FAULT RESEARCH WITH DOCUMENTATION

Daniela Popescu, Professor PhD
Faculty of Economics and Business Administration,
University of Craiova, Romania;
Adriana Scrioşteanu Assistant Professor PhD
Faculty of Economics and Business Administration,
University of Craiova, Romania;
Andrei Popescu, Student,
Faculty of Economics and Business Administration,
University of Craiova, Romania;

Abstract : This present study analyses a stringent and current problem of the economy which resides from the measurements of the proportion of production which lead to the growth of the amount of waste resulted from production and influence its efficiency. The first part of the study tries to point out the existing connection between the design of the fault research and the documentation of the fault research. The research of these two concepts underlines some similarities between the design and the documentation of fault research starting from the agents involved in these processes, from the need of including all the elements of the enterprise in these processes, from the way of looking at documentation as the most active part of the research process of the faults which has to be continuously revised and modified along time.After analysing the defining elements of the two concept one reaches to the conclusion that in order to study thoroughly the documentation of the fault research one also needs to point out the processes which are characteristic for this process and which are not found in the design of fault research. Starting from this statement, the field of the concept of fault research documentation is mentioned and analysed thoroughly with the help of some new concepts as: the needs and the function of the process, possible faults, possible effects of the fault, severity(S), classification (CLAS), possible fault mechanisms and causes, fault production (P(), current control process, identification(I), etc. The analysis of these new concepts and the enlargement of some of their elements give the possibility to know in detail and to document upon the fault research. This idea is sustained with the help of some tables which classify the severity of the effects resulted from the fault research, the classification of the possible fault rates for the fault research process, the classification of the probability of identifying the control process, etc. According to the facts presented in the three tables there are some specific elements for the documentation of the fault research. At the same time, this study aims to point out the multiple economic and social significations of the production fault and the possibilities to reduce them in a certain period of time. These new sides of the documentation in fault research increase the practical value of the present study and prove at the same time that the methodology used in fault research may also be used for other problems which are outside the field of quality management.

JEL classification: M11, M16

Keywords: production, efficiency, documentation, control process, quality management

1. INTRODUCTION

The basic philosophy regarding the documentation of the Process of fault research is almost identical with the one regarding the documentation of the design of fault research. The process of fault research is an analytic method used by the team of engineers responsible with production in order to prove the fact that the possible faults and its associated mechanisms and causes have been taken into consideration. There is nothing new for the engineers if we refer to the design of the fault research or to the concept of documentation of the process of fault research. In spite of these the concepts of creating and maintaining the previous document have been kept only as ideas of the engineers, The process of fault research is only the documentation of the ideas of the responsible ones seen as a whole. The process of fault research is as important as the design of the fault research and for the same reasons. The similarities between the design and the process of fault research include:

Agents coming from all the affected fields which are actively involved.
Including all the preoccupations from all the departments involved.
Dealing with these documents as if it was in force, continuous revision and modification of the document along time.

The process of fault research is required for all the new, changed parties/processes or for the ones which were left of the new applications. The documentations has to be initiated beforehand or in the current stage; the production is a priority and one has to take into consideration the production operations from individual components up to systems.

When we create and /or revise the documentation of the fault research process, one can say that the product will meet the requirements of the design stage. One can still include (if it is desired) information about the potential faults due to some weak points in the design process. The fault research process does not rely on the fact that the changes in the design stage of the product will defeat the weaknesses of the process, but they still take into consideration the characteristics of the design of the product related to the planned manufacturing in order to provide the fact that the resulted product meets the needs and the expectations of the product.

2. HELPFUL HINTS

The same as the design and the fault research processes are also the corresponding documents. For this reason, instead of revising the whole document of the fault research process, we will only point out the differences between the two documents. All the other aspects of the documents are supposed to be identical. The upper part of the document is the same as in the fault research design except for the fact that the “project responsible” becomes “the process responsible”.

The needs /the function of the process. Instead of introducing the analysed purpose and its function as in the case of fault research design, one has to introduce here descriptions of the analysed process. Examples of this process include elements of design, but these are not limited only to rotations, instructions, taps, welding and assembly. The purpose of this process has to be rendered as simply as possible. If the process includes

more than one operation, each of them has to be listed separately along with the descriptions.

Possible faults. In the fault research project one has to write one of the three types of fault. The first and the most predominant one is the way in which the process might fail in preventing the requirements of the process. The other two ways include possible faults from a recent operation and the effects associated with a previous operation. One should assume the fact that the parties which are developing and/or important are correct according to the general definition of non-conformity. Each possible fault for each operation has to be listed on components, subsystem, system or the characteristics of the process. One can assume that the fault may be produced or not. Another aspect is the one related to the consumer, if it is internal or external. Some knowledge regarding the fault research design is needed along the fault research process.

Possible effects of the fault. The possible effects of the fault are the ones perceived by the consumer, not matter if he/she is internal or external. The effects of the fault have to be described referring to what the consumers notice or experience. One has to declare if the fault will have an impact on the safety of the personnel or if it breaks the rules of production.

Severity(S). Severity has the same role as in the design of fault research. It is good to mention that severity is applied only to the effects. The severity uses a different criterion than the one used by the fault research. If the consumer affected by the respective fault is the user of the product or the enterprise, the evaluation of severity may go beyond the field of engineering experience. As in the case of the severity of fault research design, the severity of the fault research process is assessed on a scale from 1 to 10. The following example of evaluating the criterion given in table 1 is just an example; the current evolution will be different for a variety of evaluated processes.

