

Information system for quality management

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Certifying of Bulgarian firms is essential condition for opening the country towards European and world market. It allows producers offer their own products at international market, guarantee quality and insurance of delivery for their partners. Through certified quality management system (QMS) firms become competitors to foreign investors and traders, which also offer quality products at Bulgarian market. The trend of equalizing Bulgarian law to European also put higher requirements to deliverers of materials for public orders and auctions. Certifying of QMS requires preparing and implementing of management information system, which is dealing with big quantity of documents, data and information and meeting requirements of EN ISO 9001-2000. At the same time it should not enlarge the work of administrative and management staff. In the paper an analysis is made for the needs of QMS, defined by the standard. A structure of information system is designed for quality management in a production firm. Rules for management of firm's information are defined, which guarantee keeping the requirements of QMS and least burden users of the system. Characteristics of main modules for management of information flow and the interactions between them are also defined. Methods for building a dynamic firm's data base are offered, which include data renovation and result's analysis.

Keywords: *quality management, ISO9000, quality management system.*

Certifying of firms in Bulgaria is a condition, which turns gradually from wishful into imperative with the opening the country towards the European and world market and with foreign producers entering the country. On one hand, a production firm should present its partners guarantee for quality and security of deliveries in competition with other producers who offer certificates for quality, in order to go at the world market. On the other hand on Bulgarian market foreign traders and investors appear, who also offer, respectively search for products with guaranteed quality. On third point of view the tendency of harmonizing Bulgarian legislation with the European one during the processes of our integration with Europe set higher requirements to the deliverers of materials for social commissions and auctions.

Thus gradually the necessity of introduction of certified quality management system (QMS) becomes stronger. The requirements for the introduction of such system are defined by strategic goals set by

the firm's management, by markets and clients towards which it is directed, by the legislation of countries in which the production of the firm is realized. The real possibilities, which stand in front of the Bulgarian firms at the moment, are related with introduction of systems in accordance with the standards of the country, the European and American ones or other standards, which has corresponding prestige and important for firm's contractors. As relatively prestigious and good standard for many of our firms is the European standard of managing the quality ISO 9001-2000¹ and guidance for improving the results ISO 9004:2000. As a next step to improving the work and increasing the ability to compete (in some cases it is compulsory) introduction of systems for management of health, safety at the work place and preservation of environment BS 8800:1996, ISO 14000:2000 appear. The integrated system for quality, safety and

¹ EN – ISO 9001:2001 accepted for Bulgarian standard 2001.

environment is realized during their introduction in a firm.

In the base of the new international standards for managing the quality² is the processing-oriented model of designee, introduction and improvement the efficiency and effectiveness of a QMS. The most important goal is to higher the client's satisfaction through fulfillment his requirements. This approach ensures a better management of the numerous related-to-each-other activities, which are scrutinized as a process of transformation the ingoing data as outgoing. The application of a system of processes in an organization, together with realization of the interaction between these processes and also their management is defined as processing-oriented model.

The advantage of the processing-oriented model is in the uninterrupted management, which offers this model through unifying the separate processes in one system of processes and their combination and interaction. This means the applying of the system approach over the firm's organization and management with its development through giving an account of the firm's dynamic character and putting the emphasis on the clients' leading role in the work and the management.

The introduction of such systems in a firm and their certifying gives quality guarantee of the firm's production and increases the ability to compete also on the market. The introduction and the functioning of such systems, however, is related to considerable increase in the volume of work of the production, administrative and in the highest extent of the management staff. This increase is expressed mostly in growth of the firm's document volume: documentary of all important processes, following the movement and alteration of recourses and registration of their condition in all stages-from the entrance to the exit of the system and after realization of the products (support and repair services). Introduction of

such system makes worse the firm's flexibility, obstructs taking fast, consistent with the present situation decisions and is hard to introduce in smaller firms, where the skills, practice and documentary are not enough, where informal approach in communicating is mainly used. In order not to allow excessive increase of the staff and the corresponding expense increase during the introduction of the new system, an appropriate information system should be developed and introduced, which will concentrate all efforts, will centralize the information in database, will mitigate the work over the creation of the documents, their use and the management of the document exchange, will integrate the quality management and the firm's manager information system.

