

Computer Govern Maintenance System for a Process Industry

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Abstract

The present paper deals with development of Computer Govern Maintenance System (CGMS) for a Process Industry. The developed software is easy to use, less complicated, less costly and less time consuming and consisting of number of modules like detailed information of equipment, procedures of maintenance tasks, employees, work order, and calendar facility etc. The software has been developed in Microsoft Visual Studio.NET. The development of CGMS Software i.e. 'IOCL CGMS' at "IOCL Panipat Refinery", Panipat, may furnish good results. The currently developed CGMS aims to reduce total downtime, overall annual maintenance cost, frequency of failures of the machines, to get day-by-day maintenance schedule, maintenance policy.

Keyword : Computer Govern Maintenance System, Maintenance Schedule, Maintenance Policy.

1. Introduction

The present paper deals with development of Computer Govern Maintenance System (CGMS) for a Process Industry. Computer Govern Maintenance Systems are increasingly being used to manage and control plant and equipment maintenance in modern manufacturing service industries. It is not any new system of maintenance but is making use of computers for quickly and efficiently deciding, planning and organizing various jobs for effective plant maintenance. The CGMS not only provides valuable information to take decisions, but also enables valuables operational tools to ensure an optimized availability and sustained throughput. Panipat Refinery has doubled its refining capacity from 6 MMT/yr to 12 MMT/yr with the commissioning of its Expansion Project. Panipat Refinery is the seventh refinery of Indian Oil. It is located in the historic district of Panipat in the state of Haryana and is about 23 km from Panipat City. The original refinery with 6 MMTPA capacity was built and commissioned in 1998 at a cost of Rs. 3868 crore (which includes Marketing Pipelines installations) Determining what maintenance activity is actually due requires a scrupulous analysis of all records. It is clear that, the whole procedure is a time consuming activity. Therefore, IT widespread has significantly permitted to optimize preventive maintenance activities.

Labib (2004) states that several factors are driving the need for information to aid maintenance management. First, the record keeping of huge amount of information available for future reference. Secondly, data-life-time is diminishing as a result of the shop-floor realities, which are real-time in nature, and the rapid pace of change. The initiative now is to acquire data about individual machines, based upon real interactions rather than deduced behavior from historical data. Finally, the way that data is being accessed has changed. The days of legacy maintenance systems of large batch reports, where the focus was on data throughput, are being replaced by dynamic, online queries, and with answers in seconds rather than days.

(Hlchael Cannon, Paul Wilder, 2002) states that in this age of automation an engineering department has more sophisticated equipment to maintain and a lot more of it. A properly utilized CGMS can assure management of properly maintaining capital investments on costly plant equipment.

Presently a number of CGMSS are available (eg. Proview CGMS, MEX (Maintenance Experts) CGMS, COGZ CGMS, Smart Maintenance CGMS etc.), but all these suffer from many deficiencies, which results in arise of need to develop new CGMS.

Numbers of years ago (Weir, 2000) the principles of CGMS were applied to hospital equipment maintenance, where critical breakdowns could lead to the development of life threatening situations. In recent years private companies have come to recognize the value of these systems as a maintenance performance and improvement tool. The advent of the PC during the last few years has further boosted their popularity.

Some important deficiencies/drawbacks are following:

1. These CGMSs are for general industry therefore necessary alterations/changes are to be done in these CGMSs.

2. The cost of all these CGMSs is very high.

3. These CGMSs are complicated to use.

4. Some of these available CGMSs do not have any feedback option (like smart maintenance CGMS &. COGZ CGMS), while this option is required in Sugar Industry.

5. Inventory cost feature should be available, which some of these available CGMSs doesn't possess.

3. CGMS SELECTION

Good Computerized Maintenance Management Software (CGMS) is an integral component of any efficient maintenance department. CGMS should not be too complex at the beginning but should allow other functions to be added on a later stage.

