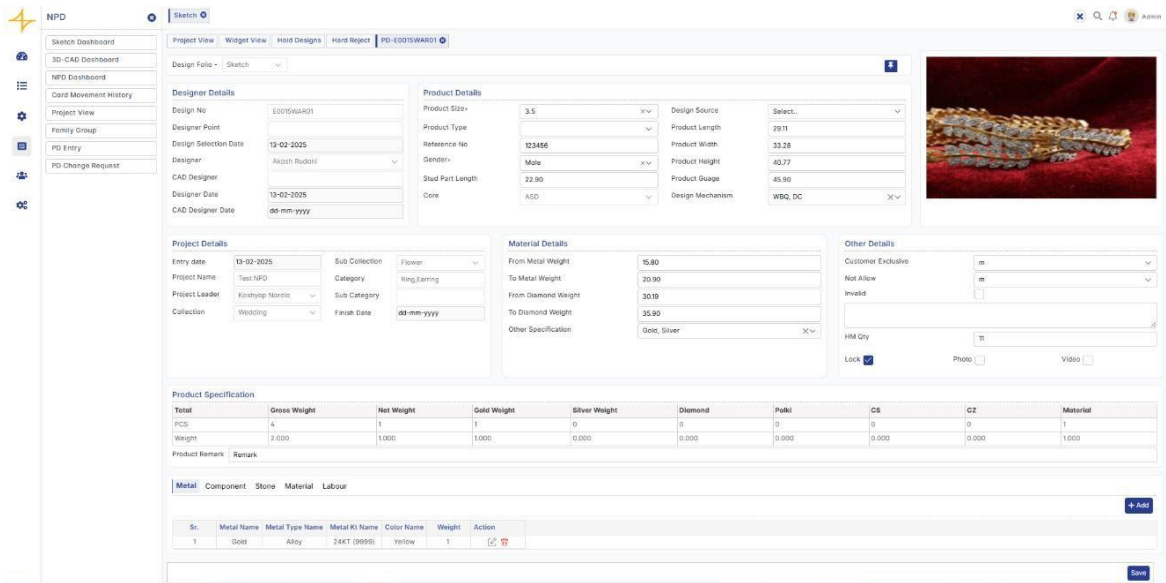


Fig 5.30 PD Entry Detail

Designer Details

Design No: E0010W401
 Designer Point: 13-02-2025
 Design Selection Date: 13-02-2025
 Designer: Akash Radoni
 CAD Designer: 13-02-2025
 CAD Designer Date: 09-mm-yyyy

Product Details

Product Size: 3.5
 Product Type: 123456
 Reference No: Male
 Gender: 22.90
 Stud Part Length: ASD
 Core: 3.5
 Design Source: Select...
 Product Length: 29.11
 Product Width: 33.28
 Product Height: 43.77
 Product Gauge: 45.90
 Design Mechanism: WSQ, DC

Project Details

Entry date: 13-02-2025
 Project Name: Test NPD
 Project Leader: Kishayap Narani
 Collection: Wedding
 Sub Collection: Flower
 Category: Ring, Earring
 Sub Category: 09-mm-yyyy
 Finish Date: 09-mm-yyyy

Material Details

From Metal Weight: 15.80
 To Metal Weight: 20.90
 From Diamond Weight: 30.39
 To Diamond Weight: 35.90
 Other Specification: Gold, Silver

Other Details

Customer Exclusive: m
 Not Allow: m
 Invalid: ☐
 HM Qty: 11
 Lock: ☒
 Photo: ☐
 Video: ☐

Product Specification

| Total | Gross Weight | Net Weight | Gold Weight | Silver Weight | Diamond | Pukli | CS | CZ | Material |
|--------|--------------|------------|-------------|---------------|---------|-------|-------|-------|----------|
| PCS | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Weight | 2.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |

Metal Component Stone Material Labour

| Sr | Type Desc | Component No | Size | Metal Type No | Metal Kt Name | Color Name | Unit | Labour | Pcs | Std. Wt | Weight | Action |
|----|-----------|--------------|------|---------------|---------------|------------|------|---------|-----|---------|--------|--------|
| 1 | PLATE | ROUND | 1.5 | Gold | 24KT (9990) | Yellow | GMS | Wax Set | 1 | 1 | 1 | |

Fig 5.31 Component Detail

Designer Details

Design No: E0010W401
 Designer Point: 13-02-2025
 Design Selection Date: 13-02-2025
 Designer: Akash Radoni
 CAD Designer: 13-02-2025
 CAD Designer Date: 09-mm-yyyy

Product Details

Product Size: 3.5
 Product Type: 123456
 Reference No: Male
 Gender: 22.90
 Stud Part Length: ASD
 Core: 3.5
 Design Source: Select...
 Product Length: 29.11
 Product Width: 33.28
 Product Height: 43.77
 Product Gauge: 45.90
 Design Mechanism: WSQ, DC

Project Details

Entry date: 13-02-2025
 Project Name: Test NPD
 Project Leader: Kishayap Narani
 Collection: Wedding
 Sub Collection: Flower
 Category: Ring, Earring
 Sub Category: 09-mm-yyyy
 Finish Date: 09-mm-yyyy

Material Details

From Metal Weight: 15.80
 To Metal Weight: 20.90
 From Diamond Weight: 30.39
 To Diamond Weight: 35.90
 Other Specification: Gold, Silver

Other Details

Customer Exclusive: m
 Not Allow: m
 Invalid: ☐
 HM Qty: 11
 Lock: ☒
 Photo: ☐
 Video: ☐

Product Specification

| Total | Gross Weight | Net Weight | Gold Weight | Silver Weight | Diamond | Pukli | CS | CZ | Material |
|--------|--------------|------------|-------------|---------------|---------|-------|-------|-------|----------|
| PCS | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Weight | 2.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |

Metal Component Stone Material Labour

| Sr | Shape | Quality | Color Name | Cut | Size | Stone Size Type | New Size | Unit | Labour Type | Fix Size | Pcs | Standard Weight | Weight | Wax Qty | Hnd. Qty | Fix Size | Action |
|----|-------|---------|------------|------------|----------------|-----------------|----------------|------|-------------|----------|-----|-----------------|--------|---------|----------|----------|--------|
| 1 | ROUND | VVS1 | EF | Single Cut | 0.80*0.00*0.00 | P | 0.80*0.00*0.00 | CTS | Hand Set | H | 2 | 1 | 11 | 1 | 1 | | |

