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EFFECTIVE QUALITY MANAGEMENT TECHNIQUES IN THE PRODUCTION PROCESS

EFEKTYWNE TECHNIKI ZARZADZANIA JAKOŚCIĄ W PROCESIE PRODUKCJI

Key words: quality menagement, production process
Słowa kluczowe: zarządzania jakością, proces produkcji

Abstract. The application of specific instructions and regulations are needed to meet customer demands. The production of faulty products is the biggest source of danger and loss for factories and also for end-customers. The reduction of deficiency number is the task of quality management. Continuous development, feedback, intervention and efficient actions are needed to minimize the number of faulty machines. This article is an overall introduction to quality techniques used at production processes. The aim of this work is to point out how difficult the product realization process is and the handling of possible production problems after serial production. The most efficient tool of this is the successful 8D-method. The introduction of the 8D-method is the basis of our work.

Introduction

Quality management is based on Economy, Management, Law and Technical Sciences. Quality Management is becoming independent and it is one of the fields of Social-Technical Sciences [Husti 2004]. According to the European Quality Assurance Association „quality is a complex of product and service features which determine if they are applicable for the given purpose" [Parányi 1989]. With a wide explanation of our demands in connection with quality we get to the stage of quality assurance. Quality assurance is not just the separation of good and faulty products, but the continuous production of good quality products. Quality assurance contains technical parts and furthermore presumes mainly managerial view and quality-oriented production structure and process. The actively involved human workforce is the deciding chain-loop in quality assurance [Végső-Szigeti 1995].

Team-centered problem solving process/8D (To Do)-method

The 8D-problem solving method focuses on detection and determination of the problem (phenomena). In 1987 Ford developed this method for automotive industry suppliers. The 8D-method is for the establishment of an appropriate, faultless production system. When the problem determination is needed and introduction of the 8D process is determined, the preparation and starting must appropriately emphasized. The systematic 8D problem solving process can be used at the reduction of costs at utilization of appropriately prepared projects. The 8D method is needed for high level customer complaints, because it makes problems clearer and helps to establish a fact-based approach of inside and outside problem solving. With this it helps to exclude recurring inside and outside consumer complaints [www.quality-mmt.hu]. The 8D-method can be used in those cases where the cause of the problem is unknown. The method consists of three complementary tasks. These are the following:

– problem solving process,
– constant method,
– form of methods.

As a problem solving process it is the consequence of different steps, which have to be continuous until the problem is determined. It helps in appropriate handling with the determination of the solution in time and space. The 8D process is a constant method which focuses mainly on the following:

– data centered system: a system which is based on real data at problem solving, at making decisions and at planning; also a system which can be controlled with collecting real data,
– liquidation of the root cause: not just the effects of the failure are determined, also the root cause of the problem is solved.

The 8D method is a form of report, which shows the stages of development. The stages are closed when the appropriate information is available. The 8D report is a task list until certain steps are closed. It contains the tasks which have to be solved.

Process of method

D1/Usage of team approach. A team must be formed from those colleges who have the right process and product knowledge and poses technical expertise to solve the problem and introduce the corrections [www.quality-mmt.hu].

D2/Description of failure. The aims of this step are: the collection and systematization of all important data which describe the whole problem and team members and customers can come to terms [www.quality-mmt.hu]. Brainstorming is recommended for the determination of the origin and cause of the problem, because it may happen that there are more problems than one.

Brainstorming as a quality technical tool. Brainstorming is a typical application for team work. The aim is to gather several ideas for solving an adequately restricted problem with a carefully selected team. At making suggestions not the quality of ideas, but the quantity is important. Brainstorming is not made for the evaluation or disputation of ideas; these must be done in other stages of work [Nagy 2001]. The advantages of brainstorming [Erdei et al. 2006]:

– easy application, lot of ideas can be generated in short period of time with few tools,
– it can be combined with other methods, and be built into other methods,
– according to circumstances it can be applied in different ways (together in small teams, written without speech, in short period of time, and in longer time periods),
– improves open-minded thinking, connection of idea tolerance, associative skill, creativity of team members with focusing on the corporate goal. Possible disadvantages of brainstorming:
– there is no opportunity to call the best experts,
– the shortage of time, the status, prestige and behavior can disturb the participants,
– the placement of suggestion is inordinate (the solution can be the affinity diagram) [Erdei et al. 2006].

