Технічні науки

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CHANGING THE RULES AND CRITERIA OF INDUSTRIAL DESIGN

Compositional technical solutions – as an inevitable basic pushing basis for changing the rules and criteria of smart industrial design and creating software products – equivalents of complex integrative inventions

Summary. *Composite and complex technical and technological modules and innovative technical solutions are equivalent to integrative inventions. New opportunities in design and testing the performance of technical solutions are also added by elements of compositional design solutions and they become the main criteria for the tools and methodology of industrial design;*

The introduction of new technologies, the use of new materials, the replacement of traditionally accepted production methods with unusual ones, which help and are an indispensable condition for a technological leap or breakthrough, increasing production efficiency, is now commonly called an innovation process;

This process in the conditions of different technical and technological cultures, in the conditions of different levels of starting positions for the beginning of the initiated process of innovation, can differ significantly, but the most urgent need for the beginning of such a process exists and this fact does not raise any doubts;

And if at the beginning of this process the innovative breakthrough had a local significance and was observed in the field of high technologies, microelectronics and so-called nano-scale technologies, then today the innovative process is

becoming more and more directed towards classical, basic technologies, energy, medicine, transport, that is, it covers all fundamental spheres of human activity.

Key words: *Technical solution, Technological solution, Compositional technical solutions, Compositional technological solutions, Rules and criteria of industrial design, A new look at the technical characteristics of a new product, Reliability of a new product.*

Changing the rules and criteria of industrial design

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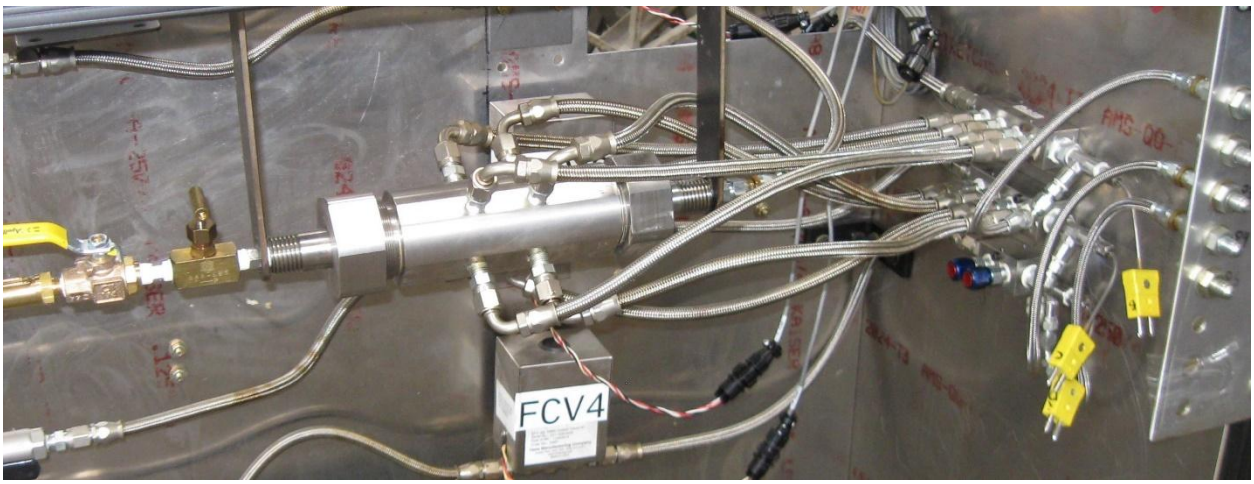

Fig. 1. Test bench for liquid fuel activation device

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In recent years, the economy in virtually all industrialized countries has taken on and continues to take on an increasingly innovative character.

And if at the beginning of this process the innovative breakthrough had a local significance and was observed in the field of high technologies, microelectronics and so-called nano -sized technologies, then today the innovative process is becoming more and more directed towards classical, basic technologies, energy, medicine, transport, that is, it covers all fundamental spheres of human activity.

