

DEVELOPMENT OF COMPUTERIZED MAINTENANCE MANAGEMENT SYSTEM FOR RAIL TRANSPORTATION SYSTEM

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Abstract: Applying a computerized on-line maintenance effort to decrease maintenance cost and increase maintenance quality is the pursuing objective of modern rail transportation (MRT) corporations. This report aims to introduce the approaches that merges together the MRT operational strategy and the integrated logistics support (ILS) concept into a computerized maintenance management system (CMMS). By effectively using on-line maintenance data collection and maintenance data analysis approaches to monitor and control the variation of inherit reliability of major equipment, the goal to service the sustaining availability of the MRT systems can be achieved.

Our approach is neither a new theory nor a new invention, but a method that applies the integrated techniques to create a modern enterprise environment instead of the traditional workshop appearances. The strength and opportunity of the CMMS will not only provide the maintenance performance, but also reflect the efficacy of the maintenance resources as well as life cycle cost, and most importantly, spread the maintenance experiences in an automatic circumstance.

1、Introduction

Automation and coupled the electrical and mechanical (E&M) function is a trend for modern MRT systems. Thus, developing a proper maintenance strategy and following a maintenance structure (include organization and resources) to fulfill the system maintenance requirements is a significant task for MRT corporations.

To bring up a concept of developing a CMMS by following the ILS ideal to achieve the life cycle cost saving and efficiency maintaining on the maintenance structure for Taiwan MRT systems is the purpose of this paper.

Meanwhile, the planned CMMS for “CKS International Airport to Taipei Rapid Transit System (CKS RTS)” Project by Ever Transit International will be introduced in the last chapter as well.

2、Development of ILS

The effect of ILS can not be achieved by using only one simple process. It has to keep on circulating to evaluate the reliability variation due to the early unadaptable

immigrating of E&M equipment from the first system's test to its mature stability. In other words, the adherent engineering characteristics will be changed in the early operation period due to environmental influences. In this circumstances, the solution to manage those engineering data to modify maintenance strategy and maintenance structure in time becomes the key factor to accomplish the ILS benefits and goal.

1. General concept of ILS development

The general concept of ILS development is described in figure II-1. Combining operation strategy and feasibility studies (cost and risk analysis) to produce the preliminary maintenance plan (PMP) and using PMP as the guide to establish all maintenance resources should be conscientious accomplished in the R&D phase and the production phase respectively. In other words, at the starting point of system's test, a preliminary maintenance organization should be ready and capable to conduct maintenance tasks on the unadaptable fault respect. Through continuously collecting and analyzing the

unexpected faults (using maintenance data collection system MDCS and maintenance data analysis system MDAS) and enhancing the schedule maintenance efforts, an

efficient support system can be achieved in a short period after the system start revenue service.

