

APPLICABILITY OF STANDARDS ISO 9001/2000, QS-9000 AND TS16949 IN MAINTENANCE

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Abstract. The article treats the 3 different standards and client requests (ISO 9001/2000; QS-9000; and TS16949), explaining shortly how they got "birth", why it was necessary to have a global valid standard of certification in quality management, and how this standard is applicable in the maintenance activity, being a step for implementation of Total Productive Maintenance.

Keywords: standard, process-orientation, uptime, OEE

1. Introduction

The approach "process orientated" concretizes by admitting and controlling the different single processes within a company, especially as an interaction between the existing subprocesses.

The series of standards ISO 9000 which appeared for the first time in 1987 had the biggest impact in thinking "in processes" (process mapping).

ISO9001/2000 is an international valid Quality standard which represents the needs to a quality management system.

QS 9000 is a request of the OEM's of North America which unites all possible requests of FORD, GM, Chrysler in a single specification list, so that all the companies which deliver to these OEM's have a unique request specification.

QS9000 is a specification that is used just in the automotive sector.

Because of globalisation, it came to a unification of standards from all countries from Western Europe and America that has been called TS16949 and those companies that get this Quality Management Certificate, can deliver parts to all the Automotive Manufacturers being international recognized.

2. Description of ISO 9001/2000

ISO 9001/2000 describes the whole activity of a company splitted in different processes. These standards highlight the recognition and managing of processes within a company, specially the interaction among these.

Process orientated quality management describes the actions to be taken in order to have an efficient business.

The process model is a description of a normal system where we have an input (ex. client, environment, laws, know-how), this inputs are forms of wishes and requests by using adequate resources changing them into an output that fits the requests and wishes of the clients (figure 1). A basic of this process, is a continuous improvement circle, with steps Plan- Do- Check- Act.

This Circle is named PDCA circle or Deming circle. Highlights of this process are:

- Understanding of the requirements of the customer and the importance to fulfil these;
- The need/ importance, to watch processes from the angle of value stream;
- Reaching targets, process- performance;
- Continuous improvements based on constant measuring results.

The major issues are:

- Responsibility of the management;
- Resource management;
- Product- service performance;
- Measuring, analysing, and improving.

3. Description of QS 9000

QS 9000 is not Standard like ISO-9000, it is a specification of the American automobile manufacturers (OEM) to their suppliers of:

- Production materials (direct materials);
- MRO (materials for repair and maintenance , overall);

- Thermal treatments, and
- Painting, coating or other surface-treatments.

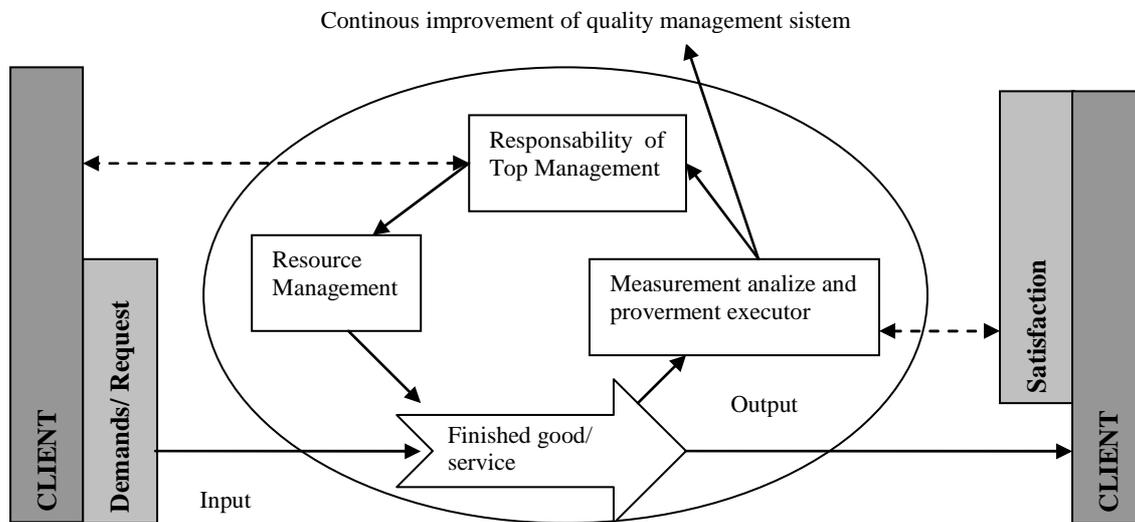


Figure 1. The process model

QS 9000 is splitted in 2 chapters (chapter 1 is nearly identical to the ISO 9000 framework, and chapter 2 contains the requests that could be unified), supplementary there are 8 attachments to describe (certification procedures, explanations of features, symbols, abbreviations, accreditation addresses). Figure 2 shoes schematic how QS 9000 is defined.

