

A Proposal of a model for the organization of Energy-efficient products

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Abstract: The article deals with the production of energy-efficient products. It shows a way that could be used from the product determining over the organization of the process up to the realization of a product ready for use. The description of the steps will be carried out with the help of a model.

Keywords: Customer requirements, Energy efficiency, Energy-efficient product, Energy management, Product Idea

I. INTRODUCTION

Before a product is manufactured, an enterprise must provide certain preliminary works. It has to determine what the product is supposed to be used, for which demands it is supposed to cope with, which share of the market it should prove, whether the market needs the product, which sales strategy could be applied, whether parts must be bought from other suppliers and above all, whether it can be manufactured economically and last but not least, is a non-polluting and energy-efficient way of production possible. Due to the requirements at the product a strategy must be elaborated for the production process. Here the model for the creation of energy-efficient products starts. With the help of the flow model the requirements for the organization of the process are illustrated.

II. RECOMMENDATION OF A MODEL FOR THE DESIGN OF ENERGY-EFFICIENT PRODUCTS

At the beginning of the implementation of an idea for a new product always stands the product determining, followed by development and construction. During the phase of the product determining not only the product itself has to be considered, but also the application according to rules and the level of strain. Since the entirety of the processes is very complex, it is named product process.

Normally the objectives of the enterprise and the customer and market requirements are basis for the realization of a product idea. For this purpose the courses within the enterprise must be adapted onto the energy-efficient product that has to be designed. In large-scale enterprises those processes of product determining and realization have already been realized with former products and are based on repeatedly proven logical course structures and on harmonized processes of product determining, realization and support service. The complexity which is necessary in order to manufacture an energy-efficient product results from the product definition. This product definition is the fundament for all future decisions and defines, whether the product is supposed to become a simple, useful product or rather a product that should fulfill high-quality functions. In this way the decision is taken which extent and degree of complexity the manufacturing process will have and which share of the market the product is supposed to achieve.

Since every product is specific, also the flowchart must be tailored to every product separately. The flowchart shows the most important phases of the realization of the product with all single measures. With the help of furcations special features can be demonstrated. In the flowchart the word "process" is used frequently. In this way the manufacturing process and the product process are in brief meant. When a mass-production shall take place the manufacturing process must be elaborated very detailed since otherwise the error rate increases itself correspondingly. Simultaneously the qualification of the workers must be improved.

The projected flowchart is created in stages and follows in its classification the methodology of the VDI (The Association of German Engineers) Guidelines 2221. Accordingly the product is manufactured in an iterative process which corresponds to a stepped, progressive procedure (according to product and number of items). This procedure is in step with actual practice.

At the beginning of every process there is the idea. In the VDI Guidelines 2220 the course of the product planning as well as the upstream activities of the product determining are illustrated. The result of all measures for the product determining is the dutybook which, however, is not an inflexible flowchart. If it turns out that after creation of the dutybook new findings were added, these are integrated into the dutybook. If a principle-solution was reached, changes at the product are not possible. For the protection of the quality and to avoid errors methods of the preventive quality management can be used (according to VDI 2247) during the entire life cycle in all phases of the flowchart.

According to VDI Guidelines 2221 a flowchart contains all organizationally technical measures concerning planning, development and construction of technical products. The management makes the corresponding decisions for the priority of the energy efficiency. The interaction between product, product technology and fabrication techniques is expressed in the flowchart. Through intermediate measurements in different stages of the product (at the laboratory pattern, at the functional pattern and at the manufacturing pattern) errors can still be repaired in the course process.

References to the flowchart:

The flowchart ends with the finishing of the energy-efficient product while the life expectancy of the product ends only with the recycling of the product. During the processes of product determining and product realization should already attached importance to the fact that the product will be recycled energy-efficiently.

With the help of a solution catalog (by putting together the typical functions of all products in the company) a fast access can be carried out since it contains different realization possibilities, empirical values and calculation instructions for the products.

