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MANAGEMENT SYSTEM ACCORDING TO THE INTERNATIONAL STANDARDS IN AUTOMOTIVE INDUSTRY

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Tento list vyjměte a nahraďte zadáním bakalářské práce

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Wolfsburg, 15th September 2015

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I would like to thank Dipl.-Ing. for the possibility of working in his department, on my own project and for the confidence given in me during the preparation of the recertification audit. I would also like to express my thanks to Dr , who helped me to understand the working processes and who supported me during the whole audit preparation. Last but not least I would like to thank who helped me every day to translate, correct, explain everything I needed and who was my biggest moral support during the whole internship period. At the same time I would like to thank the whole EASZ department that accepted me as a full team member. Finally, I want to thank my thesis supervisor Martin Folta, Ph.D., EUR ING for his guidance and expertise.

Content

List of Abbreviations

AG	Aktiengesellschaft
COP	Conformity of Production
DIN	Deutsches Institut für Normierung
EASZ	Entwicklung-Aggregate-Service-Zulassung
ISO	International Organization for Standardization
NIST	National Institute of Standards & Technology
PDCA	Plan-Do-Check-Act
PEP	Product development process (Produktentstehungsprozess)
PKW	Personenkraftwagen
QM	Quality Management
QMS	Quality Management System(s)
RSI	Responsibility (Responsibility matrix)
TÜV	Technischer Überwachungsverein
USA	United States of America

Introduction

We live in the 21st century, which states still higher and higher requirements on the companies, operating in diverse industries, for example in the automotive industry, which is in addition to the market claims controlled by many strict rules, standards, policies and laws. It is almost impossible to run a successful company without any functioning quality management system, respectively total quality management system.

The goal of the thesis "*Management System According to the International Standards in the Automotive Industry*" is to characterize the quality management system requirements in the company „*ABC*" according to the international system standards, analyse the implementation and results of the recertification process of the management system in the department EASZ and recommend actions leading to the improvement of the quality management system in accordance with the final report of the certification auditor. This topic was chosen because of the direct participation of the author of the thesis in the recertification process in the role of the project coordinator of the recertificated department EASZ.

First, there will be a brief introduction to the field of the quality management. The history of ISO 9001 will be shortly introduced, then the author will focus on the ISO 9000 group of standards, furthermore on the ISO 9001 implementation, and, lastbut not least the focus will be on the certification process and the methods which may nowadays be used for the ISO 9000 implementation, such as the Plan-Do-Check-Act in relation to Kaizen and Standardize-Do-Check-Act, or responsibility matrix, risk matrix and qualification matrix.

After that, the thesis will concentrate on its practical part, where the company „*ABC*" will be introduced and its already existing quality management system and policy will be described. Next, the recertificated department will be introduced.

Finally, the author proceeds with the implementation and results of the management system recertification process in the department EASZ and analyses both, results and implementation, of the recertification audit and suggests further possible implementation for other processes of the department EASZ. All the information will be summarised in a concise conclusion in the end.

1 Quality Management System and Standards

This chapter focuses on the basic information about the quality management systems and standards, furthermore with the development of ISO 9001 in the past and it explains the whole ISO 9000 family of standards. Then it focuses on the certification process and its stages and at the end of the chapter there will be a few methods, possibly applicable while implementing the ISO 9000 described.

Standardization comprises the unification of methods, systems and terms or product characteristics and its goal is to bring the benefit to its user group. These unified standards are defined by the development of the rules. The goal is to reach the measurability and comparability of the quality. Furthermore, the norms have to increase the efficiency in a way to account the security planning and simplify the technical and financial adaptation as well as the movement of goods and services. The standardization appears in different ways. We define the process/procedural standards, for example the Quality Management according to the ISO 9000, then the technical standards such as the screw type-DIN A4 and the classificatory standards, for example national identifications - .de, .com, .jp, etc. (Hinsch, 2014, p. 1-2)

The following table names different types of standards and states the real examples of them.

Table 1 Types of Standards

Criterion	Types of standards	Examples
Objective	To ensure product/ service quality	ISO 9001, ISO/TS 16949, TL 9000, AS 9100
	To ensure food safety	HACCP, BRC, IFS, ISO 22000
	To reduce an organization‘s operational risk	ISO 14001, OHSAS 18001, ISO 27001, ISO 22301, ISO 28000, ISO 31000
	To improve an organization‘s result and image	ISO 26000, ISO 50001
Business area	Quality management	ISO 9001, ISO/TS 16949, TL 9000, AS 9100
	Food safety and hygiene management	HACCP, BRC, IFS, ISO 22000

Criterion	Types of standards	Examples
Business area	Environmental management	ISO 14001
	Occupational health and safety management	OHSAS 18001
	Information security management	ISO 27001
	Business continuity management	ISO 22301
	Supply chain security management	ISO 28000
	Risk management	ISO 31000
	Social responsibility management	ISO 26000
	Energy efficiency management	ISO 50001
Universality	Universal	ISO 9001, ISO 14001, OHSAS 18001, ISO 27001, ISO 22301, ISO 28000, ISO 31000
	Sector-related	ISO/TS 16949, TL 9000, AS 9100, HACCP, BRC, IFS, ISO 22000, ISO 26000, ISO 50001

Source: Integrated Management Systems

All standards shall have the following key features:

- Representation of the best, easiest and safest way to do the particular work.
- Offering the best way how to keep the know-how of the organization and its technical knowledge.
- Mediation of a tool to measure the performance.
- Picturing the relationship between the causation and consequences.
- The basis for the maintenance and improvement.
- Goals mediation and tasks specification in the field of employee training.
- The base for the employee training.
- Audits and diagnosis foundation.

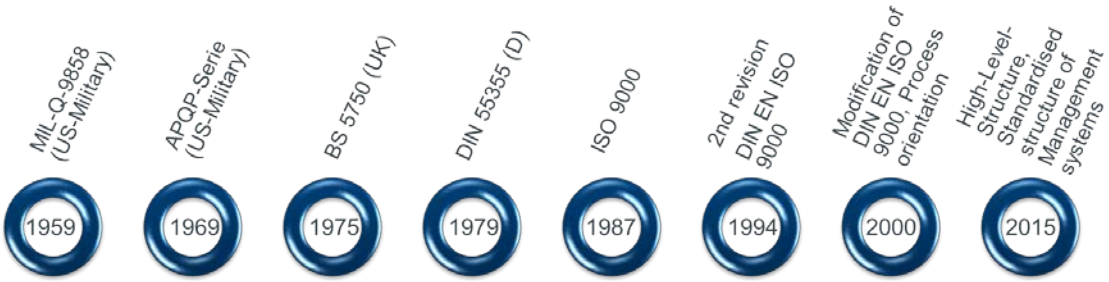
- Mediation of the tools for mistakes prevention as well as their repeating and minimization of the variability.

  (Masaaki, 2005, p. 63-66)

1.1 History of ISO 9001

First international standards were developed at the end of the 19th / in the beginning of the 20th century and since then they have significantly expanded. Big growth was after the Second World War hand to hand with the foundation of the **International Organization for Standardization** (ISO) and when was the "Deutsche Institut für Normierung" (DIN) founded in Germany.

Until the seventies of the 20th century had dominated the technical standards hand to hand with their development or dissemination. Finally in the 1979 was released the first standard for the Quality Management Systems (see Figure 1) from which came, in 1987, the ISO 9000 standard group from. The ISO 9001, as we know it nowadays, arouse first during the huge revision in 2000. For the essential reforms at that time was important to comprehensibly choose the right words and precise requirements, as well as the improved applicability for the service organizations. The following figure states the **main changes** of the norm during its **development.**



Source: Grundlagen Qualitätsmanagement, p.124

Figure 1 Development of the ISO 9001

1.2 ISO 9000 Family

Nowadays is the ISO 9000 group valid as a **worldwide important procedural standard**. ISO 9000 and 9004 have more of a clarifying and supportive character, whereas the ISO 9001 is in this group the only norm, which is certifiable.

What should **motivate** the company to **implement** the **ISO 9000** family?

- It can enhance the credibility of the organization.
- It can bring benefits for marketing.
- It demonstrates the company's commitment to continuous improvement.
- It demonstrates the company's commitment to customer satisfaction and quality.
- It helps to build the improvement structure.
- It can create more effective organization.
- It should help to reduce the rework of defective products.
- It can cut the poor quality costs.
- Thanks to less rework, the productivity improves.
- Morale improvement potential. (O'Regan, 2014, p. 186)

The ISO 9000 group **consists of 3 standards** (see Figure 2)

- ISO 9000 – this standard describes the fundamentals and vocabulary of QMS
- ISO 9001 – this standard further defines the quality management system requirements and can be applied on manufacturing, software and service organizations. The main focus is on measurement, customer satisfaction and continual improvement. This standard is the only certifiable from the ISO 9000 family.
- ISO 9004 – "Managing for the Sustained Success of the Organization" (ISO 9004:2009) assists organizations to help to implement the ISO 9001 and it guides the company in way to improve its performance.

Figure 2 ISO Standards System for the QM

There are 3 types of processes defined in the ISO 9000 group:

- management processes,
- product realisation processes,
- support processes.

A process oriented model is based on this process thinking and on the continual improvement of the quality management system (see Figure 3)

Source: Grundlagen Qualitätsmanagement

Figure 3 Continual Improvement of the QMS

The following scheme (Figure 4) describes the main goals of the quality management according to the EN ISO 9000, which is based on the concept of the continuous improvement and on the Deming's principle Plan-Do-Check-Act.

Source: EN ISO 9000

Figure 4 QM- Content According to the ISO 9000

Quality management means to coordinate activities „*to direct and control an organization with regard to quality*"(ISO 9000:2005).

With regard to the quality, the direction and control needs to establish: the quality policy, quality objectives, quality planning, quality control, quality assurance and quality improvement.

Quality policy describes „*overall intentions and direction of an organization related to quality as formally expressed by top management*"(ISO 9000:2005). The quality policy consists from the overall policy of the company and provides a framework to set off the quality objectives. The basis to establish the quality policy in this International Standard could be formed by the quality management principles.

Quality objective means something, what aims for, seeks, or relates to the quality. It is mainly based on the quality policy of the organization and mostly „*specified for relevant functions and levels in the organization*"(ISO 9000:2005).

Quality planning as a part of a quality management sets the quality objectives and specifies necessary operational processes and resources, related to the fulfilment of the quality objectives. The part of the quality planning can be the establishment of the quality plans.