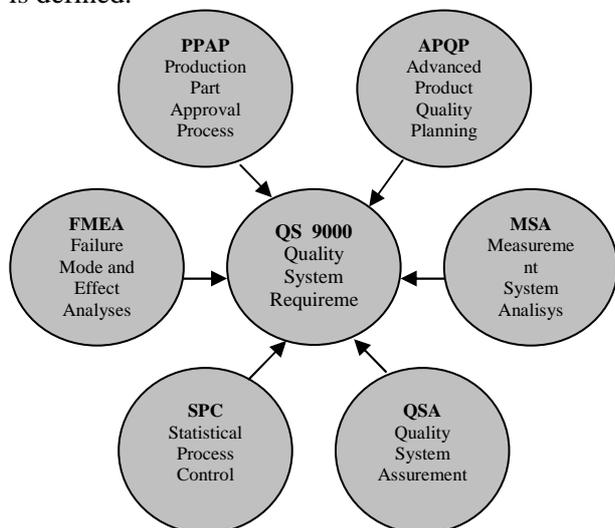


Figure 2. Schematic of QS 9000

4. Description of TS 16949

Depending on the market where the customers where settled it was necessary for the suppliers to get certified in order to be accepted to deliver to America, Germany, Western EUROPE and so on.

It was annoying to get double certification in order to be allowed to deliver for a client that had plants in other countries where the certificate was non valid. By the unification of QS9000 and VDA6.1 (the German standard that included already ISO 9001), it came to a bundling of targets like:

- Creating a worldwide base for quality management certificates;
- Avoiding of multi certifications;
- Worldwide recognition of the certifications as extra-requests coming in by TS16949 standards;
- Implementing of a procedure in order to guarantee the acceptance and fulfilling of local laws;
- Implementing of procedures in order to rise motivation of the employees (to assure the quality requests and promote the continuous improvement process);
- There are no more figures recommended as a minimum for process - performance measuring but there is a recommendation to respect the clients special terms.

5. Maintenance and QS -9000

The requests are similar like those for Implementing TPM: highlights are:

- maintaining clean and tidy the workspace (being a first step for discovering faults in early stages).

- preparing emergency strategies/ backups (for purchasing spare parts, shipping parts and goods, manufacturing), in order to raise OEE and UPTIME.
- preventive maintenance system (description in Table 1) in order to reduce the risk

Table 1. Element preventive maintenance

<ul style="list-style-type: none"> • Planning and documentation of done activities by explicitation of responsibilities;
<ul style="list-style-type: none"> • Predefined maintenance methods;
<ul style="list-style-type: none"> • Taking in consideration of producers recommendations, Mould usage, optimizing of MTBF (mean time between failures), consideration of results from SPC dates;
<ul style="list-style-type: none"> • Procedures for wrapping up and using of measuring instruments;
<ul style="list-style-type: none"> • Disponibility of spare parts for the bottleneck and high risk machines;
<ul style="list-style-type: none"> • Description, evaluation and development of Maintenance targets

- probability, of faults and performance-loss;
- Process monitoring and working procedures maintaining process-capability and performance;
- Checking of adjustments before start producing;
- Process-changes.

All elements can be taken as a step before implementing TPM, (Total Productive Maintenance), because they all contribute to the rising of OEE (Overall Efficiency of the Equipment).

In order to be very clear in the specifications of procedures (all kind of procedures, especially maintenance procedures) there have to be respected some rules like:

- The logical way of happening divided into steps has to be shown schematic;
- Each step has a single responsible for executing;
- The procedure is valid for all standards of repair (for ex. inspections, basic care);
- The responsible person (job name) is defined in each step;
- It is explicitated where is a decision to be taken, who is responsible, and who is informed;
- If the time for repair is longer than

production can afford, the emergency-procedure is started (connection to procedures)

- If necessary the capability tests or parameter-control is done and documented in a "history-manual" of the machine.

