



EVALUATION OF MAINTENANCE PROCESS THROUGH CONTROLLING

Katarína TEPLICKÁ, Katarína ČULKOVÁ

Faculty BERG, Technical University of Kosice, SLOVAKIA

ABSTRACT:

High costs of maintenance as ones of supporting processes of production system keep to managers to put high attention of maintenance management and cost optimizing in process of maintenance. High reliability, life cycle production, safety of the employees, protection of the environment these are key factors that must be accepted in maintenance management. Possibilities, how create high-class system process control maintenance it names controlling, that is presented in this paper.

KEY WORDS :

controlling, maintenance, cost, plan of maintenance, annual plan.

1. INTRODUCTION

Basic task of the firm's management is to state goals, to plan, to realize the plan, to compare plan with reality, to control result, to suggest and realize measurements for stated goals achievement. There is therefore task: How to be more effective? How to come to the problem and what measurements install when plan is significantly different from the reality? Controlling provides answer to such questions – since controlling is tool of the managing decision, which aim is to achieve stated firm's goals through planning methods, budgets, calculation and analysis [3].

2. MAINTENANCE PROCESS IN CONTROLLING

High cost for maintenance between 15-40% of production cost press managers to increase awareness of maintenance managing. [1] Cost decreasing, profit achievement, high job security, decreasing of negative impacts to the living environment connected with maximal reliability and durability of production equipments are subjects of new philosophy with mark RCM (Reliability Centered Maintenance) – Maintenance that is orientated to the reliability and TPM (Total Productive Maintenance).

From the view of controlling there is very important maintenance character, since according maintenance character algorithm of maintenance indexes following will be stated for example cost, maintenance performance, etc.

Maintenance presents sum of technical, administrative and managing activities, connected with life cycle of technical equipment, orientated to the maintain or renewing of the function of given equipment. [4] With technical equipment maintenance there is linked cost for maintenance, that significantly influence volume of production cost in the firm. [5] Due to the given facts there was necessary to solve problem of high cost of Maintenance Department in concrete firm. Whole process has been orientated to the controlling using during following of individual cost rising and to the finding of discrepancies, that influence cost increasing in maintenance. Whole problem solving in concrete firm has been orientated to the cost optimizing in maintenance through elaborated information flow in SAP system Module Controlling. III. Generation of philosophy, orientated to the level of maintenance demand describes this problem solving also.