Quality control puts the focus on the fulfilment of the quality requirements.

Quality assurance focuses on confidential provision of the fulfilment of the quality requirements.

Quality improvement means to improve the ability of the organization to fulfil the quality requirements, which can relate to any aspect such as efficiency, effectiveness or traceability.

Continual improvement means activity, which repeats in order to increase the „*ability to fulfil the requirements*"(ISO 9000:2005). The objectives establishment process and detection of the improvement opportunities is a continual process, which is used through the audit findings and conclusions, analysis of data, management reviews or other tools and general guidelines for the corrective or preventive action.

1.2.1 ISO 9001 Implementation

The ISO 9001 certification is supposed to reach the competitiveness of a company by using an effective quality management system with efficient processes, which must be **continuously** evaluated. The company is supposed to continuously improve, plan, adapt and evaluate its QMS. The companies should always learn from their own mistakes as well as define and rationalize the weak and waste points. (ISO 9001:2008)

The development of a powerful quality management system needs to be applied within the whole company and to its all core processes. The **main requirements** of the ISO 9001 concern the following:

- Creation and maintenance of a process oriented QM-System under consideration of the environmental conditions and influential variables.
- Responsibility and commitment to the business performance under the consideration of quality politics and its targets.

- Personal qualification, awareness and resource planning including the associated documentation.
- Creation/recording and integration/assimilation of customer requirements.
- Planning and implementation of construction works and product/services development.
- Selection, monitoring and control of extern providers as well as their evaluation and control of the delivered products and services.
- Planning and implementation of the service performance including their release and activities after the delivery.
- Process and Product monitoring and measurement, the analysis of the collected data.
- Continuous improvement, mistake correction, risk minimization. (Brugger-Gebhardt, 2014)

ISO 9001 defines the content of a QM-System mainly unspecific. The norm **determines fixed what should be in the end implemented**, but **not how** should be the processes and working steps **described in detail**. There are no tools, instruments or implementation methods set, but the requirements for the output. The norm leaves the detailed content of the process design and the choice of the tools upon the organization/company. (ISO 9001:2008)

At the same time, the certification of the QM-System is not free of disadvantages. It **does not check** the **product** or the service **quality**, but the **structure and process organization of the company.** This does not suffice to the big company's quality demands and they create, independent from the norms, their own **supplier requirements**.

The following table names the ISO 9001 clauses, which are further described in detail.

Table 2 ISO 9001:2008 Clauses

ISO 9001:2008[1]	
0	Introduction
1	Scope
2	Normative references
3	Terms and definitions
4	Quality Management System
5	Management responsibility
6	Resource Management
7	Product realization
8	Measurement, analysis and improvement

Source: ISO 9001:2008

Clauses 0-3 have only **introductive** character, the requirements, organization needs to fulfil, are described first from the chapter 4.

Clause 4 describes the **general requirements** of the quality management system. In order to develop the QMS it is necessary to:

- establish,
- document,
- implement,
- maintain
- and improve the organization's process based quality management system.

The organization has to **document the QMS**. First, the documents of the organization's QMS need to be **developed** and after that **reviewed** in order to ensure, the QMS **documents reflect** and **respect** what the company does and how. After that follows the establishment of a **quality manual** and of course its maintenance. It is essential to control the organization's QMS documents and documents used as QMS records. In the end, organization has to **establish** its **QMS records** and **procedures** to control them. (ISO 9001:2008; p.16-19)

Clause 5 establishes the **management requirements**. The company should show its **quality commitment** and support the development, implementation and efforts for **continual improvement** and **effectiveness** of the company's **QMS**. The

[1] The new revision of ISO 9001 follows in the 3rd quarter of 2015.

customer's satisfaction needs to be enhanced to ensure the **customer requirements** are being **identified** and **met**. Does the **quality policy** serve to its **purpose**? Does it state clear the **requirements** have to be met? Does the quality policy **commit to continual improvement** of the effectiveness of the QMS? Does it support the **quality objectives**? Is it discussed throughout the whole organization? Is the quality policy reviewed periodically, furthermore still suitable? That all needs to be ensured. In order to carry out the **QMS planning**, the quality objectives shall be **established within the whole organization** at relevant functions and levels and furthermore **reviewed** if they are effective. The company shall also **plan** the establishment, documentation, implementation, maintenance and continual improvement of the QMS. It has to be **ensured**, the QMS authorities and responsibilities are defined and communicated within the organization, the **management representative** role is created and internal communication supported. The organization shall create **management reviews** at planned intervals, evaluate the opportunities for improvement and need to make changes and maintain the management reviews records. Finally, the information about management review inputs should be examined and the outputs generated. (ISO 9001:2008, p.19-23)

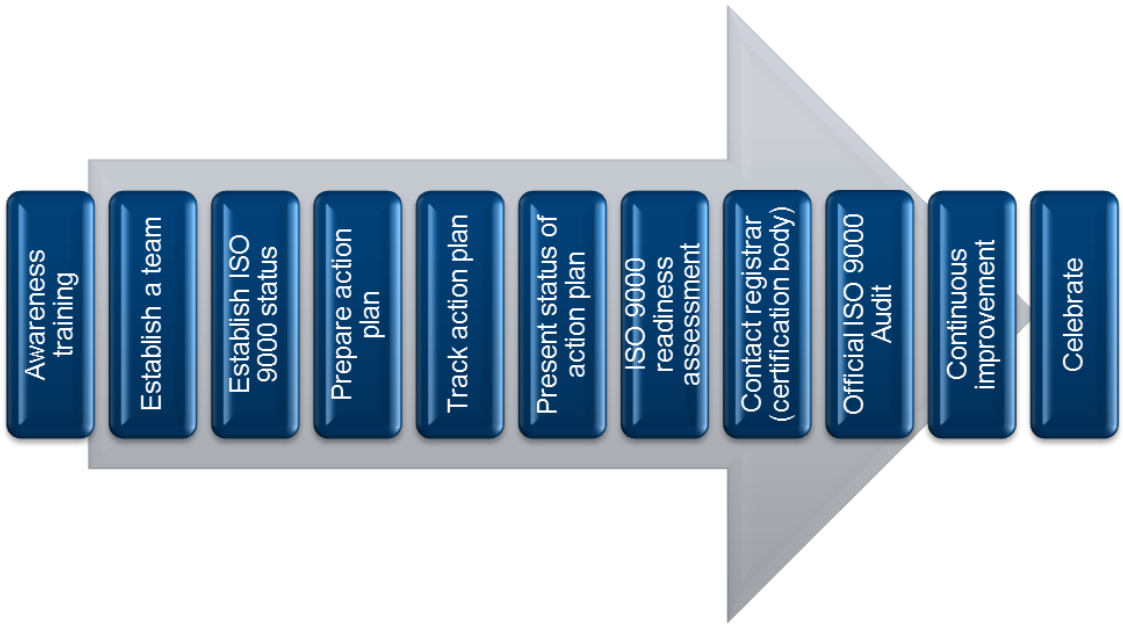
Clause 6 sets up the **resource requirements**. It says, the organization shall **identify** and **provide** the **resources** that the **QMS** needs**,** provide competent personnel, ensure the competence of workers is being met and meet the **competence requirements**. Also identify, provide and maintain the **infrastructure** necessary for the organization. Finally identify and manage the necessary **work environment** in order to meet the product requirements. (ISO 9001:2008, p. 23-25)

Clause 7 describes the **realization requirements**. It says, the company shall **control** the product realization planning and customer-related processes by identifying the **unique product requirements**, reviewing the product requirements of the customer and communicating with them. Companies shall also control and plan **product design** and **development**, identify their inputs and generate their outputs, carry out the reviews, perform the verifications, conduct the validations and manage all the changes. The control of the following is essential:

- purchasing and purchased products,
- production and service provision and
- monitoring and measuring equipment. (ISO 9001:2008, p. 25-39)

Clause 8 identifies the **remedial requirements**. It states, the company shall identify the **monitoring**, **measurement** and **analytical** processes, plan how it will be used for **conformity demonstration** and **improvement** and implement them. In order to monitor and measure customer satisfaction, the monitor methods should be established. The **internal audits** should be planned and performed regularly. It is essential to choose the **right methods** for measurement and monitoring of the processes that make up the organization's QMS, measure and monitor them and take **appropriate actions** in case of the QMS failure and monitor and measure the product characteristics. Establish, document, implement and maintain the **nonconforming products** procedures. The QM data shall be collected and analysed and finally the QMS effectiveness continually improved, nonconformities corrected in order to prevent recurrence and prevention from the occurrence of nonconformities should be met. (ISO 9001:2008, p. 39-45)

The following diagram describes the **ISO 9001 implementation**.



Source: Introduction to Software Quality, Undergraduate Topics in Computer Science

Figure 5 ISO 9001 Implementation Process

Awareness training shall involve the management briefing on ISO 9000 and its implementation steps. Then, the **team** responsible for ISO 9000 implementation shall be **established**. The **ISO 9001 status** needs to be determined by a consultant or by a self-assessment, which is further described in ISO 9004 and it needs to be identified, which areas need to be addressed for the standards satisfaction.

After that, organization shall prepare its **action plan** which defines required resources, the activities to be performed and for each activity also estimated date of completion. The action plan shall be tracked and updated and its status presented to management, the re-plan will be prepared if needed. Optional, it is recommended to **control**, if the organization is prepared for a **formal ISO 9001 assessment**, which could be done by a **readiness** review carried out by an independent body or consultant. It leads to identification of any serious issues which need to be solved before the official assessment.

When the organization made sure, it has implemented the standard, it could **apply for an audit** of its QMS. In the **official ISO 9000 audit**, it is compared by auditors if the QMS meets the ISO 9001 requirements by interviewing individuals and groups. After the official audit, the organization receives a **feedback**, which should be used for its QMS continual improvement. In the end, the major achievement in way of **ISO 9001 certificate** means a „celebration“, an important step to the quality and customer satisfaction. (O'Regan, 2014, p. 115-116)

1.3 Certification process

The certification consists from the following steps:

Figure 6 Steps of the Certification Process

The organization exchanges the information with the certification company, which is necessary for the implementation of the certification. That means they exchange **basic information about the organization and its quality management system**, which can be done for example by a standardized questionnaire.

After that, it is essential to **control**, if the **QMS documentation corresponds** to the relevant norm requirements. In case of finding a discrepancy, the organization shall eliminate them and repeat the **internal audit** again. When all that corresponds, it is recommended to run the Stage 1 audit, which examines, if the company is ready for the ISO 9001 certification. First after thesuccessful examination in the Stage 1 audit, it is possible to run the certification audit.