Fig 5.32 Stone Detail

Designer Details

Design No: E0010WAB01
 Designer Point: Test NPD
 Design Selection Date: 13-02-2025
 Designer: Akash Rudoni
 CAD Designer: 13-02-2025
 CAD Designer Date: dd-mm-yyyy

Product Details

Product Size: 3.5
 Product Type: 123456
 Reference No: Male
 Stud Part Length: 22.90
 Core: ASD
 Design Source: Select...
 Product Length: 28.11
 Product Width: 33.28
 Product Height: 40.77
 Product Gauge: 45.90
 Design Mechanism: WSG, DC

Project Details

Entry date: 13-02-2025
 Project Name: Test NPD
 Project Leader: Kishayap Naroli
 Collection: Wedding
 Sub Collection: Flower
 Category: Ring, Earring
 Sub Category:
 Finish Date: dd-mm-yyyy

Material Details

From Metal Weight: 15.80
 To Metal Weight: 20.90
 From Diamond Weight: 30.19
 To Diamond Weight: 35.90
 Other Specification: Gold, Silver

Other Details

Customer Exclusive: m
 Not Allow: m
 Invalid:
 HM Qty: 11
 Lock: ☒ Photo: ☐ Video: ☐

Product Specification

| Total | Gross Weight | Net Weight | Gold Weight | Silver Weight | Diamond | Paki | CS | CZ | Material |
|--------|--------------|------------|-------------|---------------|---------|-------|-------|-------|----------|
| PCS | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Weight | 1,000 | 1,000 | 1,000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Product Remark: Remark

Material Labour

| Sr. | Type Desc | Description | Size | Unit | Labour Type | Pcs | Weight | Action |
|-----|-----------|-------------|------|------|-------------|-----|--------|--------|
| 1 | Enamel | Enamel | 1 | GMS | Prong | 2 | 1 | |

Fig 5.33 Material Details

Designer Details

Design No: E0010WAB01
 Designer Point: Test NPD
 Design Selection Date: 13-02-2025
 Designer: Akash Rudoni
 CAD Designer: 13-02-2025
 CAD Designer Date: dd-mm-yyyy

Product Details

Product Size: 3.5
 Product Type: 123456
 Reference No: Male
 Stud Part Length: 22.90
 Core: ASD
 Design Source: Select...
 Product Length: 28.11
 Product Width: 33.28
 Product Height: 40.77
 Product Gauge: 45.90
 Design Mechanism: WSG, DC

Project Details

Entry date: 13-02-2025
 Project Name: Test NPD
 Project Leader: Kishayap Naroli
 Collection: Wedding
 Sub Collection: Flower
 Category: Ring, Earring
 Sub Category:
 Finish Date: dd-mm-yyyy

Material Details

From Metal Weight: 15.80
 To Metal Weight: 20.90
 From Diamond Weight: 30.19
 To Diamond Weight: 35.90
 Other Specification: Gold, Silver

Other Details

Customer Exclusive: m
 Not Allow: m
 Invalid:
 HM Qty: 11
 Lock: ☒ Photo: ☐ Video: ☐

Product Specification

| Total | Gross Weight | Net Weight | Gold Weight | Silver Weight | Diamond | Paki | CS | CZ | Material |
|--------|--------------|------------|-------------|---------------|---------|-------|-------|-------|----------|
| PCS | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| Weight | 2,000 | 1,000 | 1,000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1,000 |

Product Remark: Remark

Labour

| Sr. | Type Desc | Lab. Desc. | Unit | Action |
|-----|-----------|------------|------|--------|
| 1 | Prong | CASTING | GMS | |

Fig 5.34 Labour Detail

Designer Details

Design No: C00056501
 Designer Point:
 Design Selection Date: 13-02-2025
 Designer: Akash Rudrol
 CAD Designer:
 Designer Date: 13-02-2025
 CAD Designer Date: 00-mm-yyyy

Product Details

Product Size: 3.5
 Product Type:
 Reference No: 103456
 Gender: Male
 Stud Part Length: 22.90
 Core: ASD
 Design Source: Select...
 Product Length: 29.11
 Product Width: 33.28
 Product Height: 40.77
 Product Gauge: 45.80
 Design Mechanism: WSD, DC

Project Details

Entry date: 13-02-2025
 Project Name: Test NPD
 Project Leader: Kashyap Narola
 Collection: Wedding
 Sub Collection: Flower
 Category: Ring, Earring
 Sub Category:
 Finish Date: 00-mm-yyyy

Material Details

From Metal Weight: 15.80
 To Metal Weight: 20.90
 From Diamond Weight: 30.19
 To Diamond Weight: 35.90
 Other Specification: Gold, Silver

Other Details

Customer Exclusive: m
 Not Allow: m
 Invalid:
 HM Qty: 11
 Lock: ☒ Photo: ☐ Video: ☐

Product Specification

| Total | Gross Weight | Net Weight | Gold Weight | Silver Weight | Diamond | Pulki | CS | CZ | Material |
|--------|--------------|------------|-------------|---------------|---------|-------|-------|-------|----------|
| PCS | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Weight | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Product Remark: Remark

Metal Component Stone Material Labour

| Sr. | Metal Name | Metal Type Name | Metal K1 Name | Color Name | Weight | Action |
|-----|------------|-----------------|---------------|------------|--------|--------|
| 1 | Gold | Alloy | 24KT (9999) | Yellow | 1 | |

Save

Fig 5.35 Save PD Entry

Designer Details

Design No: R000056502
 Designer Point:
 Design Selection Date: 13-02-2025
 Designer: Kashyap Narola
 CAD Designer:
 Designer Date: 13-02-2025
 CAD Designer Date: 00-mm-yyyy

Product Details

Product Size:
 Product Type:
 Reference No:
 Gender:
 Stud Part Length:
 Core: ASD
 Design Source: Select...
 Product Length:
 Product Width:
 Product Height:
 Product Gauge:
 Design Mechanism: Select...

Project Details

Entry date: 13-02-2025
 Project Name: Test NPD
 Project Leader: Kashyap Narola
 Collection: Wedding
 Sub Collection: Flower
 Category: Ring, Earring
 Sub Category:
 Finish Date: 00-mm-yyyy

Material Details

From Metal Weight: 15.8
 To Metal Weight: 20.9
 From Diamond Weight: 30.19
 To Diamond Weight: 35.9
 Other Specification: Select.....

