

## Integration of management systems on the chosen example

**M. Spilka\*, A. Kania, R. Nowosielski**

Division of Nanocrystalline and Functional Materials and Sustainable Pro-ecological Technologies, Institute of Engineering Materials and Biomaterials, Silesian University of Technology, ul. Konarskiego 18a, 44-100 Gliwice, Poland

\* Corresponding author: E-mail address: monika.spilka@polsl.pl

Received 06.02.2009; published in revised form 01.08.2009

### Industrial management and organisation

#### ABSTRACT

**Purpose:** The paper presents effects of integrated management systems implementation. Integration of these systems makes possible organization image and working efficiency improvement.

**Design/methodology/approach:** Despite of difficulties occurring during integrated management systems implementation the analyzed production enterprise achieved many advantages, for example: gaining of new customers, cost reduction through faults elimination, inside communication improvement, management improvement etc.

**Findings:** In this article the analysis of workings in direction to integration of managements systems in the chosen production enterprise was showed. The first step of this integration was quality management system implementation which next was integrated with environmental management system and occupational health and safety management system.

**Research limitations/implications:** Integrated management systems may functioning in all types of organizations. The one of the problems is high cost of this system working what causes belligerent attitude of management for systems integrations.

**Practical implications:** Integrated management systems is an effective tool of development strategy realization what leads to processes improvement and competitive position betterment.

**Originality/value:** As a result of integrated management systems functioning products of analyzed enterprise are: the best quality, they characterized minimum influence on the environment and they are manufactured in safety work conditions. It is a good direction for many organizations development.

**Keywords:** Quality management; Environmental management; Occupational health and safety management; Integrated management systems

#### Reference to this paper should be given in the following way:

M. Spilka, A. Kania, R. Nowosielski, Integration of management systems on the chosen example, Journal of Achievements in Materials and Manufacturing Engineering 35/2 (2009) 204-210.

## 1. Introduction

The firm success mainly depends on degree of the needs and expectations fulfillment of the interested partners in the business, like: owners, customers, workers, subcontractors and society. Because of that enterprises which take care about their future

make a decision about the standardizing management systems implementation. The implementation of the management system enlarges the effectiveness of the organization and the efficiency of the resources management. This leads to perfection by minimization and the optimization of costs, the unambiguous qualification of tasks, competences and workers responsibility. Implementation of the quality management system is usually the

first working of enterprises [1,2]. The quality of articles, and services they are the decisive factor of competitiveness. However the conviction grows up that the ecological agreement of articles is important element influencing on the market product value. Implementation of the environmental management system and occupational health and safety management system is the next stage. It is possible to build the single management systems but the logical and economic consequence is the integration of these systems [3]. Every system contains many common elements, and their division it seems to be the most artificial and little practical.

The integration of the management systems is the important and profitable process. It is not simple process, because we should connect in one coherent system many workings and processes, which were separate so far and administered by various persons.

The implementation of the integrated management system makes easy the fulfillment of legal requirements relating to the environment protections and the work safety. The adaptation of internal settlements to changes occurring in the valid legal system is also possible.

The integrated management system not only contributes to the improvement of the organizational and technical situation of the firm, but it becomes the pass of the enterprise on the local and global market.

## 2. Integration of management systems

BSI Management System Integration can be defined as: “the connection of the processes, procedures and practices of the working of applied at the organization in the aim of its politics implementation which can be more effective in achieving aims resulting from the politics than the approach through separate systems”.

Because of that integrated management system it is documented and coherent management system which fulfill requirements at least two norms.

The matter of the management systems integration in the enterprise may be solved on three ways:

- 1) **building of the separate management systems and then the test of their integration.** The simplest way of the systems integration which often leads to double of the efforts and the later integration is in certain cases more difficult than designing, from the point of the future integrated management system.
- 2) **building of system with one aspect and then gradual integration with the next systems.** It is the most popular way of the systems integration because of the fact that many enterprises have already implemented management system (e.g. quality) and it is difficult and labour-consuming complete management systems implementation.
- 3) **building from the bases of the integrated management system** is very difficult and labour-consuming process however it carries many advantages:
  - common documentation,
  - possibility of the simultaneous process of the system supervision certification,
  - possibility of the synergy effect obtainment,
  - frankness and elasticity in relation to introducing the requirements of future norms.

