MAINTENANCE MANAGEMENT INFORMATION SYSTEM ON THE INTERNET-BASED WORKSHOP UNIT

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ABSTRACT

Learning from the economic crisis during the period of economic recovery, reconditioning activity of manufactoring facilities and the company's assets will rise high enough. To anticipate the possibility of facing and taking opportunities that arise, it is necessary a good management information system relating to the planning and controlling of the industrial asset maintenance work. Computerized Maintenance Management System (CMMS) is an integrated system that serves the need for operating parts such as Maintenance Planning and Engineering, Production Operations, Procurement of Materials, and Finance. In the management of effective maintenance necessary to have a good data organization. Beginning with the planning of the right database structure which will be useful to get the full information, easily and quickly. This is useful to build a strong foundation for improving the reliability and efficiency of equipment from the maintenance workers control.

Keywords: Management Information Systems, CMMS, Work Order, Asset, Preventive Maintenance.

1. INTRODUCTION

In an era of increasingly globalized industry competition with rapid technological developments, industries continuously improve the quantity and quality of the product. The development of industrial products increased continuously and need support smooth production processes. To anticipate the possibility of facing the challenge and take the opportunities that will arise, it is necessary a good management information system relating to the planning and controlling of maintenance work on industrial assets.

Computerized Management Maintenance System (CMMS) is an integrated system that serves the needs of the following functions to do the job. CMMS functions are integrated in them include the need for operating parts such as *Maintenance Planning* and *Engineering*, *Production Operations*, the part of procurement of materials such as *Warehouse* and *Purchasing*, also part of Finance. The device used is a PC as a server and some other PC as a *client* to form a *Local Area Network (LAN*).

Database CMMS is a separate database software with application software, this software is used to manage the data well about the data equipment, parts and materials needed, and *manpower* are organized hierarchically and its *relationship*. The management of such data will make it easier for record-keeping activities that occur on plant equipment so

that it can be used for analysis in order to increase the reliability of the production facilities. In the *manpower* data, user is registered by name, identity, as well as its functions and authority, making it possible to record what is being done each *user* and prevent use beyond the allowed limits. As a management tool, this system will help to do maintenance work planning, either for work already scheduled and the work that needs to be done immediately based on current needs. Management functions of the expenditure based on available budget can be done well. By providing input on the organization and cost center, then to do a cost analysis can be done in a planned way so as to facilitate accounting and management to control costs that can be attributed to the company's success in achieving a certain target. Therefore exercise with the benchmarks of success (*key performance indicator)* can be done more easily, what we need to do is plan a reporting system (*reporting system*) periodically.

II. RESEARCH METHODS

2.1 Procedure Design

Procedures or measures undertaken in this design are as follows :

a. Preparation Step
   - Studying literatures which are related to the design of CMMS.
   - Planning targets, strategies, tasks, and modulees for CMMS

b. Programming Step
   - Creating a *database* using *Microsoft Acces* 1997.
   - Connecting a *relationship* on each table in *database*.
   - Creating a ODBC *driver* as a connection into *database*.
   - Making a *Graphical User Interface* (GUI) of CMMS application with *Microsoft Visual Basic*.
   - Connecting GUI with *database* using ODBC.
   - Testing simulation of CMMS application.

2.2 Supplies and Equipment

2.2.1 Hardware

1. *Personal Computer* (PC)
   a. 1 Unit PC as a *Server* with specification :
      - Intel Pentium 4 CPU 3.00 GHz
      - RAM DDR2 768 MB
      - HDD 20 GB
   b. 1 Unit PC as a *Client* with specification :
      - Intel Pentium 4 CPU 3.00 GHz
      - RAM DDR2 768 MB
      - HDD 20 GB
2. *LAN cable*