Other Details

Customer Exclusive: m
 Not Allow: m
 Invalid:
 HM Qty:
 Lock: ☐ Photo: ☐ Video: ☐

Product Specification

| Total | Gross Weight | Net Weight | Gold Weight | Silver Weight | Diamond | Pulki | CS | CZ | Material |
|--------|--------------|------------|-------------|---------------|---------|-------|-------|-------|----------|
| PCS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Weight | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Product Remark:
 Remark

Metal Component Stone Material Labour

| Sr. | Metal Name | Metal Type Name | Metal K1 Name | Color Name | Weight | Action |
|-------------------|------------|-----------------|---------------|------------|--------|--------|
| Grid has no data. | | | | | | |

Save

Fig 5.36 PD Entry Page

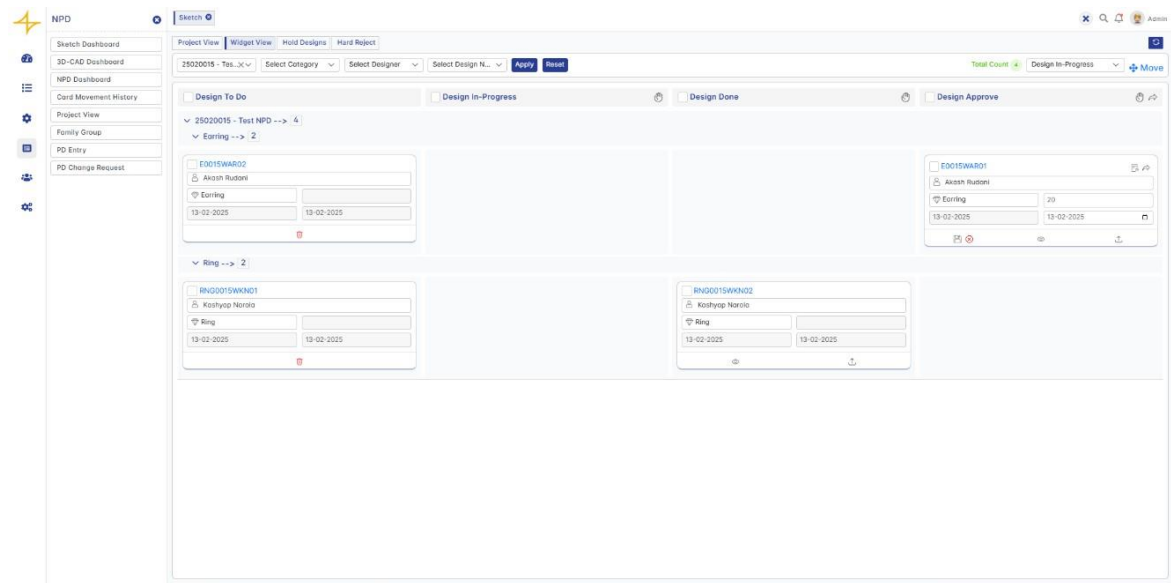


Fig 5.37 Add Point

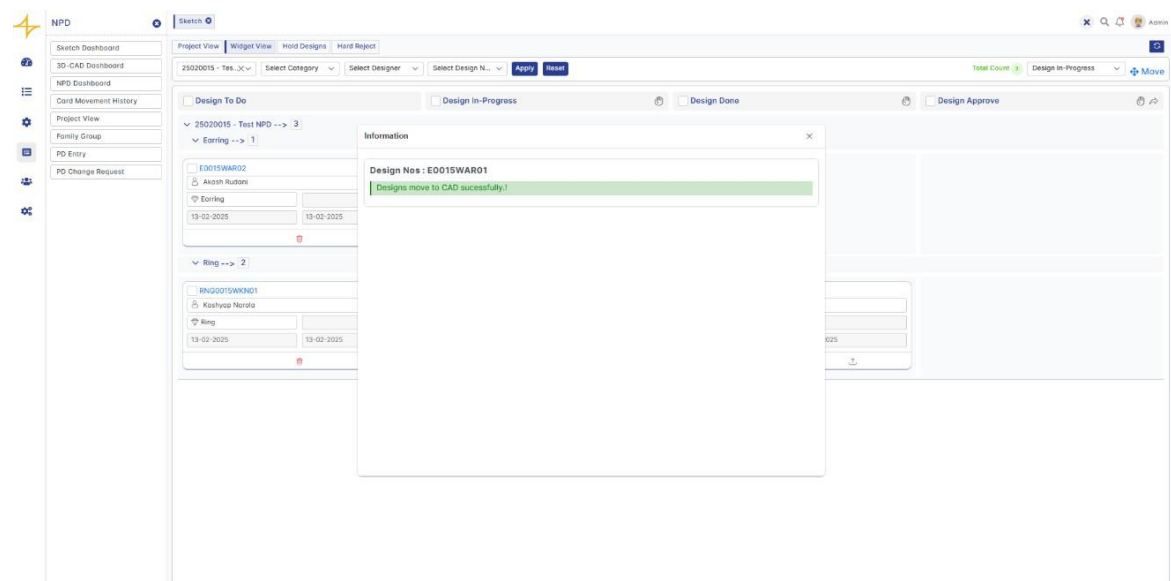


Fig 5.38 Card Move to CAD

6. SYSTEM IMPLEMENTATION AND TESTING

- System implementation and testing play a crucial role in ensuring the system operates efficiently, meets user requirements, and is free from critical defects. This chapter outlines the coding standards, testing methodologies, test suite design, and test cases used to validate the system.

6.1 CODING STANDARDS

To ensure consistency, maintainability, and readability of the code, the following coding standards are followed:

6.1.1 General Coding Guidelines

- Code Readability – Code should be well-structured with proper indentation and meaningful variable names.
- Commenting and Documentation – Every function or module should include comments explaining its purpose and usage.
- Naming Conventions – Use camelCase for variables and functions (e.g., `calculateTotalPrice()`), and PascalCase for classes (e.g., `UserProfile`).
- Error Handling – Proper error handling mechanisms should be implemented using try-catch blocks or validation checks.
- Modularization – Code should be divided into reusable functions and modules to enhance maintainability.
- Security Best Practices – Avoid hardcoding sensitive information, use encryption where necessary, and follow secure coding practices.

6.1.2 Language-Specific Standards

- For JavaScript: Use ESLint to maintain code quality.
- For SQL Queries: Use proper indentation and avoid using `SELECT *` for better query performance.

6.2 TESTING METHODS

Testing is performed to ensure the system functions correctly and meets the requirements. The following testing methods are used:

6.2.1 Unit Testing

- Individual components and functions are tested independently to verify their correctness.
- Automated testing frameworks like JUnit (for Java) may be used.

