Professional MBA
Automotive Industry

Development of an advanced safety excellence system in automotive supplier industry

A Master's Thesis submitted for the degree of
"Master of Business Administration"

supervised by

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Poysdorf, 12.03.2017

Affidavit

I, **KURT FISCHER**, hereby declare

1. that I am the sole author of the present Master's Thesis, "DEVELOPMENT OF AN ADVANCED SAFETY EXCELLENCE SYSTEM IN AUTOMOTIVE SUPPLIER INDUSTRY", 77 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted this Master's Thesis as an examination paper in any form in Austria or abroad.

Vienna, 12.03.2017

Signature

ACKNOWLEDGMENT

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I would like to thank my interview partners from automotive OEM customer and supplier side to get a good overview of initial situation regarding safety excellence systems in industry.

Last but not least I want to thank my family: my wife Martina for supporting me spiritually throughout my whole MBA studies and my two sons Thomas and Peter who also motivated me for studying and writing this Master's Thesis.

Abstract

In automotive branch producing cars or components the highest priority is mostly seen in cost factors, afterwards quality and delivery aspects are focused. Work safety is often on last spot.
Why should it be a contrary priority sequence?

1. **Safety**
2. Quality
3. Delivery
4. Costs

Only employees / operators working in safe environment within the company are able to produce good quality. Thus products can be delivered on time in required quantity and costs stay manageable. So work safety is fundamental basis for success in industry and must be handled with high priority.

Safety is often seen as a topic not so prior not to say boring, most of the time it appears to be very technical and of course for experts and specialists.

Bodo Marschall (Volkswagen AG) states that “Creating an organization with great safety not only prevents injuries!”
In detail he means “Safety and health help to maintain, develop and promote capability and willingness of our employees to develop their competences in their respective areas of responsibility. This continuous improvement process contributes to our productivity“. [1]

The aim of this Master’s Thesis is to propose and create a cultural bridge for achieving safety excellence based on leadership decisions – coming from external COMPLIANCE motivation ending in internal COMMITMENT motivation.

As a theoretical base of my investigation, I studied and analysed several safety management systems of automotive organisations. For that purpose interviews based on a checklist have been performed with top management safety representatives from OEM company (Daimler AG Stuttgart) and several first and second tier automotive suppliers (BMW Plant Steyr, ZKW Group Wieselburg,

Pollmann Austria GmbH Karlstein and finally Gebauer&Griller GmbH Poysdorf as the company I'm working for).

The practical part is a gap analysis in existing safety management systems comparing to the state of the art in safety excellence. The chosen way how to close existing gaps in safety excellence will be visualized in a "safety house".

Finally, this Master's Thesis results in a recommendation instrument for any industry, but mainly automotive, how safety excellence can be integrated in existing management systems. Implementation steps are shown in a case study for Gebauer&Griller.

Keywords:

Safety management system, people involvement, company culture, safety first, safety house, SQDC (Safety, Quality, Delivery and Cost), near misses, training, awareness, visualisation, commitment.

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List of abbreviations

BBS	Behaviour Based Safety
BS	British Standard
CSR	Customer Specific Requirement(s) and / or Corporate Social Responsibility
EHS	Environment Health Safety
FAC	First Aid Case
FMEA	Failure Mode and Effects Analysis
GG	Gebauer & Griller Kabelwerke GesmbH
HSE	Health Safety Environment
IATF	International Automotive Task Force
ISO	International Organization for Standardization
KPI	Key Performance Indicator
LTI	Lost Time Injury
LTIFR	Lost Time Injury Frequency Rate
MTI	Medical Treatment Injury
MTIFR	Medical Treatment Injury Frequency Rate
OEM	Original Equipment Manufacturer
OH&S	Occupational Health and Safety
PDCA	Plan Do Check Act
SQDCE	Safety Quality Delivery Costs Environment
3F	3 Factors (method)

1. Introduction

1.1. Research focus and problem

The research focus of my Master's Thesis is a sustainable improvement process in safety management system as part of IMS – Integrated Management System. Not only work accidents have to be reduced in a most effective and efficient way by company's experts and management team, more important is (line) operator's involvement for creating safe workplace and safe working environment.
The research problem derives from the fact that companies focus on product / production cost and quality respectively on time delivery issues as state of the art, but safety first thinking in combination with safety culture by full employees' involvement will be additional essential success factor in industry.
Besides this companies are constrained to fulfill basic work safety demand as per legal fundamentals and as perhaps customers ask for health & safety management system certificate, but a serious process of continuous improvement in that field is missed in many cases.
Finally, a bridge has to be built to leave compliance motivation and reach commitment motivation in work safety management.

1.2. Research questions

For research the following research questions have been developed:

- What are organizational requirements for a safety excellence system and for a respective safety culture?
- What are the most important work safety elements?
- Which methods are used to improve work safety?
- What is the interaction to existing integrated management systems?
- Which problem solving tools can be used in quality and in safety?
- How can we come from actual external COMPLIANCE to internal COMMITMENT motivation under consideration of employee's involvement?
- How can the performance of a safety management system be measured?

1.3. Hypothesis statement

Based on my work and study experience and after reviewing the literature respectively performing interviews, the following hypothesis is identified:

- Many companies in automotive and other business administrate several safety elements but not as a living system.
- Many companies are fulfilling legal and other requirements but have no focus in continuous improvement process (P-D-C-A circle) in safety.
- Employees' involvement and engagement is not adequate.
- Employer hope for not occurring serious work accidents.
- International Standards as ISO/TS 16949 or OHSAS 18001 have some gaps in safety culture elements.
- Customer specific requirements in automotive field are not demanding safety excellence satisfactorily.

2. Aim of this Thesis

Based on the hypotheses and with the state of the art knowledge in safety management systems in automotive industry this Master's Thesis shall show a scientific way how safety excellence can be achieved.

Existing gaps in industrial sector and present day´s literature have been analysed through personal interviews on site with top management safety representatives in automotive OEM and supplier companies.

In addition shortcomings in OH&S and Risk Management Systems out of several ISO Norms / Standards respectively Customer Specific Requirements inputs are analysed in this Thesis.

A safety excellence system based on organizational and cultural aspects and needs is designed inside of this Master's Thesis. One essential safety management core tool (NEAR MISS) will be described in detail

A road map how safety excellence can be achieved, how the existing gaps can be closed will be shown at the end – cultural change through employees involvement is the focus, that will be shown in a case study – summing up with a related outlook in safety excellence system.

3. State of the Art

3.1 Literatur study

3.1.1 Herbert William Heinrich – workplace safety

H.W. Heinrich, a qualified engineer who lectured in safety at the New York University for more than 20 years, served as an Engineering Officer in the US Navy during World War One. Heinrich was appointed as chair of the safety section of the US Army's War Advisory Board during the World War Two and he became a fellow of the American Society of Safety Engineers in 1961. [11]

So it can be said that Heinrich created some fundamentals on the way to workplace safety thinking.
If one works in the safety field in any capacity, anybody should care about this because the concepts of injury causation and prevention so prevalent today were first proposed by Mr. Heinrich. [11]

The most sustained of Heinrich's concepts were:

- There exists a mathematical relationship between the numbers of accidents of similar types and their severity;
- Unsafe acts of employees is the most common cause of workplace accidents; and
- By reducing the overall frequency of workplace injuries an equivalent reduction in the number of severe injuries will be produced.

BBS (Behaviour Based Safety) is one of the basic foundations of many current safety programs; Zero Harm (or zero anything) and so forth which are vigorously promoted by consultancies and adopted by companies and safety professionals.

Heinrich's Loss Control Triangle

H. W. Heinrich obtained data about workplace injuries from insurance claims as well as from workplaces (usually Supervisors). None of those data remain available today nor was there enough information in Heinrich's books or notes to duplicate it.

From analysis of these data, Heinrich suggested that for every major injury there are 29 minor injuries and 300 no-injury accidents. Most people working in health and safety field would have seen some variation of this formula in presentations containing triangles with different colored horizontal bands representing the different severity of injuries and the ratios between them. Most commonly, these are used by proponents of **Behaviour Based Safety (BBS)** programs and are often called Heinrich's Triangle or Bird's Triangle (after Frank Bird who revised Heinrich's classifications in 1969). [2]

Originally, Mr. Heinrich did not qualify his discussion of these ratios. However, by the fourth revision [2] they applied only to similar incidents with similar causes involving the same person.

Heinrich's severity categorization was also very different from what is commonly discussed in presentations today using this concept. Heinrich considered a major injury as one that required a claim to be lodged with a workers compensation insurer or reported to a state regulator irrespective of the actual severity of the injury. A minor injury was what would be considered a first aid case in modern language and no injury would be a near miss. Frank E. Bird Jr. revised these classifications as well as the actual ratios between them and qualified the results by indicating that they would be different for each workplace and time. [2]

Figure 01: The Heinrich 300-29-1 Model [10]

Heinrich's results of his analyses are:

- 88% of workplace accidents were caused by unsafe acts (mainly by the injured persons);
- 10% of workplace accidents were the result of unsafe work equipment or conditions; and

- The remaining 2% were unavoidable.

In the so called “Domino Theory”, Heinrich argued that injuries resulted from accidents; accidents from unsafe acts which in turn occurred from the faults of people which had their **origin in the social environment**. Injuries could be prevented best by stopping accidents from happening. As the immediate cause of accidents was unsafe acts, then eliminating them was the most effective and efficient focus of injury prevention programs. Does this basically sound familiar? It should as it undertakes **BBS** and other psychology based safety management programs – that changing the **behaviour** of workers is the principal mean of reducing the number and severity of workplace accidents. [2]

Figure 02: Heinrich's chart of direct and proximate accident causes [11]

3.1.2 The DuPont Bradley Curve – Promoting Independence

Next to H.W. Heinrich's basic principles the worldwide known company DuPont has set milestones in safety performance with methodical approaches to operations excellence.

Regarding safety culture DuPont has a very long and interesting history:

Year 1802: Start of operation of black powder mills.
Year 1811: The first safety rules were drawn up →
Mr. E. I. du Pont stated that safety is the responsibility of line management. No employee may enter a new or converted mill until such time as a member of the management has been personally supervised.
Year 1912: Start of inducting work safety statistics.
Year 1940: Convinced that all injuries can be prevented.
Year 1950: Start of company external safety programs.
Year 1990: "Zero accidents" targets are established.

DuPont seems to have the capability to support on the way achieving safety excellence and by all means has outstanding reference projects in industry so I want to summarize DuPont´s safety culture approach.
At DuPont, it is basically recognized that leadership and other human factors can influence outcomes. Therefore, it is people's **behaviour** that is the focus of the company's safety performance, production & quality system and also other management models.

DuPont has developed a safety assessment tool called the DuPont Bradley Curve (Fig. 05) based on the book "The 7 Habits of Highly Effective People" by Stephen R. Covey. [3]

This model allows DuPont and their customers to assess where it is in its safety culture. It has become clear that there is a tipping point in organizations when the culture becomes much more effective and develops its own momentum. This critical point of transition lies between the dependent and independent phases shown on the Bradley Curve. [12]

Once employees cross the cultural bridge from compliance/force to choice, they will become mostly motivated, not just for safety, but also for operational excellence (productivity / quality / delivery).

The reason for this lies in people's innate attitudes and behaviour. The following explains how employees are likely to act and react in the different phases of the DuPont Bradley Curve:

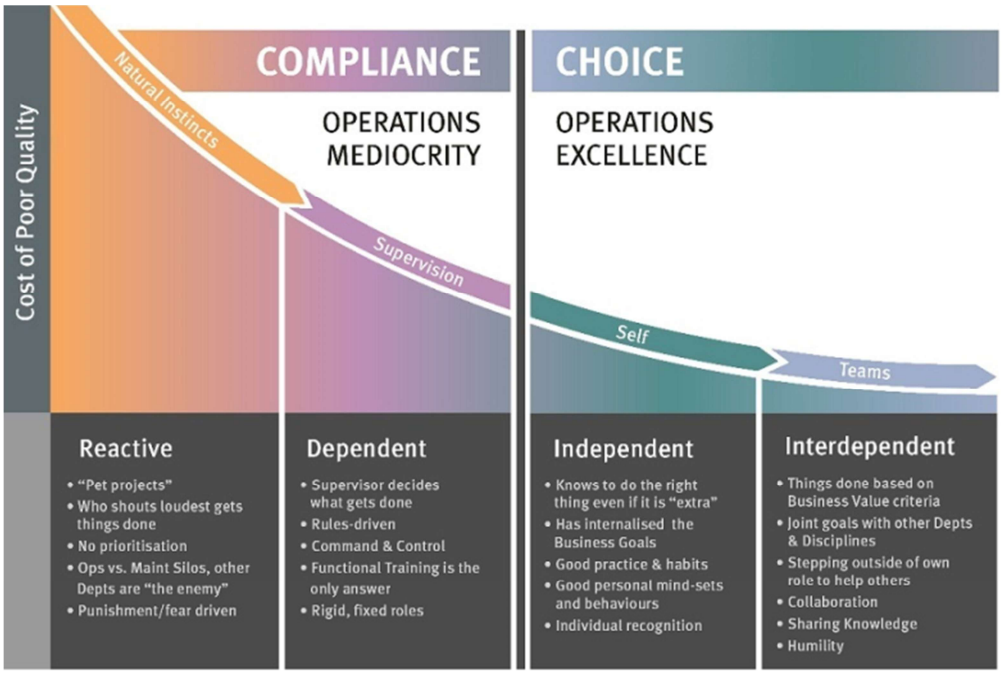


Figure 03: The DuPont Bradley Curve [12]

Reactive culture [12]

Any organization, that finds itself in the reactive phase, is in a vicious cycle of one action resulting in a destructive reaction. Behaviour is just based on instinct. Compliance is the goal. Employees follow the rules because they have to. The "law of the jungle" dominates. The attitude is likely to be "just get the day in"; do whatever it takes to get through it fast and out the other end. Reactive behaviour mostly manifests in people taking shortcuts, schedule busting, little or no schedule backlogs, little discrimination in prioritizing work (everything is urgent), etc.

This is where companies encounter "silos" and a notion of "the enemy", whereas operations versus maintenance versus reliability. This is the worst place to be and is many times reflected in safety performance, too. Ultimately it is not a good environment to work in.

Dependent culture [12]

Dependence is slightly better, but employees will still do things only because they are told to, or because there is an implied threat. Discipline and fear are the motivators. In this organizational culture, people leave their brains behind in the workplace parking lot and let their bosses decide for them. If the boss gets it wrong, there can be big implications. If the superior is not there, employees tend to slip back into reactive behaviour. In this environment, there might be more focus on training than on competence.

Independent culture [12]

In this quadrant, there is a subtle, yet significant mind-set change. Employees follow the rules because they want to and because they see the sense and benefits in doing so. That results in a much better place to work. In this environment, people know what the right thing to do is and they do it. They often understand their role is directly linked to business results. Applied to asset management, this means the culture of maintenance reliability leadership has changed from a cost focus to a value focus. In an independent behaviour phase, you begin to see individual recognitions and the adoption of good and best practices because everyone knows the goal. However, there is still room for improvement.

Interdependent culture [12]

Once organizations attain a culture of interdependence, things are done for the greater good. Companies are in a virtuous cycle of one action affirming a new, better action. Everyone is aligned with a joint goal. Operations work as equal partners with maintenance reliability. People cross boundaries without being asked to do so and proactively help each other. There is collaboration. Knowledge is shared and codified. Coaching and mentoring is the norm. There is team recognition, but not just for heroic efforts, such as those responding to an after-hours production incident. In this environment, a planner or planning team that quietly and methodically extracts value and eliminates waste by superior planning, will be recognized and receive acclamation.

Thus, the virtue of proactivity trumps reactivity.

Now, with this attractive cultural entry with some practical experience, further essential theoretical aspects coming from safety management systems side will be described in the next chapter. Experts from global industry are defining standards for continuous improvement in safety and can give valuable inputs on the way to safety excellence.

3.2 Safety Management Systems

3.2.1 OH&S management systems OHSAS 18001:2007

In that British standard, released in year 2007, the first detailed requirements for an effective and efficient occupational health and safety management system have been defined – it's also used for assessment series.

Any organization can use that management system to increase OH&S performance after defining an OH&S policy and appropriate objectives. Basic risk management is also covered in OHSAS 18001 standard.

