Optimizing Function of Equipment Comprehensive Efficiency in Integrated Circuit Semiconductor Testing Equipment Management

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Abstract: With the progress and development of management science, the way of production management and improvement in modern factories increasingly depends on the management strategy of equipment comprehensive efficiency. In the automotive industry and electronic industry, equipment integrated efficiency strategy has been widely used, while in the management of integrated circuit semiconductor test equipment, the related research on equipment integrated efficiency level is relatively small. This paper mainly introduces the relative advantages of the integrated efficiency management strategy of equipment. At the same time, based on the three indicators of the integrated equipment management strategy, namely, time crop rate, performance crop rate and yield rate, are used as evaluation indicators in the management of integrated circuit semiconductor test equipment. Practice shows that the equipment comprehensive efficiency proposed in this paper has been applied to IC semiconductor testing to improve efficiency and provide a scientific management method for enterprise industry change.

1. Introduction

Semiconductor testing equipment is a leading industry in the semiconductor industry. It is constantly revised and improved in the process of continuous industrial development. Driven by Moore's law, the renewal iteration of semiconductor testing equipment is deepening with the development of semiconductor industry. At present, the characteristics of IC semiconductor test equipment industry are that its development cycle is getting shorter and shorter, and the corresponding equipment price tends to be civilian [4-8]. Therefore, in this context, how to achieve the high efficiency of semiconductor test equipment management and reduce the corresponding management costs is extremely important and meaningful. As a comprehensive equipment efficiency promotion strategy already used in automobile industry and electronic industry, equipment integrated management efficiency plays a great role in improving equipment management efficiency [9]. Therefore, the research on the efficiency of integrated device management in integrated circuit semiconductor test equipment is also growing vigorously.

There has been no interruption in the research on the comprehensive efficiency of equipment, and a large number of scholars and research institutes have done a lot of research on it. The strategy of equipment comprehensive efficiency can be divided into five stages at the earliest, namely, corresponding development stage, preventive maintenance stage, production maintenance stage, maintenance prevention stage and corresponding equipment integrated management stage [10]. In the application of integrated efficiency of equipment, developed countries [11] first applied it to manufacturing industry, fully considering the convenience of maintenance and replacement of equipment in the use of client side, so as to ensure the feasibility of rapid switching on production line; European countries [12] applied the integrated efficiency management strategy of equipment to the manufacturing industry. In the electrical, mechanical and medical industries, this strategy greatly improves work efficiency, reduces manufacturing costs, and also improves the utilization of equipment.

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The structure of this paper is as follows:

In the second section of this paper, the application scheme of integrated efficiency strategy in semiconductor test equipment management of integrated circuits will be analyzed and studied concretely.

The third section of this paper will analyze the changes after application and the corresponding competitiveness.

Finally, I will make a summary of this paper.

2. Application of Integrated Equipment Efficiency Strategy in Integrated Circuit Semiconductor Testing Equipment Management

The current statistics of test equipment related to IC semiconductor testing industry are shown in Table 1 below. From the table, it can be seen that the corresponding growth rate of semiconductor testing equipment is very fast, which also proves that the management of semiconductor testing equipment urgently needs reasonable equipment comprehensive efficiency strategy to achieve profits. At the same time, it can reduce the production cost and improve the utilization rate of equipment.

Table 1 Statistics of IC Semiconductor Testing Equipment Industry

Global Semiconductor Testing Equipment Prediction		
Global Semiconductor Testing Equipment Industry	40	20%
Global Sales of Semiconductor Testing Equipment	40	20%
Global Growth Rate of Semiconductor Testing Equipment Sales	36	18%
Data Sources: IC Semiconductor Testing Equipment Industry Observation, Network Data		

Based on the related contents of Table 1 and the characteristics of semiconductor testing equipment itself, this paper proposes the following strategies and measures for equipment comprehensive efficiency.

2.1 Target of improving equipment comprehensive efficiency

At this level, it is mainly based on the status quo of relevant semiconductor testing equipment. The main measures include the following:

Improve the management and maintenance process of semiconductor test equipment, improve the intact rate of test equipment, reduce the corresponding equipment maintenance time, reduce the shutdown phenomenon caused by equipment, and then reduce costs.

Improve the load of semiconductor testing equipment to achieve balance and shorten the planned shutdown time of equipment.

The standardization process of semiconductor test equipment switching is formulated to shorten the switching time of the equipment, and then to reduce the unplanned downtime of the equipment.

Improve the abnormal fast response and processing efficiency of semiconductor test equipment.