A. Functions of the integrated information system.

Building of integrated information system in the firm embraces all basic functions and tasks of the manager information system [5], subordinated and supplemented with the requirements set by the standard and the procedures in the firm's system for management of the quality [6]. It can unite the following major functions:

- Centralizing of information in database. Thus a fast access to the information from all management stages is reached, the search for data is eased and the time for reaching the needed information is shortened.
- Efficient management of the information flows. It is executed by the system and the programs and rules for work in it. It includes preservation and archiving of the data. Thus security and rehabilitation in case of problems are guaranteed. The system for management of the quality and the standards define the rules of creation, preservation and processing the information in the base as they guarantee access and rapidity.
- Analyzing the information: tools for analysis, automatic functions for analysis. The system includes implemented func-

² ISO 9002:2000 and ISO-9004:2000

tions and programs for analyzing the data for helping the management. Frequently repeating analyses and processing of the data can be implemented in modules for automatic processing – making up references from data in the base or the files created in different sections. When analysis of the information not with a traditional method is needed, the system should have instruments and tools for analysis and experts that can do them. Because of the dynamics of the environment and the possibilities of the modern program products, these are the experts who can create the modules for automatic processing and analysis. Thus constant development of the system and improvement of its introduction benefit is ensured.

- Management of the access to the information through program means of the products used in the system, administrating the access to users and passwords.
- Combination of different types of data, files. Transfer between different formats data. It is imposed by the variety of the used program products and the format of the electronic data. Where is necessary to use data which is laid with one type application software in another, the specific possibilities for converting are to be used, programs and modules for automatic transfer from one format to another are to be designed.
- Facilitations during searching and access the information – well-built structure and firm rules for working with centralized preservation of data, creating names of the files and fast and easy reaching the needed information is ensured. When the firm's computer network is used and a large number of assistants have access, it is important common rules to be kept, which save time for searching.
- Guarantee of the possibility for control of procedures over the management of quality. During introduction of the system for quality management it is important to conform with it the creation of all documents and modules for processing the information. Every document related with

the quality management should be developed with all attributes (date, supervisor, designer, manager and so on) that are in the templates generated by the information system. This ensures enough information for control, feedback to the managers and will guarantee the completion of quality management procedures with minimum waste of time.

B. Firm data, documentation and information flows

The accountancy information is comparatively well organized in firms. It is important for the needs of the management to automate the creation and estimation of divers firm information related with different aspects of its functioning. On fig.1 grouping of firm's information for aluminum doors and windows production is presented according to its type. More important elements in the firm's information flow are:

- Trade information – offers and contracts – information and documents, that are purposed for the firm's clients which include technical data (description of the product), financial data (prices and conditions for delivery), certificates and documents showing the quality of the product, guarantee cards, references etc. On one hand this type of information should be developed explicitly and in details (prices of products and services should be defined and real), on other hand – different products and different conditions for delivery should be made. This requires much time, different specialists and different information (mostly for prices).

Production information – Technical information – concerning technical devices in the firm including construction documentation, technical requirements for the machines and the used equipment. Technology information – the technologies for production, which can be relatively constant during serial production, and production in large numbers, but during single and small series production (which is often met in small and average enterprises SME) constant development of new technologies

and constructive documentation for each new product is required. Planning of the production is made on the basis of documents for the accepted offers and the concluded contracts. The planned documents are developed in different management stages, but the most detailed and concrete

are in the operative stage – in different production lines. The problems of firms exist because of the constant changes of plans and projects because subjective and objective reasons – changes in client's requirement, in prices of raw material, in terms of delivery etc.

