Quality Management System according to ISO 9001 in SME

Analysis and Implementation of the ISO 9001 Standard in Small and Medium Enterprises

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submitted by

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Abstract

The ISO 9001 has become the worldwide standard for quality systems. The standard has been developed to regulate production and organisational processes in all types of companies, all over the world. Still, studies have different outcomes when talking about the implementation of the standard in big, medium or small businesses. Big enterprises have much better possibilities concerning budget, experts and knowledge. The aim of this thesis is to illustrate a successful implementation of the ISO 9001 quality standard in a small business.

After a theoretical introduction to the quality system, its methods and techniques, this thesis focuses on a case study that examines the implementation of such a system in a small enterprise, *Fauri Mauro & C. S.a.s./K.G.*. All implemented tools and documents are described in detail and analysed for their effectiveness and potential.

The conclusion highlights the benefits and remaining concerns regarding the system, along with the difficulties which were encountered during the yearlong process of implementation.

The gained conclusion is that the success of the ISO 9001 implementation strongly depends on who is working with the system. The commitment of all members of the company is crucial for the success of the operation, regardless of the size of the company. The presented company has now been certified for eight months and the future will show how well the system was incorporated and which modifications will still be necessary. In conclusion, ideas for the near and more remote future of the company are summarised.

Kurzfassung

Die ISO 9001 Norm ist zum weltweiten Standard für Qualitätssysteme geworden. Sie wurde entwickelt, um alle Produktions- und Organisationsprozesse in Betrieben aller Art zu standardisieren. Verschiedene Analysen kommen jedoch zu unterschiedlichen Ergebnissen wenn es um die Implementation der Norm in kleinen, mittleren oder großen Unternehmen geht. Große Unternehmen haben, zum Beispiel, geringere finanzielle Bedenken und eine größere Möglichkeit auf speziell ausgebildetere Experten mit detailliertem Wissen. Ziel dieser Abschlussarbeit ist die Durchführung und Dokumentation einer erfolgreichen Implementierung des ISO 9001 Qualitätsystems in einem kleinen, handwerklichen Betrieb.

Nach einer kurzen Einführung in das Qualitätsystem, seine Methoden und Verfahren, beschäftigt sich diese Masterarbeit hauptsächlich mit einem Fallbeispiel in dem Kleinunternehmen *Fauri Mauro & C. s.a.s./K.G.*. Alle implementierten Dokumente werden dabei vorgestellt, erklärt und dessen Effektivität und Potential diskutiert.

Das Ende der Arbeit hebt den erreichten Nutzen und eventuelle noch zu klärende Punkte hervor und beschäftigt sich außerdem mit den Schwierigkeiten die während dem einjährigen Implementierungsprozess aufgetreten sind.

Der erste Eindruck ist, dass der Erfolg eines solchen Systems sehr stark von den Personen abhängt, die mit ihm arbeiten. Das Engagement und der Einsatz jedes Einzelnen ist ausschlaggebend für das Gelingen der Implementierung, unabhängig von der Größe des Unternehmens. Der Betrieb ist nun seit acht Monaten zertifiziert. Die Zukunft wird zeigen wie gut das System implementiert worden ist und welche weiteren Verbesserungen notwendig sind. Abschließend wurden Ideen für die nahe, und etwas fernere Zukunft, die während der Implementierung aufgekommen sind, aufgezählt und kurz beschrieben.

Acknowledgements

This master thesis is more than just another paper for me. It marks an end, but at the same time, a new beginning in my life. After more than 20 years of studies, I will start a new chapter in my life and work at my families business, being the third generation to run the company. This master thesis helped me to have a smooth transition from studies to worklife, as it represents the first major project I took over for the company.

Thanks to my chosen master programme, my first big project at the company coincides with my master thesis. This allowed me to get deeper insight into the subject, understand the details of the standard and acquire as much knowledge on the matter as possible. I am grateful to the Institute of General Management and Organization and the Graz University of Technology which have supported me during this unique opportunity. Particularly, I want to express my gratefulness to Univ.-Prof. Dr.-techn. Stefan Vorbach and Dipl.-Ing. Wolfgang A. Marko for their support throughout the composition of this thesis.

Beside the support I received from the University and its members, I have to be eternally grateful to my parents, Lorene and Mauro, who gave me the possibility to develop myself to what I am today, always free to express myself in any way. These expressions were also deeply influenced by my brother, Ivan, who first challanged me to take interest in an ever changing world, understanding and always questioning it, rather then just being a temporary part of it. The discussions I have with you, about us and the universe, I could perpetuate forever - thank you for that! A special thought also goes to my grandfather, Bruno, who founded the company over 50 years ago and, sadly, passed away shorty before his grandson pursues what he has begun.

Everyone who I have not specifically mentioned, my aunts and uncles, my cousines and friends, my grandmothers and my new gained family, as well as my pets, thank you, from the deepest of my heart, for making my surroundings so perfect. The activities we do toghether, the atmosphere I feel when I am with you and the love we share for each other make me want no more from life. Thanks to you, I have more than I need. A special thought goes to my friend Manuel Puce. I spent one of the most intense periods of my life with you. I leared a lot from you and still enjoy every moment with you, even from far, far away! Cheers, mate!

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Contents

Chapter 1

Introduction

In the last decades, more and more companies reached out to the international quality standard known as ISO 9001. Even though there are three subcategories to the standard, ISO 9000 which explains the concepts and terminology of the norm, ISO 9001 which defines the requirements of a quality management system and ISO 9004 which focuses on giving guidelines to improve the quality system's effectiveness and efficiency, the standard is known to the public simply as ISO 9001. When implementing the system, however, an ideal cooperation between all those standards has to be found.

A high-quality product has always been important to persist in the market. Until the ISO 9001 standard, there has not been a unified concept of how to assure that, . That is why the standard has had such an important impact on the market, regardless of the field and, as this paper will show, the size of the business.

The ISO 9001 standard was first published in 1987. In the meantime, after some major and minor changes in the editions of 1994 and 2000, the 2008 version is the current document. The standardised quality system is designed to help companies improve their understanding of the core- and surrounding processes of the business, thus increasing the quality of the product and/or service they are offering. Beside the direct effects, like the increase of the customer satisfaction, it also can have some indirect effects such as the minimization of costs, the reduction of waste products, the increment of the overall efficiency as well as some other internal and external benefits.

Since the standard is not a straight forward way to achieve all of these benefits, but instead acts as a guideline that points at the right direction, a few questions arise when trying to implement it. Are there different approaches when implementing the standard into big companies with thousands of employees, rather than into small companies? Is the implementation a positive boost for all kinds of companies or is there any difference between big and small companies, businesses that deliver products or services, private corporations or public offices? Many studies have been carried out regarding these questions and all suggest that if the standard is implemented correctly, with full commitment from top management to the floor level employee, all the benefits should be perceptible, regardless of the field and

size of the business.

Most of the studies, such as the one carried out by Nadia Bhuiyan and Nadeem Alam, mostly consider big and medium companies.[Bhuiyan and Alam, 2005] But what about small and micro-enterprises? Does something change having a limited amount of capital and employees or is the approach always the same? The goal of this thesis is to answer these questions by studying the implications of such an implementation at *Fauri Mauro & C. s.a.s./K.G.*. This small artisan company is a micro-enterprise, as it has fewer than 10 employees and an annual turnover and/or annual balance sheet total below 2 million Euro. [Europa.eu, 2007] The implementation process is analysed and studied in all its necessary modules, support documents and work instructions.

Before introducing the case study, this thesis gives a quick insight of the ISO 9001 standard and the difference between big, medium and small companies in the following chapters. The eigth main sections of the standard, as well as the necessary requirements for a successful audit, are explained in detail in the theoretical framework in chapter 2, while the differences in application, resources and capacities, depending on the size of the company, are shown in chapter 3.

When trying to understand and implement the quality system, I mostly relied on the following two books: *ISO9001:2008 - For small businesses* [Tricker, 2010] and *Projekt DIN EN ISO9001:2008 - Vorgehensmodell zur Implementierung eines Qualitätsmanagementsystems* [Pfitzinger, 2009]. Looking back I think these books helped me to avoid at least some of the common problems as I will illustrate chapter by chapter.

Chapter 2

ISO 9001 - Theoretical Framework

2.0 Introduction

The first chapter in the ISO 9001:2008 norm is divided into four sections which give a first overview of the standard. They do not provide any requirements for a quality management system but give general information about the purpose, the approach and the harmonisation with other standards. [Art Lewis, 2010f]

2.0.1 General

The first section gives an overview of what the standard is about, what it expects and when it can be applied. It is made clear that the ISO 9001 quality management system is not a straightforward recipe for every company but its design and implementation are rather organisation specific, depending on their field of operation, product/service and size.

Finally, it is implied how nowadays the standard is *"used by internal and external parties, including certification bodies, to assess an organisation's ability to meet customer, regulatory and the organisation's own requirements."* Art Lewis [2010a]

2.0.2 Process Approach

The quality standard promotes a process approach when developing, implementing and improving the effectiveness of a quality management system [Art Lewis, 2010b]. A process is defined as an activity using resources and managed in order to enable the transformation of inputs into outputs process, illustrated in figure 2.1. [ISO 9001-3, p. V]

It is also pointed out that the norm does not have any specific product or service requirements but rather focuses on the processes of the company. This is one reason that allows the standard to be applied in every field of production or service. By controlling and continually improving the companies' processes, this will necessarily have a positive effect on the product quality and eventually on the customer satisfaction.

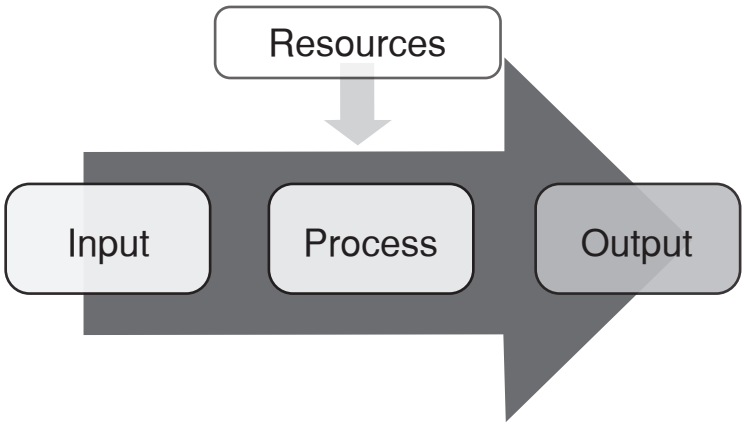

Figure 2.1: Input/Output Process [Art Lewis, 2010b]

A final suggestion is made regarding an approach that can be taken in all the following chapters, the so called PDCA-Cycle, represented in figure 2.2: [Al-Rawahi and Bashir, 2011, p. 3]

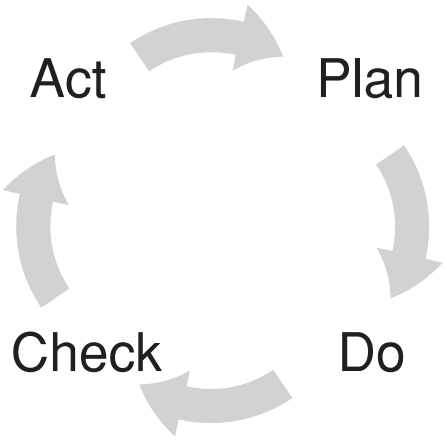

Figure 2.2: PDCA-Cycle [Tricker, 2010, p.76]

- *Plan:* Establish objectives and develop and document each process accordingly
- *Do:* Implement the documented process
- *Check:* Monitor the implemented process
- *Act:* Improve the process according to the monitoring outcome

Such an approach should be applied to all processes within the company, directly or indirectly connected to the product or service. It encourages all the members of the business to pursue continuous improvement in every part of the company as well as to improve their own skills and understanding of the system. The PDCA-cycle is explained in more detail in the glossary in appendix E 'Glossary' .

2.0.3 Relationship with ISO 9004[1]

The quality management system is not just based on one paper but rather an interaction between various documents. Therefore, the standards *ISO 9001:2008 - Quality management systems - Requirements* and *ISO 9004:2009 - Managing for the sustained success of an organization - A quality management approach* are structured in the same way to facilitate the interaction between each other. While the first one specifies the requirements needed to implement a quality management system, the second one gives more detailed guidance to continuously improve the system. It is thought as an addition to go beyond the requirements of ISO 9001.

2.0.4 Compatibility with Other Management Systems

The last section of this introductional chapter mentions that, although ISO 9001 does not include requirements for other standards such as the *ISO 14001 - Environmental Management Systems* or the ISO 18001 - Occupational Health and Safety Management, amongst others, many parts of the standards have a similar alignment in their structure and documents. [ISO 14001-3. International Organization for Standardization, 2009], [ISO 18001-3. International Organization for Standardization, 2009]

2.1 Scope

In the two paragraphs within this chapter the general objectives of the norm are described as well as the applicability to different working systems and the possibility to omit some of the content entirely are given. [Art Lewis, 2010c]

2.1.1 General

It is stated, that an organisation needs to be able to demonstrate its capability to consistently deliver the product required by the customer and, at the same time, consistently try to increase customer satisfaction by applying, and continuously improving, the quality management system.

2.1.2 Application

This section declares that the standard can be applied to all organisations regardless of their size, type and product/service they provide. It additionally mentions how some of the parts of chapter 7 - Product realisation, can be omitted as long as they do not affect the integrity of the quality management system. If, for instance, an organisation does not plan to design its products, then section *7.3 - Product Design and Development* can be skipped. If this is the case, this fact has to be noted in the quality manual.

[1] All referenced standards and guidelines can be obtained from Appendix 'Bibliography'.

2.2 Normative References

The third chapter of the standard describes if there are other norms connected to the ISO 9001 standard and if so, which ones (i.e. *ISO 9000:2005: Quality Management Systems - Fundamentals and Vocabulary*). [Art Lewis, 2010d]

2.3 Terms and Definitions

Some terms that are used throughout the standard, in addition to the ones explained within ISO 9000:2005 are explained and defined in this chapter. For example this can be the case if the company wants to simplify its descriptive work and intend *product* as both a material product and service. [Tricker, 2010, p. 109]

In addition, the three main concepts in the production chain need to be further explained [Tricker, 2010, p.51]:

- The supplier may be either external, or internal to the organisation (for example the previous production step)
- The organisation in the supply chain can be understood as a group of people and facilities with an orderly arrangement of responsibilities, authorities and relationships
- The customer is the recipient of the product or service. This can be the ultimate consumer or simply the next unit in the production process

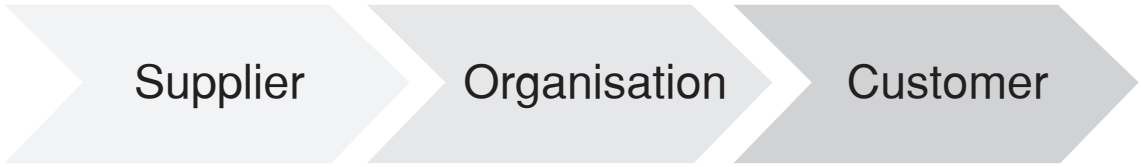

Figure 2.3: Supply chain [Tricker, 2010, p.109]

2.4 Quality Management System

The section which describes the concept and the approach of the quality management system is basically divided up into two main chapters:

- General Requirements
- Documentation Requirements

Both sections describe what kind of quality management system the company uses to ensure the customer gets exactly what he asked for in terms of quality, quantity, costs and times. The documents required in the system help to make sure every step, from the supply of

material to the final delivery, is documented and regularly analysed to continually improve the efficiency and effectivity of the company. Their extent is dependent on the size and type of organisation, the complexity and interaction of the process and on the competency of the personnel. [Tricker, 2010, pp.110-116]

2.4.1 General Requirements

To achieve the parameters set by the ISO 9001:2008 standard and, more importantly, to achieve the companies own quality policy (specified in section 5.3) and the customer requirements, the company must thoroughly document and analyse all the processes and their interaction between one another. This has to be done for all processes, directly or indirectly involved in the realisation of the product. In addition to the correct realisation of the desired product, a company must focus on achieving the goals of transparent procedures and clear, rational processes, to continually improve the product they offer.

This can be perceived in a matter of quality, costs or delivery times.

2.4.2 Documentation Requirements

General

To be effective, a quality management system has to be established throughout the whole company, understood and applied correctly by everyone. This is critical, because if the documentation or work instruction of a process acts more as an obstacle than it is help for the employees, they will not accept it or even work against it. The documents have to be clear, well-structured and easily understandable. Therefore it might be helpful to confront with some of the more experienced employees about their necessities and carefully listen to their thoughts before implementing new documents. Specifically, the quality management system has to include:

- *Quality Policy* - Describing the companies' quality policy and objectives
- *Quality Manual* - Which describes the companies policy and objectives
- *Documented Procedures and Instructions* - Which describe all the processes running in the company
- *Quality Records* - Which serve as analysis and verification of the quality management system

The amount and specificity of the documentation varies from company to company, depending on its size, number of employees and complexity of the processes.

Quality Manual

The quality manual basically embodies everything remotely related to the quality principle in a company. It has to include a general description of the company, as well as the application

field in which it is valid. Furthermore, the manual has to provide the reader with all the information about the procedures and processes within the company, how they are interrelated and what must be done to make them run correctly. If any section of the standard is omitted, this must be noted in the manual.
The quality manual is a dynamic document, which must be reviewed and updated from time to time as its documentation has to stay up to date with the changing company. It has to be reviewed, controlled and validated every time something changes by the hand of the appropriate instances. To avoid overloading it with information and documents, there should be only standard formats of every document in use attached to the manual. The rest of the information can be collected and stored in hardware form (i.e. Folders) or digitally on a computer with an appropriate backup system. Usually the person responsible for the quality manual is the quality manager.

Control of Documents

To guarantee the correct use of up to date documents a specific procedure must be followed. Depending on which kind of document (drawing, contract, support documents, etc.) there must be a set of rules which has to be followed in order to avoid the distribution of wrong and obsolete documents. This regulation is mandatory, but should be revisited from each company by its own, according to their structure and needs. For example, it should be clear to everyone with access to the documents database, which steps a document has to go through until it can be implemented, how it is numbered and stored, what has to be done to successfully remove or substitute a document from all places where it is in use, etc. It is not to forget, that also external documents have to be subject to a periodical control and update.

Control of Quality Records

A record is a special type of document that provides written evidence of results achieved or activity performed (i.e. an inspection record). Keeping record of the quality documents is important, for instance to be able to trace back to the root cause of an error if one has been detected. Depending on the importance of the document and its validity it should be stored, again, either in hardware or digital form for an appropriate amount of time. It is extremely important to have a well-integrated system of storage to retrieve the necessary document quickly and without complications.

2.5 Management Responsibility

To successfully implement ISO 9001:2008, it is crucial for the company, that management sets a good example in dealing with quality. This way, personnel is more likely to be committed to the quality system and to a common goal. This chapter is split down into six sections [Tricker, 2010, pp.117-130]:

- *Management Commitment* - If management does not commit to the system, neither will the employees

- *Customer Focus* - To give the customer exactly what he wants means to understand his needs. The company has to analyse and monitor its clients to provide them with what they ask for; Surveys or questionnaires can be useful to achieve that
- *Quality Policy* - The basic document of the quality system. It describes the goals and believes of the company and should be followed by every member of the company
- *Planning* - A systematic approach to implement the quality policy has to be planned
- *Responsibility, Authority and Communication* - Specific responsibilities and authorities have to be assigned to all members of the company. Everyone should know what he needs and has to do in order to achieve the goals that have been set
- *Management Review* - Continuity is important. The management should make sure to review the results and goals from time to time and identify areas for improvement

2.5.1 Management Commitment

The commitment of employees to ISO 9001:2008, and any other standard, strongly depends on the commitment and conviction of its managers. Management should always try to fully involve its personnel into the norm in order to have an effective quality management system. To achieve that some of the following documents and guidelines could be helpful:

- The top management has to establish a quality manual
- Responsibility and authority has to be written down for every person or instance (depending on the complexity, size, etc.)
- A quality manager has to be nominated if not already existing
- Customer requirements have to be of highest priority
- Make sure everything necessary to perform a process correctly is available at all times
- Improve the communication and information flow between instances and people
- Involve the employees wherever possible and appropriate
- Think for continuous improvement

As Tricker [2010, p. 119] points out in his book, management commitment is especially important in small businesses as the success and failure of many systems typically lies with top management's commitment or lack of enthusiasm.

2.5.2 Customer Focus

Without customers, the company cannot exist. Consequently, the satisfaction of customer needs and requirements is of highest priority for the company. If this goal is achieved, the company set the best conditions to enable a return of the client. A way to identify what the known customer wants can be to start a survey or handle out one or more questionnaires. In any case, it is not only extremely important to know what the customer wants, but also to know the customer himself. Not only management, but also subordinates should have good contacts to their customers, partners, suppliers and even the competitors. New, potential customers, on the other hand, can be attracted by analysing the market, isolate weaknesses

and possibilities, study competitors and look out for new technologies which might give you a technological edge.

2.5.3 Quality Policy

The quality policy sets the basic guidelines regarding the companies' basic principles, the working philosophy, the goals and the main features of the quality management system. It should be formulated by the management and communicated throughout the entire company. The quality policy should be clear and straightforward. It should transmit the belief and necessity of continuous improvement and motivate people to do their best to achieve the set goals and objectives.

2.5.4 Planning

Once the overall strategy has been set by the quality policy, the way of how to achieve these goals and the resources needed have to be planned. It is important to keep in mind that these formulas have to be realistic and reasonable. The employees have to feel their objectives are achievable (not to confound with *easy*) and tangible. They should motivate them to give their best. When talking about planning, it is easier for understanding to divide this section into two separate parts: The quality objectives and the planning of a system to achieve them:

Quality Objectives

The quality objectives are a bit more specific than the overall strategy expressed in the quality policy. They are formulated for every level and function within the organization and should focus on the best way to meet the customer requirements. For management reasons, and to effectively adopt the continuous improvement doctrine, the objectives should be measurable and be reviewed and adjusted whenever necessary. To effectively do that, it is important to keep an eye on the market, both at its current state and at what is predicted for the near and the remote future, as well as to take into consideration the outcome of the previous objective formulation.