Some of the most important issues to consider (Ouellette, 2005) when deciding which CGMS is right are cost, stability of the vendor, program features, fast implementation, support availability, and availability of a demonstration program. Cost is possibly the most important consideration in the hunt for a CGMS. Another important factor is the stability of the vendor developing and distributing the preventive maintenance software. Choose a system only from a company that has been in business for a number of years and that sells only one line of products. Program features are another important component of choosing a CGMS. Determine what your maintenance goals are and look for a program that will meet them. Select a CGMS, which is having fast implementing capability, for which full support and demonstration program is available.

4. DEVELOPMENT ON CGMS FOR IOCL (CRUDE DISTILLATION UNIT) , PANIPAT

The maintenance function of the manufacturing company for which the CGMS was developed was totally responsive and breakdowns were dealt as they occurred. The company's computer system and its operation were complicated and time consuming. Furthermore, maintenance managers did not have time or personnel to process. Moreover, a lot of shortcomings were observed in available CGMSs. As a response, a CGMS was developed using MS Visual Studio.net based on existing Proview CGMS, but customized to the needs of the company. However, more features have been added to the structure of the computer system making it more robust and versatile. Figure 1 shows the main menu of developed CGMS.

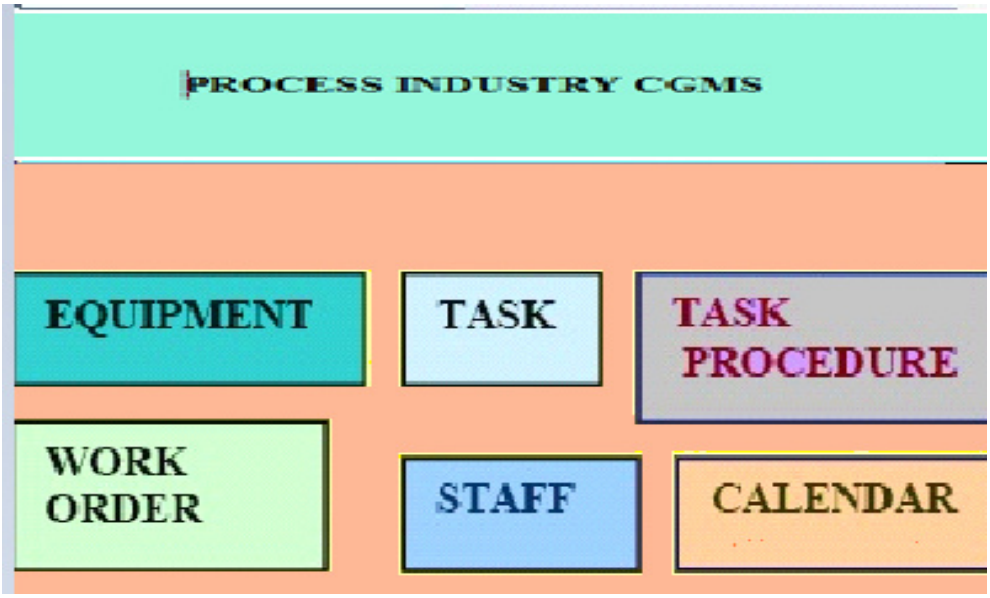

Figure 1: Main Menu of Process Industry CGMS

4.1 Steps for Developing CGMS

The flow chart showing the various steps for the development of "PROCESS INDUSTRY CGMS" is shown in Figure2.