The BS OHSAS 18001:2007 standard is based on the PDCA methodology (Plan-Do-Check-Act) and can be briefly described as follows:

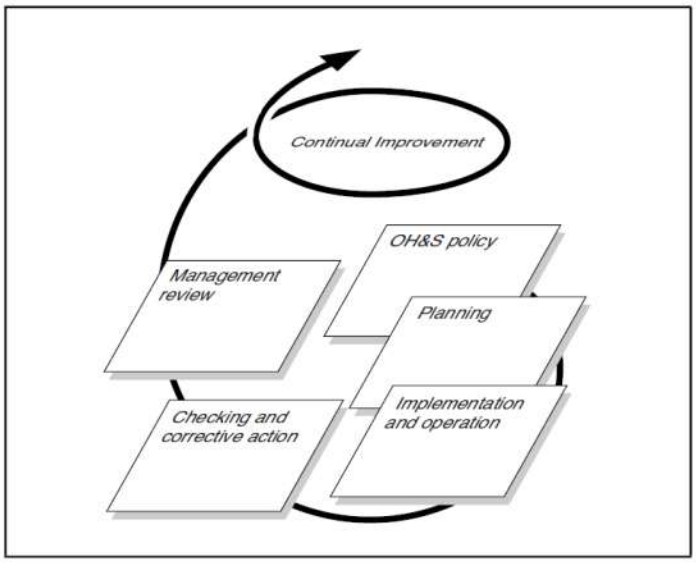


Figure 04: OH&S management system model for Standard OHSAS 18001 [4]

- **Plan**: establish the objectives and processes necessary to deliver results in accordance with the organization´s OH&S policy.
- **Do**: implement the processes.
- **Check**: monitor and measure processes against OH&S policy, objectives, legal and other requirements and report the results.
- **Act**: take actions to continually improve OH&S performance.

This BS OHSAS 18001 standard released in year 2007 has a good systematic approach, how to manage safety systems within any company and use PDCA for continual improvement.

Details to OHSAS 18001 are described in Appendix 01.

Now at actual time in year 2017 we are in the lucky position, that ISO committee is very busy creating a new standard ISO 45001 that should be released in year 2018.
ISO experts also recognized that work safety is leadership based and workers´ participation in safety management is mandatory.

3.2.2 OH&S management systems ISO 45001:2016 - DRAFT

At the time of drafting this International Standard ISO 45001, after BS OHSAS 18001 has already been used for ten years, the International Labour Organization (ILO) estimates that 2.3 million people die from work-related accidents and diseases every year.
Basically, every organization is responsible for the health and safety of its workers and that of other persons under its control, who are performing work in its behalf. Promoting and protecting employees mental and physical health has also to be considered.
Same as in OHSAS 18001 that new ISO 45001 management system standard is intended to enable an organization for continuous improvement for its OH&S performance in the enhancement ot health and saftey at work and to manage its OH&S risks.

The new ISO 45001:2016 standard is also based on the PDCA methodology (Plan-Do-Check-Act) and can be briefly described as follows:

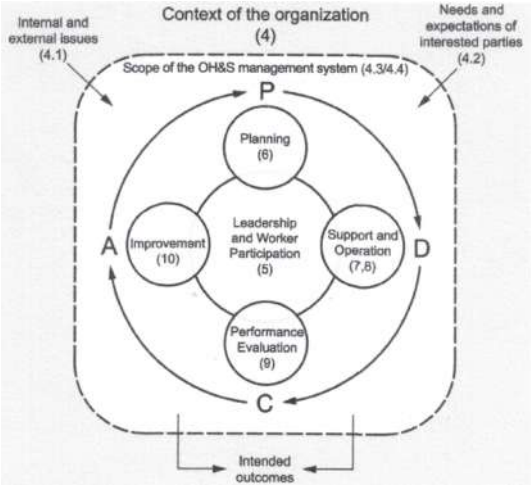


Figure 05: PDCA in ISO 45001:2016 [5]

- **Plan**: establish objectives, programmes and processes necessary to deliver results in accordance with the organization´s OH&S policy.
- **Do**: implement the processes as planned.
- **Check**: monitor and measure activities and processes with regard to the OH&S policy and objectives and report the results.
- **Act**: take actions to continually improve the OH&S performance to achieve the intended outcomes.

The big difference in new ISO 45001:2016 standard compared with the revised OHSAS 18001:2007 is the focus on “Leadership” and “Worker Participation” that will be higlighted within this Master’s Thesis.

Details to ISO 45001 are described in Appendix 02.

The following chapter specifies an essential topic, which is needful for preventive measures in any management system.

3.3 Risk management requirements in new ISO norms / standards

3.3.1 ISO 9001:2015

Planning / Actions to address risks and opportunities

Any organization that plans implementing a quality management system, shall determine the risks and opportunities that need to be addressed to

- give assurance that the quality management system can achieve its intended result(s);
- enhance desirable effects;
- prevent, or reduce, undesired effects;
- achieve improvement.

The organization shall plan

- actions to address these risks and opportunities;
- how to integrate and implement the actions into its quality management system processes;
- how to evaluate the effectiveness of these actions.

Actions taken to address risks and opportunities shall be proportionate to the potential impact on the conformity of products and services. [6]

3.3.2 IATF 16949:2016

The organization shall include its risk analysis, at a minimum, lessons learned from product recalls, product audits, field returns and repairs, complaints, scrap and rework. [7]

The organization shall retain documented information as evidence of the results of risk analysis. [7]

3.3.3 DRAFT DIN ISO 45001:2016

In clause 3.2.2 the basics of OH&S management systems ISO 45001:2016 are described. Here are now further detailed requirements for planning and actions to address risk opportunities.
When planning for the OH&S (Occupational Health & Safety) management system, the organization shall consider the issues referred to the context of the organization, the requirements referred to interested parties and the scope of its OH&S management system and determine the risks and opportunities that need to be addressed to

- give assurance that the OH&S management system can achieve its intended outcome(s);
- prevent, or reduce, undesired effects;
- Achieve continual improvement.

The new ISO 45001 standardizes very useful management aspects as organization´s consideration for effective participation of workers, hazard identification and assessment of OH&S risks, assessment of OH&S risks and other risks of the OH&S management system and finally identification of OH&S opportunities and other opportunities.

Details to Risk Management out of ISO 45001 are described in Appendix 03.

Previous chapters describe safety management prospects form international norms / standards that are mandatory for companies in field of automotive supplier industry – OEM customers are expecting ISO certificates according several standards beginning with Quality Management Systems (ISO 9001 and ISO/TS respectively IATF 16949), Environmental Management Systems (ISO 14001) and finally Safety Management Systems (OHSAS 18001 respectively ISO 45001).

Thus, those standards are the same for everybody in industry. But what are customers in automotive supply chain (Tier-1, Tier-2, etc.) expecting?

During this MBA study several considerable automotive supplier safety requirements have been analysed. Chapter 4.6 shows the results with upstreaming references to safety.

3.4 Employees´ behaviour

For completion state of the art work safety some essential statistics associated with employees' behaviour are processed in this clause.

As shown in subsequent chapter 4.7 "Statistic on work accidents" main part of work accidents is arising from humans' unsafe activities, human behaviour → loss of control, body movements, slipping, stumbling and falling.
Several other statistics are showing that.
Mr. Andreas Huber from consulting company "successfully safe" (www.erfolgreichsicher.at) presented a very clear chart during TUEV-Austria Safety Day on Oct. 13th 2016 in Voesendorf:

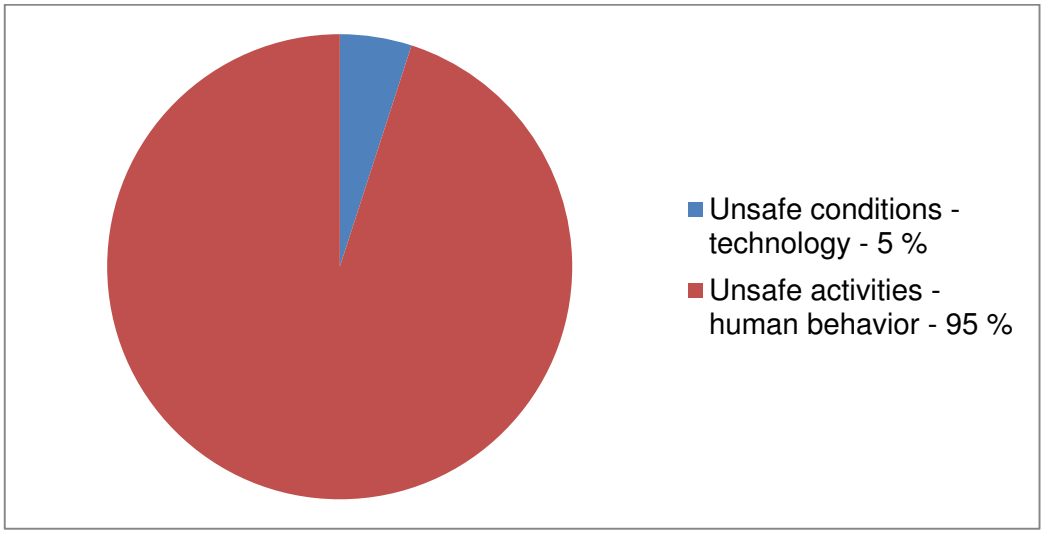


Figure 06: Unsafe conditions vs. unsafe activities

The figures are from Mr. Huber's own research.
For this purpose, 300 work accidents (period 3 years) were analysed in maintenance companies, on the basis of accident reports and related event analyses.
A part of this (in case of uncertainty) was held with interviewees, colleagues and executives.

Even more interesting is an aircraft study from LUFTHANSA Captain Mr. Manfred Mueller (head of flight safety research):

In order to gain a better overview of potential safety-critical situations, a so-called Human Factor Research Project was carried out in the aviation industry.

It was the most extensive study so far: 2070 pilots completed a 120-page questionnaire. The survey dealt with the explanation and description of the most recent security-critical incidents. The replies yielded 3,200,000 records. The analysis of the data took more than two years.

Those risk grades have been divided into 6 categories - from level 1 (an irregular event but no action required) to level 6 (there was a safety-relevant event, the situation was completely out of control and was only surrendered by chance or luck).

Mr. Mueller defined 4 main categories in safety relevant incidents (respectively NEAR MISS cases):

- TEC **Tec**hnical problems, failure of systems
- HUM **Hum**an error(s)
- OPS **Op**erational problems, complications
- SOC **Soc**ial factors - deficits in communication, unresolved conflicts, hierarchical incidences, psychological problems

The following graphic shows the percentages of the individual risk groups. The figures show that the survey was able to break down the fine structure of the human factors relevant to the safety: adding all the areas where the HUMAN factor appears results in 79.1%, which is roughly equivalent to the IATA- accident statistics of 75%.

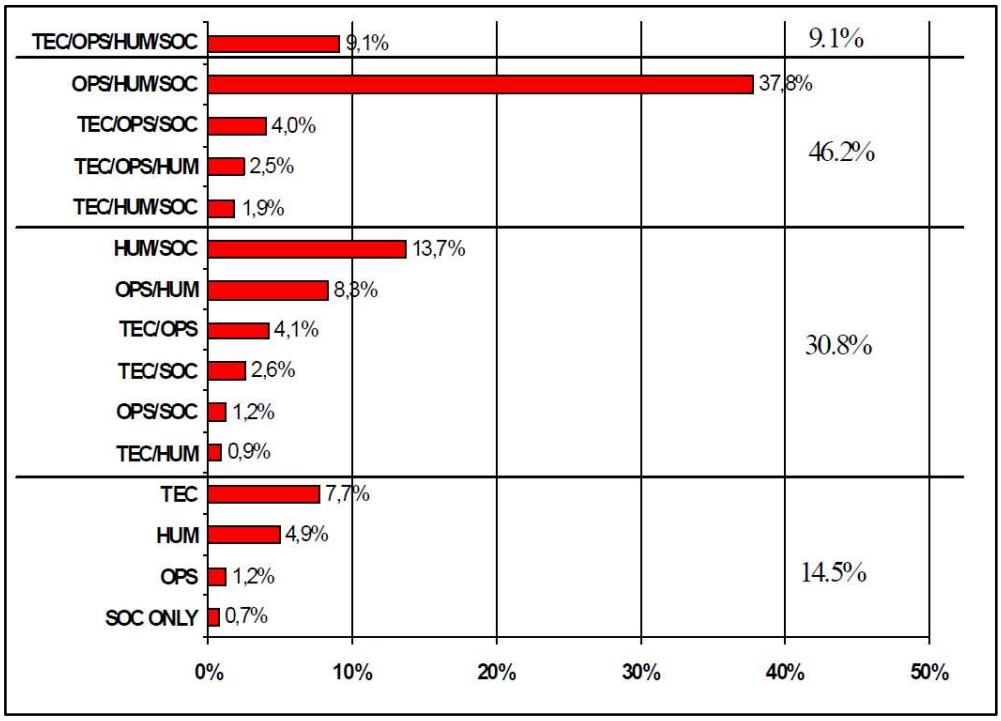


Figure 07: Frequency of event configuration [13]

Recognition of the aviation industry:

- 75% of incidents with factor HUMAN.
- 68% of incidents with factor SOCIAL.
- 48% of incidents due to communication problems.
- 32% of all unfavourable events by "solo walking".
- 77% of all work errors by feeling invulnerability, time pressure, routine or negligence.

Final statement to Mr. Mueller's study:

- 80% of the HUMAN errors are to be defused by optimal working atmosphere (an open, unencrypted expression of the own emotional situation is possible - feedback culture).
- In other words, the factor SOCIAL increases the risk by a factor of 5.
- Discipline, motivation, acceptance of detectability, value systems, social competence and teamwork are the key factors for improvement.

Factor HUMAN, mainly human´s behaviour, will be the central issue in chapter 6.3 – Employees´ involvement and motivation / **Behaviour Based Safety (BBS)**.

4. Initial situation in industry

For this work interviews have been performed directly on site of automotive OEM and also supplier companies based on following questions:

- Do you have a **safety policy** within your organization?
- If yes, what is the **quintessence** out of it?
- How would you specify **safety culture** within your company?

- How do you / did you get **management commitment** for safety culture?
- What are your motivation factors for **employee's participation**?
- How is your safety policy & culture integrated in your **management system**?
- What are your main KPIs in safety?

- What is your experience in **near miss** system or **risk management tolls** in general?
- How would you describe **gaps or room for improvements** regarding safety situation in your management system?

4.1 Interview Daimler AG Stuttgart – Dr. Stephan Buerkner

Interview date: October, 5th 2016:

DAIMLER Safety Policy is based on 5 Health & Safety Principles:

DAIMLER global full integrated health and safety protection is a major part of overall entrepreneurial responsibility. Standardized processes that promote the protection of employees' safety and health have been established. Prevention is one of the top targets within OH&S. Ergonomic design of work systems is promoted through

ergonomic standards. Finally all employees must take personal responsibility for health and safety by performing work in a safe manner. Employees are involved in the design of their workplaces, their working environment and their work processes.

Details to DAIMLER Safety Policy are described in Appendix 04.

Organization in DAIMLER top down:

Top level:	Executive board member (HR representative)
2nd level:	Division manager HR and safety police
3rd level:	Leading works doctor
4th level:	Heading safety engineer

Regarding safety culture Dr. Buerkner mentioned that DAIMLER employees should understand the purpose of H&S principles and not see it as harassment or bureaucracy subjects.

The management commitment is given as per **top down** organization described above.

Employee's participation is driven by **bottom up** involvement through safety representatives as team members directly in DAIMLER production lines. Regularly performed safety walks (organized through supervisors), health circles and several audits are also involving operative staff.

Safety items are fixed in **shop floor management** based on daily meetings beginning 6 o'clock in the morning with supervisor and operator, at 7 o'clock with team leader, at 7:30 o'clock with department head and finally at lunch time with plant management. Logging of relevant information is done on site on paperboards, also safety cross is used for visualization of work accidents.

Ergonomic investigations are done for all employees, including indirect.

Psychologic supervision at DAIMLER is offered through intranet software tool, so employees have less shy to contact occupational health practitioner directly.

Regarding health & safety integration in management system Dr. Buerkner mentioned pro forma approach within the company – rules and regulations coming from the system are not 100% identical with living practice.
DAIMLER organization is too big for installing one complete management system covering all the Quality, Environment, Health & Safety aspects coming from several ISO standards.

Coming to the question about main key performance indicators for Daimler I want to summarize the relevant information of DAIMLER AG sustainability report 2015 - on page 75 of this report (see list of literature – internet source) there is a hyperlink to "Key figures of operational health and safety":

"Accidents frequency" calculation: OA (1-n DA)/Ah x 1 million → this correlates to LTIFR (Lost Time Injury Frequency Rate) which is standard KPI figure in automotive OEM field and should become also a standard in automotive supplier industry.
Rate numbers for DAIMLER group in last three years are:

LTIFR for 2013	**9.1**
LTIFR for 2014	**8.8**
LTIFR for 2015	**8.8**

Figure 08: LTIFR for DAIMLER group [14]

There will be more details to that KPI calculation in clause 6.8 in this Master's Thesis.

In fact those DAIMLER rate numbers are very good ones, even car producers as BMW (see next interview in clause 2.2) have slightly better numbers as 5 and below 5.
DAIMLER has different manufacturing depth with heavy parts for truck or bus divisions including casting facilities than e. g. BMW group.
In personal car division DAIMLER numbers for accidents frequency are in the area of 6.7.

Next to frequency numbers DAIMLER is also following total occupational accidents and very interesting also detailed ergonomic workplace evaluations with status indication red, yellow, green.

Risk / Room for improvements

In the field of **near miss** system DAIMLER uses employee's suggestion system as a tool to get shop floor information on unsafe situation or behaviours. At the moment no special KPI reporting system is in place. That might be room for improvement within DAIMLER organization.
Near miss as one possible tool in work safety **risk management** will be outlined in chapter 6.7 of this Master´s Thesis.

