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# Process management in foundries

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## Abstract

This paper presents the nature of process management and the basic process analysis. A general model of process management in a foundry is showed. The essential activities of processing, systems and change management are described. There is also presented a problem of effectiveness, efficiency and processing improvement. The criteria, methods and techniques of process improvement are indicated. The importance of process approach to the improvement of foundry management system is underlined.

**Keywords:** Foundry, Process, Process management

## 1. Introduction

Today process management is considered as one of the most effective and efficient methods of management. Each foundry activity which is based on input data and transforms it into results can be perceived as a process. Therefore a process is a logical set of activities taken to produce or deliver a product to an internal or external customer. The sequence of taken processes is specific to each process. Quality management is realised by foundry process management concerning structures and functioning of the processes, which transform a product and information, and the quality of cast transformed during the process. Designing and creating the system of quality management, the foundries put emphasis on the employers' training, identification, description, modelling and documentation of the processes, the implementation of the principles taken previously as well as measurement, analysis and processes improvement. The foundry activity is described by the goals and objectives which are precisely determinate and included in the Quality Manual. The objectives are described by contemporary economy. The quality policy of the foundry is its strategic factor consisting of the cast production conformed with the customers' requirements and demands. It must be understood and accepted by all employees and followed at all areas connected with the Quality Management System in order to achieve an objective as a result of coordinate actions. What may change are the methods and actions leading to achieve the goals and targets adapted for the market conditions, i.e. dynamic environment and competitiveness. In most cases seeking for profit is the result of assurance and focus on the accomplishment of quality tasks as well as creation of the image of a trusted foundry. Each enterprise is controlled and supervised by the foundry's management. Therefore the employees are obliged for observing strictly the decisions and documentation of quality management system to ensure a continuous improvement of the cast quality. There are also some actions taken to identify, describe and improve the quality of processes. The tasks fulfilled in the foundry organisational unit and the connections among them are determined. Basing on the foundry strategy, the results of analysis are used to describe initially the range of quality system. It is also possible to evaluate initially the influence of system implementation on present organisational structure, and to describe the most possible connections with current systems of work.

## 2. The process approach in foundry

The effective way a foundry works is mainly dependent on determining and managing many processes connected with one

another. A leader - owner is chosen for each process to ensure an appropriate process management and determine clearly the responsibilities and qualifications. Every process consists of the internal and external customers, transferable products, and its owner personally responsible for the correctness of process functioning to its full extent. The process owner should create a clear set of procedures, starting from the idea of activity, a customer oriented approach, partner relationships with suppliers up to creation of the process maps. Frequently the result of one process creates the input data for the next one. To ensure an effective cooperation between the processes, it is necessary to conduct an analysis of the cooperation of the processes. The process documentation is also kept to give profits to the user and to measure the effectiveness and efficiency of the processes, e.g. increase of profits, waste reduction or customer satisfaction degree. The efficiency means reaching the objectives, whereas the effectiveness is connected with the profitability of the objective realisation. The objectives must be measurable, i.e. able to be presented as a specified unit. They can also be evaluated with the use of alternative expressions: "they are executed" or "they are not executed". It is worth mentioning that the standards ISO 9001, ISO 14001, ISO 18001 do not require that the processes be effective. However, the technical specification ISO TS16949, which refers to the automotive industry, includes specific requirements relating to the degree of process efficiency. A strong point of foundry process oriented management structure consists of clear decisions and presentations of enterprise organisational processes and better recognition of weak points. A constant improvement of employee motivation produces a process of constant improvement, i.e. increase in customer improvement and retention. The flexibility, i.e. the ability to adapt quickly to the external conditions is essential in the process activity. A dynamic process adaptation is necessary [1-3].