6.2.2 Integration Testing

- Verifies the interaction between different modules of the system.
- Ensures seamless data flow and proper communication between system components.

6.2.3 System Testing

- A complete system test is conducted to verify that the entire application functions as intended.
- Includes both functional and non-functional testing.

6.2.4 User Acceptance Testing (UAT)

- Real users test the system to validate that it meets their needs and expectations.
- Feedback is collected and necessary modifications are made before final deployment.

6.3 TEST CASES AND RESULT

Table 6.14 Sketch Module

| Test Case ID | Method Name | Description | Input Data | Expected Result | Actual Result | Status |
|--------------|----------------------------------|------------------------------------------------------|-----------------------------------------------|------------------------------------|------------------------------------|--------|
| TC01 | Upsert Project master | New project entry. | Valid data entry fields | New project created successfully. | New project created successfully. | Pass |
| TC02 | Upsert Project master | New project entry with missing fields | Valid data enter except some mandatory fields | New project not created | New project not created | Pass |
| TC03 | Upsert Project AssignTo Designer | Inserts or updates project assignments to a designer | Valid designer name | Designer Assign Successfully | Designer Assign Successfully | Pass |
| TC04 | Assign Design Delete | Deletes a design assignment | Select the design to delete | Assigned Design removed | Assigned Design removed | Pass |
| TC05 | Project Design Hard Reject | Hard rejects a project design | Select the design to reject | Design Rejected successfully | Design Rejected successfully | Pass |
| TC06 | Get PD Entry Details | Retrieve the new Added Product details | Access the PD section | Entry Details display successfully | Entry Details display successfully | Pass |
| TC07 | Image Upload | Upload the image of the designs | Select an image to upload | Image upload successfully | Image upload successfully | Pass |
| TC08 | Project Design Hold_Unhold | Holds a project design. | Select the design to hold | Design hold successfully | Design hold successfully | Pass |
| TC09 | Upsert PD | Upsert the PD entry | Valid project_id with | PD entry saved successfully | PD entry saved | Pass |

| | Entry Details | detail With projectid | other detail | | succes sfully | |
|------|----------------------------------------------|--------------------------------------------------------------|-----------------------------|---------------------------------|-------------------------------------|------|
| TC10 | Project Design MoveTo CAD_F inal | Moves a project design to the final CAD stage | Select design to move | Design moved successfully | Design moved succes sfully | Pass |

