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ESTIMATION OF PROCESSES REALIZATION RISK AS A MANNER OF SAFETY MANAGEMENT IN THE INTEGRATED SYSTEMS

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Abstract: *Realization of quality, environmental and occupational health and safety policy using the proposed model of processes' integrated risk estimation leads to the improvement of the analyzed productive processes by the preventive and corrective actions, and in consequence - to their optimization from the point of view of products' quality and in the aspect of quality of environmental influence and occupational health and safety.*
Keywords: *Quality, Environmental Management, Health and Safety Management, Technological Process Analyzes, Integrated Risk Estimation*

1. INTRODUCTION

The result of constantly increasing requirements and expectations of the customers are the more modern and based on the quality criterion solutions in the field of quality management. However "quality management" is not enough to reconcile the contradictory businesses of the company, clients and its employees, together with taking into consideration problems connected with natural environment protection. The way to assure the "quality" should be management "based on the quality criterion" by the simultaneous implementation of the quality management system, environmental management system, as well as occupational health and safety management system.

Such integration is recommended to be realized on the "process approach" grounds of ISO 9001 standard having a characteristic way of specifying the elements of the organization and its partial activities, which influence on each other and create the management system permitting on identification of the interrelated and interacting processes and their improvement, according to Edward Deming's model of "continuous improvement".

Nevertheless one should remember that implementation of integrated quality, environmental as well as occupational health and safety management system is only the confirmation, that organization has done everything to assure "quality" being understand as both products and fixed services offered to clients as well as the environmental influences and occupational safety; it doesn't mean that products are good, environmental influences are minimized or eliminated and occupational conditions are safe. And therefore, the question "why" arises. One can answer because each human activity carries the probability of partial or total failure.

In the free-market economy the most popular human organizations, directed to the achievement of the particular aims, are production and services companies; both of them can be analyzed in the context of process and system approach.

Every of the functioning area is characterized by countless number of variables that are registered in the function of aims' achievement. Point of achievement of an objective can be crossed by the function or the function can pass it by, if there were any undesirable accidents.

As the effect of observation there is possibility to systematize and even to normalize main accidents, which are unfavorable for realization of the aims of every process in any aspect. Using many methods one can assess the risk more and more accurately, taking into account nearly all of the aspects of organizations' functioning.

2. INTEGRATION OF STANDARDIZED MANAGEMENT SYSTEMS

„The total quality", being in practice reflected by integrated quality, environmental as well as occupational health and safety management system, and it is based on the Edward W. Deming's quality philosophy. That is why all of the above-mentioned management systems are nearly identical; in every

range the main point is prevention of nonconformities creation based on the quality criterion (Bagiński 1999, Juran 1999, Pavletic, Sokovic, Buksa 2009, Soković, Pavletić 2009, Szewieczek, Karkoszka 2005, Tkaczyk, Karkoszka 2001, Karkoszka 2010).

In such situation the integration of analyzed management systems seems to be natural; not only in the relation to the documentation based on the norms connected with individual subsystems, but also in the meaning of the resources, processes, aims and procedures and especially in the context of nonconformities assessment (Bagiński 1999, Juran 1999, Pavletic, Sokovic, Buksa 2009, Soković, Pavletić 2009, Szewieczek, Karkoszka 2005, Tkaczyk, Karkoszka 2001, Karkoszka 2010).

The realization of the integration by listing the common and specific points in organizational and operating structure of the quality management system, environmental management system as well as occupational health and safety management system in the aspect of technology management brings advantages such as (Bagiński 1999, Juran 1999, Pavletic, Sokovic, Buksa 2009, Soković, Pavletić 2009, Szewieczek, Karkoszka 2005, Tkaczyk, Karkoszka 2001, Karkoszka 2010):

- improvement of the processes accordingly to the described procedures of the interior structural system together with clearly stated aims of the company as well as with the range of responsibilities and the entitlements,
- decrease of the costs of the defective products, which means costs of repairs, warranty, customer service and the financial fines,
- increase of the turnover and the shares on the market due to the increase of the customer's satisfaction,
- increase of the productivity due to the work-force motivation,
- improvement of the work effectiveness, due to combining of the economics business together with the natural environment protection ones,
- better position in the competition on the market due to the improvement of the company image,
- less frequent controls and easier acquiring of the outside permissions,
- decrease of the costs refraining from the accidents occurred or the work-related illnesses,
- creation of the comfortable conditions for the whole workers in the field of the physical and psychical safety

and simultaneously - better position in the "integrated competitive fight" on the global market.