# 3. Process map in foundry – basic guidelines

General and detailed process maps are the result of the process orientation. They show the course and interaction of the processes, therefore the foundry employees may verify what is the degree of their actions influencing internal or external customer, and how the surplus value is created by them. In most cases, the process described above consists of a determined sequence of activities. The process description should consist of functions achieved successively, responsibility for the achievement of separate functions, input and output documents. The diagrams of processes are the basis of the function implemented by employees at separate levels of company organization. The processes presented on the map need to be developed in the form of procedures. Fig. 1 presents a basic scheme of foundry processes. Fig. 2 presents an exemplary foundry process map. Tab. 1 consists of main activities referring to the management of process, systems and changes. Fig. 3 points out basic elements of the degree of process efficiency. In fig. 4 there is a characteristic of selected processes.

# 4. Conclusion

The management of processes identified by foundry depends on continuous analysis and evaluation of the course of each one of them and implementation of the quality objectives given previously using any sources of information available. The processes are separated, the tasks are joined into groups to create value taking under consideration the element of continuous improvement. The process approach allows to notice how the work is implemented, what are the connections among people working cast [1, 4, 5].

The processes allow foundry to organize the staff and to function better, thus to confirm its competitive position. They also fulfil basic requirements such as: customer orientation, skill to react quickly and to adapt for new requirements, introducing changes to the organization, better cooperation of separate organizational units of the foundry. The idea of process management in foundry consists of the improvement of process and casts taking under consideration the aspiration for "zero defects" state and shortening of the production cycle. Frequently it means a reduction of production costs and increasing of enterprise performance. The criteria for processes improvement consist of combining the improvement process with foundry strategy and complexity of the scope of processes improvement. There are many concepts and methods of enterprise management improvement including foundry such as reengineering (processes reconstruction), benchmarking (researches, comparative analysis), Total Quality Management (TQM – quality complex management), the Kaizen philosophy and Lean Management (more value with less work). There are also many techniques that help or support process improvement, e.g. the rule of 5S (sometimes called 5C – tidiness maintaining system), Kanban (materials flow technique), Just In Time (JIT), Andon (abnormality signalling technique), Total Productive Maintenance (TPM – optimal flow maintenance) and Set Defaults. Each method and technique of process improvement should be supported by standardisation process and based on Deming Cycle that enables a stabilisation of operation and of all instruments, norms and indicators used for process control.