Final statement of Mr Buerkner:
In my opinion, room for improvement is mainly in the area of mind set / attitude / behaviour / culture.
Keeping this alive and the willingness to engage in work safety is the most difficult.

4.2 Interview BMW Plant Steyr – Mag. Robert Pfoser

Interview date: September, 23rd 2016:

Policy

BMW Safety Policy based on THE NINE GUIDING PRINCIPLES OF OCCUPATIONAL SAFETY

Eyes shall be opened in the company; accidents are preventable, the look forward prevents accidents. The management directly is responsible for prevention of safety risks. Protective equipment has to be worn. OH&S risks must be realized, reported and get under control. OH&S protection is in direct connection to quality and

productivity and makes an important contribution to the company success. Most of the accidents occur at leisure time. Main focuses are the household, hobbies, sports and traffic. Safe tools, protective clothing, safe machines and a safe behaviour are also fundamental. By review of hazard sources accidents can be prevented and the health protection can be established. NEAR MISS must be reported and discussed to avoid further hazards.

Details to BMW Safety Policy are described in Appendix 05.

Organization in BMW top down:

Top level:	Executive board member (HR representative)
2nd level:	Division manager HR and health/safety
3rd level:	Plant manager
4th level:	Plant HR manager

Mr. Pfoser mentioned in the interview that the situation of an accident is the basis, the severity only by chance. Therefore, we have to make the work environment in our plant as safe as possible.

Since its founding in 1979, BMW Steyr factory has been without any fatal occupational incidents. Jointly implementing the principles of occupational safety is a key factor here. Each employee is responsible to know and live the nine guiding principles (listed above), because if everyone takes care, less happens!

For ongoing employees´ participation, BMW Steyr started a “Safety Champions League“ program. One winner can get the “Key for safety” which means a nice weekend driving a nice BMW car sponsored by the company.

Safety audits and safety inspection tours are done very consequently. Beginning on top management level in cycle of every two weeks and ending in shift leader level with work council members, occupational medicine team and safety engineers.

Regarding safety culture within BMW company Mr. Pfoser spoke about long term orientation on the DuPont Bradley Curve – Promoting Independence → see chapter 3.1.2 in this Master’s Thesis.

Focus point in the interview was also Key Performance Indicators in BMW group. Looking into BMW GROUP SUSTAINABLE VALUE REPORT 2015 on page 63 following figure can be found:

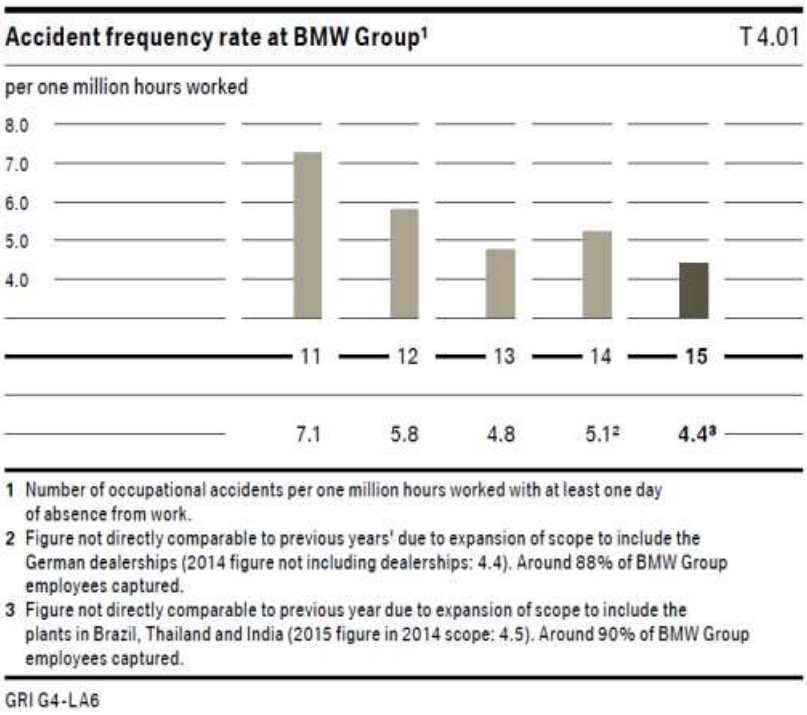


Figure 09: Accident frequency rate at BMW Group [15]

Other very interesting KPIs within BMW is **Ergonomic assessment index** (Ergonomischer Beurteilungsindex – EBI) with a special software tool "ABA Tech" for worker places and "BAPA" (Büro Arbeitsplatz Analyse) for clerk office ergonomic assessments.

Risk / Room for improvements

Talking about describing gaps or room for improvements regarding safety situation within BMW, Mr. Pfoser mentions further possible efforts in safety culture in solicitousness with the key words "look at my friends". Another item is the Near Miss

System improvement, were the actual reporting level of average 1, 1 per employee within one year might not be enough.

4.3 Interview ZKW Plant Wieselburg – DI Ines Naderer

Interview date: November, 18th 2016:

ZKW Safety Policy based on ZKW COMPANY PHILOSOPHY.
Safety aspects are mentioned sparsely in ZKW philosophy. It includes a code of conduct which describes the interpersonal interactions in the company and with customers.
The basis is leadership principles:

EMPLOYEES: Employee-oriented, attractive and vibrant.
BUSINESS OWNERS, SUPPLIERS: independent, successful, international and willing to perform.
CUSTOMER, ENVIRONMENT, SOCIETY: customer focused, innovative, quality-aware and sustainable.

Safety and risk management aspects are only mentioned in following sub items:

- We offer attractive jobs in a safe and healthy working environment.
- We focus on sustainable growth and a healthy economic foundation.
- We aim for continual improvement of all of our business processes taking all of the risks and opportunities into account.

Final statement in ZKW COMPANY PHILOSOPHY:
In support of and in compliance with the requirements of our company philosophy, ZKW is committed to an integrated management system which is based on the

foundations of quality, environment, health and safety, as well as compliance with all the relevant legal regulations.
Depending on the requirements and the needs of our production sites, we are also certified according the following management system standards or they have been introduced in our company in part or in whole:
ISO 9001, ISO/TS 16949, ISO 14001, OHSAS 18001 and ISO 26262.

Details to ZKW company philosophy are described in Appendix 06.

Organization in ZKW top down:

Top level: Chief executive officer

2nd level: General plant manager together with Group Quality & IMS Manager

3rd level: Local safety engineer together with local Quality & IMS Manager

Key Performance Indicators: Accidents – Numbers from ZKW plant Wieselburg (A) for year 2015:

Work accidents < 3 lost days:	29	
Work accidents ≥ 3 lost days:	33	
Work accidents total:	**62**	
Way to work accidents:	*4*	➔ *not for LTIFR calculation*
Number of employees:	1.931	
Working hours:	2.929.061	
LTIFR	**16**	
Number of NEAR MISS reported	11	

Figure 10: Accidents – Numbers from ZKW plant Wieselburg (A) for year 2015

Risk / Room for improvements

Regarding gaps or room for improvement regarding safety situation Ms. Naderer mentioned two items:

- Root cause analyses and classification in work accidents (Pareto – Analyses)
- Safety management system standards – ZKW group vs. ZKW site standards

4.4 Interview POLLMANN Plant Karlstein / Austria – Andreas Weber

Interview date: November, 22nd 2016:

Policy

POLLMANN´s Safety Policy is described very rudimentary based on a corporate philosophy. Only one passage describes complying with all applicable laws and regulations and continuously improving processes and using state-of-the-art technology for environmentally friendly production. Pollmann feels a strong sense of social responsibility for their local communities. Through the continuous improvement of Pollmann´s products and processes, they provide job security both at their corporate headquarters in Karlstein and all international locations.

Details to POLLMANN corporate philosophy are described in Appendix 07.

Management

Organization in POLLMANN top down:

Top level:	Country managing director
2nd level:	Department head engineering
3rd level:	Local safety engineer

Key Performance Indicators: Accidents – Numbers from POLLMANN plant Karlstein (A) for year 2016 (Jan. to Nov.):

Work accidents < 3 lost days:	8	
Work accidents ≥ 3 lost days:	7	
Work accidents total:	**15**	
Way to work accidents:	*4*	➔ *not for LTIFR calculation*
Number of employees:	580	
Working hours:	872.175	
LTIFR	**15**	
Number of NEAR MISS reported	10	

Figure 11: Accidents – Numbers from POLLMANN plant Karlstein (A) for year 2016

Risk / Room for improvements

Regarding gaps or room for improvement concerning safety situation Mr. Weber mentioned two items:

- Priority for safety in general – also during dislocation projects.
- Risk management in safety.

4.5 Interview GG Plant Poysdorf – Dr. Holger Fastabend

Interview date: December, 12th 2016:

Compared to the previous companies, GG does not have an explicit or separate safety policy – but as additional benchmark GG CORPORATE POLICY is also examined in this work. That policy is described on the basis of VISION, MISSION, STRATEGY and OBJECTIVES statements. GG´s corporate strategy depends on the demands and expectations of all relevant partners (customers, employees, suppliers, owners, community) based on the integrated management system (GMS), which covers at least the requirements of the current quality, environmental, **occupational and health standards**. In accordance to GG´s strategic orientation goals are defined with emphasis on … ***occupational safety and health.*** GG´s management periodically evaluates the results of the integrated management system (GMS) and defines new goals to ensure continual improvement and efficiency for best corporation.

Details to GG corporate policy are described in Appendix 08.

Organization in GG top down:

Top level:	Managing director
2nd level:	Plant manager together with Group Quality & IMS manager
3rd level:	Local safety engineer together with local Quality & IMS manager

Key Performance Indicators: Accidents – Numbers from GG plant Poysdorf (A) for year 2016 (April to Oct.):

Work accidents < 3 lost days:	2	
Work accidents ≥ 3 lost days:	11	
Work accidents total:	**13**	
Way to work accidents:	*2*	➔ *not for LTIFR calculation*
Number of employees:	*943*	
Working hours:	817.149	
LTIFR	**16**	
Number of NEAR MISS reported	34	

Figure 12: Accidents – Numbers from GG plant Poysdorf (A) for year 2016

Risk / Room for improvements

Closing now that chapter of five interviews (2 automotive OEMs and 3 automotive supplier companies), it can be summarized that company Gebauer&Griller has some major gaps in safety management system, as for example health and safety aspects are only mentioned sparely in the group corporate policy.
Finally, poor performances in work accidents frequency rates within Gebauer&Griller that can also be seen in chapter 4.7 statistics confirm the necessity to work in field of safety excellence system within this Master's Thesis. Improvement steps in safety management system will be shown finally in the case study in chapter 7.

To continue in analysing initial situation in industry, it's also valuable to look in customer specific requirements, which are moreover contract papers to get in business relationship. Following chapter represents five considerable companies in automotive supplier industry.

4.6 Customer Specific Requirements (CSR) on safety

4.6.1 CONTINENTAL

The CONTINENTAL Strategic Supplier Contract (SSC) in Revision 15.09.2009 comprises only requirements regarding quality, price and logistics issues. The supplier shall maintain a quality management system in line with the recent standards of the automotive industry. The Buyer Supplier Quality and Environmental System Requirements are based upon the latest edition of ISO/TS 16949 Quality System Requirements and ISO 14001 Environmental System Requirements. OH&S Management System is not expected.

Details on CONTINENTAL CSR are described in Appendix 09.

4.6.2 BOSCH

The BOSCH „Qualitätssicherungs-Leitlinie für Lieferanten QSL“ - Quality assurance guideline for suppliers in Revision 06/2004 also has only short statements to OH&S requirements – environmental protection is mentioned, so suppliers have to comply with all legal regulations on environmental, **health and safety** and to abide by an appropriate environmental organization and adequate environmental protection effects on humans and the environment low. For this purpose, the establishment and development of an environmental management system (EMS) ISO 14001 is expected. Bosch reserves the right to assess the level of implementation in the course of audits.

4.6.3 SCHAEFFLER

The SCHAEFFLER Technologies AG & Co. KG “Qualitätssicherungsvereinbarung mit Produktionsmateriallieferanten“ - Quality assurance agreement with production materials suppliers in Revision – May 2012 again has poor focus on OH&S aspects. The quality strategy of the supplier must be geared to continuous improvement of its processes and services. The objectives are "zero defects", 100% delivery performance and the reduction of costs.

One chapter is entitled “Environmental, **safety**, recycling” but only describes, that the supplier undertakes to comply with the relevant laws and regulations. A certification according to ISO 14001 is desirable and is taken into account via the supplier evaluation.

4.6.4 VALEO

VALEO´S requirements vis-a-vis suppliers in revision 01.02.2008 has some more OH&S aspects named “Respect for health and safety in the workplace”. The supplier has to ensure that each work position is perfectly compliant with legislative provisions and/or provisions set forth in Collective Bargaining Agreements as regards **health, safety and ergonomics**. In particular, the foregoing relates to introducing this principle of protection for staff carrying-out product-research, development, design and manufacturing work. As one of Valeo’s targets is to ensure zero industrial accidents, the group’s policy in this respect necessarily involves a contribution from all the company’s players and its partners. [18]

4.6.5 MAGNA

The MAGNA Global Supplier Requirements in Version 04-04-2014 is firstly not demanding direct OH&S aspects from its suppliers. Magna is committed to maintain position as global leader within the automotive sector and recognizes the integral role that each supplier to Magna has to support Magna´s position of excellence in **innovation, technology, cost, quality and delivery**. **Safety is missing** here also like in previous supplier samples.

Magna´s intent is to establish strategic, long-term relationships with suppliers and it is incumbent on each supplier to maintain a position of cost leadership while demonstrating a commitment to sustained quality, highest levels of service and a strong focus on continuous improvement. [19]

This supplier manual outlines the fundamental requirements for all suppliers to Magna International’s global operations. The **Quality System Requirements** have

been aligned across all its global manufacturing sites, to the greatest extend possible.

Then Magna expects social responsibility and also that all suppliers show the same dedication and commitment to the environment, and recommend certification to ISO 14001 environmental standards.

More OH&S details are claimed in so called “Global Working Conditions” with final statement that workers shall have a safe and healthy workplace that meets or exceeds all applicable **standards for occupational health and safety**.

Magna is expecting certifications according **OHSAS 18001**.

Finally, Magna reserves the right to review and assess their supplier’s financial, operational, quality, environmental and **health & safety systems**.

Details on MAGNA CSR are described in Appendix 10.

Summing up, company MAGNA has very high expectations in health and safety management systems up to the goal for suppliers to demonstrate conformity to management standard OHSAS 18001 while other companies are describing that more sparely in their CSRs (Customer Specific Requirements).

4.7 Statistic on work accidents

Work accidents statistics are followed in different ways in industry respectively country specific.
In Austria for example work accidents with three and more than three days have to be reported to AUVA (Allgemeine Unfallversicherungsanstalt = General accident insurance institution) with a given format template.
AUVA is calculating accidents statistic as **"Accident rate on 1000 employees"**.

In AUVA Company specific metal report from 2015 the rates for some companies are as follows:

Company	Number of employees	Number of accidents ≥ 3 d	Accident rate on 1000 employees	Average number of absenteeism days
Gebauer & Griller Kabelwerke GmbH	848,8	22	**25,9**	23,7
General Motors Powertrain Austria GmbH	1.554,9	19	**12,2**	27,3
BMW Motoren Austria GmbH	3.083,2	33	**10,7**	17,8
Infineon Technologies Austria AG	3.187,2	16	**5,0**	7,8

Figure 13: AUVA Company specific metal report from 2015 [16]

Even that report (including 120 Austrian companies in metal industry) shows numbers up to 180 accident rate on 1000 employees (that company has only 5,3 employees!) it's very clear that there is a way to work on continuous improvement in safety excellence so that rate gets down below 10.
One interesting statistic of AUVA report I want to highlight – see Internet Source in chapter 8.