It has been justified that the most efficient way of management systems integration is the simultaneous implementation supported by the ISO 9001 standard with regard to the straight and comprehensible assumption that "for organizations to function effectively, they have to identify and manage numerous interrelated and interacting processes". Such a „process approach" by:

- defining and analysis of processes indispensable to achieve the aims based on the quality criterion,
- choice of proper methods of processes' measurement,
- estimation of the risk of the processes' realization,

has a fundamental meaning both for individual processes, as well as for system of processes, so - from the point of view of integrated systems (ISO 9001 2009, Buksa, Pavletic, Sokovic 2010, Sokovic, Pavletic, Fakin 2005).

3. METHODS OF ESTIMATING THE PROCESSES IN THE QUALITY, ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY SYSTEM MANAGEMENT

Company, while realizing the requirements of the ISO 9001 standard, and at the same time managing the production system based on the quality criterion, is obliged to constant fulfilling of the external requirements, proving the conformity of the management system and constant improvement of the effectiveness of the process management system by the proper quality policy, environmental policy, and the health and safety-at-work legislation. Due to that fact managing the processes in practice requires applying the proper methods of estimation of processes being realized, both in the aspect of environment protection as well as in occupational health and safety (Szewieczek, Karkoszka 2005, Tkaczyk, Karkoszka 2001, Karkoszka 2010, ISO 9001:2008, Buksa, Pavletic, Sokovic 2010, Sokovic, Pavletic, Fakin 2005, Karkoszka 2008).

Apart from the compatibility of the ISO 9001 standard, which is the base of the integrated system, together with the standards pointing the guidelines for the quality management system, environmental management system, occupational health and safety management system, each of these standards suggests different methods of estimating the potential irregularities in the processes and the products. That is the reason why the starting point to the improvement based on the quality, environmental as well as occupational safety criterion, and including the identification and analysis of processes as well as creating the aims and undertaking the optimizing workings, should be applying the proper tools and methods of risk estimation (Szewieczek, Karkoszka 2005, Tkaczyk, Karkoszka 2001, Karkoszka 2010, ISO

9001:2009, Buksa, Pavletic, Sokovic 2010, Sokovic, Pavletic, Fakin 2005, Karkoszka 2008).

So far measurable and proved aims of the quality, environmental and occupational health and safety policy have been realized mostly in independently functioning management systems and with use of independently applied methods of threats estimation. Regardless of the implemented management system, all of the techniques of risk analysis and monitoring are based on the investigation of risk sources and their meaning. Analysis can be realized with the usage of quantitative and qualitative methods, and the choice of a particular method depends on the organization (Sokovic, Pavletic, Fakin 2005, Karkoszka 2009, Gieryń 2006).

Among quantitative methods one can differentiate (Gieryń 2006):

- alternative plans methods: management games, optimization techniques,
- operational research methods: decision trees, simplex algorithms, network techniques, queue theories,
- financial methods: products, optimization, indicators techniques, profitability verge assessment,
- statistical methods: sensitivity analysis, correlation analysis, probability analysis, histogram analysis, standard variation analysis,
- simulation methods: Monte Carlo technique.

Descriptive risk assessment, risk factors catalogue, profile analysis, failure mode and effects analysis, early warning system, brainstorming session, risk straightening methods can be classified as qualitative methods (Gieryń 2006).

In the field of quality management one of the most popular meted of examination and estimation is the expert method failure mode and effect analyzes allowing for elimination of the potential problems occurring in the process by elimination of the sources of their origin (Pavletic, Sokovic, Buksa 2009, Buksa, Pavletic, Sokovic 2010, Sokovic, Pavletic, Fakin 2005, Karkoszka 2008, Karkoszka, Szewieczek 2007).

First stage of the analysis concerns defining the structure of the system and its individual functions.