Quality Management System Planning

Once the quality objectives have been postulated, the company has to show how they will be achieved. Questions regarding the resources needed, the economic and/or human risks, eventual improvement opportunities and customer requirements need to be answered before starting with the work itself.

2.5.5 Responsibility, Authority and Communication

For a business to be successful, it is important to transmit the motivation a commitment the management has to all companies' sectors and employees. The best way to do that is to involve people in the firms' development and success. Make them feel that their contribution

is important for the success of the company they work in. For a clearer and more detailed explanation, this chapter is divided up into three sectors:

- Responsibility and Authority
- Management Representative
- Internal Communication

Responsibility and Authority

For a smooth workflow on all levels of the company, management needs to assign clear and well-defined responsibilities, functions and authorities of all personnel and communicate them throughout the organisation. These assignments need to be revisited and updated on regular terms to assure that adequate staff, material and equipment are available at all time to meet the customer requirements. By making everyone clear about what his powers and limitations are, conflicts can be prevented and unnecessary, time consuming discussions avoided.

Management Representative

As mentioned in the previous chapter, every person should know what he/she is assigned to. In the same way, every process should be assigned to one or more persons. This applies for the quality system as well. There has to be one person responsible for the implementation and the correct functioning of the quality system. The person with the power and authority to make necessary changes and adjustments is usually nominated by top management and is called the quality manager. His main tasks and responsibilities are:

- Make sure the quality system is running effectively
- Control and analyse the situation via audits with the appropriate people
- Make sure every member of the company has understood and follows the quality instructions set by the quality policy and the quality manual
- Make sure the necessary documentation is filled out correctly and the required quality records saved and analysed properly
- Provide the top management with periodic reports about the situation concerning quality matters within the company, report problems as well as point out potential for improvement
- He is the contact person for third parties for everything concerning the quality management system

Internal Communication

The information flow and communication within the company needs to be as fluent and smooth as the material flow. Every member should be informed about important changes or modifications concerning the company or his department and workplace. This way a lot of errors and problems due to lack of communication such as wrong drawings being used, wrong execution of processes, misunderstandings because of a long information-passing chain (i.e. one person tells another to tell another to tell another ...) can be avoided.

Depending on the matter in discussion, the size of the company, the group size, the complexity of the problems and many other factors which have to be taken into account there are many different methods to prevent any communication problems. A few of them are:

- Team briefings
- A company intern newspaper/magazine
- Visual information wherever necessary
- Audio information brought to the people with speakers
- Audits/Meetings
- Sheet of papers attached to the wall/machine/workplace

2.5.6 Management Review

Quality management is a dynamic system which changes throughout time and needs to be reviewed and updated at least once every year to make sure it always suits the company and its objectives. It is important to keep record of the changes the management agreed upon to be able to trackback eventual errors and analyse its evolution. That is why, since the latest version of the ISO 9001 standard (2008), it is mandatory for the management to regularly have a complete review of the organisations quality management system. Doing that, management has to take into consideration the performance of the products and processes, audits and briefings, customer feedback and all the previous records before deciding which changes come next.
Beside the introducing general subsection, this chapter is spilt into two further subsections to precisely describe and analyse the input which is needed to perform a review and the expected output from each review.

General

At planned intervals, management has to evaluate the suitability, the adequacy and the effectiveness of the quality system as well as to assess eventual opportunities for improvements. Records about every decision taken have to be kept.

Review Input

To make sure that at every review, all fundamental subjects are discussed, and to make the record keeping easier, it is useful to have a checklist about what topics indispensable to talk about. Even though many important topics surely differ from company to company, the input data should include information about:

- Results from previous audits
- Analysis of customer feedback
- Analysis of process performance
- Analysis of product conformance
- Corrective and Preventive Actions
- Supplier performance

Review Output

The outcome of every review should be aimed at improving the actual performance, efficiency and final product the company is offering. On the way to these final goals, other positive effects, or intermediate goals, should be achieved such as an improvement in the customer satisfaction, a diminution of the resources needed and a decrease or the elimination of risk factors.
All reviews have to be documented recorded as they could be important in the future.

2.6 Resource Management

The resource management embraces all kind of resources, how to get them in the right times and costs, manage them and increase their effectiveness and efficiency. The chapter is divided up into the following four sections [Tricker, 2010, pp.131-136]:

- *Provision of Resources* - To achieve customer satisfaction, it is essential, or at least it makes it easier, to have all the necessary amount of qualified human and material Resources available wherever needed in the right time, quantity and quality
- *Human Resources* - All the activities within the company must be performed by adequately educated and skilled personnel which feels comfortable in his/her working environment
- *Infrastructure* - Without an adequate infrastructure, workspace, equipment and supporting services it is not possible to deliver a high quality product or service
- *Work Environment* - The work environment is a combination of human and physical factors such as: Health, Safety, Relationships, etc. They must at least cover the standard requirements and possibly exceed them

2.6.1 Provision of Resource

To improve the performance of the system and meet all customer requirements, management should ensure that all the resources needed are provided in time and at the right place. Resources include all the information, infrastructure, human resources, work environment, natural resources, financial resources and support in the company.

2.6.2 Human Resources

General

The required human resources should be made available to realise the product in the given time. When choosing to hire a new employee, the company must make sure that he/she has the right qualification, motivation and experience for the job he/she has been selected for or provide additional training to bring him/her to the right level. Every process should only be performed by adequately skilled and trained personnel in order to meet customer demands.

Competence, Awareness and Training

Beside the first inaugural training and safety procedures, the company should periodically offer theoretical and/or practical training courses for its employees to make sure they remain interested and motivated in its job and to improve its capabilities throughout time. For a better overview, a so called *Skills Matrix* (explained in appendix E 'Glossary') could be implemented.

2.6.3 Infrastructure

Depending on the size of the company, the complexity of the processes and the product, the organization should provide and maintain an adequate infrastructure. Infrastructure includes [Art Lewis, 2010e]:

- Buildings, workspace and associated utilities
- Process equipment (both hardware and software)
- Supporting services (such as transport or communication)

2.6.4 Work Environment

A good work environment has a positive influence on the employees' motivation and performance. Two factors define a good work environment:

- Human factors: Work and career opportunities, health and safety rules, ergonomics
- Physical factors: Can influence human factors (i.e. vibrations, noise, heat, air flow, pollution, etc.)

All these, and other, factors must be taken into account when planning a new facility, department, workplace or new working methods. The so called *Maslow Pyramid* additionally illustrates which needs are perceived as fundamental by humans and which ones are more likely to motivate, or demotivate, people the most.

2.7 Product Realisation

This chapter is probably the most demanding one in the ISO 9001:2008 standard. It covers various elements surrounding the product realisation such as process control, purchasing, maintain and control measuring devices. The chapter is divided up into the following six sections [Tricker, 2010, pp.136-170]:

- *Planning and Realization* - All processes must be analysed, defined and documented
- *Customer-Related Processes* - Make sure customer and product requirements have been understood correctly and the communication with the customer throughout the realization is maintained
- *Design and Development* - Through the control of inputs, outputs, reviews, validations, etc. the design and development criteria must be ensured at all processes

- *Purchasing* - Having precise and documented procedures helps to identify the best supplier and thus to produce a high quality product
- *Production and Service Provision* - The instructions for the production processes and procedures, the preservations of the product, the identification and traceability of the product or service must be documented and made available to the appropriate employees at all time
- *Control of Monitoring and Measuring Equipment* - All devices used for monitoring and measuring the process or product must be under control and well protected to ensure the delivery of a high quality product

2.7.1 Planning and Realization

The organisation must plan all processes which directly or indirectly contribute to fulfil the customer requirements. This includes everything, from marketing, to production, until the final delivery. All processes should be accurately analysed and planned with the objective to continually improve the company's efficiency and to reduce the room for errors. Documents such as quality plans, process models and work instructions can be helpful to fulfil these requirements and must be documented and recorded appropriately.

2.7.2 Customer-Related Processes

Before signing any contracts, the company shall work out what the customer exactly wants. This is important to avoid future problems and additional costs as well as to make sure the company is capable to deliver the requested quantity of products in the right time and with the right quality. These aspects are explained in more detail in the following three sections:

- Determination of Requirements Related to the Product
- Review of Requirements Related to the Product
- Customer Communication

Determination of Requirements Related to the Product

When making an offer, the company should be sure to have all the information they need to guarantee the total capability to deliver the products as established in the contract. The company must be able to deliver the requested quantity at the established quality, date and price as well to make sure the product respects all legal regulations. To be able to ensure that, the company needs to make sure the following elements are available:

- Enough employees with the demanded skills
- The correct equipment
- An adequate infrastructure
- All necessary tools
- Enough raw material and/or suppliers to get additional one
- Up to date drawings

Review of Requirements Related to the Product

Before signing the final contract, the company should, if possible, review all the clauses and decisions along with the customer (i.e. quality, delivery, service, etc.) and make sure that both parties are on the same page in the matters of requirements and documentation.

Customer Communication

The company should regularly inform the customer about the current state of its product. By keeping an open communication, the company has the possibility to learn from the customer's feedback or complaints and to constantly improve the production and support processes.

2.7.3 Design and Development

The planning of design becomes interesting when developing a new product or modifying an already existing one. When trying to find the perfect design the company must first answer some questions such as: What does the customer want? How much time do we have? Do we have all the necessary resources and infrastructure? This chapter is very complex and therefore divided into the following seven sections:

- Design and Development Planning
- Design and Development Inputs
- Design and Development Outputs
- Design and Development Review
- Design and Development Verification
- Design and Development Validation
- Control of Design and Development Changes

Design and Development Planning

The design is usually one of the first stages of the product creation, thus having a major impact on the outcome, the production costs and the complexity of the production processes. The person responsible for the design must be fully aware of the product requirements, the production processes, the material, financial and physical possibilities, the appropriate and applying standards as well as any legal restrictions. The planning should include:

- Verification and validation activities
- Identification of responsibilities and authorities
- Provision of effective communication

Design and Development Inputs

At this stage, any incongruences and ambiguities must be resolved between the company and the customer. All drawings must be correct and up to date, standards be decided and eventual limitations expressed. The design input can be divided into three categories:

- Internal: Policies, standards, specifications
- External: Customer needs, contractual requirements, industry codes
- Other: Storage, handling, maintenance, delivery

Design and Development Outputs

The final drawings, schedules and schemes regarding purchase, production and service matters, as well as the description and specifications about the system, are seen as the design output. Before getting the final acceptance it needs to be checked again internally and by the customer.

When the production processes are up and running, the design department still has a lot of work to do as they have to constantly stay in touch with production and execute tests to find errors, issues or weaknesses in the system or in the product and quickly resolve them.

Design and Development Review

The company should perform periodic design and development reviews to make sure that the requirements are met and to identify errors and potential issues. Additionally, using a systematic review system, the company makes sure that not just one, but many variations are being considered to find the best possible solution.

Design and Development Verification

The Verification of the outcome of a process is not only necessary to control if it meets the input requirements, but can also be very helpful for the company. By constantly evaluating their system, the company learns more about its processes and procedures and can improve them over time. Some possible evaluation methods can be:

- Comparison with other, already tested, results
- Feedback from the customer or internal feedback
- Third-party evaluations
- Testing (i.e. durability, safety, reliability, maintainability, etc.)

Design and Development Validation

Once the product has been appropriately and thoroughly tested, the company must validate the Design and/or Development. To avoid expensive processes to be done in vain, testing and validating should be done after (or before) every critical (expensive or time consuming) process in the production line and in any case before the final delivery.

Control of Design and Development Changes

All changes made throughout the Design and Development phase should be documented and recorded in order to leave them available for reviews (especially the one before implementing

the change), evaluations or further discussions.

2.7.4 Purchasing

When it comes to deliver a high quality product at a good price and at the right time, the raw material and support material purchased have an extremely important influence. It is therefore very important to keep track, document and evaluate suppliers, especially the ones who deliver crucial parts or material and the company buys most often of. The documentation should give information about the previous supplying performance (delivery time, availability, friendliness), conformity with national and international standards, quality of the product and/or material, etc. If a supplier is new, it might be helpful to first get a trial sample to analyse it and then decide whether to continue with the order. The chapter dealing with the purchasing process is divided into the following three sectors:

- Purchasing Process
- Purchasing Information
- Verification of Purchased Product

Purchasing Process

The company should have a methodology on how to decide where to buy the goods needed as they are responsible for the quality of the final product. This is often accomplished by evaluating each regular supplier according to specific characteristics (i.e. price, delivery times, etc.). It is best if the supplier or subcontractor has its own quality management system and can provide information about what processes, treatments and procedures the material went through in order to guarantee high quality products.

Purchasing Information

The documents used for the purchase process should contain information such as:

- Product description
- Quality requirements
- An agreement on the quality assurance, the verification methods and the settlement on quality disputes

Verification of Purchased Product

Depending on the importance of the purchased items, they should be verified to a certain degree at acceptance. If the product is not critical, of low cost and easy to replace, it is enough to verify that the delivered items correspond to the ordered ones and if they show any clear sign of damage. On the other hand, if an item is very delicate, critical for the final product, expensive or difficult and time consuming to replace the control should be more accurate. The degree and method of control depends much on the item itself and on the quantity it has been delivered. For example, measurements or tests can be done on every

item or in a control sample. In any case, the results of these tests should be documented and recorded.

2.7.5 Production and Service Provision

A company should have predefined procedures for the control of the following operations:

- Control of Production and Service Provision
- Validation of Processes for Production and Service Provisions
- Identification and Traceability
- Customer Property
- Preservation of Product

Control of Production and Service Provision

The company should make sure to have all the necessary information and equipment such as information about the product, work instructions, appropriate measuring devices and enough human, material and infrastructure resources available when starting a process.

Validation of Processes for Production and Service Provisions

Whenever it is not possible to measure or monitor the outcome of a process, the company should have adequate procedure that can demonstrate the completeness and correctness of its processes and the adequate qualification of personnel.

Identification and Traceability

A product (or batch) should be identifiable and traceable throughout every stage of the production stage, from the suppliers' delivery (document the completeness and correctness of the delivery and where the items/material has been stored until further use) throughout all production processes until the final delivery to the customer. To allow such a smooth system, a precise methodology of documenting and recording is required and has to be set up by the company.

Customer Property

The company must ensure that all of the customer property they have in possession (i.e. goods which need to be repaired, intellectual property) is protected and maintained according to the contract, previous agreements or simply by common reason to preserve the integrity of the goods. To avoid complications, the items received should be controlled, best if in presence of the customer, documented and recorded.

Preservation of Product

Throughout the production and packaging phases as well as the final delivery, the product must be under control and protected from any damage. Mechanisms that can help protecting the product and reducing the margin of error are:

- Documented serial numbers
- Written instructions on how to handle and store the product
- Highlighting any necessary special treatments (i.e. hazardous material, protection from magnetic fields, etc.) and the eventual expiration date
- Adequate storage infrastructure and organisation
- Specifications about the delivery (i.e. handling methods, environmental conditions, type of transport, etc.)

2.7.6 Control of Measuring and Monitoring Equipment

Like all materials and tools, also measuring and monitoring equipment is more or less sensible to wear and tear. Since these tools are responsible for the precision needed in the production they should be appropriately treated. Personnel using measuring and monitoring equipment must have adequate competence and training in order to use them correctly.

All measuring devices have to be regularly calibrated against an internal or external standard (which again, depending on the needed precision should be regularly controlled). The device must be identifiable and traceable, and the calibration of it, documented and recorded. The frequency of calibration depends on different factors (how much is the device used, how is it stored, what precision is needed, how is the wear and tear) but should nevertheless be conducted at least once a year.

2.8 Measurement, Analysis and Improvement

The last chapter of the ISO 9001:2008 standard deals with the measurement and analysis of processes and data, with the goal to continuously improve the quality system, its processes and, in the end, the company itself. It is divided into the following five sections [Tricker, 2010, pp.170-185]:

- *General* - The organization has to define, plan and implement procedures which monitor and analyse the processes within the company
- *Monitoring and Measurement* - In order to improve the system, it has firs to be monitored and measured. With the gathered data the company must continuously improve its product and/or service, the customers satisfaction as well as the quality management system itself
- *Control of Non-Conforming Product* - Errors can be seen as an opportunity to learn for the company. Appropriate conclusions and must be taken and implemented in order to improve the system and its processes

- *Analysis of Data* - Before making any conclusions, the company must carefully analyse the collected data and the gathered information
- *Improvement* - To have long term success in the market, the company must continuously challenge itself for continual improvement of the quality management system, its processes and procedures

2.8.1 General

The organisation has to plan and implement processes that demonstrate the conformity and continuous improvement of its products, processes and quality management system. Using special statistical techniques such as control charts or the Pareto analysis can help to verify the characteristics and parameters of a product or process. Employees using such techniques must be familiar with them or appropriately trained to achieve the required competence. The standard *ISO 10017 - Guidance on statistical techniques for ISO 9001:2000* can be helpful to better understand such techniques or to learn new ones.

2.8.2 Monitoring and Measurement

To take appropriate decisions at the periodic management review, the company needs to have some techniques to gather the information they need. Proper techniques to collect information about the customer, products and processes are better specified in the following section:

- Customer Satisfaction
- Internal Audit
- Monitoring and Measurement of Processes
- Monitoring and Measurement of Products

All collected data must be properly documented and recorded.

Customer Satisfaction

To find out the level of Customer Satisfaction there are various methods. Some of them can be:

- Surveys
- Questionnaires
- Feedback from the delivery of a product
- Focus groups or sector studies
- Direct communication with the customer
- Customer complaints

Internal Audit

The organisation has to organise periodic internal audits to define the correct functioning of the quality system as well as the potential for improvements. The audits can be First- Second or Third- Party Audits (conducted by the organisation itself, by the customer or by an independent party) and should help defining elements like:

- Strengths and weaknesses of the quality system
- Identify hazards
- Eliminate waste (time and material)
- Reduce (or eliminate) errors
- Documentation of decision making, implementation and control processes
- Any other considered important by the company

Management needs to take corrective actions for all deficiencies found during the audit and verify the results after implementation. Internal audits must be performed by trained people. *ISO 19011 - Guidelines for auditing management systems* could be helpful in this matter.

Monitoring and Measurement of Processes

The organisation must find adequate methods for monitoring and measuring the processes in the quality system. The gathered data helps understanding if all the customer requirements have been achieved, if the processes are running efficiently and if there is any room for improvement. Important factors to analyse can be the cycle time, the utilization of machinery, the reaction time and the dependability of the processes.

Monitoring and Measurement of Product

Before delivering the product to the customer, the company must make sure that all necessary measurements and test have been carried out and the product inspected in an appropriate manner. This can be performed by the company itself, the customer or independent third-parties. In any case it must be ensured that the monitoring and measuring is executed only by trained personnel. The commodity should be controlled at every stage which has been decided to be critical as well as before the final packaging to make sure it meets all of the requirements demanded by the customer. All measurements and tests have to be accurately documented and recorded.

2.8.3 Control of Non-Conforming Product

The company must guarantee that products which do not achieve the stipulated requirements do not get any further in the production line. There are a few basic steps to follow when dealing with non-conformities:

- Highlight the product as erroneous (i.e. with a red sticker) and/or eliminate the item
- Document the discovered error and all the following actions
- Inform all the necessary people and departments

- Evaluate the error
- Take appropriate measures to avoid future problems (i.e. Team meeting)

If the erroneous item can be used for something else or reprocessed, the company can do so. If this is the case, the product must be re-verified. Non-Conformities should be seen as a possibility to grow as a company. If the company learns how to correctly handle errors and problems it can learn and improve the system.

2.8.4 Analysis of Data

For a correct evaluation of the functionality and efficiency of the quality system a suitable analysis of the gathered information is needed. The company must try to avoid the collection of a massive amount of confusing data but rather concentrate and focus on the most important ones. Important outcomes of the analysis might be the customer satisfaction level, the achievement of all the requirements, the process efficiency as well as ways to deal with errors and how to prevent them. Tools like the Pareto-diagram, the FMEA (Failure Mode and Effect Analysis) and the Ishikawa-Diagram, amongst other, can be used to have significant data. All information must be documented and appropriately recorded.

2.8.5 Improvement

The organisation must have adequate procedures to prevent or correct non-conformities as well as procedures to promote continuous improvement. This is further explained in the following three sections:

- Continual Improvement
- Corrective Action
- Preventive Action

Continual Improvement

To continually improve the quality management system to company should regularly update, plan and manage its processes, policies and objectives and everything surrounding them (audits, reviews, corrective actions, preventive actions and data analysis) as well as make use of past experiences and errors. Tools and techniques which can be helpful to achieve that are:

- Statistical Process Control (SPC)
- Cause and Effect Analysis
- Pareto Analysis

Corrective Action

Once an error or issue has been detected, the company must have documented procedures on how to solve it and to prevent recurrence. These should include:

- An evaluation of the severity and the consequences of an error
- The elimination of the cause of error
- The correct actions to take to avoid similar events in the future
- The decisions taken have to be recorded and evaluated
- Corrective actions have to be reviewed

Preventive Action

The best way to avoid problems and costs arising from them is to identify potential problems before they occur. The following tools are just some of the actions that can be taken to help the company preventing any kind of issues:

- Market Analysis
- Customer Feedback
- Fault Tree Analysis
- Trend Analysis
- Statistical Process Control (SPC)
- Process Measurements

The effectiveness of the actions which have been taken must be reviewed as well as the results adequately documented and recorded.

2.9 Deduction

This chapter showed that the theoretical framework of the ISO 9001 standard covers all the basic processes in an organisation and is valid for every type of business. The theory covers all elements of service, production and management, from the administration of documents to the resourse management and from the production processes to the administrative processes. The theory gives the impression of being capable to improve a companies effectivity and efficiency without too many complications. Studies show, that this is not the case. The following chapter is an analysis of these latest studies and analyses the arising proplems before, during and after implementation as well as the applicability of the standard in small and medium enterprises. This consists as an introduction to the case study in chapter 4.