The goal of the Stage 2 - **certification audit** - is to examine, if the QMS documentation corresponds with the realization of the documented process by the independent third-party (certification auditor). In case of positive evaluation, or after repairing the discrepancies, the organization receives **the relevant certificate**.

During the validity period of the certificate, the certification body continuously controls its legitimacy, by **the surveillance audits**, which are held usually **once**

per year, if the organization and the auditor don't agree on any different time period, for example once per 6 months. After the expiration of the validity period (mostly 3 years), the certification company performs the **recertification audit,** also called "**renewal audit**", in the extent of the certification audit. The certification is held by the independent certification companies, for example TÜV Nord, TÜV Süd, EURO CERT CZ, a.s., etc. (Váchal, Vochozka and col., 2013, p. 504-505)

A guide **how to audit the management systems**, including the auditing principles, how to manage an audit programme and how to conduct management system audits, furthermore how to evaluate the competence of individuals who are involved in the audit process, as well as the person who manages the audit program, auditors and audit teams are described in the norm **ISO 19011**[2]. All organizations in need of conduction of an internal or external management systems audits or managing an audit programme can apply the ISO 19011. (ISO 19011:2011)

ISO/IEC 17021 standard describes the **requirements** and **principles** for the "competence, consistency and impartiality of the **audit** and **certification** of **management systems** of all types and **for bodies providing these activities**" (ISO/IEC 17021-1:2015). That means QMS, environmental management systems, etc. Management systems "**certification**" is named in this International Standard and means a conformity assessment activity provided by a third-party, also called "**certification bodies**".

1.4 Current Methods used while implementing the ISO 9000

As mentioned in the chapter 1.2.1 ISO 9001 Implementation, ISO 9000 does not state which methods or tools should be used for its implementation. This chapter describes a few methods currently used in praxis.

1.4.1 Plan-Do-Check-Act versus Kaizen

Every quality management system shall work on the continual improvement. The ISO 9000 is based on the Deming's/ Shrewhart's principle "PDCA", of which steps are comparable to the steps of the system KAIZEN, as we can see in the Figure 7.

[2] The new revision of ISO 19011 follows in the 3rd quarter of 2015.

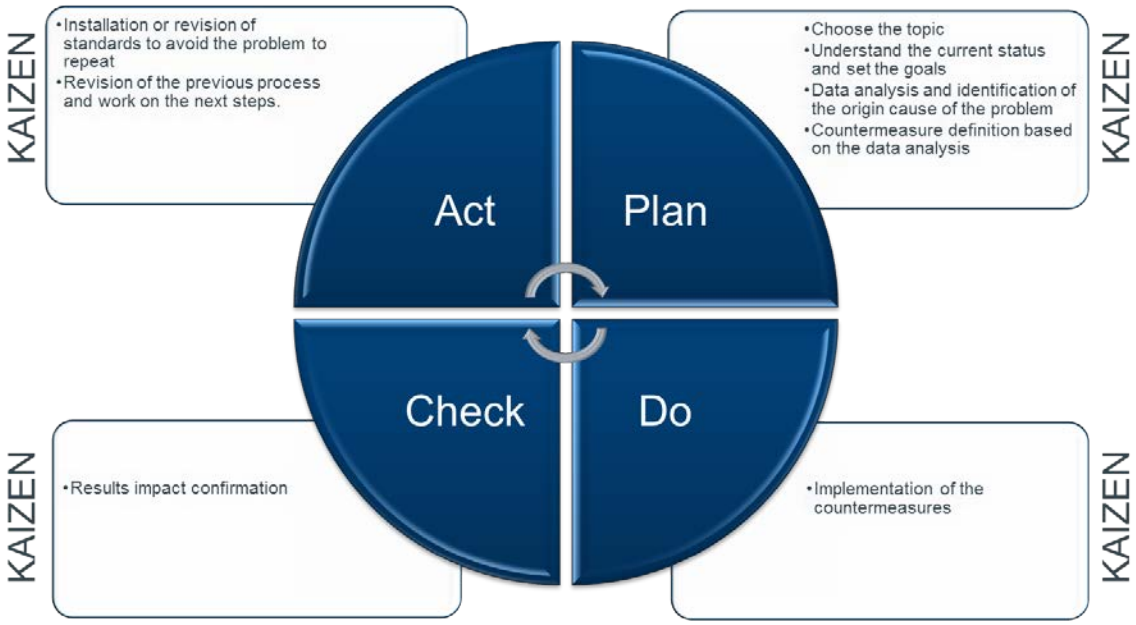


Figure 7 PDCA vs. Kaizen Steps

The phase "**plan**" concerns with the implementation of the goal of the improvement and creation of an action plan to reach the goal. The phase "**do**" means the realization of the action plan. In the third phase "**check**" it's being set and decided, whether the realization of the plan proceeds correctly and if it brings its planned improvement. The last phase "**act**" covers the performance and **standardization** of the new procedures, which could prevent from returning of the original problem, or set the goals for the further improvement.

Kaizen follows the PDCA cycle. Steps 1-4 correspond to the phase "plan", step 5 to the practical performance "do", step 6 concerns with the control "check" and the last steps 7 and 8 mean the implementation "act".

The **standardization** has similar 4 phases to PDCA: **Standardize – Do – Check – Act**. **SDCA cycle** standardizes and stabilizes the actual processes, whereas the PDCA improves them. SDCA concerns the maintenance, PDCA improvement, which are 2 main tasks of the management. (Masaaki, 2005)

1.4.2 Responsibility Matrix

This matrix serves as a tool to display the responsibilities of the workers and states clear who bares the responsibility for different activities in a table form.

"R" stands for Responsibilities, "S" for Support and "I" for Information (see Table 3 RSI Matrix Explanation). (Karavul, 2015)

Table 3 RSI Matrix Explanation

R	The person bares the **Responsibility** for the activity package (involves objectives achievement while compiling the term- and resource specifications)
S	The person who will work with **Support** on the project. The impulse to do something comes from the responsible person, otherwise from the own initiative and own responsibility.
I	The person will be **Informed** about the occurrences and results of the activity package. It involves the obligation of the responsibility to this person, which means, the informed person does not have to be active on its own.

Here is an example of the RSI Matrix for a simplified CD creation process (see Table 4).

Table 4 Example of the RSI Matrix

	RSI Matrix	Songwriter	Musician	Singer	Publishing worker	Publishing manager
1	Write music	S	R			I
2	Write lyrics	R	S			I
3	Perform a song	S	S	R		I
4	Record a song	S	S	S	R	I
5	Make a CD				R	I

1.4.3 Risk Criteria – Risk Matrix

Risk matrix can clearly present the identified risks. On the axis is shown the **probability** and the **impact** (see Table 5). This kind of visualization brings the benefit in possibility to present the whole project in one piece. In addition to it, it is possible to add the third dimension "time" and obtain a risk trend analysis. This way enables the development of the risks prevention and minimization of the risks right on time. (Karavul, 2015)

Table 5 Risk Matrix

Probability		Impact				
		Insignificant	**Negligible**	**Moderate**	**Extensive**	**Significant**
	Almost Certain > 95%	Medium	High	High	Very High	Very High
	Likely > 65%	Low	Meidum	High	High	Very High
	Possible > 35%	Low	Low	Medium	High	High
	Unlikely < 35%	Very Low	Low	Low	Medium	High
	Rare < 5%	Very Low	Very Low	Low	Low	Medium

1.4.4 Qualification Matrix

In ISO 9000 quality management system, it is also important to **plan, track** and **improve** the **qualifications** of the employees. According to the author of the thesis, a suitable tool for this can be the qualification matrix. It is an instrument which helps to **visualize the qualification requirements**.

As a first step it will be set, **which activities** are **necessary** for a **certain person**. In the second step, there will be the **positions** of the **responsible project team members allocated** and it will be **analysed** if the **necessary activities** are **available** or **possible** and if they need to be **supplemented**. Finally, the suitable **action points** will be **determined** to sustainable **close** the **identified qualification's gap**. (Karavul, 2015)

2 Practical Background

This chapter relates to the practical part of the thesis and further describes the company, where was the recertification held – “ABC”. It involves the information about the company’s quality management system and policy and introduces the recertificated department “EASZ” which will lead to the analysis in the next chapter. As a part of the internship tasks of the author, was to independently prepare the department EASZ for the recertification audit according to the DIN EN ISO 9001:2008.

2.1 Company “ABC”

One of the leaders of the automobile manufacture market – the ABC Group, headquartered in , belongs to the **car manufacturers** in .
It delivered over ten millions vehicles in 2014 on the world’s passenger cars market. There are brands from European countries in the ABC Group (see Table 6):

Table 6 ABC Group Brands

Every brand of the concern operates **independently** on its own market with its own character. The product range differs from luxury vehicles to low-consumption small cars and motorcycles. Commercial Vehicles produce furthermore heavy trucks, buses and pick-ups.

The ABC Group also manufactures large-bore diesel engines for stationary and marine applications, turbomachinery such as steam and gas turbines, furthermore turbochargers, compressors and chemical reactors, vehicle transmissions, slide bearings and couplings, special gear units for wind turbines and testing systems

for the mobility sector. In addition to it, the Group has a wide offer of financial services, insurance and banking activities and fleet management. Since November 2014 has run production plants in 19 countries in Europe, 8 countries in the USA, Asia and Africa.

(, 2015)

2.2 Quality Management System and Policy of the Organization

Quality management system is a **prerequisite** of the **car manufacturer** for the receipt of the **type-approval** for manufacturing and selling the products on the automobile market. Thus, the **quality management system**, in addition to the **type-approved vehicles**, the **location permit** and the **CoP tests** (standard and compliance audits) forms a central pillar for sustainable success of the ABC company. (Internal Documentation)

The **car manufacturer** is **obliged** by the **approval authority** to **demonstrate its QMS** based on the requirements of the approval authority which is in Germany "*Kraftfahrt-Bundesamt*" (Federal Motor Vehicle and Transport Authority). **Kraftfahrt Bundesamt** issues national and international legislation **approvals** for both, complete and incomplete **vehicles** and for the **vehicle parts** - components, systems, separate technical units and equipment. The manufacturer **can fulfil** the **technical responsibility** by the **certificate verifying compliance with** the norm ***EN ISO 9001:2008***, respectively by its revisions.