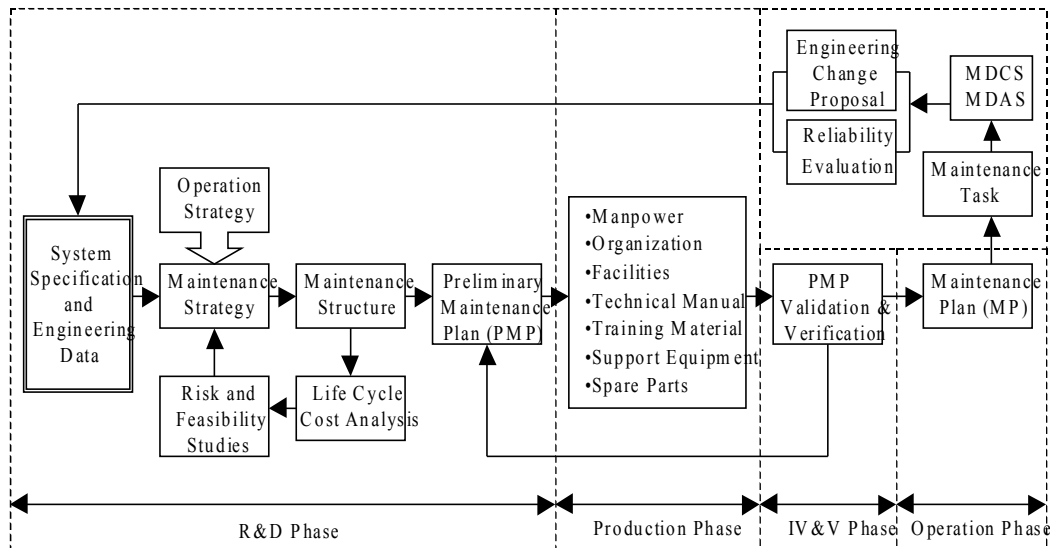


Figure II-1: General concept of ILS development

2. ILS concept for Taiwan MRT systems

Since most major E&M equipment of Taiwan MRT systems were and will be built from import pattern, how to allocate the suppliers' efforts from their R&D and production phases into the owner's following maintenance activities, should be the first one of studies for the developing of the ILS.

In the Figure II-1, to collect engineering data and to generate a domestic maintenance structure should be the beginning steps to build a Taiwan MRT system and should be conducted in the owner's site in the contractual and early production phase.

The ILS development concept for Taiwan MRT system is described in the Figure II-2.

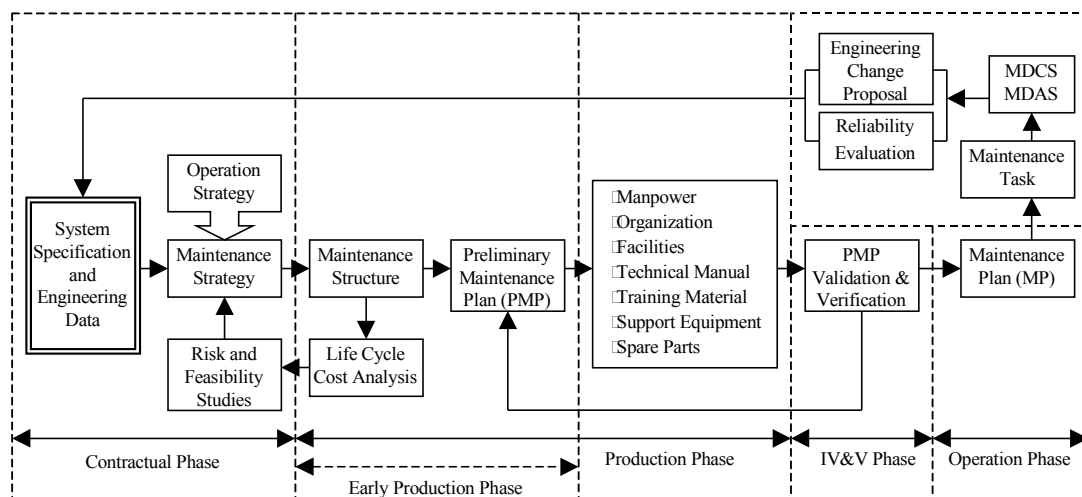


Figure II-2: The ILS develop concept for Taiwan MRT systems

3、Development concept of CMMS for Taiwan MRT systems

A CMMS should be developed in accordance with the ILS concept from the previous section and its major functional structure is described as Figure III-1. By means of the service of automation, the

software itself has to be able to integrate the organizational functions, maintenance workflows and management strategy, all the engineering data are managed by a Maintenance Information Center to maintain its configuration, and all the relevant maintenance assets can be automatically interpreted by their specified functional module across the INTRANET.

