2017

Zero Defects
Conceptual Design and Implementation

This white paper describes in the form of seven design blocks the creation of a zero-defects concept as well as its operationalization. It allows both a systematic set-up of zero-defects concepts as well as the identification of gaps in existing zero-defects concepts.

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July 12, 2017

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What means Zero-Defects?

Zero defects should be understood as the goal of delivering products without any errors, or even processes without any error. Errors in this sense are all deviations from the existing requirements for the product or the process. The Zero Defects Approach sees prevention as the basic principle of quality. The benchmark for quality is the costs arising from a failure to fill the requirement. In the following chapter, we present a methodology that allows you to either create a zero-defect concept for your company or to test an existing concept for existing gaps.

The seven Building Blocks

We believe that a zero-defects concept can be comprehensively described with seven basic building blocks.

1 Requirements-Engineering

The basis for a zero-defects concept is the knowledge of all internal and external customer requirements. If all product and process-specific customer requirements are known **and understood**, they must be transferred to quality features. A quality feature is a measurable customer requirement, which can ideally be met without defects.

Requirements management includes all the necessary methods and processes with which customer requirements can be transferred into clear and measurable quality characteristics.

Requirements management is constantly following the change in customer requirements on the market and has the task of implementing appropriate corrections of the requirements in the company processes.

2 Zero-Defects-Controlling
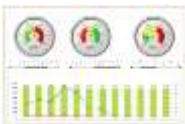
The Zero-Defects-Controlling must show on the one hand potentials for improvements and on the other make the effectiveness of improvement measures transparent. It is important to ensure that fault data are correctly recorded, appropriately processed and addressed to the right target person. A major challenge is often to present the costs associated with the errors. These nonconformity costs consist of costs for rejects and rework, complaints and guarantee costs. Zero-defect controlling can be understood as part of operational controlling.

Data Collection

The data which are relevant to the Zero-Defects-Controlling are data, which provide information about the CTQs (Critical to Quality). In order to ensure adequate controlling, it is first necessary to clarify which data are to be evaluated continuously and which statistically (i.e. on the basis of random samples). Customer requirements can play a role as well as legal factors. But also the stability of the process itself must be taken into account, as well as the effort associated with data collection. Naturally, the respective technical possibilities play a decisive role.

Data Preparation

The information content of the data depends essentially on how well the data is prepared for the respective addressing. For this purpose, the evaluation dimensions and the type of representation are decisive. Evaluating dimensions are the differentiation possibilities of the data, for example by products, locations, area, lines, layers, etc. The visual representation of the data, for example, as a run chart, bar chart, histogram, etc., can then be combined. Different report formats, which are based on the different requirements of the respective report recipients, can then be compiled. The IT-technical possibilities also play an important role in data preparation.

Adressing the data

The controlling concept also has to describe which areas of responsibility receive which information in which form. The IT technology makes it possible to provide different reporting and evaluation formats with different details in different management levels. Depending on the software, drilldowns or filter functions are also possible. Access privileges can be controlled via permissions. The transparency on the shop floor is particularly important for efficient zero-defects controlling. The question is: Which quality-relevant information should be given to the production staff in what form. In this case, information boards with visualized data can be quickly acquired and interpreted.

3   Methods to use

 Methods shall be understood as methods and tools to describe quality problems, to analyze their causes and to derive activities for their elimination. The Zero-Defects concept describes which methods are used and how these are interlinked. The framework factors that are decisive for the selection of the appropriate method can also be different in different areas of the company, which means that different methods can be used for each area. Frequently, a step-by-step introduction is also useful, which is then also to be described in the strategy.

Selection of Methods

For the selection of suitable methods it is decisive according to which criteria the quality problems can be characterized. Such criteria are, for example, complexity, frequency, construction or process conditions, etc. For example, KVP is the improvement in small steps which should be supported by as many employees as possible. Accordingly, the tools used for this purpose are kept simple. On the other hand, more complex problems often require more complex tools for the analysis of causes, such as for example Six Sigma or Shainin methods. Statistical tools, such as those used in Six Sigma,

require larger amounts of data and thus higher numbers of pieces. If mistakes occur sporadically, the Poka Yoke approach can be well suited to solve the problem on a sustained basis. Design-related problems, such as at the start of production, are to be addressed with proactive methods, as offered by the Design for Six Sigma approach. If the problems are due to inefficiencies in the process, lean tools, such as the value stream analysis, are available for error reduction.