Recognized Accidents at Work 2015

(Manufacture of basic metals; Manufacture of fabricated metal products, except machinery and equipment; Manufacture of electrical and optical equipment; Manufacture of electrical machinery and apparatus)

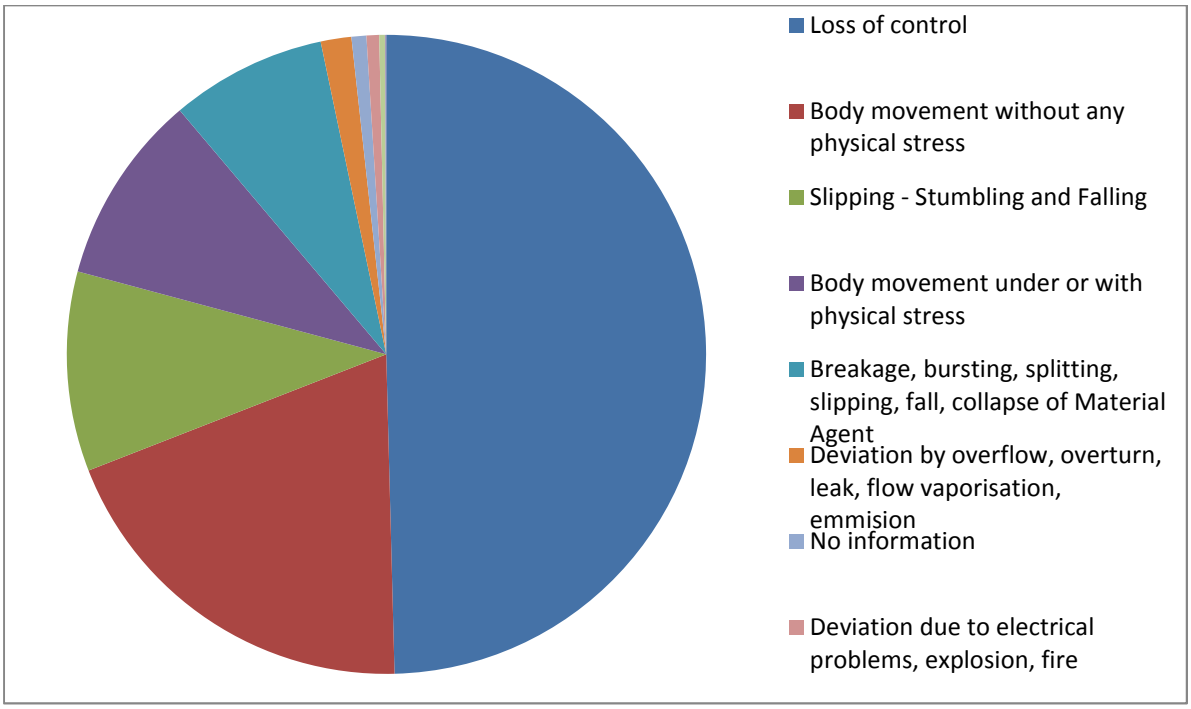


Figure 14: Recognized Accidents at Work 2015 [16]

Details for Figure 14 – work accidents groups:	Accidents at Work
Loss of control (across tool, items, machines, means of transport)	3.898
Body movement without any physical stress (to collide, to bang against, to be gripped by something, to step on a sharp object, to kneel down, to sit down, to lean on something)	1.532
Slipping - stumbling and falling	794
Body movement under or with physical stress (to lift or carry something, to go over on one's ankle, pull or push something, twisting or turning)	758
Breakage, bursting, splitting, slipping, fall, collapse of material agent	620
Deviation by overflow, overturn, leak, flow vaporisation, emission	121
No information	60
Deviation due to electrical problems, explosion, fire	50
Shock, fright, violence, aggression, threat, presence	22
Other deviations not listed above	6
All deviations	7.861

It can be concluded, that the largest part of the cake is resulting out of (work) accidents from “loss of control” or “body movements” that has to do with human / employee behaviour. Thus elementary and sustainable improvements into direction of safety excellence is only possible by implementing **Behaviour Based Safety (BBS)** System – that will be specified in the next chapters, mainly in 6.3.

5. Requirements and gaps

5.1 Actual weaknesses in safety excellence in automotive branch

With the comprehensive knowledge and summarized facts in previous chapters it can be said, that the hypothesis statements written in clause 1.3 of this Master's Thesis correspond to practice. Safety thinking and acting has to be number one; safety excellence has to be the final ambition in work environment but also in private life.

5.2 Gaps in Safety Management System

In automotive branch OEM customers are expecting more and more certified management systems. Starting with Quality Management many years ago, followed by Environmental / Energy / Health / Safety Management Systems and ending nowadays in Information Security and Corporate Social Responsibility Management Systems.

Employees' involvement is missed in creating and prosecuting that systems. Continous improvement based on P-D-C-A circle is a gap here. A very good approach in worker participation can be seen in new ISO 45001 Management System – see chapter 3.2.2.

There is a need to talk about IMS (Integrated Management System) based on a corporate policy driven by top management representative, away from insular thinking for one specific system. Synergies have to be used in problem solving techniques, risk management and finally internal audit procedures including key performance indicators measurements.

5.3 Gaps in customer specific requirements

Clause 4.6 in this work describes a spectrum for safety requirements in car manufacturing supply chain. SQDC projection can not be veryfied in that written contracts. But in practice during customer visits or audits at supplier sites there is always a safety view from customers – they are expecting to be protected from inspected companies and cleared up about basic safety rules before entering the company.

So it can be expected, that customer specific requirements will be modified relating to safety management aspects that have to be agreed finally from supplier side.

6. Defining Safety Excellence System

6.1 Safety team organization

Safety excellence respectively safety management starts with a clear defined team organization that is stated in DIN ISO 45001:2016 / clause 5.3 - occupational health and safety management systems as follows:

Organizational roles, responsibilities, accountabilities and authorities: Top management shall ensure that the responsibilities, accountabilities and authorities for relevant roles within the OH&S management system are assigned and communicated at all levels within the organization and maintained as documented information. Workers at each level of the organization shall assume responsibility for those aspects of OH&S management system over which they have control. [5]

Following figure shows a possible organisational chart for EHS management for a global automotive supplier company:

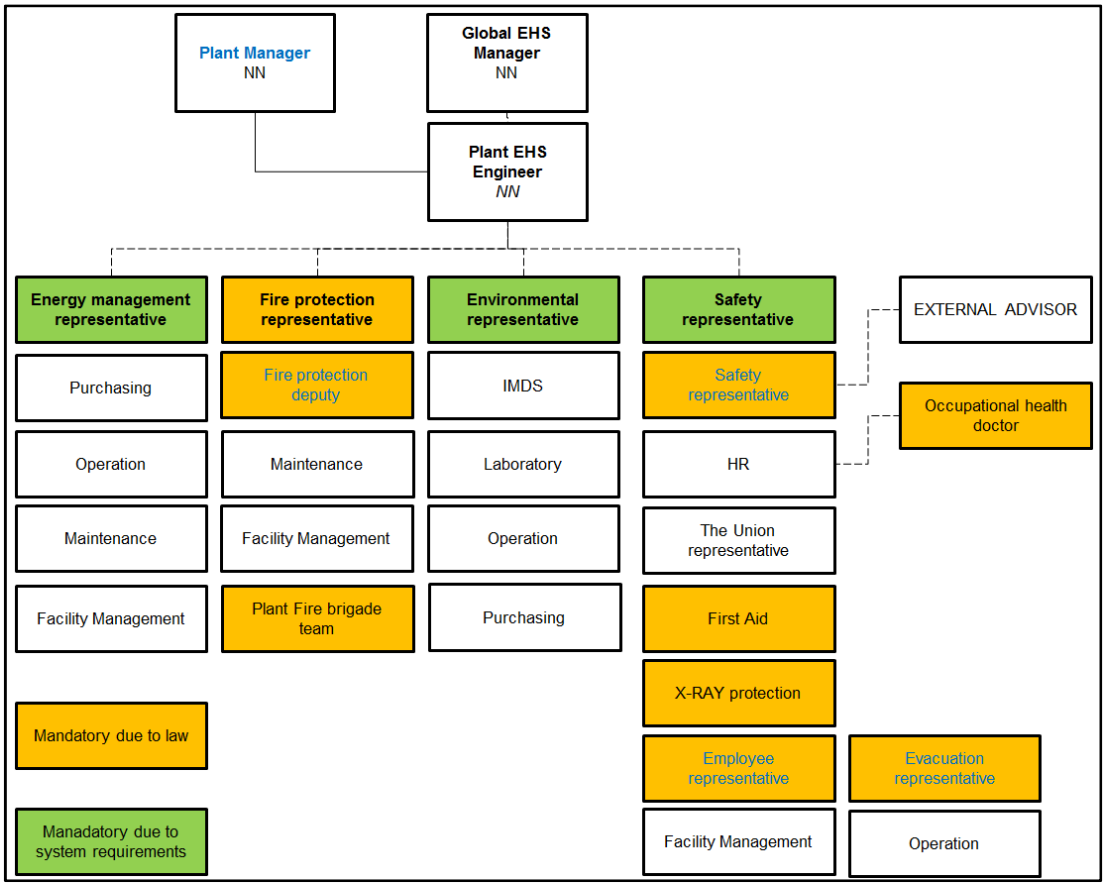


Figure 15: Possible organisational chart for EHS management

6.2 Safety house as fundamental part of safety culture

Within the scope of this work, a safety house was developed and reflected with safety excellence experts – that safety house is shown and described here:

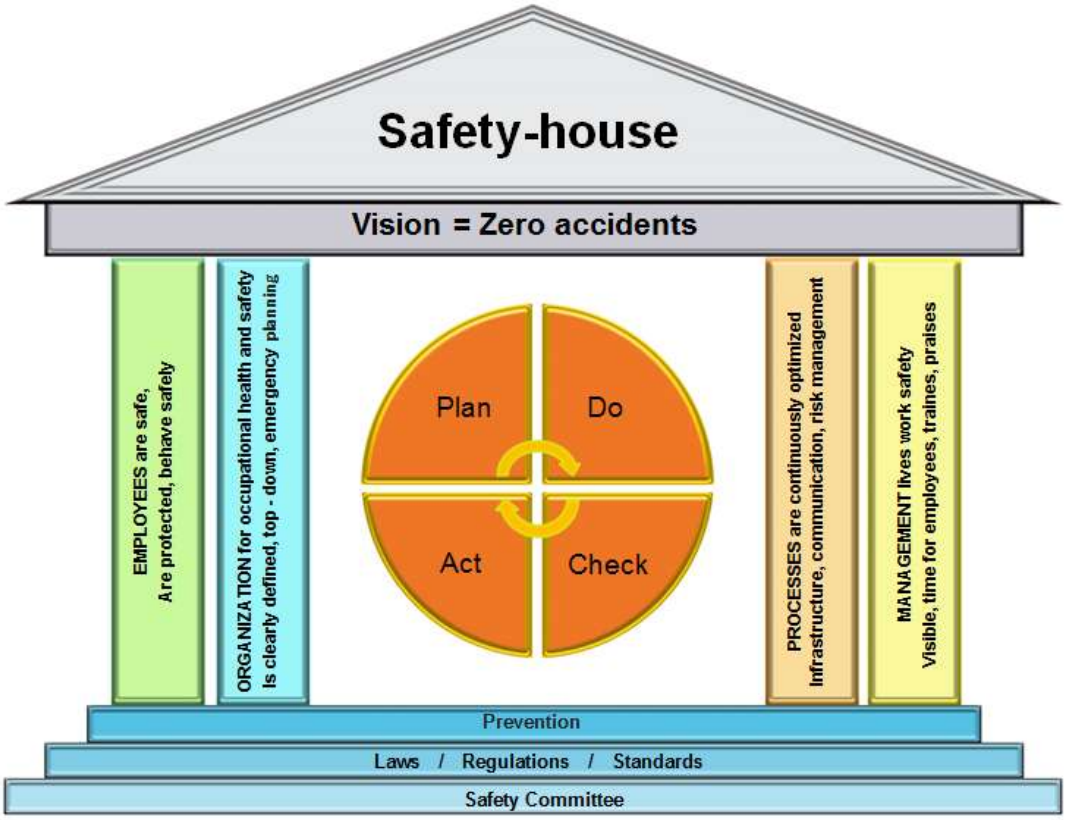


Figure 16: Safety House

The Basement:

The basic prerequisite for a living work and health protection culture is the ongoing support of the executive committee (Security Committee), starting with managing director(s) (sponsor), the plant management (legal framework), the work councils (codecision, codetermination, personal protective equipment), the occupational health care worker (health promotion), the safety confident employees (counseling of the employees) up to the first responders.

Country specific laws and regulations provide a solid foundation for the protection of workers. In addition to this, management system standards such as the OHSAS 18001, which are well known to us, are further prerequisites for the continuous improvement of occupational health and safety. Fortunately, the new ISO 45001 puts the employees even more in the foreground.

Part of the basement is also prevention → active instead of reactive - acting instead of reacting is the central concern here.

The pillars:

The first and most important pillar includes employees - employees enter the company healthy and leave it unchanged. The employee behaves safely in work, on the road and at home. GG protects the employee best.

The stability of the first pillar requires a corresponding organization for occupational health and safety (second pillar). The GG Safety Committee provides workplace validation, work equipment / working substance management, training, instruction and accident data management.

Pillar three describes the (management) processes for achieving the best possible occupational health and safety system from the planning process for safe production facilities and / or secure buildings through an effective and continuous communication process through to a comprehensive risk management process.

The final, fourth pillar represents the "cultural change" that the GG Group will experience in the coming years. The management, starting with the management, through the management as well as the master or foreman, is more visible in the company, takes time for employees, recognizes its own role as a teacher or coach and also praises - where applicable - praise. The motto is "We value our employees and they are important to us!" A pilot project for this is the regular safety dialogues of 22 executives with the machine operators in the Poysdorf cable plant.

The PLAN-DO-CHECK-ACT circle:

Our GG safety house "lives", is dynamic, not static!

This is ensured by the PLAN-DO-CHECK-ACT control loop (by US American physicist, statistician and pioneer in quality management - William Edwards Deming). The new ISO 45001 standards for occupational health and safety management deal with this area in detail and describe the ongoing planning, implementation, assessment and improvement.

The roof:

The top of the safety house means our vision = zero accidents.

Conclusion:

Out of safety experts knowledge and out of gap analyses in this study it can be said, that more and more companies are working hard on a solid foundation and stable pillars, but the roof is a bit leaky because there are still too many accidents in automotive supplier industry. There is a big need working together on the renovation of the house.

6.3 Employees´ involvement and motivation/Behaviour Based Safety (BBS)

Based on state of the art summary in chapter 3.4 (Employees´ behaviour) this chapter now desribes a very interesting and promising method for people involvement and motivation for work safety improvement and followed by SQDC (Safety-Quality-Delvery-Cost) approach →

Behaviour Based Safety (BBS) is the most successful and best-researched method to promote the work-related behaviour of fellow workers. BBS relies on feedback and recognition for safe work practices rather than penalties for risky behaviour. Thousands of companies worldwide use BBS's methodology to reduce their accident rates.

The ABC Model for safe behaviour:

Behavioral analysts are concerned with the functional connection between behaviour and achievements in the environment of a living being. The sentence "When Tom jokes people laugh" describes a functional link between a behaviour (joking) and an environmental event (the people laugh). We can, for example, observe that Tom makes fewer jokes when no one laughs. This is an indication that the behaviour "joke" is dependent on the consequence of this behaviour (the people laugh or laugh not), so "controlled" as the behavioral analysts say.

In order to understand behaviour, behavioral analysts use the so-called ABC model.

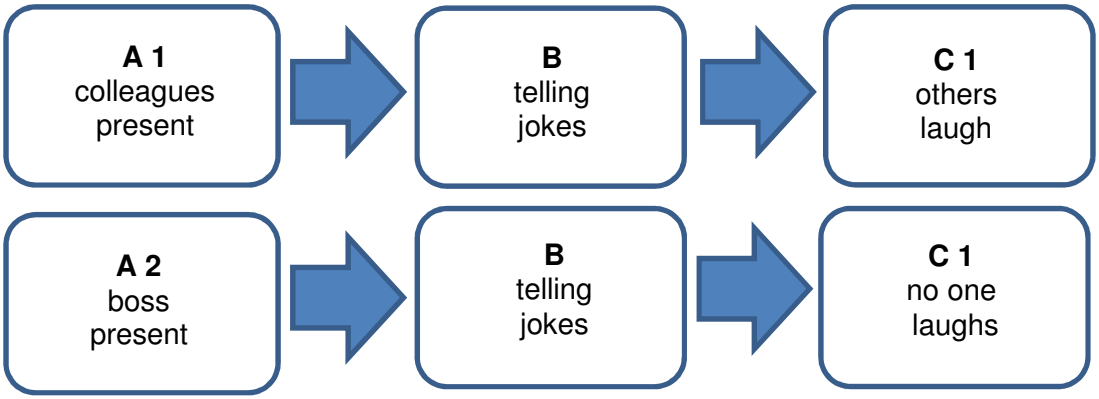
In order to use this model for our purposes, we must first distinguish between behaviour and environmental events.

Behaviour is all that a person does. All the activities of a living thing that can be observed are behaviours. This definition sounds very simple. The difficulty is, however, to describe only the observable activities.

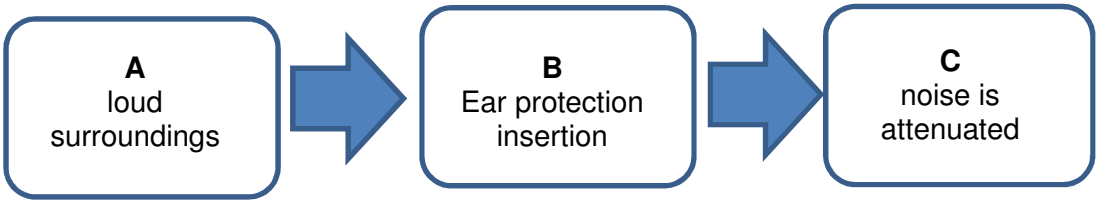
Environmental events, on the other hand, are all events that are not behaviour and can be perceived by the actors: everything that happens around the person, everything that directly or indirectly affects them.