Second stage it is the analysis of incompatibilities. Potential defects are elements of the system, which do not fulfill or fulfill wrongly the way their functions. Potential reasons of incompatibility are ill-functioning elements of the lower line, and the potential results of the defects are ill-functioning elements of the higher line. Accordingly to the ISO standards series 9000 these nonconformities are called "non-fulfillment of a requirement" and the defect means "non-fulfillment of a requirement related to an intended or specified use (ISO 9000:2006)".

Third stage concerns the estimation of the nonconformity meaning. It is based on the three fundamental questions:

- what is the probability of occurring the cause of the nonconformity,
- what is the probability of detecting the cause of the nonconformity,
- how severe can be the nonconformity.

The answer to the mentioned questions is:

- the approximate number of occurrence presents the estimation of the probability of occurring the cause of the nonconformity and it is defined together with taking into account all applied preventive actions,
- the approximate number of detecting presents the estimation of the probability of detecting the cause of the nonconformity and it is defined together with taking into account all applied detecting actions,
- the approximate number of importance presents the estimation of the importance of the nonconformity occurrence and it is defined for the particular system,

and the final evaluation of the coefficient of the risk level presenting the level of risk probability connected with incompatibility occurrence.

Stage four covers the range of meaningful nonconformity and the optimization. The high level of risk proving the threat of appearance of the particular incompatibility in the process points at the necessity of taking up the correcting and preventing optimizing steps.

In the range of the environmental management system ISO 14004 standard proposes the environmental aspects identification aiming at estimating the previous, current and the further, both positive and negative, influence of the company acting on the environment (ISO 14004:1998).

Stage one refers to the choice of company activity, its product or service, which will be analyzed.

Stage two it is the identification of the environmental aspect of the chosen activities, products or services; environmental aspect it is "element of an organization's activities or products or services that can interact with the environment (ISO 14001:2005)".

Stage three covers the identification of the current and the potential environmental impacts connected with the identified environmental aspects; the environmental impact it is "any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects (ISO 14001:2005)".

Stage four it is the estimation of the identified environmental impacts meaning. The estimation is made with taking into account the influence scale, harmfulness of the influence, probability of its occurrence and the duration time.

Occupational safety management system based on the guidelines of the PN-N-18002 standard, suggests the

occupational risk assessment. Its aim is to identify the threats occurring at the work places as well as to define the occupational risk involved (PN-N-18001:2004).

Stage one it is gathering the necessary information for the occupational risk estimation. At that stage the information concerning the company location, applied technologies and technological appliances, localization of the work position, used appliances and means of work, harmful and troublesome factors at the work place, usage of the protective minces, is gathered.

Stage two means the identification of the occupational safety and health threats, as well as their effects; threat it is "the condition of the environment which might cause the accident or the illness (PN-N-18002:2000)".

Stage three covers the defining the occupational risk and is based on the two main questions:

- what is the probability of threat occurrence,
- how severe can be the consequence of the threat occurrence.

While estimating the probability of the harmful effect of the threats occurrence, the frequency, time of risk exposure, probability of the threat evoking event occurrence and possibility of the losses avoidance is taken into account.

Stage four it is pointing of the risk acceptance. It is the last stage of the occupational risk estimation and the aim of that is pointing of the risk acceptance. Risk acceptance is pointed directly on the base of its estimation.

As the result from the above presented it can be stated that although all of the analyzes led aim at estimating the probability of the incompatibility occurrence (nonconformity, environmental impact, threat result) and pointing the risk connected with it, the procedure of the estimating these factors is different in each case (Szewieczek, Karkoszka 2005, Tkaczyk, Karkoszka 2001, Karkoszka 2010, Soković, Pavletić 2009, Karkoszka 2008, Karkoszka 2009).

4. OWN RESEARCH

4.1. Methodology

Dependently on the subject of threat as well as its consequences in the context of integrated management system it can concern, threat risk can be classified as (table 1):

- quality,
- occupational,
- environmental.

Table 1: Specification of the risk subject dependently on the range of management system

Risk	Threat, source of risk	Subject of risk
quality	unfulfilling the technical and technological requirements	product, service, quality management system
occupational	undesirable event connected with performing work, usually influencing health	worker, occupational health and safety management system
environmental	unfavorably environmental aspect	natural environment, environmental management system

The constant dependence between causes of nonconformities and nonconformities (quality management system), environmental aspects and their impacts (environmental management system) as well as between threats to occupational health and safety and their results (occupational health and safety management system) can be accepted - Fig. 1.