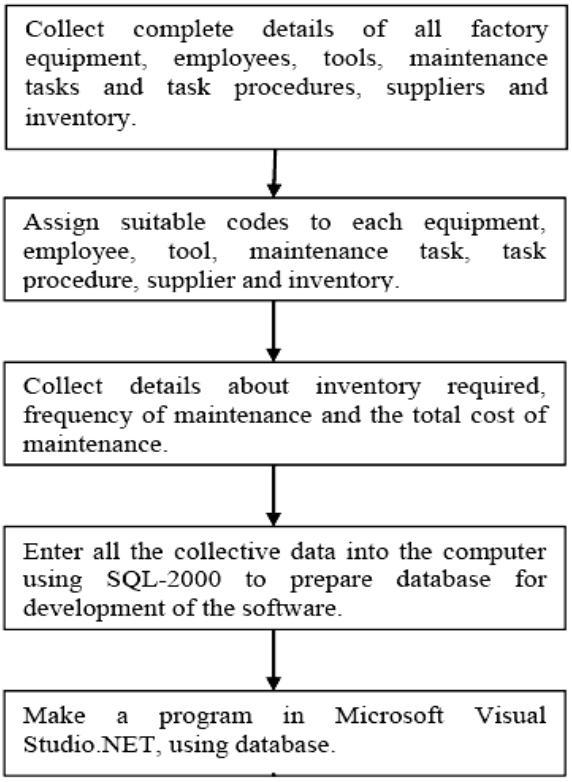

Figure 2: Steps for developing CGMS

5. FACILITIES IN DEVELOPED CGMS

5.1 *Module 1: EQUIPMENT*: This module contains the complete information about Equipment/Machines in the Industry. Just by selecting any equipment ID in the window shown in figure 3, detailed information (along with list of maintenance tasks and notes) related to that equipment can be achieved in fraction of seconds.

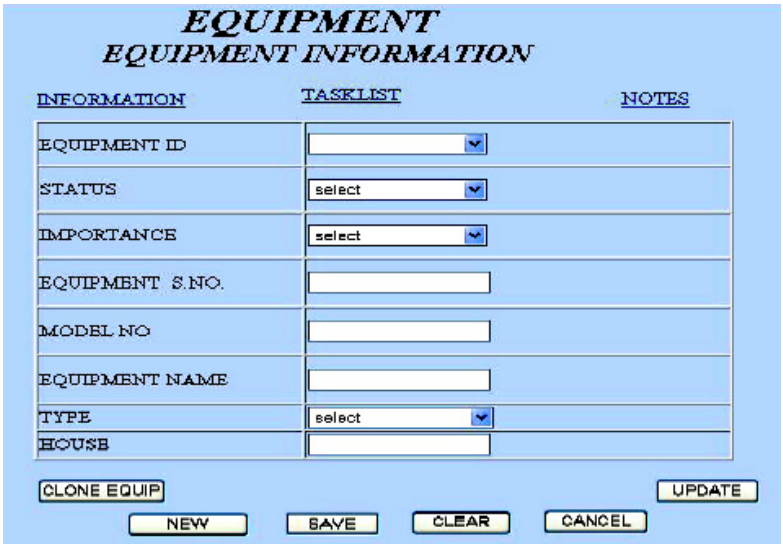

Figure 3: EQUIPMENT Module

5.2 Module 2: TASK: This module contains complete details of the different maintenance tasks. By selecting any Task ID in the window shown in figure 4, details related to that task can be achieved in fraction of seconds.