Chapter 3

ISO 9001 in Small- and Medium- sized Enterprises

Even though, well known experts such as Ray Tricker in his book *ISO 9001:2008 for small businesses* [Tricker, 2010, p.xvi] claim that *these processes, procedures, disciplines and criteria can be applied to any firm, no matter its size - whether they employ just a few people or many thousands*, the answer might not be so simple. Some aspect need to be disassemblied and analysed in more detail.

According to Theofanis Stamou [Stamou, 2003, p.14] there are significant differences between large and small companies. Beside the lack of resources, technical ability, time and capital, SME are closely integrated into the fabric of local community and often have customers just within a small radius of the company. They are often family businesses in the second or third generation and therefore very traditional in their processes. Some of it might have changed since the explosion of the internet, but a lot of the problems still remain. The reason to implement a quality system is often very different when looking at big, medium or small companies.

Especially at small companies, the motivation to implement a quality system is frequently driven by external forces rather than internal ones. According to Theofanis [Stamou, 2003, p.23] ,the pressure coming from large companies often forces smaller ones to implement a quality system. This hypothesis is supported by the survey carried out by Prakash J. Singh [Singh et al., 2006, p.10] and confirmed by the comparisons performed in this thesis in chapter 5.3 'Comparison with other SME' on page 47. Generally, it seems that while big companies are more often driven by internal reasons to implement ISO 9001, SME tend to wait for external reasons to push them into action. This might have to do with the fact that SME often fear the costs and bureaucracy involved with the certification and do not have a specialised quality manager who is responsible for the whole preparation and implementation process. Without a quality manager, the general manager or owner is habitually responsible for the quality system and, as a consequence, more time and effort have to be invested in order to learn about the norm and its effects. As a consequence, small businesses often implement the quality system because they have to, not because they believe in it, making

it in fact a quality certification, but just on paper. Also, not having an expert dealing with eventual quality problems, repeatedly leads SME to think that ISO 9001 is a tool acting as a *quick fix* of existing problems rather than incorporating it into the company consequently and on a daily basis [Manders and de Vries, 2012, p.19]. Other motivations for the ISO 9001 implementation are mentioned by various studies:

- Compliance with customer requirements [Al-Rawahi and Bashir, 2011, p.8], [Singh et al., 2006, p.10], [Stamou, 2003, pp.23-24]
- Meeting government demands [Al-Rawahi and Bashir, 2011, p.8], [Stamou, 2003, pp.23-24]
- Improvement of company image [Singh et al., 2006, p.10]
- Gain advantage over competing firms [Singh et al., 2006, p.10]
- Improvement of the efficiency of the quality system [Al-Rawahi and Bashir, 2011, p.8]
- Improvement of marketing internationally [Al-Rawahi and Bashir, 2011, p.8]
- Improvement of product/service quality [Al-Rawahi and Bashir, 2011, p.8], [Singh et al., 2006, p.10]
- Improvement of productivity [Al-Rawahi and Bashir, 2011, p.8]
- Reduction in costs [Al-Rawahi and Bashir, 2011, p.8], [Singh et al., 2006, p.10]

When a company finally decides to implement the ISO 9001 quality system, there are many barriers that might have to be overcome. They can be divided into internal and external barriers. Internal factors are essentially problems concerning the tradition, knowledge and resources of a SME. More specifically, Stamou [2003] points out the following barriers:

- *Quality perception*: Key people within the company do not believe in the system and consider it useless. A sort of *What worked in the past will work in the future*-conviction is spread around the firm.
- *Resistance to change*: People often like things *just the way they are* because they feel known and secure while change always carries a little bit of risk with it. [Bhuiyan and Alam, 2005, pp.11-12]
- *Short term-orientation*: For a small company it is difficult to see further then the near future and they tend to focus on the quickly apparent costs of implementation rather than the future benefits.
- *Lack of top management commitment*: The quality system only works if everyone, from the top manager to the shop floor worker, apply it correctly. If the manager does not *walk the talk*, the system will not work properly.
- *Lack of resources*: The implementation of a quality system and the relative certification are a big investment for every SME.
- *Lack of knowledge*: As Stamou [2003, p.30] points out, *the multifunctional nature of staff becomes of ever increasingly importance as the size of the company decreases*. This often results in a lack of knowledge concerning the quality system.
- *Lack of training*: To make sure that everyone applies the quality system correctly, everyone needs to understand it and adequate training is fundamental to achieve that. This is an additional investment of time and money the company has to bring up.

[Bhuiyan and Alam, 2005, p.13]

External barriers are instead often a result of economical or historical nature. Most commonly the lack of sector specific implementation tools and examples intimidates SME as well as the uncertainty about the value of a quality system in the specific market. [Stamou, 2003, p.31]

Once the decision for implementation has been made, SME should avoid letting these hindering factors become troubles. In order to do so, many different techniques and tools can be applied. The company constantly must seek for improvement, which might be exhausting and tiring especially for small companies, through the application of the continuous improvement cycle *PDCA*, explained on page 4: This must be executed in every aspect of the company, from the training of employees to the documentation and the standardisation of processes.

One of the main complaints about the ISO 9001 norm is the apparent bureaucratisation of the processes. Therefore it is extremely important to concentrate in standardising the companies' practices, not to practice the given standards while implementing the quality system. This means to understand, that it is not enough to change a document to achieve the promised benefits. If this fails, the ISO 9001 might just be a bunch of papers in the way of getting the work done. There are a lot of tools that should help the company dealing with this, and other, issues. But as a study by Fotopoulos and Psomas [2009, p.8] shows, just few of them are used on a regular basis. Most companies use the easy and familiar check sheets, flow charts and data collection forms, but when it comes to more complicated and sophisticated instruments such as the Failure-Mode-Effect-Analysis (FMEA) or the Pareto diagram companies often fail to use them. This has been observed also in big businesses, but much more in small companies. The answer to that might be connected to the lack of knowledge and training discussed before. Although it is not mandatory for the ISO 9001 certification, companies which do not implement and use these, or other, mechanisms and devices will be more likely to miss out on some benefits of the quality system. The previously mentioned lack of knowledge, training, tools and methods lead to inevitable shortcomings as listed in Al-Rawahi and Bashir [2011, p.11]:

- Increased complexity of paper work
- High costs
- Staff focus on the assessment and not the actual work improvement
- Focus on control of the management system rather than improvement

But like Stamou [2003, p.23] says, small companies do not only have disadvantages when dealing with ISO 9001, or any other norm for that matter. Their small range of activities generates less bureaucracy, easier training and internal communication. This makes it possible for small companies, with fewer resources, to achieve all the benefits the ISO 9001 quality system bares. According to Stamou [2003, p.24], the benefits can, much like the barriers, be divided into interior and exterior benefits. Internal benefits are closely related to the internal function and processes of the system [Al-Rawahi and Bashir, 2011, p.11] [Singh et al., 2006,

p.12]:

- Increase of operational efficiency
- Streamlining paperwork and communication
- Cost savings
- Increase of profit margin
- Increase in employee motivation
- Creation of a better company image
- Higher work safety
- Better coordination
- Fewer mistakes and less defective work

While internal benefits can be summarised into organisational, financial and people benefits, external ones are grouped into commercial and quality benefits [Singh et al., 2006, p.12]:

- Competitive advantage
- Improvement of market place (i.e. enter new markets)
- Improvement of product/service quality
- Higher customer satisfaction

Taking into account all previous considerations it can be said that citet[p.xi]Tricker2010 might be correct when indicating that the ISO 9001 quality system is applicable to all businesses, regardless of their size and field of operation. But although it might be more complex for big companies, SME have to jump over higher hurdles to implement the standard. As a consequence they are often driven solely by external reasons and therefore more likely to miss out on lots of internal benefits arising from the system as Manders and de Vries [2012, p.19] point out in their article *Focus+*.

If the only purpose of the implementation is to achieve the certification or a quick fix of arising problems in the company than the total increase of the financial performance might be lower than for a business implementing the system with full conviction and commitment. Most, if not all, of the internal benefits will not be achieved or might even harm the companies' performance with just the signalling benefits remaining.

Summarising, the conclusion of whether to commit to a quality system or not seems obvious. If, on the one hand, a company is convinced of the quality system and committed to implement it properly, there is little doubt that the effectiveness of it will be tangible, regardless from the size or field of operation of the company. If, on the other hand, the only motivation to certify the company comes from outside, and is looked at with suspicion, than, considering the investment a company has to make, a well calculated analysis should be carried out before committing to the implementation.

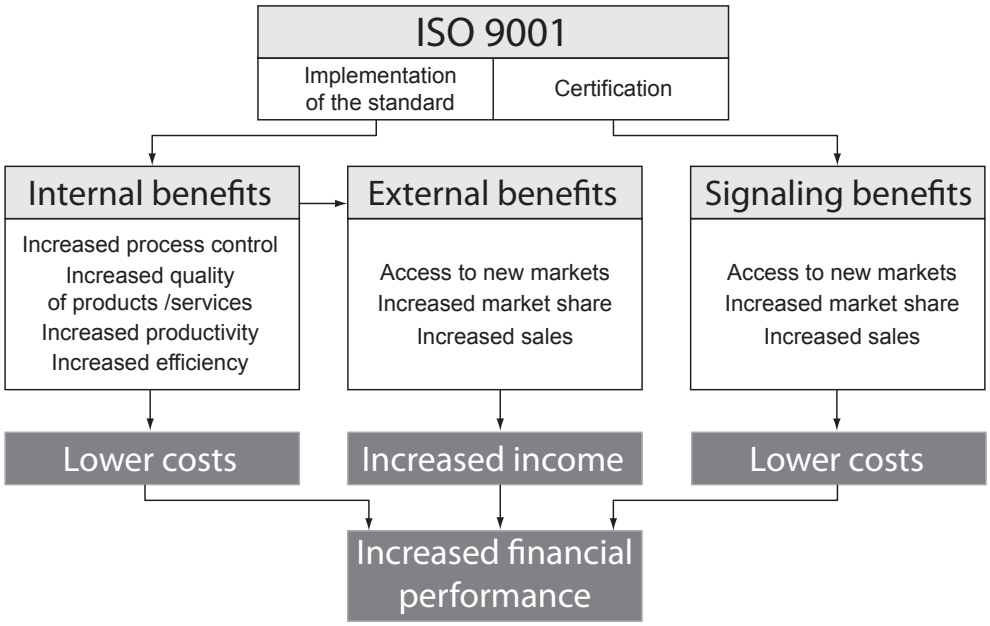

Figure 3.1: Intenal/External benefits [Manders and de Vries, 2012, p.19]

Chapter 4

Case study Fauri Mauro & C. s.a.s./K.G.

The following first three chapters will be a short introduction to the company, its motivations to implement the quality system and my approach in the road to implementation. Furthermore, as all the theory about the quality system was covered in the previous chapters, this chapter will concentrate on the module and support documents as well as the difficulties faced by the company in each chapter.

Up to now, the quality system has been active for more or less eight months and some valid experience has been gained. As the company worked with the system, after a while it became clear that some things work very well, while others appear obsolete or incomplete. The latest revisions and updated documents are explained and displayed in this thesis.

4.1 Introduction to Fauri Mauro & C. s.a.s./K.G.

For convenience, from now on, *Fauri Mauro & C. s.a.s./K.G.* will simply be referred to as *Fauri*.

The company works in two branches: The first one is the classic artisan metal work combined with some more technical machinery such as computer numerical control machinery. This sector deals with materials like iron and stainless steel as well as copper and some sorts of plastic. It mostly deals with one time orders and specific demands. The second section is almost fully automated and makes use of several CNC-lathes and CNC-milling machines. The only material allowed to be processed here is graphite, while the orders are mostly in serial quantity and usually come on a weekly basis.

4.2 Motivation to implement ISO 9001

As described by other studies, Al-Rawahi and Bashir [2011, p.3] for instance, the motivation to gain the certificate can be external or internal. While externally motivated companies often don't fully understand the benefits of a quality system and aim to quickly gain the certification for promotional and marketing reasons, internally motivated companies are more

stimulated to achieve the benefits that can come with an adequately implemented quality system such as productivity improvements, personnel motivation, product quality improvements and organisational benefits, among others.

Prior to a specific request from the main customer *Fauri* had no real intention to certify the company with the ISO 9001 quality standard. This is a classical external reason to implement ISO 9001. Nontheless, the goal was not to limit the benefits to external ones, but incude as much internal benefits as possible into the implementation of the quality system. It was clear from the beginning that not all of them can be achieved in the first round of implementation and that many aspects may have to be revised and improved in the future. The most important aspect was to gain the approvement of the management and all the employees to engage in the correct realisation and functioning of the ISO 9001 standard.

4.3 Approach to implementation

Knowing the consequences of a badly implemented quality system, usually due to lack of commitment of the management Al-Rawahi and Bashir [2011, p.11], motivation was high to avoid or minimize the usual difficulties other companies have faced before when implementing the standard. After a careful consideration of time, costs and risks, the management decided to assign this complex task to its internal quality manager, *Fauri Manuel*. One of the reasons the idea of recruting an external consultant was put aside was the possibility for the quality manager to connect this project with the master thesis at the *Technical University of Graz*. Even though the risk of misunderstanding the implementation project was higher than with an external expert, the benefits that an internal expert can bring to the company are, in *Fauri's* view, much higher in the long term.

The theoretical knowledge about the implementation of ISO 9001 was mostly gathered by reading *ISO 9001:2008 for small businesses* [Tricker, 2010] and *Projekt DIN EN ISO 9001:2008 - Vorgehensmodell zur Implementierung eines Qualitätsmanagementsystems* [Pfitzinger, 2009] as well as some explanatory articles on the internet. To develop the active parts of the quality system, in other words its modules, support documents and work instructions, ideas and inspiration were found on the website Qualitiamo [2003] next to the previously mentioned books. Modules can be seen as documents which interact with the people using it, while support documents are basically general information about the company and the people working in it. Instruction documents have as well informational purposes but are more directly connected with the work in the company rather than the system surrounding it.

In the following chapters every document will be explained in detail, the purpose why the company needs it, the reason why it is done the way it is done and what the benefits the company achieves.

4.4 Quality Management System

The first objective was to detect all existing documents within the company. This includes external software descriptions, machinery manuals, safety documents, privacy documents, drawings made by the customer as well as the ISO norm itself. All the relevant digital and/or hardcopy papers were then summarised in the module *M4.01 - External documents* and marked with the according version and revision date as well as the source for eventual updates and the frequency of control. The summary has then been placed in a showcase in the office. This way an updated list of all external documents is clearly represented and easily accessible for any eventual needs.

Prior to the implementation of the quality system such a list was not available making the updating of important documents much more difficult, non-transparent and irregular. Although it might not matter too much if the instructions of software such as Microsoft Office or the accounting program Arca Professional are out of date, it is crucial that customers drawings are organised and controlled. For instance, the over three hundred drawings of *Fauri's* biggest client have been given to the company more than twenty years ago in an organised folder. Since then, no one had the specific assignment to look after those drawings. As the years went by, some drawings became obsolete, others were updated and many new ones came along. Without the help of any structured updating system, soon the organised folder turned into a messy accumulation of papers. Today the drawings are organised in three different folders, depending on their material and application field, and organised according to their commodity number, which is highlighted in yellow, while the revision number is highlighted in green. The three folders are present in the technical office, as a backup, as well as in the workshop. Every time a new or renewed document is sent via e-mail, fax or mail, the old one is suppressed and destroyed, while the new ones are highlighted as previously explained and put in the correspondent folders.

Next to the module summarising the external documents, two support documents were implemented into the quality system. Their purpose is to give management and administration an overview of the quality system and its timings. The first one is the *S4.01 - Document Management Plan in Quality System*. It has been developed to assure a well regulated overview of all the procedures, modules and support documents used in the quality management system. Next to the latest revision date, its storage location and storage period of every form, the document also represents who is authorised to look at it and use it. The S4.01 is stored in the ISO 9001 folder and accessible only to the general manager and the quality manager.

The second support document is the *S4.02 - ISO9001:2008 Schedule*. This paper was created to guarantee the punctual update and correct usage of every module, support document and work instruction present in the quality system. It also represents who is responsible for the relative form and is displayed in the showcase in the office.

At the moment, there are two showcases within the company, with a third one arriving soon, one in the technical office and one between the Graphite and the Carpentry department. They show documents of interest such as instructions, definitions and general informative state-

ments. The third one will be placed next to the exit door and will display available courses and trainings for the employees.

Both support documents are important to keep the whole management system under control without too many complications. Two easy to read papers summarise all important information of every document within the quality system, thus avoiding losing too much time looking for information about the single documents.

4.5 Management Responsibility

As described in the theoretical part of the thesis, it is important for a company to know its structure and everyone's responsibilities. Of course, describing a micro-enterprise, the diagram will not be too complex, but it is still very important to determine everyone's role in the company. It is important to establish who is responsible for management, commercial activities, the different departments as well as for emergency activities. *Fauri* has a simple hierarchical structure as some subjects lead several positions. The support document is stored in the technical office's showcase under the definition *S5.01 - Organisational structure*.

The directorate not only manages the company, but is at the same time assigned for safety, all commercial, purchasing and production activities as well as co-responsible for first aid. The quality manager leading the ISO 9001 quality system is also responsible for the privacy management and the administration of the company. Finally, the Head of the carpentry department is additionally responsible for fire protection as well as co-responsible for first aid in the company. Of course these positions cannot simply be declared but have to be officially recognised. People responsible for first aid have to have taken a first aid course as well as the person responsible for fire protection an adequate fire protection course.

The tasks, responsibilities and functions of each position are described in detail in the support document *S5.03 - Job specifications*. Every member of the company has been informed about his role in the company and what is expected from him. It is very important to take the time and explain to everyone what this document means, as it specifies each ones responsibilities in order to avoid discrepancies and at the same time gives the employees the certainty that his position in the company is valued and appreciated.

Another important document in this chapter is the support document *S5.02 - Quality policy*. A company needs to make its goals and beliefs visible and spread this statement amongst all members of every department. *Fauri* makes clear, that its highest goal is to satisfy its customers, focusing on the quality of his products and services by continuously improving them. Every member has an important role in the process to reach and possibly exceed this goal, and therefore, *Fauri* commits itself to offer the best possible work environment for every member of the company. Often these intentions might seem mere words that sound good and the only function the quality policy has, is to make the company look good to the outside, the customer. But *Fauri* is aware of the fact that these intentions have to be shared, understood and accepted by every member of the company and therefore tries its best to make these intentions become a rule and a habit within the company.

Next to this three support documents, this chapter also includes two modules. The first one, *M5.01 - Quality Management System Review*, involves the directorate and the quality manager and has to be filled out at predefined times, in the case of *Fauri*, this occurs once every year. The document pushes the company to look at some important factors which have been gathered by other documents throughout the year, to analyse them and, eventually, take adequate measures. All in all, the module has eight incoming factors and at least two outcomes. The information necessary for appropriate measures are:

- Results of internal audits (M8.01)
- Customer satisfaction questionnaire résumé (M8.04.02)
- Eventual non-conformities (M8.02)
- Suppliers quality progress (M7.03)
- Projects for improvement
- Observation of binding norms and regulations (i.e. M4.01)
- Analysis of the annual indicators (M8.03)

All participants have to analyse and discuss the various forms and papers before writing down eventual conclusions as well as updating two documents for the following year:

- Formation Management (M6.01)
- Indicators (M8.03)
- Eventual improvements and an according time plan

It might be too early to tell, but this document has the potential to have a profound impact on the conventionality of operations in the company. Before the quality system was implemented, certain behaviour was common. If something new came up, or some other thing had to be done, phrases like *"This should be done"* or *"Someone should do this"* were not rare. But without writing it down or making a timetable, the matters often got forgotten and, maybe next time, a few weeks or month later, they came up again until further postponing was no longer an option or it was already too late.

Today a mandatory briefing is preventing important matters, also regarding the safety of employees, get delayed only because no one thinks about it. *Fauri* has decided to execute this task at the beginning of every solar year.

The second module in this chapter is *M5.02 - Meeting module*. The purpose of this document is to briefly summarise every meeting within the company. The paper sums up the day and time the meeting took place as well as the topic of discussion, which for example can be future market strategies, risk analysis or formation courses. A brief outcome summary is then written by the quality manager and, at the end of the discussion, signed by every participant. Initially there was a feeling of superfluity regarding this module since in such a small company classical meetings are sort of an exception, meaning that if the manager has to say something he does not call a meeting but rather goes to the employee at issue and tells him directly. But after some consideration the benefits of such a module became clear.

Besides officialising the discussions taking place, thus eliminating eventual misunderstanding, after a while a path will probably emerge. The company can then analyse which topics of discussion are frequent, but more importantly, which topics are *forgotten* and have to be considered more often. *Fauri* is planning to perform a mandatory meeting for all members of the company at the first Monday of every month.

4.6 Resource Management

Employees are the most important resource a company has, and therefore it is crucial to manage them appropriately. An important factor for the continuous improvement the company is aiming at, is the training an employee gets. One never stops learning, especially in an environment where there are new technologies every year. The employee must be kept constantly up to date with the latest developments. *Fauri* has decided to use a certain amount of its budget for the training and specialisation of its workers. Every month a new set of available courses will be displayed in the public showcase next to the entrance door. Most of the courses are offered by the LVH (Landesverein der Handwerker), the *National Association of Craftsmen* but any other course which might be helpful for the professional development of the employee will be considered by the management. If an employee is interested in taking a course, he needs to communicate that to the management which will then consider his enrolment. Some courses will be mandatory, such as an update on work safety whenever needed or the certification of the authorised welding employees. If there are some courses already in plan for the coming year, the directorate and the quality manager have to note them in the *M6.01 - Formation Management*module during their annual quality management system review.