2.2.2 Software

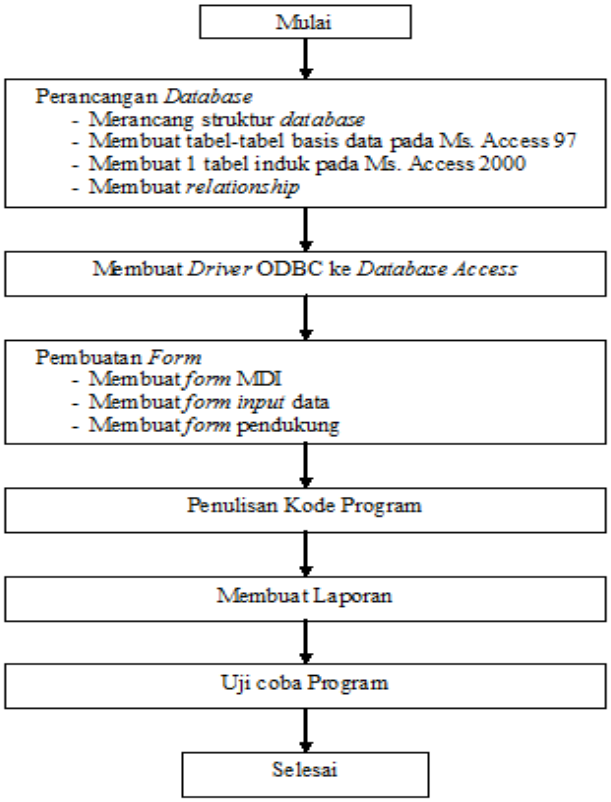
Some of the software which are used in this CMMS application are :

1. *Microsoft Access*
   In this design, each table that will be needed for the database created on a *file* of *Microsoft Access* 97 version to reduce the capacity of *file's database*. And add one more *file of Microsoft Access* 2000 version as the host for linking relationship on each table.
2. *Microsoft Visual Basic* 6
   User Interface of CMMS program consist of some *Standard* form as a *input* form and a *support* form, and a *form* of MDI as a *parent* form. On the reporting system is assisted using a software named *Seagate Crystal Report* 7.0.
3. *Driver* ODBC
   For making a connection into the database, in this design will be made driver of Open Database Connection (ODBC) by using DSN System. The connection of DSN System means every user who uses a computer can access the ODBC driver.

2.3 Algorithm Design

Systematic planning which is done for this project in outline as shown in the following diagram :

Diagram of Systematic Design



III. RESULTS AND DISCUSSION

3.1 Arrangement Goal of CMMS

Before upgrading an implementation, the first target must be precise. There are two main objectives that can be achieved by implementing a CMMS, namely by reducing maintenance costs and increasing equipment uptime. Table 3.1. below shows how each of these goals achievable.

Sasaran	Strategi	Tugas	Modul CMMS
Mengurangi Biaya-biaya Perawatan	- Mengurangi biaya-biaya tenaga kerja	- Kontrol Pekerjaan - Perencanaan Tenaga Kerja/Material	- *Work Order* - Lokasi - Karyawan - *Requester*
	- Mengurangi biaya-biaya penyimpanan *inventory*	- Menganalisa Penggunaan - Menganalisa Investasi	- *Inventory*
Meningkatakan *Uptime* Peralatan	- Mengurangi rata-rata waktu hingga perbaikan	- Menjaga data peralatan - Menjaga data Lokasi - Menjaga daftar kebutuhan material - Menjaga Info Karyawan - Menjaga Info Kontraktor - Menjaga Info *Supplier* - Mengatur stok cadangan - Menjaga sejarah peralatan	- Asset - Lokasi - Karyawan - *Requester* - *Work Order* - *Inventory*
	- Mengurangi rata-rata waktu sebelum *failure*	- Menganalisa *breakdown* - Menjadwalkan PM	- *Work order* - Asset - Lokasi - PM

Sumber : Clueword Dotcom S dn Bhd, 2002.

Each strategy in Table 3.1. above can be applied by itself. By notified that the user selects a target and which strategies are actually most needed and then apply them first. Then each of the other strategies that can be applied if necessary. The application by considering the objectives are capable achieving profits on CMMS faster.

3.2 Design Database

Management of maintenance is more effective begins with a good organization maintenance data. The database structure is really important to get all the necessary information. The CMMS program is created based on the database structure.

3.3 Development Process, Design, and Documentation

A process is a package of related activities, which is started from an input and transformed into an output. The sample of a process for processing service call is shown in Figure 3.1 below :