As an example is presented a maintenance-procedure for actioning in case of machinery-breakdown (figure 3 and table 2).

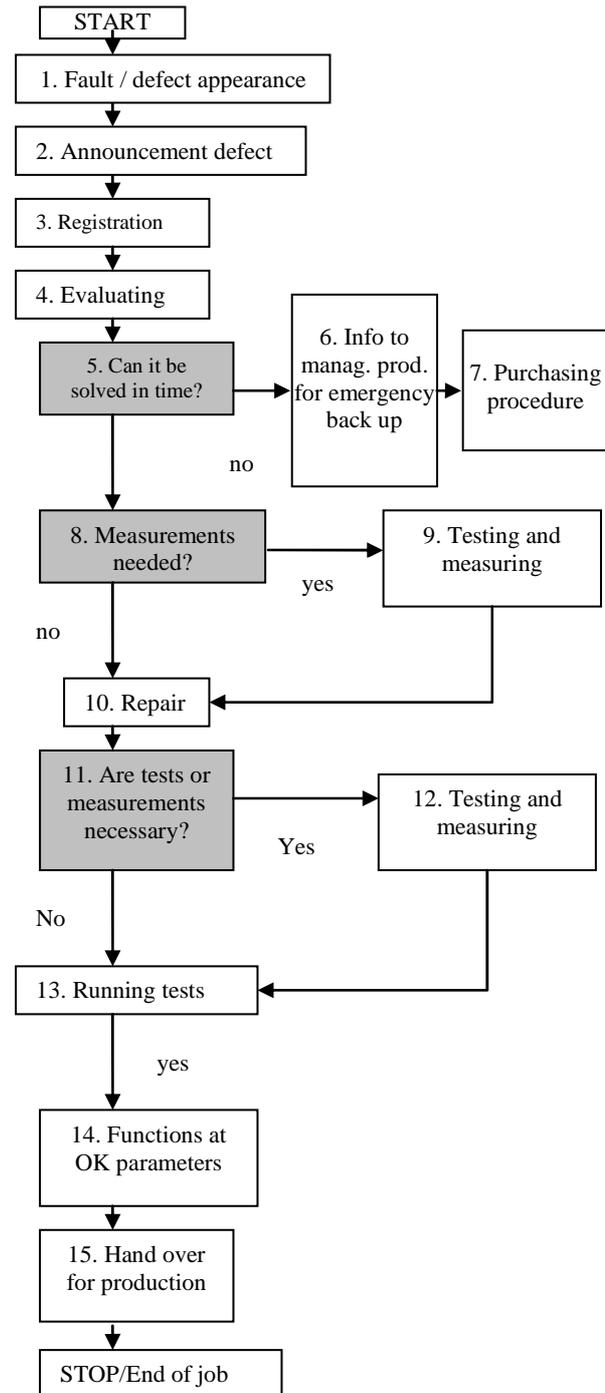


Figure 3. Maintenance procedure

Table 2. Actions in case of machinery-breakdown

Nr.	Worker operator	Maintenance service personal	Supervisor	Manager
1.	E		I	
2.	E	I		
3.		E		
4.	C	E		
5.		D		
6.		E	I	I
7.			E	
8.		D		
9.		E		
10.		E		
11.		D		
12.		D		
13.	C	E	E	
14.	C	E	E	
15.	C	E	I	

where D: Decision; E: Execution; C: Cooperate teamwork; I: Inform

6. Conclusions

Because of technical progress and globalization it was necessary to unifique procedures, even in maintenance in order to make life easier.

The vision “orientated to the process” shoes that it is a need to streamline targets and goals of all different departments in a company.

Maintenance is not just a matter of a small group of people; it is everybody’s concern in a company.

Applying standards we create transparency and see where the interfaces do not fit.

Documenting how, when, who did some repairs or changes in the process we can learn from each other and from the past. Analyzing this dates (statistics, standard-procedures, history of the machines) we can better prevent, plan and coordinate maintenance activities in order to shorten the times for repair and have longer intervals between 2 repairs, and this helps in increasing Uptime and implicit OEE.

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