To choose the suitable way of the systems integration it is necessary to consider, on the beginning, the similarities and

differences in existing systems, choose the eligible level of the integration and qualify favorable and unfavorable factors of the integration. The situation of the enterprise is also important. The systems integration is easier when they are more compatible. The implementation according to ISO 9001, 14001, 18001 is easier because they are worked out on the basis of the same ideological foundations and with the usage of identical formal procedures [4,5,6]. The implementation of these three systems warrants the enterprise considerable savings in the costs of the implementation and gives concrete economic advantages.

The important factor of the management systems integration success is the commitment of all workers in the organization. The present enterprises couldn't function without knowledge by the workers of the management system principles and requirements of individual norms. The necessary condition is the individual and group ability of the workers to finding the ways of achieving improvement and progress in the organization activity. The quality of the integrated management system concerns to article, information, service, process, knowledge, management, life, but it has to take into account the indispensability of changes and courage to theirs implementation [7].

## 3. The integrated management system implementation

Before the accession to the integrated management system implementation should be analyzed the current position from the point of view the possibilities of already existing solutions usage. In order that the integrated management system rendered profits following conditions have to be fulfilled [8]:

- commitment of the management,
- motivation of the workers,
- consciousness of the aims of the working,
- complex approach to the integrated management system in the organization,
- seeking ways of the continuous improvement,
- the workers training,
- changes treatment as the chance and not the threat,
- persistence, patience and consequence in the realization of tasks,
- complex costs account,
- proper approach to knowledge.

The process of the integrated management system implementation consists of 10 stages:

### 1. THE PROJECT PREPARATION

- presentation of ISO 9001, ISO 14001 and PN 18001 for the managerial personnel,
- appointment of the implementation body,
- the cycle of the workers trainings worked out,
- designing of the system solutions.

### 2. THE PRELIMINARY REVIEW

- the quality, environmental and occupational health and safety management system reviews worked out.

### 3. THE DESIGNING OF THE SYSTEM

- correction of the frame list of system documents,
- defining of the processes and qualification of their objective and subjective range.

#### 4. THE PROCESS APPROACH AND THE DOCUMENTATION LEADERS

- process identification,
- appointment of the documents names and their description with appointment of the documents leaders,
- appointment of the „owners of processes”.

#### 5. THE DOCUMENTS GROUPING

- classification of procedures and instruction on three groups of documents: connected with the management, processes, control and supervision.

#### 6. PREPARING OF THE SYSTEM DOCUMENTATION

- creation of the system documentation,
- choice of the form of the system document:
  - procedures printed in the physical form,
  - procedures printed and made accessible in the electronic form,
  - procedures worked out with software usage to the system documentation management and made accessible in the internal net enterprises.

#### 7. THE INTEGRATED QUALITY, ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT MANUAL

- elaboration of the manual with reference to the integrated system.

#### 8. THE IMPLEMENTATION

- publication of the order concerning the implementation body appointment and acceptance of the works schedule,
- presentations of documents in groups using concrete procedures and instructions.

#### 9. AUDITS AND AUDITORS

- choice of the auditors,
- internal audits carrying out.

#### 10. THE CHOICE OF THE CERTIFICATION BODY

- the choice of body which will confirm fulfillment of requirements contained in ISO 9001, 14001 and PN 18001.

Many organizations introduce specified systems sequentially obtaining in this way integrated management systems certificate. However implementation of the management systems carries along many advantages (Table 1) but it causes additional difficulties also (Table 2) [9].

Table 1.

Advantages attained by enterprises having integrated management system

ADVANTAGES ATTAINED	ISO 14001	PN 18001
Image enterprises improvement	23	4
Reduction of harmful influence on the environment	21	0
Documentation unification	19	4
Facilitation of contact with customers	12	1
Enterprises management improvement	15	2
Improvement of work consciousness and efficiencies	16	3
Increase of work safety	7	4
Product quality improvement	9	2
Increase of processes efficiencies	7	1
Decrease of claim number	5	-

Table 2.