6.3.1 Testing Report

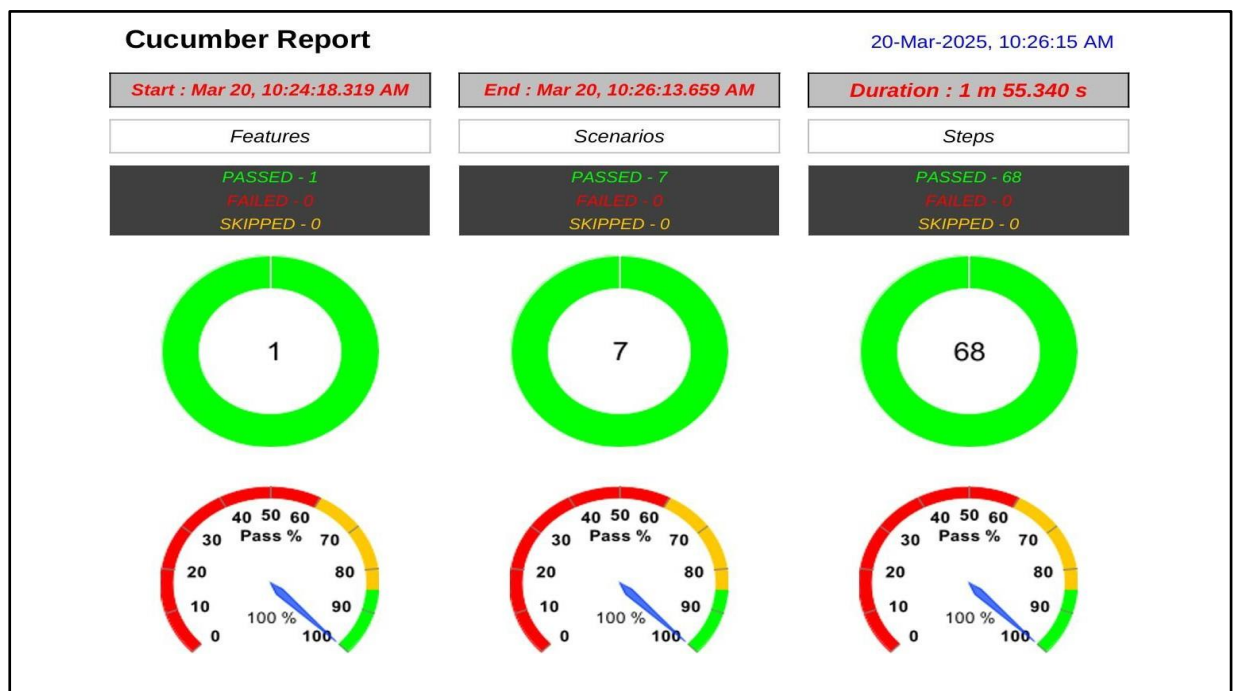


Fig 6.39 Cucumber Report

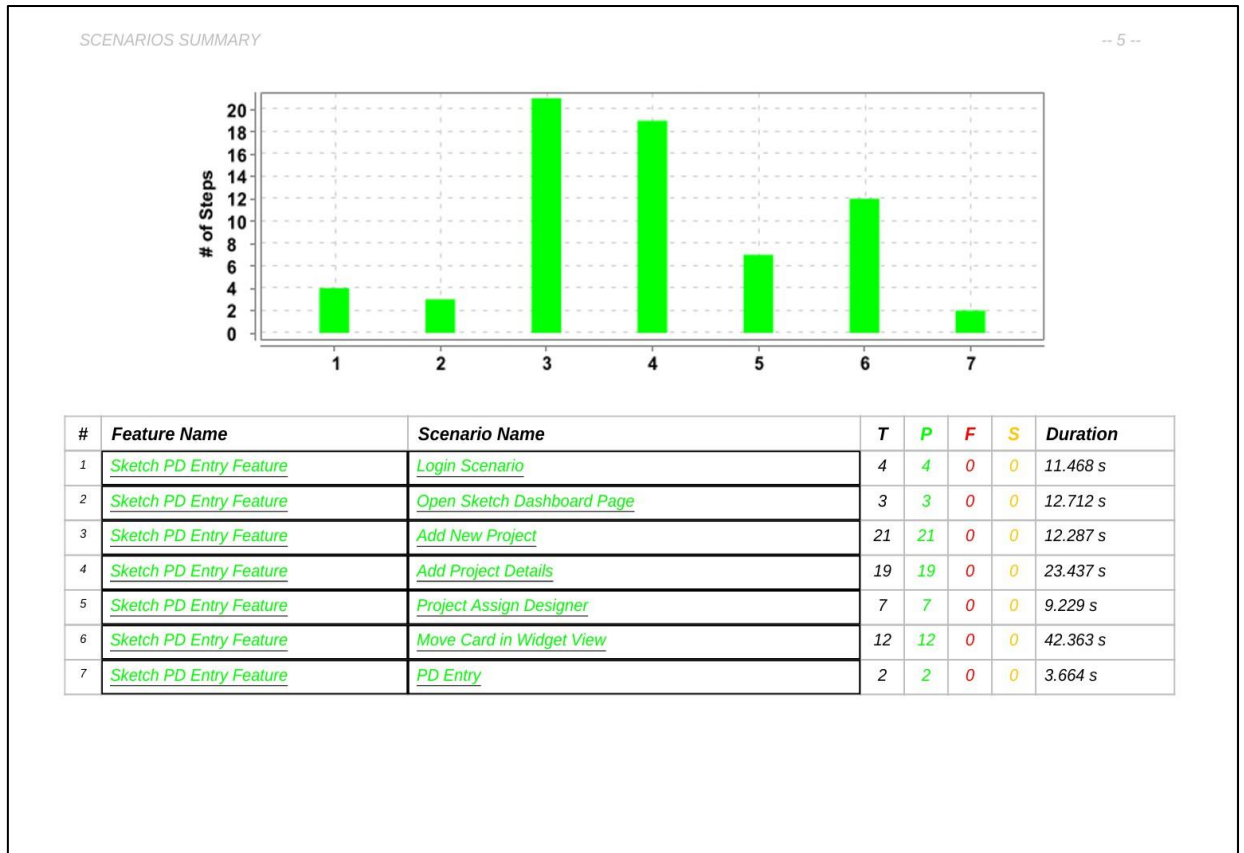


Fig 6.40 Scenario Overview

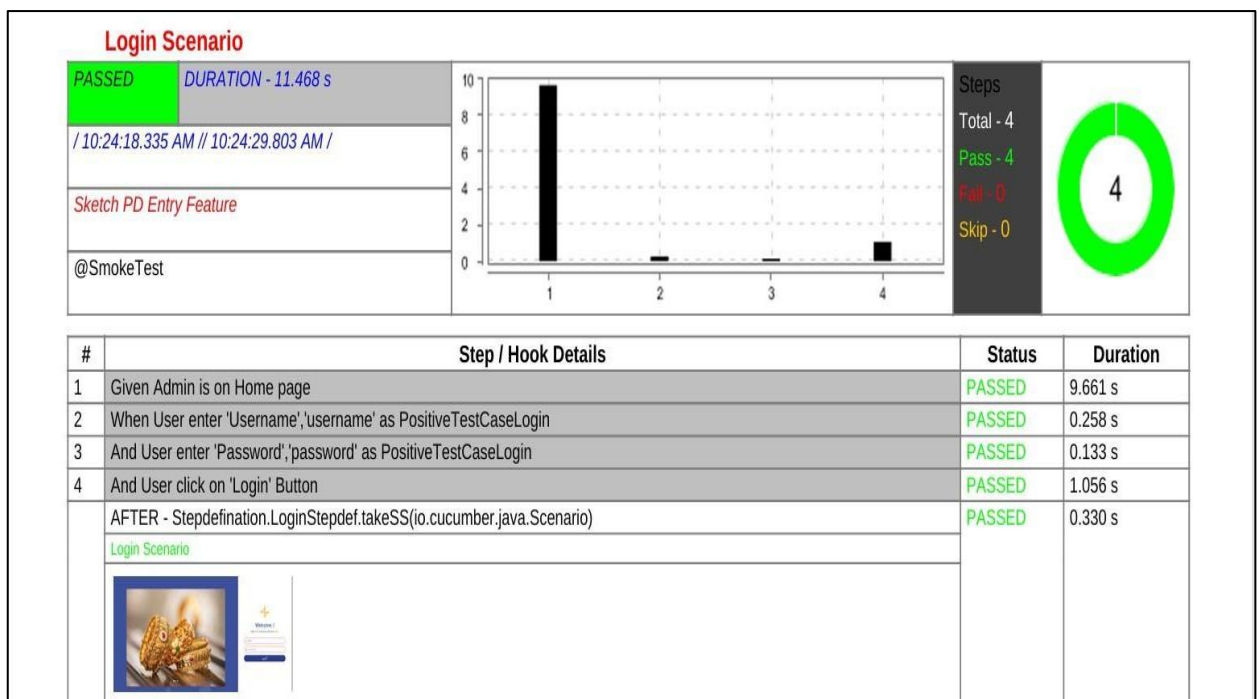


Fig 6.41 Login Scenario

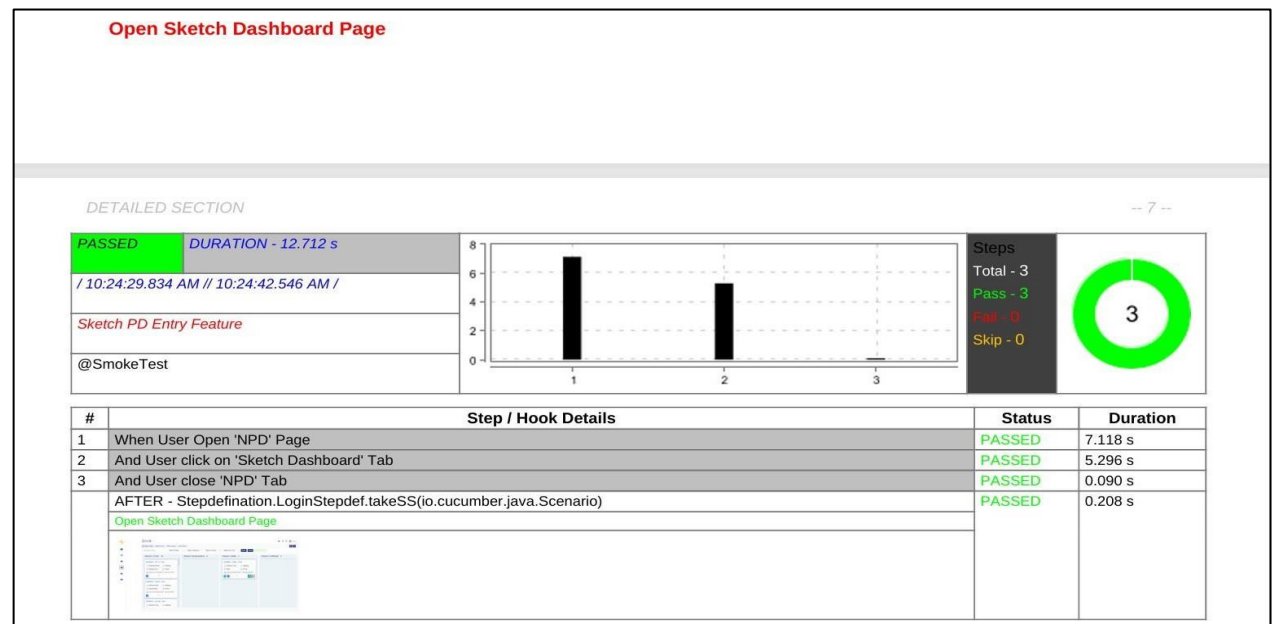


Fig 6.42 Open Sketch Dashboard Page Scenario

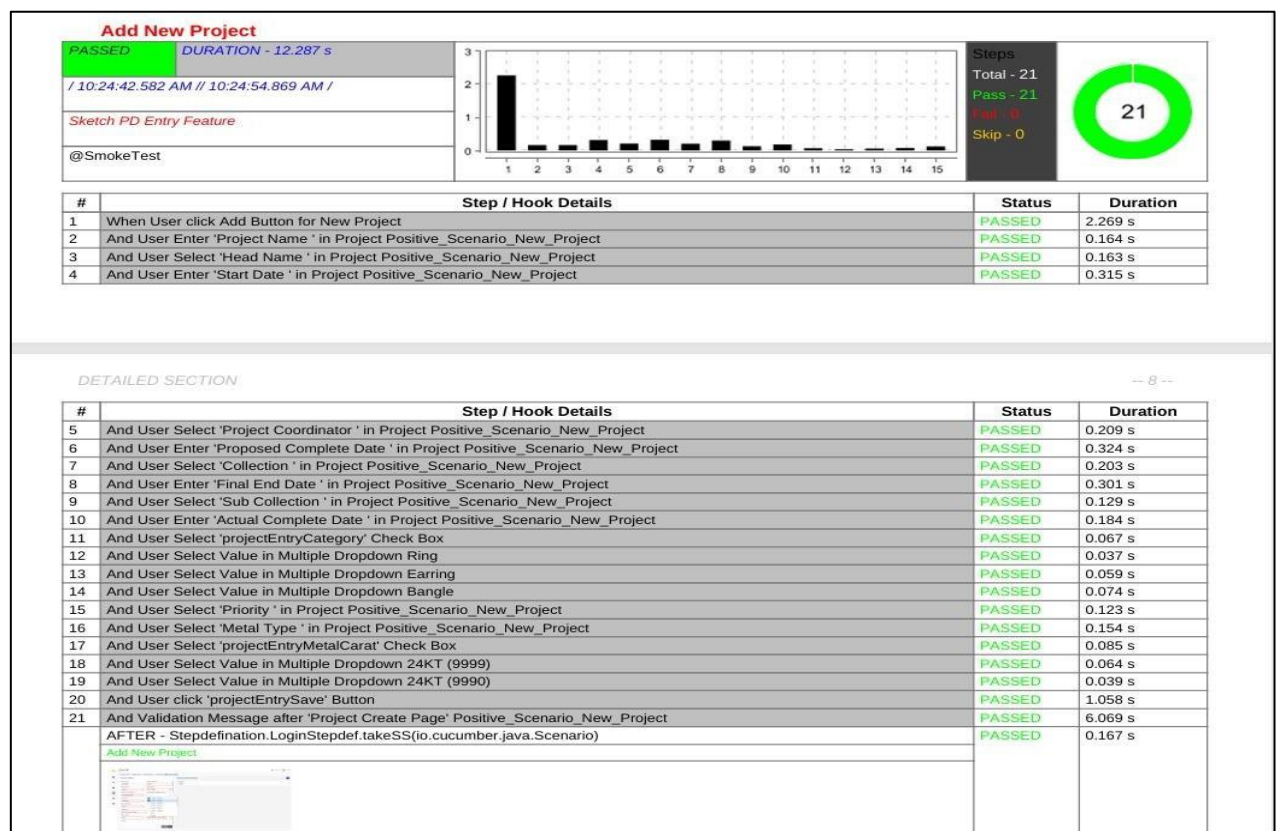


Fig 6.43 Add New Project Scenario

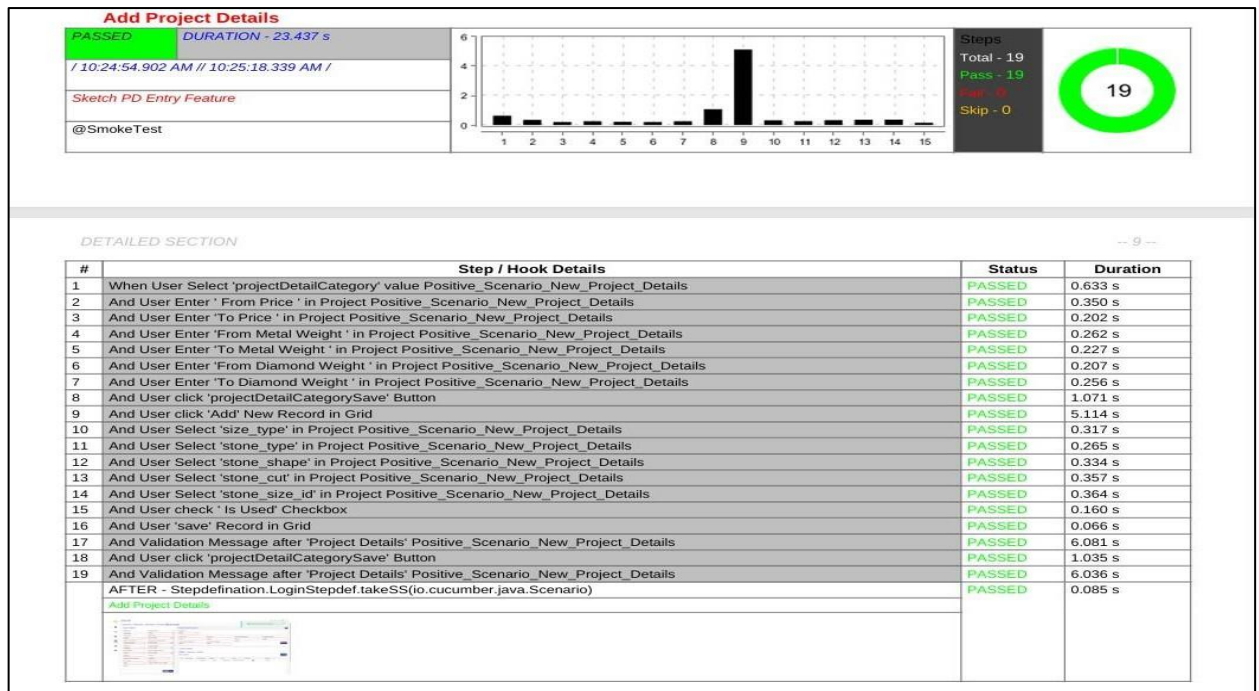


Fig 6.44 Add Project Details Scenario

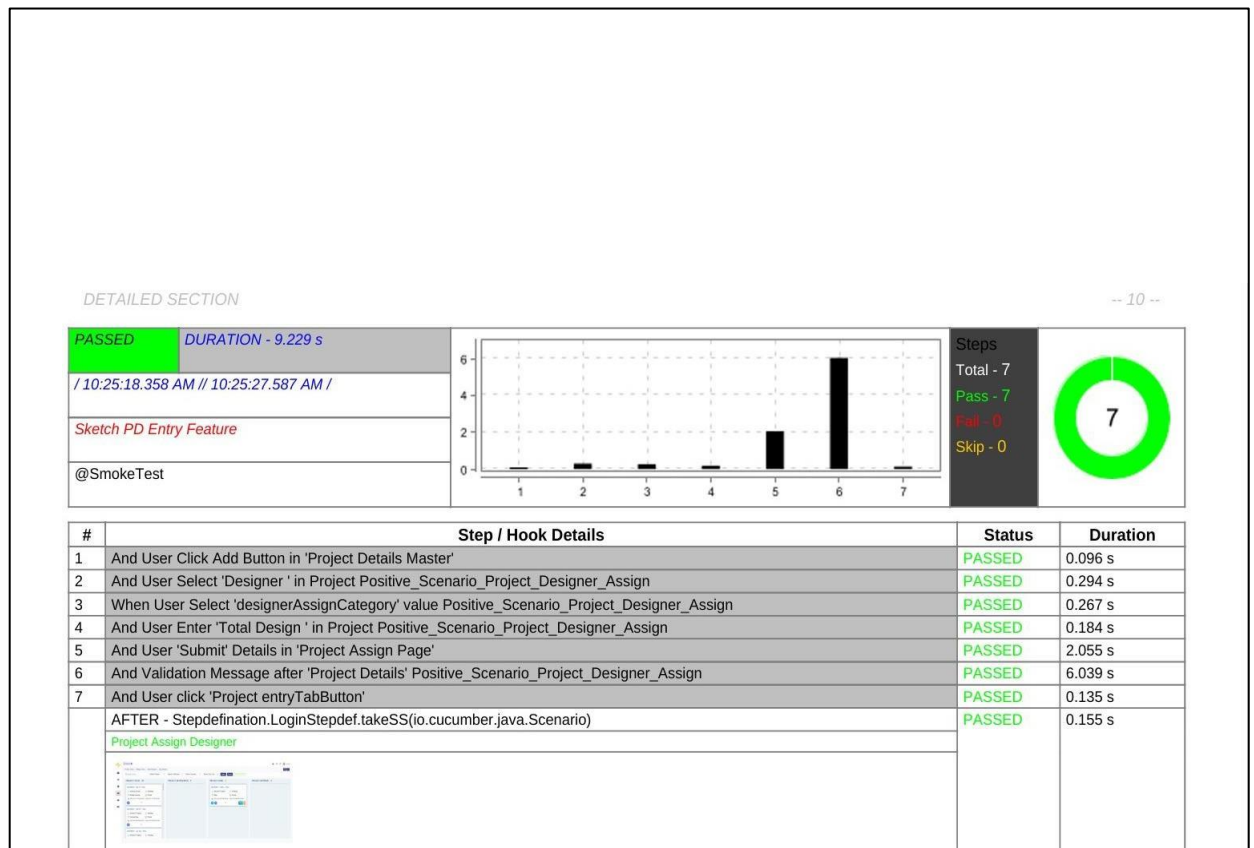
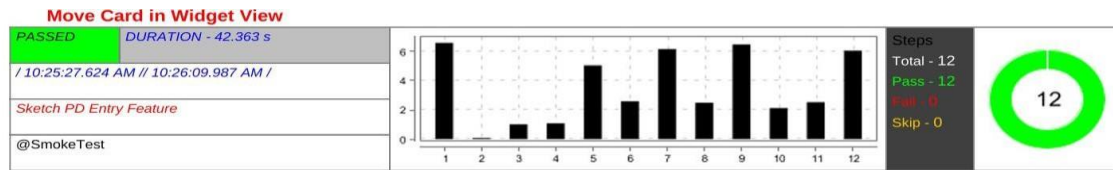


Fig 6.45 Project Assign Designer Scenario



DETAILED SECTION

-- 11 --