D3/Implementation and control of temporary (immediate) actions. The determination and introduction of immediate actions is needed for excluding the internal/external consumer from the effect of the failure until corrections are made. The efficiency of immediate actions must be controlled. [www.muszakiforum.hu].

D4 / Determination and control of the problem's root. A list of possible causes must be made on the basis of experiences using the FMEA method (Failure Mode and Effects Analysis) or the fishbone-diagram (Ishikawa-diagram) [www.quality-mmt.hu].

Failure Mode and Effects Analysis (FMEA)

FMEA is a preventive failure management method which analyses the failure modes in early stages. It is a structured method which describes:

– the possible failure,
– the possible failure effect,
– determination and evaluation of possible faults,
– actions for decreasing or avoiding risks of possible failures.

FMEA can be used in two well-differentiable stages in the product cycle. In the development-planning stage (construction FMEA) and at the analysis of effective failures in production (process FMEA). In the case of constructive FMEA the product must be separated to functional items and in case of process FMEA the production process must be separated to elemental steps.

The key question of the method is the transformation of non-numerical data to numerical data. This can be made just with a pointing method which involves relatively little subjectivity.

The value of RPN[1] determines answer behavior (limits can be modified, there is o need to hold to them) [Nagy 2001]:

[1] RPN=S*O*D=B*A*E (S-B: standard of effects' seriousness, O-A: frequency of failure, D-E: efficiency of control)

– RPN > 125: action must be taken definitely,
– 60 < RPN <125: action can be considered,
– RPN < 60: there is no need for action in general.

Advantages of FMEA:

– numerical evaluation,
– determination of critical parts before validation of serial production,
– recognition of risks in time,
– development process shortening,
– harmonization of construction and production,
– decrease of costs,
– avoiding changes in initial stages and in serial production.

Cause-and-Effect (Ishikawa) diagram

Every failure in quality has its cause. In most cases the cause of failures cannot be determined exactly at once. For the determination of failures possible failure causes and their connections must be known. The Ishikawa-diagram is one method for describing the cause-effect connections.

This method is very efficient if we want to describe all the causes of the result [Végső, Szigeti 1995]. The causes can be categorized into 5 main groups, which are called the "5M's": manpower, material, method, machinery and measurement.

Certainly other causes can be listed depending on the exact quality problem. The influence of environment on quality is such a factor and it has to be examined beside the 5Ms.

The cause-effect diagram represents the effect (problem) and the causes in connection with them in a structured way [Végső, Szigeti 1995].

The process of diagram making:

1. Choose the most difficult failure type (effect) which has to be decreased. It is practical to characterize effects numerically (e.g. frequency of occurrence).
2. Invite 5-10 colleges who are aware of the problem for a brainstorming meeting. Search for those possible causes which may result in effects. Summarize carefully all the mentioned suggestions.
3. Mark the effects with a horizontal arrow from left to right.
4. Select the most important irrespective causes (influencing factors) and represent them with arrows which point to the first thick arrow.
5. Search for other sub-causes which influence the most important causes. Represent them also with arrows which point to the appropriate place. Add information of values as soon as possible.