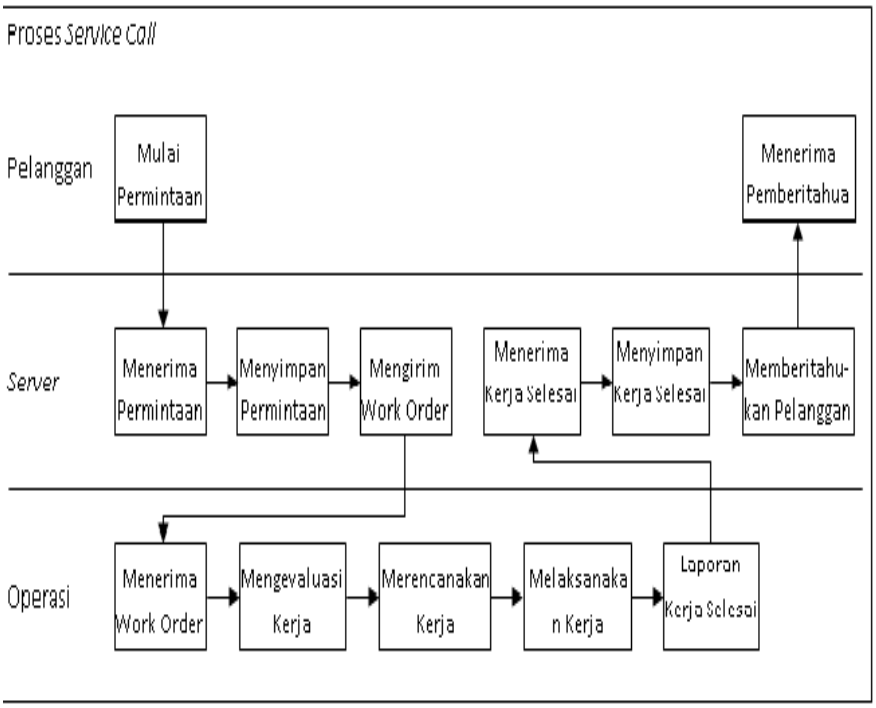


Figure 3.1 Sample for a processing of *service call*
Source : Results Design.

3.3.1. *Work Order* Module

Work Order module is used to describe and schedule of maintenance activities either planned or unplanned. It contains a list of tasks and inventories for the job. Work Order module consists of five display where each display contains data as follows:

1. *Work Order* – Description of Work Orders information that received, it consists of description of Issues, Job Status, Job Type, Priority Work, Asset, and employees who do the work request.
2. *Work Order* Close – Assessment and scheduling of work either planned or unplanned.
3. Labor – Registering a labor who is assigned to do the work and the amount of time and cost needed for labor
4. Direct Request – Registering a demand of required components for the job and following by the required amount of fees.
5. *Work Order* Cost – The total amount required for Work Order Cost that consists of the total employee costs and the total component cos

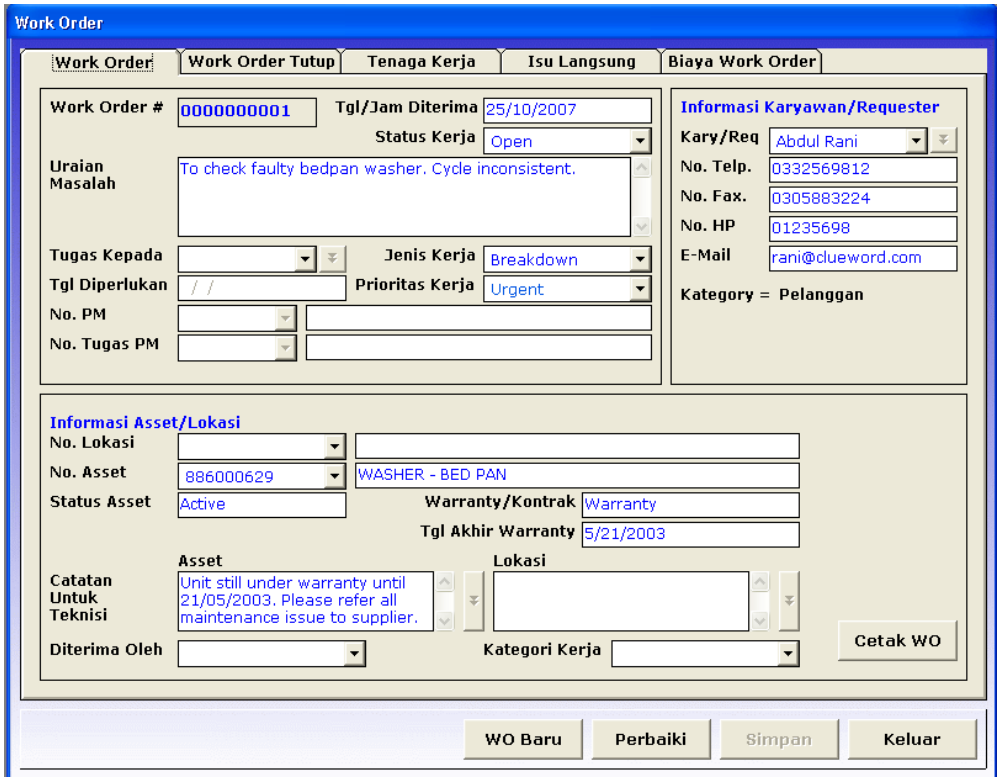


Figure 3.2 *Work Order* Module Display
Source : Results Design.