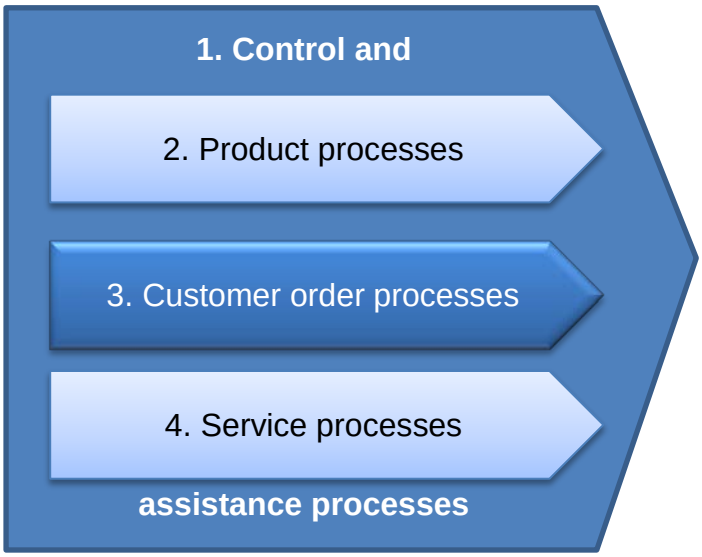
Every **brand** of ABC operates with **its own QM-System**, which has to be created at least according to the ISO 9001 requirements. The **parts** of the QM-System are the **QM-Policy**, the **Management Handbook for Quality** as well as the **internal regulations** of the company. **Compliance** of the implementation of the standard is **checked** by the **independent certification company** in a way of the certification audit. The confirmation of this audit is then proved by a certificate.

2.2.1 Business Process Model and Management Handbook for the Quality

Management handbook for the quality documents the **networked operations without functional boundaries** with the focus on its **core tasks** and is **structured** according to the **business process model**.

The business process model describes the **relations** between the **different processes** and is **divided** into the following **core business processes** (see Figure 8):

- PP – Product processes,
- KAP – Customer order processes,
- SPK – Service processes,
- SUP – Control and assistance processes (Internal Documentation).



Source: Internal Documentation

Figure 8 Core Business Processes of the Organization

- **Control and assistance processes**

In order to **implement the decisions of the top management**, different processes are in need. These processes are called control processes. There are also assistance processes, in which are the **administrative or advisory activities** performed.

- **Product processes**

The product process orientates on the **customer needs** and the **market requirements**. It covers the design of the vehicles and their components the same way as the planning and preparation of the production facilities, series launch and the further development of the vehicles over their life-cycle.

- **Customer order processes**

As soon as is the **order from** the **customer** available, begins the customer order process. It is controlled by the market, including the production and all activities that are necessary for the fulfillment of the order until the vehicle can be handed over to the customer.

- **Service processes**

Acquiring of the **new customers** and **their loyalty** are the main focus of the service processes. It also involves all the customer services such as Customer Lifetime Service or Car Lifecycle Services. (Internal Documentation)

2.2.2 QM Policy of the Organization

The **quality** management **policy** creates the **basis for** the **rules** at ABC in accordance with the scope of the QMS of the ABC brand. The moto of the company is “ – *Our focus is on quality*” (Internal Documentation).

The policy states, ABC should develop and build reliable and exciting cars of the highest quality. ABC wants to become the most innovative car manufacturer in the world. The basis for the ideas, action and learning should be the customer satisfaction. All departments of the company need to meet the QM policy objectives, which are available in an electronical form to all employees. (Internal Documentation)

2.3 Department EASZ

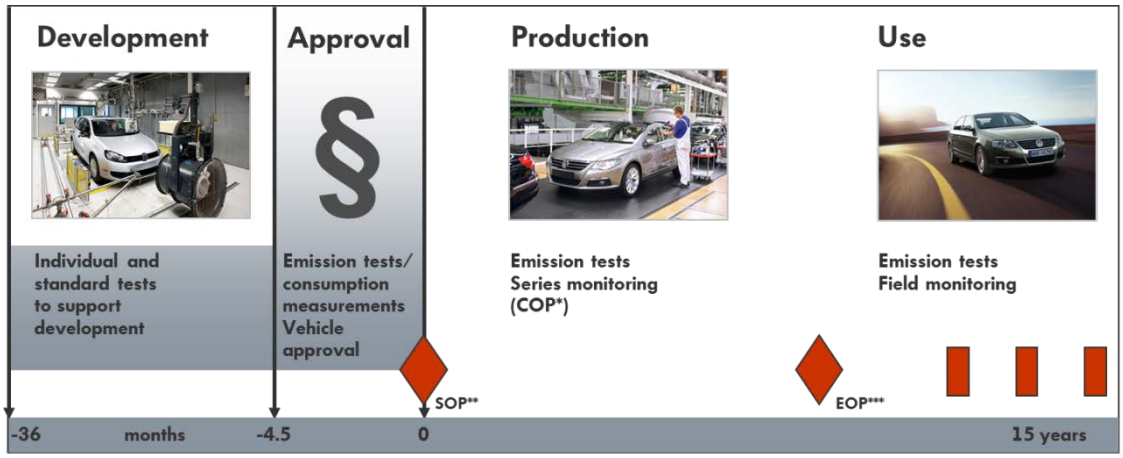
EASZ department belongs to the **technical development** of the ABC. As its **core tasks**, EASZ **approves worldwide the engine unites**, **develops the measuring** and **testing procedures**, **operates the roller dynamometers** in factory**, supervise the exhaust-measurement technology** for worldwide engine

test rings and roller dynamometers, runs the **cold/climate centre** and **produces its own calibration gas**.

EASZ owns vehicle test facilities within numerous locations in Wolfsburg plant, has approximately 200 intern employees, exhaust and endurance roller dynamometers, cold/climate test ring, cold/climate chambers, laboratory areas for component testing, T SHED and Mini SHED Chambers. Among others, EASZ runs approximately 32 000 exhaust tests per year.

EASZ **bears the responsibility for the worldwide engine unit approvals of all Volkswagen engines** made by the Group brands. That means, it communicates and cooperates with the responsible authorities for approvals and also performs approval tests in order to fulfil the worldwide standards at the Wolfsburg plant.

In the Figure 9, there are the tasks of EASZ during the whole vehicle service life described.



Source: Internal Documentation

Figure 9 Tasks of EASZ during the Vehicle Service Life

The structure of the aggregate development, furthermore of the aggregate test center, to which belongs the department EASZ is shown in the Annex nr. 1.

Structure of EASZ is described in the Figure 10 and is divided into 5 different subdivisions, respectively 7 subdivisions (2 divisions belong to the). Two divisions have their own masterships - “Meisterschaften”.

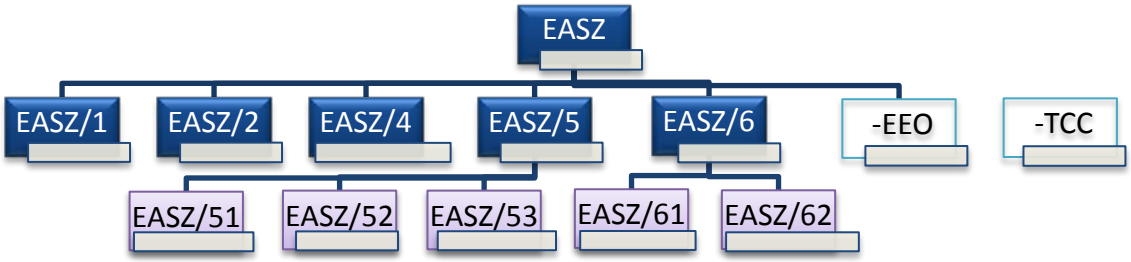


Figure 10 Organization Structure of EASZ

The main tasks of EASZ are summarized in the Table 7.

Table 7 The Main Tasks of EASZ

EASZ-1:	Engine unit approvals
EASZ-2:	Testing methods
EASZ-4/5:	Exhaust measurements worldwide
EASZ-6:	Vehicle test facilities

For the purpose of the thesis, it will be mostly talked about the department EASZ/2 and the gas calibration process, which will be explained in the chapter 3.1 Testing/Calibration Gas Production.

The following figure describes the co-workers organisation structure in the gas calibration process.

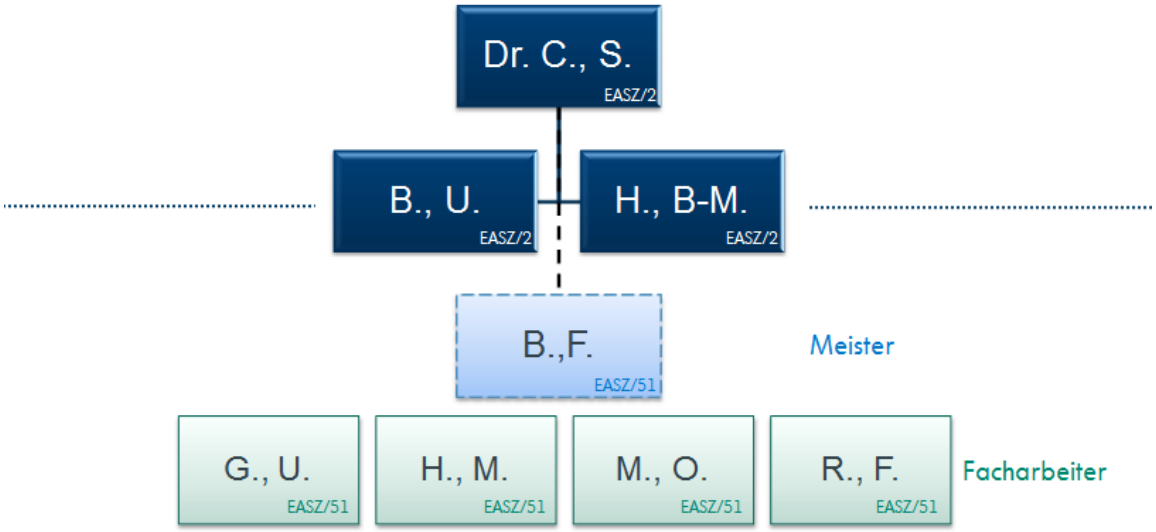


Figure 11 Organisation Structure of Workers in the Gas Calibration Process

The subdivision manager supervises more employees, but in the gas calibration process are that 2 specialists, who further cooperate with the “Meisterschaft”, its leader “Meister” and 4 technicians. [3]

[3] In order to follow the personal data protection, the names of the workers are not written in this table.