Difficulties during implementation of the integrated system with ISO 9001 system

SYSTEMS	DIFFICULTIES
ISO 14001	Identification of environmental aspects Conviction of management personnel about integrated systems validity Documents elaboration and unification for integrated systems Awareness workers of necessity of system implementation and workers training Workers oppose, no engage Internal communication (information interchange among departments, management team appointments) Documents integration Change of personnel consciousness Accommodation to legal requirement High costs
PN 18001	No synchronization between points of ISO 9001 and PN 18000 system Impeachment of documents clarity through certification body Documents integration No full engage of all workers Change of personnel consciousness Accommodation to legal requirement (regulations incoherence) Rapidly changing normalization Incompatibility of particular systems

## 4. Evaluation of the integrated management system functioning

The evaluation of efficiency and effectiveness of the integrated management system is equal the evaluation of the system measures in individual segments. To evaluation of the integrated management system should be accepted the evaluation of the tasks realization of the management system. The aims and tasks compatible with the requirements of norms should be considered in worked out plans by enterprises initiating the system. These plans usually result from the politics of the integrated system worked out by enterprise. However the evaluation of the effectiveness system functioning is equal the evaluation of the tasks realization degree which are enclosed in plans and resulting from the quality, environmental and occupational health and safety politics. The example model of the integrated management system functioning evaluation presented in Figure 1 [10].

This model is based on the requirements of the norms of the quality management, environmental management and occupational health and safety management. It concerns [10]:

- process approach,
- management by aims,
- management by improvement,
- efficiency and effectiveness management.

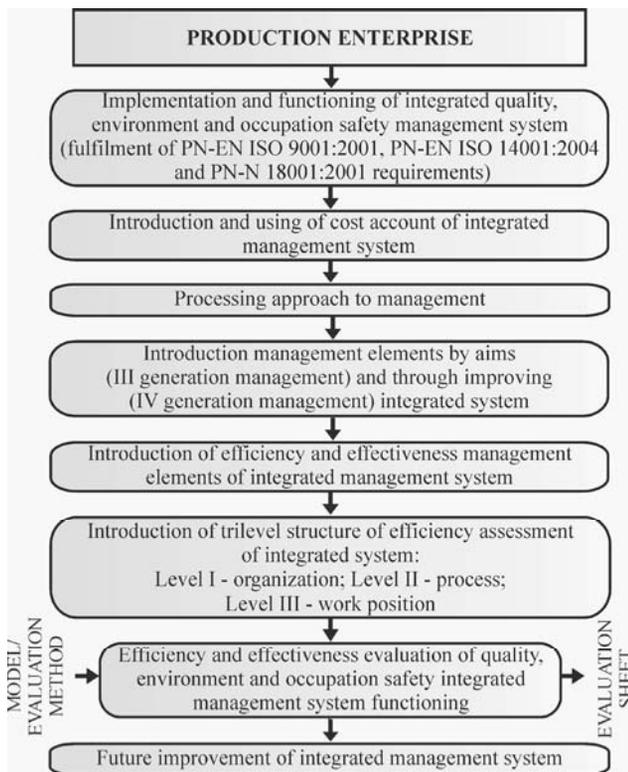


Fig. 1. Principles of efficiency and effectiveness functioning evaluation model of the integrated management system

- To complete the above mentioned elements it is possible [10]:
- introduce the costs account of the integrated management system,
  - introduce the efficiency and effectiveness evaluation on three levels:
    - organization,
    - process,
    - work position.

This division results from PN – EN ISO 14001: 2004 and PN – N 18001: 2004 requirements where are signaled the elaboration of the management plans on the individual work positions.

#### 4.1. Evaluation of the integrated management system effectiveness

The evaluation of effectiveness can be based on PN - EN ISO 9001: 2001, PN - EN ISO 14001: 2004 and PN - N 18001: 2004 requirements concerning the necessities of the quality plans elaboration, the programmes of the environmental management and planning of the occupational health and safety management. They should in detail specify the ways of the qualitative, environmental and safety work tasks achievement showing e.g. the realization deadlines, responsibility for their realization and essential financial expenditures [10].

#### 4.2. Evaluation of the integrated management system efficiency

In Figure 2 proposed the classification of the integrated management system functioning efficiency. The efficiency is divided on three categories and everyone has separated two segments [10]. Then the measures in the individual segments are chosen. They determine a standard of the efficiency evaluation in the enterprise. To appoint the measures it is necessary the aims analysis and the mission and politics of the integrated management system also.



Fig. 2. Classification of efficiency of the integrated management system functioning

The complex evaluation of the integrated management system functioning includes:

1. The necessity of the effectiveness and efficiency evaluation performing results from norms requirements but from good management practice also.
2. Possessing concrete evaluating data one can undertake possible correcting activities and preventive actions.
3. The full evaluation of the integrated management system functioning includes the efficiency and effectiveness evaluation.
4. After acceptance of specified standards of the efficiency evaluation may be compared the functioning of the management systems in the different organizations.