In order to increase the competitiveness of their products and technologies, entrepreneurs are forced to constantly seek new ways to increase efficiency, reduce energy intensity and energy costs, and improve the level of environmental safety and economic stability within each individual enterprise or company;

Fig. 2. Test bench for dynamic homogenization device for diesel engine fuel system

New opportunities in designing and testing the functionality of technical solutions are also added by elements of compositional design solutions and they become the main criteria for the tools and methodology of industrial design

A new look at the durability of a new product

Until recently, the durability of a product was one of the most important criteria determining its commercial value; At present, with the constant reduction of time from the beginning of the period of implementation of a new product to the beginning of the period of implementation of an even newer product, this period of time is so small that it often makes no sense in the innovation process to concentrate attention and spend efforts and resources on an excessive increase in durability, which in duration exceeds the period between the beginning of operation of an existing product and the release of a newer or modernized product on the market; Since this period for different types of product can differ significantly, the concept of durability can be blurred in time and as the purpose of the invention is not critical

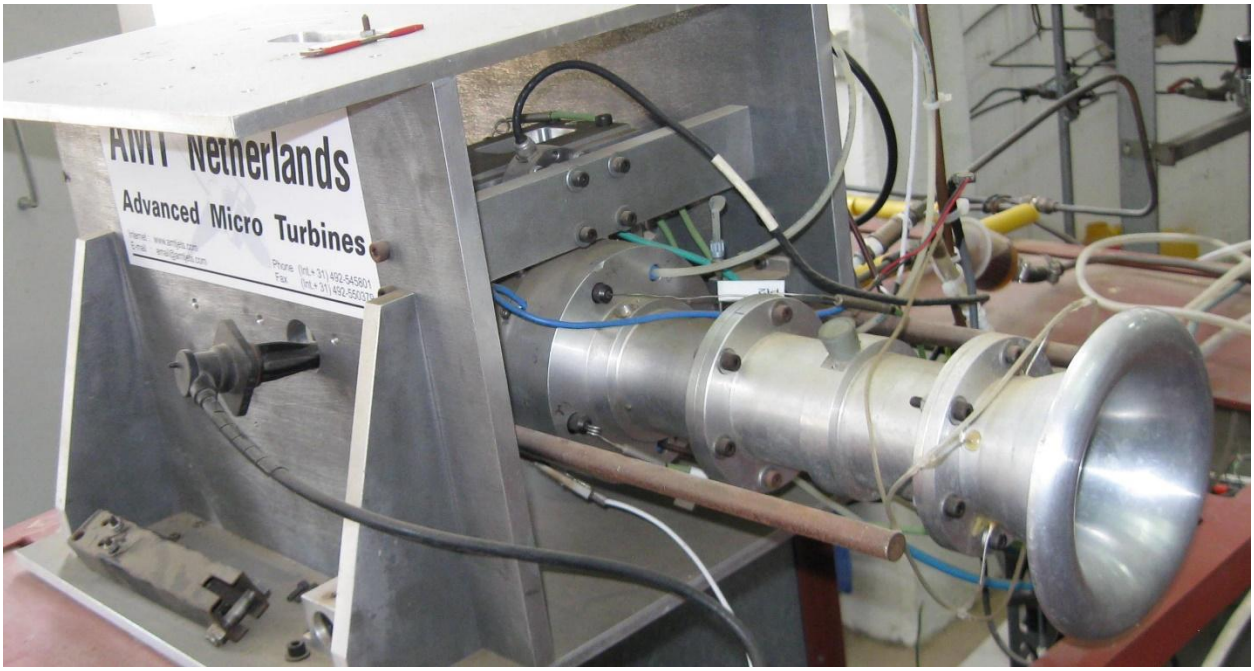

Fig. 3. Also laboratory equipment

There is another subjective factor of durability that must be taken into account; According to the stereotypes of durability that have developed for different types of products, many commercial factors are determined, including the quantity of required, and therefore sold, products and their real price; Imagine that a technical solution has been found that allows increasing the durability of a product and then this factor reduces the quantity of the required product, while maintaining the existing price level that the consumer is willing to pay for this product;

This leads to a decrease in sales volumes for companies producing the product and puts these companies before a choice - to agree with the innovation or do everything to block the implementation and introduction of the innovation; As practice shows, these companies choose the second option and block the innovation and in this process the only loser is the inventor who invented something rejected by the market.