Table no.1

Classification of the severity of the effects for the design of faults research

Effect	*Criterion: severity of the effect*	*Scale*
Risky without warning	May affect negatively the equipments and the assembly operator. Classification on the highest scale when the potential fault affects the safety of the process.	10
Risky with warning	May affect negatively the equipments and the assembly operator. Classification on a high scale when the potential fault affects the safety of the process. The fault appears with warning.	9
Very high	Minor break in the production process. 100% of production may be unusable. The product is inoperable with losses of functions. The consumer is not satisfied.	8
High	Minor break in the production process. A part of the production may be selected and disposed. The product may be operated, but with a lack of performance. The consumer is not satisfied.	7
Moderate	Minor break in the production process. A part of the production may be selected and disposed. The product may be operated, but with a lack of comfort. The consumer feels the discomfort.	6
Low	Minor break in the production process. 100% of the production may be remade. The product is operable, but with a lack of performance and comfort. The consumer has a certain dissatisfaction.	5

Very low	Minor break in the production process. The production may be sorted and partly remade. Certain characteristics of the product do not correspond. The observation is made by many consumers.	4
Little	Minor break in the production process. A part of the production may be remade on-line, but not on the spot. Certain characteristics of the product do not correspond. The observation is made by some consumers.	3
Very little	Minor break in the production process. A part of the production may be remade, but not on the spot. Certain characteristics of the product do not correspond. The observation is made by discriminating consumers.	2
None	No effect.	1

Classification (CLAS). This column is used to classify any special characteristic of the product, subsystems or systems which may need additional control processes. There should also be special methods of designing any problem which requires additional control processes.

Mechanisms/possible causes for faults. Causes for faults are defined in the way in which these can be produced, are described in the terms of an object which may be corrected or controlled. Each possible cause of fault has to be listed for each fault as complete and concise as possible. Many causes are not selected and in order to correct or control the cause the designers of the experiments have to determine the root of the causes and how they may be controlled. Only the specified errors and the malfunctions have to be completed; no ambiguous phrases have to be used.

Fault production (P). This section is the same as for CDAEA. One has to remember that the production or the occurrence is the frequency with which the causes/mechanisms of the fault are produced. Table 2 contains an example of the occurrence criterion.

Table no. 2

Classification of the possible fault rates for the fault research process

Fault probability	*Possible fault rates*	*Classification*
Very high: Fault is almost inevitable.	> 1 of 2 1 of 3	10 9
High: in general associated with processes similar to the previous processes which have often failed.	1 of 8 1 of 20	8 7
Moderate: Generally associated with processes similar to the ones which have experienced occasional faults.	1 of 80 1 of 400 1 of 2000	6 5 4
Low: isolated faults associated with similar processes.	1 of 15000	3
Very low: only isolated faults associated with almost identical processes.	1 of 150000	2
Weak: no fault.	<1 of 1500000	1

Current control process. This process contains descriptions of the controls which either prevent the fault or it detects the fault if it is produced.

Identification (I). Identification is an evaluation of the probability with which the current control process will detect a potential weakness or a previous fault before the component leaves the production line or the assembly line. If we suppose that the fault has been produced and then we asses the possibilities of the current control process to prevent this defective part to be sent. Let's suppose that the identification of the classification is weak because the identification is weak, but let's evaluate the ability of the control process to detect low frequencies of the faults or to prevent their sending. The criterion of evaluation and the system of classification (see table 3) should be the result of understanding of the members of the team and should remain the same for the whole fault research process.

The other sections of the fault research process are not different from the ones of the fault research design. The designer is responsible to provide the fact that all the recommended actions have been properly recommended or implemented.

Table no. 3

Classification of the probability of identification through the control process

Identification	**Criterion: probability of detection through direct control**	Classification
Absolutely impossible	There is no type of control which could detect any fault.	10
Very few	Very few chances that this control could detect any fault.	9
Few	Few chances that this control could detect any fault.	8
Very Weak	Very weak chances that this control could detect any cause or mechanisms for the fault.	7
Weak	Weak chances that this control could detect any cause or mechanisms for the fault.	6
Moderate	There are moderate chances that this control could detect any cause or mechanisms for the fault.	5
Relatively high	There are relatively high chances that this control could detect any cause or mechanisms for the fault.	4
High	There are high chances that this control could detect any cause or mechanisms for the fault.	3
Very high	There are very high chances that this control could detect any cause or mechanisms for the fault.	2
Almost certain	There are almost certain chances that this control could detect causes of the fault.	1

REFERENCES

1. Andrei, Victor [1]. *Quality Assurance Management. Principles, concepts, policies and instrument,* Infarom Publishing House, Bucharest, 2008
2. Olaru, Marieta [2]. *Quality management,* Ediţia a II-a, Economică Publishing House, Bucharest, 1999
3. Olaru, Marieta *Quality management,* Economică Publishing House, Bucharest, 2004
4. Olaru, Marieta si colectiv Techniques and instruments used in quality management, Editura Economică, Bucharest, 2000
5. Popescu, Daniela *Quality management*, SITECH Publishing House, Craiova, 2004
6. Popescu, Daniela Principles and techniques used in quality management, SITECH, Craiova Publishing House, 2007