3 Recertification Process

The goal of this chapter is to describe the implementation and results of the recertification in calibration gas production process. It explains the re-certificated process and how the recertification audit proceeded, step by step, in praxis.

3.1 Testing/Calibration Gas Production

ABC produces, in the department EASZ, **as** its own testing/calibration gas with high precise quality **for the calibration of exhaust measuring facilities**. The department ensures that the consistent standards required for the high measurement quality are being met. The gas is comparable to the NIST (National Institute of Standards & Technology, USA) standards and can be delivered either to internal or external customers.

EASZ realizes the gas production **within the +/- 1% tolerance** for the calibration of gas analysis devices. The basis of the process is the **exact initiation** of the **gas volume** with the appropriate **gasometer** using the **exact weights** and a **horizontal beam**. (Internal Documentation)

First, it is necessary to receive the **order** of the calibration gas from the customer, for example per E-mail, with the desired **type** and **quantity** of the standard gas, its addition and concentrations. As soon as is the order **feasible**, the **fill permission** can be released. After that, the **containers** will be **prepared**, **evacuated** and **filled** with the volume and the standard gas according to the **manometric production process**, which is further described in the internal work instructions. Subsequently follows the **analysis** of the created calibration gas with the **gravimetric standards**.

When is the **deviation** between the setting value and the control value of the gravimetric created testing gas **too extensive**, the analysis must be **repeated.** When is the **gauging** completed **successfully**, with the accuracy of +/- 1%, the calibration gas **certificate can be issued**. Only then can be the test gas **sent to the customers**.

The **gas production ensures** that the **gas analysis devices function reliable according** to the **same standard within** the **whole concern**. Every gas bottle has its etiquette, describing the fuel in the bottle and the certification mark. ABC

calibration gas must be secured with the national and/ or international testing gas standards. Therefore are the reference gases from “National Institute of Standards and Technology” set up. (Internal Documentation)

3.2 The Process of the Recertification Audit in the Organization

The department EASZ was chosen by the department EAS to participate on the recertification audit as one of the representatives of the technical development of the ABC. At that point, it was necessary to **choose** and **specify** the **relevant process for the auditing**. In accordance with the fact, the department operations are mainly secret, it was decided to audit the gas production/calibration process.

The discussions about the audit started in October 2014 with the exact plan (see Annex nr. 2). The whole audit process, including internal preparation, documentation and on-site audit had the following flow (see Figure 12):

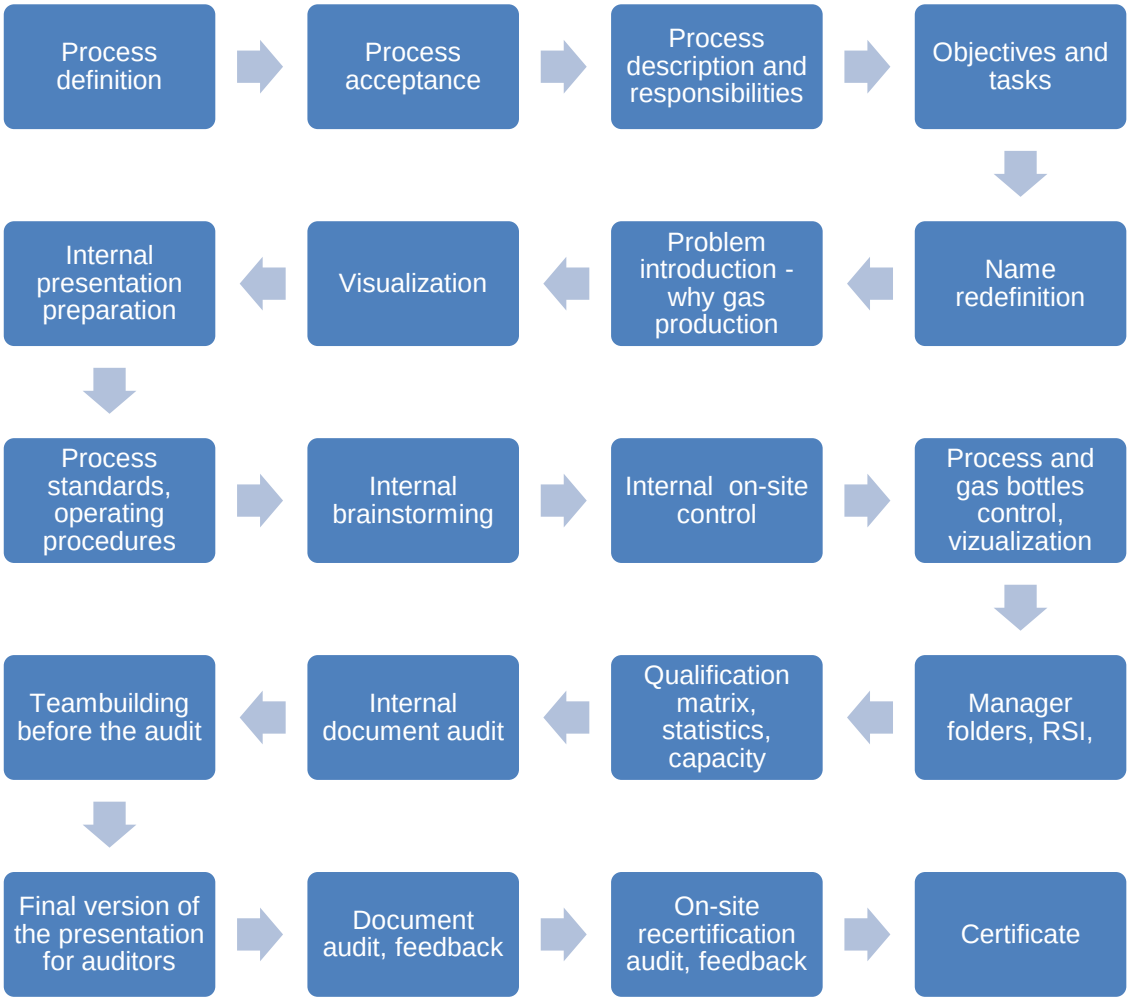


Figure 12 Process of the Recertification

3.2.1 Process Definition and Process Acceptance

In the beginning, it was necessary to find one particular process which would be certificated. It was supposted to be a **process with an improvement potential**, but as well a process with a “time-gap”. That means, the department tried to find a process, where the coworkers were not too busy or stressed by a huge project, or similar. The reason was to avoid overwhelming the employees with even more extra work and keep a friendly working climate.

After that it was necessary to **get the acceptance** of the process by the quality assurance department and furthermore by the independent auditors.

3.2.2 Process Description and Responsibilities

As the next step followed the **description of the approved process** and the determination of the **responsible persons** for the key processes. It included 3, respectively 4 internal departments in total – EASZ, aggregate quality department, quality management department and respectively concern quality management department. The **author** of the thesis was set as the **project coordinator for the recertification** of the department EASZ, that means also as the person for the communication with other departments involved in the recertification preparation process.

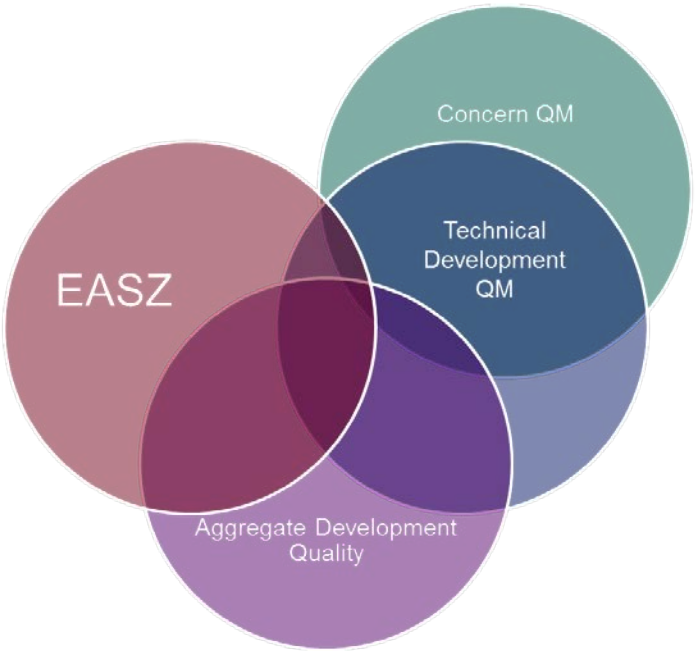


Figure 13 Internal Audit Communication

The **communication structure between the departments** is described in the Figure 13, the most frequent cooperation was between EASZ and aggregate development quality department, guided by the technical development QM department, furthermore by the concern QM, which shows the **connectivity between** the ABC **concern** and ABC **brand**.

3.2.3 Objectives and Tasks and Process Name Redefinition

At least **once per week** took a **meeting with manager** of EASZ place in order to **inform about the audit preparation progress** and in order to adjust a presentation for the auditors.

First, it was necessary to **define and describe** the **objectives and tasks** of the department, respectively of the **gas calibration process** and present them to the quality management departments, which gave their feedback and a few **recommendations** about how to present it to the auditors. Hand to hand with this, the official name of the process had to be changed in order to clearly define the issues in an understandable way.

3.2.4 Introduction to the Gas Production Problem – “Why” and its Visualization

Then it was essential to **explain**, **why** is the calibration **gas beeing produced** and **which purpose** does it have **during the automobile PEP**. In order to proceed with the **presentation for the auditors**, it was decided to **visualize** the key process steps in way of photographies and diagrams. The photos had to be approved by the internal competent bodies before the presentation. The presentation was internal prepared and revised in EASZ. Meanwhile the **process standards** and **operating procedures** were also reviewed.

3.2.5 Internal Preparation and Process Standards and Operating Procedures Revision

It had been checked if the information, described in the operating procedures, coresspond to the reality – how is the process really beeing done. The procedures were shortened in order to increase their clarity and comprehensibility. It had been **examined from place**, how was the process done and if it corresponded to the

operating procedures, furthermore, if there was something done during the process, what wasn't described in the procedures.

3.2.6 Internal Brainstorming

After the first phase of the EASZ preparation proceeded **an internal brainstorming with the QM departments**, where was the status of the process standard and the operating procedures introduced as well as the draft of the presentation for auditors. It was set up, the process standard and the presentation need to be adjusted.