The identification of the processes with use of the "process approach" can be proposed.

In the estimating the risk connected with presence of nonconformities, environmental impacts and results of threats to occupational health and safety as well as the undertaking the preventive and corrective actions one can acceptthe assessment algorithm (Fig. 2).

Risk, in all of the ranges of integrated management system, can be defined as a function of probability of specified dangerous events occurrence and resulting from it consequences, therefore:

- nonconformity occurrence risk - as a function of probability of occurrence of cause of the nonconformity and the meaning of the nonconformity,
- environmental impact occurrence risk - as a function of probability of occurrence of environmental aspect and the meaning of the environmental impact,
- threats to occupational health and safety occurrence risk - as a function of probability of occurrence of threats and the meaning of their results.

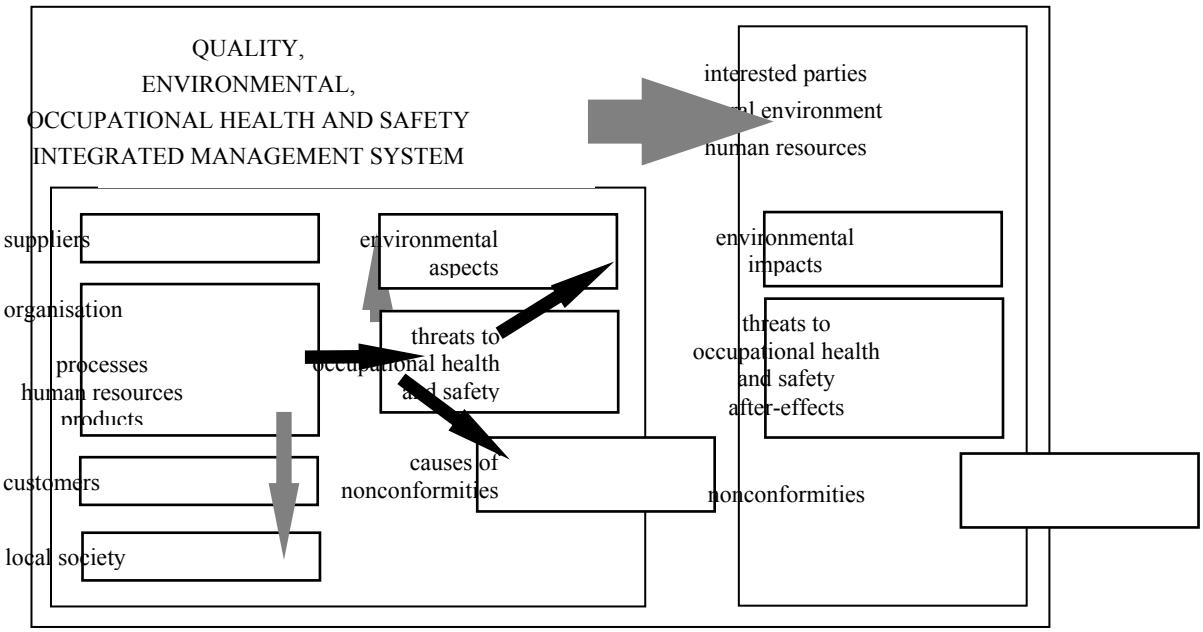

Figure 1. Pattern of dependences between causes of nonconformities and nonconformities, environmental aspects and their impacts and threats to occupational helath and safety and their results