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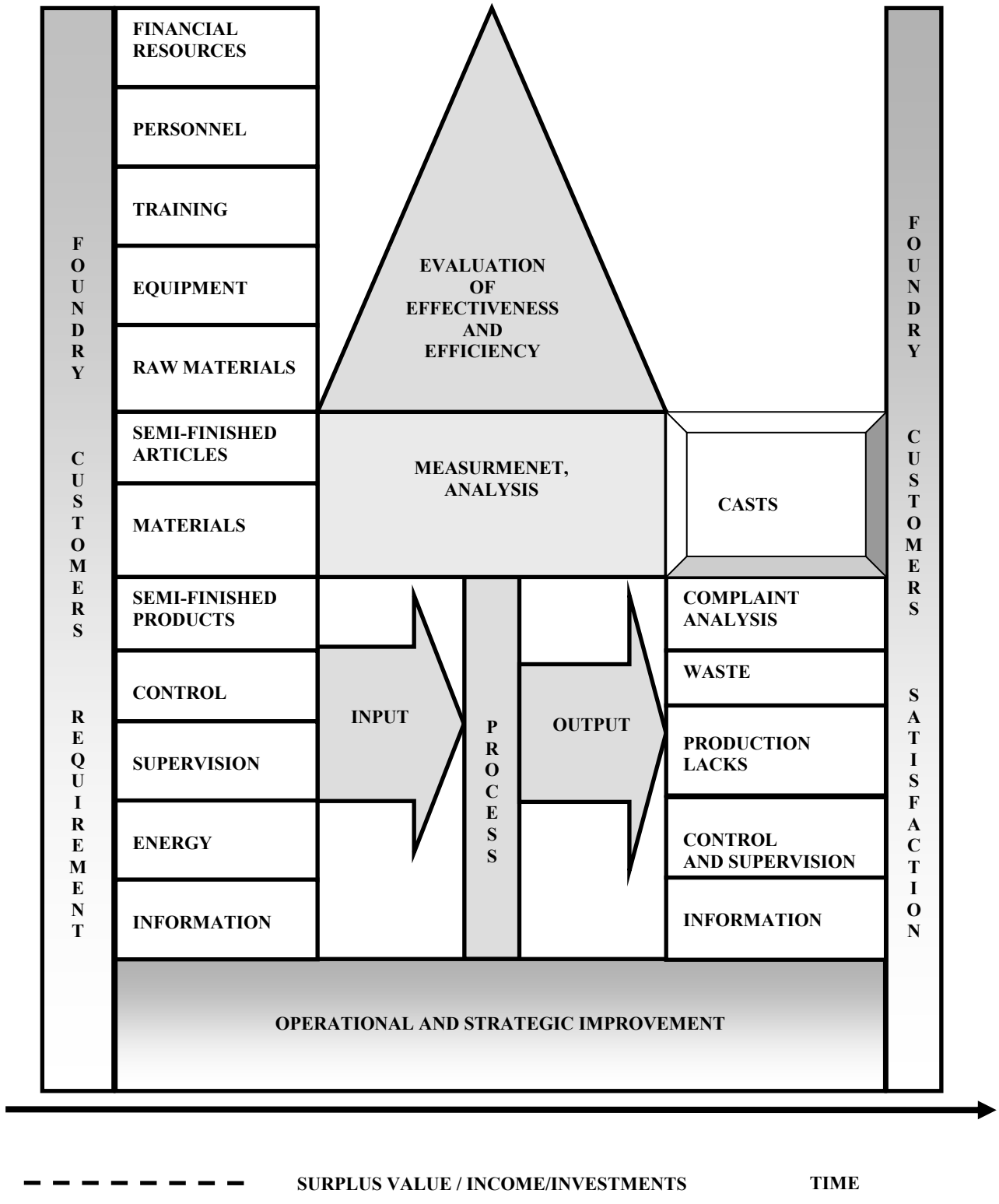