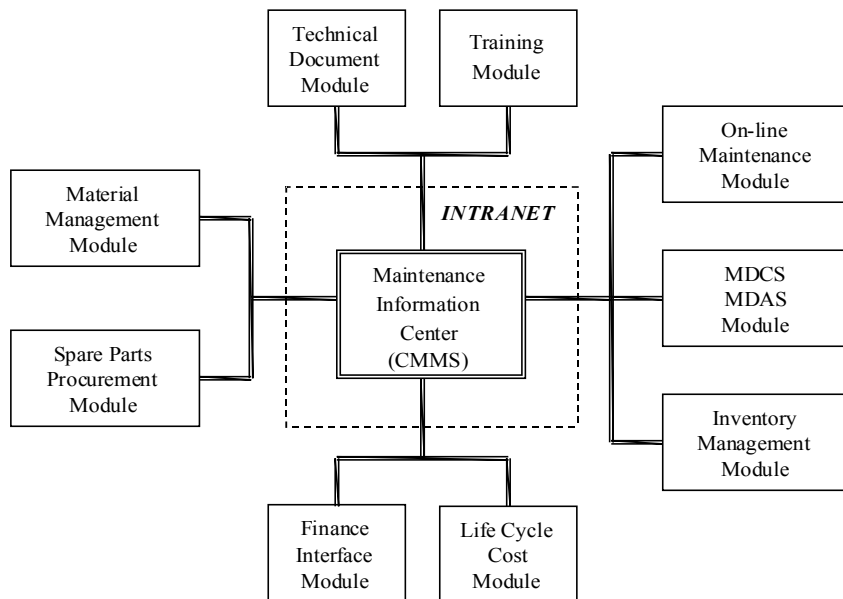


Figure III-1:
The basic

function of the MRT CMMS

4、Planned CMMS for CKS International Airport to Taipei RTS

For the purpose of evaluating the cost profile of the CKS RTS life cycle operation and maintenance of the E&M system, the

Ever Transit International had started the ILS planning in the early stage of his contractual phase. In accordance with the ILS effort, a preliminary CMMS development plan has also been generated during the CKS RTS contractual phase. The functional diagram of the CKS RTS is described in the Figure IV-1.

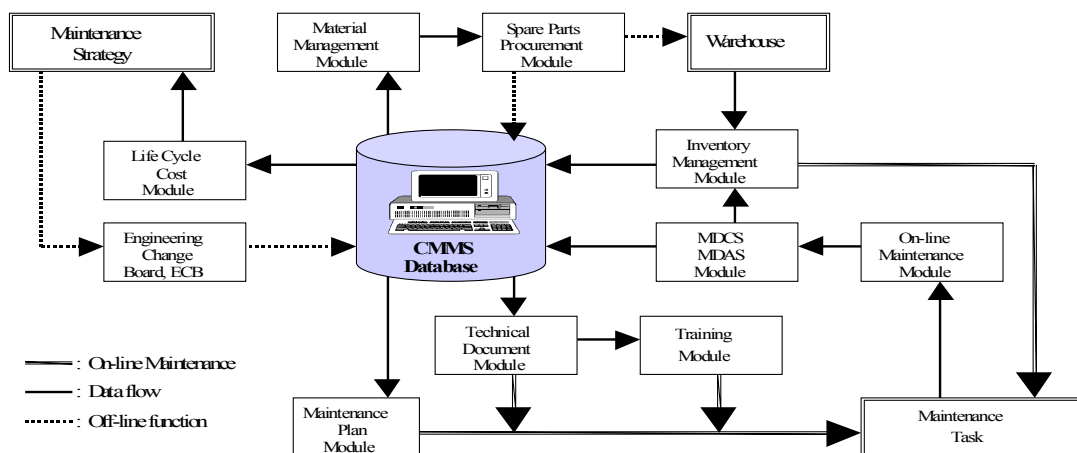


Figure IV-1: Functional diagram of CMMS of CKS RTS
The functions of each specified module are:

- On-line Maintenance Module:
Provide on-line maintenance records and provisions for each defined scheduled maintenance task.
- MDCS/MDAS Module:
Provide necessary ILS data collections and reliability analysis from the On-line Maintenance Module.
- Technical Document Module:
Provide computer viewing and hard copies of maintenance manuals for each defined scheduled maintenance task.
- Training Module:
Provide technical training (includes multimedia packages) by in-house and remote access.
- Inventory Management Module:
Provide inventory management of all spare parts according to the E&M hardware breakdown structures HBS and provide safe-inventory monitoring function.
- Material Management Module:
Provide parts specification; suppliers; procurement lead time; cost; contract of all spare parts in the inventory.
- Spare Parts Procurement Module:
Provide spare parts procurement documents for the off-line proving processes.
- Life Cycle Cost Module:
Provide actual maintenance cost distributions and comparing to the predictions.

V、 Conclusion

A CMMS represents an organic maintenance mechanism, not a simple software curriculum. The CMMS has to not only be integrating the maintenance strategy; maintenance structure; maintenance flows and management philosophy, but also managing the ILS data and curriculum vitae of major equipment in dynamic sense. If effectively managing the central database (data configuration) to produce the quality maintenance conforming system's availability can be approached, the expected goal of CMMS can be achieved.