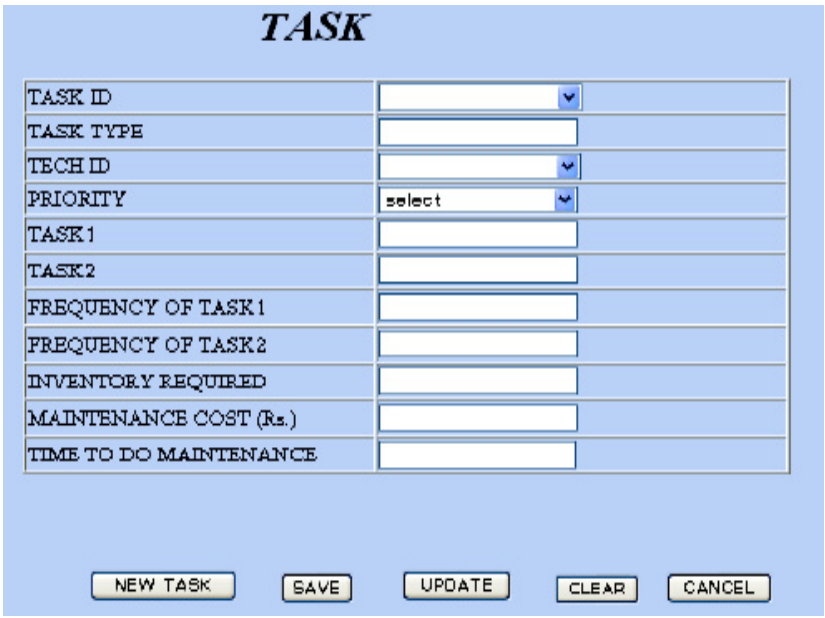

Figure 4: TASK Module

5.3 Module 3: WORK ORDER: This is very important module. This module shows the details of a maintenance task to be performed. Just by selecting any equipment ID and task ID in the window shown in figure 5, detailed maintenance information related to that equipment/task can be achieved immediately.

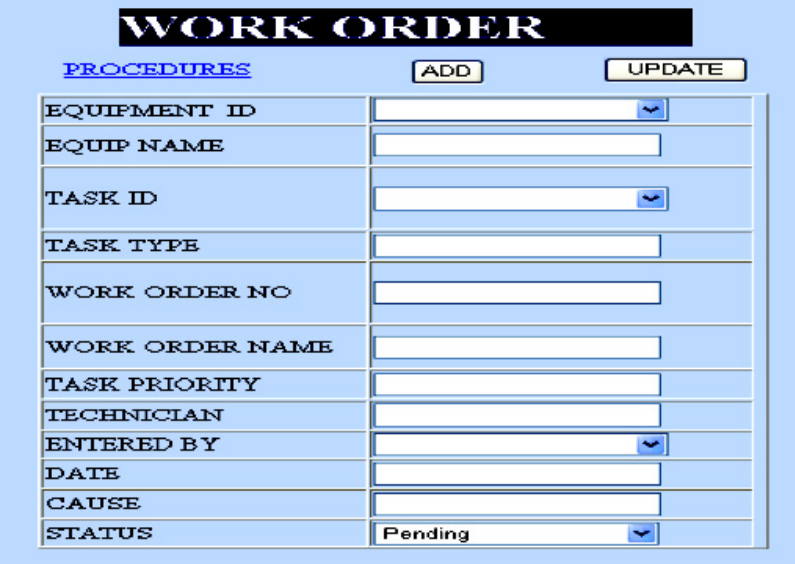

Figure 5: WORK ORDER Module

5.4 Module 4: STAFF: In this module, just by selecting any Employee ID, detailed information related to that employee will be achieved at an instant.