Fig. 1. Basic process diagram in foundry

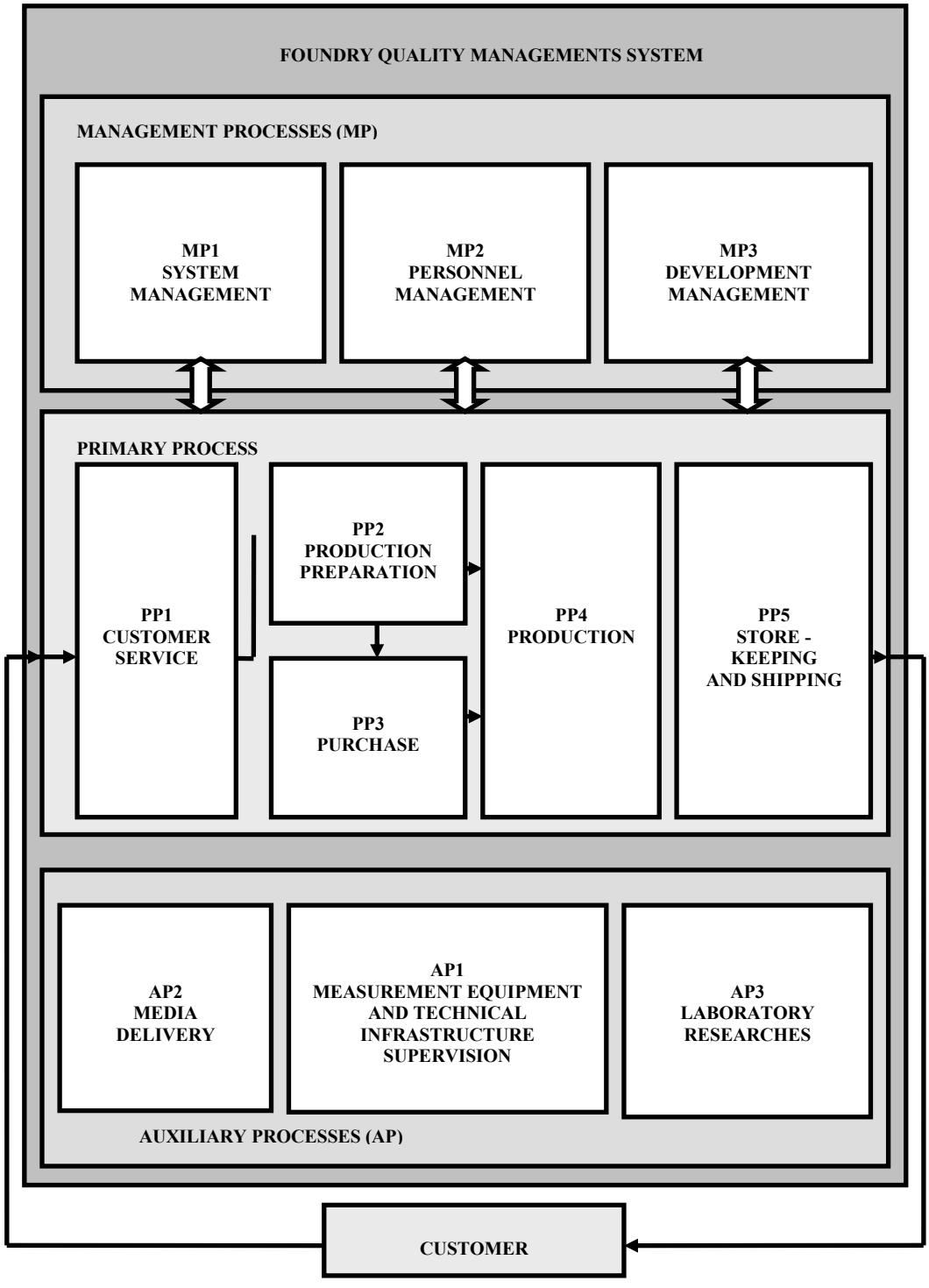



Fig. 2. Exemplary process