Behavioural analysts roughly distinguish two types of environmental events: those which occur before or during the behaviour, and those which occur after that time.
Environmental conditions, which occur before or during the course of the behaviour, are called previous conditions (= antecedents). The prevailing conditions are certainly the situations in which a behaviour can occur.
Environmental events, which occur after the behaviour, are called consequences.
The relationship between the behaviour and the relevant environmental events is illustrated by the **ABC-Modell**:

Some basic samples:



Safety sample:



[8]

Some further behaviour samples:

- Wiping oil spill.
- Using PPE (personal protecting equipment) – safety shoes or glasses.
- Placing a pallet in the intended area.
- Look at the piece of work while working.
- Using handrail on stairs.
- Lifting objects over 15 kg with straight back, bent knees.
- Cleaning palette of walkway.
- Using ladder for working above shoulder height.
- An employee observes the safe behaviour of another employee.

The aim of BBS observations is to observe and reinforce safe behaviour so that it is more frequent.

Types of reinforcement:

Social reinforcement: For people, recognition by other people is very important. Man is by nature not a loner, but a socially oriented creature. It is important to people whether others approve what they do or not.

Social reinforcers are events that follow a behaviour and which play a role in interpersonal situations. Social reinforcers can not be touched and you cannot pay them - they have no material value.

A common social reinforcer is praise. The form of praise may be different. "Right!", "Keep it up!" or "Good thing, you thought you could pull the plug!" - all this is praise.

Also the time we dedicate to someone can act as a social reinforcer. The positive reinforcement does not always have to be praised. It can be enough if the manager expresses his interest in the work of the colleagues with BBS through questions. [8]

Material reinforcement: In the case of the term "reinforcer", most people initially think of material reinforcers. Many people think that when they hear a concept like reinforcer, there must be a "thing" that stands for this concept. However, reinforcer are not necessarily comprehensible things, as we have seen in the social reinforcement.

Material reinforcers are "things". More precisely, these are events that follow a behaviour, which are associated with physically present things or have a monetary value.
The monetary bonus is usually seen as a material reinforcer. The vast majority of people can never have enough of it and are not "saturated". Money is called the so-called conditioned or generalized reinforcers. In contrast, there are primary, material reinforcers: eating or drinking.
Material reinforcers apply in BBS as an expression of the recognition of the enterprise, rather than as part of the remuneration. For example, they should be items that the employee can not buy. In American BBS systems, documents and plaques are also common. There can also be a T-shirt with a company logo and the "Safety champion" print. Some companies rely on a point system ("tokens"). After collecting several points, the employee can exchange them for an item. [8]

Activity reinforcement: Activity reinforcers can be used to increase group loyalty and team spirit. A common goal is also to be celebrated through a joint activity. This can, for example, be a common dinner after a safety goal has been reached, or the management allows to go into the lunch break earlier and not have to wait in front of the canteen, for example.

Pure activity reinforcers are rarely used in BBS. However, the combination of social, material and activity reinforcers is wise and useful. Social reinforcement always plays a role in BBS. With every observation of safe behaviour, with every activity for work safety social reinforcement can be used. At first this is planned, but with time it is also a matter of course. [8]

6.4 Soft facts – mind change

The basis mind change to get into safety excellence has to do with cultural changes embossed mainly in employees involvement, employees reliance and management participation (felt leadership). There are some reference in the case study in chapter 7 of this Master's Thesis.

6.5 Hard facts – visualization

A picture says more than 1000 words – chapter 6.8 in this work describes necessity of team boards (SQDCE) as substantial visual shop floor utilities for leadership communication, employees´ involvement and finally employees´ behaviour purposes.

6.6 Adaptation of integrated management system

Almost every company in automotive business has at least a quality management system according ISO 9001 standard. Global ISO committees are busy creating same structure for guality, environment, health, safety and so on. The rules in every management system are the same. Starting with corporate policy (general principles or mission statement), management commitment, worker participation, planning processes, resources management, operation control, performance evaluation, audits management and mangement review performing has to be done accordingly.

6.7 Safety management core tool / NEAR MISS

Before explaining details in NEAR MISS System, further details on the safety triangle – see clause 3.1.1 in this Master´s Thesis – have to be described.

Accident pyramid model (Safety Triangle):

In 1969, Frank E. Bird Jr. committed to a study of industrial work accidents based on the previous research of H.W. Heinrich, which established the ratio of 1 major injury to 29 minor injuries to 300 no-injury accidents.
Since H.W. Heinrich estimated the relationship and because his sample was not randomly chosen, Bird was willing to determine what the actual reporting relationship of accidents was by the entire average population of workers.

What is important in Bird's study?

Bird analyzed 1,752,498 work accidents reported by 297 cooperating companies representing 21 different industrial groups employing over 1,750,000 workers who served over 3 billion hours during the study.

The study uncovered following ratios in reported accidents:
For each major injury reported (resulting in fatality, disability, lost time or medical treatment) there have been 9.8 reported minor injuries (requiring first-aid), 30.2 property damage accidents and 600 incidents.
It must be remembered, that those ratios represent reported accidents and incidents discussed – not what actually occurred. This study was not intended to predict the ratio of injuries for any particular occupational group or organization.

How can we put the Safety Triangle to work ?

What this study has mainly declared is that major injuries are sporadic so we have to take action on the more recurrent and less compromising events to decrease the chance of total accident losses from transpiring.

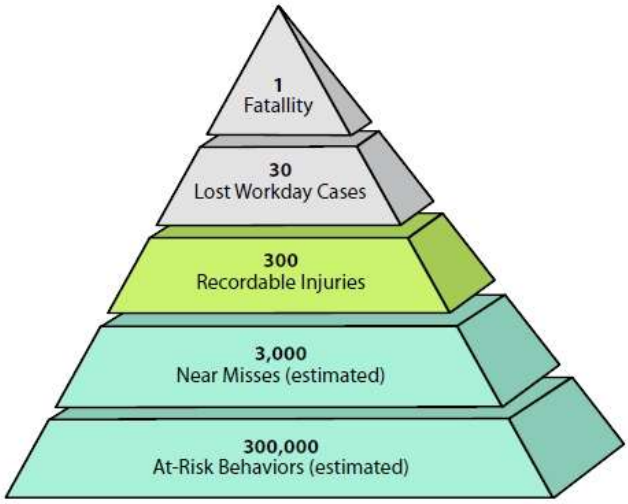


Figure 17: Bird's accident pyramid model (Safety Triangle) [17]

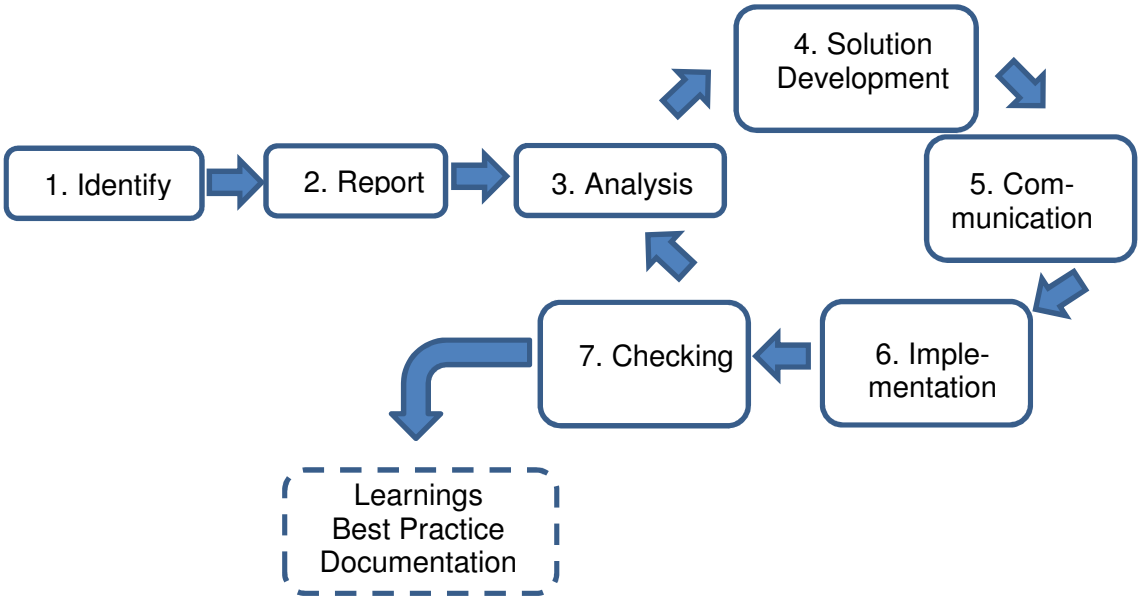
What does NEAR MISS mean in detail?

- an unsafe condition
- an uncertain action
- a hidden danger
- a risk potential
- a minor accident
- a mistake
- a toleration

The golden NEAR MISS rule: **"If you cannot do it safely, do not do it at all"!**

Employees are asked to report NEAR MISS cases so that an accident can be avoided.

This flow chart shows a possible way how to manage NEAR MISS System:



6.7.1 NEAR MISS – Reporting

Notification of a case:

The detector, which can be any person, enters the NEAR MISS into a database. This could be done anonymously.

The input usually takes only 2 to 3 minutes. The case is automatically forwarded to the analysis team and processed by the analysis team

Analysing of the case:

The cause is determined. The risk is assessed using the 3F-method.

On the basis of the factors determined, the changes or improvements are initiated in order to avoid repetitions.

Message:
Entering a NEAR MISS normally takes only 2 - 3 minutes!

6.7.2 NEAR MISS – Audit

The NEAR MISS audit on the one hand is held on a regular basis and on the other hand is made up interdisciplinary.
The aim is to identify unsafe conditions and unsafe behaviour (NEAR MISS) on site and, if necessary, to take the necessary measures to eliminate them.

NEAR MISS – Analysis:
On a simple format (paper or tablet) following items should be captured:

- **What has happened?** E.g. employee works with angular grinder next to gas container.
- **What is the result?** E.g. possible fire / explosion hazard.
- **What are the possible reasons?** E.g. inadvertence.
- **How can the incident be avoided in the future?** E.g. regulation for correct behaviour.

Also a NEAR MISS picture should be captured and final statement to "unsafe source was removed?" → YES / IMEDIATELLY / NO

6.7.3 NEAR MISS – Evaluation – 3F-Method:

In order to be able to evaluate NEAR MISS comprehensibly, the 3F (Factors)-Method is to be used. The method invites you to think about the different aspects of a threat or uncertain condition. It can set priorities for further actions. The method is a selection criterion for internal and external communication.

The 3 Factors are:

I **Impact**, extent of loss
O **Occurrence**, with which one is exposed to a certain danger.
P **Probability**, of a certain effect

Risk = I x O x P

This can be compared with well-known FMEA - Failure Mode and Effects Analysis - Risk analyzing tool in automotive industry → **RPN** Risk Priority Number is calculated as **S**everity x **O**ccurrence x **D**etection. [9]

Within the scope of the work, the following proposal for a graduation was developed:

I (Impact): Unwanted result of an event / sequence of events.

I = 1: Minor impact (e.g. first aid)

I = 3: Important impact (e.g. severe injury, working time loss)

I = 7: Serious impact (e.g. permanent disability)

I = 15: Very serious impact (e.g. fatal accident, severe illness)

I = 40: Major damage event (e.g. several deaths)

I = 100: A catastrophe (e.g. numerous deaths)

O (Occurrence): How often can a certain risk occur?

O = 0,5: Very rare (less than once a year)

O = 1: Rare (once a year)

O = 2: Sometimes (monthly)

O = 3: Now and then (weekly)

O = 6: Regular (daily)

O = 10: Continuously

P (Probability): How likely is a certain impact?

P = 0,2: Inconceivable

P = 0,5: Almost impossible

P = 1: Unlikely, but long-term possible

P = 3: Usually not, but possible

P = 6: Quite possible

P = 10: Pretty sure

Some comments to “Unlikely”: There are some things you can learn from nuclear accidents in Japan. For example, that something can actually happen, that engineers consider as extremely unlikely.

Risk categories:

A scale is used to assess the urgent need for action.

Risk below 20: Low risk - check whether there is any need for action

Risk 20 to 70: Possible hazards - need for action

Risk 70 to 200: High risk - improvement necessary

Risk 200 to 400: Immediate action

Risk above 400: Imminent danger – STOP!

Finding of causes:

After the risk assessment, the 3 Factor method is followed by a cause finding:

Periphery factors

1. Bad lighting
2. Defective equipment or facility
3. Inadequate protective equipment
4. Disorder
5. Slippery or uneven ground

Activity

1. Improper use of the equipment
2. Work process / -step was overlooked
3. Non-compliance with instructions or rules
4. Disabling of safety devices
5. Use of broken equipment

Checking

1. Employee training
2. Technical inspections
3. Analysis and investigation of incidents
4. Personal communication
5. Planned inspections

Personal factors

1. Inadequate experience
2. Too little respect to technique
3. Lack of knowledge
4. Lack of training
5. Stress

Work factors

1. Faulty maintenance
2. Improper use
3. Inadequate procedures or rules
4. Unsuitable equipment
5. Worn equipment

6.8 Legal basis for near miss reporting (in Austria):

Austrian Federal Act on Safety and Health Protection at Work
(ArbeitnehmerInnenschutz-gesetz – AschG) BGBl Nr. 450/1994

Paragraph [§] 15. Obligations of the employees

(5) Workers shall immediately report any serious accident, any incident that has almost led to an accident, and any serious and immediate risk to safety and health, as well as any defects found in the protection systems, to the appropriate supervisor or to other persons responsible report.

Paragraph [§] 16. (1) Employers must keep records.

(3) On all events which almost led to a fatal or serious work injury and which were reported in accordance with Article 15 (5).

6.9 Safety culture / SQDCE

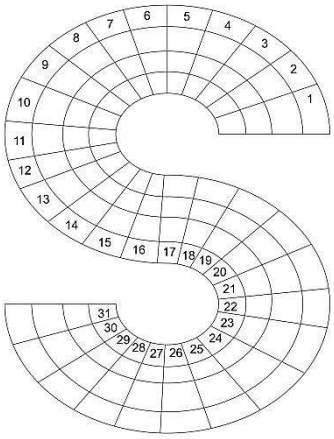
As written in Abstract Safety first approach is main focus in this Master's Thesis.
The acronym SQDCE stands for Safety, Quality, Delivery, Costs and Environment and can be seen as relevant element in any industrial production system. This section describes the focus items – practical sample including visualisation on SQDCE board (every letter has to be coloured red or green per shift) will be shown in Gebauer & Griller case study in chapter 7.

Team boards are substantial visual shop floor utilities for leadership communication, employees´ involvement and finally employees´ behaviour purposes.

Description will show how SQDCE-Section Team Board can be set up with focus items respectively objectives named SETTLE, QUICKLY, ERADICATE and CONTROL – that can be seen together with PDCA cycle.

SAFETY

Objective: Follow-up of Safe Workplace Conditions and Avoidance of Unsafe Acts.



SETTLE: No MTI (Medical Treatment Injury) and LTI (Lost Time Injury) – letters on board will be coloured green, otherwise red.

QUICKLY (Action plan): Short-term action (problem description, action, responsible person, due date). E.g. water on the ground lead to slipping risk → containment action: cleaning.

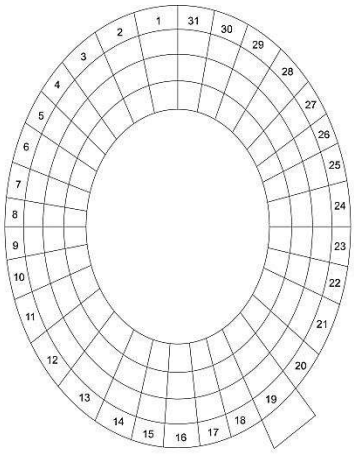
ERADICATE (Pareto follow up): List of major reasons / root causes (e.g. unsafe conditions, unsafe behaviour, unclear organisation, unsafe technology, …) with number of identified items → identify focus.

ERADICATE (Action plan): Mid-term action plan to address most important issues from Pareto (description, action, responsible person, due date) in PDCA logic. E.g. check leakages in the section and close them. Define sealing principle and audit frequency.

CONTROL (Control chart): Monthly trend of KPI compared to objective of the year. E.g. trend of FAC, MTI, LTI or number of implemented preventive actions

QUALITY

Objective: Internal Non-Conformities (2nd step external)



SETTLE: Number of Internal Non-conformities / Number of suppliers' non-conformities below objective → green; otherwise red.

QUICKLY (Action plan): Short-term action (problem description, action, responsible person, due date) e.g. high number of knots on cable → containment action: stop line, clean, check recipe, start again.

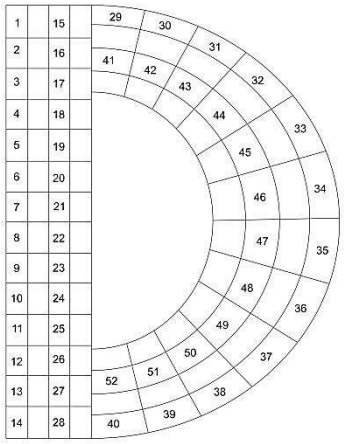
ERADICATE (Pareto follow up): List of major reasons / root causes for non-conformities (e.g. dimension, surface, length, colour, completeness, ...) with number of identified items → focus

ERADICATE (Action plan): Mid-term action plan to address most important issues from Pareto (description, action, responsible person, due date) in PDCA logic. E.g. identify critical materials and review parameters, update recipe and control plan if appropriate

CONTROL (Control chart): Monthly trend of KPI compared to objective of the year. E.g. trend of internal non-conformities.