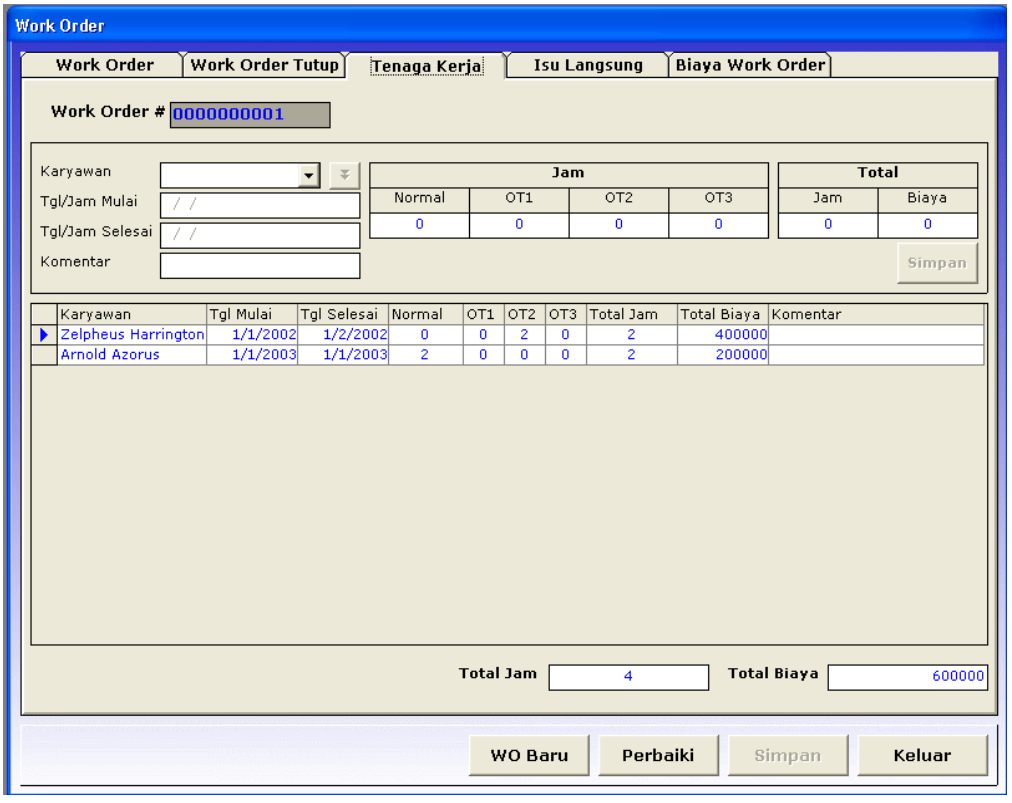


Figure 3.3 *Work Order Close* Module Display
Source : Results Design.

3.3.2. *Asset* Module

Asset module is used to register and multiply all important data regarding the asset. Asset module consists of four displays where each display contains data as follows :

1. *Asset* – Identity and Name of Asset, the following specific data such as Serial Number, Model Number, Status, Location, Department.
2. Relationships – Registering other related assets.
3. Additional Info – Informations of other data deemed important for these assets.
4. *Work Order History* – The list of information *Work Order History* which is ever undertaken in assets.