map. Foundry quality management system

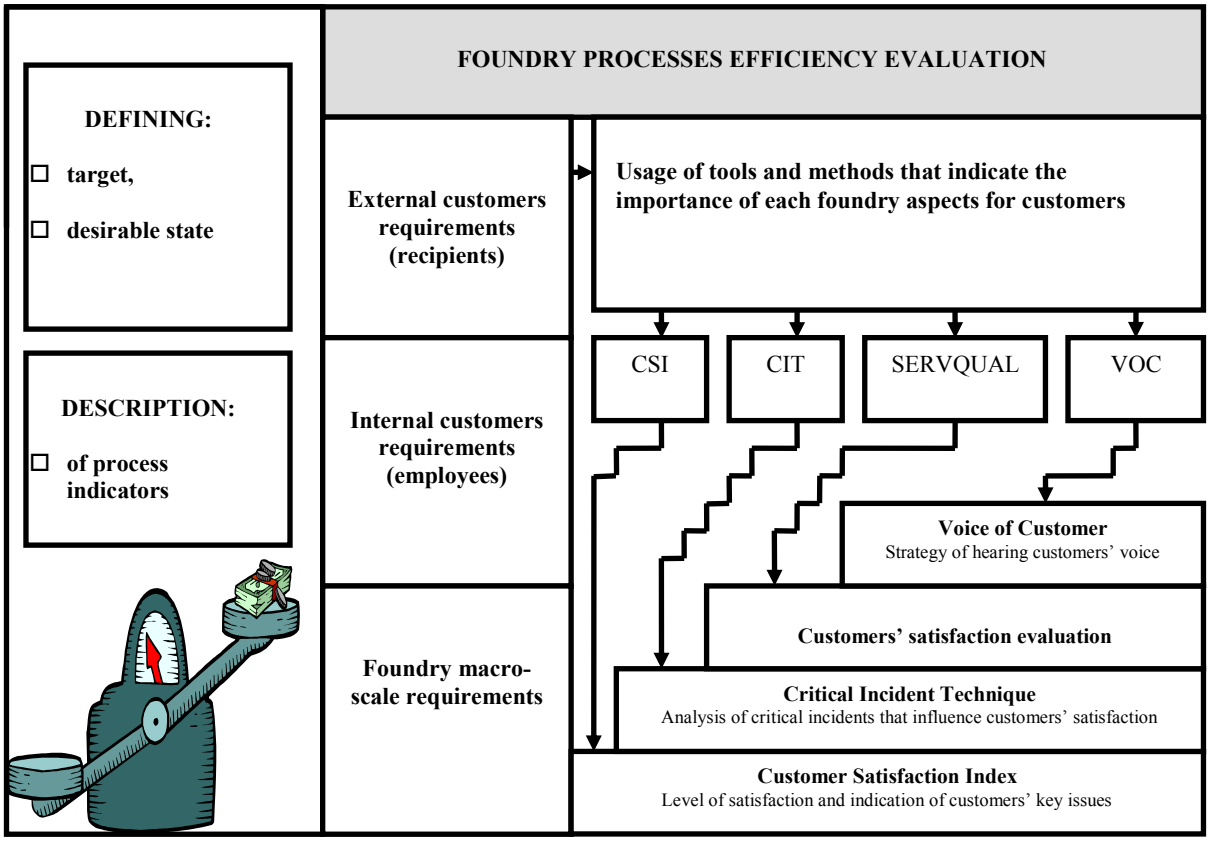
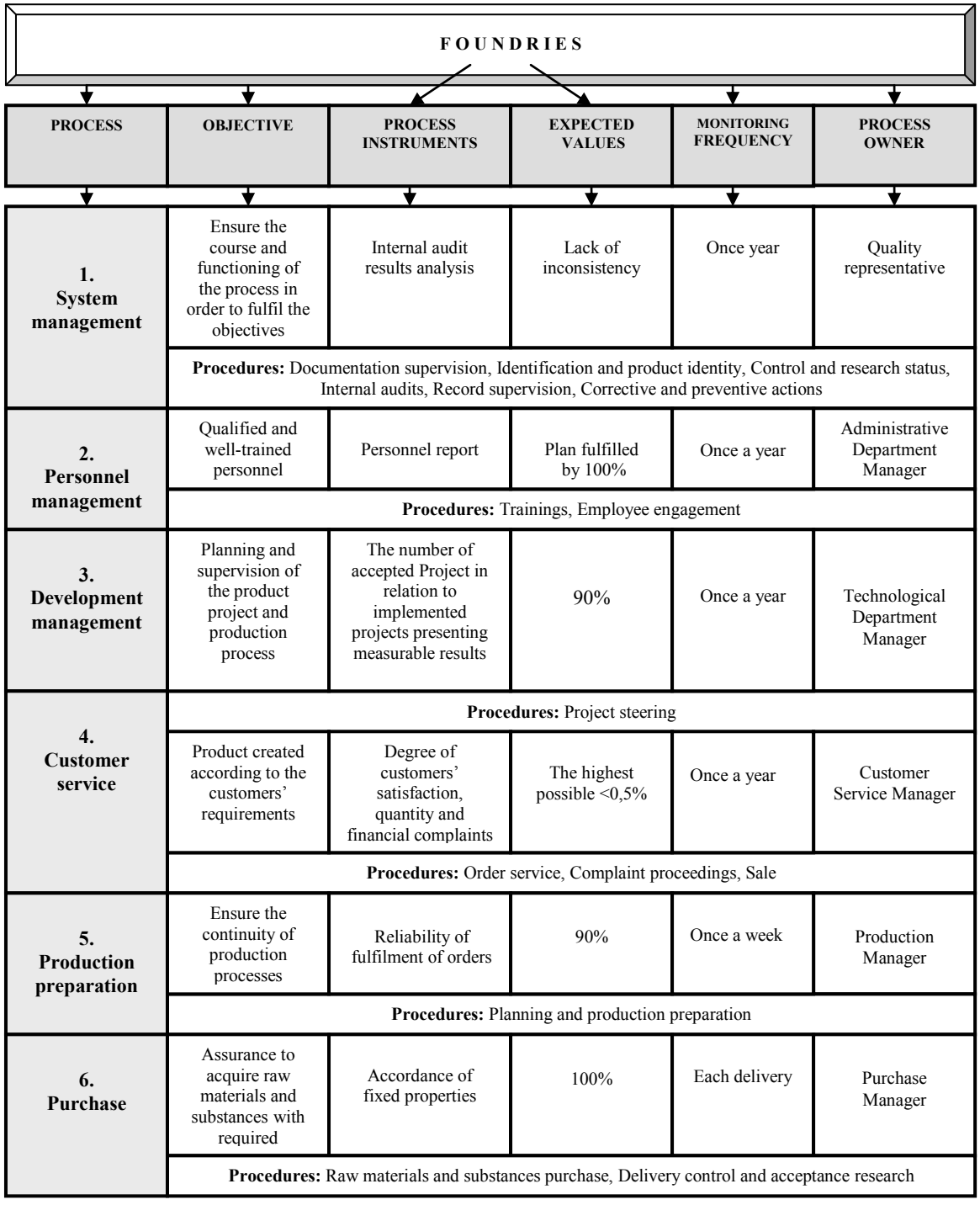