DELIVERY

Objective: Schedule attainment (Respect of detailed scheduled due dates)



SETTLE: Number of due dates by operation achieved / below objective → green; otherwise red

QUICKLY (Action plan): Short-term action (problem description, action, responsible person, due date), e.g. delays due to missing manning on bottleneck. Containment action: additional staff from other machines.

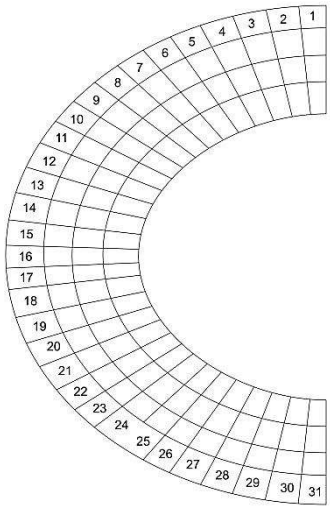
ERADICATE (Pareto follow up): List of major reasons / root causes for delays (e.g. missing material, machine breakdown, missing shifts, non-conformities,...) with number of identified items → focus.

ERADICATE (Action plan): Mid-term action plan to address most important issues from Pareto (description, action, responsible person, due date) in PDCA logic. E.g. bottlenecks are often not sufficiently staffed. Special capability training for further staff to cover bottleneck (follow-up with qualification matrix).

CONTROL (Control chart): Monthly trend of KPI compared to objective of the year. E.g. trend of schedule attainment.

COSTS

Objective: Cost related KPI´s achieved (Productivity, scrap,…)



SETTLE: Number of Workplaces above OEE or productivity target, scrap below objective → green; otherwise red.

QUICKLY (Action plan): Short-term action (problem description, action, responsible person, due date). E.g. high scrap on a given line → containment action: review tools, parameter setting.

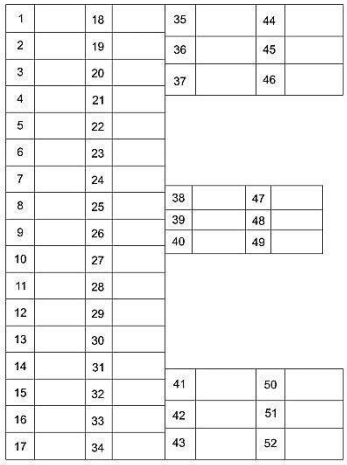
ERADICATE (Pareto follow up): List of major reasons / root causes for productivity losses or scraps (e.g. productivity: speed losses, set-up time overrun, rework, …). E.g. scrap: process related scrap, non-conformities, short-length, ...) with number of identified items → focus.

ERADICATE (Action plan): Mid-term action plan to address most important issues from Pareto (description, action, responsible person, due date). E.g. relatively high start-up length. Review start-up procedure in order to reduce lost length and update.

CONTROL (Control chart): Monthly trend of KPI compared to objective of the year. E.g. productivity or scrap trend.

ENVIRONMENT

Objective: 5S level achieved (audit evaluation)



SETTLE: 5S level achieved, audits performed, results above target → green; otherwise red.

QUICKLY (Action plan): Short-term action (problem description, action, responsible person, due date). E.g. tools not at defined place. Containment action: ask operator to follow the rules with the shift and to inform next shifts.

ERADICATE (Pareto follow up): List of major reasons / root causes for non-achievement of 5S level (e.g. tools, materials, instructions, ... not at defined place, cleaning not done properly, ...) with number of identified items → focus.

ERADICATE (Action plan): Mid-term action plan to address most important issues from Pareto (description, action, responsible person, due date). E.g. 5S is not improving mid term. Repeat training and increase cross audit frequency.

CONTROL (Control chart): Monthly trend of KPI compared to objective of the year. E.g. trend of audit results.

6.10 Safety management key performance indicators

LTIFR (Lost Time Injury Frequency Rate)

LTI (Lost Time Injury) work injury that results in a fataility permanent disability for time lost from work of noe shift or more.
Apply for GG employee or external employee (agency worker) performing the job in GG plant.

Absence from work > 1 shift

IT IS NOT: injury with absence from work less than 1 shift.

Work injury: injury occurred directly at work place and caused by work activity.
IT IS NOT: injury according to local legislation e. g. injury caused on the way home from work or caused at external seminar, in business trip, etc.
Sickness due to repeated operations (example backbone pain due to lifting heavy stuff, arm pain due to taping, etc.).

Work hours: it is attendance tiem white colour and blue colour (direct/indirect) employees. Definition is the same as used for calculation productivity.
IT IS NOT: attendance time does not include vacation, sickness leave, maternity leavy, etc.

MTIFR (Medical Treatment Injury Frequency Rate)

MTI (Medical Treatment Injury) work injury or disease that resulted in a treatment given by a medical personnel in or outside of the work.

Absence from work < 1 shift

IT IS NOT: First Aid Treatment or treatment given by not-medical personnel (e.g. co-workers or self treatment).

FAC (First Aid Case) –

No treatment by a medical professional (outside the factory) is required.

6.11 P-D-C-A circle and continuous improvement in safety

“Good old Deming” – everybody in business life knows Deming circle /wheel respectively Shewhart cycle PDCA (plan–do–check–act or plan–do–check–adjust) as an iterative four-step management method used in business for the control and continual improvement of processes and products.
See Figure 05: OH&S management system model for Standard ISO 45001.

Summary of basic practices when it comes to establish a rigorous OH&S management system is shown here:

- Management Commitment
- Roles & Responsibilities
- OH&S Policies & Standards
- OH&S Objectives and targets
- Federal / State regulations
- Risk Assessment
- OH&S Management System

- Safety Procedures
- Emergency Procedures
- Staff & Management Training
- Preventive Management
- Risk Management
- Incident Management
- Document Control

- Incident / Safety Analysis
- Measurement / Testing
- Internal / External Audits
- Requirements Review
- Conformance Review
- Management Review
- Key Performance Indicators Tracking

- **Continuous Improvement**
- Process Enhancements
- Procedures Enhancements
- Requirements Review
- Training
- Review
- Upgrades

7. Implementation at Gebauer&Griller - Case study

Within GG company a comprehensive project was performed named “GG Safety excellence”.
The basis milestones in that project was management team involving and defining a vision for the next 3 years in performing some brainstorming meetings, after that a SWOT analyses in current safety situation was done in management team and finally a road map for GG on the way to safety excellence in year 2019 was constructed.

Next pages show the outcome of that project, clearly represented in bullet point form, that can be a worthful input for any other organization in automotive supplier industry.

7.1 Brainstorming – GG Safety excellence - Vision in 2019

7.1.1 What characterizes the organization?

- New priority: Safety First
- Reduction of accidents at work by 50%
- Visibly clearly defined organizational structure regarding safety
- Safety is lived
- Safety aspects are considered in a standardized way during planning (plant, product, etc.)
- Safety organization available in a clear way
- Organization and implementation of regular safety audits (possibly in combination with product / process audits)
- Organization has developed awareness of safety issues
- Area-specific safety programs
- Proud of zero accidents

7.1.2 How do the employees feel?

- Appraisal against employees - Company ensures work safety
- Employees also live safety at home
- Employees are save and understood (correctly perceived) and have a say
- Employees recognize that their own safety is a concern to the company
- Employees are heard and involved
- Employees enter the company safely, and leave it safe again
- Employees are proud and feel well understood

7.1.3 What do the line managers do?

- Line managers life established safety rules and conduct dialogues with employees
- Line managers feel responsible for the safety of their employees (role model)
- Line managers think across departments (away from insular thinking)
- Line managers do not accept any deviations
- Line managers have an "eye" on safety shortcomings and speak to employees on it
- Line managers demand and encourage employees
- Line managers are regardful and praise (employees)
- Production lines are only put into operation when safety aspects are 100% existent

7.1.4 What makes the management stand out?

- Management lives his / her role as a guide
- Management pursues the clear objective of ZERO accidents at work
- Management provides the necessary resources for this target achievement
- Management operates quick and correct
- Management is the contact person for everyone in matters of safety
- Management supports all safety issues in a self-assured and active manner
- Management celebrates achievements with employees

7.2 SWOT analyses for Gebauer&Griller

Gebauer & Griller management team has performed a SWOT (STRENGTHS, WEAKNESSES, OPPORTUNITIES and THREATS) matrix in existing safety aspects and safety thinking with external moderator. The picture shows results out of that were English translation can be found below:

Figure 18: SWOT matrix in existing safety aspects and safety thinking

The SWOT mind map pictures in Figure 18 are not easy to read so a summary is described here:

7.2.1 Strengths

- Technology of existing equipment
- Willingness to change
- Team spirit in the departments
- New value for safety
- Safety basics are available
- PPE - personal protective equipment
- Personal scope of action
- Training of workers
- Openness

7.2.2 Weaknesses

- Own role model
- Own responsibility
- Inconsequential action
- On-site presence
- Design of workstations
- Verify effectiveness
- Assigning blame
- Responsibility for others
- Lack of motivation for employees
- No praise
- Employees not included
- Missing tools
- Island thinking
- Training staff
- Audits / dialogues
- Communication

7.2.3 Opportunities

- Accident Investigations
- Celebrate achievements
- Communication

- Connection to the fire brigade
- Process management
- Learn from other GG sites
- Network with customers
- Management support
- HSE Organigram

7.2.4 Threats

- Forklift truck
- Place
- Traffic / transportation
- Too much at once
- Time pressure
- Old buildings
- Material flow
- In emergency situation, no priority for safety

7.3 Road map for GG on the way to safety excellence in Year 2019

As described above in GG safety excellence project after brainstorming and SWOT analyses performance a road map (project time plan) with defined focus subjects including key performance indicators was constructed which is shown in figure 19:

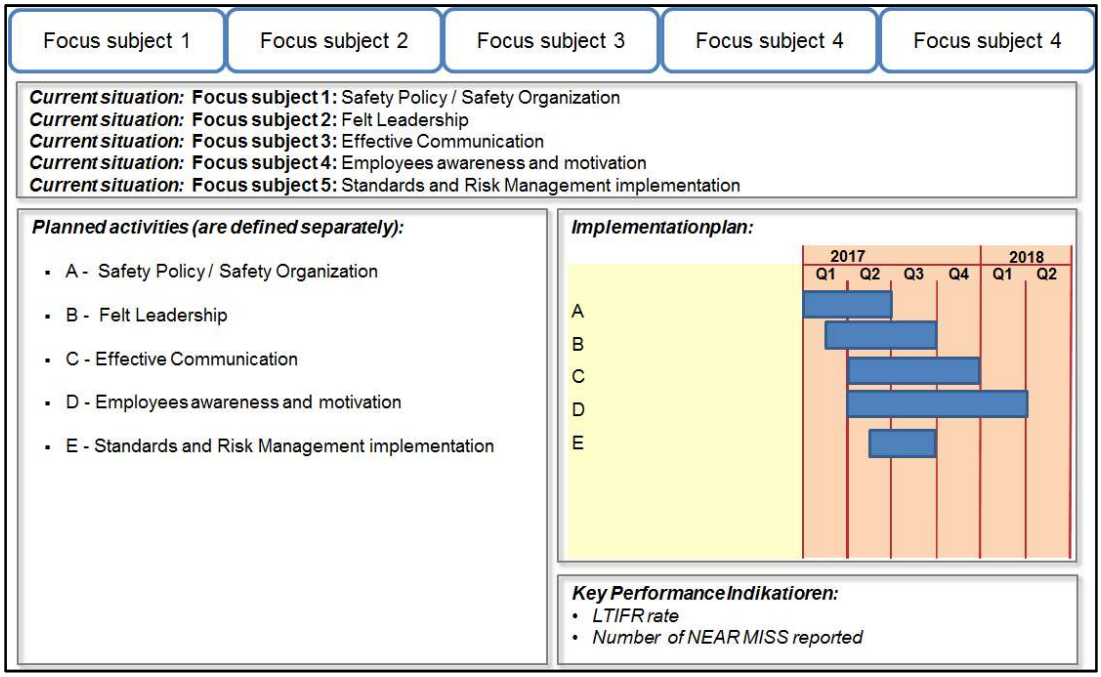


Figure 19: Road map for GG on the way to safety excellence

The defined 5 focus subjects which have been agreed by top management are summarized here:

7.3.1 Focus subject 1 – Safety Policy / Safety Organization

Current situation:

- The guideline for occupational safety is not currently available.
- In the existing company policy, "work safety and health" are mentioned only briefly.
- HSE Organizational Chart Top Down not running.

Planned activities:

- Guiding principle (policy) for safety management
- Collect patterns
- Completion of the GG safety house
- Completion of the GG safety policy

- HSE Organizational Chart
- Clarification HSE position – position reporting to board
- Modification Top organization chart and job description.

- Release and distribution
- Enable safety guideline / policy
- Release organization chart and job description
- Recording in existing management system

7.3.2 Focus subject 2 – Felt Leadership

Current situation:

- Felt leadership - the culture of personnel management is currently not sufficiently team-oriented.
- Employees' sense of responsibility is currently hardly noticeable.
- Lack of prioritization in the management of employees including third parties.

Planned activities:

- Implement security dialogs / observations
- Create a plan for managers
- Create a safety observation card
- Basic information for managers including motivation

- Perform safety dialogs / observations
- Start with January 2017 in production cable plant
- Monthly dialogue leadership with operator until summer 2017

- Result presentation
- Collecting, condensing, reporting from first quarter 2017
- Lessons learned for second quarter 2017
- Actions initiating and tracking

7.3.3 Focus subject 3 – Effective Communication

Current situation:

- Direct (effective) communication not given adequately - supervisors with employees in production AND office.
- Indirect (effective) communication is not sufficiently given - Visualization SQDCE.
- Presence on site for effectiveness tests or feedback (including praise) not sufficiently available.

Planned activities:

- See the topic - Safety dialog
- Reinforce indirect communication
- GG company newspaper - safety house including PDCA
- GG Company TV - safety dialogues

- SQDCE Team Board
- Safety / Quality / Delivery / Costs / Environment
- Support of the project by Safety Team

- Give feedback
- "Behavioural shaping" by "positive reinforcement" – praise, recognition, success, affirmation, pride.
- Use of the three types of "reinforcement": social reinforcement, material reinforcement, activity reinforcement.

7.3.4 Focus subject 4 – Employees awareness and motivation

Current situation:

- Consciousness of all employees is not given adequately.
- Lack of motivation for employees.
- Safety Committee (= GG Safety Team) is not integrated and clearly defined.
- Resource bottlenecks in the area of work safety.

Planned activities:

- Definition of Safety Committee

- Top Down: Board member / Plant manager / Quality manager / Safety engineer(s) / Safety trusted third party / Fire protection engineer / occupational physician / Waste manager / First aiders
- Definition of roles and responsibilities
- Check existing resources and plan new ones if necessary

- Awareness of employees
- Implementation BBS Behaviour Based Safety (behaviour-oriented safety)

- Involvement of employees
- More active integration into workplace evaluation
- Active integration in accident analyses

- Reporting chain and emergency planning
- Clear definition of emergency signalling chain
- Practice of risk and opportunity management

7.3.5 Focus subject 5 – Standards and Risk Management implementation

Current situation:

- Standards for occupational safety are not sufficiently available.
- The legal basis is not sufficiently known.
- Standard requirements from occupational health and safety management systems are not sufficiently implemented

Planned activities:

- To expand standards for work safety
- Accident Reporting Sheet (GG global)
- JSA (Job Safety Analysis) to perform continuous
- Set the NEAR MISS system
- Perform NEAR MISS Perform audits

- Legal basis
- Establish a status quo from the Employee Protection Act and identify deficits
- Close existing gaps in the law
- Improve workstation ergonomic in the office

- Convert standard requirements
- Revision ISO 45001:2016 must be taken into account

The implementation time-plan for all that topics is staid for 15 month in total which is very ambitious. In fact final result is kind of cultural change in the organization that needs encouragement from each and every single employee beginning in top management, ending in back staff team and also external service providers.

7.4 Safety observation / safety dialogue - management with employees

For the cultural change in any organization employees involvement is a prerequisite. But how can that be accomblished?
Next pages desribe a very practicable method in performing dialogues from management team members with employees.

7.4.1 The characteristics of Felt Leadership

Management team members have to understand some basic leaderhip behaviour principles:

- Be visible in the company.
- Be unyielding about your time with your employees and third parties.
- Recognize your role as a teacher / trainer and pay attention to your own safe behaviour.
- Develop your own leadership skills (in terms of security), and pass them on to the company.
- Your behaviour and leadership style should match what you expect from others.
- Celebrate and honour successes.

7.4.2 What do we need safety dialogues for?

- Safety is the top priority.
- Our employees are important to us.
- Positive reinforcement (social, material, activity enhancers).
- Preventive, non-reactive.
- So that we can empower our employees "without blame".
- So that we can involve our employees rather than impose or impose something on them.
- Tools to encourage our employees to change unsafe behaviour.
- We value our employees and they are important to us.