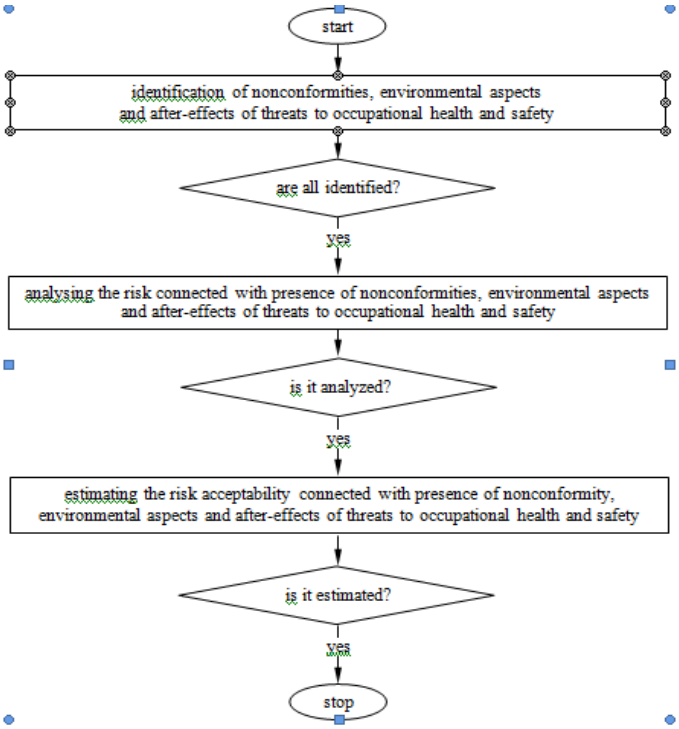

Figure 2 - Algorithm of the risk estimation connected with the occurrence of nonconformities, environmental impacts as well as results of threats to occupational health and safety

In the estimation of the probability of appearance of both cause of nonconformity, environmental aspect, threat to occupational health and safety and in the opinion of the significance of nonconformity, environmental impact, result of threat to occupational health and safety the three- or the five-stage scale can be used. As the example, the estimating suggestions for assessment of the probability of appearance of threats in the five-stage scale has been pointed out in tables 2-4, and of the significance of results in the three-stage scale - in the tables 5-7.

Table 2: List of guidelines necessary in estimating the probability of occurrence of cause of nonconformity

Probability	**Criterions of estimation**
very low 1	occurrence of cause of nonconformity very little probable, there is no possibility of occurrence of nonconformity, nonconformities connected with similar processes have never appeared
low 2	sporadic cases of occurrence of nonconformity connected with similar processes, low probability of occurrence of cause of nonconformity, process under the statistical control
moderate 3	appearing nonconformities accompanying the similar processes, cause of nonconformity appears, process under the statistical control
high 4	often occurring nonconformities, causes of nonconformities with repeatable character, process beyond the statistical control
very high 5	occurrence of nonconformity cause or nonconformity almost inevitable or inevitable

Table 3: List of guidelines necessary in estimating the probability of occurrence of environmental aspect

Probability	**Criterions of estimation**
very low 1	occurrence of environmental aspect improbable, there has never been environmental impacts connected with the similar processes
low 2	occurrence of environmental impact almost improbable, sporadic cases of occurrence of environmental aspect connected with the similar processes, process constantly controlled
moderate 3	occurrence of environmental aspect probable, sporadic cases of occurrence of environmental influence, process controlled
high 4	multiple cases of occurrence of environmental aspect, occurrence of environmental impact extremely probable, process seldom controlled
very high 5	occurrence of environmental aspect and impact almost inevitable or inevitable, process uncontrolled

Table 4: List of guidelines necessary in estimating the probability of occurrence of threat to occupational health and safety

Probability	**Criterions of estimation**
very low 1	occurrence of threat to occupational health and safety improbable, there has never been and there shouldn't be the after-effects of threats connected with the similar processes
low 2	sporadic cases of occurrence of threat to occupational health and safety connected with the similar processes, occurrence of after-effects of threat almost improbable
moderate 3	occurrence of threat to occupational health and safety probable, sporadic cases of occurrence of after-effect of threat
high 4	multiple cases of occurrence of threat to occupational health and safety, occurrence of after-effect of threat extremely probable
very high 5	occurrence of threat to occupational health and safety and its results almost inevitable or inevitable

Table 5: List of guidelines necessary in estimating the significance of nonconformities

Meaning	Criterions of estimation
insignificant	welding nonconformities, dimensional and others, that don't influence client's satisfaction and are not in breach of an agreement, but can be important the comparison of organizations
moderate	welding nonconformities, dimensional and others that can be removed totally or partially; they influence client's satisfaction and are in breach of an agreement so they can be the reason of rejection of product as well as loss of client
significant	welding nonconformities, dimensional and others, that fully disqualify product