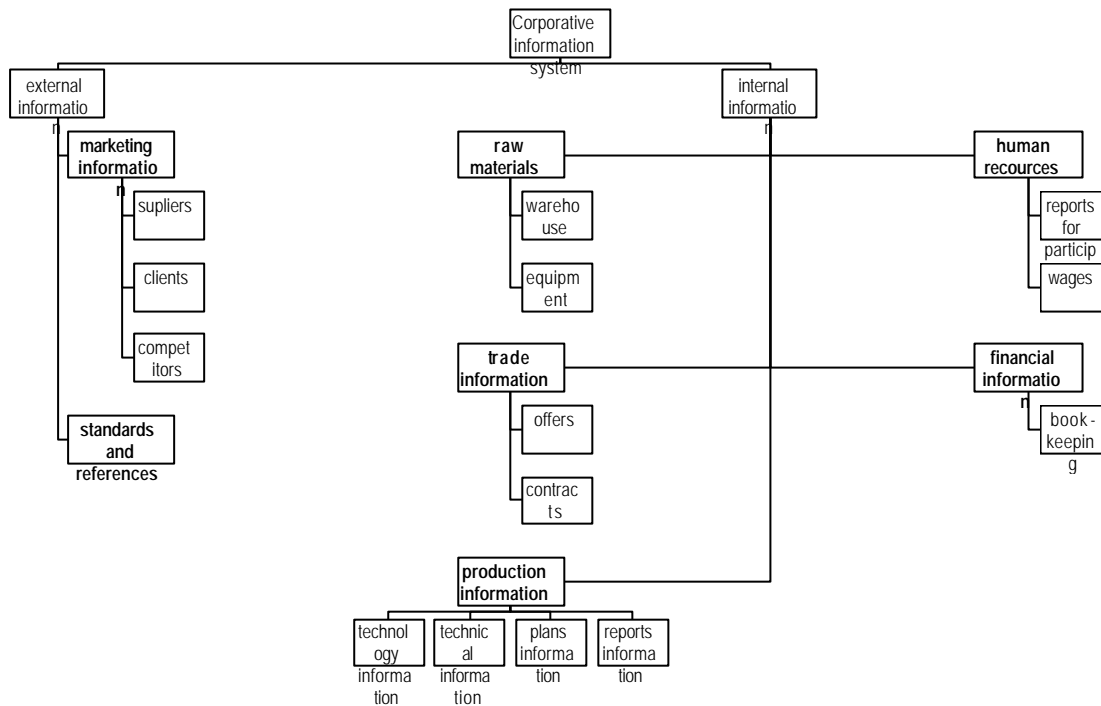


Fig. 1. Decomposition of information, used by Firms
Information System windows and doors

- Standards – making internal norms (system for management of quality, instructions for security and support of equipment, etc.) and outer norm documents (from national organizations, government, parliament, ministries, etc.). With the introduction of the system for quality management internal system of rules, procedures and norms for keeping the quality in the firm is being created and introduced.
- Records of quality – documents that register the quality of raw materials, not finished and finished products, discrepancies (defects), etc. Their contents and structure cover the processes in the firm and put boundaries, in which should be put all documents concerning the quality management of the products and the processes of the firm.

It is seen that the information used in the firm is diverse. Different departments use it and it is hard to build a strict scheme describing the whole process of registration, cultivation, preservation, analysis and transferring the information in the firm. The introduction of the system for quality management through written procedures, instructions and references puts at e certain extent in order the firm's documentation and its cultivation. Unfortunately apart from their execution, which increases the employee's administrative work, the order in the information recourse is not complete because the aims and the tasks, which are solved, are limited to management and guarantee of the quality. In order to increase the productivity according to quality system's requirements, it is important to be

integrated in the existed FIS and FIS to be changed and developed according to QMS. On fig.2 a connection is presented, which follows to be built up during the introduction of a system for quality management in a firm, in order to guarantee effective functioning and managing of production firm. The system for quality management requires strict development over the rules mentioned in **procedures** of all documents, precise registration and taking full responsibility for keeping the rules in the

whole production process. The problems in the small and average firms during the introduction of the system for quality management are defined as considerable increase of the work related with creation, cultivation and preservation of large amount documents, lack of experience of the staff, informal management and communication approach, insufficient number of employees for all activities, complicated and slow system for documentation, confirmation, verification and control.

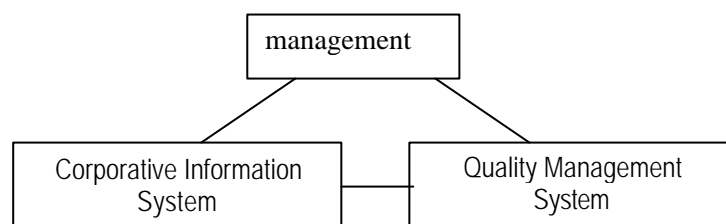


Fig. 2. Connections between CIS, QMS and management

Conditions for introducing the system for quality management:

- QMS requirements for documentation of processes in the firm. Putting a norm basis and generating tracking of processes.
- Interaction between QMS and FIS – during the process of introduction of QMS – developing application software – electronic database.
- The benefit of FIS during the introduction of QMS. QMS requires processing of large amount of information, its analysis and its committing to the needs of the management, which can be realized with minimum expenses of time and recourses through introducing the processes of quality management in the firm's information system.

