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Implementation of the Rapid Application Development Method in the Development of a Web-Based Information System for Monitoring Defective Replacement Parts at PT Bonecom Tricom Paintech

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Keywords

Information system, Monitoring, Replacement of Not Good parts, Rapid Application Development, web based

Abstract

Developments in information technology have encouraged companies to improve the effectiveness and accuracy of operational data management. PT Bonecom Tricom Paintech still records Not Good (NG) part monitoring manually, which increases the likelihood of recording errors, delays in reporting, and the possibility of data loss. This study aims to design and implement a web-based information system for NG part monitoring using the Implementation of the Rapid Application Development Method in the Development of a Web-Based Information System for Monitoring Defective Replacement Parts at PT Bonecom Tricom Paintech method. The RAD method was chosen because it focuses on rapid system development through an iterative approach, prototyping, and active user participation at every stage of development. The research process includes needs analysis, system design using Unified Modeling Language (UML), application development, and system functional testing. The results indicate that the developed system is able to improve the efficiency of the recording process, reduce errors caused by human factors, and provide NG part monitoring information that is more accurate and integrated. With this system, the Quality Assurance Department can conduct supervision and decision-making more quickly and precisely.

Introduction

Information technology has a significant impact on the effectiveness and efficiency of work processes. For most companies, technology can simplify employees' activities (Purwati et al., 2023). This is evident from the number of companies, business entities, and institutions that are inseparable from the influence of technology in carrying out their operations. In particular, with the development of computer technology, various tasks can now be performed more effectively and efficiently (Setiawan et al., 2021). One form of information technology is a website. A website is generally defined as a collection of pages that display information in the form of text, images, animations, sound, video, and/or a combination of these, both static and dynamic, forming an interconnected system in which each page is linked through a network of hyperlinks (Batubara et al., 2022). There are many benefits that can be obtained from using a web-based application system, one of which is as a medium for accessing information (Malaikosa & Mokola, 2024). For example, research at Usia Tama Private Junior High School shows that web-based information systems can accelerate, facilitate, and improve the accuracy of data processing, making data access and management easier for all related parties (Lorenza et al., 2025).

Currently, the data recording process for monitoring defective replacement parts (Not Good/NG) returned to vendors at PT Bonecom Tricom Paintech is still performed manually using paper-based records (Haloho et al., 2025; Sari et al., 2024). This results in delays in report entry, as data must be recorded manually on paper. Consequently, data processing takes a long time, and there is a risk of data loss, making management suboptimal (Hasibuan, 2024; Pradana et al., 2022). Reports are often stacked on desks for a period of time and then stored in binders, increasing the risk of data loss or document misplacement (Nasihi & Hapsari, 2024). Based on observational results and literature studies, manual processes in industrial environments have been shown to reduce operational efficiency and cause miscommunication across departments (Nugroho et al., 2025).

Structured database design for monitoring needs in a company is essential to ensure that data integrity across system entities is maintained and to facilitate future system development (Duha & Juliani, 2020; Fitriani et al., 2022). The implementation of a well-designed database model is a critical foundation in the development of reliable monitoring systems (Yulianto & Firdaus, 2021). The Implementation of the Rapid Application Development Method in the Development of a Web-Based Information System for Monitoring Defective Replacement Parts at PT Bonecom Tricom Paintech methodology emphasizes iterative prototyping, intensive user collaboration, and rapid system development. In this context, the application of RAD enables stakeholders at PT Bonecom Tricom Paintech to be directly involved during the development process, thereby accelerating iteration cycles and refining the system to align with user needs and organizational objectives (Duha & Juliani, 2020; Wijoyo et al., 2021).

Several studies have shown that the RAD method is effective in information system development (Narulita et al., 2024; Rosida & Wibisono, 2022). For instance, research conducted at PT NOK Indonesia revealed that the application of the RAD method in a production monitoring information system effectively accelerates the software development process without reducing the quality of the final product and remains aligned with user requirements (Ana Koamri et al., 2022; Komala & Yusuf, 2024).

Although the RAD method has been applied in the development of sales and production monitoring systems, it has not been widely implemented specifically for integrated NG replacement part monitoring information systems in manufacturing environments such as PT Bonecom Tricom Paintech. Therefore, this study seeks to address this gap by applying the RAD method, which offers a high level of adaptability and can accommodate time and cost constraints in system development (Profita et al., 2022).