Table 6: List of guidelines necessary in estimating the significance of environmental aspects

Meaning	Criterions of estimation
insignificant	unfavorably environmental aspects that have minimal influence on the closest natural environment and having short-lasting character
moderate	unfavorably environmental aspects that can have long-lasting character and influence the closest natural environment or unfavorably environmental aspects that can have short-lasting character and influence the far-off natural environment
significant	unfavorably environmental aspects that have long-lasting character and influence the far-off natural environment

Table 7: List of guidelines necessary in estimating the significance of results of threats to occupational safety (PN-N 18002:2000)

Meaning	Criterions of estimation
insignificant	injuries and illnesses that don't cause long-lasting ailments and absences in work; temporary worsening of condition
moderate	injuries and illnesses that cause slight but long-lasting or periodically repeated ailments and connected absences in work
significant	injuries and illnesses that cause severe and long-lasting permanent ailments and/or death connected absences in work

The pointed independent risk indicator connected with the occurrence of nonconformities, environmental impacts as well as the results of threats to occupational health and safety, defined as a sum of products of probabilities of occurrence of "integrated" incompatibilities and the significance of their results, shows the risk of realization of the analyzed process in the frames of integrated management system.

On the other hand, traditional method using matrix with "significance of incompatibilities" rows and "probability of occurrence" columns indicates the acceptability of nonconformities, environmental influences and results of threats to occupational safety in the area of integrated system.

4.2. Analysis

The proposed methodology has been used in the estimation of process of metal inert gas welding (MIG) and metal active gas welding (MAG), that are a semi-automatic or automatic welding processes in which a continuous and consumable wire electrode and a shielding gas are fed through a welding gun (Pilarczyk2003).

Typical welding semi-automatic consists of: constant power source, ionizer that is a generator of high frequency, welding gun, shielding gas supply as well as set of welding cables (fig. 3).

MIG and MAG welding methods use metals usually in the form of a solid wire electrode fed through a welding gun. The filler metals are melted off continuously in an electric arc generated by the electric power source.

The arc and the molten weld pool are protected by a shielding gas which flows out of the gas nozzle located on the welding gun. Transferring metal from the electrode wire to the molten pool depends upon current, voltage and shielding gas composition (Pilarczyk 2003).

Dependently on the composition of the shielding gases, welding can be realized either in inert (MIG) or active conditions (MAG). During welding by metal inert gas method, the gas (e.g. argon and argon/helium mixture) doesn't react with the molten weld pool or the melting electrode. Metal active gas welding (e.g. argon/oxygen/carbon dioxide mixtures) ensures process stability and reliability (Pilarczyk 2003).