7.4.3 Advantages of safety dialogues

- Avoid incidents and injuries.
- Show that your employees are important to you.
- Encourage positive working practices.

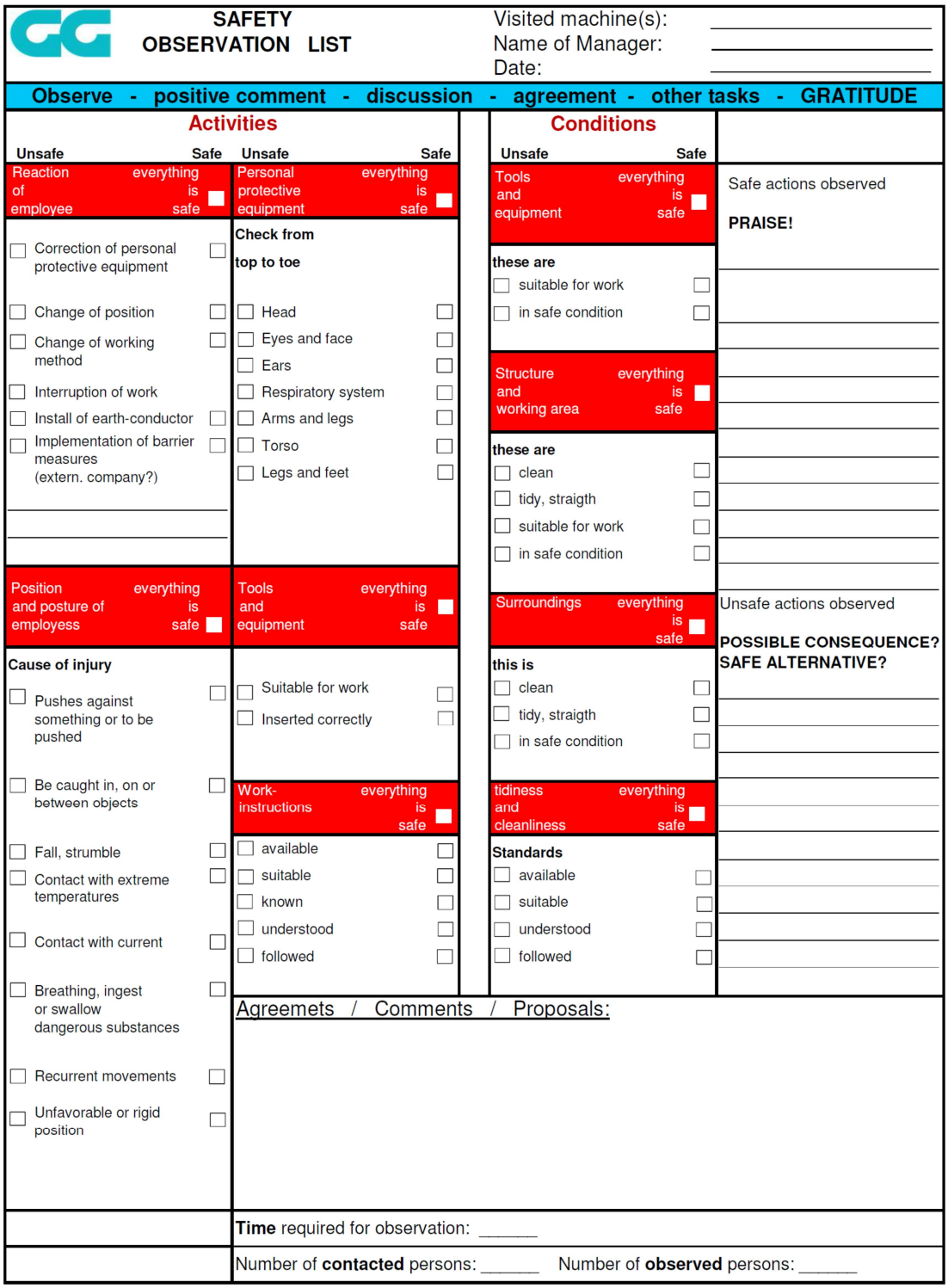
- Raise everyone's awareness of work safety.
- Establish HSE standards.
- Ensure that the rules are understood and complied with.
- Define and correct uncertain situations.
- Weaknesses, improvement potentials and trends in the safety system.
- Motivate employees.

7.4.4 Execution of safety dialogues – the 6 steps for conversation

1. Briefly observe / make contact - stop if necessary.
2. Positive entry / comment - safe actions.
3. Discussion / possible consequences in case of uncertain behaviour / worst case / safe alternatives
4. Agreements and / or filling the observation list
5. Discussion of other tasks
6. Thanks to the employee

After that description of safety observation and safety dialogues advantages figure 20 on next page shows an assistance instrument for preparation, performing and finally documented working tool for safety dialogues.
When management representative visits a machine, a department like maintenance or despatch area, he / she shall take that safety observation list and take sufficient time to speak with employee(s) on site.

7.4.5 SAFETY OBSERVATION LIST



SAFETY OBSERVATION LIST

Visited machine(s): _____
Name of Manager: _____
Date: _____

Observe - positive comment - discussion - agreement - other tasks - GRATITUDE

Activities

Unsafe / Safe

Reaction of employee — everything is safe ☐

- ☐ Correction of personal protective equipment ☐
- ☐ Change of position ☐
- ☐ Change of working method ☐
- ☐ Interruption of work
- ☐ Install of earth-conductor ☐
- ☐ Implementation of barrier measures (extern. company?) ☐

Position and posture of employess — everything is safe ☐

Cause of injury

- ☐ Pushes against something or to be pushed ☐
- ☐ Be caught in, on or between objects ☐
- ☐ Fall, strumble ☐
- ☐ Contact with extreme temperatures ☐
- ☐ Contact with current ☐
- ☐ Breathing, ingest or swallow dangerous substances ☐
- ☐ Recurrent movements ☐
- ☐ Unfavorable or rigid position ☐

Unsafe / Safe

Personal protective equipment — everything is safe ☐

Check from top to toe

- ☐ Head ☐
- ☐ Eyes and face ☐
- ☐ Ears ☐
- ☐ Respiratory system ☐
- ☐ Arms and legs ☐
- ☐ Torso ☐
- ☐ Legs and feet ☐

Tools and equipment — everything is safe ☐

- ☐ Suitable for work ☐
- ☐ Inserted correctly ☐

Work-instructions — everything is safe ☐

- ☐ available ☐
- ☐ suitable ☐
- ☐ known ☐
- ☐ understood ☐
- ☐ followed ☐

Conditions

Unsafe / Safe

Tools and equipment — everything is safe ☐

these are

- ☐ suitable for work ☐
- ☐ in safe condition ☐

Structure and working area — everything is safe ☐

these are

- ☐ clean ☐
- ☐ tidy, straigth ☐
- ☐ suitable for work ☐
- ☐ in safe condition ☐

Surroundings — everything is safe ☐

this is

- ☐ clean ☐
- ☐ tidy, straigth ☐
- ☐ in safe condition ☐

tidiness and cleanliness — everything is safe ☐

Standards

- ☐ available ☐
- ☐ suitable ☐
- ☐ understood ☐
- ☐ followed ☐

Safe actions observed

PRAISE!

Unsafe actions observed

POSSIBLE CONSEQUENCE?
SAFE ALTERNATIVE?

Agreemets / Comments / Proposals:

Time required for observation: _____

Number of **contacted** persons: _____ Number of **observed** persons: _____

Figure 20: Safety observation list

8. Conclusion and Outlook

Development of an advanced safety excellence system in fact is a very broad sphere of activities. Basic safety culture thinking is going back even until year 1811, when company DuPont defined their first safety rules – see details in chapter 3.1.2.

In field of automotive business, special in supplier companies, safety culture is not just yet suitable considered – that is proven within initial situation interviews in well-known organisations and within certain gaps in customer specific requirements on safety.

SQDCE - Safety Quality Delivery Costs Environment – approach is improvable. Employees working in a safe and clean surrounding field can produce good quality, so delivery is possible in right amount and time and costs will be controllable.

The key for that achievement might be employees´ involvement!

Who spends eight hours on the machine at work every single day?

Who can see unsafe conditions in the factory?

Who can observe colleagues in unsafe activities?

Who can provide ideas for improvement?

We have to look after employees´ involvement and engagement more rigorous.

Luckily the international OH&S management system standard ISO 45001, that will be released in year 2018 latest, has very clear defined requirements in **Leadership** and **Worker participation** matters based on **P-D-C-A cycle** for continuous improvement.

We also have to care more about our sub-suppliers safety first thinking and share all our experiences.

The **safety house** presented in chapter 6.2 should become state of the art in industry.

LTIFR Lost Time Injury Frequency Rate has to be strongly lowered with a safety excellence system.

Essential steps for the necessary cultural change, starting with the attitude to work protection are covered within this Master's Thesis.

A lot of work still has to be done in order to gain a competitive advantage over the SQDCE approach in the automotive supply industry.

Completing this work, some pictures below show best practice samples in field of safety excellence, that is already implemented inside of Gebauer & Griller Kabelwerke GesmbH.

Visualisation of accident-free working days for employees and all interested parties:

Figure 21: Visualisation of accident-free working days

Unfallfreie Tage = Accident-free days
Bisheriges Maximum = Previous maximum
Sicherheit ist unser oberstes Ziel = Safety is our top priority

Any company shall show their performance respectively target achievement on the way to zero work accidents to every interested party – not only direct employees, also external service providers or truck drivers shall be involved in that open communication and visualisation to support also through their own safe behaviour. Also passing civil society outside the factory should see that effort in safety thinking and acting.

SQDCE Team-Board on shop floor for daily morning meetings:

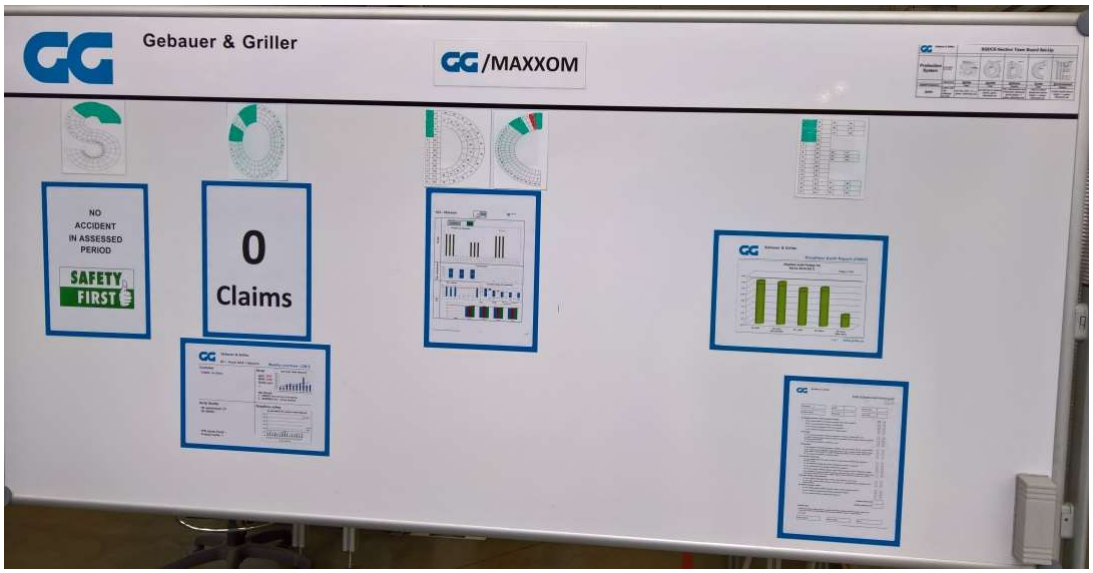


Figure 22: SQDCE Team-Board

Chapter 6.9 within this work is describing Safety, Quality, Delivery Costs and Environment as essential safety culture management tool in detail. Open and direct communication every day in every shift is a need for suitable employees' involvement. Team boards as shown in figure 22 are substantial visual shop floor utilities that can be handled from shift leader or shift foreman.

Marked walkways:

Figure 23: Marked walkways

Standardized floor markings have proven their worth in road traffic for quite some time. This visual aid is also a valuable contribution inside factories to guide pedestrians, truck drivers or fork lift drivers in carefully looking where they should walk or drive and where not.

Any collision should be prevented so far!

Panorama mirror for dangerous crossings:

Figure 24: Panorama mirror for dangerous crossings

Together with adequate floor marking shown on previous page, this kind of panorama mirror shall be used special in dangerous, poor visible crossings special inside factory buildings. Walking with open eyes, looking left and right and if required looking also towards overhead into panorama mirrors to verify, it someone is bending the corner.

Any collision should be prevented so far!

Optical travel warning device - BlueSpot™:

Figure 25: Optical travel warning device

Special in production or logistic companies where lot material has to be handled and moved there is a need to use fork lifts.

Automotive OEM plants more and more are using automated guided vehicles (mobile robots) that follow markers or wires in the floor, or uses vision, magnets or lasers for navigation. In these cases collisions are prohibited almost by 100%.

In the field of automotive supplier companies fork lifts are still in use what is in fact a very high risk factor in collision with a pedestrian.

A setup change with that optical travel warning device for every fork lift should be done – the blue spot coming from LED light is beamed some meters in front or also back the driving fork lift any pedestrian will be warned to go aside.

Any collision should be prevented so far!

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Appendix 01: OH&S management systems OHSAS 18001:2007

BS OHSAS 18001:2007 (British Standard Occupational Health and Safety Assessment Series) – Occupational health and safety management systems - Requirements

Introduction

Organizations are increasingly concerned with achieving and demonstrating occupational health and safety (OH&S) performance by controlling their OH&S risks, consistent with defined OH&S policy and objectives. They do mostly so in a context of increasingly stringent legislation, the development of economic policies and as other measures that foster good OH&S practices, and increased concern expressed by interested parties about OH&S issues.

Several organizations have undertaken OH&S "reviews" or "audits" to assess their OH&S performance. On their own, however, these "reviews" and "audits" may not be satisfactory to provide an organization with the assurance that its performance not only meets, but will continue to meet, its legal and policy requirements. To be efficient and effective, they need to be conducted within a structured management system that is integrated within the organization.

There is an important distinction between the OHSAS Standard, which describes the requirements for an organization's OH&S management system and can be used for certification/registration and/or self-declaration of an organization's OH&S management system, and a non-certifiable guideline intended to provide generic assistance to an organization for establishing, implementing or improving an OH&S management system. OH&S management encompasses a full range of issues, including those with strategic and competitive implications. Demonstration of successful implementation of the OHSAS Standard can be used by an organization to assure interested parties that an appropriate OH&S management system is in place.

Scope

The Occupational Health and Safety Assessment Series (OHSAS) Standard specifies requirements for an occupational health and safety (OH&S) management system, to enable an organization to control its OH&S risks and improve its OH&S

performance. It does not state specific OH&S performance criteria, nor does it give detailed specifications for the design of a management system.

The OHSAS standard is applicable to any organization that wishes to:

a) Establish an OH&S management system to eliminate or minimize risks to personnel and other interested parties who could be exposed to OH&S hazards associated with its activities;
b) Implement, maintain and continually improve an OH&S management system;
c) Assure itself of its conformity with its stated OH&S policy.

Appendix 02: OH&S management systems ISO 45001:2016 - DRAFT

Aim of an OH&S management system:

Purpose of an OH&S management system is to provide a framework and settings for managing the prevention of death, work-related injury and ill health. The intended outcome is to prevent death, work-related injury and ill health to employees, to improve and provide a safe and health workplace for its workers and other persons under its control. Any organization's activities can pose a risk of death, work-related injury and ill health, consequently it is critically important for the organization to eliminate or minimize OH&S risks by taking effective and efficient preventive measures. When these measures are applied by the organization through its OH&S management system (supported by the use of appropriate controls, methods and tools, at all levels in the organization) they continuously improve its OH&S performance. It can be more effective and efficient to take early action to address potential opportunities for improvement of OH&S performance.

An OH&S management system can enable an organization to improve its OH&S performance by following aspects:

a) Development and implementing an OH&S policy and OH&S objectives;
b) Top management has to ensure and demonstrate leadership and commitment with respect to the OH&S management system;
c) Systematic processes are to be established, which consider its context and which take into account its risks and its opportunities;
d) Hazards and OH&S risks shall be determined, associated with its activities; seeking to eliminate them, or putting in controls to minimize their potential effects;
e) Operational controls shall be established, to eliminate or minimize its OH&S risks;
f) Increase awareness of its OH&S hazards and risks, and associated operational controls, through information, communication and training;
g) Evaluate its OH&S performance and seeking to improve it;
h) Establish and develope the necessary competencies;
i) Develope and support an occupational health and safety culture in the organization;
j) Ensure, that workers, and where they exist, workers´representatives, are informed, consulted and participate continuously.

An OH&S management system can assist an organization to fulfill its applicable legal requirements.