Combining Methods and Step-by-Step implementation

Different methods have to be combined. The concept must, for example, describe how KVP and Six Sigma work together. As method competency is often distributed among different employees, these aspects must also be taken into account in the organization. Also, it is not always useful to establish all the methods at the same time. A start with simple methods is often a good idea, in order to sensitize the employees step by step to the topic and to integrate them into the implementation.

4 Processes to implement

The sustainable implementation of a zero-defect strategy requires its processual anchoring. That is, it is necessary to establish processes in the company, which ensure the systematic recording of errors, their cause analysis, as well as the derivation of activities. In addition, the effectiveness of the activities must be examined and the involvement of the managers must be ensured.

Interaction of the Building Blocks

The interaction of the building blocks of the Zero-Defects Strategy is ensured by the processes. For example, the use of the controlling tools for error detection and verification of the effectiveness in the processes is described. On the other hand, the different methods are play together (as often several methods are used, see methods). In addition, the processes clearly define the responsibilities. Thus, the process description is also the basis for the resource estimation and the organizational anchoring of the Zero-Defects strategy.

Integration of Leadership

Activities for error reduction are often accompanied by adjustments to procedures, organizational changes and investments. For this, management decisions, as well as leadership in the implementation are necessary. In the zero-defect processes it is therefore necessary to describe how the management is integrated into the decision-making process. It is important to organize the improvement process in such a way that decisions can be made promptly. Nothing is so demotivating for the improvement teams, as if improvements were developed, because of missing decisions are not implemented or only very time-delayed. Even if reasons speak against decisions, a quick feedback is important. In addition, the processes must ensure that the management is involved in the assessment of the effectiveness of measures and, if necessary, critically questions them.

5 Functions and Resources

In diesem Baustein sind zwei Elemente verknüpft. Zum einen geht es bei den Funktionen um die Festlegung und Nutzung von Eskalations- und Entscheidungswege um richtige Entscheidungen und Ausrichtungen (Time & Data Management) auf der Grundlage des Qualitätscontrollings sicherzustellen. Zum anderen geht es bei den Ressourcen um den richtigen und zielgerichteten Einsatz der vorhanden Ressourcen wie Personal, Material, Maschinen, Dienstleistungen, usw.. Auch hier werden die vorhandenen Vorgehensweisen sowie Entscheidungswege und der Ressourceneinsatz überprüft ob sich damit effektiv die Fehler vermeiden und korrigieren lassen. Sollte dies nicht der Fall sein werden auch hier Lücken und Korrekturmaßnahmen ermittelt.

6 Enable people

Phil Crosby paid particular attention to this important point. First and foremost, management must be committed to improving the quality of a company. This obligation must also be noticeable and recognizable for all employees so that the right attitude towards a Zero Defects philosophy can arise. Training to empower the employees for the successful and correct implementation and application of the previously defined methods and measures must be defined.

7 Leadership

This component focuses on the company's management skills. It describes and also defines how all executives - from the board to the group leader - drive, implement and support the zero-defect concept in the company, or, in words, "run in one direction". This conduct has a significant influence on the Building Block resources and functions, and is ultimately networked.