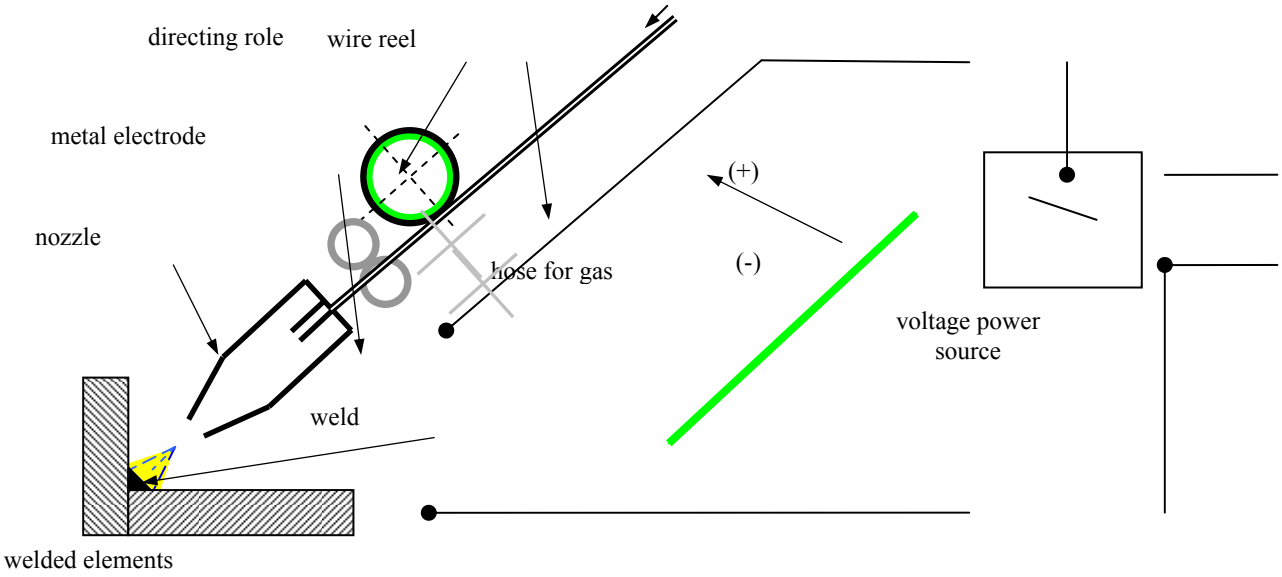

Figure 3 - Draft of metal inert gas (MIG) and metal active gas (MAG) welding (Pilarczyk 2003)

For the analyzed process one has qualified the risk connected with occurrence of the incompatibilities, risk connected with occurrence of the environmental impacts as well as the risk connected with occurrence of the results of threats to occupational health and safety.

Below it has been compared:

- examples of causes of nonconformities and probability of their occurrence, nonconformities and their meaning as well as the risk connected with them (table 8),
- examples of environmental aspects and probability of their occurrence, environmental impacts and their meaning as well as the risk connected with them (table 9),
- examples of threats to occupational health and safety and probability of their occurrence, results of threats of occupational health and safety and their meaning as well as the risk connected with them (table 10).

Table 8: Specification of the chosen classical reasons of the nonconformities and the probability of their occurrence (P), nonconformities and their significance (I), and the connection of it with the risk (R) during welding by MIG and MAG method

Nonconformity	**Nonconformity cause**	**Nonconformity effect**	**P**	**I**	**R**
inclusions in the weld	contamination of the welded material, too high temperature of welding process	decrease of strength and plasticity, hot breaks inter-crystalline	2	4	8
inadequate joint penetration	inconsistent: welding parameters, preparation of the surface to the welding process, positioning of the electrode	susceptibility to brittle (during welding process) fatigue failures	3	4	12
gas cavity in the weld	inconsistent welding conditions, inconsistent welding technique	decrease of strength, fragile breaks of ferritic alloys	3	4	12

Table 9: Specification of the chosen classical environmental aspects and probability of their occurrences (P), environmental impacts and their significance (I) together with the risk involved (R)

Environmental impact	**Environmental aspect**	**Environmental impact effect**	**P**	**I**	**R**
fire, explosion	welding close to gas cylinder or flammable materials	pollution of air and site	1	5	5
emission of the welding smoke	welding process in open premises and open countries	filling the air with smoke in the neighborhood of the welding shop, deposition of heavy particles, acid rains created by nitrogen oxides	1	1	1

Table 10: Specification of the chosen classical threats to occupational health and safety together with their occurrences (P), effect of threats to occupational health and safety (I) and their significance and the risk involved (R)

After-effects of threat to occupational health and safety	**Threat to occupational health and safety**	**Cause of threat to occupational health and safety**	**P**	**I**	**R**
electric shock, electric burn, death	contact with electrical energy	use of devices fed by electrical energy	2	5	10
thermal burn of I and II degree	contact with hot surfaces	welded elements, melted alloys metal	2	4	8
irritation of eyes, redden of eyelids, headaches	blue light	welding process – electric arc burning	1	1	1

Table 11: Specification of the probabilities of the chosen occurrence of "integrated" incompatibilities, significance of their results as well as outcomes of acceptability assessment in the electric welding processes; A - acceptable risk (small), B - acceptable risk (moderate), C - unacceptable risk (high)