Accordingly, this research aims to fill the gap by designing an NG replacement part monitoring information system using the RAD method, which is expected to accelerate the application development process and ensure that the system aligns with the needs and dynamics at PT Bonecom Tricom Paintech (Sari et al., 2024). It is also expected that this system will not only resolve issues in the NG part monitoring process but also improve operational data accuracy and support better decision-making.

Methods

This study aimed to improve the effectiveness of monitoring activities for Not Good (NG) replacement parts returned to vendors in the Quality Assurance Department of PT Bonecom Tricom Paintech through the implementation of the Rapid Application Development

(RAD) method. A qualitative descriptive case study approach was used, focusing on the implementation process of the RAD method in developing an NG replacement part monitoring information system at PT Bonecom Tricom Paintech.

The study was conducted in the Quality Assurance Department of PT Bonecom Tricom Paintech, located at Jl. Timor Blok D3 No. 1, MM2100 Industrial Estate, West Cikarang District, Bekasi Regency, West Java. The company operates in the manufacturing sector, specializing in the painting of components for the automotive and electronics industries.

Results and Discussion

Observing the results of the running system analysis that has been described earlier, the author found the results that will be used to test the suitability of the system that has been developed. This system test is carried out to assess whether the developed system is in accordance with the needs desired by stakeholders, and functions in accordance with the design that has been made. The supporting tools used in this research test include several devices, including:

Software Specifications

In making this system, the author uses several software including the following:

1. Windows 11 64-bit Operating System
2. Visual Studio Code Verse 1.109.3
3. Xampp Verses 3.3.0
4. MySQL
5. Microsoft Edge / Google Chrome

Hardware Specifications

The hardware used in this study is as follows:

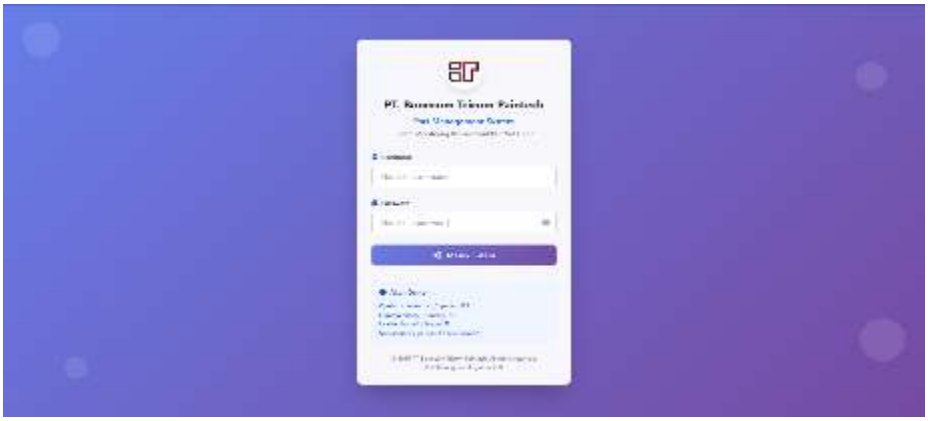
1. Acer Aspire 5 laptop with 500GB of storage
2. Mouse
3. Machine Internet

Discussion and test results

User Interface Display

The user interface display is a graphical display of the system that the user uses to interact with the system. The following is an explanation of the user interface used in this system as follows:

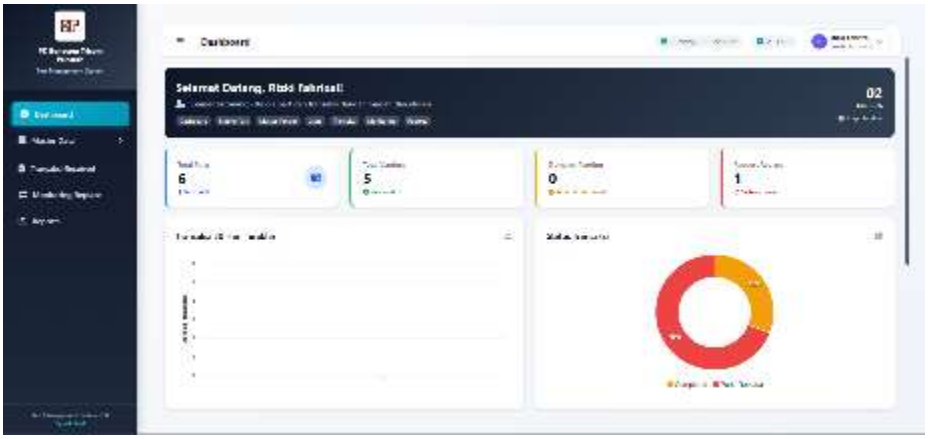
1. Inteface Login Page



Picture 1. Page Views Login

The image above is a view of the login form. Each user is required to fill in the username and password that has been registered in the system to be able to enter the system.

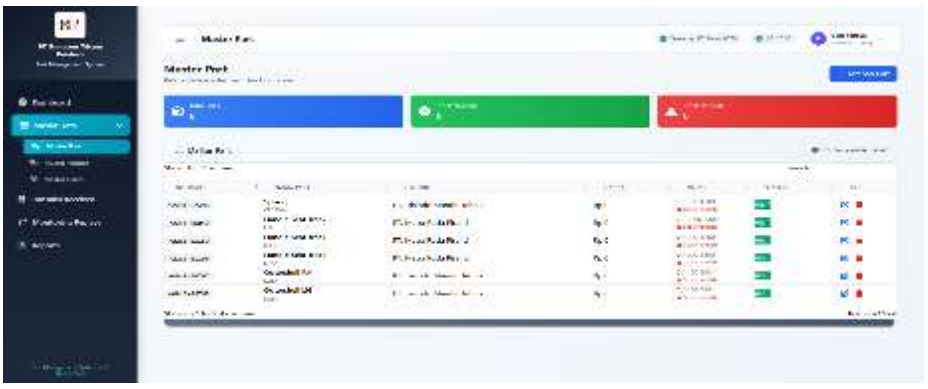
2. Interface Halaman Dashboard



Picture 2. Page Views Dashboard

The image above is a view Dashboard or the main page on the web system, it provides access to various features in the system and presents some concise statistical data such as transaction history and transaction status.

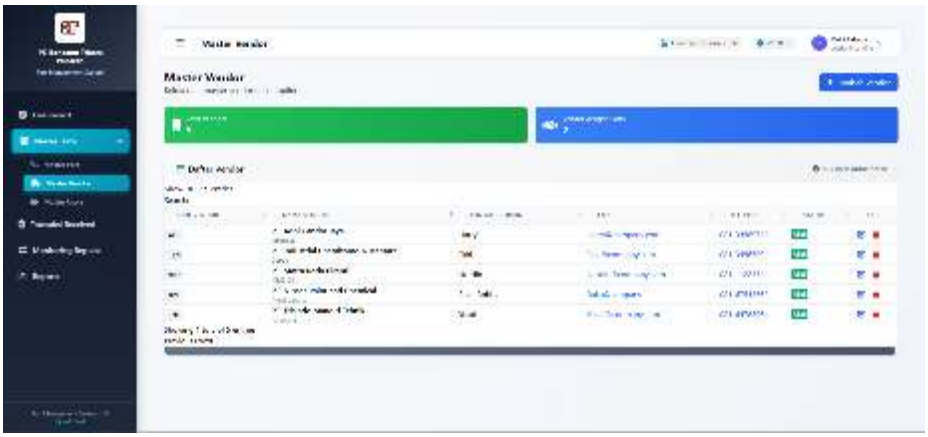
3. Interface Halaman Master Part



Picture 3. Master Page View Share

The image above is a view on the Master page Share, the page displays data share or material and contains CRUD functionality (Add, edit, and remove buttons share).