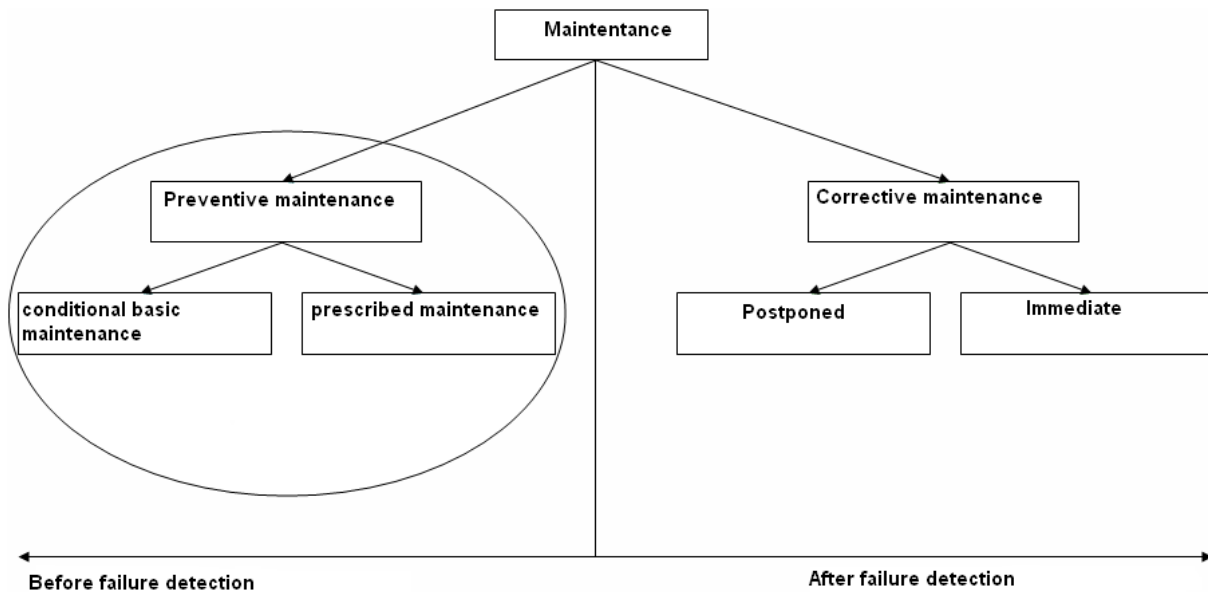


Figure 1. Maintenance according STN EN 13 306 [2]

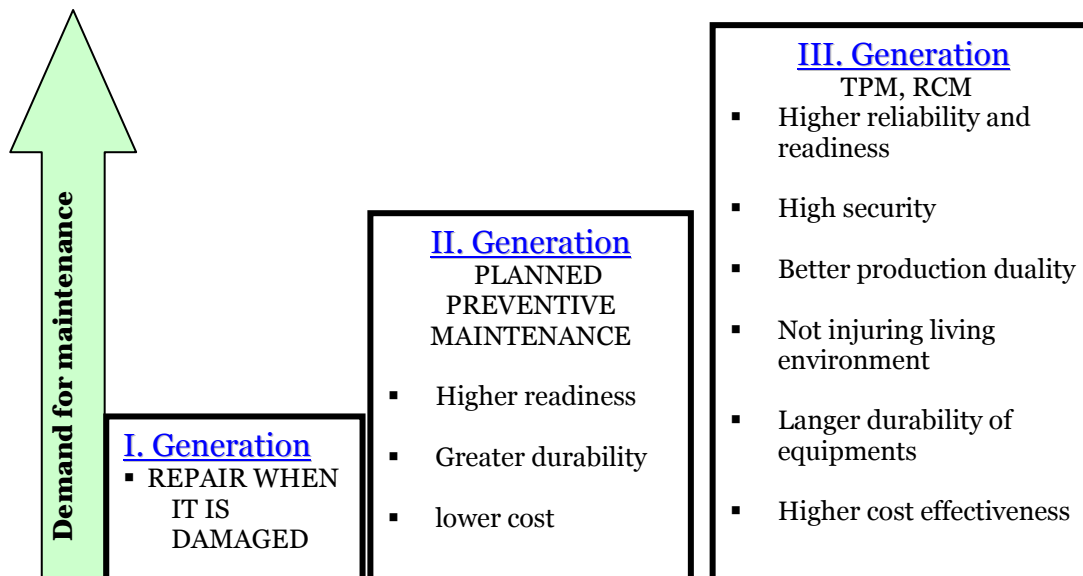


Figure 2. Demands for III. Generation Maintenance [6]

3. METHODOLOGY OF MAINTENANCE AND PRELIMINARY RESULTS

Strategy of reliable maintenance of technical equipment is orientated to the areas that define following questions[4] :

- # What are functions and assigned standard characteristic of the equipment in its present service context?
- # By which way equipment will stop to fill its function?
- # What causes every function failure of the equipment?
- # What if there will be equipment failure?
- # What is consequence of arising equipment failure?
- # How it is possible to prevent equipment failure?
- # What should be done, when it is not possible to find proper preventive solution?

According such questions we can decide, what form of maintenance it is possible to use from the view of care for equipment (figure 1). Controlling is further instrument of such decision, since controlling is information system, linked to the maintenance module, in which information about total maintenance cost are presented, that serve for management during

alternative choosing for maintenance performance, that is own capacities or external outsourcing. Whole controlling process of maintenance in concrete firm is illustrated in figure 3.