3.2.7 Internal On-Site Control, Gas Bottles and Process Control - Vizualization

A representative of the QM department was invited to **the internal on-site control of the process** in order to find possible insufficiencies. The results of this control were positive. Then followed the visualization and detailed description of the process and especially gas bottles control. Each gas bottle has its own security marks in order to avoid the interchangeability.

3.2.8 Manager Folders, RSI, Qualification, Statistics and Capacity

After a carefull control, it was decided to **update the manager folders** and create an **RSI matrix** in order to clearify, who bares the **respobsibility for the key processes**. Furthemore, the statistics about the customer satisfaction were created and in order to create a tool to enable to count the throughput, it was decided to develop the **capacity planner**, which states approximate production and analysis times for the particular gas mixture.

3.2.9 Internal Document Audit and Teambuilding

As a next step, there was an **internal document audit held**, where the QM departments controlled, if the documentation meets the requirements and it could be presented to the auditors.

To inform the **co-workers** involved in the recertificated process about the audit, there was a **presentation** introduced, where the workers could also express their **own improvement ideas**. All EASZ audit participants met to make a **teambuilding** and to confirm the **final version** of the presentation for the auditors.

3.2.10 Document and Recertification Audit, their Feedbacks and Certificate

Finally, there was the **document audit** with the QM departments and the independent certification body, including 2 auditors. After that got the department EASZ short **feedback**, where were the questions, to be answered in the on-site audit, stated.

On-site recertification audit was held directly **from place** at the hall, where is the gas produced. All the questions from the document audit were answered and there were **no insufficiensies** found during the recertification. It included also the **feedback** for the department EASZ, with the **amazement at the commitment of all employees** involved in the audit. EASZ was then a part of a **succesful recertification** and ABC **received a valid certificate** of its **quality management system**. EASZ was also assigned as a best-practice department in ways of audit preparation by the management. The whole audit process is further described and time framed in the Gannt Diagram (see Annex nr. 3).

4 Improvement Potentials and Recommendations

The aim of this chapter is to analyse, implement and evaluate the audited process. Firstly, it describes the methods used for the analysis. Then it points out the results of the recertification, suggests improvement potentials, respectively describes the improvement potentials already implemented in the process[4]. Last, but not least, it mentions the possibilities to implement the recommendations in other department processes.

4.1 Applied Methods

The author researched the international standards, especially the ISO 9000 group and compared it with the department documentation and operations. It was necessary to interview the specialists at the department in order to link the theoretical requirements and the practice. It was important to take account of any other regulations, such as logistics of the gas, security and many others.

4.2 Results of the Recertification

According to the auditor's final report, there were **no nonconformities** found at the whole organization. The auditor didn't define any **improvement potentials** at the EASZ, but in other recertificated departments. Auditor also found a few **positive aspects** within the organization as well as in the departments. The **certificate** was therefore succesfully **extended**, with a **3 year validity** (see Annex nr. 4).

(*20 Jahre „ISO-Zertifizierung bei ", 2015)*

4.3 Improvement Potentials

Already **during the internal preparation**, in order to improve the QMS, there were a few improvement potentials defined (see Table 8), before the third-party recertification audit had taken its place. The author suggests also other improvement potentials, which have not been implemented yet.

[4] The author of the thesis participated on the whole recertification process and therefore already involved her own ideas during the audit. The whole internal process in the department was coordinated by the author.

Table 8 Improvement Potential Implementation

Improvement Potential	Implementation		
	not started	in progress	completed
1. Process standard according to the internal standards			
2. Manager folders renewal			
3. Responsibility matrix			
4. Qualification matrix			
5. Statistics			
6. Capacity planner			
7. Risk matrix			
8. Forecast			

4.3.1 Process Standard According to the Internal Standards

In accordance to the internal QM requirements, the **process standard** had been **revised and updated**. The existence of the unified process standard template in the whole organization got positive evaluation from the auditors.

4.3.2 Manager Folders Renewal

The manager folders were integrated and simplified in the cooperation of the author and the specialists. Auditors evaluated them positive as well. In order to assure, the employees get the up-to-date information, all manager folders are available in an electronical version and are regulary updated.

4.3.3 Responsibility Matrix

The **responsibilities** in the organization should be **clearly defined** and **known to all the process participants**, therefore the author of the thesis created a **responsibility matrix**, which describes all activities and their responsible persons

in the gas calibration process. This improvement was seen positive as well, because it states the accountability in a well arranged table (see Table 9)[5].

Table 9 RSI Matrix

Responsibility Matrix							
R = bares the **Responsibility** for the activity package **S =** will work with **Support** on the project **I =** will be **Informed** about the occurrences and results of the activity package	BA	CS	HBM	GU	HM	MO	RF
Gas order processing	R	I	S				
Examination of feasibility	R	I	S				
Gravimetric production of the calibration gas	S	I	R		S	S	
Assurance of the calibration gras	S	I	R		S	S	
Filling the gas bottles with the base gas and ist addition	R	I	S	S	S	S	S
Analysis	S	I	R	S	S	S	S
Calibration gas certificate	S	I	R				
Shipping to the customers	R	I	S	S	S	S	S
Processing of complaints	R	I	S				
Delegated person for the dangerous goods (Trainings)	R	I	S				
Supplier support	R	I	S				

4.3.4 Qualification Matrix

To create an **overview of the qualifications** necessary for the working positions in the gas calibration process, the internal audit team created the **qualification matrix**, describing the **qualifications and the development** of the worker's **training**. This was also crucial for the auditor's evaluation. According to the independent auditor, it was seen as one of the most examined features of the QMS[6].

[5] In order to follow the personal data protection, the names of the workers are not written in this table. For internal purposes, they were replaced by the capital letters of the names.
[6] In order to follow the personal data protection, this qualification matrix will not be presented in the thesis.

4.3.5 Statistics

The department gets **customer's satisfaction feedback** every year from a created questionnaire. It examines the following features:

- quality of the calibration gas,
- reaction time in case of a problem,
- technical supervision.

All interviewed customers evaluated the named features in **100% as satisfactory** and stated **no complaints**.

To create an **overview about** the **produced gas delivered to the customers**, a **statistic table** was established. The **data** were **acquired** from the **computer database**, which involves information about the gas in production, already produced gas and about the gas delivered to the customers. The database involves data about the concentration of the gas, number of bottles and other features of the calibration gas.

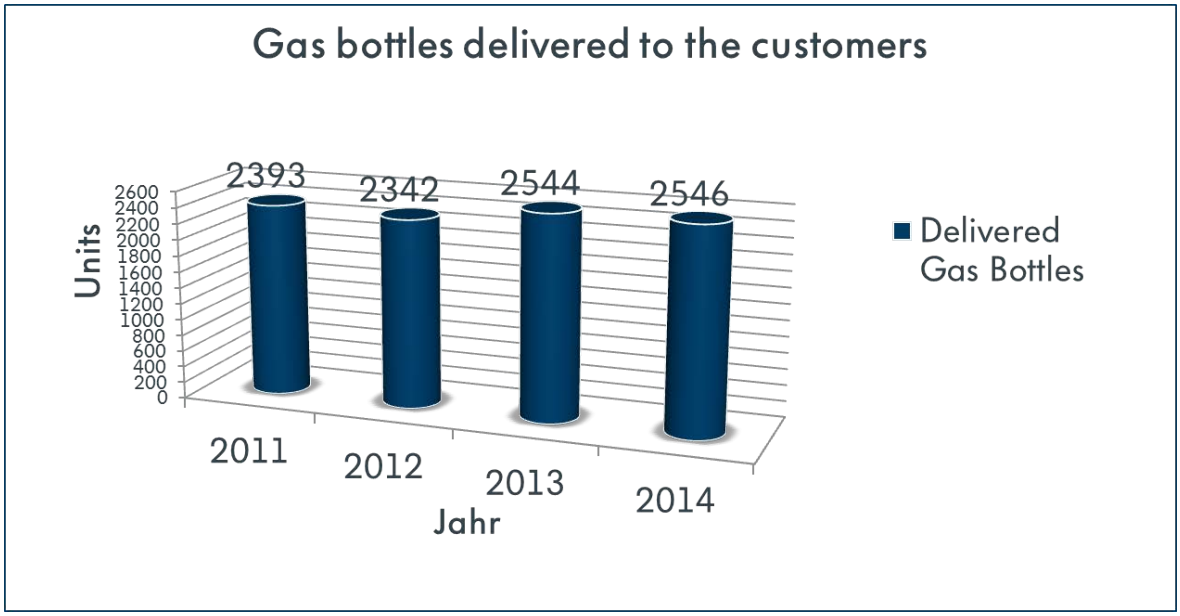


Figure 14 Graph of the Gas Bottles Delivered to the Customers

4.3.6 Capacity Planner

To plan the production and the **production capacity**, the gas calibration team and the author of the thesis created a **capacity planner**, which states **approximate time needed for a production and analysis of different calibration gas mixtures**. It serves as a tool to compute if is the order from the customer feasible and how fast can it be delivered (see Annex nr. 5 Capacity planner).

4.3.7 Risk Matrix

The calibration gas production must be performed under **strict conditions**. It could be **beneficial** for the **security planning** but also for the **strategic planning** to create a **risk matrix** which will **describe** the **possible threats** and **their intensity** of the internal and external environment. It **may include following threats**: lack of trained personnel, not enough capacity, customer's decrease, decrease of orders, change of the law conditions, revocation of the fill approval, decrease of using Otto or Diesel engines and others.

4.3.8 Forecast

The department produces the calibration gas in advance. Due to that, it would be **convenient** to use the statistics from the last years to **compute the probability** of the **order of the particular calibration gas**, thus **create a forecast**. It could cut the waiting time of the customers and the storage costs.

4.4 Possible Implementation to other Department Processes

The **creation of documentation** is often **seen as negative**, but it should be stated clear, **why the company needs** the documentation. In order to **keep the valuable know-how** in the organization, it is necessary to **keep the records**. It shall be **explained within the department**, why is it important. Then it is necessary to state, which information is relevant for the documentation. Furthermore, there shall be **an independent observer**, who would take a look at the process and state **the key steps of the process**, which can be further described by the **specialist** involved in the process. The documentation doesn't have to be detailed, even a **brief** one means a plus for the department. The author **recommends** to the department to **create** for example "**act sheets**" for its employees. They should brief describe (if it does not exist yet) what are their **key**

competences and who are their **contact persons**. The subsidiary managers shall create an **overview of the activities,** including the **cooperating departments/persons**. Furthermore, the **process standards and work instructions** shall be revised according to the **current praxis** and if they do not exist yet, created as soon as possible. All the **tools** described in the thesis, especially the responsibility matrix could be then **easily created** and serve as a tool for the department as well as for the whole concern and it would help to **faster the communication within the department and with its partners**.