The second human resources module, *M6.02 - Personal Formation Sheet*, gives detailed information about the single members of the company. Data about the person, the day he/she was hired, the qualification and the previous working experiences as well as all of his/her additional formations and the according documents are summarised in this personal document. After reading it carefully, the employee is asked to sign it for validation. The general mentality on the matter, before the quality management system was implemented, was to take the mandatory courses just when absolutely necessary. This was due to the thought that most of the things an employee needs to know he can and will learn at the company, either by himself or with the help of more experienced workers. Courses, on the other hand, cost time and money. Also, the thought that an employee might get trained and eventually leave the company, was holding back management to invest too much in the education of his workers. This train of thoughts has now stopped. Management is aware of the fact that the continuous improvement approach not only affects processes, but people as well. A company is only as strong as the people in it, and this alone should encourage the company to invest in its employees and support their professional development. Beside this, a worker is far less likely to abandon the company if he feels appreciated, important and challenged, and a way to do so is making him grow professionally through courses and trainings.

The second part of this procedure concerns the maintenance of the material assets of the

company. *M6.03 - Vehicle Management* lists all vehicles in property of the company. *Fauri* owns four vehicles, specifically one truck, two cars and one forklift. These vehicles need to be regularly controlled and module M6.03 regulates that. The stamp due date, the next vehicle inspection date and the insurance due date are highlighted as well as the relative costs. This way, *Fauri* makes sure to have its vehicles always under control.

In comparison with how this was handled before, this module does not change much, but is now part of the quality system at *Fauri*. The next modules deal with the maintenance of the machinery and its accessories. Because of the high number and diversity of the equipment, three separate modules have been created:

- M6.04.01 - Machinery Maintenance
- M6.04.02 - Equipment Maintenance
- M6.04.03 - CNC Machinery Maintenance

The first one deals with machines like manual lathes and milling machines, cutting and bending machines as well as drilling machines and saws while the second module contains, among others, all *light* equipment such as welding-, tool sharpening-, drilling- and sawing-equipment. The CNC Machinery Maintenance module includes, as the name says, the computer numeric controlled machines. The module is built in a manner to make the maintenance tasks and dates easily understandable, and to guarantee a safe and up to date work environment. An employee for each department has been assigned the task to make sure that all the necessary maintenance is done properly and within the due date. Next to the properties of each equipment or machinery, the date of the last maintenance and the next due date are displayed. Maintenance is of course important in every sector of the business, but it gains highest significance in the department which deals with graphite. While the equipment in the carpentry department is relatively robust and persistent, graphite makes the machinery, computer, equipment and measurement tools become extremely sensible. The dust which is created when processing graphite easily penetrates in the tiny holes and slits, despite all prevention measures (i.e. high power exhaustion device). This reduces the life cycle of the equipment and increments the costs for repair or substitution of machinery parts or entire devices. To demonstrate how much maintenance costs, a quick investigation has been carried out, as shown in figure 4.1 [1]:

Given that in the last ten years the company purchased four major CNC machines (in 2005, 2007, 2010 and 2011), next to other, smaller equipment, it appears natural that the maintenance costs and the tool sharpening costs increase every year (also considering that after a while all machines lose their guarantee and performance). But focusing on the ratio between the machinery repairs und the annual turnover (since the tool sharpening increase in costs seems justified) a steep upwards trend is noticeable in figure 4.2 (from 0,42% in 2002 to 2,69% in 2012).

This means an average yearly increase of 0,22% for ten years. *Fauri* hopes to get this negative trend under control with the help of an organised maintenance management.

[1] The red and blue bars refer to the left y-axis, the green graph to the right y-axis

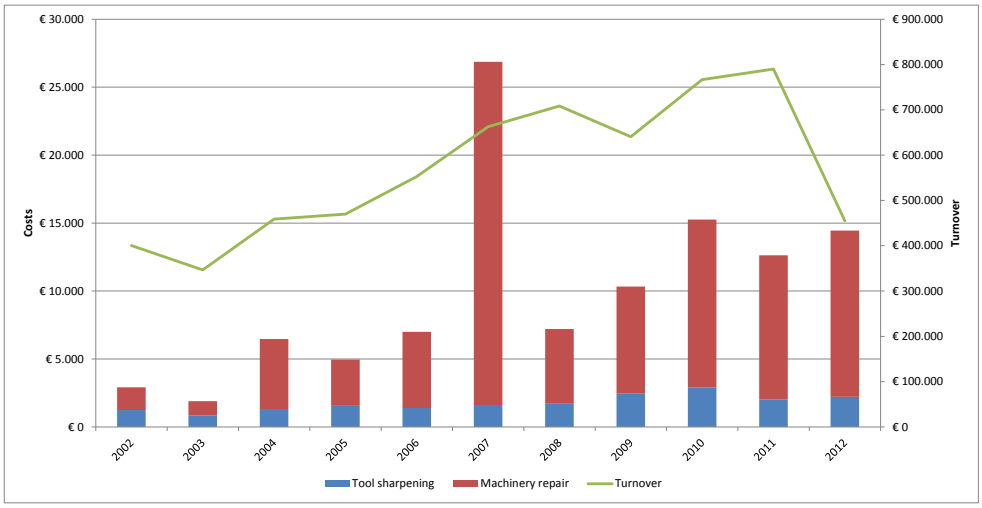

Figure 4.1: Maintenance costs

4.7 Product Realisation

A delicate part of the whole working process takes place at the beginning of the production chain. Making an accurate quotation is not only important to receive the order, but vital to ensure the company a good profit, thus securing its future, while satisfying the clients' needs for a good, and possibly convenient, product. To learn from eventual past mistakes in the past, and to see the development of quotation ratios in the future, a module named *M7.01 - Quotation Register* has been developed. This register collects all quotations formulated throughout the year, with the respective value, and practically shows the percentage of quotations - and percentage of worth - which had a positive response from the client. It is important to analyse this data, learn from it, and try to improve the percentage year after year. This register only makes sense since the company has implemented a software to easily create and manage all quotations. The program is explained in more detail at page 39.

At the end of the year, for the annual management review, a summary of the total amount of quotations, as well as the number of the successive ones, can be printed and analysed without any supplementary work. For the future, the company hopes to improve their successful quotations ratio thanks to this tool. As for now, the program highly facilitates the quotation making process as well as bringing a whole new organisation to the matter.

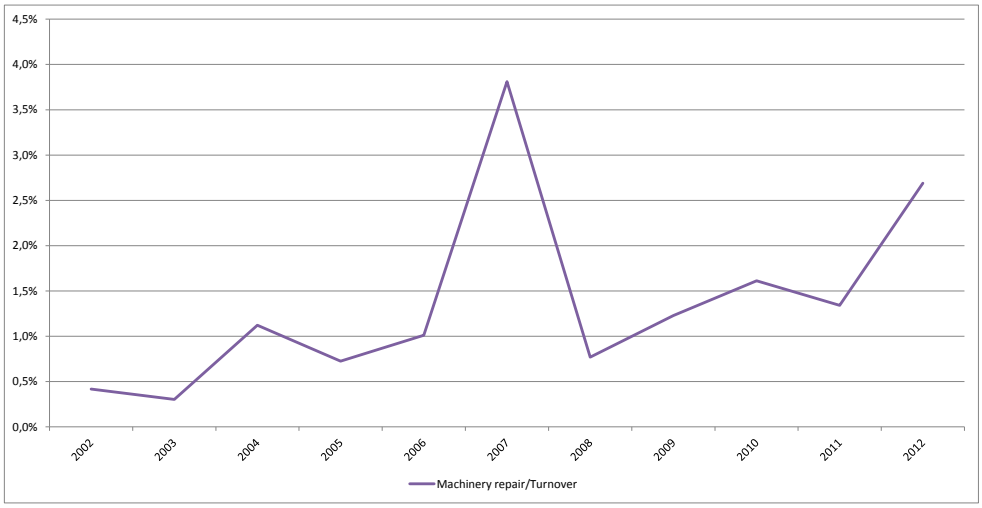

Figure 4.2: Maintenance percentage

The second module has an impact on the organisational aspect of the business and is divided into two documents: *M7.02.01 - Purchase Request* and *M7.02.02 - Material, Equipment and Accessories needed*. The first one is kept in the administration office and keeps track of which material, equipment or other accessorial component needs to be bought or has been bought and is expected to be delivered. The second module is at the employees' disposition where they can write down every request regarding materials, equipment or accessories they need. Once a week the document is collected by the purchase manager and, if it is approved, the item is ordered. For emergencies and very urgent components, this step can be skipped and the manager will be informed directly by the employee in charge of the work. Nonetheless, even in this case, the first module has to be accurately filled out describing the product, the quantity and the expected delivery date. Whenever a requested product has been delivered, the reference on both modules has to be crossed with a marker or pen.

The company expects high reward from this new strategy of organising purchases. Before switching to this method, there was no organisation on the matter at all. If the manager thought something was needed, or the employee told him so, he ordered the requested material without any supervision or plan. This often led to material missing when needed, delays, but also an accumulation of material that has been ordered way too often. To test this, an inventory test of all drill bits has been carried out and an exceptionally high amount of drills

with the diameters 6 and 13mm have been found, distributed between the two departments, the technical office and the warehouse. This was a clear sign of superfluous inventory and will be fixed with the new purchasing management.

Next to the own high quality processes and products, a business must also make sure that the third party products and materials they use are qualitatively high. A way to minimize the risk of receiving poor products is to evaluate the suppliers, eliminating the ones with low ratings. Module *M7.03 - List of qualified suppliers* lists all major suppliers and evaluates them with ratings from 1 (insufficient) to 4 (very good) referring to their price, flexibility and delivery times as well as their official certifications such as the ISO 9001 quality certificate. Furthermore, a column is allocated for eventual noticed deficiencies or especially satisfactory factors. The values get averaged and the resulting value written next to each company. An average from 1 to 1,9 is classified as *Poor*, from 2 to 2,9 as *Sufficient*, from 3 to 3,5 as *Good* and from 3,6 to 4 as *Very good*. Companies with a specifically low or an averaged rating below 2 must not be considered during the purchasing process, while companies which are rated as *Sufficient* should be avoided, if possible. All values have to be updated, considering the deficiencies and/or exceeded satisfaction comments, once every year during the quality management system review.
Although it is difficult to compare this system to the way suppliers have been dealt with before, in other words by the managers' experience, it is foreseeable that an evaluated supplier list will facilitate the purchasing process in the future.

Quotations are today developed using a program which has been created by Dipl. Ing. Marina Kofler. The Microsoft Access file *Preventivi/Conferme*, represented in figure 4.3 allows the purchase manager to quickly draw a quotation and send it via e-mail in a non-modifiable PDF format.

This method replaced the old one and significantly improves the quotation management. Prior to this instrument, *Fauri* used to send its quotation by simply writing an e-mail. This made it virtually impossible to track, organise and analyse quotations. Today, after filling in all the necessary information, such as product description, quantity and price, amongst others, a PDF file with a unique identification number (ID) is generated and automatically sent as attachment and with a standardised message via e-mail. If the quotation is accepted by the customer, a box in the corresponding quotation is checked.

Similar to the quotation making process, prior to the implementation of the quality system all orders have been carried out by e-mail, fax or phone. While the first two options, especially orders sent via fax, are difficult to organise and keep track of, the latter gives no guarantee at all, if there ever is any complaint regarding the product quantity or quality. This is why a structured and easy to use system was needed to send orders in an organised way. Again with Dipl. Ing. Marina Kofler's help, a program has been developed that keeps track of every order with its unique identification number, date, description and quantity. Figure 4.4 shows the starting screen when opening the prorgam.

A PDF file is then created, known as module *M7.04 - Order module* and saved on the computer as well as the external backup hard drive and can be directly sent to the relative supplier via e-mail.

Figure 4.3: Quotation program

Next to the administrative modules, a document managing the measuring and monitoring devices was needed. A precise and high quality product can only be guaranteed as long as the measurement tools are accurate. This requires a controlled and scheduled calibration of every measurement tool. Of course, the frequency of control and the accuracy of the measurement tools vary. Some digital calibres are very sensitive to the graphite dust and need to be very accurate while, for instance, a normal measuring tape is neither sensitive nor very accurate. To keep track and to have an overview of all calibrations a specific module has been created: *M7.05 - List of Measuring and Monitoring Equipment*. The different measuring tools are registered by their type and unique identification code and an appropriate time for control is scheduled. Some need to be controlled every three month, while others meet the requirements with one check per year. Every control is carried out using *Gauge blocks* (explained in appendix E 'Glossary') which are kept in a protective case and under the right temperature and humidity conditions to guarantee highly precise results. If a measurement device does not fulfil the needed requirements, it is either brought to specialists for repair, if

Figure 4.4: Purchase order program

possible and convenient, or dismissed and substituted by a new one.

Before this organised method of control was implemented, measurement devices were replaces when they malfunctioned or it became apparent that they did not have the desired accuracy anymore. Although no investigation was carried out at that time, it is highly probable that sometimes products had a low precision due to defective measurement devices. This risk is minimized now as every measurement device is corrected, if possible, or replaced if it fails the regular tests. As mentioned previously, *Fauri* is divided into two operating sectors. This has to be considered when organising the incoming orders. Another factor to consider is the circumstance that, compared to all the others, one specific client plays a major role in the annual turnover of the company, especially in the Graphite department. Therefore, the order management needs to be adapted to the sector as well as to the company from which the order comes from. This is done by the following three modules. Module *M07.06.01 - Serial Order* is generated by a specifically designed program (figure 4.5), in place on the computer in the administrative office. Every week the client selects what he needs from a list

of over two hundred elements and sends his order via e-mail or fax. These elements, their code and quantity, are then transferred into the program and an informative DIN A4 sheet is printed. This will then be handed to the designated employee who organises the work in order to produce what is needed in time.

Figure 4.5: Order program

Before the ISO 9001 was implemented serial orders were written on an sheet of paper manually in the administrative office, thus requiring much more time than now. But while these orders are serial and recurrent, others are not, for example products which are still under development or when new designs have to be tested before becoming serial. These orders, as well as orders from other companies, are processed in the same way and by the same software program, but printed on a different sheet of paper, the module *M7.06.02 - Extraordinary Order*. These orders were also processed like the serial ones before the quality system was implemented.

Both the previous modules are used exclusively by the Graphite department. For orders, regardless from which client, that have to be produced in the carpentry department, the module *M7.07.01 - Activity record* is filled out with all the necessary information by hand in the administrative office and then handed to the designated employee. There are two scenarios in which this document is helpful. If there is an order without any previous quotation agreement, the administration office will later know how much to charge the client, while if the price has been predetermined, the module acts as control if the quotation has been done correctly. Prior to the implemented quality system, administration used to give the necessary drawings to the employee who has been selected for the work and tell him the quantity and delivery date. Of course, sometimes, this created confusion and mistakes. With an own paper, where all information are summarised for every job, this will certainly be avoided in the future.
A similar module has been created for a recurrent job at a client's factory. Every month

several hoist devices have to be checked for their integrity. *M7.08.02 - Hoist devices control* is a simple module which summarizes everything that has to be controlled, repaired and/or exchanged. A copy of the module is given to the client after job conclusion. This document has been used for years and is now successfully implemented into the ISO 9001 quality system.

All four of these documents improved the companies' rapidity and accuracy. Some of them were present in a similar way also before the ISO 9001 implementation, while others give additional value to the system.

In order to minimize the risk of flaws in critical products, employees are advised to control them following predefines guidelines. The critical serial products are highlighted on a sheet of paper in the showcase in the Graphite Department, while all other products that are considered critical will be marked on their drawings. If that is the case, module *M7.08 - Conformity Certificate* has to be filled out by the employee in charge of production. If not other specified, the rule reads as shown in the table 4.1:

Order quantity	**Number of control**
1-10	1-2
11-25	3-5
26-50	5-7
51-100	8-10
> 100	At least 10%

Table 4.1: Conformity control rules

The module itself is not very useful to the management or the customer, except if he wants a confirmation of the data, but it forces the employee to regularly control critical measurements. This is something that might have been overlooked in the past. To safeguard the company, all conformity certificates are stored in a specifically assigned folder in the technical office.

Next to all the modules, this chapter includes also three instructions. *I7.07 - Instructions for the AWEA milling centre*, *I7.08 - Conformity control instruction* indicates the approach and the guidelines for the previously mentioned quality controls while *I7.09 - Bender instruction* informs the employee which adjustments have to be made when bending materials with different thickness.

4.8 Measurement, Analysis and Improvement

The first module dealing with the analytical part of the quality system is the *M8.01 - Internal Audit Report*. Once every year, management, in cooperation with the quality manager, has to answer thirty-five predefined questions regarding the companies' documentation, organisation, employees, suppliers and customers, as well as other useful data. The results can be analysed and compared to previous years to understand the development of the company and take appropriate measures to improve eventual flaws in the system or the way management is applying it. Since no process is perfect over time, the company will benefit from the internal audits as regular analysis of the system will help them continuously improving their processes and procedures. It is too early, with the norm implemented for merely eight months, to tell which benefits the business will have, but after the next months the first positive results are expected to emerge.

The module used to describe eventual errors and mistakes in more detail is the so called *M8.02 - Non-conformity report*. Whenever a misstep occurs, such a module has to be filled out by the person responsible for the fault in collaboration with the quality manager. This report encourages a PDCA-Cycle (Plan-Do-Check-Act). After describing the problem, and how it was treated on the spot, possible causes are described as well as the corrective actions that have been taken after a careful investigation and analysis.

In contrast to how it was before, non-conformities today can be seen as opportunities to improve the company rather than something that has to be quickly fixed and forgotten about. By analysing the mistake and getting to the root cause of it, the same mistake will not happen again in the future.

M8.03 - Indicators summarises goals and targets the company has set for the year. Every January the data will be analysed, to see if the goals for the past year have been achieved, or to find out the causes if they were not, and updated for the following year. The twenty-five indicators comprise data regarding the financial aspects of the business, such as the annual turnover and profit, the efficiency and effectiveness of the system, safety aspects (i.e. injuries), quality aspects as well as elements concerning suppliers and customers.

Prior to the quality system, the manager more or less had a feeling about what went well and what did not in the past year, but having a list of hard data makes feelings become facts. With help of previously explained modules, eventually not achieved goals can be analysed and, the processes responsible for it, improved for the following year. Instead of keeping in mind everything, this module helps to have a constant overview of which aspects of the company need to be focused on and which ones are going according to plan.

The last modules of the quality system deal directly with the customer satisfaction. At the end of the year a survey is taken among all of *Fauri's* major customers to determine what they appreciate of the product and service the company offers, and more importantly, what they do not. *M8.04.01 - Customer Satisfaction Questionnaire* contains ten simple questions

and is sent to the customers via e-mail. After receiving the responses, all the answers are evaluated with the module *M8.04.02 - Questionnaire Evaluation*. This way, *Fauri* can constantly improve where a lack of satisfaction is highlighted, thus making its quality system more effective and, at the same time, demonstrating to the customer that his opinion matters and can make a difference. *Fauri* carried out a first survey at the end of 2011 among forty-three clients and has received eleven responses, about 26%. The first conclusion is that this ratio needs to be higher in the coming years. While most of the ten questions were given a positive mark (*Very good* and *Good*), and none received a *Very bad* mark, the response time for quotations question received the worst evaluation compared to all other. *Fauri* tried to learn from this and did its best to decrease the time needed to prepare a quotation. The 2012 questionnaire will show if the customer recognised this or if *Fauri* needs to further improve this aspect.

Chapter 5

Conclusions

5.1 Outcome

On the 7th of May 2012, *Fauri* has officially become certified for the ISO 9001:2008 quality system by the Italian entity for accreditation Accredia, through the control of the certification company SGS Italia s.p.a. (See appendix B)

The whole creation and implementation of the system, from the first reading to the final audit, took about one year, but that is where the quality system just starts. Now the company must learn to interact with the system, keeping it dynamic and always questioning processes and procedures, in order to guarantee a continuous improvement in the future. There have already been different modifications to the modules, support and instruction documents and there probably will be others before the first control audit in May/June 2013.

The owner, Mauro Fauri, states, that when he was asked to certify his company, his first thought was that this might cost a lot of money, but that at least it will help the company, if not else, present itself better to the outside. Today, after a few month of working with the system, he still looks at the certification with some suspicion. Not much on the system itself, but rather on the certification entity. Although it is understandable to consult an external expert for the first time you assess the quality system, there is no apparent need to constantly hire externals to control it, once it is done correctly. *'Lots of the things suggested by the standard you can do by yourself and don't need someone come to your company for five minutes to tell you that you have done it properly, and then demand 1.000 €every year '*, he says. Maybe, especially in small companies where not much changes within one year, a control every three or five years would be enough. *'Probably, bigger companies have the possibility to do so, but small ones, like us, would rather spend the money elsewhere. '*

Although this statement is arguably correct, it is also a clear sign that there is still a lot of work to do, to make the quality system work. The annual costs of the certification are not influenceable by the company and must be cosidered as fixed costs every year. If the quality system works, the costs should easily be covered by the external and internal benefits the company gains.

'If the client would not ask for it, I would not certify the company again, but rather apply the things we learned without any official recognition ', the company manager says. If only internal benefits are considered, this might be a possibility for the future. That is, of course, only if the company has truly understood the quality system and its way to constantly questioning the efficiency of every process. The constant improvement strategy, ideally carried out by an internal expert, can work also without the official certification, but the possibility for external benefits would be lost. The certificate acts like a marketing device and has the potential to outscore the annual certification costs by far. The company must strongly consider this, before deciding to abandon the certification.

5.2 Difficulties

Although the company already profits from the quality system in some aspects, from an organisational point of view to a productive one, there were difficulties and obstacles that had to be overcome. First of all, when the company finally decided to implement the system, the management was eager to get it done. This enthusiasm was generated by the thought that the quality system will quickly help improve the production processes and the product itself. However, there was, and still is, a lot of work involved to optimise all processes. Due to the lack of quick results, there has been some resistance to change as well as growing scepticism towards the standard. Only with total commitment from the management, and a thorough explanation and constant involvement of all members of the company, this can slowly be overcome.

