CMMS FOR POWER SUPPLY

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ABSTRACT

This paper briefly explain computerized maintenance management systems (CMMS) which we made for "Elektrosrbija" especially integration of work order into information system of company. This paper briefly explains what is maintenance and type of maintenance. One of mainly task in power supply company is maintenance and control time and materials for maintenance. This program enables full control time for maintenance and gives good reports for boss.

INTRODUCTION

This paper explain our CMMS and connection CMMS with other parts of information system. The maintenance by definition is extending lifetime of equipment, or at least the mean time to the next failure whose repair may be costly. Furthermore, it is also expected that effective maintenance policies can reduce the frequency of service interruptions and the many undesirable consequences of such interruptions. Maintenance clearly affects component and system reliability: if too little is done, this may result in an excessive number of costly failures and poor system performance and therefore, reliability is degraded; done too often, reliability may improve but the cost of maintenance will sharply increased. In a cost-effective scheme, the two expenditures must be balanced. Completely and accurately, CMMS can make great contribution to RCM analysis In fact; maintenance is becoming an important part of what is often.

CURRENT MAINTENANCE PRACTICES

Maintenance, in general, consists of preventive and corrective maintenance. Preventive maintenance is carried out in planned intervals. Corrective maintenance is carried out upon the equipment failure.
Three typical approaches to maintenance practice are well established at present:

- Time-based maintenance (TBM)
- Condition-based maintenance (CBM)
- Reliability-centered maintenance (RCM)

Time-Based Maintenance (TBM)

Maintenance routines consisted mostly of predefined activities carried out at regular intervals (scheduled maintenance). The maintenance intervals are selected on the basis of recommendation from manufacturers or/and long-time experience. This type of maintenance involves maintenance engineers in regular intervals and is, in general, considered to be reliable. The disadvantage of this maintenance method is 'too early or too late' maintenance. Therefore, such a maintenance policy may be quite inefficient: it may be too costly (in the long run), and may not extend component lifetime as much as possible.

Condition-based maintenance (CBM)

CBM is a method that optimizes the interval between preventive maintenance checks according to the 'real time' equipment condition. This method requires additional equipment to monitor the equipment condition, particularly of the critical parts. The collected data, which can be obtained through periodic or continuous condition monitoring, has to be presented and processed in such a way that a decision on action can be made efficiently.
'On line' monitoring normally keep an eye only on vital equipment parts. Monitoring of other parts is not considered practical, as it would involve unjustifiable costs.
CBM provides the asset engineer with a greater confidence on the condition of the asset. Following the data analysis, a decision would be made about immediate or delayed action.
If the maintenance intervals for CBM are longer compared with TBM then the savings in maintenance is achieved, if it is shorter then it is likely that failures are prevented and the associated consequences avoided. CBM could be utilized even more if combined with TBM and/or RCM maintenance.
One of the difficulties with CBM is building up a huge database that requires complex analytical analysis.

Reliability-Centered Maintenance (RCM)

RCM concept originated within the aircraft industry and has been applied with considerable success for more than 20 years. RCM method provides a framework for utilizing operating experience in a more systematic way. RCM is not always based on condition monitoring, but on other features such as failure modes, effects and criticality analysis (FMECA) and an investigation of operation needs and priorities. RCM is a method that distinguished failure causes from failure effects analysis. In an RCM approach, various alternative maintenance policies can be compared and the one most cost-effective for sustaining equipment reliability selected.
RCM requires an initial inspection to assess the equipment, measurements and specialist's assessment. Following the initial inspection, routine inspection in regular intervals

would also be required. The routine inspections include the maintenance tasks defined as high priority tasks related to 'high probability'. Maintenance tasks linked to 'low probability' could be excluded from the program. The implementation of RCM programs represented a significant step in the direction of "getting the most out of" the equipment installed. RCM has been considered as an important part of asset management, its information-processing model is given.
The main objective of RCM is to reduce the maintenance cost, by focusing on the most important functions of the system, and avoiding or removing maintenance actions that are not strictly necessary. If a maintenance program already exists, the results of an RCM analysis will often be to eliminate inefficient PM tasks.

BASICS FUNCTIONS OF DIGICMMS

In most of the electric utilities the maintenance functions have been split into several sub-functions supported by separate information technology systems, without real organization and consistency in their implementation strategies, but we create unique information system which have several sub-functions created on unique database Oracle. DigiCMMS contains next modules:

Asset module

- Capture asset nameplate information
- Track warranty and contract
- Track purchase information and straight depreciation
- Create additional fields for specific asset details
- Create and track parent child and siblings relationship for easy system based reporting
- Displays work history for each asset
- Displays work order costs for each asset
- Track bill of material of each asset for better critical spares management
- Displays asset tree
- Track movement of assets

Location module

- Capture location data
- Displays work order details by location
- Enables work order to be assigned to location for civil structure works
- Displays work order costs by location
- Capture all assets belonging to a particular location