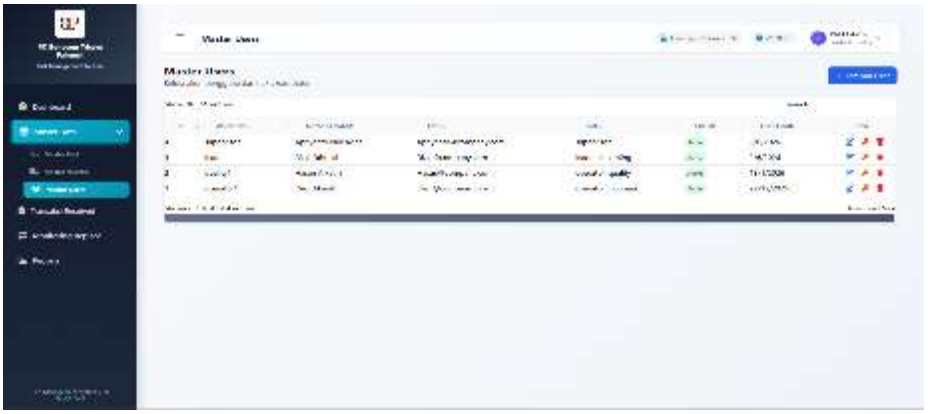
4. Interface Halaman Master Vendor



Picture 4. Master Page View Vendor

The image above is a view on the Vendor Master page, it displays vendor or material provider data and contains the CRUD (Vendor add, edit, and remove button) functionality.

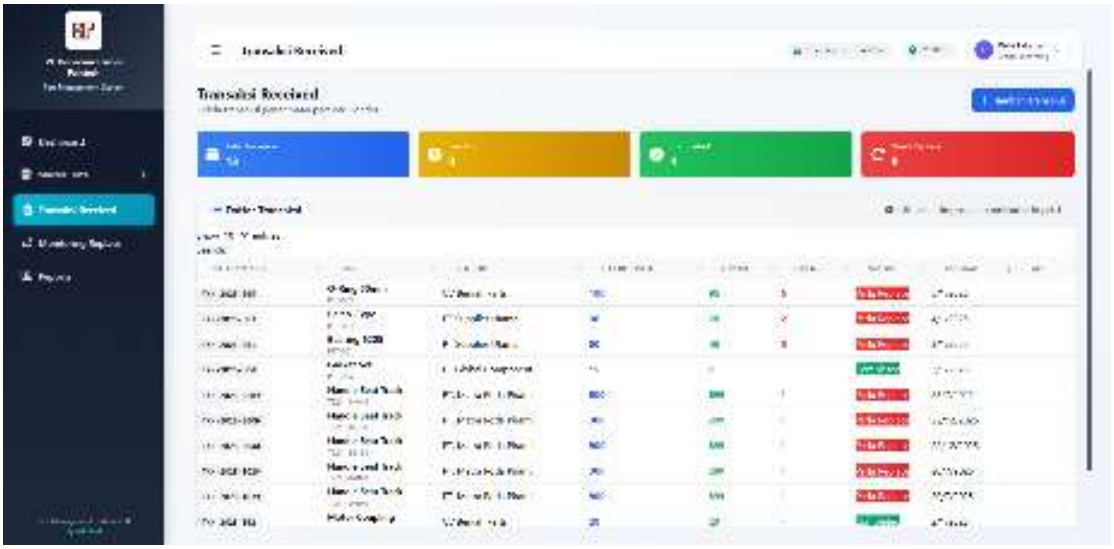
5. Interface Halaman Master User



Picture 4. Master Page View E-Mail

The image above is a display on the Master User page, the page displays user data or system users who are given access to be able to use the system and contains CRUD (Add, edit, and remove user buttons) functionality.

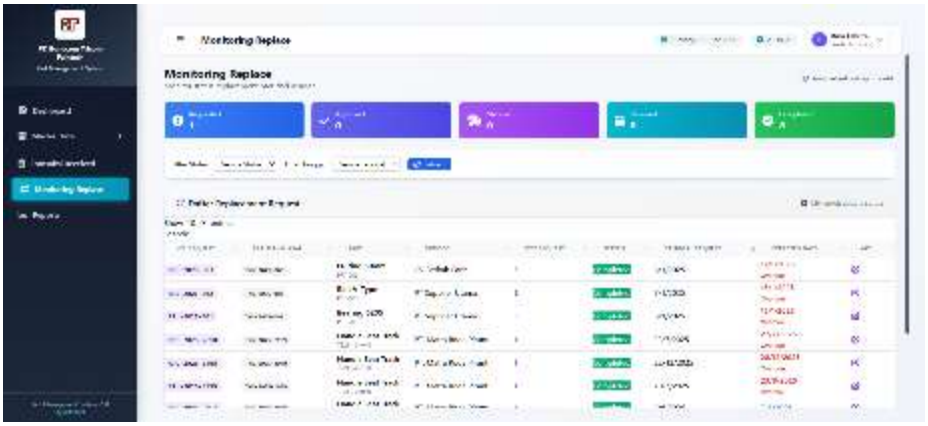
6. Transaction Page Interface Received



Picture 5. Transaction Page View Received

The image above is a display on the Transactions Received page, the page displays the transaction data of the receipt of parts or materials from the vendor and contains the CRUD functionality (Add, edit, and delete buttons).