FIS can be looked upon as complicated system, in which many subsystems can function together and each of them process information with different character and content [5]. In view of clearer presentation of the relations and interactions between the subsystems, described previously, it is appropriate the management information system to be looked upon as a structure defined, on the basis of a certain measure, as

part of a more common firm information system.

C. Structure of an integrated information system

Elements – constructing on the principal of FIS

- Database – different information from different sources, for different needs, caters for different interests
- Universal software – word processing, spreadsheets etc.
- Specialized software – modules book-keeping, store, offers, constructing, analysis,
- Requirements for their defining
- Renovation, modernizing and improvement of the system
- Teaching and presenting the possibilities of the staff
- Staff – teaching
- Dynamics – constant development
- Modules – software is designed by independent modules and possess synergetic effect when modules works together
- Available organization structure to be covered and when needed to be actualized
- To embrace all processes in the activity of the firm

- To embrace all documents, procedures and requirements of the QMS – documen-

tation to have information about people who create, confirm and control it.

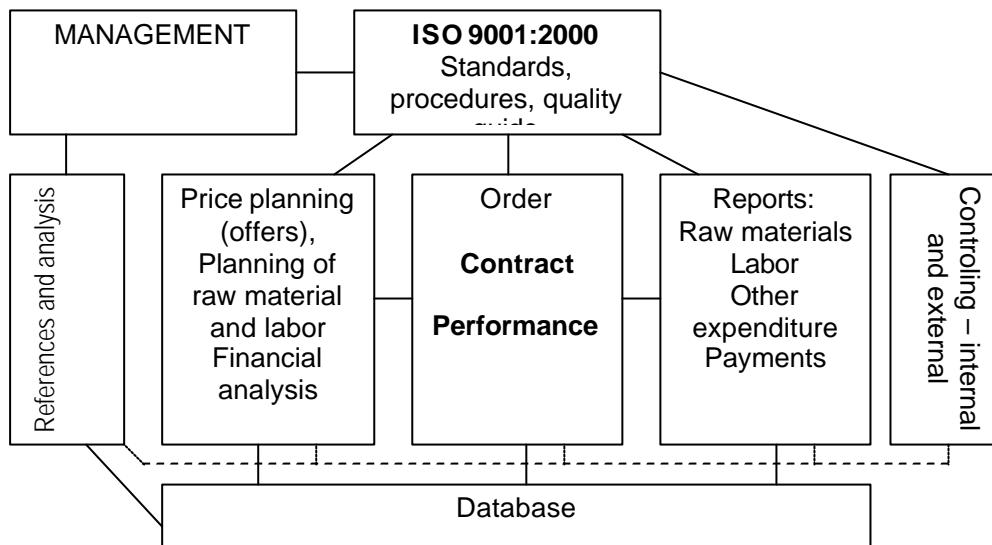


Fig. 3. Structure of the quality management information system.

On fig.3 a scheme of the structure of a firm information system is presented. It is built up during the introduction of a quality management system and taken into consideration with the practice.

Problems, which occur during its creation, are:

- Presence of various information – different form, usage of various software (for word processing, spreadsheets, database, construction and designing and as follows files with different types, concerning one and the same object (client)
- Constant change of the conditions, requiring creation of many variants of offers, plans and etc. – requires keeping certain rules during the formation of the variants and supporting the information about the variant of the day.
- Admission to documents and information of different specialists in the firm – during usage of electronic documents as files it is necessary to create and practically introduced rules for the formation of the files' names and the place for their preservation in a firm's database with common admission, which allows the needed document and respectively information to be found.

D. Construction

Choice, appointment and training of staff – support on high level of competence as to the usage of the firm's information system and keeping the rules for creation of the documentation. Simultaneously, together with the introduction of QMS, the development of the firm's information system and defining the rules of work are realized. This should take place through adapting and improving of the present information system. After the introducing of the quality management system, during the exploitation, the permanent evaluation of the system and its modules, concerning its efficiency, promptness and accuracy, takes place. When problems occur and the possibilities for improving are specified, we should continue towards change and improvement of the corresponding element of the system.