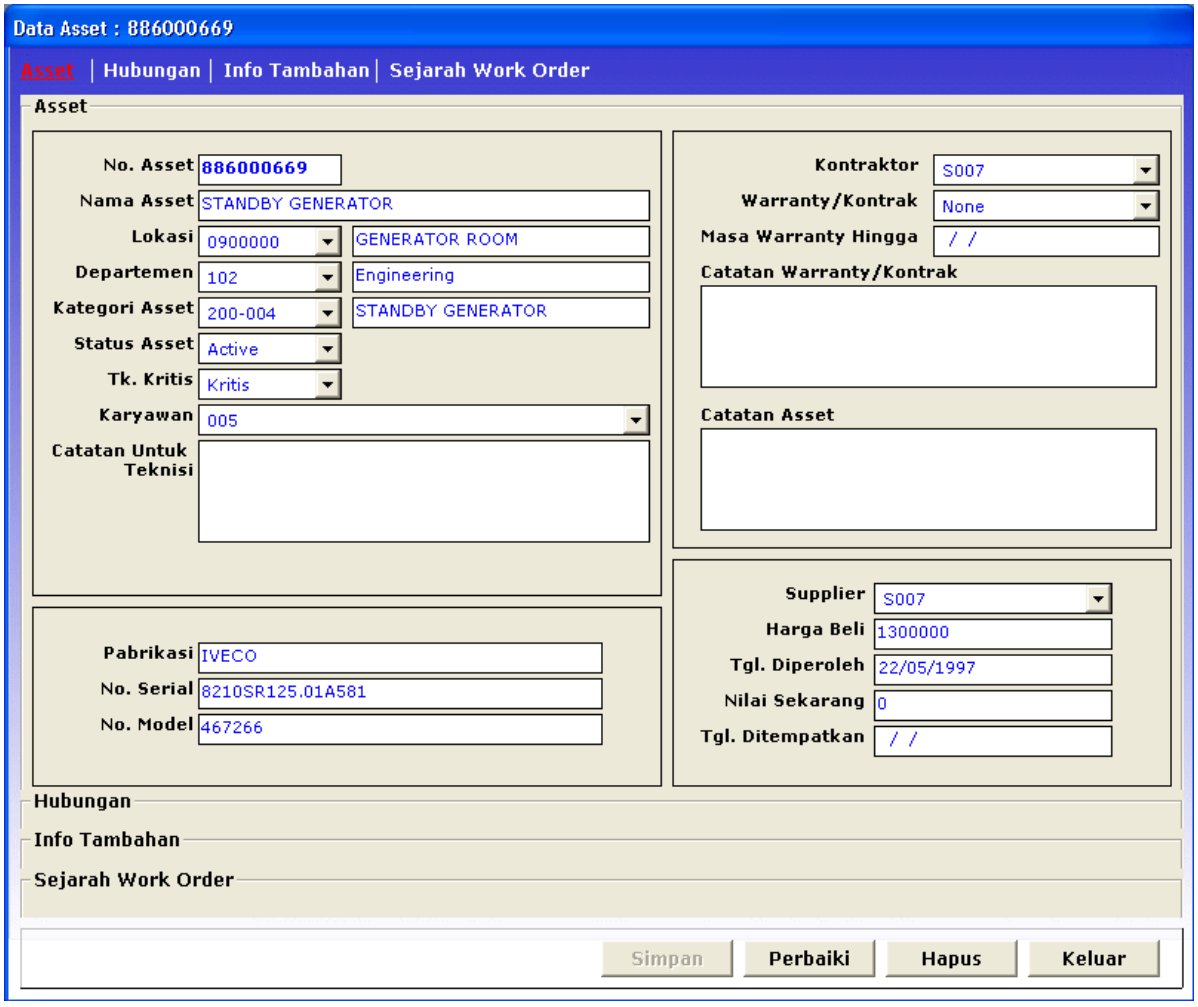


Figure 3.4 *Asset* Module Display.
Source : Results Design.