The efficiency and effectiveness analysis is essential because of its can be perceived connection among the strategic aims of the organization and its operating activities [11]. It should be applied to ensures the enterprise success e.g. by increase of the customer satisfaction [12].

#### 5. Functioning of the integrated management system on the example of the chosen production plant

The analyzed enterprise possesses from 1996 the quality management system and from 2001 the integrated management system according to ISO standards including the environmental management system and occupational health and safety management system [13].

##### 5.1. Stages of the management systems implementation

###### Quality management system

Works over the quality management system implementation were begun in 1991.

In the aim of comparison of existing state in the enterprise with ISO 9001 requirements appointed the problematic bodies. To tasks of this body belong:

- analyze of the actual principles of the quality control on individual stages of the production and comparison them with the requirements of ISO standards,
- choice of the activity directions leading to the agreement of applied principles control to ISO standards,
- elaboration:
  - quality politics,
  - procedures of quality ensuring,
  - documentation control for individual production stages,
  - principles of the circulation, collection and storage of this documentation,
  - principles of correcting and introducing of the quality ensuring procedures,
  - schedule of the quality management system implementation,
- cycle of workers trainings carrying out,
- preparation of essential materials and undertaking of efforts about the accreditation of acceptance laboratories.

The introduced quality management system imposed on the enterprise an obligation of setting the responsibility range on the work positions.

The next stage of the system improvement in the enterprise was ISO 9001:1994 implementation.

As a result of decision making about the integrated management system implementation considered the necessity of ISO 9001:2000 implementation and the environmental management system according to ISO 14001.

#### **Environmental management system**

The works over the environmental management system implementation were begun in November 1997.

Like in the quality management system there also appointed problematic bodies. To tasks of this body belong:

- analysis of existing state in the range of the activity concerning the environment protection and presentation of tasks in the range of the fulfillment of ISO 14001 requirements [14],
- elaboration:
  - environmental politics,
  - environmental management procedures,
  - documentation control for the individual production stages, principles of circulation, collection and storage of this documentation,
  - principles of correcting and introducing of the environmental management procedures,
  - schedule of the environmental management system implementation,
- cycle of workers trainings carrying out.

The implementation of the environmental management system according to ISO 14001 caused activities connected with personnel education and the necessity of the ecological investments.

#### **Occupational health and safety management system**

To determine the actual situation in the enterprise in the range of the safety work appointed the groups to carrying out the enterprise physical inspection. To tasks of the body belong:

- analysis of existing state in the range of the activity concerning the occupational health and safety and presentation of tasks to fulfill PN-N-18001 requirements,
- preparation of the working schedule concerning elaborations of the occupational health and safety management system with the qualification of persons who are responsible for their realization and the duration time of the individual stages of the system implementation,
- checking of the prescriptions and decrees knowledge by the personnel concerning the organization and occupational health and safety in the unit body,
- preparation of the documentation:
  - trainings e.g. in the range of the occupational health and safety,
  - occupational personnel improvement,
  - instructions of the occupational health and safety,
  - notations concerning technical condition of hygienic-sanitary facilities,
  - possession and using of the chemical substances and poisonous,
  - describing the processes especially harmful for the health,
  - lists of positions with occurring of harmful factors and burdensome for the health.

The introduced occupational health and safety management system imposed on the organization the duty of the responsibility on the work positions qualification.

In the aim of ISO 9001, ISO 14001 and PN-N 18001 requirements fulfillment identified all necessary processes to functioning of the quality, environmental and occupational health and safety management systems. Criteria and necessary methods to efficiency assurance of realization and process control were also established. They include: management processes, quality management systems, principal, main and supporting.

## **5.2. Effects from the management systems implementation**

#### **Quality management system**

In the aim of the quality management system certificate maintenance the enterprise still improve system including techniques of sale, optimization of production costs, active creating of new products and continuous increasing of articles quality. Still decreasing of the reclamations and defective products testifies about high quality of the enterprise products (Fig. 3).

#### **Environmental management system**

We can distinguish two kinds of the environmental aspects which can be found in the enterprise:

- Direct environmental aspect - the aspect on which the organizational unit can directly influence or it directly control. The direct environmental aspects are:
  - emissions - dust, gas (Fig. 4),
  - emissions - influence on soil and ground waters,
  - releases to water,
  - vibrations, noise, radiation,
  - waste (solid, liquid);

- *Indirect environmental aspect* - the aspect on which the organizational unit has or has not influence. The indirect aspects are:
  - transportation (materials, products, waste),
  - usage of resources and unrenovable natural resources (water, fuels, energy and others: chemicals, paper).