Another difficulty was to simplify every document as much as possible, to make sure it still fulfils its purpose but does not become too much paperwork for the employees. This was a very important factor to gain the workers acceptance for the system. While administration is relatively fine with bureaucratic paperwork, a worker usually is not and avoids it as much as possible. This was one of the reasons why many documents already stepped into the first revision. The best way to learn if a document works is to ask people who work with it for their opinion. This has been done whenever possible. Hopefully many more changes will come in the future, as this is a sign that the quality system is alive.

As for now, it is too early to have measureable examples of improvement. The first financial outcome will be delivered in May, shortly before the first audit since the certification. The management will then have a meeting with the quality manager and the heads of departments to discuss what has been achieved and, more importantly, which goals were not accomplished and what difficulties were encountered along the way.

5.3 Comparison with other SME

In order to have a comparison with other SME, *Fauri* performed three short interviews with the quality manager of similar companies. The purpose was to understand their development with the quality system in place, whether they are satisfied with it or not and what difficulties

they had during implementation: The companies are the following:

No.	Company	Field of operation	Quality Manager
1	CO.GI. s.r.l.	Public constructions	Dott. Aldo Girardi
2	Ambrosi Cesare & C. s.r.l.	Mechanical precision workshop	Thomas Ambrosi
3	Gottardi Rino & Silvano s.r.l.	Road transport	Gianluca Gottardi

Table 5.1: Interviewed companies

The interview was performed via e-mail with the companies number two and three, while the quality manager of the first company was interviewed in person. The following questions were asked:

1. How many employees do you have?
2. When did you get certified?
3. For internal or external reasons?
4. How long did implementation take?
5. Did you have major difficulties during implementation?
6. What opinion does management and the employees have towards the standard?
7. Which particularly positive or negative developments have you noticed since the certification?
8. From your point of view, are there any differences for small, medium or big companies? Is it worth for everyone?
9. Do you have other certifications? If so, are they well integrated with ISO 9001?
10. If you achieved certification mainly for external reasons, now that you know the norm and its implications, would you get certified again just for internal reasons?

The entire answers from the interview can be found in appendix number one, *Interviews* on page A. Summarising, the interviews point out, that external reasons were the main, if not the only, driver for implementing ISO 9001 and that no company has any other certification. Besides that, no statement seems to be equally valid for every company. *CO.GI. s.r.l.* was the only one which had any internal reasons to consider a quality system. They had to overcome some difficulties, like the huge amount of suppliers, but seem to have achieved an improvement in comparison to before. They are satisfied with how the system works and would implement it again. *Ambrosi Cesare & C. s.r.l.* was instead driven mainly by external reasons and seems to be pleased with the external benefits they gained, even if the quality system is not completely successfully implemented and accepted by all members of the company. The implementation of ISO 9001 at *Gottardi Rino & Silvano s.r.l.* appears to have been a smooth ride without any difficulty along the way. But the fact that the company cannot present any benefit at all, although the quality system is apparently embraced by everyone, leads to think that the system might not have been implemented correctly. Nevertheless, all companies agree that the ISO 9001 quality system can be helpful for all types of companies,

no matter the size or field of operation. The key point for a successful implementation seems to be the people behind the accomplishment and the people working with the system.

5.4 Future

Fauri has committed to the ISO 9001 standard mainly for external reasons, but somehow it seems the company was brought to new life with it. The company is more eager than ever to continue the path of improvement. Many new ideas have already been brought up, not only by the management, but by the workers themselves and will be discussed in the upcoming management review. They can shortly be summarised into short term and long term ideas and objectives. Short term ideas are intended as things which should be done before the next external audit in May/June 2013 or shortly after.

The auditor has the possibility to note critical elements, non-critical elements, general observations and possibilities for improvement in his audit report. Critical observations must be resolved before the next audit or the ISO 9001 certification cannot be assigned again. Non-critical observation should be fixed until the next audit. If they are not, they will become critical for the next time. General observations have no urgency, but have to be resolved in the years to come. If they are not, they will become non-critical observations, first, and critical ones later. The opportunities for improvement are considerations by the auditor which he thinks might help the company improve their quality system. They can be implemented if the company wants to, but do not have to.

No critical observations were made during the first audit by the accreditation company SGS in May 2012. Nevertheless all other observations and considerations will be the first short term items taken care of:

- **Short term:** Two non-critical observations have to be solved before the next audit. Both involve small adjustments in the quality manual as well as in work instructions and the according procedures. It is asked to give more evidence to the validation process of non-structural welding operations as well as to the calibration process of the measuring equipment. The only general observation given by the auditor concerns the employees operating welding machines in the company. It was suggested to officially certify them. *Fauri* found that, since no structural welding operations are carried out, such a certificate is not mandatory and will therefore not be performed at the moment. Instead, the school certificates of the employees in question, testifying their ability to weld, will be attached to their personal formation sheet. Eight opportunities of improvement were noted by the auditor. They are basically minor changes to some modules and work instructions and will be implemented until the next audit. Next to the auditors' observations, other ideas came to mind when implementing the quality system. Some of them will be applied for sure, while others will be discussed at the management review in January:
  - *Update safety course for all employees*: Planned for December 2012
  - *ISO 9001 Training*: All employees should get one day of intense training about the quality system, its goals and objectives, methods and techniques to use, and

which responsibilities everyone has to make it work effectively. This has been decided, because the impression after the first months of implementation is, that although they are doing what they are told, they seem not to fully understand why.

- *Integrate PDCA*: During the employees' training, the company will focus on a better implementation and standardisation of some sort of visual PDCA-Cycle. The exact aspect of this integration will have to be discussed during the upcoming management review.
- *Courses in showcase*: Offer courses and training in a public showcase where employees can choose which skills they want to improve, or what they want to learn. Every employee should have a minimum and maximal budget or time limit for courses each year.
- *Implement a system to collect ideas from the employees*: The management is thinking about equipping every employee with a personal clipboard. Ideas, as well as other useful matter, can be noted and presented at the monthly meeting.
- *Implement useful statistical techniques into the system*: The implementation of the Pareto-analysis, the Statistical Process Control, Value Stream Mapping and the Skills Matrix will be discussed at the next management review.

- **Long term:** Long term goals will have to be discussed in much more detail during the next management reviews, as well as during some internal meetings with the management. The ideas are momentarily thought to be a vague guidance for the next one to five years:
  - *Re-organisation of the company*: Today, the company is a very uncoordinated accumulation of machinery and equipment and needs to be re-thought for a more efficient way of production. The devices were put in place over the last decades and no clear plan of placement was known during their implementation. Some machinery is very heavy, making it laborious and time-consuming to relocate. Also the warehouse is very chaotic and unclear making it difficult for the workers to find what they need in short time. Before re-organising everything, a detailed study is required, to restrict the time needed to implement the new system. After a quick analysis, the approximate estimation is that the re-arrangement will take about one week.
  - *Reduce the usage of paper*: For some modules, which do not need to be recorded for more than a few months, the lamination of documents can reduce the amount of paper used. (i.e. Maintenance documents, Formation plan, etc.) Another way to reduce the usage of paper, could be a sort of web-based quality system, where a lot of the information is directly written on a computer or tablet without writing it on single sheets of paper. This might also increase the interaction between documents and facilitate analysis.
  - *Implement Kanban in the warehouse*: Reducing the amount of items lying around in the warehouse, thus reducing the costs and freeing up some space, is a technique which has been taken into consideration. The Kanban system is a valid form to achieve that and could be implemented during the re-organisation pro-

cess of the company.

- *Deeper understanding of ISO 9004 and ISO 19001*: *ISO 9004 - Managing for the sustained success of an organization - A quality management approach* and *ISO 19001 - Guidelines for auditing management systems* are a good way to upgrade the quality system. Further analysis and a deeper understanding of the standards are needed.
- *Integrated Management System*: The ultimate goal of *Fauri* is to have an Integrated Management System (IMS). This consists of further certifications: *ISO 14001 - Environmental Management* and *OHSAS 18001 - Occupational Health and Safety Management System*. The IMS widens the spectrum of control and standardisation of processes, not only for high quality, but also for a safe and healthy work environment and for good environmental care.
- *Implement a reward system*: *Fauri* is thinking about implementing a reward system in order to motivate its employees to actively participate in the enhancement, expansion and efficiency improvement of the company. The way and strategy this will be done is not clear yet and needs further discussions, but the following scheme is conceivable:
  - Recruitment of a new customer with single order: 5% of the profit
  - Recruitment of a new customer with recurrent order: 3% of the profit for one year
  - Improved efficiency for serial activities: 3% of the savings for one year
  - Improvement which is not easily convertible in money (i.e. removed safety hazard): Some sort of bonus, either monetary of free hours from work

  All numbers are purely estimated with no calculation at all and need therefore to be carefully analysed and simulated before being implemented.

Chapter 6

Résumé

The implementation of the ISO 9001 quality system proved to be a difficult task from the very beginning, because of the huge amount of information comprised in it. The standard contains standardisation processes for virtually every aspect of the company. This makes it difficult to generate a concise overview of the system within the company and to filter all superfluous information at the beginning. Nevertheless, it is crucial to spend a lot of time understanding the system and adapting it to the own company. Unnecessary or repetitive processes are not only wasteful, but can keep employees from embracing the quality system and finally weaken the company instead of strengthening it.

Like in many other companies, the implementation of the ISO 9001 at *Fauri* was no smooth ride at all; there were initial barriers, difficulties during the introduction and there still is some suspicion towards it. But the quality processes have to be, like the company, dynamic and constantly scrutinised. This scepticism can turn out to be a motivator for a qualitatively better and more efficient future of the company.

Fauri expects further positive results to emerge in the near future, by means of reliability and reduction of costs. This can only be achieved by a better implementation of the quality system and further, constant training of the employees. Besides that, the future includes many organisational innovations and huge structural changes for the company. This seemingly cost-intensive investment will necessarily lead to higher work efficiency and a tangible reduction in production and administrative costs. To promote those positive developments, and to proceed on the overdue path of innovation, management must be totally committed and convinced of the benefits it can achieve. The quality system must be just the first step to an integrated management system and a continuous improvement cycle. Other certifications like the ISO 9004, OHSAS 18001 and ISO 14001 have to be considered to achieve the desired high quality products and service that are produced in a safe and healthy workplace and environment. At the moment, an official certification in all those standards seems superfluous, but some important aspects of each norm should be incorporated even without official recognition. A last note can be added concerning the certification entities. They often seem to pay too much attention to documents without much interest for the smoothness of the system itself. Considering the fact of the big investment, especially for small companies,

this is an aspect they need to improve in the future to avoid being seen as some bureaucratic entity devouring money.

Summarising, the conclusion of this paper is, that the ISO 9001 quality system can be implemented, and generate benefits, in companies of every size. Its success depends on three main factors:

- *Commitment*: The commitment of all members of the company is crucial to achieve the desired benefits.
- *Quality Manager*: The quality manager needs to listen to the employees, to the people who actually work with the system, and avoid implementing complex documents which are an obstacle rather than a help for them. Every document needs to be adapted to the company and the people working in it.
- *Certification Entity*: Several certification entities should be considered according to their field of expertise and reputation before selecting one. The auditor needs to understand the company and its processes.

Appendix A

Interviews

Dott. Aldo Girardi of CO.GI. S.r.l.:

1. We have twenty employees.
2. On the fifth of June 2001.
3. According to the regulation for the performers of public works DPR34/2000 every company operating in public constructions must be quality certified. But this was just the push we needed to implement the quality system as soon as possible. We were actually thinking about it for quite some time.
4. The whole implementation took about one year.
5. The management of all suppliers was probably the most difficult part. We have about 250 suppliers of all kinds of material and depending on if you construct houses, bridges or streets the normative changes and so do our requirements for the supplier. It is difficult to keep an eye over such a huge number of possibilities.
6. At the beginning there was some resistance from the employees working on the construction site. But management tried to listen to the feedback the employees gave and were able to simplify all documents in a way to minimise the bureaucratic work needed from them. Now the quality system is not only accepted but embraced by all members of the company.
7. The biggest improvements were achieved in the supplier management and in the formation of the personnel. A document summarises which courses every employee has taken or still has to take, thus making it easier for the management to plan trainings and improve the technical skills of every employee.
8. It probably always depends on the people within the company and which objectives are set. Of course the bigger the company, the easier it is to find experts for every sector and department of the business. The quality system probably developed that way: It was established in big companies and then made compatible with smaller ones. I think every company can achieve great benefits with the certification even though it is probably more important, or even vital, for a big company. It depends, again, from the people inside the company and how they manage implementation. From my point of view, ISO 9001 is important to make the decisive jump in quality.
9. We don't have other certifications.

10. We certainly would do it again. It is important, especially for medium-big companies, to have standardised procedures and processes, for example to assure a smooth changeover if an important member of the company has to be replaced.

Thomas Ambrosi of Ambrosi Cesare S.r.l.:

1. We employee fifteen people.
2. On the 12th of November 2007
3. Our main motivation was to satisfy the request of our customers and to gain new ones.
4. The whole implementation process took more or less two years.
5. Honestly, no specific parts are difficult to implement. They main obstacle was probably to make everyone understand how the different modules have to be filled out.
6. Often it is seen as something superfluous and everybody tries to avoid it with the excuse that they have no time.
7. The most positive aspect is the acquisition of new clients.
8. The certification and the subsequent maintenance have a considerable cost, so its implementation has always to be evaluated. But while it can be challenging for small businesses, it is essential, at an organisational level, for every big company.
9. We do not have any other certifications.
10. While the implementation of a quality system was a purely external one at the time, after seeing the benefits of having a qualitative standard, today I would certify the company also without external pressure.

Gianluca Gottardi of Gottardi Rino & Silvano S.r.l.:

1. We have 14 employees.
2. We have been officially certified since the 20th December 2011.
3. We had internal and external reasons to get certified.
4. The whole implementation process took one year.
5. There were no major difficulties.
6. The standard is accepted by everyone.
7. We do not have any tangible improvements at the moment.
8. I think it is favourable for many companies, but maybe not for ours.
9. We do not have other certifications.
10. Since no real benefit is noticeable I would not certify the company just for internal reasons.

Appendix B

ISO 9001 Certificate

Certificato N. IT12/0431

Il sistema di gestione per la qualità di

FAURI MAURO & C. S.A.S. /K.G.

Via Trento, 80 - 39040 SALORNO (BZ) – Italia

è stato verificato ed è risultato conforme ai requisiti di

ISO 9001 / UNI EN ISO 9001:2008

Scopo della certificazione:

Officina di carpenteria metallica non strutturale e di lavorazione a controllo numerico della grafite.

Settore EA: 17, 15

Questo certificato è valido dal 07/05/2012 fino al 07/05/2015.
La validità è subordinata all'esito soddisfacente dell'attività di sorveglianza periodica.
Ricertificazione da eseguirsi entro il 04/05/2015.
Rev. 1. Certificata dal 07/05/2012.

Ulteriori informazioni riguardanti lo scopo del certificato e l'applicabilità dei requisiti ISO 9001:2008 possono essere ottenuti consultando l'organizzazione.

Autorizzato da
Paola Santarelli

SGS ITALIA S.p.A. - Systems & Services Certification
Via G. Gozzi, 1/A 20129 MILANO - Italy
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Appendix C

Quality Manual

Quality Manual
according to UNI EN ISO 9001:2008

CONTROLLED COPY NO.1

TABLE 1: DISTRIBUTION LIST OF CONTROLLED COPIES

NO.	NOTES	RECIPIENTS
1	Original Manual	
2	Copy Certification Entity	SGS

TABLE 2: MODIFICATIONS

PARAGRAPH	DATE	MODIFICATIONS
1	03/05/2012	Updated certification goal
All	13/12/2012	Reformatting

TABLE 3: NOT CONTROLLED COPIES

Issued by: QUALITY MANAGER

Signature: _____

Controlled by: DIRECTORATE

Signature: _____

Contents

TABLE 4: REVISION MATRIX

SECTION	DESCRIPTION	REVISION	DATE
SECTION 0	Contents	02	22/02/2012
SECTION 1	General	02	22/02/2012
SECTION 2	Overview of the company	02	22/02/2012
SECTION 3	References	02	22/02/2012
SECTION 4	Quality Management System	02	22/02/2012
SECTION 5	Management Responsibility	02	22/02/2012
SECTION 6	Resource Management	02	22/02/2012
SECTION 7	Product Realisation	02	22/02/2012
SECTION 8	Measurement, Analysis and Improvement	02	22/02/2012

TABLE 5: LIST OF PROCEDURES

PROCEDURE	DESCRIPTION
P4	Quality System Documentation Management
P5	Directional Process Management
P6	Resource Management
P7	Product Realisation
P8	Measurement, Analysis and Improvement

Documented procedures required by the UNI EN ISO 9001 norm are contained in the system documents specified in the following table:

TABLE 6: QUALITY MANUAL REFERENCES

ISO 9001	PROCEDURE	QM REFERENCE
4.2.3	CONTROL OF DOCUMENTS	SECTION 4.2.3
4.2.4	CONTROL OF QUALITY RECORDS	SECTION 4.2.4
8.3	CONTROL OF NON-CONFORMING PRODUCTS	SECTION 8.3
8.2.2	INTERNAL AUDITS	SECTION 8.2.2
8.5.2	CORRECTIVE ACTIONS	SECTION 8.5
8.5.3	PREVENTIVE ACTIONS	SECTION 8.5

Section 1. SCOPE

1.1. General

This quality manual describes the quality management system implemented by *Fauri Mauro & C. S.a.s./K.G.* in order to ensure the compliance of customer products guaranteeing their full satisfaction.

The requirements of the quality manual shall apply to all activities of the *Fauri Mauro & C. S.a.s./K.G.* which have direct or indirect influence on quality.

1.2. Application

The activities of *Fauri Mauro & C. S.a.s./K.G.* certified to ISO 9001:2008 are:

Non-structural metal carpentry and numerical control machining of graphite

This quality manual is excluded of the following clauses of the standard UNI EN ISO 9000:2008:

- Design activities in Section 7.3 as the company works only on customer specifications

Section 2. NORMATIVE REFERENCES

All terminology and definitions relating to all matters affecting quality are referred to the UNI EN ISO 9000:2005 norm.

The quality system refers to the UNI EN ISO 9001:2008 norm.

The conduction of internal audits refers to the UNI EN 19011 norm "*Guidelines for auditing management systems*".

Section 3. TERMS AND DEFINITIONS

The terms and definitions used in this manual refer to the standard UNI EN ISO 9000:2005.

TABLE 7: ABBREVIATIONS

DEFINITION	ABBREVIATION
QUALITY MANAGEMENT SYSTEM	QMS
QUALITY MANUAL	QM
OPERATIVE PROCEDURE	OP
WORK INSTRUCTION	WI
MODULE	MOD
DOCUMENT	DOC
REVISION	REV
NON-CONFORMITY	NC
CORRECTIVE ACTIONS	CA
AUDITS	AUD
PREVENTIVE ACTIONS	PA
DIRECTORATE	DIR
SALES MANAGER	SAM
PRODUCTION MANAGER	PRM
ADMINISTRATION MANAGER	ADM
PURCHASE MANAGER	PUM
QUALITY MANAGER	QM

Section 4. QUALITY MANAGEMENT SYSTEM

4.1. General Requirements

The quality system is the tool that allows the implementation of the quality policy to achieve customer satisfaction and to create the conditions for an improved quality performance within the corporate organisation. To do this, the following is needed:

- All processes, their sequence and interaction, needed for the quality management system and their application in the context of the entire organisation have to be identified
- Criteria and methods that ensure the effective functioning and process control in compliance with all normative decrees have been set
- A continuous update of fabrication techniques and service delivery, through collaboration with professional associations and companies of machinery and equipment construction, is ensured
- Definition of technical specifications and parameters for the evaluation of materials and equipment which provide the customer the objectivity and validity of the final value expressed by *Fauri Mauro & C. S.a.s./K.G.*
- The availability of resources and necessary information to support the operation and monitoring of these processes is guaranteed
- Activities to monitor, measure and analyse these processes are established
- All necessary actions to achieve the planned results, and continual improvement of the processes, are implemented.

This chapter describes the quality management system by:

- Defining the focus points in order to ensure that the company's output is consistent with the contract requirements
- Constituting the reference standard for the assignment of responsibilities and requirements on which to assess the effectiveness of the actual quality operation in the company

4.2. Documentation Requirements

4.2.1. General

The quality management system of *Fauri Mauro & C. S.a.s./K.G.* is described in the following documentation:

- Quality Manual

- Procedures
- Operating Instructions

The operating instructions include:

- Work Instructions
- Forms
- Technical specifications of purchased materials, semi-finished and finished products
- Technical drawings
- Technical Reports
- List of unit prices
- ISO reference
- Technical Standards
- Corporate laws and laws concerning the working sector

4.2.2. Quality Manual

The purpose of the quality manual is to:

- Describe the quality management system of *Fauri Mauro & C. S.a.s./K.G.* The system intends to meet the information contained in the UNI EN ISO 9001:2008 on organizational structure, responsibilities, procedures, processes and resources that *Fauri Mauro & C. S.a.s./K.G.* put in place. This is performed in order to meet the quality requirements and to ensure that customer expectations are fulfilled so to achieve customer satisfaction
- Establish, together with the supporting procedures, a guiding document for the implementation of the quality management system

The manual is divided into eight sections. Each section reads as applied in the quality management system of *Fauri Mauro & C. S.a.s../K.G.* in reference to the clauses of the UNI EN ISO 9001:2008 norm. At the beginning of each sector such references are defined.

When the methods adopted to meet the clauses of the standard require more detailed specific descriptions, the specific procedure is referred to at the beginning of each section.

The quality manual of *Fauri Mauro & C. S.a.s./K.G.* was prepared in collaboration with the various business functions.

The quality manager has supervised the preparation and verification, the directorate has approved the content. Their signature appears in the front page of the manual.

The procedure P4 "*Management of the QMS documentation*" establishes the liability for the activities of processing, review, approval, revision and distribution of the quality

manual. The procedure also sets out the guidance for managing revisions of the QM as well as the treatment of obsolete editions.