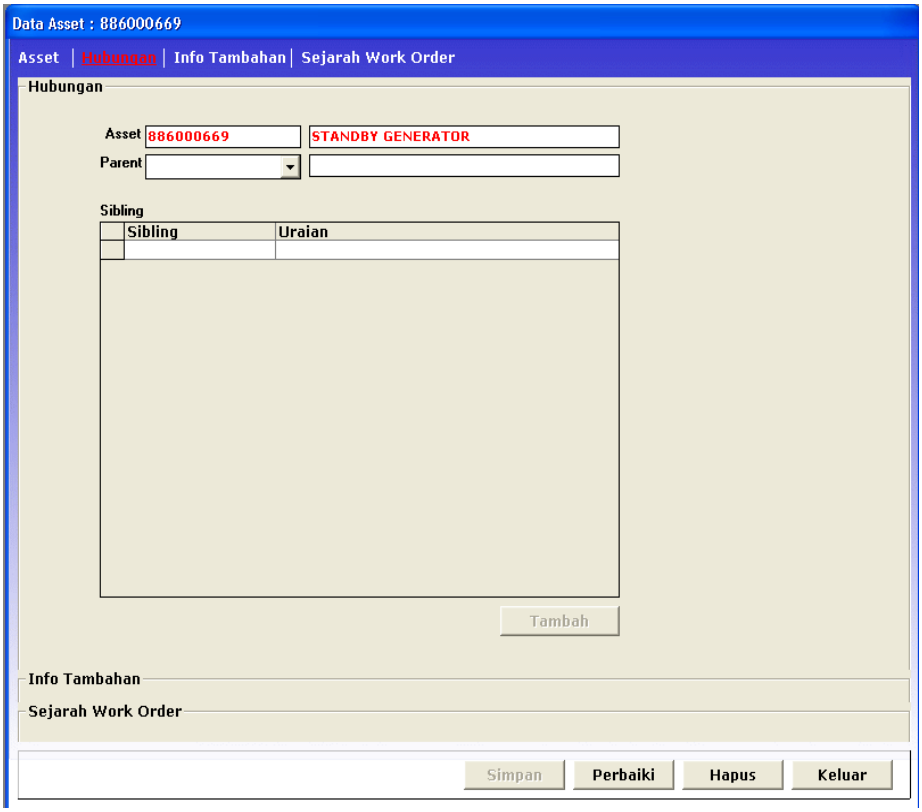


Figure 3.5 Relationships *Asset* Display.
Source : Results Design.

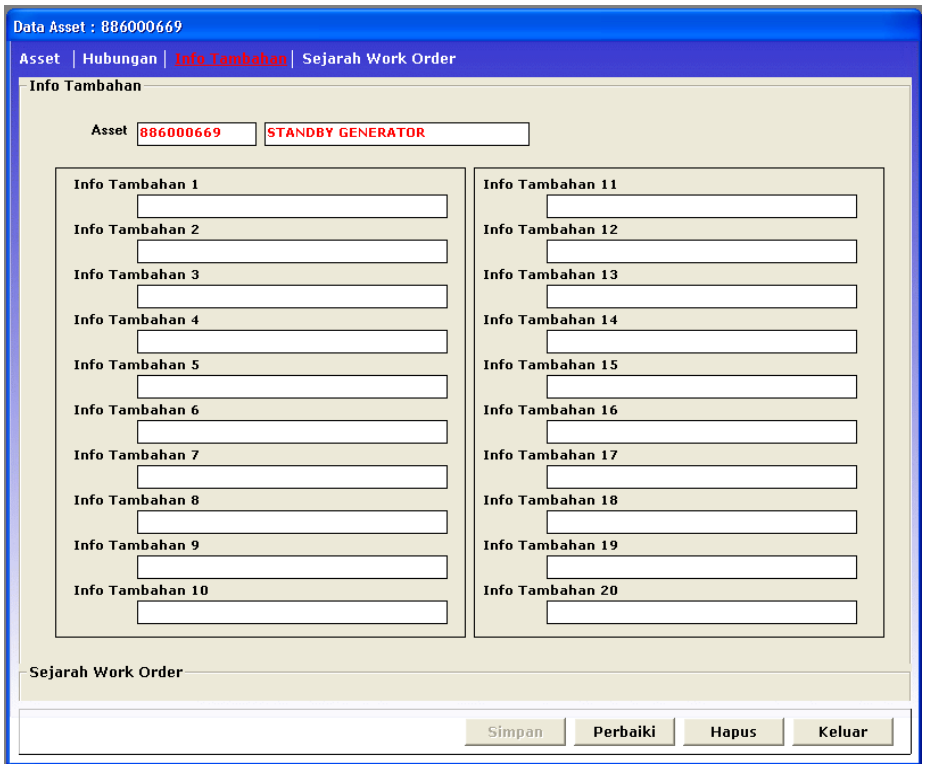


Figure 3.6. Additional Info *Asset* Display.
Source : Results Design.