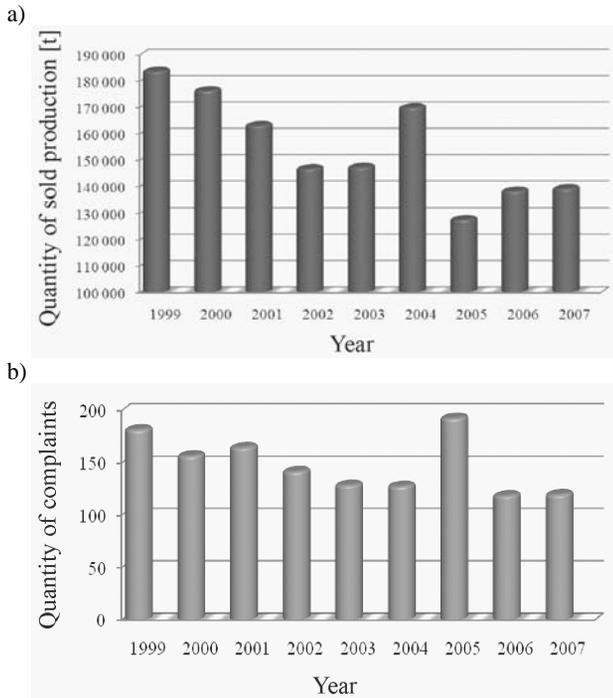


Fig. 3. Quantity of sold production a) and complains b) [13]

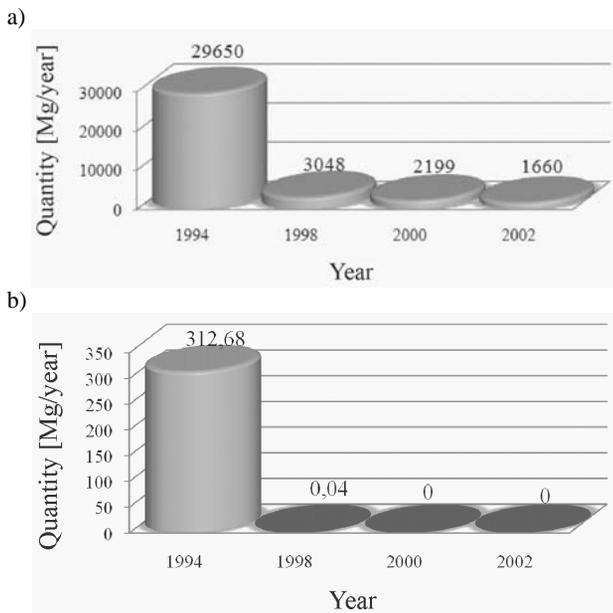


Fig. 4. Emission of dusts a) and carbon dioxide b) before and after modernization stages [13]

In the range of the restructuring programme in the enterprise performed many modernization and liquidational projects which made possible elimination of obsolete and harmful technologies [15].

**Occupational health and safety management**

The occupational health and safety management system caused in the organization many calculable economic profits because of decrease of the number of industrial accidents, occupational diseases and elimination of losses caused by bad work conditions. It also contributed to increase of the workers efficiency and improvement of the products and services quality. The proper identification of threats and the risk management helped to assure the safer work environment. Thanks to that the quantity of industrial accidents (Fig. 5) decreased and in the consequence the reduction of days quantity in which injured workers were not able to work.

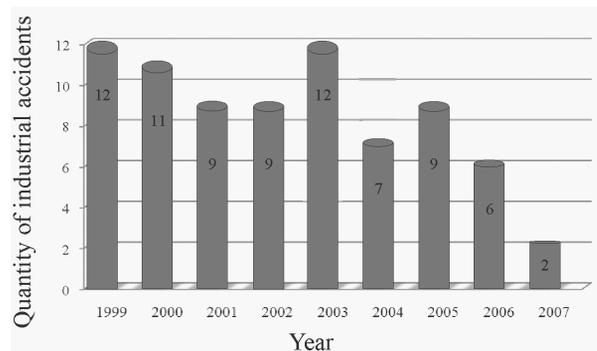


Fig. 5. Quantity of industrial accidents [13]

**5.3. Difficulties during the integrated management system implementation**

The enterprise after the integrated management system implementation achieved the main aim which was the certificate granting. During the realization of the system initiation the enterprise encountered the difficulties:

- workers renitence, the lack of commitment,
- conviction of managerial staff about the validity of the systems integration,
- elaboration and unification of documentation for the integrated systems,
- identification of the environmental aspects,
- implementation costs,
- internal audits carrying out,
- requirements of the certification body,
- costs of the infrastructure elements purchase.