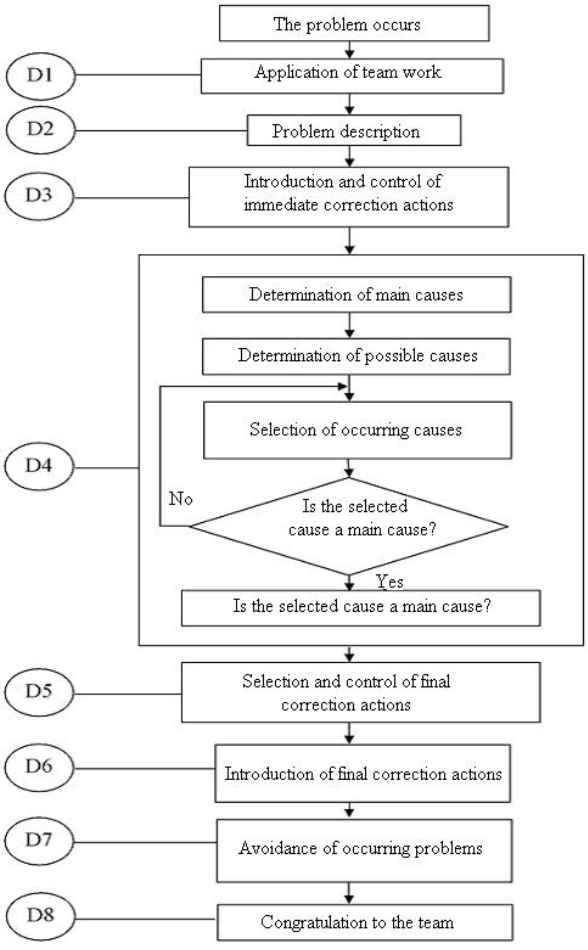

Figure 1. The 8D-process
Source: [www.muszakiforum.hu].

This is how we gather the typical fishbone-diagram which illustrates the connection of all possible causes. If the diagram is too large the separation of parts is needed to examine different causes. The most important causes can be selected with classification of the Pareto-diagram. After that action plans must be made to stop the failure causes [Dézsán 2000].

Then the possible causes must be selected and examined. These problem's roots must be verifiable defined. The last phase of this stage is to prove that the team is able to define and eliminate the problems. The demonstrated actions of correction are utilized in step D5.

D5/Selection and control of final correction actions. It must be proved that selected actions of corrections solve the customer's problem and there are no undesired effects of it. Conditional actions must be formed based on risk analysis if it is needed [www.muszakiforum.hu].

D6/Introduction of final correction actions. For introduction of selected final actions of correction an action plan and continuous control is needed to observe the stoppage of the main cause. The introduction of conditional actions is needed beside the observation of long-term effects. The following must be stated in the action plan: who will take part in the actions, when will these actions be made, what are these actions, who are responsible for these actions [www.muszakiforum.hu].

D7/Avoidance recurring appearance of failures. To avoid the returning occurrence of problems the following questions are necessary be to asked [www.quality-mmt.hu]:

– which malfunctions resulted that the faulty product reached the customer?
– what is needed to be done to avoid the send out of faulty products?
– what caused the possibility of the fault's appearance?

D8/Appreciation of the team. The closing of the teamwork and the appreciation of the team is happening in this stage [www.muszakiforum.hu].

Conclusions

Quality assurance is not an easy task. Several tools and methods must be used to make the products became faultless. Of course well qualified experts are needed to select and validate the appropriate tools for each process. The production processes must meet the customer's requirements to serve their existence. If the customers lose credit with the supplier (producer) company then they may terminate contracts. This act may cause a decrease in income. This is why appropriate and complex quality assurance is needed. The aim of 8D is to avoid recurring failures and to make actions for continuous corrections. The bases of development are continuous actions to reach perfection, so this is the way to follow.

Bibliography

Dézsán I. 2000**:** Minőségbiztosítás, Nemzeti Tankönyvkiadó – Tankönyvmester Kiadó. Budapest.
Erdei J., Kövesi J., Topár J., Tóth Z.E. 2006**:** A minőségmenedzsment alapjai. Typotex Kiadó, Budapest.
Husti I. 2004**:** Minőségmenedzsment. Szent István Egyetem, Gödöllő.
Nagy I. 2001**:** Minőségbiztosítás. Műszaki Könyvkiadó, Budapest.
Parányi G. 1989**:** Minőség és vállalat. Gépkoop Nyomda, Budapest.
Végső K., Szigeti F. 1995**:** Minőségbiztosítás. GATE-MFK, Nyíregyháza,
[www.muszakiforum.hu/cikk/51717/a-8d-modszer-bevezetese-a-mav-zrt-gepeszeti-uzletaganal-1resz?wa=emuh0816h].
[www.quality-mmt.hu/portal_mmt/magyar/cikkek/21/2006-3.pdf].

Streszczenie

W artykule omówiono metodę 8D zarządzania jakością w procesie produkcyjnym. Zwrócono uwagę na znaczenie jakości w procesie produkcyjnym, wskazując na metodę 8D jako narzędzie do jej podnoszenia.

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