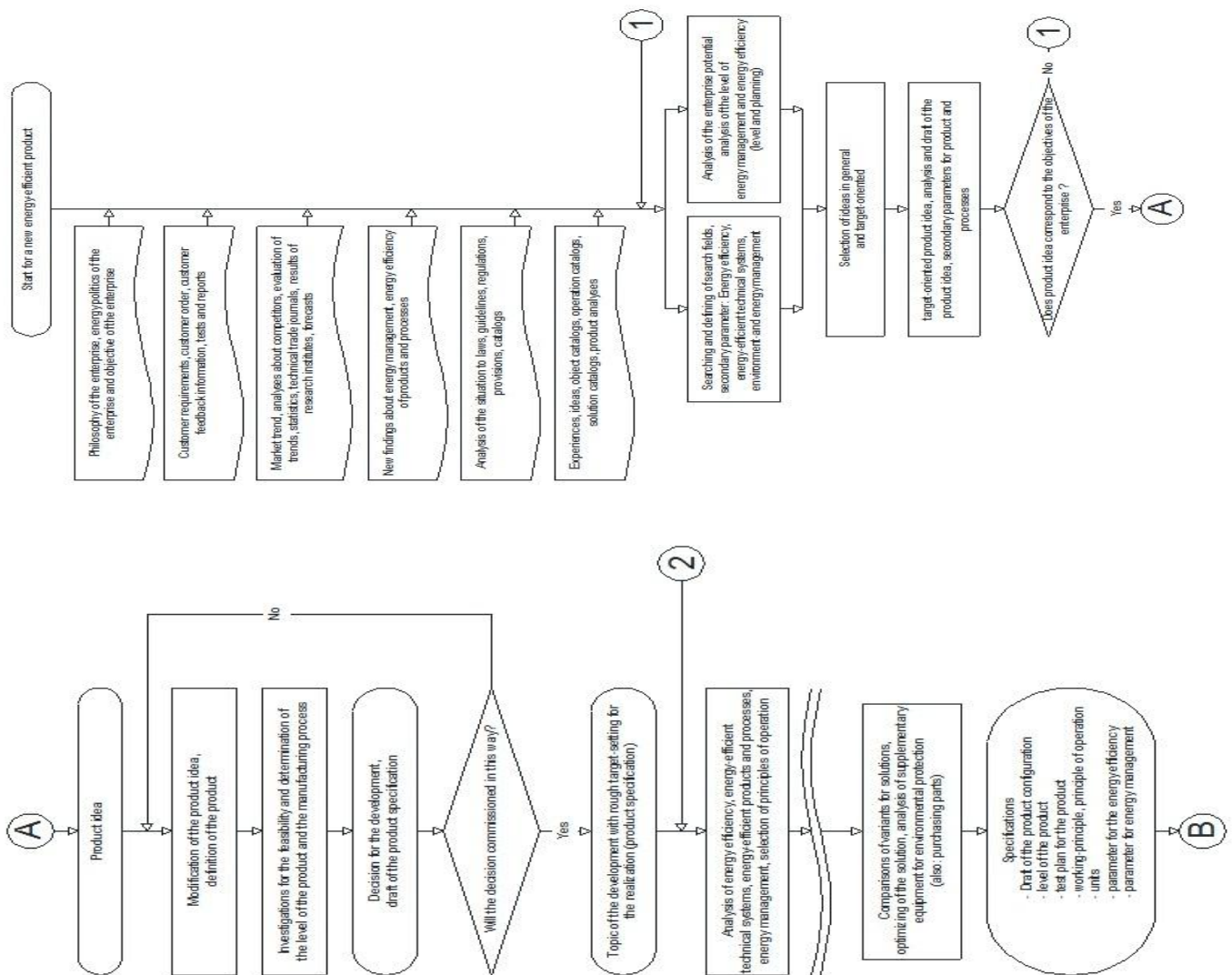
The object catalog on the other hand contains – independently of the task - solutions and calculations for one object/ one subject. This catalog should be split up into machine elements and manufacturing processes and can be used for the creation of solution variants.

The operation catalog contains experiences, instructions in calculations for different functions which can be realized with a product and solutions.

Functional or object plans are suitable as support during the product configuration. They must be compiled during the phases of product determining and product realization. Thus the compulsion of thinking over all phases during the process arises. The results are recorded in the field report.

In order to manufacture energy-efficient products, knowledge from different sectors as environmental protection, energy efficiency (Renewable energies law, Energy saving rule), ergonomics, design, etc. is necessary. As a result of a product development on the one hand products with practical functions must arise, however, on the other hand these products must not endanger the health of the human being. During the organization of a product its aesthetic function is also important. Indeed the appearance of a product is not always the main aim of the realization of the product. Nevertheless it should also be of high-quality, in a customer-oriented way and innovatively.