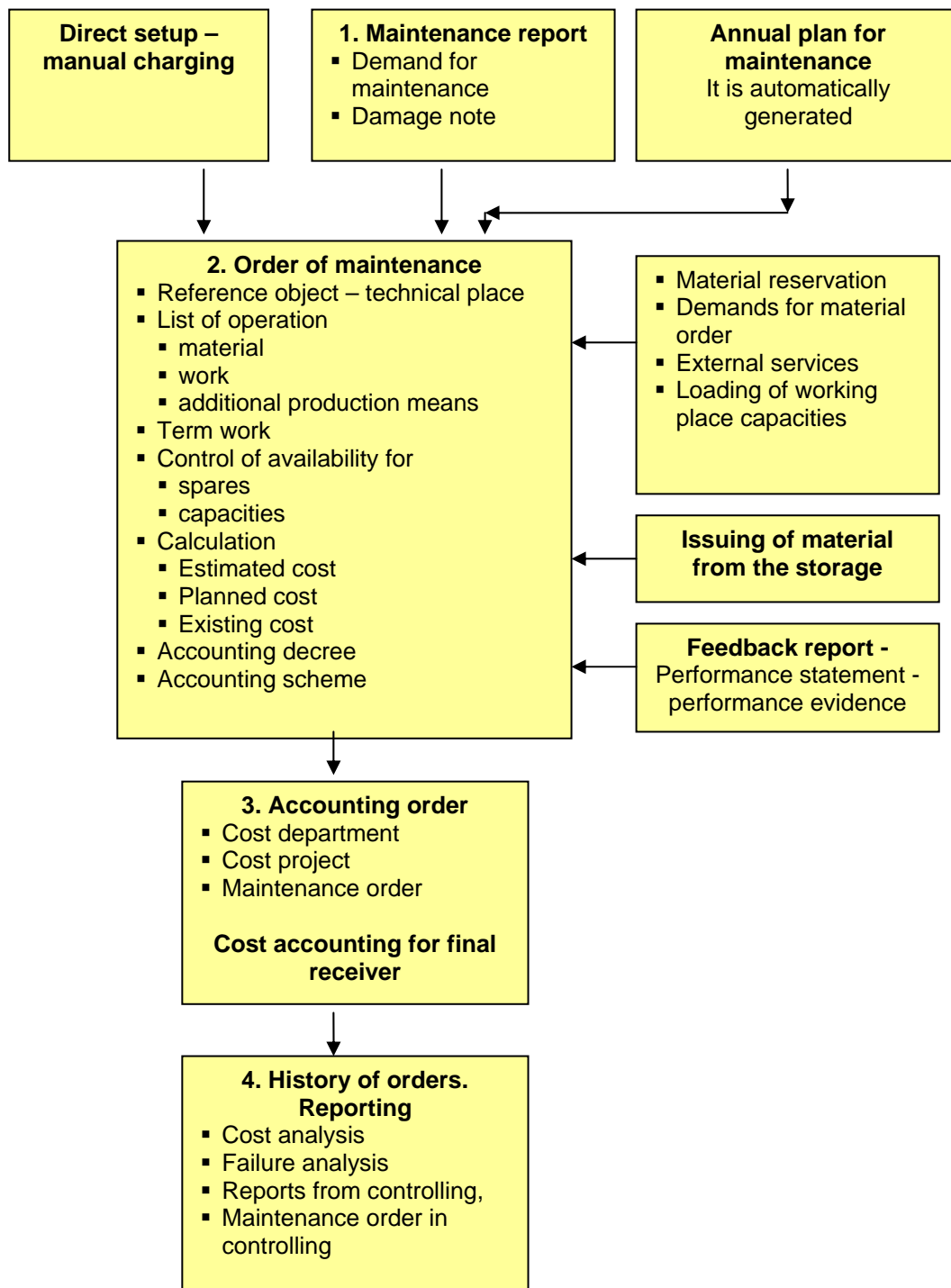


Figure 3. Principle of maintenance managing according controlling

Whole process of controlling during managing of maintenance goes through gradual algorithm of steps. Presumption of effective controlling function is evidence of objects, equipments, machines and instruments that is long term property that needs to be maintained. Process of maintenance in controlling module of concrete firm runs according following steps:

1. **Damage note** – it is report, that classify incident on the equipment, for example failure according anticipated defined codes and catalogues. Note should be always linked to the technical place, and by this way there will be created source of information for following of serviceability of given equipment.
2. **Order of maintenance** – it presents working command, in which there is possible to follow managing of working activities on the equipment, planning of activities on the equipment, planned and existing cost for equipment maintenance. Order should be linked to the technical place, to the cost department and it could be accomplished according direct charging, report or annual plan of order accounting, in which cost are allocated to the equipment maintenance.
3. **Stating of annual plan for preventive maintenance** – determination of demands (according law, ordinance, and producers' decree), timing norm, and maintenance provider for concrete equipments. Annual plan for preventive maintenance is divided to the several time intervals that are weekly, monthly, quarterly. RCM access demands stating of annual plan for all equipment on every technical place.

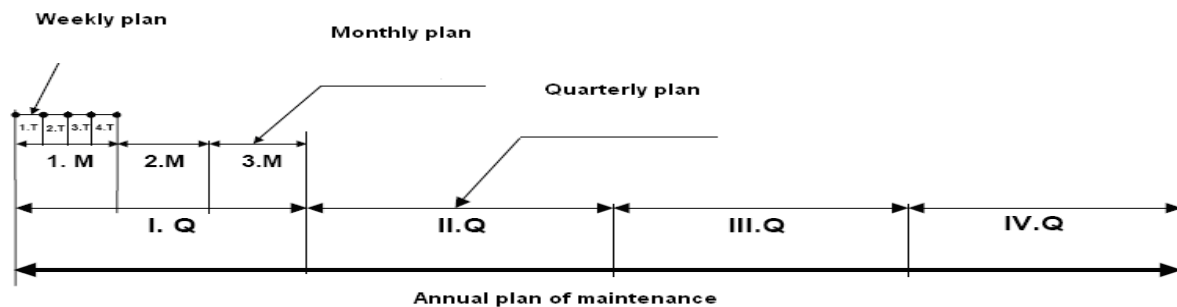


Figure 4. Plan of maintenance

4. **Comparing of plan with reality** - in this module there are compared planned cost for maintenance with existing cost. Information about really performed works during maintenance is reflected in the evidence according feedback reports. During cost comparison it is necessary to accept qualification to preventive and corrective maintenance. Total rate between corrective and preventive maintenance should presents **20%: 80%**, that results from RCM strategy.

Controlling result is mutual comparing of planned and existing cost according stated goals and ahead stated standards for discrepancies. Differences between existing state and standards are so-called discrepancies, differences (variances). Whole comparing will show discrepancies of the plan from reality and such discrepancies will be evaluated.

Total rate of corrective and preventive maintenance in compared areas is 29%: 71%, that is closely correlated with optima value according RCM strategy.

5. **Evaluation of plan filling** – it is made according reports, orders and performance. Plan filling is possible to evaluate from the view of planed, as well as not planed maintenance.

According performed analysis in module – Controlling there have been finding discrepancies of planed and existing values, with consequences in following facts:

1. Low using of working available time for maintenance workers.
2. High rate of corrective maintenance in area of machine maintenance – removing of failures.
3. Lack of workers for preventive maintenance.
4. Not filling of plan for preventive maintenance.
5. Technical shortages on equipments during preventive maintenance.
6. Not sufficient coordination of works during maintenance.
7. Not possibility to improve dead-line for preventive maintenance during the year due to the objective reasons.