| # | Step / Hook Details | Status | Duration |
|----|---------------------------------------------------------------------------------|--------|----------|
| 1 | When User click on ' Widget View ' Tab | PASSED | 6.598 s |
| 2 | And User Reload Project View Page Button | PASSED | 0.078 s |
| 3 | And User Select 'widgetViewProject' value Positive_Scenario_Widget_View_Moment | PASSED | 1.023 s |
| 4 | And User click 'widgetViewApply' Button | PASSED | 1.086 s |
| 5 | And User Select 'E0003WA02' Card in Widget | PASSED | 5.052 s |
| 6 | And User Move 'E0003WA02' Card to In Progress Stage | PASSED | 2.596 s |
| 7 | And Validation Message after 'Widget View' Positive_Scenario_Widget_View_Moment | PASSED | 6.164 s |
| 8 | And User Move 'E0003WA02' Card to Done Stage | PASSED | 2.494 s |
| 9 | And Validation Message after 'Widget View' Positive_Scenario_Widget_View_Moment | PASSED | 6.476 s |
| 10 | And User Upload Image | PASSED | 2.130 s |
| 11 | And User Move 'E0003WA02' Card to Design Approve Stage | PASSED | 2.530 s |
| 12 | And Validation Message after 'Widget View' Positive_Scenario_Widget_View_Moment | PASSED | 6.050 s |
| | AFTER - Stepdefinition.LoginStepdef.takeSS(io.cucumber.java.Scenario) | PASSED | 0.084 s |
| | Move Card in Widget View | | |