The product configuration is a complex process and therefore requires a flowchart tailored in particular to every single product.



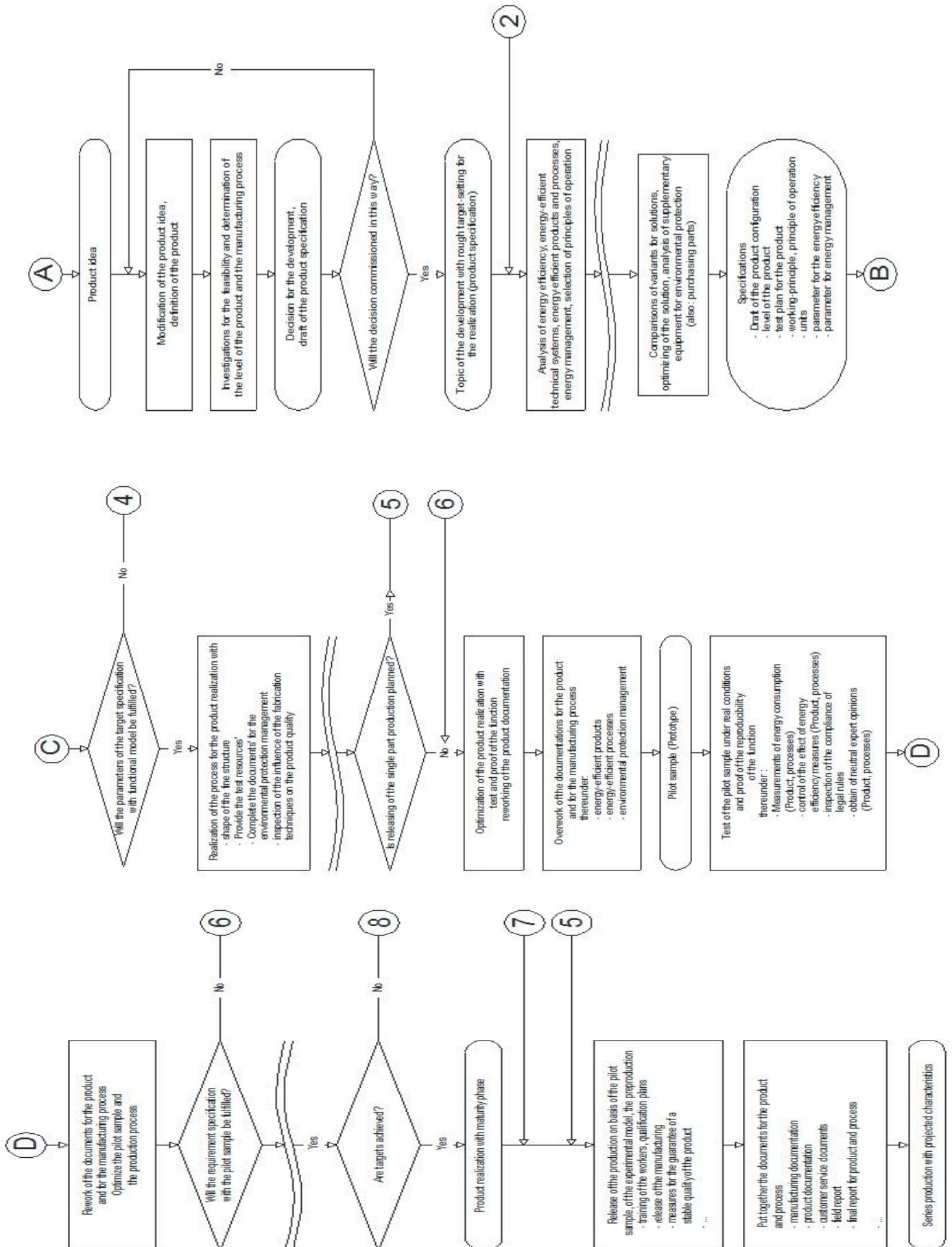


Fig. 1: Flowchart for the production of a new energy-efficient product

III. Conclusion

The organization of a new product is a comprehensive process which requires a complex approach. For every new product a separately designed flowchart for this product has to be elaborated. Attention has to be paid to the respective factors of the enterprise, the market and the legislation. This model was developed in particular for energy-efficient products. It can be adjusted correspondingly if certain conditions change.

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