Conclusion

The goal of the thesis was to characterize the quality management system requirements at the ABC company, considering the inetrnational system standards. That means, it analyzed the realization and results of the recertification process of the management system in the department EASZ. It lead to the recommendations for the QMS improvement with regard to the final report of the certification auditor.

The theoretical part itroduced the quality management systems and standards, the ISO 9001 historical background and the whole ISO 9000 family group of standards, especially then the ISO 9001 implementation. It described the certification process and mentioned a few current methods used for the ISO 9000 implementation. In the practical part it is desribed, how the company ABC implemented the QMS, which is followed by the analysis of the implementation and results of the part of the recertification audit, held in the department EASZ. In the end of the practical part, the author sugessts improvement potentials as well as their possible implementation to other department processes.

Functioning quality management system is a prerequisite of every car manufacturer for the receipt of the type-approval for the manufacturing and selling the products on the automobile market. Certificate confirming the ISO 9001 implementation is one of the possible ways how to prove, that the company's QMS functions. In order to succesfully achieve the certification, the author suggested to revise the process standard and related working instructions and manager folders considering the current trends and legal conditions, which are very strict in the gas production. To define the responsibilities and qualifications of the employess, RSI and qualification matrix have been created. Before, it was hard to find the responsibilities in the working instructions. Statistics about the customer's satisfaction were created. To plan the production capacity efficiently, the capacity planner was established. The author further reccommends the creation of the risk matrix to avoid the possible risks ahead, and a market forecast to plan the production more efficient.

This bachelor thesis had a significant contribution to the extension of the author's quality management awareness and was seen as a crucial experience in the field of the project management, thanks to the independent project coordination by the author. The author comes to the conclusion, that the level of the QMS implementation in the department EASZ is of a high quality, however it should not be forgotten, that the QMS requires its continual improvement. The evaluation by the certification body of the whole company ended up positive. The problem can be seen in the separation of the particular processes from each other during the recertification. That means, that even if the individual processes of different departments operate according to the ISO 9001, it does not have to necessarly mean, the whole company operates the same way. Therefore it should not be forgotten to see the QMS of an organization as a huge group of subsystems, which need to function at the same time to avoid the colapse of the QMS.

References

20 Jahre „ISO-Zertifizierung bei “: TÜV Nord vergibt erneut Zertifikat für bewährtes Qualitätsmanagement-System [online]. [cit. 2015-07-09]. Available from:

BRÜGGEMAN, H. -- BREMER, P. *Grundlagen Qualitätsmanagement, Von den Werkzeugen über Methoden zum TQM.* Wiesbaden: Springer Vieweg, 2015. 275 p. ISBN 978-3-658-09220-7.

BRUGGER-GEBHARDT, S. *Die DIN EN ISO 9001 verstehen.* Wiesbaden: Gabler Verlag, 2014. 142 p. ISBN 978-3-658-06337-5.

BUGDOL, M. -- JEDYNAK, P. *Integrated Management Systems.* Switzerland: Springer International Publishing, 2015. 194 p. ISBN 978-3-319-10027-2.

HINSCH, Martin. *Die neue ISO 9001:2015 - Status, Neuerungen und Perspektiven*. Springer-Verlag, 2014, 154 p. ISBN 9783662450291.

ISO 19011:2011. *Guidelines for auditing management systems*. 2nd edition. International Organization for Standardization, 2011. Available also from: https://www.iso.org/obp/ui/#iso:std:iso:19011:ed-2:v1:en

ISO 9000:2005. *Quality management systems: Fundamentals and vocabulary*. 3rd edition. International Organization for Standardization, 2005. Available also from: https://www.iso.org/obp/ui/#iso:std:iso:9000:ed-3:v1:en

ISO 9001:2008. *Quality management systems: Requirements*. 4th edition. Internation Organization for Standardization, 2008. Available also from: https://www.iso.org/obp/ui/#iso:std:iso:9001:ed-4:v2:en

ISO 9004:2009. *Managing for the sustained success of an organization: A quality management approach*. 3rd edition. International Organization for Standardization, 2009. Available also from: https://www.iso.org/obp/ui/#iso:std:iso:9004:ed-3:v1:en

ISO/IEC 17021-1:2015. *Conformity assessment: Requirements for bodies providing audit and certification of management systems*. 2nd edition. International Organization for Standardization. Available also from: https://www.iso.org/obp/ui/#iso:std:iso-iec:17021:-1:ed-1:v1:en

ISO/TS 16949. *Systémy managementu kvality: Zvláštní požadavky na používání ISO 9001:2008.* 3rd edition. Prague: Česká společnost pro jakost, 2009. 128 p. ISBN 978-80-02-2176-6.

KARAVUL, Berekat. Projektmanagementhandbuch, *VMI-Matrix* [online]. [cit. 2015-07-09]. Available from: http://www.projektmanagementhandbuch.de/projektplanung/vmi-matrix/

MASAAKI, I. *Gemba Kaizen.* Bno: Computer Press, 2005. ISBN 80-251-0850-3.

O'REGAN, G. *Introduction to Software Quality, Undergraduate Topics in Computer Science.* Switzerland: Springer International Publishing, 2014. 354 p. ISBN 978-3-319-06105-4.

PHILLIPS, A. ISO 9001:2008 internal audits made easy: tools, techniques, and step-by-step guidelines for successful internal audits. Milwaukee, Wisconsin: ASQ Quality Press, 2009. 176 p. ISBN 978-0-87389-751-8.

VÁCHAL, Jan a Marek VOCHOZKA. *Podnikové řízení*. Praha: Grada Publishing a.s., 2013, 688 s. ISBN 9788024786827.

The Group [online]. [cit. 2015-07-09]. Available from:

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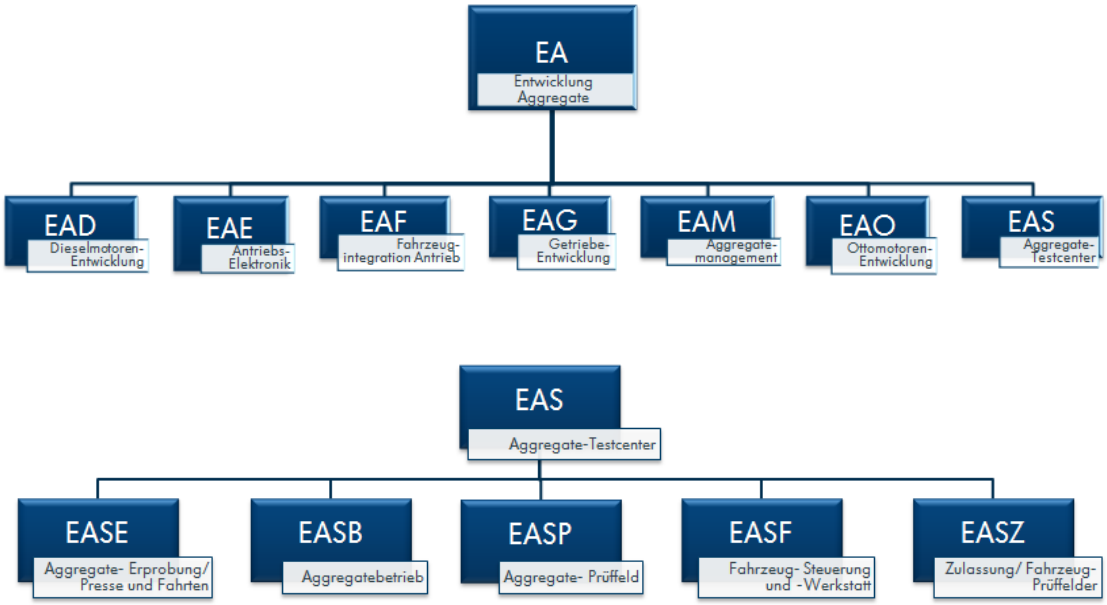
Annex nr. 1 Structure of the EA and EAS