Nákl.druh	Nákl.druh (Text)	▬ Celkové plán.náklady ▬	▬ Celk.skut.nákl. ▬	▬ Plán./skut.odchýlka ▬	P/SOchch(%)	Mena
501200	Spotreba materiálu	0,00	2.250,00	2.250,00		SKK
511120	Opravy a údržba plynovodov	0,00	0,00	0,00		SKK
511210	Opravy a údržba špeciálnych strojov a za	0,00	6.974,40	6.974,40		SKK
801000	Personálne výkony	0,00	87.489,91	87.489,91		SKK
Účtovanie na ľarchu		0,00	96.714,31	96.714,31		SKK
501200	Spotreba materiálu	0,00	2.250,00-	2.250,00-		SKK
511120	Opravy a údržba plynovodov	0,00	0,00	0,00		SKK
511210	Opravy a údržba špeciálnych strojov a za	0,00	6.974,40-	6.974,40-		SKK
801000	Personálne výkony	0,00	87.489,91-	87.489,91-		SKK
Zúčtovanie		0,00	96.714,31-	96.714,31-		SKK
		0,00	0,00	0,00		SKK

Figure 5. Application programme of controlling

6. **Measurement suggestion for removing of discrepancies in plan** – there are stated in maintenance order according detected facts in point 5.
1. Increasing of process effectiveness for evidence of not presented workers in working place.
 2. Securing of maintenance coordination by working positron – maintenance coordinator.
 3. Operative dividing of maintenance workers for preventive maintenance.
Improving of dead-line for preventive maintenance in the system due to the objective reasons.

4. FINAL RESULTS

According controlling application in area of maintenance managing in concrete firm there were **determined following contributions:**

1. Specification of events on concrete technical place.
2. Capacity planning on the maintenance according technical place.
3. Following of material availability in storage.
4. Following of maintenance working place capacity.
5. Exact calculation of maintenance cost.
6. Exact following of annual plan filling for preventive maintenance.
7. Following of the rate between preventive and corrective maintenance.

5. CONCLUSION

Contribution in the firm that in the frame of logistic cost managing will use controlling is decreasing of overhead rate, that finally could influence products price, and by this way to influence demand and clients demand meeting, increasing of products sales, decreasing of total cost, profit increasing.

But accept financial contribution it is necessary to see also other side of this access that is improving of the quality in the system of information transmitting to the individual management levels, securing of feedback connection in synergy with client, removing of not effective activities in chain of logistic maintenance processes.

Through controlling it is possible to manage successfully basic firm's processes and to enable firm as a whole to build conception for permanent and continual improving in area of maintenance cost decreasing. But minimizing of maintenance cost should bring in future positive contributions for the firm with goal to eliminate risks and prefer economic profit. Installing of controlling conception suppose to dispose with high qualified managing workers, interested in firms goal filling.

This paper is output of project VEGA number: 1/0002/08.

REFERENCES

- [1] ESCHENBACH, R. a kolektiv.: *Controlling*. 2. vyd. Praha: ASPI PUBLISHING, 2004. ISBN 80-7357-035-1
- [2] FOLTÍNOVÁ, A., KALAFUTOVÁ, Ž.: *Intradepartmental controlling*. Bratislava: Elita, 1998. ISBN 80-8044-054-9
- [3] NESTERAK, J. - BOBÁKOVÁ, V.: *Controlling – new system of management*. Bratislava: EKONÓM, 2003. ISBN 80-225-1660-0
- [4] RAKYTA, M.: *Maintenance as a power of productivity*. Žilina: Slovenské centrum produktivity, 2002. ISBN 80-968324-3-3
- [5] POTKÁNY, M. ŠATANOVÁ, A., 2004. *Controlling modern instrument of management*. In: Ekonomický časopis, Bratislava, Slovak Academic Press s.r.o., 2004, s. 148 –165. ISSN 0013-3035.
- [6] BOLLOVÁ, E.: *Using and addition of controlling in cost management*. In: Bachelor work, TU F BERG Košice, 2008