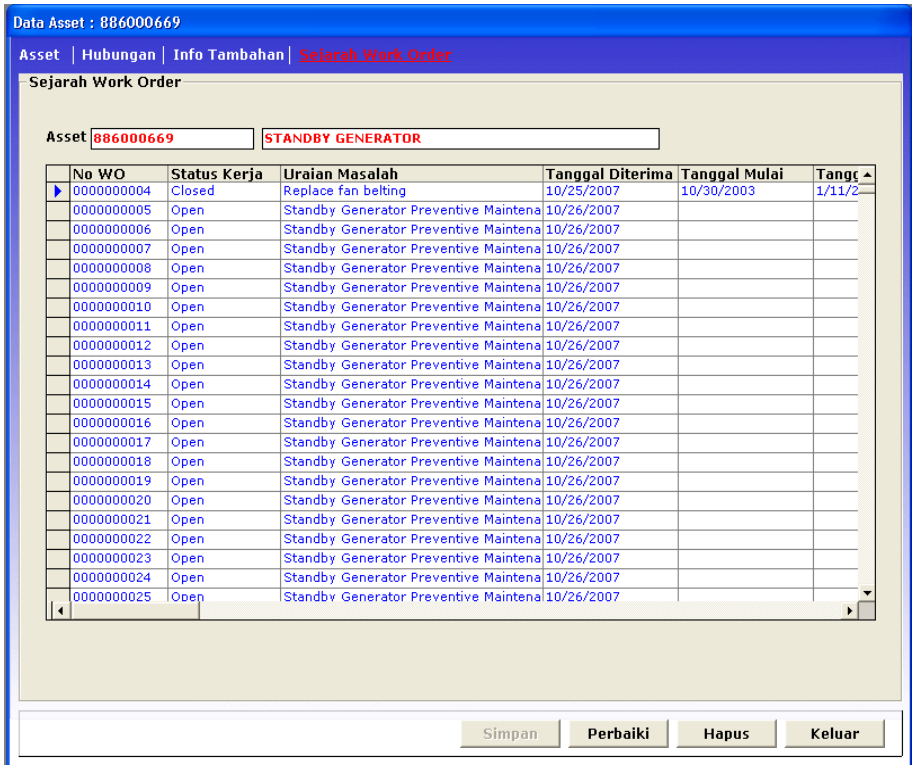


Figure 3.7 *Work Order History* Display on each Asset
Source : Results Design.

3.3.3. Location Module

Location module is used to register and describe data that related such as Number and Name Location, Department, Notes and information Work Order history which has ever done at that location.

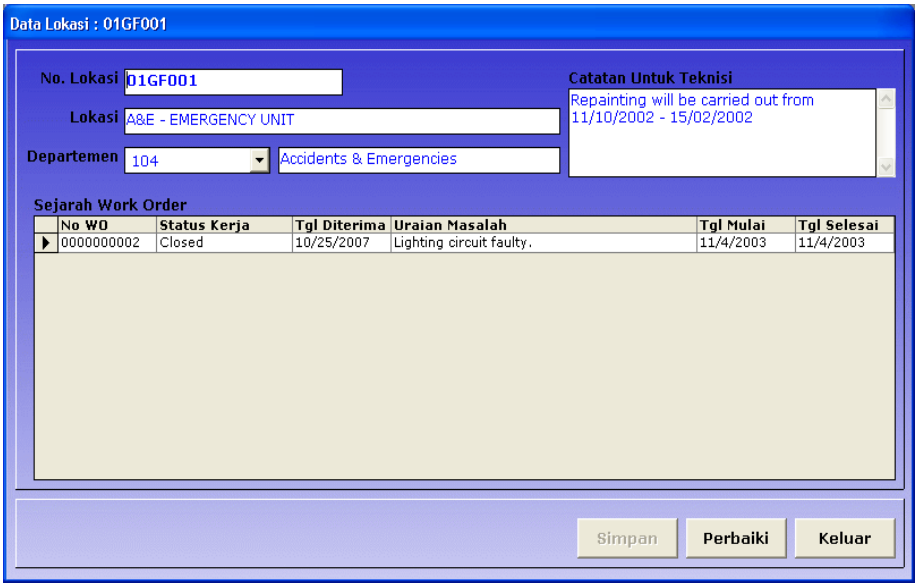


Figure 3.8 Location Data Display.
Source : Results Design.

3.3.4. *Preventive Maintenance* (PM) Module

Preventive Maintenance Module serves to outline and schedule inspection and maintenance for each piece of equipment periodically. Within this module is divided into three parts, namely:

1. *Preventif Maintenance* Task

Preventive Maintenance Tasks display contains information on examinations that outlines the steps of work that will do at each scheduled job.