Improve the on-time completion rate of the whole semiconductor testing equipment, increase the production capacity of the whole enterprise, and then enhance the production management level of the enterprise.

2.2 Principles for Improving the Comprehensive Efficiency of Equipment

On the principle of improving equipment comprehensive efficiency, this paper puts forward the following principles: the principle of full participation, the principle of rapid response, the principle of standardization, the principle of innovation and the principle of practicability.

2.3. Improvement Scheme of Equipment Comprehensive Efficiency

In the semiconductor test equipment management scheme, this paper uses the DMAIC implementation process, which is both operable and effective. The related operation process is shown in Figure 1.

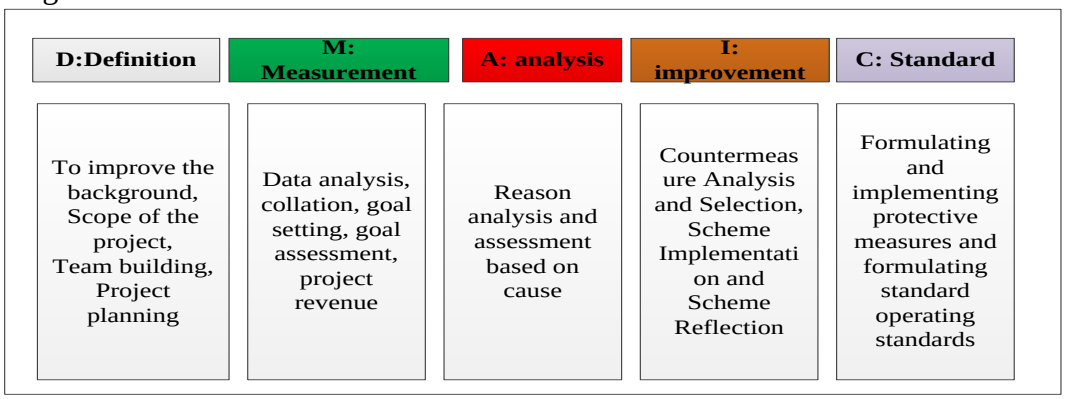

Figure. 1 Flow chart of DMAIC implementation for semiconductor test equipment management

3. Change and Competitiveness Analysis of Equipment Comprehensive Efficiency Strategy after Application

Taking a semiconductor test equipment management as an example, the comprehensive efficiency of the equipment is applied in practice. After promoting the implementation of relevant strategies, the corresponding changes appear in the production site, KPI and other aspects, and the relevant competitiveness has been further improved.

3.1 Changes in Semiconductor Testing Sites

After the implementation of the comprehensive efficiency measures, the production site has been able to meet the 5S standard, and the corresponding technical personnel's field management skills have been further improved. Employees show great enthusiasm for the strategy, product problems and test problems can be solved in time, and the cost of dealing with unexpected faults on the test line is also decreasing.

3.2 Change of KPI Index

After promoting the comprehensive efficiency measures of equipment, the comprehensive efficiency of equipment has been raised from 66% before improvement to 80% at present. The time crop rate and yield of the whole test line have been improved, and the efficiency of the whole test line has been further improved. The improved statistical tables of comprehensive efficiency of related equipment are shown in Table 2.

Table 2 Statistical table of comprehensive efficiency of Integrated circuit semiconductor testing equipment

Statistical Table of Integrated Efficiency for IC Semiconductor Testing Equipment	
Situation	Quipments Comprehensive Efficiency
Normal operation of test line	80%
Test Line Burst Problem Handling	55%
Test line change	70%
Maintenance of Semiconductor Testing Equipment	65%

In terms of competitiveness, the whole test efficiency has been improved, the life of equipment has been prolonged invisibly, and the speed of handling emergencies and the cost has become faster and smaller. The test cycle of the test line is shorter, which improves the time crop rate and the corresponding yield of the equipment, and reduces the waiting time.

4. Conclusion

With the progress and development of management science, the way of production management and improvement in modern factories increasingly depends on the management strategy of equipment comprehensive efficiency. In the automotive industry and electronic industry, equipment integrated efficiency strategy has been widely used, while in the management of integrated circuit semiconductor test equipment, the related research on equipment integrated efficiency level is relatively small. This paper mainly introduces the relative advantages of the integrated efficiency management strategy of equipment. At the same time, based on the three indicators of the integrated equipment management strategy, namely, time crop rate, performance crop rate and yield rate, are used as evaluation indicators in the management of integrated circuit semiconductor test equipment. Practice shows that the equipment comprehensive efficiency proposed in this paper has been applied to IC semiconductor testing to improve efficiency and provide a scientific management method for enterprise industry change.

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