MAINTENANCE MANAGEMENT OF METALLURGICAL PROCESSES

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Abstract

The key function of knowledge systems should do effective interpretation of data with a view to determine which hypothesis of surveyed best corresponds with real data. The solution of problem takes a form of progressive evaluation and revaluation of particular hypothesis. The objective of management production is to provide the increasing of its capacity, the improving of product’s quality, the decreasing of production costs and the service of equipment with maximum safety.

The inaccurate information of real service of production facilities, the incorrect schedule of inspection and preventive maintenance in time, the unsuitable using of plans for maintenance, the bad evidence and the bad planning in supply of service part, the bad using of manpower, the bad counting of costs for maintenance are some of the typical problems that are in companies.

Keywords: Maintenance, Management, Fuzzy, Lifetime

1. THE APPROACHES

The process of economic situation puts pressure on company’s management to reduce the costs. This trend brings the planary reducing of costs, which means the mistakes in management and presents the situation, when the costs are reducing at any price.

The possibilities of optimization of total costs can be seen in maintenance of production facilities, when the appropriate implementation of TPM (Total Productive Maintenance) can increase the share of device operator in routine maintenance. The experts of maintenance in co-operation with product management should do the control of staffs, who manipulate with facilities (if the staffs are trained by adequate means, if the staffs use the facilities properly and appropriately), the quantities of faults caused by ignorance of maintenance can be eliminated. The proper regulation of maintenance can increase the applicability of plant - production time. The costs can be annihilated by the revision of waste disposal´s costs and by the regulation of separation´s system, or the costs can bring the profit

The demands of market are developed in term of production, the new possibilities of service for maintenance are developed too. The analysis of one´s own activities, approach the market potential, can change the periods of repairing in connection with new trends of components using in production facilities.

The implementation of maintenance system should appear of several important connecting steps:

- to define the problems in firm´s maintenance
- to define and to measure the condition of maintenance system in the measurable indices and characteristics
- to analyze the principal causes of insufficient function of existing maintenance system, to consider and to design the organizational structure of maintenance
- to design the system of maintenance planning, to design the way of planning all activities that lead to prevention in term of fault liability, to design the system that could improve the maintenance, ensure
the efficiency in failure recovery and bring the reparation in maintenance activities with the result not to repeat the fault.

2. THE ISSUES OF FUNCTIONAL MAINTENANCE SYSTEM:

The issues for staff of maintenance and production – increasing of safety and hygiene at work, the clear rules of machine and facilities maintenance, the clear system of maintenance action planning (the system of planning maintenance - the plans of medium repair, common repair, preventive inspection, cleaning, pasting, control, revision, the management and controlling system).

The issues for company – efficient stability machines and facilities, low costs of machine and facilities maintenance, optimal organization of maintenance, available sources for maintenance activities

The issues for customers - delivery of product or service "just in time" (JIT)

The defined plan of effective maintenance includes the factors:

- clear defined objective for prevention or reduction of the consequences of system failure (defined objective (e.g.) 95% of maintenance availability with maintenance costs under 4% of value of alternate production facility).
- definition of consequences of system
- To understand all parts, related to facilities and responsible for functional facilities, have to support and have to be responsible for fruition.
- Formalized plan of fruition (e.g. defined strategy of maintenance, such as Reliability Centered Maintenance, Preventive Maintenance Optimization etc. with Standard Operating Procedures).
- Indices for assessing of achievement in the direct of fruition (e.g. percentage of preventive maintenance, percentage of corrective maintenance, percentage of facilities availability, total efficiency of facilities etc.).
- Understanding of all parts what right activities should be carried (e.g. Specific tools for reliability, as precise maintenance, Root Cause Analysis, 5S etc.).

Maintenance strategies for different types of objects (possibly in different sectors and areas of human activity) are often distinguished from one another. The differences are mainly due to the concept of the place and role of preventive or predictive maintenance in ensuring reliability of objects. Each of these approaches can be used to characterize the maintenance system, which defines when and how the maintenance of the building done.

Currently, in the field of the production equipment observed four major trends. Probably the strongest current trend in the care of the production facilities is directed explicitly to the concept of maintenance according to the actual state of the device and its modifications. This concept is in line with the second trend - the introduction of the original Japanese methods TPM (Total Productive Maintenance), which significantly moves the share of responsibility for the maintenance and repair of maintenance entity to entity manufacturing and emphasizes the proper involvement of each. The third trend is the increasing degree of earmarking their own maintenance and repair entities outside the company - the so-called outsourcing. And here, but in the case of the first two trends is increasingly an emphasis on promoting information technology along with the implementation of various control systems and identification technologies. This can be considered a strong trend for the fourth in the maintenance and repair of production equipment, which is given among other things, the advent of relatively inexpensive software systems for maintenance and repairs with high user comfort.
The benefit for the introduction of computer technology into the data maintenance activities and thus increase the effectiveness of management based on adequate data and information. Modern maintenance management based on monitoring data means production facilities, planning and management of their preventive maintenance, including a link to warehouse management and administration operations, purchasing spare parts with a link to information and economic system of the whole company.

The Classification of failures and maintenance strategy

Decision support for the classification of the object was within ARPO as an additional module create an open rule-knowledge system (Fig. 1) allowing you to make the categorization of disorders resulting from the building, evaluate the risks incurred and propose maintenance strategy object.

![Screen of knowledge system for classification of failures, risks and design a maintenance strategy](image)

**Fig. 1** Screen of knowledge system for classification of failures, risks and design a maintenance strategy

Input values into the system are the answers to the following questions:

- What is the frequency of occurrence of the fault to the 1000 event?
- What are the financial consequences of the trouble?
- What is the percentage rate of production influence the performance of the device?
- What is the level of production losses?
- What is the percentage rate impact on the quality of the final product?
- What is the percentage failure rate effect on traffic safety?
- What is the percentage rate of environmental threats trouble?
- What is the time availability of spare parts?
- What is the cost of spare parts?
What is the average time technical downtime of failure?
It is for early fault detection applied technical diagnostics?
Can the defect be classified as progressive?
In the event it is possible to repair components exchange?
There dependence within the building maintenance (renewal grouping)?

After answering questions answers are transformed on linguistic value, which enter the inference mechanism of knowledge system. The following figures are examples of fuzzy sets of input variables with approximate angled sections. The number and shape of each fuzzy set is always dependent on a specific object (Fig. 2-9).
3. CONCLUSION

Current system of metallurgical devices maintenance in many metallurgical companies is based on making regular preventive maintenance completed with the data from prophylactic visits. These are exercised in regular time intervals, which length is determined according to treatment level of the whole production process by given device of its part. Designed knowledge system represents a modern approach to modification of current way of maintenance strategy determination, when into the solution enter several factors, which in complex evaluate the influence and significance of the device for given process and is designed a proper maintenance strategy for given device.

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BIBLIOGRAPHY