Work Order Module

- Track who, what, where, why, when and how of each maintenance work
- Track employees hours and cost on each work
- Track costs by work
- Allows prioritizing and categorizing work for easy planning
- Capture failure code and prevention taken
- Track spares and consumables on each work
- Track customer satisfaction
- Track work access appointment times
- Allows multiple employee to be assigned to a work order
- Allows re-open of work order
- Allows attachment of safety instruction or job plan

Employee Module

- Capture employee details
- Capture employee rates
- Track employee hours and costs by work orders

Most maintenance and engineering managers have been faced with the requirement of having to justify staffing levels or increased manpower. The availability of quantitative data would greatly simplify this justification process. By using DigiCMMS system to document labor hours, over time managers can build a significant amount of useful information. Thus, DigiCMMS plays an important role in budgeting times because different crafts usage can be easily stored and retrieved, and a detailed account of crafts usage can be got. Employee module is connecting to human resource system of our information system (KADROVI).

Preventive Maintenance Module

- Generate time based PM work orders
- Schedule time based work orders based on scheduled or actual completion
- Accommodate coinciding time scheduling segregations
- Schedule different scheduling frequencies types

Meters (Inspections)

- Record inspection information for operational and statutory requirement
- Generate mitigating work orders when readings are outside threshold bands
- Generate mitigating work orders when incremental limits are reached
- Scheduling by meter or time (Whichever comes first)
- Accommodate coinciding meter or time scheduling segregations (Whichever comes first)

Material

- Track spares and consumables receipts, issues and returns
- Track adjustments to stock counts due to expiration and obsolescence
- Track costs based on standard and average costs

- Issue spares from work order module
- Track reorder and min max level

Purchasing

- Generate purchase orders
- Track information on good or services received
- Track information on orders, purchases and receipt
- Track purchase order by vendor and requester
- Track purchase order status for approved purchase order
- Track purchase order approval levels

Service Request

- Track internal requests separately from work orders
- Separate application module for installation on terminals in local area network
- Raise work orders from the work requests
- View work orders from work requests

Report module

Finally, DigiCMMS can generate reports and graphs from a variety of fields ranging from equipment, cost centers, projects, labor, inventory, reason for outage, parts usage, and so forth. These fields supply any conceivable combinations for report criteria.

INSURING COMPLETE AND ACCURATE CMMS DATA

The most important part of ensuring complete and accurate CMMS data is getting support for system both from those involved with maintaining the system and from top management. Top management and users should be educated on how CMMS paints an accurate picture of where time and money is being lost or saved in a maintenance department. In addition, they should understand that CMMS is one of the few investments that keeps paying back year after year through the automation of manual processes such as generating PMs and reports, procuring stocked parts, locating parts, gathers part information, building work order history, etc.

Company also must understand that, in addition to the initial investment of the CMMS, additional resources such as time, training, and additional staffs are needed to gain maximum value from the system. The most common failure of maintenance software is purchasing the software and not committing sufficient time and resources to the planning, implementation and full execution of it.

We create our program on basis of ten years experience of maintained and very good know of our information system and data model. Many parts of DigiCMMS already use in other parts of our information system and we not create this. In work order (Appendix A) we can see name of object which is part of DigiTIS, name of materials which is part of EDIS, name of workers which is part of "KADROVI" (program from human resource) only type of work is table of DigiCMMS. Because we easy use this CMMS all other part information system we use ten years. Once when is fill out work order all data go to into rest of information system. All equipment that has work performed on it must exits in the CMMS but our data stored into DigiTIS and DigiCMMS create connection to DigiTIS. If equipment hierarchies in the system, equipment hierarchies also must exist in the CMMS so that similar groups of equipment can be compared to each other which group needs the most attention. All work order types must exist in the CMMS so that work can be easily classified. All maintenance employees and contractors that work on a plant's equipment must exist in the CMMS but our data stored into "KADROVI" and DigiCMMS create connection to "KADROVI". All labor hours, both in-house and contacted, spend on a piece of equipment then can be charged back to a piece of equipment, building accurate equipment history. All parts data used to maintaining equipment, including stock locations, must be set up in the CMMS. Parts then can be checked out and charged back to the piece of equipment, building accurate equipment history. In addition, if a piece of equipment is failing due to a defective part, data will exits for failure analysis for both the equipment and the part. All comments, reason for outages and downtime pertaining to work performed must exist in the CMMS for future analysis.

CONCLUSION

We use DigiCMMS on start for speed create work order, later we collect data from work order and analyze. On basis this analyze we know place and time, where and when we replace parts. We use DigiCMMS and don't forget time for preventive maintenance. All this aspects increase value of company and reduce coast of maintenance. Very minor number of the information system for power distribution on south-east Europe and underdeveloped countries has CMMS, technical information system, business information system; geographic information system, billing system and accounting system unite into unique information system. Working on developing into this power distribution system is very hard; they have small information for their system. Our information system can be solution for many power distribution systems.