Source: Internal Documentation

Annex nr. 2 Audit Plan

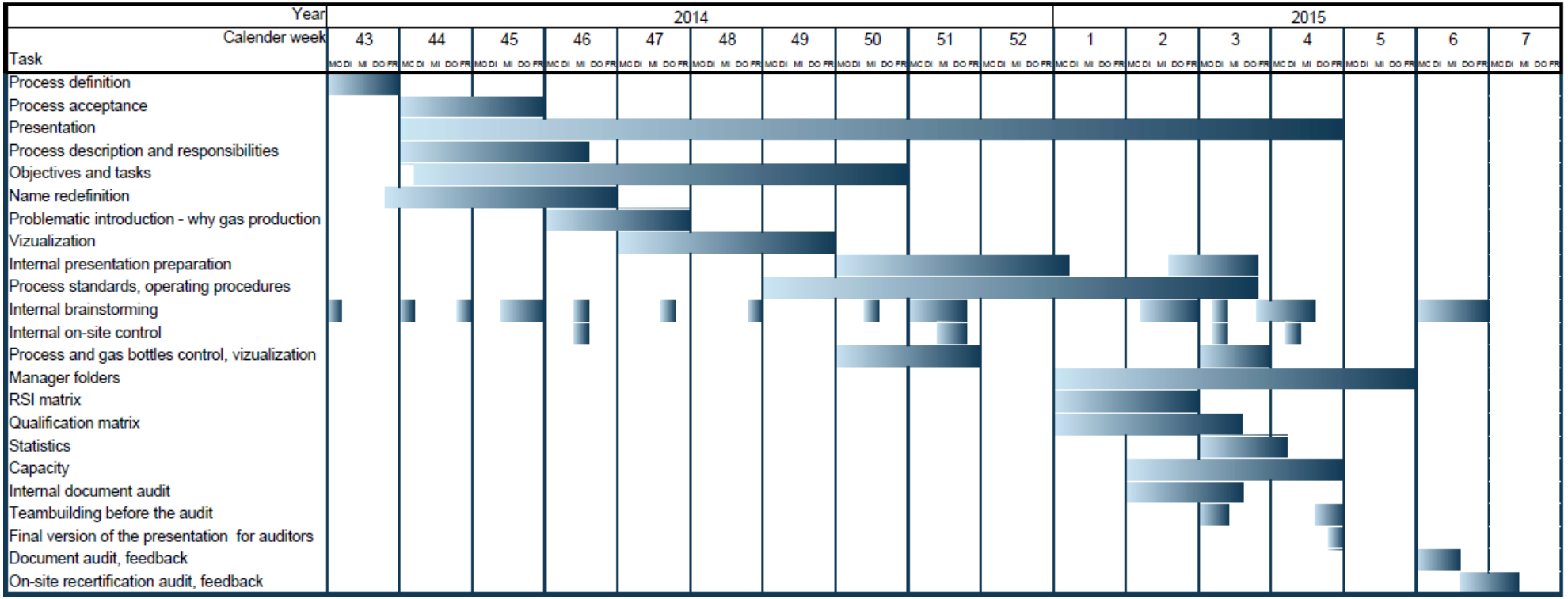
Audit 2015 – EAS Aggregate-Testcenter

Time			Activity	Content	Involved
2014	Oct	CW 43	First preliminary talk	Introduction of the audit team and general information about the audit	EAS, ADQM, TDQM
		CW 44	EAS internal preparation	1. Arrangement of the extent 2. Nomination of the collaborators participating on the audit	EASZ
	Nov	CW 45	Second preliminary talk	Definition of the extent and topic nomination	EASZ>ADQM>TDQM
		CW 46	Topic report to the auditor		TDQM>CQM>Auditor
		CW 47			
		CW 48			
		CW 49			
	Dec	CW 50	Third preliminary talk	1. Status preparation audit 2. Statement of the auditor to the topic 3. Topics for the document audit	EASZ, TDQM, ADQM
		CW 51			
		CW 52			
		CW 53			
2015	Jan	CW 01			
		CW 02	Fourth preliminary talk	1. Status preparation audit 2. Discussions about the document audit files	EASZ, TDQM, ADQM
		CW 03			
		CW 04			
	Feb	CW 05	Document audit at quality assurance	1. Introduction of the department, topic, processes and interface 2. Range recommendation from auditor	Auditor, CQM, EASZ, TDQM, ADQM
		CW 06			
		CW 07			
		CW 08			
		CW 09	On-site audit	Audit report and action plan	Auditor, EASZ, ADQM, TDQM

Source: Internal Documentation[7]

[7] unofficial names of the departments: ADQM – Aggregate Development Quality Management Department; TDQM – Technical Development Quality Management Department; CQM – Concern Quality Management Department

Annex nr. 3 Gannt Diagram



Annex nr. 4 ISO Certificate

TÜV NORD

CERTIFICATE

Management system as per
DIN EN ISO 9001 : 2008

In accordance with TÜV NORD CERT procedures, it is hereby certified that

with the sites according to the annex

applies a management system in line with the above standard for the following scope

Development, Manufacture and Sale of Motor Vehicles and Sale of Genuine Parts of the

Certificate Registration No.
Audit Report No.

Valid from 2015-04-01
Valid until 2018-03-31
Initial certification 1995-03-16

Certification Body
at TÜV NORD CERT GmbH

Essen, 2015-03-20

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.com

IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

DAkkS Deutsche Akkreditierungsstelle D-ZM-12007-01-01

Source: Internal Documentation

Annex nr. 5 Capacity planner

Hilfsrechner für die Kapazität-Planung**(sieh Hinweis)

Beimengung	Meßbereiche (Mb.)	Zeit notwendig für die Tätigkeit (Angabe in Stunden)								
(Component)	(Range) Prüfgaskonzent. 90 % - 95 % v. Mb.	Befüllung	Min. Wartezeit bevor Analyse	1. Analyse	Min. Wartezeit bevor 2.Analyse	2. Analyse	3. Analyse	Insgesamt	Zwischenrechnung	*(Arbeitstag = 6,85h) Arbeitstage notwendig*
A	9,0-9,5 ppm	5	72	4	0	0	0	81	11,9118	12
	27,0-28,5 ppm	5	72	4	0	0	0	81	11,9118	12
	90,0-95,0 ppm	5	72	4	0	0	0	81	11,9118	12
B	2,70-2,85 ppm	5	72	4	0	0	0	81	11,9118	12
	9,0-9,5 ppm	5	72	4	0	0	0	81	11,9118	12
C	18,0-19,0 ppm	5	72	4	0	0	0	81	11,9118	12
	27,0-28,5 ppm	5	72	4	0	0	0	81	11,9118	12
	90,0-95,0 ppm	5	72	4	0	0	0	81	11,9118	12
	270,0-285,0 ppm	5	72	4	0	0	0	81	11,9118	12
	900,0-950,0 ppm	5	72	4	0	0	0	81	11,9118	12
	2700-2850 ppm	5	72	4	0	0	0	81	11,9118	12
	4500-4750 ppm	5	72	4	0	0	0	81	11,9118	12
D	18,0-19,0 ppm*	4	72	4	168	4	0	252	37,0588	38
	45,0-47,5 ppm*	4	72	4	168	4	0	252	37,0588	38
	90,0-95,0 ppm*	4	72	4	168	4	0	252	37,0588	38
	225,0-237,5 ppm*	4	72	4	168	4	0	252	37,0588	38
	450,0-475,0 ppm*	4	72	4	168	4	0	252	37,0588	38
	900,0-950,0 ppm	4	72	4	0	0	0	80	11,7647	12
	2250-2375 ppm	4	72	4	0	0	0	80	11,7647	12
	2700-2850 ppm	4	72	4	0	0	0	80	11,7647	12
	4500-4750 ppm	4	72	4	0	0	0	80	11,7647	12
	9000-9500 ppm	4	72	4	0	0	0	80	11,7647	12
	2,70-2,85%	4	72	4	0	0	0	80	11,7647	12
	9,0-9,5%	4	72	4	0	0	0	80	11,7647	12
E	0,450-0,475 %*	4	72	4	168	4	0	252	37,0588	38
	0,90-0,95 %*	4	72	4	168	4	0	252	37,0588	38
	1,80-1,90%*	4	72	4	168	4	0	252	37,0588	38
	2,70-2,85 %*	4	72	4	168	4	0	252	37,0588	38
	9,0-9,5%	4	72	4	0	0	0	80	11,7647	12
	14,4-15,2%	4	72	4	0	0	0	80	11,7647	12
F	9,0-9,5 ppm*	4	72	6	168	6	0	256	37,6471	38
	18,0-19,0 ppm*	4	72	6	168	6	0	256	37,6471	38
	22,5-23,75 ppm*	4	72	6	168	6	0	256	37,6471	38
	90,0-95,0 ppm*	4	72	6	168	6	0	256	37,6471	38
	225,0-237,5 ppm*	4	72	6	168	6	0	256	37,6471	38
	900,0-950,0 ppm	4	72	6	0	0	0	82	12,0588	13
	2250-2375 ppm	4	72	6	0	0	0	82	12,0588	13
	4500.4750 ppm	4	72	6	0	0	0	82	12,0588	13
G/H/I	14,4-15,2%	6	72	4	0	4	4	90	13,2353	14
	2,70-2,85%							0	0	0
	1,80-1,90%							0	0	0
J/K/L	7,20-7,60 %	6	72	4	0	4	4	90	13,2353	14
	4500-4750 ppm							0	0	0
	9,0-9,5%							0	0	0

**** Hinweis**

Befüllung - 12 Flaschen zusammen in einem Gestell

Wartezeiten nach Befüllung mindestens 3 Tage bis zur 1. Analyse, bei Mehrfachanalysen nochmals mind. 1 Woche bis zur 2. Analyse

3-Komponenten Gas- Analyse nach mindestens 3 Tage Wartezeit, die einzelnen Komponenten können dann direkt hintereinander analysiert werden
Die Zeiten sind als **mindest Wartezeiten** zu sehen und verschieben sich nach Bedarf und Kapazität.

ANOTAČNÍ ZÁZNAM

AUTOR	**Tereza Procházková**		
STUDIJNÍ OBOR	**6208R087 Podniková ekonomika a management obchodu**		
NÁZEV PRÁCE	**Management system according to the international standards in automotive industry**		
VEDOUCÍ PRÁCE	Martin Folta, Ph.D., EUR ING		
KATEDRA	**KLRK - Katedra logistiky a řízení kvality**	**ROK ODEVZDÁNÍ**	**2015**

POČET STRAN	**58**
POČET OBRÁZKŮ	**14**
POČET TABULEK	**9**
POČET PŘÍLOH	**5**

STRUČNÝ POPIS	**Práce se zaměřuje na problematiku řízení kvality a souvisejících požadavků dle mezinárodních standardů. Popisuje process recertifikace ve firmě ABC v oddělení EASZ dle požadavků normy ISO 9001, který dále analyzuje a popisuje několik návrhů na zlepšení a jejich případnou implementaci v ostatních procesech oddělení s ohledem na závěrečnou zprávu nezávislého auditora, na základě jehož evaluace byl firmě prodloužen příslušný certifikát. Autor srovnával příslušnou dokumentaci s národními a mezinárodními normami a konzultoval se specialisty uvedeného procesu. Na základě toho byly vytvořeny návrhy na zlepšení, z nichž některé byly úspěšně implementovány. Obecně byla úroveň systému řízení hodnocena velice kladně. Autor ale upozorňuje na nutnost neustálého obnovování, kontrolování a zlepšování.**
KLÍČOVÁ SLOVA	Quality Management Recertifikační audit ISO 9001 Potenciál zlepšení Výroba testovacích plynů

PRÁCE OBSAHUJE UTAJENÉ ČÁSTI: Ano

ANNOTATION

AUTHOR	**Tereza Procházková**		
FIELD	**6208R087 Business Management and Sales**		
THESIS TITLE	**Management system according to the international standards in automotive industry**		
SUPERVISOR	Martin Folta, Ph.D., EUR ING		
DEPARTMENT	**KLRK - Department of Logistics and Quality Management**	**YEAR**	**2015**

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SUMMARY	**This work focuses on the quality management problem and related requirements according to the international standards. It describes the recertification process at the ABC company in the department EASZ in accordance with the norm ISO 9001, which further analyses and describes a few improvement potentials and their possible implementation in other department processes with regard to the final report of an independent auditor, who extended the certificate's validity. The author compared relevant documentation with the national and international norms and discussed it with the process specialists. Based on that, the improvement potentials were created, some of them successfully implemented. Generally speaking, the level of the management system got a good evaluation. However, the author points out, that the continuous update, control and improvement are necessary.**
KEY WORDS	Quality Management Recertification audit ISO 9001 Improvement Potential Gas Calibration Process

THESIS INCLUDES UNDISCLOSED PARTS: Yes