Success factors:

Implementation of an OH&S management system is a strategic and operational decision for any organization. The success of the OH&S management system depends mainly on leadership, commitment and participation from all levels and functions of the organization. The implementation and sustainability of an OH&S management system, its efficiency and effectiveness and its ability to achieve its objectives are dependent on a number of key factors which can include:

a) Top management leadership and commitment;
b) Management developing, leading and promoting a culture in the organization that supports the OH&S management system;
c) Workers participation, and where they exist, workers´representatives;
d) Communication and consultation processes;
e) Allocation of the necessary resources for its sustainability;
f) Clear and understandable OH&S policies, which are compatible with the overall strategic objectives and direction ot the organization;
g) Full integration of the OH&S managementsystem into the organization´s business processes;
h) Continual evaluation and monitoring of the OH&S management system to improve OH&S performance;
i) OH&S objectives that align with the OH&S policies and reflect the organization's OH&S hazards and risks;
j) Awareness of its applicable legal and other requirements;
k) Effective and efficient processes for identification of OH&S hazards, control of the OH&S risks and taking advantage of OH&S opportunities.

This ISO 45001 International Standard, like other International Standards, is not intended to increase or change an organization's legal requirement.

Demonstration of successful implementation of this International Standard can be used by an organization to give assurance to workers and other interested parties that an effective OH&S management system is in place. Adoption of this Internationl Standard, however, will not in itself guarentee optimal outcomes.

Levels of details, the comlexity, the extent of documented informations, and the resources needed to ensure the success of an organization´s OH&S management system will be depend on a number of factors such as:

- the organization’s context (e.g. number of workers, size, culture, geography, social conditions, applicabele regal and other requirements);
- the scope of the organization´s OH&S management system;
- the nature of the organization´s activities and the related OH&S risks.

Appendix 03: OH&S management systems ISO 45001:2016 - Risk management

The organization shall consider the effective participation of workers (ISO 45001 – 5.4 Participation and consultation) in the planning process and, where appropriate, the involvement of other interested parties.

When determining the risks and opportunities that needed to be addressed, the organization shall take into account

- OH&S hazards and their associated OH&S risks and OH&S opportunities;
- applicable legal requirements and other requirements;
- Risks and opportunities related to the operation of the OH&S management system that can affect the achievement of the intended outcomes.

The organization shall assess the risks and identify the opportunities that are relevant to the intended outcome of the OH&S management system associated with changes in the organization, its processes, or the OH&S management system. In the case of planned changes, permanent or temporary, this assessment shall be undertaken before the change is implemented.

The organization shall maintain documented information of its

- OH&S risks and OH&S opportunities that need to be addressed;
- Processes needed to address risks and opportunities to the extent necessary to have confidence they are carried out as planned.

Hazard identification and assessment of OH&S risks

Hazard identification

The organization shall establish, implement and maintain a process for the on-going proactive identification of hazards arising. The process shall take into account but not limited to:

- Routing and non-routine activities and situations, including consideration of:
    - Infrastructure, equipment, materials, substances and the physical conditions of the workplace;

- Hazards that arise as a result of product design including during research, development, testing, production, assembly, construction, service delivery, maintenance or disposal;
- Human factors;
- How the work is actually done;

- Emergency situations;

- People, including consideration of:
  - Those with access to the workplace and their activities, including workers, contractors, visitors and other persons;
  - Those in the vicinity of the workplace who can be affected by the activities of the organizations;
  - Workers at a location not under the direct control of the organization;

- Other issues, including consideration of:
  - The design of work areas, processes, installations, machinery/equipment, operations procedures and work organization, including their adaption to human capabilities;
  - Situations occurring in the vicinity of the workplace caused by work-related activities under the control of the organization;
  - Situations not controlled by the organization and occurring in the vicinity of the workplace that can cause work-related injury and ill health to persons in the workplace;

- Actual or proposed changes in the organization, its operations, processes, activities and OH&S management system;
- Changes in knowledge of, and information about, hazards;
- Past incidents, internal or external of the organization, including emergencies, and their causes;
- How work is organized and social factors, including workload, work hours, leadership and the culture in the organization.

Assessment of OH&S risks and other risks of the OH&S management system

The organization shall establish, implement and maintain a process to:

- Assess OH&S risks from the identified hazards taking into account applicable legal requirements and other requirements and the effectiveness of existing controls;
- Identity and assess the risks related to the establishment, implementation, operation and maintenance of the OH&S management system that can occur from the issues referred to the context of the organization and the needs and expectations of workers and other interested parties.

The organization's methodology(ies) and criteria for assessment of OH&S risks shall be defined with respect to scope, nature and timing, to ensure it is **proactive rather than reactive** used in a systematic way. These methodologies and criteria shall be maintained and retained as documented information.

Identification of OH&S opportunities and other opportunities

The organization shall establish, implement and maintain a process to identify:

- Opportunities to enhance OH&S performance taking into account:
  - Planned changes to the organization, its processes or its activities;
  - Opportunities to eliminate or reduce OH&S risks;
  - Opportunities to adapt work, work organization and work environment to workers;
- Opportunities for improving the OH&S management system.

Appendix 04: DAIMLER – Safety Policy

Safety Policy based on Health & Safety Principles:

Preamble:

"Holistic, integrated health and safety protection is a major part of our overall entrepreneurial responsibility. This approach basically is oriented to the target of the Vision of Daimler and is a binding yardstick for our actions and has to be seen within the scope of the CSR (Corporate Social Responsibility) Principles of Daimler."

Principle 1:

"Daimler has established standardized processes that promote the protection of employees' safety and health and, in turn, positively impact morale."

Principle 2:

"Daimler endeavours to practice and further develop qualitatively advanced, holistic and integrated health and safety processes and systems. Prevention is one of the top targets within Occupational Health and Safety."

Principle 3:

"Proper ergonomic design of work systems is promoted through ergonomic standards that are regularly revised to reflect current ergonomic knowledge."

Principle 4:

"Daimler obligates management to act responsibly and in an exemplary manner in keeping with the principles of health and safety protection, and support them in doing so in order to obtain best safety results."

Principle 5:

"Ultimately all Daimler employees must take personal responsibility for health and safety by performing work in a safe manner. Daimler acknowledges the right of employees to remove them from work situation that they have reasonable justification would present an imminent and serious danger to their lives or their state of health, with protection from undue consequences. Daimler involves all employees in the design of their workplaces, their working environment and their work processes with the aim to achieving continuous improvement."

Appendix 05: BMW – Safety Policy

Safety Policy based on THE NINE GUIDING PRINCIPLES OF OCCUPATIONAL SAFETY

Principle 1: Recognize of hazard sources

Open your eyes in the company! Occupational accidents are preventable. The look forwards prevents accidents. Go with open eyes through your area and search increased for hazard sources and risks.

Principle 2: Leading

The management directly is responsible for the prevention of safety risks! Take your part as a role model very seriously. Wear protective equipment consistent and behave always safety conscious.

Inform your employees regularly about safety issues.

Principle 3: Point out

Safety- and health risks must be realized reported and get under control. Raising awareness for health, occupational safety and environment. Keep your eyes open and report any sources of risk immediately.

Principle 4: Remind

Follow the rules of health protection and occupational safety. Live this at any time – both at the workplace as well as outside of plant. Remember yourself and also the employees to the basic content on occupational safety.

Principle 5: Win

Occupational safety and health protection are in direct connection to quality and productivity. They make an important contribution to the company success.

Principle 6: Protect

Most of accidents occur at leisure time. Main focuses are the household, hobbies, sports and traffic. Safe tools, protective clothing, safe machines and a safe behaviour are also fundamental.

Principle 7: Continue learning

It is important to continually develop and learn in all areas - including and especially in the areas of occupational safety and health protection. Wear by attending seminars and training activities actively helping to make all work areas safer.

Principle 8: Check

By review of hazard sources accidents can be prevented and the health protection can be established.

Take advantage of the available possibilities such as e.g. CIP or SOS-inspections. Take care that the review of surveillance devices carried out on schedule (in due time?).

Principle 9: React

Near-accidents must be reported and discussed to avoid further hazards. Analyse the incident and eliminate the hazard sources. Near accidents should not be taken lightly!

Appendix 06: ZKW – COMPANY PHILOSOPHY

The company philosophy defines the identity of ZKW.
It represents the framework of orientation within which all of the entrepreneurial actions and the decisions are taken.
The company philosophy also includes a code of conduct which describes the interpersonal interactions in our company and with our customers.
The company philosophy makes ZKW into a distinctive unit and serves as the basis for our leadership principles.

EMPLOYEES: EMPLOYEE-ORIENTED, ATTRACTIVE AND VIBRANT

- We work with the best automotive manufacturers
- Our employees are the basis for our success
- We relate to each other respectfully
- We support our employees by providing them with opportunities for qualification and development
- Our managers take clear and fair decisions
- We offer attractive jobs in a safe and healthy working environment
- We are proud of our achievements
- We are a top company in our region
- We offer jobs in an international environment
- We pull together

BUSINESS OWNERS, SUPPLERS: INDEPENDENT, SUCCESSFUL, INTERNATIONAL AND WILLING TO PERFORM

- We are an independent company that takes its decisions independently
- We focus on sustainable growth and a healthy economic foundation
- We aim for continual improvement of all of our business processes taking all of the risks and opportunities into account
- We are a high-performing partner
- We use our resources on an economical and targeted basis
- We choose partners in accordance with our values
- We focus on reliability and the highest standards with our suppliers
- In cooperating with our suppliers we aim to achieve a mutual benefit
- Our growth is aligned with the globalization of our customers
- Our internationalization ensures our success for our site
- We respect new cultures without disregarding our own

CUSTOMER, ENVIRONMENT, SOCIETY: CUSTOMER FOCUSED, INNOVATIVE, QUALITY-AWARE AND SUSTAINABLE

- Our customer's requirements steer our actions
- We are reliable and professional
- Our customers trust us
- We accomplish quality right from the start
- We and our products get continuously better
- We fulfil the highest expectations regarding function, design and styling
- Our products fulfil the requirements regarding functional safety
- We are dynamic force for innovative light systems
- We focus on new technologies
- We are committed to an active protection of the environment and a reduction or impacts on the environment
- We see ourselves as an important part of society and therefore we take our responsibility seriously

In support of and in compliance with the requirements of our company philosophy, ZKW is committed to an integrated management system which is based on the foundations of quality, environment, health and safety, as well as compliance with all the relevant legal regulations.

Depending on the requirements and the needs of our production sites, we are also certified according the following management system standards or they have been introduced in our company in part or in whole:

ISO 9001, ISO/TS 16949, ISO 14001, OHSAS 18001 and ISO 26262.

Appendix 07: POLLMANN – COMPANY PHILOSOPHY

- ➔ Our headquarters in Karlstein (A) are the centre of competences for all other locations.
- ➔ We offer secure, attractive jobs for employees who are willing to work hard and take ownership.
- ➔ Our proactive information policy and systematic training programs drive technological development and promote a highly motivated, qualified and dedicated staff.
- ➔ We involve our customers and suppliers beginning in the early stages of a project, thereby ensuring our outstanding product quality.
- ➔ Our strategic investments and responsible use of resources add to our efficiency and increase the opportunities offered by our group.
- ➔ We emphasize the organic and sustainable growth of our company.
- ➔ We avoid putting any kind of strain on the environment and comply with all applicable environmental laws and regulations. By continuously improving our processes and using state-of-the-art technology, we are able to make our production environmentally friendly through the efficient use of raw material and energy.
- ➔ Our long-term perspective ensures our economic success, self-sufficiency and independence.
- ➔ We feel a strong sense of social responsibility for our local communities. Through the continuous improvement of our products and processes, we provide job security both at our corporate headquarters in Karlstein and our international locations.
- ➔ Together we develop a strategic maturity of POLLMANN continuously.

Appendix 08: GG – CORPORATE POLICY

WHO WE ARE

Gebauer & Griller (GG) is an international, family-owned business group, which produces technically advanced high-quality wires and harnesses for automotive, elevator and industrial applications. We are constantly guided by the challenges of our customers and we passionately develop intelligent solutions together.

WHAT WE WANT TO ACHIEVE

GG ensures position as a competent supplier by developing and expanding resources in R&D. Access to new markets is achieved by the expansion of GGs capacities, hereby creating a base for the global supply to GGs customers.

GG VISION

Gebauer & Griller is a distinguished wire manufacturer worldwide.

GG MISSION

Products of Gebauer & Griller provide the best solutions to transmit data and energy.

STRATEGY AND OBJECTIVES

GGs corporate strategy depends on the demands and expectations of all relevant partners (customers, employees, suppliers, owners, community) based on the integrated management system (GMS), which covers at least the requirements of the current quality-, environmental, occupational and health standards.

In accordance to GGs strategic orientation goals are defined with emphasis on:

- customer satisfaction
- employee satisfaction
- highest quality (zero error philosophy)
- continuous improvement process (CIP)
- ***occupational safety and health***
- careful use of environmental resources

- reduction of environmental impact
- implementing all relevant legal obligations

EVALUATION OF RESULTS AND CIP

GGs management periodically evaluates the results of the integrated management system (GMS) and defines new goals to ensure continual improvement and efficiency for best corporation.

Appendix 09: CONTINENTAL Strategic Supplier Contract (SSC)

Chapter 0 Preamble: The STRATEGIC SUPPLIER is to be characterized by the ability to demonstrate continuously its competitiveness regarding quality, price and logistics, and to meet the special demands of the automotive subcontractor sector. The fulfilment of these prerequisites will form the basis of a long-term business relationship between the SUPPLIER and CA. The performance of the SUPPLIER will be monitored and tracked by regular Supplier Performance Ratings.

Chapter 7.1 Quality Assurance System: The SUPPLIER shall maintain a quality management system in line with the recent standards of the automotive industry in accordance with the General Quality Agreement for Automotive Suppliers of CA. →

CONTINENTAL General Quality Agreement – Revision 01.06.2008

Chapter 1.2 Purpose: The purpose of this document is to communicate the Buyer requirements with respect to the quality and environmental management system of those companies that supply production goods and/or services to the Buyer.

Chapter 1.3 Background / Area of Application: The Buyer Supplier Quality and Environmental System Requirements are based upon the latest edition of ISO/TS 16949 Quality System Requirements and ISO 14001 Environmental System Requirements.

Chapter 2.1 Management System Requirements: Present and potential suppliers to the Buyer must operate within a comprehensive quality system. Suppliers shall provide written confirmation and objective evidence of third party certification to an active version of ISO/TS 16949. Suppliers are required to install environmental systems in their facilities that are compliant to ISO 14001.

Appendix 10: MAGNA Global Supplier Requirements

The Magna – Supplier relationship:

Magna is committed to maintain position as global leader within the automotive sector and recognizes the integral role that each supplier to Magna has in maintaining Magnas position of **excellence in innovation, technology, cost, quality and delivery**. Magnas intent is to establish strategic, long-term relationships with suppliers and it is incumbent on each supplier to maintain a position of cost leadership while demonstrating a commitment to sustained quality, highest levels of service and a strong focus on continuous improvement.

This supplier Manual outlines the fundamental requirements for all suppliers to Magna International's global operations. The **Quality System requirements** have been aligned across all your global manufacturing sites, to the greatest extend possible.

Social responsibility:

The Environment

Magna is committed to **environmental responsibility** and has many different programs designed to protect environment and manage critical resources so as to sustain and replenish these resources for future generations. Magna expects all suppliers to show the same dedication and commitment to the environment, and **recommend certification to ISO 14001 environmental standards**.

Global Working Conditions

Recognizing that Magna's supply chain spans many different regions around the globe, Magna is committed to maintaining global working conditions and standards that result in dignified and respectful treatment of all employees within all your global operating locations, as well as those of supply chain. It is therefore Magna's expectation that suppliers will have appropriate policies, procedures and systems in place, to support the following standards:

Workers shall have a safe and healthy workplace that meets or exceeds all applicable standards for occupational health and safety.

Certifications:

Magna's goal is for all suppliers of all materials and all services, producing or affecting direct production material, to demonstrate conformity to the latest ISO/TS 16949 standards, and to other standards that might be directed by the procuring plant(s) including, but not limited to ISO 17025, **OHSAS 18001**, ISO/IEC 27001 and ISO 15504 SPICE.

Supplier Assessments:

Magna reserves the right to review and assess a supplier's financial, operational, quality, environmental and **Health & Safety systems**.

Assessment results are intended for verification of applicable ISO/TS requirements and in no way reduces or negates responsibility to meet specific regulatory, **health and safety or other legal requirements** applicable to the supplier.

Appendix 11: Interview list for initial situation in industry / actual weaknesses

Professional MBA
Automotive Industry

Development of an advanced safety excellence system
in automotive supplier industry

A Master's Thesis Submitted for the Degree of
"Master of Business Administration"

Interview: Initial situation in industry / actual weaknesses

Company: _____

Interview Partner: _____

Questions:

1. Do you have a **safety policy** within your organization?
   If yes, what is the **quintessence** out of it?

2. How would you specify **safety culture** within your company?

3. How do you / did you get **management commitment** for safety culture?

4. What are your motivation factors for **employee's participation**?

5. How is your safety policy & culture integrated in your **management system**?

6. What are your main KPIs in safety?

7. What is your experience in **near miss** system or **risk management tolls** in general?

8. How would you describe **gaps or room for improvements** regarding safety situation in your management system?