Fauri Mauro & C. S.a.s./K.G. conducts its business mainly through own employees and subcontracts some specific jobs to specialized firms. All suppliers who are subcontracted are previously evaluated in accordance with the procedure in P7.

In relation to the activities subcontracted, *Fauri Mauro & C. S.a.s./K.G.* ensures the coordination and control of individual activities through its technicians with constant checks and controls.

It will also be its responsibility to ensure that only CE marked materials are used according to the technical information of the offer.

4.2.3. Control of Documents

The document control is applied to the entire documentation of the QMS:

- Quality Manual
- Procedures
- Operative Instructions

In the procedure 4 the following is described:

- The details of the characteristics and structure of the documents
- The procedure for issuing and approving documents
- The arrangements for reviewing and editing documents
- The procedures for updating and the distribution of all documents
- The methods of storage and retention of documents
- The contents of the documents

In this procedure it is also shown how to control the documents of external origin with regard to the identification, verification, distribution and storage.

The organization has also indicated the people responsible for checking the update status of the ISO standards and all technical standards of reference.

It also indicates the manner of implementation of the new corporate legislation and the transmission of information to the affected units.

Section 5. MANAGEMENT RESPONSIBILITY

5.1. Management Commitment

The management shall implement and maintain an adequate system for quality management to ensure compliance with the requirements of the customer and the improvement of quality performance. To this end, the directorate:

- Constantly communicates to employees the importance of meeting customer requirements and the mandatory rules of the industry
- Has defined, documented and communicated to the staff its quality policy for customer satisfaction
- Has defined and documented the responsibility, authority, and the relationship of the staff in general and especially of who manages, performs and verifies work affecting quality
- Identified the resource requirements and made them available
- Has defined and documented a quality management system which provides a periodic review of the same and where quality goals are defined in order to optimise and improve the system

5.2. Customer Focus

The quality management system aims at the maximum satisfaction of the customer needs in accordance with:

- Contractually agreed product requirements
- Legal and regulatory requirements, particularly those of security
- Latent qualitative aspects related to the service
- Any other requirements set by the company and considered significant for the customer, even if not specifically expressed

To this end, based on customer characteristics and involving the heads of the departments, the main requirements have been identified.

These requirements have been translated into indicators described in the following § 8.2.1. The system provides systematic monitoring of quality indicators identified to measure the level of customer satisfaction.

During the management review, target values for the requirements specified in § 8.2.1 are set.

5.3. Quality Policy

The directorate commits to allocate all the resources possible as well as a culture of quality because its success depends on the ability to better manage internal resources such to achieve two general goals:

- Customer satisfaction
- Good economic results

The highest priority for the management is the pursuit of these goals by focusing on the following instruments:

- Continuous improvement of processes, in order to ensure increasing levels of quality and safe products, through systematic analysis of the qualitative performance of the system
- Identification of hidden costs due to the lack of quality in order to increase the economic performance of the company

Management believes that the achievement of objectives through the maintenance of the quality system in compliance with UNI EN ISO 9001 and the according legislations, involves:

- Disseminating and communicate this policy within the organization
- Controlling all the processes, identify and record any problems – represented by data and facts – and manage deviations from the standard through appropriate corrective actions
- Clarifying tasks and responsibilities
- Promoting preventive actions necessary to anticipate the occurrence of deviations from the standard of services and quality of the system
- Maintaining an adequate level of education and training of employees involved
- Adapting the system constantly, changing internal and external requirements, and enforcing the requirements by all personnel involved
- Involving employees constantly – the quality problems are everyone's problems, and therefore require their participation in the research and proposals for new solutions, according to their functions and responsibilities, focusing on continuous improvement
- Consolidating and monitor each adopted solution and verify customer satisfaction

5.4. Planning

5.4.1. Quality Objectives

The criteria to assess the degree of achievement of objectives in the quality policy, is to refer to indicators directly related to management parameters considered particularly significant.

These indicators are described in § 8.2.3. – Measurement and monitoring of processes and may be periodically revised and resized to guide the company in terms of improvement.

It is the management's responsibility to determine the quality objectives for each following year.

The achieving or the deviation of the actual values for the period, compared to the target values, will be concrete and the overall judgment to assess its effectiveness, in terms of meeting the company's policy, defined.

For more details, refer to § 6 of this chapter (Quality Management System Review).

5.4.2. Planning of the Quality Management System

The management defines and plans the activities and availability of organisational resources to achieve the quality objectives and the maintenance of the quality system.

In particular, the planning process considers the following aspects:

- The identification and acquisition of processes, equipment, tools, resources and capabilities needed to achieve the required quality
- The update of the quality control techniques
- The identification of appropriate checks at critical stages of the production process
- The definition of acceptance criteria for all the features and requirements, including those involving some form of subjective evaluation
- The identification and preparation of documents recording quality

The implementation is described in this manual, in operating procedures or in specific quality plans drawn up when facing complex works or at the request of the customer.

Any changes made in relation to the quality management system (change in procedure, modules, etc...) are identified and approved by the directorate before they are implemented by the quality manager.

5.5. Responsibility, Authority and Communication

5.5.1. Responsibility and Authority

Management has communicated to all employees the organisational structure which defines the responsibilities of all functions and units involved in the implementation of the quality management system.

The organisational structure of *Fauri Mauro & C. S.a.s./K.G.* is described in the appropriate Form "*S5.01 – Organisation Structure*"

The main functions of the organisational structure are described in detail in the form "*S5.03 – Job Description*".

5.5.2. Management Representative

The management of *Fauri Mauro & C. S.a.s./K.G.* entrusted first-hand the responsibility of the representative of the directorate responsible for quality management to ensure that the processes of the quality management is implemented and kept up to date, to assess the needs of the QMS and to promote awareness of customer requirements on the part of *Fauri Mauro & C. S.a.s./K.G.*

5.5.3. Internal Communication

Internal communication on the implementation and maintenance of the QMS is carried out through the management of QMS documents as required by P4.

Internal communication on the activities of *Fauri Mauro & C. S.a.s./K.G.* is documented through meetings with its employees.

Direct communication between operators is done by managers in verbal or written form.

Communications in writing (work instructions, planning processes) will be delivered personally, while service orders, directed to all operators, are displayed on the notice boards.

5.6. Management Review

5.6.1. General

The management of *Fauri Mauro & C. S.a.s./K.G.* commits to carry out, on an annual basis, a review of the adequacy and effectiveness of the quality management system.

5.6.2. Review Input

The management review takes place through the analysis of data contained in the documents relating to the organisation of quality in the company:

- Internal audit reports
- Non-conformity reports
- Customer complaints
- The data relating to the parameters of effectiveness and efficiency of the processes
- Corrective and preventive actions report
- Results of the customer satisfaction monitoring
- Formation Management results
- The result of the previous reviews in terms of changes to the quality management system and improvement plans

From the examination of this documentation the directorate verifies the degree of implementation and effectiveness of the quality management system and the achievement of stated objectives.

5.6.3. Review Output

The results of the review are contained in a report presented during a meeting with the heads of departments. The report describes the quality objectives achieved in terms of improvement of the QMS and its processes, the product improvement connected to the customer requirements, the definition of new targets and the possible need for corrective action and new resources.

The report of the review is a document recording quality; it shall be kept by the quality manager within the records of the QS.

Section 6. RESOURCE MANAGEMENT

6.1. Provision of Resources

The management of *Fauri Mauro & C. S.a.s./K.G.* identified the resources necessary for the implementation of business processes and verified their availability with the heads of departments.

The analysis of resources focused on the following aspects:

- The organisational structure, improving the competences and the tools to implement continuous improvement
- Material resources in terms of equipment and means of work
- The infrastructure in terms of workspaces, equipment and organisational support services
- The work environment as a combination of human and physical factors
- Information
- Suppliers and partners
- Economic and financial aspects

6.2. Human Resources

The staff employed in activities that are considered to be part of the quality management system has been, and is, constantly subject to education and training.

Management defines the competence requirements needed for the personnel involved in influencing the quality. The directorate itself plans training programs and the expected goals.

The training aims to raise awareness on the importance of quality and is designed in order to get the proper performance of operations that have influence on the quality. An important part of training programs must be dedicated to education and updating system procedures.

The executive board - in order to achieve and continuously improve the knowledge necessary for the proper performance of the activities affecting quality - provides series of actions aimed at:

- Ensure that the staff is aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives
- Organise training programs and refresher courses for the staff

- Train personnel for specific tasks
- Keep an updated record of the training activities of each person

This activity is carried out using computer support. The application records:

- The necessary data for training activities (date, time, training content, etc.).
- The persons involved in the training

For each training activity the directorate carries out an evaluation of the effectiveness and the reasons that brought it and make this judgment.

6.3. Infrastructure

Fauri Mauro & C. S.a.s./K.G. uses the following infrastructure to achieve conformity of its products in compliance with the requirements specified in the law in force and the needs and expectations of the stakeholders. These infrastructures include:

- Corporate offices of Fauri Mauro & C. S.a.s./K.G.
- Indoor and outdoor plant
- Equipment factory
- Means of transport (cars and vans)
- Means of communication:
  - Telephone Networks
  - Phones for communication
  - Fax to communicate with customers and suppliers
  - E-mail for communication with customers, suppliers and agencies
  - ADSL line for internet connection
  - Website with company presentation and product line
  - Promotional material
  - Advertisement on specialized magazines

Fauri Mauro & C. S.a.s./K.G. has entrusted administrative means to the company secretary, and entrusted the maintenance tasks to a specialized external maintenance company to ensure their efficiency and continuity of operation.

6.4. Work Environment

The headquarters of *Fauri Mauro & C. S.a.s./K.G.* is located in the industrial area of Salorno where there are administrative offices as well as open and covered technical and

production areas with special machinery for production. There is also a warehouse area and an outdoor parking space that can be used as a deposit.

Fauri Mauro & C. S.a.s./K.G. protects the working conditions of the operators in accordance with the provisions in the risk analysis prepared according to the legislative decree 81/08.

Section 7. PRODUCT REALISATION

7.1. Planning and Realisation

Fauri Mauro & C. S.a.s./K.G. plans the production operations of its products by:

- Defining the product specifications with the client
- Defining the contract terms with the customer
- Defining the resources for the realisation of the product
- Defining the work program and control in collaboration with the operators
- Defining the records which are needed to provide evidence that the performed work and delivered products comply with the specified requirements

7.2. Customer-Related Processes

7.2.1. Determination of Requirements Related to the Product

In preparing the offer for a product, the SAM identifies the requirements of the customer, if necessary through contacts with the client, and indicates:

- The requirements specified by the customer including those relating to the delivery
- The requirements which are not explicitly defined by the customer but necessary for the expected usage of the product (provided that it is known)
- The requirements set by the laws in force in relation to the offered product
- Any additional requirements determined by *Fauri Mauro & C. S.a.s./K.G.*

7.2.2. Review of Requirements Related to the Product

The offer requests received by the *Fauri Mauro & C. S.a.s./K.G.* are examined by the SAM.

The SAM examines the technical documents supplied by the client (drawings, special specifications), verifies if they are sufficient to define the requirements of the customer, carries out, if necessary, an inspection and performs a feasibility analysis in terms of human and technical resources necessary to meet the demands of the customer.

After processing the offer, the SAM makes sure, that it contains all the requirements specified by the customer and the signature to attest the feasibility of the project.

The purchase order is formalised by the customer by written acceptance of the offer or by sending an order or a contract to sign.

In the event of the customer's order or contract to be signed, the PUM makes sure that the content of those corresponds to the contents of the offer and, in cases of discrepancies, resolves them with the customer.

If the latter is the case, the SAM signs the order for acceptance.

The contract documents are preserved by the SAM and the QM.

If the requirements of the work or other terms and conditions are modified by one of the parties, the changes are renegotiated by the SAM in the same manner as a new offer.

If the parties agree on the modification, the SAM reviews the documents and forwards them to the personnel involved in the new revisions.

7.2.3. Customer Communication

The SAM maintains contact with the client and updates him/her, verbally or in writing, on the work progress and about any issues that impede the smooth operation of manufacturing activities (delays in the delivery of critical materials, acts of God …).

Information or claims by the client in verbal or written form, are examined by the SAM, who then informs the directorate.

Customer complaints are dealt with in the manner indicated in P8 - Treatment of non-compliance.

7.3. Design and Development

Not applicable to *Fauri Mauro & C. S.a.s./K.G.*

7.4. Purchasing

7.4.1. Purchasing Process

The Management of *Fauri Mauro & C. S.a.s./K.G.* has prepared suitable modalities of supply, capable of ensuring that the products and services purchased are able to meet the requirements of *Fauri Mauro & C. S.a.s./K.G.*

Fauri Mauro & C. S.a.s./K.G. identified the materials and performances that have influence on quality.

For each type of critical material or performance *Fauri Mauro & C. S.a.s./K.G.* selects suppliers in agreement with their technical specifications of purchase.

Suppliers are selected on the basis of their reliability or on the basis of their acquired ISO 9001 certification.

Each year *Fauri Mauro & C. S.a.s./K.G.* performs a re-evaluation of approved suppliers through an assessment of their performance based on the following elements:

- Reliability
- Delivery speed
- Quality of the delivered products or services
- Cost
- Product certification

The results of the annual monitoring also take into account the records of non-compliance.

The details of this analysis are shown in P7.

7.4.2. Purchasing Information

Characteristics of critical products can be found in the suppliers' data sheets of in the technical specifications developed and agreed with the supplier.

The economic conditions of purchase are included in the suppliers' lists, written offers of the supplier or written orders sent to the supplier which refer to the technical specification and contractual conditions agreed.

The contents of the business performance of installers and fitters are defined in special contracts between the parties.

The purchase order is reviewed by the SAM prior to the emission, to ensure that the contractual requirements prove to be clear and complete.

7.4.3. Verification of Purchased Products

The methods of control of purchased products can be found in P7.

The types of control are carried out as follows:

- Identification controls of product, quantity, normative references and integrity performed at the reception
- Functional controls performed in some cases at takeover and in most cases before of processing the materials
- Correspondence control with the transport document performed at the reception
- Correspondence control between transport document and purchase document executed in the office within 3 days of receipt
- Functional controls performed in some cases at takeover and in most before processing the materials

For particularly urgent reasons, there may be the need to use materials bought before knowing the results of any tests or checks being carried out.

The *Fauri Mauro & C. S.a.s./K.G.* has recognised the need, in some cases, to verify the purchased product and has requested it in its purchase order. The verification of the product purchased by the *Fauri Mauro & C. S.a.s./K.G.* does not relieve the supplier of the responsibility to perform the final check to the release.

If specified in the contract, *Fauri Mauro & C. S.a.s./K.G.* grants to its customers, in the manner indicated in P7, to ascertain at its facility that what has been accomplished or acquired by *Fauri Mauro & C. S.a.s./K.G.* corresponds to what is specified in the contract.

7.5. Production and Service Provision

7.5.1. Control of Production and Service Provision

The construction control of graphite or iron components occurs through the following activities:

- Information on the characteristics of the product are contained in the technical documentation.
  All responsibilities and tasks to control the technical documents and contractual orders are defined at P7.

  The same procedure lists the technical and administrative formalities and responsibilities that have to be carried out before, and during, the early stages of production.
  The DIR uses information about the order planning, provided by PRM and SAM, to perform a feasibility study for participation in public tender or to make offers to private customers in terms of availability of resources (personnel and equipment).
- The availability of work instructions issued for the control of machining operations. The work instructions concern processes of greater complexity or that are critical and/or of interest for those responsible for the production and assembly. The department managers explain these instructions verbally to the operators whenever the need arises.

  Fauri Mauro & C. S.a.s./K.G. plans the controls that need to be performed to keep the production operations under control. The results of its inspections, deficiencies and non-compliances are documented and recorded.
- The use of proper functioning equipment and work instruments
- The availability of measuring devices which are subject to regular control and calibration
- The implementation of tools to monitor and measure customer satisfaction
- Measure the adequacy, effectiveness and application of the QMS through the results of the internal audits, as the P8 "*Measurement, Analysis and Improvement*" suggests
- Monitoring of product characteristics provided by the tests specified in P7.

- Monitoring products which are not complying with the procedures indicated in P8 "*Managing non-compliance*"

7.5.2. Validation of Processes for Production and Service Provisions

The validation that is required for production processes takes place through a series of controls during the phases of production itself.

All production processes and delivery service have been validated through production experiences implemented in time for:

- The management of equipment, vehicles and machinery
- Operators

This has led to the definition of the optimal parameters in implementing rules for the conduction of the processes themselves.

The methods of process operations are included in the procedures in place.

For each product, records are provided to demonstrate the compliance of the process which has been carried out.

7.5.3. Identification and Traceability

Purchased critical materials are in most cases identified by the manufacturer.

The traceability is not a contractual requirement, but is binding element with regard to the used materials, which in many cases must be marked CE and demonstrate certain characteristics (resistance, size, humidity etc...)

To allow the process of continuous improvement, *Fauri Mauro & C. S.a.s./K.G.* is able to track its activities through:

- The staff employed in production
- The equipment used in the production process
- Through the shipping documents and the acceptance control of critical materials
- The results of the controls which have been carried out

The identification of the materials which are present in the plant is guaranteed by a label on the material itself.

Any non-conforming products are made visible by segregation or a clear marking in easily visible areas, which shows the state of non-compliance.

7.5.4. Customer Property

In cases where the client provides *Fauri Mauro & C. S.a.s./K.G.* its own proprietary products *Fauri Mauro & C. S.a.s./K.G.* verifies the suitability of the product and is responsible for the proper care and maintenance of the products supplied by the customer. In the case of products requiring special safeguard measures *Fauri Mauro & C. S.a.s./K.G.* takes care to ask the customer how to correctly take care of it.

The verification of the product supplied by the customer does not relieve the customer from the responsibility to provide acceptable products.

If there is damage to the product provided by the client or a damage to parts belonging to the purchaser, *Fauri Mauro & C. S.a.s./K.G.* promptly notifies the customer agreeing on the modalities of repair or restoration.

In the case that the customer provides to *Fauri Mauro & C. S.a.s./K.G.* the ownership of an intellectual know-how, patents or otherwise, *Fauri Mauro & C. S.a.s./K.G.* undertakes to keep such products with due caution preventing them to become noted by others, unless it is already at the disposal of all.

7.5.5. Preservation of Product

Fauri Mauro & C. S.a.s./K.G. organises the purchase of materials for use with direct delivery at the factory or warehouse. In all cases, the storage conditions are such to ensure the correct preservation of the item.

The head of department is responsible for the proper storage of goods and monitors periodically that this condition is maintained during all handling operations. If damaged, materials are treated as non-compliant products.

The storage of materials used in the plant of *Fauri Mauro & C. S.a.s./K.G.* occurs mainly in covered areas and sometimes in open areas. The person in charge of the warehouse verbally communicates which products can be stored outside and under which precautions.

The products stored in the warehouses of *Fauri Mauro & C. S.a.s./K.G.* are not subject to expiration, but if this situation were to occur, the Warehouse Manager is to oversee and monitor the deadline.

In the annual physical inventory, the PRM or SAM performs a control of all products in stock to ensure their perfect preservation and validity, segregating any non-conforming material.

The administration of heavy materials occurs with the help of a forklift.

The management of resources and equipment is performed by qualified employees who are provided, where necessary, with the required training courses.

The delivery of finished products follows the procedure defined in the sale contract. The responsibility that this is done in accordance with the contract is of the SAM.

7.6. Control of Measuring and Monitoring Equipment

Fauri Mauro & C. S.a.s./K.G. lays down detailed rules for the calibration of instruments that measure parameters with direct influence on the product quality.

These tools are controlled by other highly reliable samples. An accuracy within the tolerance limit of interest is required.

Every new measurement tool at *Fauri Mauro & C. S.a.s./K.G.* requires a calibration certificate from the manufacturer or an internal verification calibration.

The precision required by the instruments is determined by the PRM on the basis of project data.

The choice of the type of instrument to be used, unless otherwise specified, is in responsibility of the PRM.

7.6.1. Linear Measures

For linear measurements the company uses measurement tapes conform to class II of the MPE (EMT) 73/362/EEC provided by the DIR.

In particular, for this class, the manufacturer guarantees and certifies a maximum error in millimetres expressed by the following formula:

$$EMT\ (mm)\ =\ 0.3\ +\ (0.2\ x\ L)$$

where L is the length in question, rounded to the next whole meter above. For example, to a 20m metric rope the maximum error is:

$$EMT\ =\ 0.3\ +\ (0.2\ x\ 20)\ =\ 4.3\ mm.$$

This enables the company to meet the requirements of the standards and/or specifications normally used as reference standards and contract.

The quality manager has the responsibility to monitor, during internal audits, that the meters are suitable for use by checking:

- The presence of a symbol indicating the class II precision defined by DIR. 73/362/EEC (II)
- The absence of ruptures and other damages

- The sharpness of the lines and figures
- The smoothness of the tape
- The functionality of the locking mechanism

These instruments are not subject to identification.

7.6.2. Calibrated Instruments

Additional measuring instruments used by *Fauri Mauro & C. S.a.s./K.G.* are calibres, micrometres and tracers, for which no special form of external calibration is needed. The methods of control, frequency and responsibility are handled in accordance with the procedure P7.

In the event that the measuring instruments are supplied by the client or by other companies, *Fauri Mauro & C. S.a.s./K.G.* ensures their operating status by requesting the documentation of calibration or control to the supplier and, in absence it, supervises the instrument by comparison with its own instruments.

In the event of any fault, the person who detects the non-compliance immediately notifies the PRM and suspends the measurements with such item.

Section 8. MEASUREMENTS, ANALYSIS AND IMPROVEMENT

8.1. General

Fauri Mauro & C. S.a.s./K.G. plans:

- The necessary monitoring, measurement and analysis to demonstrate the conformity of its products
- The necessary operations to demonstrate the effectiveness of the QMS
- The required operations to demonstrate continual improvement of its QMS

For manufacturing activities at *Fauri Mauro & C. S.a.s./K.G.*, no methods of statistical process control are provided.

