The Study of the Building and Application of An Informationization-based Wise Facility Management

Wei-Dong LOU, Han-Ying LI, Jun-Jie JIN, Ji-Cui WANG, Dan-Dan LI

China Tobacco Zhejiang Industrial Co., LTD, Hangzhou Cigarette Factory, No.118 Kehai Road, Zhuantang Subdistrict, Xihu District, Hangzhou, Zhejiang
Lihanying@zjtobacco.com

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Abstract. Based on the study of TnPM management, integrating the traditional facility management, this paper presents the SMART TnPM system, which helps to realize wise facility management on facility condition, facility operation and maintenance, and facility efficiency, thus improve the facility managing ability.

Founded on October, 1949, the Hangzhou Cigarette Factory of China Tobacco, with a history of over 60 years, has turned into a modern factory of certain influence in this industry. On October, 2011, the Hangzhou Cigarette Factory (HCF) moved to a new site, which is located in Zhijiang national resort, facing the Qiantang River in the east, leaning Longwu, Lingshan scenic spots in the west. The new factory taking an area of 1000 acres, possesses units including the union workshop, the power center, the office building, the trial line, warehouses as well as a highly automatic production line. The primary workshop is equipped with first-class facilities and world-level processing technology boasting features of informationization, flexibility, and intellectualization. It can meet the demand of broad adaptation, precise control and fast switch of production process. The advanced facility is in need of a wise management. Under this circumstance, HCF brought in TnPM management in order to improve the facility managing level. The primary workshop developed a wireless technology-based SMART TnPM system and has applied it to the daily facility managing procedure.

Recognition on SMART TnPM

Wisdom, according to the dictionary is the ability to use your experience and knowledge in order to make sensible decisions or judgments. While combined with TnPM, we interpret wisdom as SMART. The five letters can interpreted as follows: S as Serve and Specific; M as Management and Maintenance; A as Assign and Advance; R as Record, Result, Reward; T as Total, Track. In a SMART TnPM process, we need to define the target, carry out the process, record and analyze the result, retrospect and optimize the follow-ups to finish a PDCA circulation.

The Framework of SMART TnPM Management

According to the features of equipment, the primary workshop tries to form a facility management that is based on the facility condition management, supported by operation and maintenance management, aimed at efficiency management, and carry out SMART TnPM by focusing on facility integrity and facility health.

The primary workshop sets up the facility condition management mainly focusing on state monitoring, fault management, state evaluation, and technology management. It realizes facility state monitoring through periodically facility state evaluation. It sets up and carries out fault solution strategies by analyzing hidden fault and fault phenomenon. It conducts a monthly specific inspection on facility integrity and process performance according to technical references and criteria. It organizes facility operation analysis according to facility operation efficiency. Based on facility state monitoring, integrated with facility faults, the workshop manage to recognize the
potential risks on facility, and according to the facility operation status, it is able to optimize maintenance strategy and organize preventive maintenance. In order to strengthen technology management, “the engineer website of the primary workshop” is established to realize the online research or download of facility instructions, maintenance cases and technical drawings. Ways like setting up operation standard and topnotch operating method are adopted to formalize facility operation and maintenance practices.

The primary workshop sets up the facility operation and maintenance management mainly through operation stability assurance, onsite management and facility maintenance. Two mainlines as “key technology responsibility system” and “spot and tour combined inspection” are adopted in facility inspection and state analysis, highlighting the inspection and state monitoring of key facility and critical system to ensure three times coverage of key facility, twice coverage of important facility, and once coverage of common facility, and conduct maintenance and servicing through the following ways: workday in-turn line inspection, weekend facility maintenance, holiday production halts inspection and outburst breakdown repairs.

The primary workshop sets up the efficiency management through cost management, processing quality management and security and environment management. During the facility operation and maintenance, the workshop puts cost reduction, operation efficiency improving and quality control enhancing as its goals to make sure the safe and green operation of the facility.

![Figure 1. SAMRT TnPM management framework.](image)

**The Development and Application of SMART TnPM System**

According to the SMART TnPM management framework, based on the wireless internet, and supported by the information platform, the workshop combines the TnPM concept with the traditional management, and developed the SMART TnPM system, in order to keep sustained improvement on facility management.

**Build Data Platform and Wireless Internet to Realize Convenient Data Transmission and Storage**

According to SMART TnPM requirement identification, together with the facility layout, the workshop sets up a scheme on data exchange and storage, that is adopting hand-held spot inspecting device and onsite touch screen as terminals, using wireless internet and switchboard to realize data transmission and storage between terminals, servers and supervisory computer.
Develop Information Platform to Boost Informationization

Allocate limits of authority according to staff assignments and responsibilities. Set up machine accounts and correlate basic information and managing information of facilities such as production information, model, production capacity, energy consumption with personnel responsibilities to form the database of SMART TnPM system. Build modules of facility status management, facility operation and maintenance management, facility efficiency management, facility parameter management to enable practices like inspection online feedback, maintenance assignment, fault statistics and analysis, spare parts consumption analysis and proposal online processing.
The Effects of SAMRT TnPM System

With the help of the development and application of SMART TnPM system, the facility management has been significantly improved.

The Application of SMART TnPM System Has Rejuvenated the Workshop Activities

The application of SMART TnPM system has improved the convenience and promptness of putting forward the proposals. Since the workshop carried out this activity, over 2442 proposals has been adopted, covering aspects of facility, worksite, product quality, infrastructure and so on. About 97% of the workshop staff has been involved. The SMART TnPM system in a way has promoted the all staff participation in facility management.
The SMART TnPM System Has Provide a Platform for Staff Improvement

The application of SMART TnPM system has realized the information sharing, which helps to provide a platform for staff improvement. Since its application, the staff members have proactively devoted in experience sharing, forming 17 copies of visual operation instruction, 4 copies of teaching video of key positions, 7 copies of facility maintenance instruction, 41 maintenance cases, and conduct more than a hundred times of online class. It helps to increase team communication as well as staff improvement.

The Application of SMART TnPM System Has Lowered the Equipment Stoppage Rate

The application of SMART TnPM system has lowered the equipment stoppage rate. From 2012 to 2015, the fault stoppage rate has been declining year by year. In 2015, the fault stoppage rate of the primary workshop was confined to less than 1% of KPI evaluation goal each month. The highest rate of that year was only 0.59%, boasting a standard reaching rate of 100%. The average fault stoppage rate of 2015 is 0.45%, 0.09% lower than that in 2014.
In the following TnPM promotion, the primary workshop will stick to the idea of SMART TnPM facility management, continuously optimize the information platform, complete data collection and accumulation to realize the automatic collection and analysis of facility information. In the meanwhile, the workshop will continue to carry out characteristic activities to realize the sustained optimization, enrichment and perfection of the SMART TnPM system.

References


[2] Equipment management vision, the 019 period.