Choice of technology, techniques, and software – it takes place in the beginning through evaluation of the present condition, technique and technology and the needs defined by the accepted procedures, rules and manual for quality management. The employed staff for the system's support looks for novelties in the sphere of informational systems and technologies and through objective evaluations of the possi-

bilities and the benefits of their introducing it develops and offers well-grounded plan for improving through introduction of new technique, new program products or development of new modules to the system.

The usage of new module principle for building of the system allows more flexible management and easier renovation. This principle allows also the creation of open system towards improvement, which allows, in certain moments, two types of modules and program products to be used in parallel – existing and new one, and thus testing, adapting and improvement of the new module in practice, before being introduced and without interrupting the work or breaking the process of production.

Appropriate, from the point of view of the automatic processing and analysis of the information is the usage of program products type Database. They support and offer many instruments for creating client-oriented modules, means of management (including management of the admission) and analysis of the information. The requirement of the structuring and homogeneity of the information, as well as the limits, which are set during designing of database, do not allow it to be widely used in all spheres of the firm's activity. Even in the smallest change in the structure or the type of the data, professional intervention of programmers and alteration in the database management system DBMS or in the structure of the modules for introducing the data are needed. That is why developing a new information system in a given firm should be realized at stages at successive introducing and improving of separate elements – modules. It is appropriate to use at the beginning universal program products like Word, Excel as more flexible and convenient for the creating of documents and processing of information. After approving of an appropriate, stable structure of the documents and information of the given sphere of the firm, it is preceded towards the creation of a module on the bases of the database.

During the construction of an integrated information system some basic rules and requirements of the quality management system should be kept.

- Creating a clear structure
- Description of concrete responsibilities and tasks: of each link; of each leader; of each position
- Creation of concrete Templates with the necessary filling information from each employee of the firm, deadlines, responsibilities.
- Management of the transfer of information, responsibilities for its creation, examination, processing, deadlines.
- Description of the points for control of information – interstitial rendering an account of the results of its processing.
- Evaluation of the expenses for introducing and the efficiency of the information system.

Important moment in the constructing of the system is the integration in different modules of the system tools for analysis and assessment – criteria, for which information is collected and brought in the firm and on this basis analyses are generated. In the firm's system there are analyses of the critical reserves of materials, optimizing the orders for delivery, loading and using the staff, retable of every order and product. The introduced in the previously mentioned firm modules are conventionally called OFFERS – about formation of the price and planning the expenses of materials and labor for every concrete order for production by the clients; ORDERS – about following the information concerning the accepted offers for production; WAREHOUSE – follows the information for SEND materials for orders, clients, suppliers; LABOR – about rendering an account of the complete work over orders and workers; REFERENCE – sums up and analyzes the information for the needs of the management of the data for offers, orders, materials and labor expenses. Part of the structure of the firm's database built up in environment of Microsoft Access and

introduced in the firm is presented on fig.4 and fig.5.