Fig 6.46 Move Card in Widget View Scenario

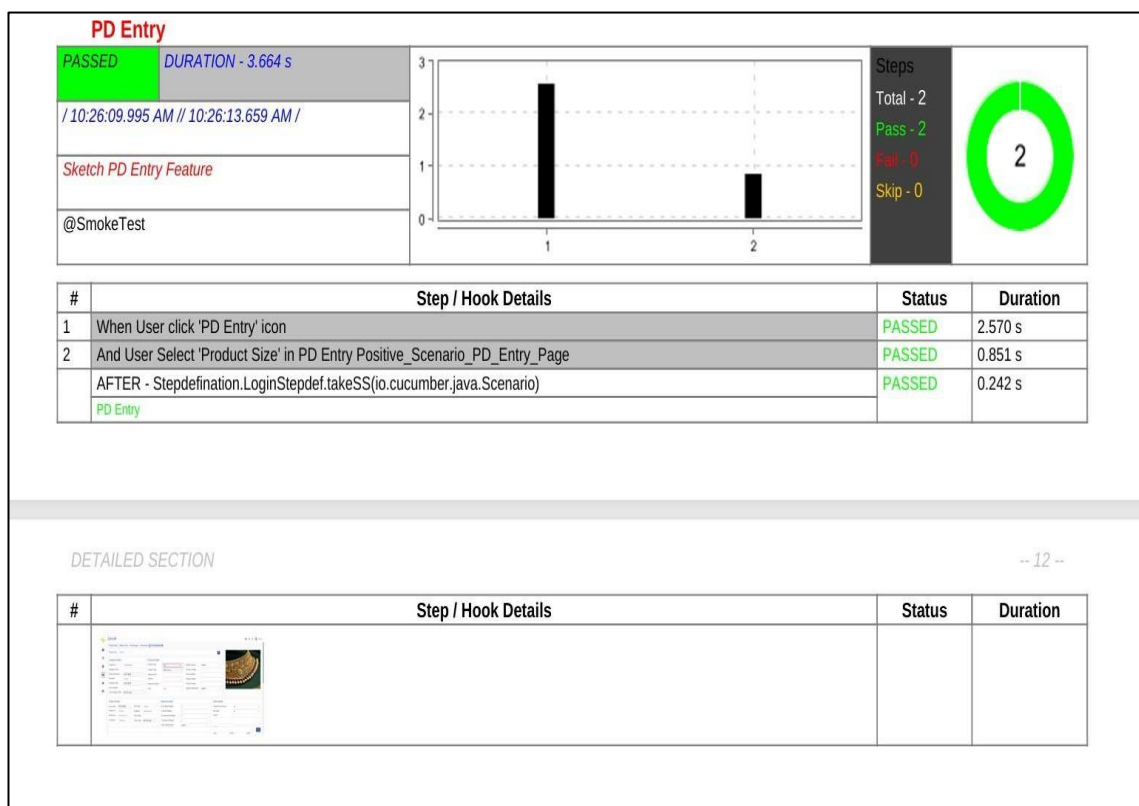


Fig 6.47 PD Entry Scenario

7. FUTURE ENHANCEMENT

❖ Sketch Module:

1. AI-Assisted Sketching

- Implement AI-powered tools to suggest design improvements, symmetry corrections, and pattern recommendations.
- Auto-generate sketch variations based on predefined styles.

2. Real-Time Collaboration

- Introduce a multi-user sketching environment where multiple designers can work on the same design simultaneously.
- Allow real-time commenting and feedback from project managers.

3. Automated Colour & Material Suggestions

- Implement AI to suggest suitable gemstones, metals, and colour combinations based on design themes.
- Allow designers to apply suggested materials with a single click.

8. CONCLUSION

8.1 SELF ANALYSIS OF PROJECT VIABILITIES

- This project has been carefully evaluated in terms of its feasibility, usability, and overall effectiveness. Throughout the development process, I ensured that the system was designed to meet user needs while maintaining efficiency and reliability. Here's how the project proves to be viable:
 - **Technical Viability:** The system is built using modern technologies, ensuring it is scalable, efficient, and capable of handling real-world operations smoothly.
 - **Operational Viability:** The interface is user-friendly, making it accessible to end-users with minimal learning curves.
 - **Economic Viability:** The project was developed within a reasonable budget, ensuring cost-effectiveness without compromising functionality.
 - **Performance Viability:** The system delivers fast response times, manages data effectively, and operates smoothly without major delays.

8.2 PROBLEMS ENCOUNTERED AND THEIR SOLUTIONS

- Like any development process, this project had its fair share of challenges. However, each problem was tackled with a structured approach. Below are some key challenges and their solutions:

1. Integration Issues

- **Problem:** Connecting different modules and ensuring a seamless data flow was tricky.
- **Solution:** Implemented modular programming and API integrations to ensure smooth communication between system components.

2. Performance Optimization

- **Problem:** The system initially faced slow response times due to heavy database queries.
- **Solution:** Optimized database queries using indexing and caching techniques, significantly improving performance.

3. User Experience Challenges

- **Problem:** Some users found certain features of the interface difficult to navigate.
- **Solution:** Collected user feedback and improved the UI/UX design, making the system more intuitive and user-friendly.

8.3 SUMMARY OF PROJECT WORK

- Overall, this project successfully meets the intended goals, delivering a well-structured and efficient system. The major milestones achieved during development include:
 - **Requirement Analysis:** Conducted a detailed study to understand user needs and system functionalities.
 - **System Design:** Designed a modular and structured architecture that allows easy scalability and maintenance.
 - **Development & Implementation:** Followed coding best practices to ensure a stable and efficient system.
 - **Testing & Debugging:** Performed thorough testing to identify and fix any bugs, ensuring system reliability.
 - **Deployment:** Successfully implemented the system on the required hardware and software platforms.