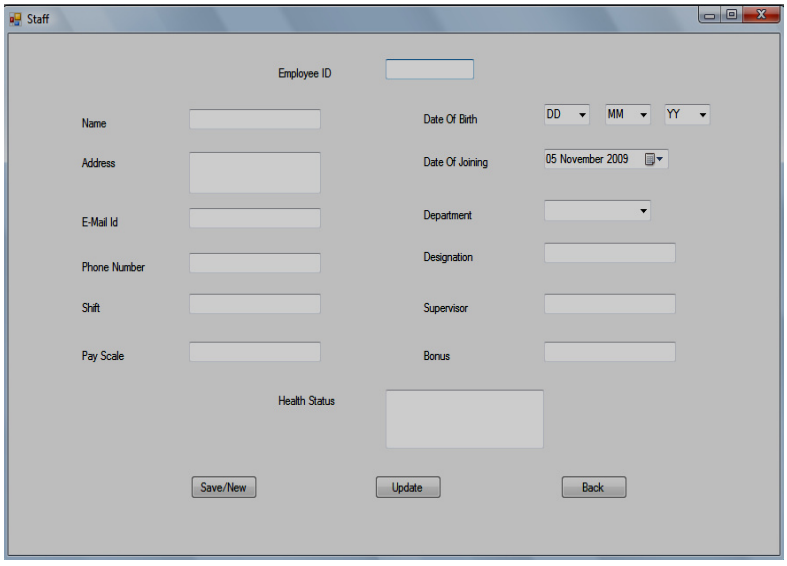

Figure 6: STAFF Module

5.6 *Module 5: CALENDER: This is an excellent module of developed CGMS. The calendar shows the* details of today's work as well as pending work. Just by selecting any date in the window shown in figure 6, complete details of maintenance tasks related to that date will be achieved in fraction of seconds.

Figure 7: CALENDER Module

6. IMPLEMENTATION OF CGMS TO IOCL (CDU), PANIPAT

One of the most important issues (Bruton, 2001) is the quality of the implementation process of the CGMS. It is this that has the greatest effect on the efficient collection, maintenance and reporting from a historical database. Implementation (Ouellette, 2005) must be quick and efficient. Technical support for implementation must be available and personnel should be on hand on an ongoing basis for any future challenges that may arise.

Steps in implementing CGMS

Hemming (2003) describes some important following steps towards implementation of CGMS:

1. The first and most important step in the implementation process is for plant management to decide how the maintenance department should function?

2. The next step is to gain plant commitment to the process. Without this commitment, the system will never be fully functional.

3. After determining the maintenance function and gaining total plant commitment, a company needs to select and purchase a CGMS that meets its needs. Consideration must be given to data collection and data entry.

4. The next step should be developing an implementation schedule. This schedule will let plant management know where they are in the implementation process.

5. The final step is having key personnel take ownership of the system. A CGMS vendor or a maintenance management consulting company may be requested to assist in the implementation process.

It is important that a proper implementation strategy should be developed for implementation of CGMS. Implementing CGMS is not a difficult task. However, it requires some customized training in order to succeed. To begin applying CGMS concepts to plant maintenance activities, the entire work force must first be convinced that upper level management is committed to the program. One of the main factor on which the results of CGMS depends, is the effectiveness of its implementation and commitment of all personnel who are involved in implementation of CGMS. Each equipment, employee, maintenance tasks, task procedure should be properly coded. Improper coding can leads to failure of implementation of CGMS.

7. BENEFITS OF CGMS

If CGMS is implemented to the IOCL Crude Distillation Unit, Panipat, the following benefits can be achieved:

a. The fault in machine, which had occurred last time, can be known easily.

b. What was the inventory required and cost of the parts required, for the maintenance that has been done last time, can be easily known.

c. Next due date for maintenance of machines can be easily known.

d. The inventory required/inventory cost for maintenance can be calculated easily, on the basis of which, total maintenance cost of whole plant can be calculated, which helps in preparation of maintenance budget for next year.

e. Outsourcing can be reduced. Reasons for reduced outsourcing are: worker efficiency can be increased, 100% inspection is totally eliminated, which leads to more working man hours available, so the need for work which is given on contract, or the worker hired from outside for maintenance, can be eliminated up to certain extent, which leads to more efficiency of a worker, increased out put and reduced maintenance cost.

f. Machine up time can be maximized and breakdown time can be reduced.

8. CONCLUSION

In the present work, a Computer Govern Maintenance System has been developed for a Process Industry. The purpose of implementation of the system is to simplify and automate existing processes as a means to improve efficiency, which has proven to be poor. The results of implementing an effective program in terms of increased plant efficiency and productivity are outstanding. In actual fact, implementing CGMS is a dramatic organizational change that can affect work-floor management system and employee responsibilities etc. As all the data is kept in computer for future reference, hence the next year maintenance policy can be easily predicted. Due to use of computer, there is saving in time resulting in to increase in plant efficiency and reduction in mental fatigue of the workers. More over, manual record keeping is reduced up to a large extent.

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