Fauri Mauro & C. S.a.s./K.G. conducts analysis of distribution, of non-compliance, complaints, corrective actions and the performance of suppliers.

The QM is responsible for data processing and has to present the results of statistical analysis during the management review.

8.2. Monitoring and Measurement

8.2.1. Customer Satisfaction

Fauri Mauro & C. S.a.s./K.G. performs an initial evaluation of customer satisfaction through the analysis of the complaints received during the year in the form of verbal or written communication.

To learn more about customer satisfaction, *Fauri Mauro & C. S.a.s./K.G.* monitors customer satisfaction by sending a questionnaire to all customers once every year.

The analysis of the questionnaire responses is performed by the QM by identifying the activities for which the customer was not satisfied.

8.2.2. Internal Audit

Internal audits are performed in order to verify if the set up on the quality management system is applied correctly and respected by all units. In particular, internal audits must find that:

Appendix D

Quality System Documents

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S4.01 - Document Management Plan in Quality System

Revision 02 - 21/11/2012

		Revision Matrix						Archive	Archive Period	Directorate	Prevention and Protection Manager	Quality Manager	Sales Manager	Purchasing Manager	Administration Manager	Production Manager	Head of Carpentry Department	Head of Graphite Department	Employee
		0	1	2	3	4	5												
P4	**Structure and Documentation of the Quality System**	**20120217**	**20121122**																
S4.01	Document Management Plan in Quality System	20120217						Tecnical Office	Untils Revision	X		X			X				
S4.02	Timetable ISO9001:2008	20120217	20121122					Tecnical Office	Untils Revision	X		X			X				
M4.01	External Documents	20120215						Tecnical Office	Untils Revision	X		X	X	X	X	X			
P5	**Directional Process**	**20120217**	**20121121**																
S5.01	Organisational Structure	20120424						Tecnical Office	Untils Revision	X	X	X			X				
S5.02	Quality Policy	20120217						Tecnical Office	Untils Revision	X	X	X	X	X	X	X	X	X	X
S5.03	Job Description	20120215						Tecnical Office	Untils Revision	X	X	X			X				
M5.01	Management Review	20120217						Tecnical Office	Untils Revision	X	X	X			X				
M5.02	Meeting Module	20120208	20121121					Tecnical Office	Untils Revision	X		X			X				
P6	**Resource Management**	**20120217**	**20121121**																
M6.01	Formation Management	20120217						Tecnical Office	Annual	X	X	X			X				
M6.02	Personal Formation Sheet	20120217						Tecnical Office	Untils Revision	X	X	X	X		X				
M6.03	Vehicle Management	20120217						Tecnical Office	Annual	X		X	X						
M6.04.01	Machinery Management	20120217	20121121					Tecnical Office	Untils Revision	X	X	X			X				
M6.04.02	Equipment Management	20120217	20121121					Tecnical Office	Untils Revision	X	X	X			X				
M6.04.03	CNC Machinery Management	20120217	20120820					Tecnical Office	Untils Revision	X	X	X				X	X	X	X
P7	**Product Realisation Management**	**20120217**	**20121122**																
M7.01	Quotation Register	20120217						Tecnical Office	Annual	X		X	X						
M7.02.01	Purchase Request	20120217						Tecnical Office	Untils Revision	X		X	X	X					
M7.02.02	Tools, materials and accessories needed	20120215						Tecnical Office	Untils Revision	X		X	X	X		X	X	X	X
M7.03	Qualified Supplies	20120215	20121122					Tecnical Office	Annual	X		X	X	X					
M7.04.01	Quotation/Confirmation	20121121						Tecnical Office	Untils Revision	X		X	X	X	X				
M7.04.02	Order Form	20120215						Tecnical Office	Untils Revision	X		X	X	X					
M7.05	List of Measuring and Monitoring Equipment	20120216						Tecnical Office	Untils Revision	X	X	X				X	X	X	X
M7.06.01	Serial Order	20120216						Tecnical Office	Untils Revision	X		X	X		X	X	X	X	X
M7.06.02	Extra-ordinary Order	20120216						Tecnical Office	Untils Revision	X		X	X		X	X	X	X	X
M7.07.01	Activity Record	20120307						Tecnical Office	Untils Revision	X		X	X		X	X	X	X	X
M7.07.02	Hoist Devices Control	20120215						Tecnical Office	Untils Revision	X	X	X			X	X	X	X	X
M7.08	Conformity Certificate	20120215	20121121					Tecnical Office	Untils Revision	X		X			X	X	X	X	X
I7.08	Conformity Controls	20120217						Tecnical Office	Untils Revision	X		X			X	X	X	X	X
I7.09	Bender Instruction	20120816						Tecnical Office	Untils Revision	X		X				X	X		X
P8	**Measurement, Analysis and Improvement**	**20120217**	**20121122**																
M8.01	Internal Audit Report	20120215	20121122					Tecnical Office	Untils Revision	X	X	X			X				
M8.02	Non-Conformity Report	20120217						Tecnical Office	Untils Revision	X	X	X			X				
M8.03	Indicators	20120217						Tecnical Office	Annual	X	X	X	X	X					
M8.04.01	Customer Satisfaction Questionnaire	20120217						Tecnical Office	Annual	X		X	X		X				
M8.04.02	Questionnaire Evaluation	20120217						Tecnical Office	Annual	X		X	X		X				

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S4.02 - Timetable ISO 9001:2008

Revision 01 – 22/11/2012

Code	Description	Last Compilation	Next Compilation	Accountable
M4.01	External Documents	January 2012	January 2013	Manuel
S4.01	Document Management Plan in Quality System	Introduction, Revision od Elimination of a Quality System document		Manuel
S4.02	Timetable ISO9001:2008	Changes in the Quality System documents		Manuel
M5.01	Quality Management System Review	February 2012	February 2013	Manuel, Mauro
M5.02	Meeting Module	Every meeting		Participants
S5.01	Organisational Structure	February 2012	Changes in personnel	Manuel
S5.02	Quality Policy	February 2012	Changes in the Quality Policy	Manuel, Mauro
S5.03	Job Description	February 2012	Changes in job description	Manuel, Mauro
M6.01	Formation Management	January 2012	January 2013	Manuel, Mauro
M6.02	Personal Formation sheet	February 2012	Changes in personnel formation	Manuel
M6.03	Vehicle Management	February 2012	April 2013	Manuel
M6.04.01	Machinery Maintenance	March 2012	March 2013	Employee
M6.04.02	Equipment Maintenance	March 2012	March 2013	Employee
M6.04.03	CNC Machinery Maintenance	March 2012	June 2012	Employee
M7.01	Quotation Register	January 2012	January 2013	Manuel
M7.02.01	Purchase Request	Whenever necessary		Mauro
M7.02.02	Material, Equipment and Accessories needed	Whenever necessary		Employee
M7.03	List of qualified suppliers	January 2012	January 2013	Manuel, Mauro
M7.04.01	Quotation	Whenever necessary		Mauro
M7.04.02	Purchase	Whenever necessary		Mauro
M7.05	List of Measuring and Monitoring Equipment	February 2012	Agosto 2012	Employee
M7.06.01	Serial Order	Weekly		Administration
M7.06.02	Extra-Ordinary Order	Weekly		Administration
M7.07.01	Activity Record	Whenever necessary		Employee
M7.07.02	Hoist devices control	Three-monthy (Controls at SEPR Italia s.p.a.)		Employee
I7.09	Conformity Certificate Instructions	Changes in the products which necessitate controls		Manuel, Mauro
M7.08	Conformity Certificate	Whenever designated products are produced		Employee
M8.01	Internal Audit Report	February 2012	January 2013	Manuel, Mauro
M8.02	Non-conformity report	Every time a Non-Conformity is detected		Manuel, Mauro
M8.03	Indicators	February 2012	January 2013	Manuel
M8.04.01	Customer Satisfaction Questionnaire	February 2012	January 2013	Manuel, Mauro
M8.04.02	Questionnaire Evaluation	February 2012	February 2013	Manuel

INDEX OF DOCUMENTS WITH EXTERNAL ORIGIN

Document	Version	Revision Date	Source	Frequency of Control
UNI EN ISO9001:2008 Norm	4	2008	www.unicei.it	1 Year
Work safety: Law 81/08	-	2008	Security Consultant	1 Year
Legislative Decree 196 - Privacy	-	30/06/2003	Security Consultant	1 Year
Microsoft Office		2010	Microsoft Update	Automatic
Arca Professional	3.0.1104	18/01/2008	Tecnobit Consultant	Automatic
Visi Series Machining Strategist	13.2 sp2	07/2006	Overmach Consultant	1 Year
Machine document: Doosan Puma 240c	1	02/2010	Overmach Consultant	1 Year
Machine document: Menti 240 CNC Siemens	1	10/01/2001	Overmach Consultant	1 Year
Machine document: Doosan TL2500	1	09/06/2010	Overmach Consultant	1 Year
Machine document: Doosan VT900	1	13/12/2007	Overmach Consultant	1 Year
Machine document: Doosan DNM500	1	19/06/2010	Overmach Consultant	1 Year
Machine document: Remac CN2 Selca1200	1	29/01/2001	Overmach Consultant	1 Year
Machine document: Jiuh-Yeh JY-2VHT	02	Gennaio 2002	Overmach Consultant	1 Year
Machine document: AWEA	8	Marzo 2004	Overmach Consultant	1 Year
SGS Regulation	10	2010	SGS Instructor	1 Year
Guidelines for the usage of the SGS certifitication mark	1	2010	SGS Instructor	1 Year
Tecnical drawings MEMC S.p.a.	-	-	MEMC S.p.a.	Until revision
Tecnical drawings SEPR Italia S.p.a.	-	-	SEPR Italia S.p.a.	Until revision

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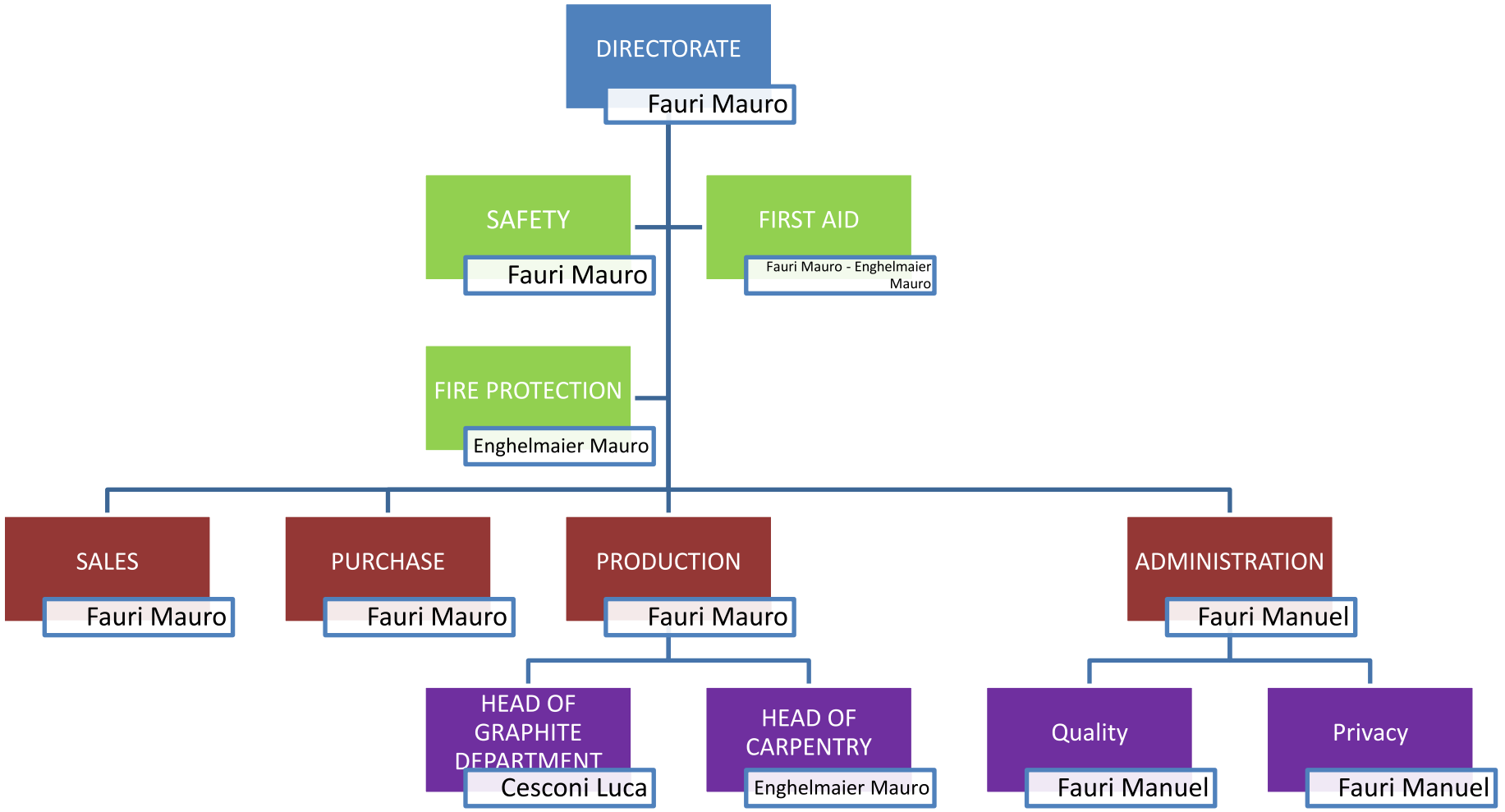
S5.01 – Organisational Structure

Revision 00 – 25/04/2012



Quality Policy

Fauri Mauro & C. S.a.s./K.G. gives highest priority to the production of reliable and durable products that meet and exceed the expectations of its customers. This can only be achieved through the dedicated work of every member of the company, from planning to final the delivery of the product, knowing that they must produce a high quality product.

To help its employees in the production of a precise and error-free product, the company makes use of modern technology and seeks to continually invest in the innovation of its structure and its machinery to increase product quality and process efficiency .

The emphasis of our Quality System is based on the concept that error prevention is better, cheaper and safer than the correction and elimination of errors. Every member of the company is obliged to actively support the absence of risk factors and potential errors in addition to seeking to reduce costs and production time wherever possible.

To ensure this passion for work, Fauri Mauro & C. S.a.s./K.G. tries to make sure that its employees feel secure and happy in the company. The employees are the essence of the company and, in return, the company strives to do its best to valorise and educate them as well as to encourage them to improve their working skills through external courses whenever possible.

Particular attention is given to the evaluation of customer satisfaction and possible strategies to increase it. Annually a detailed analysis is carried out on the basis of all compiled questionnaires.

Fauri Mauro & C. S.a.s./K.G. pays particular attention to all the adjustments and transpositions of mandatory regulations.

Despite the vast experience in the field in which it operates, and an internal system that has been successful for many years, Fauri Mauro & C. S.a.s./K.G. decided to adopt the ISO 9001 Quality System to give greater impulse to the company and to ensure that these guidelines are adopted effectively and help to further improve the system.

The company has appointed Manuel Fauri as the Management Representative with the authority and responsibility to implement, monitor and analyse a Quality System compliant with ISO9001:2008 and report regularly to the management for periodic reviews and potential improvements.

Quality Manager (RAQ) Approved by Directorate (DIR)

FUNCTIONAL ROLE:

MINIMUM COMPETENCES:

Experience:

Internal Activities:

External Activities:

Know-How:

PERSON IN CHARGE:

RESPONSIBILITIES:

Approved by the Directorate (DIR) _____

Participants:

Name/Surname	Manuel Fauri	Mauro Fauri
Role	Quality Manager	Directorate
Signature		

Analysed topics / Input:

Number	**Description**
1	Internal Audit results
2	Customer Satisfaction analysis
3	Non-Conformity Management
4	Suppliers qualitative development
5	Preventive actions / Projects for improvement
6	Quality Policy
7	Compliance with the rules and binding regulations
8	Indicator analysis

Attached to the review / Output:

Title/Description
Formation Plan – M6.01
Indicators – M8.03

Report Synthesis:

Number	Description
1	
2	
3	
4	
5	
6	
7	
8	

Date:

Compiled: *Approved:*

MEETING REPORT

On the …… at …… the periodic meeting number ……. was carried out.

The meeting was proclaimed by the employer and, in presence of the employees listed below, the following topics were discussed:

- Business situation ☐
- Business strategy ☐
- Risk analysis and evaluation ☐
- Verification of the companies' instruments' suitability ☐
- Formation programs ☐
- Work analysis ☐
- Other …… ☐

Outcome:

Participants:

Fauri Mauro	Firma:
Fauri Manuel	Firma:
Cesconi Luca	Firma:
Curcio Mauro	Firma:
Enghelmaier Mauro	Firma:
Sandri Mirco	Firma:

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M6.01 – Formation Management

Revision 00 – 17/02/2012

Formation Plan			Names and roles of personnel									Completion		
			Fauri Mauro	Fauri Manuel	Enghelmaier Mauro	Cesconi Luca	Sandri Mirco	Curcio Mauro					Verification	
Activity	Period	Lecturer	DIR	RAQ	Head of Carpentry Department	Head of Graphite Department	Employee	Employee				Conclusion date	Result	Accountable

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M6.02 – Personal Formation Sheet

Revision 00 – 17/02/2012

Name: **Surname**:

Born the: **In**:

Residence:

Hiring date:

Qualification:

Experience:

☐ Fire Protection course ☐ Work Safety course

☐ First Aid course ☐ CNC course

☐ CAD/CAM course ☐ Forklift course

Course				
Date	*Duration*	*Description*	*Result*	*Notes*

Updated: 17/02/2012 **Signature Employee**: _____

Vehicle		Expiration dates & Costs							Notes
Licence plate	Model	Stamp due date	Stamp cost	Insurance date	Insurance cost	Vehicle inspection date	Leasing	Coupon	
BK377TE	Nissan Atleon 110	31/01/2012	40,71 €	25/04/2012	1057,00 €	15/12/2011	-		
CS709HW	VW Golf 4 1.6	31/12/2011	180,51 €	22/04/2012	416,00 €	29/04/2013	-		
EA533CZ	Mercedes ML320 CD I	31/12/2011	460,07 €	06/05/2012	1342,00 €	14/06/2013	-		
	Forklift								

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M6.04.01 – Machinery Maintenance

Revisione 01 – 21/11/2012

Other machinery

Machine		Last Maintenance date	Performed by	Planned Maintenance					Next Maintenance date	Notes
Type	Identification			Gear Oil	Lubricant Oil	Oil Filter	Electrical Wires	Blade		
Milling machine	Berico FV-2AP									
Bender	Star AP 3100x200									
Bender	Euromac Digibend 360									
Punch	IMS HY50v									
Slotting	Electra									
Cutting	Gecko									
Lathe	Labor 255									
Lathe	Labor 160S									
Lathe	ZMM CU 582 Sofia									
Drill	Foster									
Drill	"Dipartimento Carpenteria"									
Drill	"Dipartimento grafite"									
Drill	Bimark 35 Fr/m									
Cutting	Lucas									

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M6.04.02 – Equipment Maintenance

Revision 01 – 21/11/2012

Equipment

Equipment		Last Maintenance date	Performed by	Plannend Maintenance					Next Maintenance date	Notes
Type	Identification									
Chain sharpener										
Tool sharpener	Aceti SM4T									
Tool sharpener	HH “1”									
Tool sharpener	HH “2”									
Grinder										
Grinder	Marpol Mod. 101									
Grinder										
Oxygen/Acetylen										
Hydraulic press	“Grafoil”									
Hydraulic press	Sincom									
Wire Welding	Sincosald Combi 4R									
Wire Welding	Nuova Cerso ISFC450									
Wire Welding										
Manual Welding	Italsaldatrici “1”									
Manual Welding	Italsaldatrici “2”									
TIG Welding	Thermal Dynamics Professional									
Aluminum Welding	Sincosald Starplus 4400									
Plasma Welding	CERV									
TIG Welding	Hitachi Inverter Pair 300GP III									
Manual Saw	Brown S.N. 270									
Circular Saw										
Automatic Saw	Fabris 275									
Manual Drills										

Maintenance Type	Gear Oil	Lubricant Oil			Computer Filter	Oil Filter	Air Filter	Transparent Film
Performed the								
Performed by								
Result								
Notes								
Performed the								
Performed by								
Result								
Notes								
Performed the								
Performed by								
Result								
Notes								

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M7.01 – Quotation Register

Revision 00 – 17/02/2012

N°	*Date*	*Client*	*Contact*	*Description*	*Total [€]*	*Order received?*	
						Yes	*No*

N° Quotations		*Awarded*		
		Not Awarded		
Total Quotations [€]		*Awarded*		
		Not Awarded		

Administration Manager: _____

Directorate: _____

Description	*Quantity*	*Supplier*	*Expected delivery date*	*Delivered?*

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M7.02.02 – Material, Equipment and Accessories needed

Revision 00 – 15/02/2012

Description	*Quantity*	*Delivered?*

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M7.03 - Qualified Suppliers

Revision 01 - 22/11/2012

Supplier	City	Type of supply	Reference Person	Price	Flexibility	Delivery	Average	General Evaluation / Notes	Certifications
CNC Machinery									
Agromec	Bolzano	Hydraulic Machine Tools		3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Ambrosi	Gardolo (TN)	Precision Machinery		2	3	3	2,7		☒ ISO 9001 ☐ CE Label ☐ _____
Costa Patrizio	Sporminore (TN)	CNC Machining	Patrizio	4	3	3	3,3		☐ ISO 9001 ☐ CE Label ☐ _____
Kasseroler	Bolzano	CNC Machining	Christian	3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Pezzi Giuseppe	Roveré della Luna (TN)	CNC Machining	Pezzi Giuseppe	4	3	3	3,3	Error during the production of 1200 pieces (21/11/2012)	☐ ISO 9001 ☐ CE Label ☐ _____
Piazza Giorgio	Rovereto (TN)	CNC Machining		3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Re.Mac.	Rovereto (TN)	CNC Machining		3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Stenghel Aldo	Caldonazzo (TN)	CNC Machining	Stenghel Aldo	4	3	3	3,3		☐ ISO 9001 ☐ CE Label ☐ _____
Tool sharpening									
ABS Utensili	Susegana (TV)	Tool sharpening		3	3	3	3		☒ ISO 9001 ☐ CE Label ☐ _____
Laser/Water cutting									
Bazzanella	Vurza (BZ)	Laser cutting	Bazzanella Alberto	3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Material supply									
Centro Inox	Mezzocorona (TN)	Stainless Steel	Drigo René	2	3	3	2,7		☐ ISO 9001 ☐ CE Label ☐ _____
Ecor	Schio (VI)	Stainless Steel	Bortolotto Ivano	3	2	3	2,7		☐ ISO 9001 ☐ Marcatura CE ☐ _____
Airoldi Metalli	Molteno (LC)	Stainless Steel and Alloys		3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Metal Center	Gardolo (TN)	Steel / Stainless Steel / Alloys		3	2	2	2,3		☐ ISO 9001 ☐ CE Label ☐ _____