A new look at the reliability of a new product

The issue of the reliability of a new product and new criteria for assessing and calculating reliability are also undergoing fundamental changes; First of all, this is the connection between reliability and warranty obligations of the manufacturer of a new product to the consumer; Very often, the costs of fulfilling warranty obligations are comparable to the cost of the product itself;

Fig. 3-1. Industrial boiler

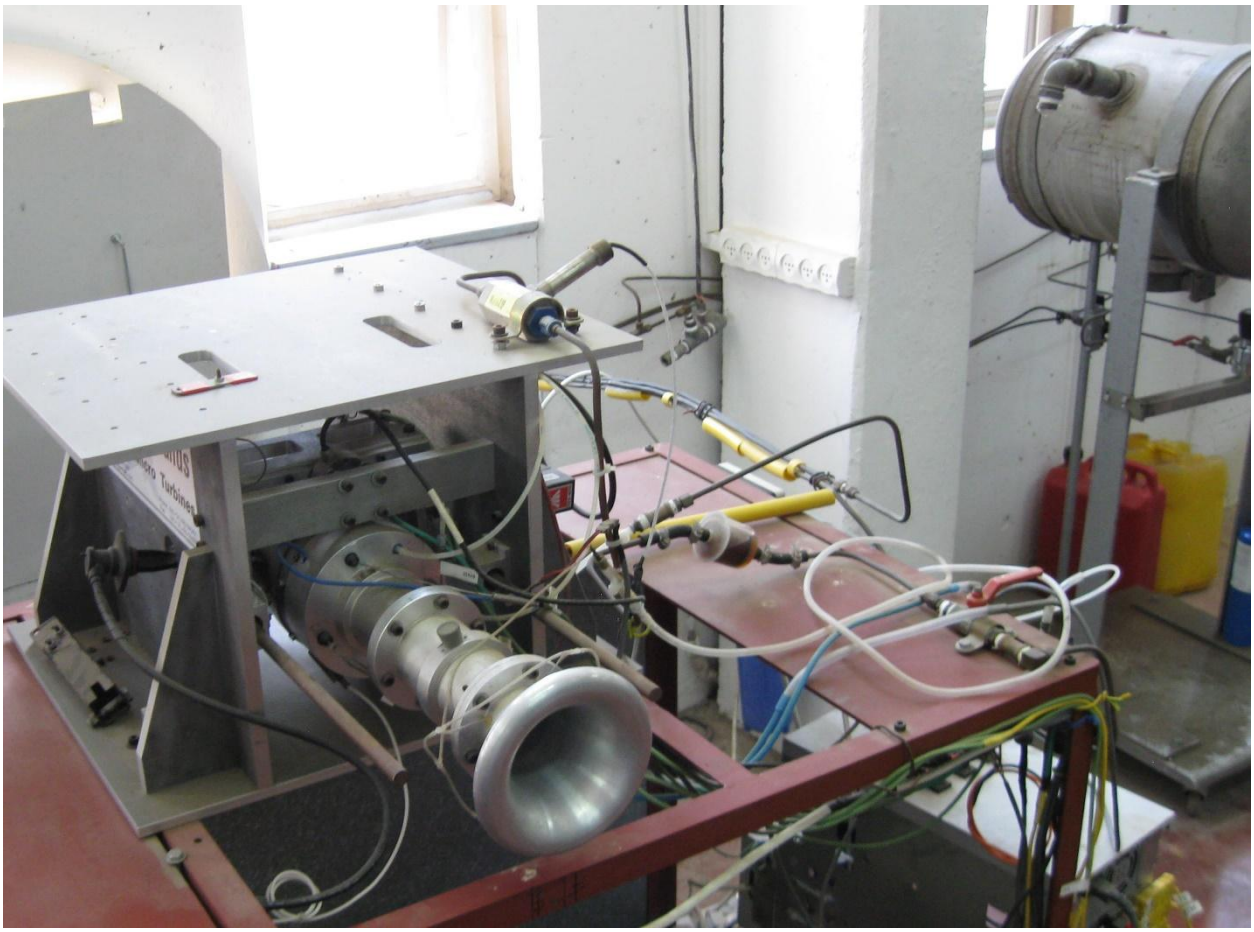

Fig. 4. Also laboratory equipment

That is, reliability is a factor that, being one of the achieved goals of the invention, can determine (naturally in combination with other technical and operational factors achieved as a result of the implementation of the invention) the level of commercial success.