7. Replacement Monitoring Page Interface

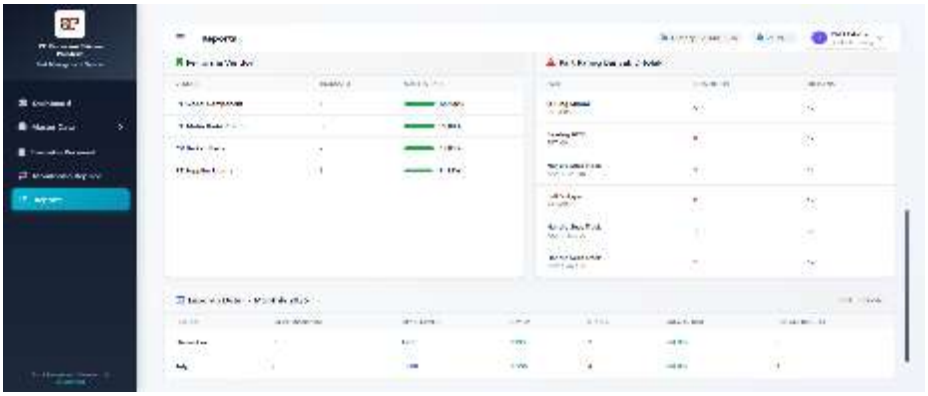


Picture 6 Monitoring Page Display Replace

The image above is a display on the Monitoring Replace page, the page displays NG replacement part request data to the vendor, replacement status notifications, and contains CRUD functionality (such as edit replacement status and edit expected date).

8. Report Page Interface

Picture 7. Report Page View 1



Picture 8. Report Page View 2

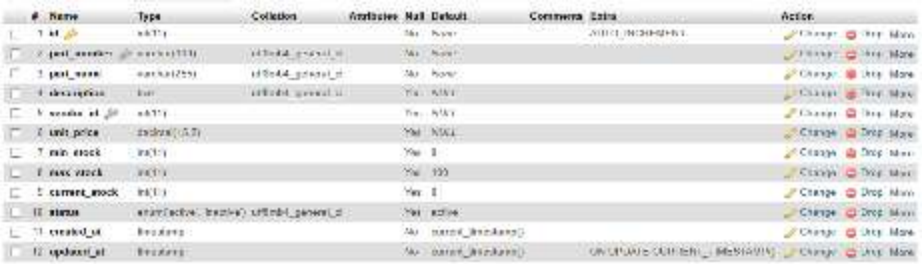
The image above is a display on the Report page, the page displays transaction data such as total part OK, total part NG, percentage of part quality, and there is access to the print button for print reports in PDF form if later needed for meeting needs and so on.

Database Implementation

In the database implementation section of the Replacement Replacement Information System Information System , there are several tables, including the following:

1. Table Parts

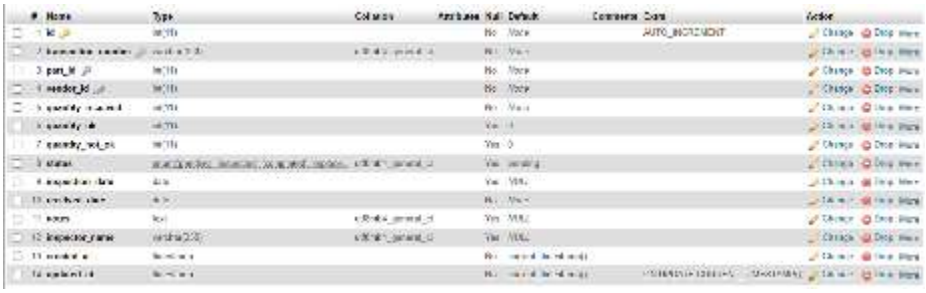
The parts table is used to store part or material data in the system, which will be used as master data in carrying out the work process in the system. The structure of the table is as follows:



Picture 9. Tabel Database Parts

2. Tabel Part_transactions

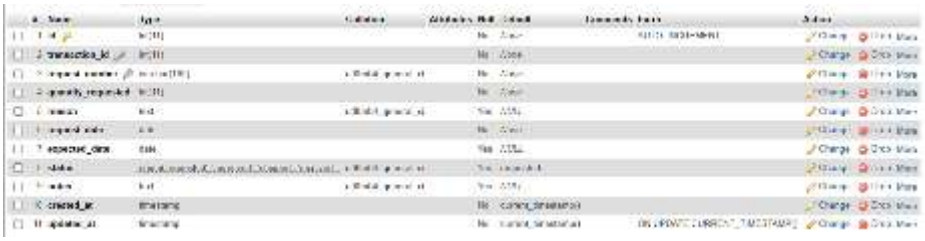
The table Part_transactions used to store transaction data on the receipt of parts or materials from vendors, as well as used to store data on incoming QC parts inspections . The structure of the table is as follows:



Picture 10. Table Database Part_transactions

3. Tabel Replacement_request

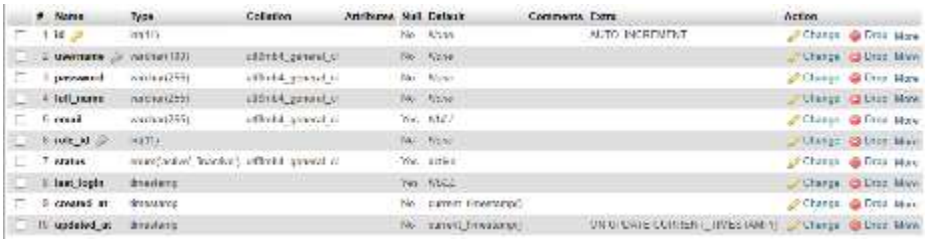
The Replacement_request table is used to store the NG part replacement request data to the vendor. The structure of the table is as follows:



Picture 11.Table Database Replacement_request

4. Table User

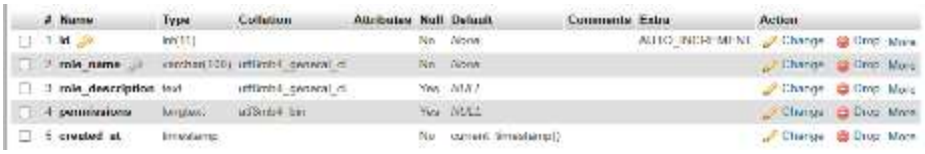
The User table is used to store user data on the system, and is also used as data for the login process to the system. The structure of the table is as follows:



Picture 12. Table Database E-Mail

5. Tabel User_roles

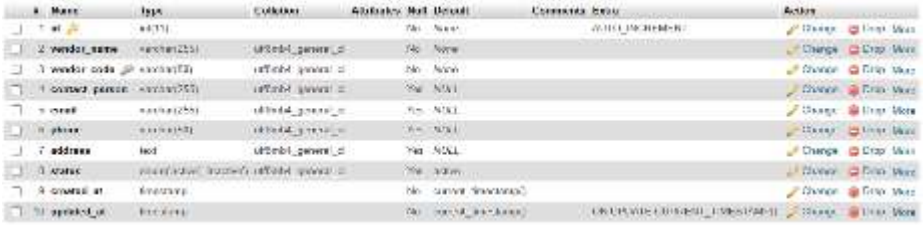
The User_roles table is used to store the access control of each user on the system according to their respective roles. The structure of the table is as follows:



Picture 13. Table Database User_roles

6. Vendor Table

The Vendor table is used to store vendor data on the system, which will be used as the master data within the system. The structure of the table is as follows:



Picture 14. Table Database Vendor

System Testing Results (Black Box Testing)

System testing is one of the crucial phases in the system or software development process. Through the testing stage, the application is expected to be able to run according to the plan that has been prepared in the design phase. In addition, if there are errors or bugs in the system, the repair process can be done faster before the application is launched to the user. The purpose of these tests is to ensure that the software created is of high quality. Software testing consists of the following:

1. Testing the Login Menu

Table 1. Menu Testing Login

No	Skenario Uji	Input	Ekspektasi	Hasil Aktual	Status
1	Login dengan username dan password valid	Username : leader1 Pass : leader123	Pengguna berhasil masuk ke dashboard aplikasi	Pengguna berhasil masuk ke dashboard aplikasi	Berhasil
2	Login dengan username dan password salah	Username : leader Pass : leader12	Muncul pesan error "Username atau password salah!"	Muncul pesan error "Username atau password salah!"	Berhasil
3	Login dengan username valid dan password salah	Username : leader1 Pass : leader	Muncul pesan error "Username atau password salah!"	Muncul pesan error "Username atau password salah!"	Berhasil
4	Login dengan username salah dan password valid	Username : leader Pass : leader123	Muncul pesan error "Username atau password salah!"	Muncul pesan error "Username atau password salah!"	Berhasil

2. Dashboard Menu Testing

Table 2. Menu Testing Dashboard

No	Skenario Uji	Input	Ekspektasi	Hasil Aktual	Status
1	Akses menu dashboard	Pengguna meng-klik icon menu dashboard	Sistem menampilkan halaman dashboard	Sistem menampilkan halaman dashboard	Berhasil
2	Akses hide menu	Pengguna meng-klik icon hide menu pada halaman dashboard	Menu pada sistem di hide	Menu pada sistem di hide	Berhasil
3	Akses icon user	Pengguna meng-klik icon user pada halaman dashboard	Muncul detail informasi user dan permission user	Muncul detail informasi user dan permission user	Berhasil
4	Akses icon Logout	Pengguna meng-klik icon Logout pada menu user di halaman dashboard	Sistem akan mengarahkan pengguna kembali ke halaman Login	Sistem akan mengarahkan pengguna kembali ke halaman Login	Berhasil
5	Akses Transaksi Terbaru "Lihat semua"	Pengguna meng-klik icon lihat semua pada halaman dashboard	Sistem mengarahkan pengguna ke halaman transaksi received dan menampilkan informasi transaksi part	Sistem mengarahkan pengguna ke halaman transaksi received dan menampilkan informasi transaksi part	Berhasil

3. Testing the Master Data Menu

Table 3. Testing the Master Data Menu

No	Skenario Uji	Input	Ekspektasi	Hasil Aktual	Status
1	Akses menu Master data	Pengguna meng-klik icon menu Master data	Sistem menampilkan pilihan 3 halaman Master data (Master part, master vendor, master user)	Sistem menampilkan pilihan 3 halaman Master data (Master part, master vendor, master user)	Berhasil
2	Akses menu Master part	Pengguna meng-klik icon menu Master part	Sistem menampilkan halaman Master part	Sistem menampilkan halaman Master part	Berhasil
3	Akses menu Tambah Part	Pengguna meng-klik icon menu Tambah part	Sistem menampilkan halaman Tambah part	Sistem menampilkan halaman Tambah part	Berhasil
4	Akses menu Master Vendor	Pengguna meng-klik icon menu Master vendor	Sistem menampilkan halaman Master vendor	Sistem menampilkan halaman Master vendor	Berhasil
5	Akses menu Tambah Vendor	Pengguna meng-klik icon menu Tambah Vendor	Sistem menampilkan halaman Tambah Vendor	Sistem menampilkan halaman Tambah Vendor	Berhasil
6	Akses menu Master User	Pengguna meng-klik icon menu Master user	Sistem menampilkan halaman Master user	Sistem menampilkan halaman Master user	Berhasil
7	Akses menu Tambah User	Pengguna meng-klik icon menu Tambah User	Sistem menampilkan halaman Tambah User	Sistem menampilkan halaman Tambah User	Berhasil
8	Akses item search	Pengguna meng-klik bagian item search dan input kata kunci yang ingin dilakukan pencarian	Sistem menampilkan hasil pencarian sesuai kata kunci yang telah di input oleh User	Sistem menampilkan hasil pencarian sesuai kata kunci yang telah di input oleh User	Berhasil