Musola Metalli	San Martino B.A. (VR)	Metallic Alloys		2	3	3	2,7		☐ ISO 9001 ☐ CE Label ☐ _____
Albertini	Trento	Plastic		3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Mediatec	Montebelluna (TV)	Plastic		3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Scala	Torri di Quartesolo (VI)	Plastic		3	1	2	2		☐ ISO 9001 ☐ CE Label ☐ _____
Gamas	Bigarello (MN)	Welding materials		3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Messner & Bonora	Magré (BZ)	Wood		3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Machinery and Tools									
Delta Macchine	Altavilla Vicentina (VI)	Tools		4	3	3	3,3		☐ ISO 9001 ☐ CE Label ☐ _____
SCR	Travagliato (BS)	Tools		3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Overmach	Moletolo (PR)	CNC Machines		4	3	3	3,3		☐ ISO 9001 ☐ CE Label ☐ _____
Other									
Alpifuni	Laives (BZ)	Metallic Ropes		3	3	3	3		☐ ISO 9001 ☐ CE Label ☐ _____
Battocletti	Mezzolombardo (TN)	Hardware		4	3	3	3,3		☐ ISO 9001 ☐ CE Label ☐ _____
Dalla Tina	Coredo (TN)	Carpentry	Dalla Tina Lino	4	3	3	3,3		☐ ISO 9001 ☐ CE Label ☐ _____
Bazzanella	Laives (BZ)	Sheet metal bending / Calandering	Bazzanella Ugo	3	2	3	2,7		☐ ISO 9001 ☐ CE Label ☐ _____

Evaluation				
1	< Average <	1,9	=	Insufficient
2	< Average <	2,9	=	Sufficient
3	< Average <	3,5	=	Good
3,6	< Average <	4	=	Very Good

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M7.05 - List of Measuring and Monitoring Equipment

Revision 00 - 16/02/2012

Measuring and Monitoring Equipment

Equipment	*ID*	*Measurement limit*	*Control*		*Next Control Date*	*Gauge block measure*	*Signalised measure*	*Precision*	*Result*		*Notes*	*Adjusted?*
			Date	*By*					OK	NO		
Digital calibre	1	0-150	16.02.2012	Luca	16.11.2012	10	10,015	0,015	x		Acceptable	
Calibre	2	0-250	16.02.2012	Luca	16.02.2013	10	10,000	0,000	x		Optimal	
Calibre	3	0-250	16.02.2012	Luca	16.02.2013	10	10,020	0,020	x		Acceptable	
Calibre	4	0-600	16.02.2012	Luca	16.02.2013	10	10,000	0,000	x		Optimal	
Calibre	5	0-850	16.02.2012	Luca	16.02.2013	100	99,800	0,200	x		Limit	
Digital calibre	6	0-150	16.02.2012	Luca	16.11.2012	100	100,000	0,000	x		Optimal	
Calibre	7	0-150	16.02.2012	Luca	16.02.2013	10	10,005	0,005	x		Optimal	
Micrometre	510-A	0-25	16.02.2012	Luca	16.08.2012	10	10,005	0,005	x		Good	
Micrometre	Far	0-25	16.02.2012	Luca	16.08.2012	10	10,025	0,025		x	To adjust	
Micrometre	4475	0-25	16.02.2012	Luca	16.08.2012	10	10,003	0,003	x		Optimal	
Micrometre	103-138	25-50	16.02.2012	Luca	16.02.2013	25	25,000	0,000	x		Optimal	
Micrometre	K	25-50	16.02.2012	Luca	16.08.2012	25	25,005	0,005	x		Good	
Micrometre	K	50-75	16.02.2012	Luca	16.08.2012	50	50,010	0,010		x	To adjust	
Micrometre	103-139	50-75	16.02.2012	Luca	16.02.2013	50	50,000	0,000	x		Optimal	
Micrometre	///	75-100	16.02.2012	Luca	16.08.2012	75	75,003	0,003	x		Optimal	
Micrometre	K	75-100	16.02.2012	Luca	16.08.2012	75	75,000	0,000	x		Optimal	
Micrometre	Panter	100-125	16.02.2012	Luca	16.08.2012	100	100,010	0,010	x		Optimal	
Micrometre	µ	125-150	16.02.2012	Luca	16.08.2012	125	125,003	0,003	x		Good	
Micrometre	Mituyoto	150-175	16.02.2012	Luca	16.08.2012	150	150,000	0,000	x		Optimal	
Micrometre	Mituyoto	175-200	16.02.2012	Luca	16.08.2012	175	175,000	0,000	x		Good	
Micrometre	MC	200-225	16.02.2012	Luca	16.08.2012	200	200,010	0,010	x		Optimal	
Internal Micrometre	Mituyoto	5-30	16.02.2012	Luca	16.08.2012	5	5,000	0,000	x		Optimal	

Internal Micrometre	Mituyoto	25-50	16.02.2012	Luca	16.08.2012	25	25,030	0,030		x	To adjust	
Deep Measurement	Metrica		16.02.2012	Luca	16.11.2012	25	25,070	0,070	x		Optimal	
Alesometro	Mituyoto	35-60	16.02.2012	Luca	16.11.2012	50	50,010	0,010	x		Optimal	
Alesometro	Borletti	15-210	16.02.2012	Luca	16.11.2012	50	50,000	0,000	x		Optimal	
Calibre	Stainless	0-200	16.02.2012	Luca	16.02.2013	10	10,010	0,010	x		Good	
Digital calibre	10225191	0-200	16.02.2012	Luca	16.02.2013	10	10,000	0,000	x		Optimal	
Calibre	Etalon	0-200	16.02.2012	Luca	16.02.2013	10	10,000	0,000	x		Optimal	
Calibre	11360884	0-200	16.02.2012	Luca	16.02.2013	10	10,000	0,000	x		Optimal	

Office Control Equipment												
Equipment	*ID*	*Measurement limit*	*Control*		*Next Control Date*	*Gauge block measure*	*Signalised measure*	*Precision*	*Result*		*Notes*	*Adjusted?*
			Date	*By*					OK	NO		
Micrometre	102-301	0-25	16.02.2012	Luca	16.08.2012	25	25,000	0,000	x		Optimal	
Micrometre	102-302	25-50	16.02.2012	Luca	16.02.2013	25	25,000	0,000	x		Optimal	
Micrometre	102-304	50-75	16.02.2012	Luca	16.02.2013	50	50,000	0,000	x		Optimal	
Micrometre	102-303	75-100	16.02.2012	Luca	16.02.2013	75	75,000	0,000	x		Optimal	
Digital calibre	11225925	0-200	16.02.2012	Luca	16.02.2013	10	10,000	0,000	x		Optimal	
Digital calibre	11254942	0-150	16.02.2012	Luca	16.02.2013	10	10,000	0,000	x		Optimal	

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«Nummer» / 2012

CLIENT			
CONTACT		ORDER N°	
ORDER DATE		DELIVERY DATE	

Description	Quantity

Utilised Material

Quantity

Duration

Employee											
Date											
Hours											

Transport Document:

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M7.07.02 – Hoist Devices Control

Revision 00 – 15/02/2012

Client	SEPR Italia S.p.a.	Di	Mezzocorona (TN)
Order		Intervention date	
N°		Year	

PERIODIC INSPECTION HOIST DEVICES

Hoist type	Pinza meccanica		Type	Teeth	
Constructor				Wedge	
Year of construction			Register N°		
Capacity [kg]			Internal N°		
Opening [mm]	max		Internal dislocation		
	min				

TECHNICAL DETAILS

Pos.	Type of Inspection	Result		Substitutive Components	Eventual Anomalies
		Positive	Negative		
1	Chains				
2	Chain Joints				
3	Chain Grills				
4	Gripper Arms				
5	Pin				
6	Pressure Bushing				
7	Pressure Nut				
8	Friction Disc				
9	Jaws				
10	Fixing bolts				
11	Opening Jacks				
12	Painting				
13	Identification Plate				
14	Notes				

Stamp and Signature:

Nebulizer: By making some tool changes, verify that 2 drops of oil fall (oil spray). Eventually, adjust the fall with the screw lying above.

With the machine in emergency mode, let text cooling, tire change lubrication and fridge level in idle (oil 32).

Check the glass behind (Oil 32) and check that it is always to level. It is needed by the cylinder that replaces the tool.

Remove tools every night.

Single block - T18 M6 - Remove tool

Regulations for Conformity Controls

1) The measurements shall be performed using the control equipment adequate for the accuracy required by the customer.

2) The control equipment (calibres, micrometres and gauge blocks) must be checked and calibrated regularly according to the indications of the quality system (Module 7.04).

3) The measurements are to be performed according to a random logic so as to minimize the possibility of error.

4) The amount of checks to be performed depends on the size of the batch of units ordered, and must follow the following guidelines:

1 to 10 pieces:	1-2 controls
10 to 25 pieces:	3-5 controls
26 to 50 pieces:	5-7 controls
51 to 100 pieces:	8-10 controls
Above 100 pieces:	Minimum 10% of the requested amount

5) Measurements should be reported on appropriate forms (M7.08 – Conformity Certificate) for measurements and delivered to the office before delivery to the customer.

6) All of MEMC's serial pieces that need to be checked can be found on the following pages.

7) For all other pieces that need to be controlled, a notification will be highlighted on their drawing.

8) The controlled items must be identifiable on the Conformity Certificates (M7.08) with their number of merchandise or drawing, the controlled batch quantity and a description of the pieces. Also the required values of the measures that need control, any notes and the work conclusion date must be recorded at the bottom of the work sheet.

9) In the case of detected flaws, the measures must be noted on the Conformity Certificate (M7.08) and the part in question marked with a "NO" as a comment. Finally, a brief explanation of how the error was remedied must be given in the "Notes" field.

10) For values where no specific tolerance is mentioned, the following general tolerances, according to DIN ISO 2768-1 - 06/1991, are valid:

Tolerance class	**Length [mm]**							
	Length taken into consideration [mm]							
	0,5 – 3	*3 – 6*	*6 – 30*	*30 – 120*	*120 – 400*	*400 – 1000*	*1000 – 2000*	*2000 – 4000*
f (fine)	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	-
m (medium)	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2
c (gross)	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4
v (very gross)	-	±0,5	±1	±1,5	±2,5	±4	±6	±8

Tolerance class	**Radius and Bevel [mm]**			**Angle**				
	Length taken into consideration [mm]			Length taken into consideration [mm]				
	0,5 – 3	*3 – 6*	*> 6*	*< 10*	*10 – 50*	*50 – 120*	*120 – 400*	*> 400*
f (fine)	±0,2	±0,5	±1	±1	±0° 30’	±0° 20’	±0° 10’	±0° 5’
m (medium)								
c (gross)	±0,4	±1	±2	±1° 30’	±1°	±0° 30’	±0° 15’	±0° 10’
v (very gross)				±3°	±2°	±1°	±0° 30’	±0° 20’

Code	Description
1	Tubes/Bars
11002594	TUBO ASPIRAZIONE HH14"
11002600	TUBO ASPIRAZIONE 18"
11103371	TUBO ASPIRAZIONE 3PC1165/1
11103989	18HHSW Tubo aspirazione 4PC1265
11110768	HYD 1380 Barra inf/int dis.4GB1624/1
11110769	HYD 1380 Barra sup. Dis. 4GB1623/1
11110770	HYD Barra 70mm SGL Dis. 4GB1589/1 Pos.1
2	Rings/Screens
11002644	SCHERMO FORATO GRONDAIA 18"
11002659	14HH Schermo forato 3QC1463
11002736	ANELLO ESTERNO SCHERMO FORATO 20"
11002737	ANELLO INTERNO SCHERMO FORATO
3	Connectors
11002591	CONNETTORI 20"
11103372	CONNETTORE 3PC1168/3
11103873	Connettore Supporto 4PC1318
11103996	18HHSW Connettore 4PC1319
11110123	24 Connettore 4RC1102/01
11110150	24 Connettore Resistore 4RC1101
11111372	20” Connettore H24 Slot Dis.000018445
4	Supports
11002784	20” Supporto Suscettore 3PC1273
11002786	LH Supporto Suscettore 3QC1192
5	Other
11002573	SPINA PER MANDRINO IN MOLIBDENO (12007165)
11002598	CANOTTO 14" HH-AC
11002599	CANOTTO ASPIRAZIONE
11104059	ADATTATORE ELETTRODO
11107735	20 M SUPPORTO RIFLETTORE 3PC1482/3
11110080	24 Pedestal grafite Isostatica 3RC1121/2
11110821	HYD Raccordo ponte 70mm 4GB1589/1 Pos.2
11110822	HYD Raccordo barre 70mm 4GB1589/1 Pos.3
11110823	HYD Adattatore cono 70mm 4GB1589/1 Pos. 4
11110824	HYD Adattatore con filetto USA 4GB1552

Bending	Blade thickness [mm]	Cavity [mm]	Pressure V
90°	1,5	15	101,23
	2	15	101,65
	3	23	101,87
	4	35	104,71
	5	35	103,65
		50	108,00
45°	3	23	98,8
		11,5	101,85

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M8.01 – Internal Audit Report

Revision 01 – 22/11/2012

N°	Question	Conformity		Objective Evidence	Anomalies/Notes	Classification
		Yes	No			
	Quality System					
1	Are the quality system documents always approved by and regularly distributed to all concerned parties?	☐	☐			
2	Is the quality system documentation to be easily found and filed in a logic and systematic way?	☐	☐			
	Management					
3	Are Management Reviews conducted periodically?	☐	☐			
4	Are appropriate indicators defined for every critical business process?	☐	☐			
5	Is there an organisational chart that faithfully represents Fauri Mauro & C. S.a.s./K.G. and all of ist figures?	☐	☐			
6	Is a company policy present and a representative for ist implementation selected?	☐	☐			
	Human Resources					
7	Are the competences of all main roles defined and described?	☐	☐			
8	Are the necessary competences of each employee defined and the appropriate formation management in place?	☐	☐			
9	Is the Formation Management regularly performed?	☐	☐			
10	Are the formation activities archieved appropriately?	☐	☐			
11	Are improvement projects and preventive actions managed appropriately?	☐	☐			
12	Is custumer satisfaction evaluated?	☐	☐			
13	Are the results analysed?	☐	☐			
	Processes/Procedures					
14	Is there a tool for the continuous monitoring of the quality management system documentation available?	☐	☐			
15	Are all the norms and legislative decrees up to date?	☐	☐			
16	Is all computer data adequately protected and safeguarded?	☐	☐			
17	Is the control for the efficiency of all equipment guaranteed?	☐	☐			
18	Is all the clients information available to write the quotations?	☐	☐			
19	Are the clients orders verified and confirmed?	☐	☐			
20	Are quotations and offers are compiled on letterhead and with the necessary content?	☐	☐			
21	Are purchase orders properly completed and provided to qualified suppliers?	☐	☐			
22	Do enough criteria for the evaluations of suppliers exist?	☐	☐			
23	Are appropriate controls for the acceptance of purchased material performed?	☐	☐			

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M8.02 – Non-Conformity Report

Revision 00 – 17/02/2012

Description			
Treatment			
Performed by		**on the**	
Analysis of possible causes			
Corrective actions			
Performed by		**on the**	
Effectiveness verification	☐ Positive ☐ Negative		
Performed by		**on the**	
Standardisation			
Notes			

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M8.03 – Indicators

Revision 00 – 17/02/2012

N°	Process	Indicator	Unity	2011 Result	2012 Target	Source	Notes
1	Commercial	Annual turnover	€			Arca	
2		Profit for the year	€			Arca	
3		Banking Situation	€			Sales Manager	
4		Goods purchased / Turnover	%			Sales Manager	
5		N° awarded offers / n° offers made	%			Quotation program	
6		Amount awarded offers / Amount offers made	%			Quotation program	
7	Customer Satisfaction	Customer complaints	N°			Quality Manager	
8		Customer satisfaction	%			Quolity Manual M8.04	
9	Non- Conformities	Solicitations	N°			Quality Manager (e-Mail)	
10		Non-Conformities	N°			Quality Manager	
11	Production	Costs of sharpening tools	€			Sales Manager	
12	Maintenance	Not planned maintenance	N°			Administration Manager	
13		Cost of not planned maintenance	€			Production Manager	
14	Suppliers	ISO9001 certified suppliers / Total suppliers	%			Quality Manager	
15	Employees	Absenteeism (Illness)	Hours [h]			Administration Manager	
16		Absenteeism / Total Hours	%			Administration Manager	
17		Formation courses	N°			Quality Manager	

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M8.04.01 – Customer Satisfaction Questionnaire

Revision 00 – 17/02/2012

Dear Customer,

one of the main objectives Fauri Mauro & C. S.a.s. / K.G. is the continuous improvement of the organization to consistently satisfy its customers. This goal can be reached only by knowing your valued point of.
We hope that our service has been satisfactory to you, please express your assessments of our performance by answering the questions below.
Such responses may be for Fauri Mauro & C. S.a.s. / K.G. a valuable contribution for the improvement of its organization.

Thank you for your cooperation.

Express a judgement regarding the characteristics listed below:	Very Good	Good	Negative	Very Negative
Quality of our products	☐	☐	☐	☐
Concordance ordered / delivered	☐	☐	☐	☐
Reliability of the supplied products	☐	☐	☐	☐
Technical competence of our operators	☐	☐	☐	☐
The answer to your quotation was	☐	☐	☐	☐
Flexibility	☐	☐	☐	☐
Availability in case of emergencies	☐	☐	☐	☐
On time delivery	☐	☐	☐	☐
Compliance with contractual commitments agreed	☐	☐	☐	☐
Overall satisfaction with the service received	☐	☐	☐	☐

Finally, express all eventual problems you had with any of our products and services and any other information you considers to be relevant:

Thank you for your time and help!

Date _____ Signature _____

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M8.04.02 - Questionnaire Evaluation

Revision 00 - 17/02/2012

Questionnaire	1				2				3				4				5				6				7				8				9				10				Question
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	Vote
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	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	Sent Questionnaires
																																									% Answered Questionnaires

Very Good	1	0	###
Good	2	0	###
Negative	3	0	###
Very Negative	4	0	###

Appendix E

Glossary

Graphite - Graphite is a modification of carbon [SGL Group, 2012] and is used at *Fauri* in the different forms, a high resistant block of graphite, a soft felt and a smooth foil (Figure E.1 shows the different types of graphite). Its main characteristics are the resistance to high temperatures, its electrical conductivity and its proliferation of options.

Gauge blocks - Gauge blocks are high precision devices used for calibration. More information can be found at Chetvorno [2012]

Skills Matrix - A skills matrix consists of a framework representing all employees and their capabilities in a clear, easy to read, matrix. It can help administering the consistent formation of all workers.

Maslow Pyramid - The Maslow pyramid represents the importance of needs for human beings. It consists of five sections describing the single segments:

- Physiological needs: Air, water, food, sleep
- Safety needs: Health and security of oneself
- Love/Belonging: Family, friendship
- Esteem: Self-esteem, confidence, achievement, confidence
- Self-actualisation: Creativity

These needs are not only valid for the day-to-day life, but apply in the work environment as well. They have to be considered when trying to improve the employees' motivation and satisfaction. [Factoryjoe, 2012]

Pareto analysis - The Pareto analysis is a statistical tool that can be helpful in the decision making process. It claims that twenty per cent of the work creates eighty per cent of the outcome. This can be applied to many sectors in a business and guides the management on focusing on the most important twenty per cent of the products/processes before dealing with the rest.

Ishikawa-Diagram - Also known as the *Fishbone-diagram* or *Cause and Effect Analysis*, the

Figure E.1: Felt, block and foil graphite

Ishikawa diagram is a visual tool to demonstrate the connection between cause and effect of non-conformities and can be helpful for a company to assess their corrective and preventive actions.

Statistical Process Control (SPC) - The SPC, or *Trend analysis*, is a tool to detect problems before they arise. In manufacturing this can be applied when producing series or mass products. By taking measurements of control samples, it is possible to detect measurement trends early on, thus preventing non-conformities to occur.

Fault Tree Analysis - This tool helps to get to the root cause of non-conformities and safety issues. Starting from the problem, this top-down method analysis deep into the details of every possible flaw that led to the fault.

Check sheet - The check sheet, or data collection form, is a simple document to collect data in an organised manner. It standardises the data collecting process and can lead to conclusions in an easy way.

Flow chart - The flow chart is a diagram which illustrates processes. It uses Boolean logic (Yes/No) to step by step connect a flow of events.

FMEA-Analysis - The Failure-Mode-Effect-Analysis (FMEA) analyses potential failures in the system and evaluates them according to their severity, likelihood of occurrence and probability of detection before delivery to the customer. The evaluation goes from 1 (less problematic) to 10 (critical). The multiplication of all three values results in the so called Risk-Priority-Number (RPN). This number represents the severity of a potential failure.

PDCA-Cycle - The Plan-Do-Check-Act-Cycle is the basis for continual improvement. Every process in a company should follow this plan of re-thinking and optimising every process for improvement. More information on the PDCA-Cycle can be found in Ray Trickers book

Tricker [2010, p.76].

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