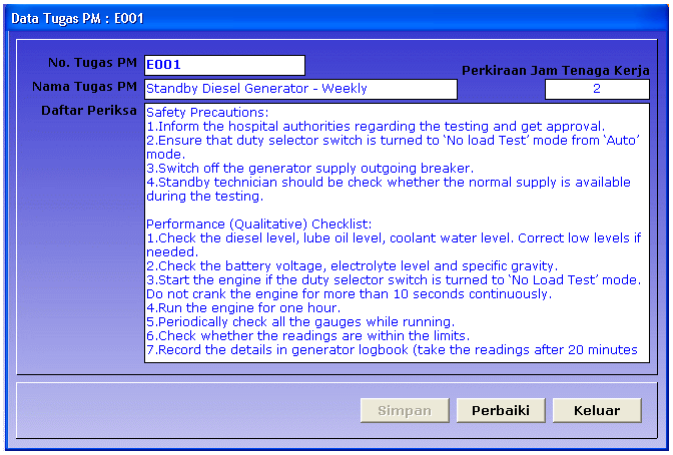


Figure 3.9 Preventive Maintenance Tasks Display.
Source : Results Design.

2. *Preventive Maintenance* Results

Preventive Maintenance Results display provides a list of preventive maintenance work based on the required date range. From this display every job will be documented in a *Work Order* module.

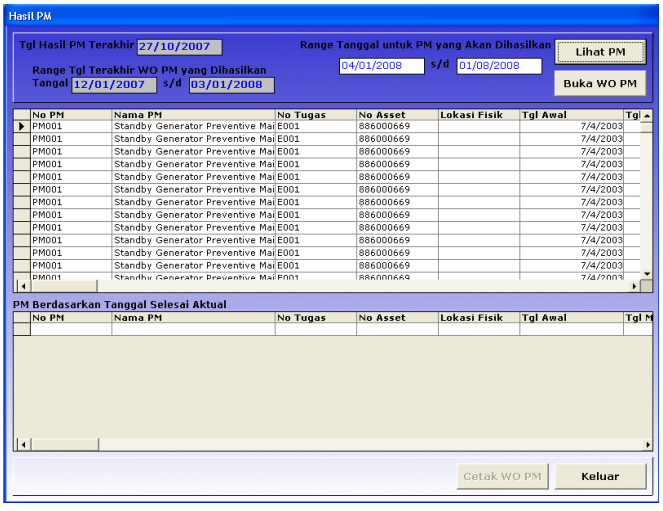


Figure 3.10 Preventive Maintenance Results Display.
Source : Results Design

3.3.5. *Employee* Module

Employee module is used for registering and outlining employee data such as the number and names of employees, as well as the Ministry of information asset list assigned.

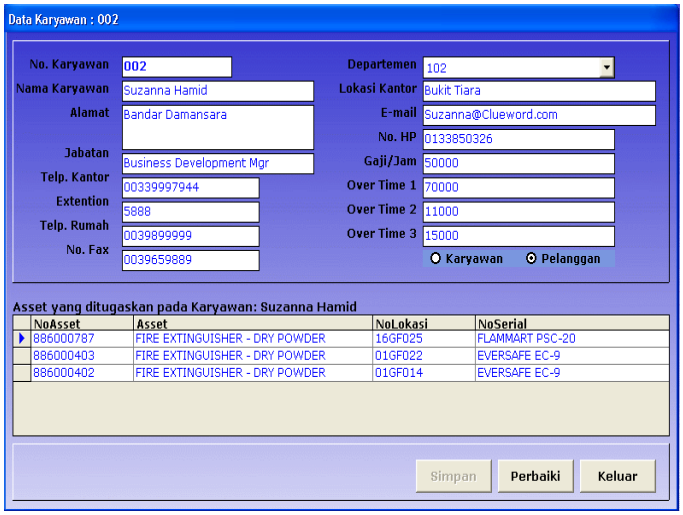


Figure 3.11 Employee Data Display.
Source : Results Design.

3.3.6. *Reports* Module

The success of the system depends on a repetition of the feedback control that has been closed. Repetition feedback referred to a report that is red by the management. The management needs to compare the available reports to address previously identified benchmarks and assign employee if needed to achieve an increase in the benchmark. The report read regularly and take action will also ensure that the integrity of data that has been achieved.

IV. CONCLUSION

Based on the results of design in making this project can be drawn some conclusions, namely: Using CMMS as enterprise management tools are necessary to improve the reliability of the production facilities and at the same time can reduce the maintenance costs. Because the system is integrated and *on-line*, so the management control function is very easy to do. In the installation, implementation and maintenance of this CMMS software applications, definitely will require additional budget, therefore this application would be better if it is for the upper mid-scale organizations in Indonesia. An additional advantage in using CMMS, this system can be used as a tool to conduct training for new staff and other employees for technicians updating a new maintenance.

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