4. Testing Received Transaction Menu

Table 4. Transaction Menu Testing Received

No	Skenario Uji	Input	Ekspektasi	Hasil Aktual	Status
1	Akses menu Transaksi received	Pengguna meng-klik icon menu Transaksi received	Sistem menampilkan halaman Transaksi received	Sistem menampilkan halaman Transaksi received	Berhasil
2	Akses menu tambah transaksi	Pengguna meng-klik icon menu tambah transaksi	Sistem menampilkan menu tambah transaksi	Sistem menampilkan menu tambah transaksi	Berhasil
3	Akses icon inspect	Pengguna meng-klik icon inspect pada halaman Transaksi received	Sistem menampilkan menu inspeksi part	Sistem menampilkan menu inspeksi part	Berhasil
4	Akses icon delete	Pengguna meng-klik icon delete pada halaman Transaksi received	Sistem menampilkan notifikasi "Apakah Anda yakin ingin menghapus transaksi ini?"	Sistem menampilkan notifikasi "Apakah Anda yakin ingin menghapus transaksi ini?"	Berhasil
5	Akses item search	Pengguna meng-klik bagian item search dan input kata kunci yang ingin dilakukan pencarian	Sistem menampilkan hasil pencarian sesuai kata kunci yang telah di input oleh User	Sistem menampilkan hasil pencarian sesuai kata kunci yang telah di input oleh User	Berhasil

5. Testing Menu Monitoring Replace

Table 5. Menu Testing Monitoring Replace

No	Skenario Uji	Input	Ekspektasi	Hasil Aktual	Status
1	Akses menu Monitoring replace	Pengguna meng-klik icon menu Monitoring replace	Sistem menampilkan halaman Monitoring replace	Sistem menampilkan halaman Monitoring replace	Berhasil
2	Akses icon refresh	Pengguna meng-klik icon refresh	Sistem menampilkan notifikasi "Data refreshed"	Sistem menampilkan notifikasi "Data refreshed"	Berhasil
3	Akses menu filter status	Pengguna meng-klik icon menu filter status	Sistem menampilkan pilihan status replacement part	Sistem menampilkan pilihan status replacement part	Berhasil
4	Akses menu filter tanggal	Pengguna meng-klik icon menu filter tanggal	Sistem menampilkan pilihan tanggal daily, weekly, dan monthly	Sistem menampilkan pilihan tanggal daily, weekly, dan monthly	Berhasil
5	Akses icon update status	Pengguna meng-klik icon update status pada halaman Monitoring replace	Sistem menampilkan halaman update status replacement	Sistem menampilkan halaman update status replacement	Berhasil
6	Akses item search	Pengguna meng-klik bagian item search dan input kata kunci yang ingin dilakukan pencarian	Sistem menampilkan hasil pencarian sesuai kata kunci yang telah di input oleh User	Sistem menampilkan hasil pencarian sesuai kata kunci yang telah di input oleh User	Berhasil

6. Testing Menu Reports

Table 6. Menu Testing Postponements

No	Skenario Uji	Input	Ekspektasi	Hasil Aktual	Status
1	Akses menu Reports	Pengguna meng-klik icon menu Reports	Sistem menampilkan halaman Reports	Sistem menampilkan halaman Reports	Berhasil
2	Akses icon print	Pengguna meng-klik icon print pada halaman Reports	Sistem menampilkan halaman print dengan format PDF	Sistem menampilkan halaman print dengan format PDF	Berhasil
3	Akses menu filter periode	Pengguna meng-klik icon menu filter periode	Sistem menampilkan pilihan periode harian, mingguan, bulanan	Sistem menampilkan pilihan periode harian, mingguan, bulanan	Berhasil
4	Akses menu filter tahun	Pengguna meng-klik icon menu filter tahun	Sistem menampilkan pilihan periode tahun	Sistem menampilkan pilihan periode tahun	Berhasil

Conclusion

Based on the results of the analysis, design, and testing in the development of a data monitoring information system for Not Good (NG) replacement parts at PT Bonecom Tricom Paintech, it was concluded that the system improved operational monitoring and data handling processes. Through a real-time, web-based system, team leaders up to the supervisor level were able to better control and minimize data input errors during the NG replacement part process.

The system design provided an integrated platform for storing, managing, and accessing NG replacement part data more efficiently, thereby reducing the risk of data loss and accelerating decision-making processes. With this web-based system, access to NG replacement part data within PT Bonecom Tricom Paintech became faster and more convenient. Employees were able to retrieve required reports in real time without the technical limitations previously encountered, resulting in more effective and efficient operational activities.

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