**5.4. Advantages from the integrated management system implementation**

The integrated management system implementation caused many advantages, also. The main advantages are:

- support of the present and gaining customers through increasing of competitiveness on national and foreign markets,
- costs reduction through faults avoidance (internal losses and complaints from customers), increasing of the responsibility for work and extension of the staff competence,
- improvement of the internal communication - decrease of the documents (through grouping),
- process optimization through the improvement of the cooperation principles among all departments and services,
- management improvement through the systematic methodology of ISO standards,
- bring into prominence the leadership role in the organization successes achieving,
- direction on the market success through the produced articles quality,
- demonstration of the ability to changes and European integration through adapting to the market strategy,
- audits carrying out and undertaking corrective activities and preventive actions eliminating the causes of the incompatibilities.

## 6. Conclusions

The integrated management system is for enterprises essential and also effective tool of the development strategy realization. It causes the processes improvement and the competitive position increasing.

The initiated in the analyzed enterprise integrated system not only improved the organization image, but it also directed its activity and the working efficiency. The activities carried out in the organization caused, that the produced final articles are:

- the highest quality,
- they characterize the minimum influence on the natural environment,
- they come into being in the safe work conditions.

## References

- [1] M. Dudek-Burlikowska, D. Szewieczek, The modern quality control of preproduction sphere in a company, *Journal of Achievements in Materials and Manufacturing Engineering* 30/1 (2008) 79-86.
- [2] D. Szewieczek, M.T. Roszak, D. Helizanowicz, Methodology of the quality management in the productive process, *Journal of Achievements in Materials and Manufacturing Engineering* 30/1 (2008) 87-94.
- [3] D. Szewieczek, T. Karkoszka, Integrated method of technological processes estimation in materials engineering, *Journal of Achievements in Materials and Manufacturing Engineering* 24/1 (2007) 456-465.
- [4] PN-EN ISO 9001:2001: Quality management systems. Requirements, PKN, Warsaw, 2001 (in Polish).
- [5] PN-EN ISO 14001:2005: Environmental management systems. Requirements with guidance for use, PKN, Warsaw, 2005 (in Polish).
- [6] PN-N-18001:2004: Occupational health and safety management systems. Requirements, PKN, Warsaw, 2004 (in Polish).
- [7] G. Paliska, D. Pavletic, M. Sokovic, Quality tools – systematic use in process industry, *Journal of Achievements in Materials and Manufacturing Engineering* 25/1 (2007) 79-82.
- [8] E. Krzemień, Integrated management: product determination aspects: quality, environment, technology, Śląsk Publication, Katowice, 2004 (in Polish).
- [9] J. Szymczyk, M. Urbaniak, Premises of integrated systems implementation, *Quality Problems* 2 (2001) 9-13 (in Polish).
- [10] Z. Chomczyk, The model of evaluation/selfevaluation of efficiency and effectiveness of integrated quality, environment and occupational health and safety management system functioning in production enterprises, *Quality Problems* 4 (2003) 34-39 (in Polish).
- [11] B. Krupińska, D. Szewieczek, L.A. Dobrzański, Improvement of technological processes by the use of technological efficiency analysis, *Archives of Materials Science and Engineering* 28/12 (2007) 751-756.
- [12] M. Dudek-Burlikowska, D. Szewieczek, Customer's satisfaction the element of proquality strategies, *Journal of Achievements in Materials and Manufacturing Engineering* 28/1 (2008) 91-94.
- [13] Information obtained from company.
- [14] R. Nowosielski, M. Spilka, A. Kania, EMS as a basis of sustainable technological process achievement, *Journal of Achievements in Materials and Manufacturing Engineering* 29/2 (2008) 199-206.
- [15] G. Radonjic, P. Tominc, The role of environmental management system on introduction of new technologies in the metal and chemical/paper/plastics industries, *Journal of Cleaner Production* 15 (2007) 1482-1493.