Fig. 3. Actions taken for foundry processes efficiency evaluation

Table 1.
Actions taken within management and process improvement in foundry

| FOUNDRY | |
|---|---|
| ☐ **Main stages of process, system and changes management** | ☐ **Analysis of process improvement – determination of instructions in the Quality Plan** |
| 1. Implement the formalised management systems | 1. Determining the objectives, input and output data of the process |
| 2. Implement the tools and methods of management | 2. Identification of process suppliers and customers |
| 3. Include the concerned parties to decide about process functioning | 3. Choice of process owner |
| 4. Use of employee creativity and innovativeness to improve the processes | 4. Identification of the process risk |
| 5. Activity improvement | 5. Activities comprising process |
| 6. Ensure a proper offer and conditions for customers | 6. Determination of possible changes of the process (variables) |
| 7. Ensure a short delivery time and punctuality | 7. Identification of the critical process parameters |
| 8. Systematic analysis of process efficiency and effectiveness | 8. Evaluation of the process" ability |




| PROCESS | OBJECTIVE | PROCESS INSTRUMENTS | EXPECTED VALUES | MONITORING FREQUENCY | PROCESS OWNER |
|---|---|---|---|---|---|
| **1. System management** | Ensure the course and functioning of the process in order to fulfil the objectives | Internal audit results analysis | Lack of inconsistency | Once year | Quality representative |
| | **Procedures:** Documentation supervision, Identification and product identity, Control and research status, Internal audits, Record supervision, Corrective and preventive actions | | | | |
| **2. Personnel management** | Qualified and well-trained personnel | Personnel report | Plan fulfilled by 100% | Once a year | Administrative Department Manager |
| | **Procedures:** Trainings, Employee engagement | | | | |
| **3. Development management** | Planning and supervision of the product project and production process | The number of accepted Project in relation to implemented projects presenting measurable results | 90% | Once a year | Technological Department Manager |
| **4. Customer service** | **Procedures:** Project steering | | | | |
| | Product created according to the customers' requirements | Degree of customers' satisfaction, quantity and financial complaints | The highest possible <0,5% | Once a year | Customer Service Manager |
| | **Procedures:** Order service, Complaint proceedings, Sale | | | | |
| **5. Production preparation** | Ensure the continuity of production processes | Reliability of fulfilment of orders | 90% | Once a week | Production Manager |
| | **Procedures:** Planning and production preparation | | | | |
| **6. Purchase** | Assurance to acquire raw materials and substances with required | Accordance of fixed properties | 100% | Each delivery | Purchase Manager |
| | **Procedures:** Raw materials and substances purchase, Delivery control and acceptance research | | | | |

Fig. 4. Exemplary description of processes in foundry