The "Zero-Defects Strategy CANVAS"

The conception of a new and discussion of an existing zero-defect concept we use a simple template that we call "Zero-Defects Strategy Canvas" and consists of the seven previously described blocks.
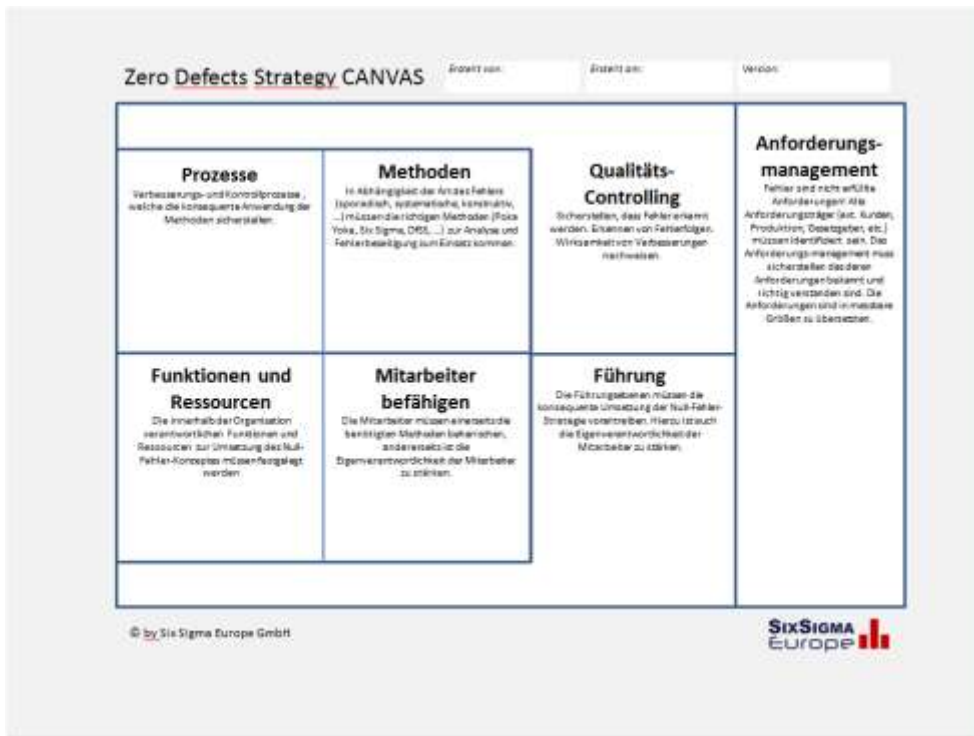
Gaps are identified for each building block using a questionnaire. The identified gaps are defined by methods and measures that address these deficits. These methods and activities are sticked into the CANVAS with Sticky's. As a result, after the processing of all blocks, a concept is available with which you can close the gaps in your previous Zero-Defects Concept.To process the CANVAS, we start with the "Requirements-Management" and move counter-clockwise to the "Leadership".
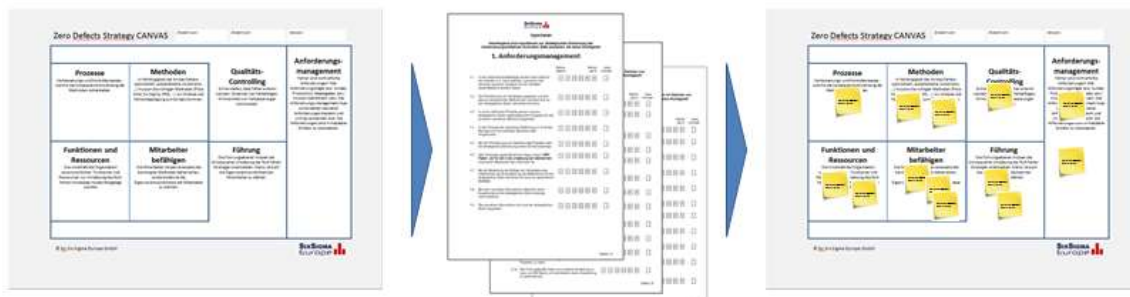
What is the Benefit oft he CANVAS?

With the CANVAS, a simple and visual development of a Zero-Defects Concept is possible. It ensures a structured discussion and reflection of all aspects. Since many of the above-mentioned building blocks have already been established in many companies, the main benefit is that a comparison of the actual situation in the company and the concept developed with the aid of the CANVAS has identified and closed gaps in the existing own Zero-Defects Strategy can be.

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