<table>
<tr><td colspan="2" rowspan="2"></td><td colspan="3">Importance of effects</td></tr>
<tr><td>small</td><td>moderate</td><td>high</td></tr>
<tr><td rowspan="3">Probability</td><td rowspan="3">little</td><td>• blue light
• electromagnetic field
• caustic substances
A</td><td>• hit, fall
• noise
• dangerous substances
A</td><td rowspan="3">• pressing by falling objects
• fire, explosion
• ultraviolet radiation UV
• infrared radiation IR
• overloading the motion system
B</td></tr>
<tr><td rowspan="2">• emission of the welding smoke
A</td><td>• fire, explosion
A</td></tr>
<tr><td>• inclusions in the weld
• hot failures
• cold failures
• inadequate shape of weld
• damages of un-welded surfaces
A</td></tr>
<tr><td rowspan="3">Probability</td><td>medium</td><td rowspan="2">• blow by the unmoving objects
• contact with sharp edge
• contact with rough surface
A</td><td>• dustiness
• welding smoke
• toxic substances
• overloading the eyesight
B</td><td>• contact with electrical energy
• contact with hot surfaces
C</td></tr>
<tr><td>high</td><td>• gas cavity in the weld
• lack of inter-run fusion
• inadequate joint penetration
B</td><td>• deformation of welded element
C</td></tr>
<tr><td></td><td>B</td><td>C</td><td>C</td></tr>
</table>

Table 11 (part II): Specification of the probabilities of the chosen occurrence of "integrated" incompatibilities, significance of their results as well as outcomes of acceptability assessment in the electric welding processes; A - acceptable risk (small), B - acceptable risk (moderate), C - unacceptable risk (high)

For the analyzed process the risk connected with the occurrence of nonconformities has been 80, the risk connected with the occurrence of environmental impacts - 6, the risk connected with the occurrence of the results of threats to occupational health and safety - 88. The risk of realization of the analyzed process in the frames of integrated management system has been 174.

5. CONCLUSIONS

The most important activity areas of every organization are: the quality of products and services, natural environment protection as well as occupational health and safety. So far measurable and proved aims of the quality, environmental and occupational health and the safety policy are usually realized in partially independent functioning and partially integrated management systems based on the requirements of: ISO 9001, ISO 14001 as well as PN-N 18001 standards.

Notwithstanding the coherent points in the integrated system, the fundamental meaning, from the point of view of the integrated processes improvement, belongs to the application of the adequate methods of processes estimation, which doesn't seem to be easy due to the multitude of assessment methods applied exclusively in the narrow scope of management. Therefore, the replacement of different estimation methods of the nonconformities in the quality management system is so important, environmental impacts in environmental management system and the after-effects of threats to occupational health and safety in occupational health and safety management system by uniform method, which seems to be the basis of the informational feedback in risk management.

The integrated unified estimation can be carried out by the integrated method of technological processes' analyzes and opinion taking advantage of general algorithm of risk estimating connected with the presence of nonconformities in a broad meaning, which means: nonconformities, environmental impacts and effects of threats to occupational health and safety.

In the activities connected with the risk one can decide about risk avoidance by the renouncement or not taking risky ventures, or about risk reduction as a result of proper preventive actions' application. So risk management is the organizational process steered on risk maintenance in the controlled state, which has been defined, accepted and left in the institution.

The proposed integrated estimation method has been used in the analysis of metal inert gas welding (MIG) and metal active gas welding (MAG) processes; risk indicator connected with the nonconformities occurrence, risk of environmental impacts as well as risk of threats effects to occupational health and safety has been put into practice. One had qualified the risk connected with the nonconformities occurrence, environmental impacts as well as results of threat to occupational health and safety, and then the integrated risk coefficient for realized process has been calculated. At the same time traditional method using matrix "significance of incompatibilities" and "probability of occurrence" to indicate the acceptability of nonconformities, environmental influences and results of occupational safety threats in the area of integrated system has been put into operation.

The risk connected with the occurrence of environmental aspects and their impacts has been estimated as low. Unfortunately one has marked the risk connected with the occurrence of occupational health and safety threats and their results as well as risk connected with the occurrence of nonconformities and their causes as comparatively high.

Simultaneously one has shown "integrated" incompatibilities that can't be accepted because of probabilities of their occurrence or their significance, or both of them.

The conducted analysis have confirmed that realization of quality, environmental and occupational health and safety policy using the proposed model of processes' estimation leads to the improvement of the analyzed productive processes by specification of both the most threatened part of integrated area and the factors that are the most dangerous for successful realization of process.

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