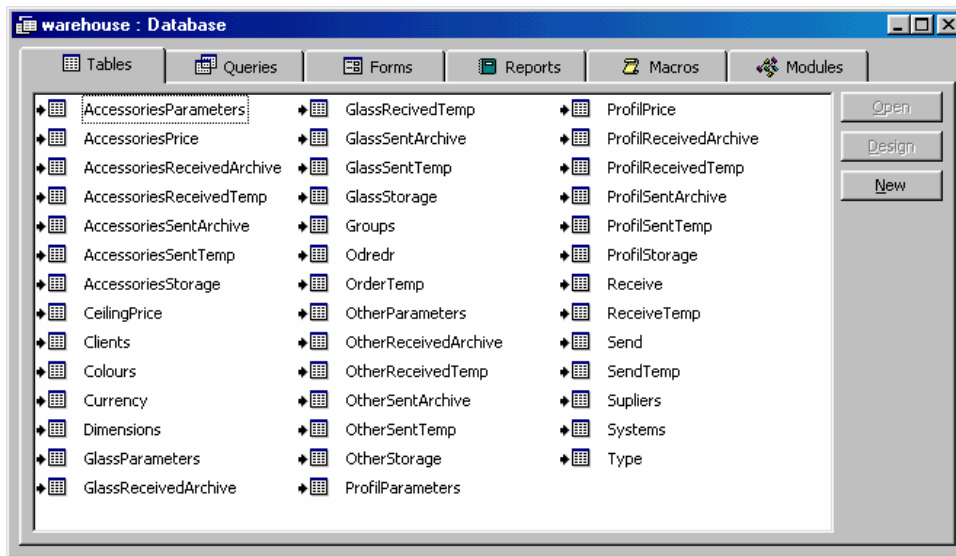


Fig. 4. Database – Module AREHOUSE

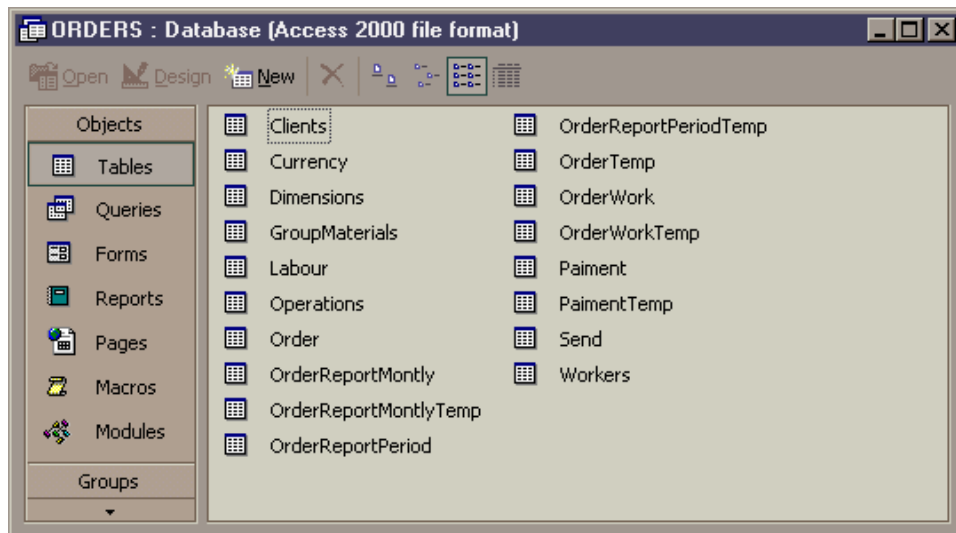


Fig. 5. Database – Module ORDERS

The integration of the activities of offering and planning in one module, created on the basis of spreadsheets Excel it allows very fast and with minimum labor to receive various primary information, helping the planning of all stages and directions, financial grounding of the deal – analysis of profitability and taking a decision for the concrete project, for offering discounts in the price, relieves during the execution and simultaneously guarantee for quality with the full connections between work and information. At the moment of creating the offer, a plan for the needed materials, a plan for the labor and financial plan with

costs and profit of the concrete order are created automatically for the client with precise price of the project.

During introduction of the firm's information system and the quality management system in the firm it is necessary to formulate rules for work, which defines the usage of the computer system, creating information as files or as a part of the database, the rights for access and alteration of the data, the management of the information flows. Here are presented **Rules** for collecting, preservation and processing of firm's information:

1. Centralized database and files with information
 2. Management of the access to the information
 3. Keeping main principles for creating filenames and data. The usage of filenames in native language with details from the file's contents allows easier search through arranging by the most commonly used parameter of through the function Search of Windows.
 4. Routine processing of the data through automatic modules and principles and methods of the firm.
 5. Preservation of variants of files – every change is saved in new name (V1, V2...)
 6. Supporting basic attributes of every file – data, author, content – allows control of information and searching through means of computer technique.
 7. Creation and management of firm's director structure.
 8. Regular archiving of data.
 9. Training of personnel – including requirements of QMS
 10. Control in usage – outer and inner control and examination, including following for keeping the rules.
 11. Constant control of work – integrated instruments for control – strategic data for its using, passwords and usernames for access.
 12. Continuous development and improvement of the system.
- Problems, defects and dangers
- Requires time and resources for its building, hiring new specialists,
 - Training and changing in work, struggle against traditions
 - Additional work for people, especially in the beginning of QMS designe.

E. Conclusions

A production firm is analyzed in direction of the need of information system for quality management. The main problems are formulated and the possibilities to solve them during integration of the quality management system with information system in a firm for production of aluminum windows and doors.

A structure and principles are created during the creation of dynamic integrated information system for management of the firm and the quality according to the standards EN ISO 9001:2000

Effective rules are formulated for developing and exploitation of a firm's information system, which guarantees the introduction of a quality management system, support of up-to-date, full, reliable database for the functioning and managing of the small and medium firms in the sphere of ordering (single) production.

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