In this case, the subjective factor of time also plays an important role, and more than the required reliability in time can become a negative factor and play a cruel joke on the inventor, in a situation where the created super-reliable product turns out to be commercially unprofitable for the manufacturer;

New opportunities in the efficiency of system search and analysis of previous technical solutions for novelty

It is clear that new information technologies open up new possibilities in the systematic search for similar solutions when developing a technical solution.

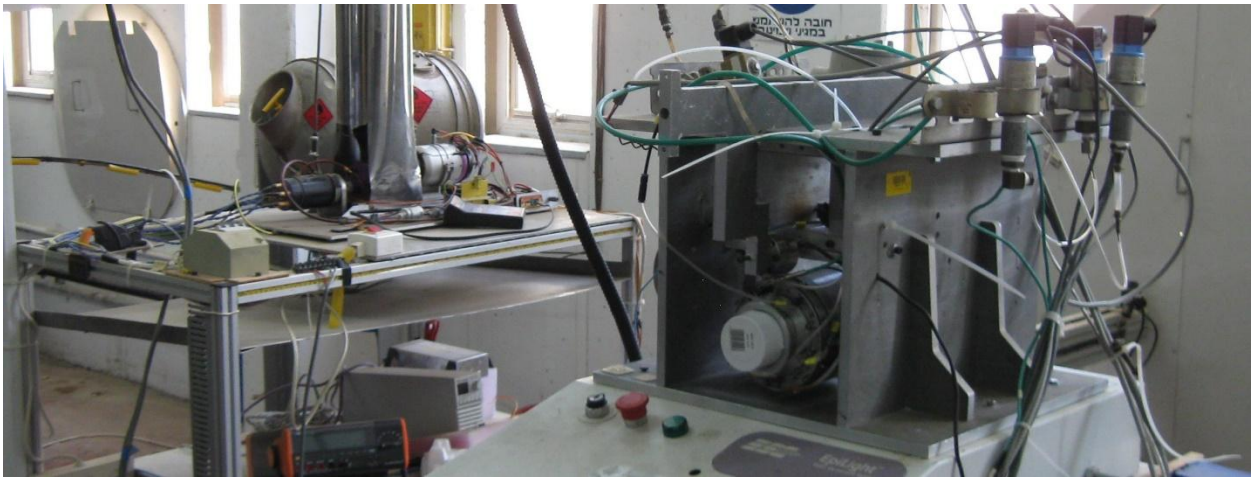

Fig. 5. Laboratory equipment

Let's imagine that, during the preliminary design of the composition structure, we came to the need to combine and integrate several classical solutions and new, say, digital technologies that connect them into the composition, so to speak, at one level of horizontal integration, and after that, we also came to the need to reach the next level of integration with the inclusion in the composition of algorithms, software products and interfaces for communication with the previous level of integration.

How to conduct a search, in what directions, and how to conduct this search most effectively and identify existing analogues of the created composition

It seems to me that in this case the most likely way to start the search is to begin a systemic search after the formation of the composition of the composition being created, after decomposition and identification of independent and self-sufficient technical solutions included in the composition.

After this stage of the search, it is better to select one basic technical solution from these technical solutions and, having searched for it, begin to attach other technical solutions included in the composition to the basic solution, and conduct a

sequential search for the basic technical solution with each attached technical solution and so on until the full composition of the composition is reached.

New opportunities for assessing the usefulness and possibility (as well as the feasibility) of modifying and modernizing known technical solutions

Very often, the new is the well-forgotten old...

Therefore, when setting a task and making a decision to start an innovative process of synthesizing a new product, it is advisable to check whether any functional elements of the composition that needs to be invented have been previously invented.

If such or an equivalent solution is found, then it is possible to replace materials, use new components and introduce a digital control and monitoring system into the future composition, which will allow the creation of a new technological composition that has the potential to be integrated into a higher-level composition.

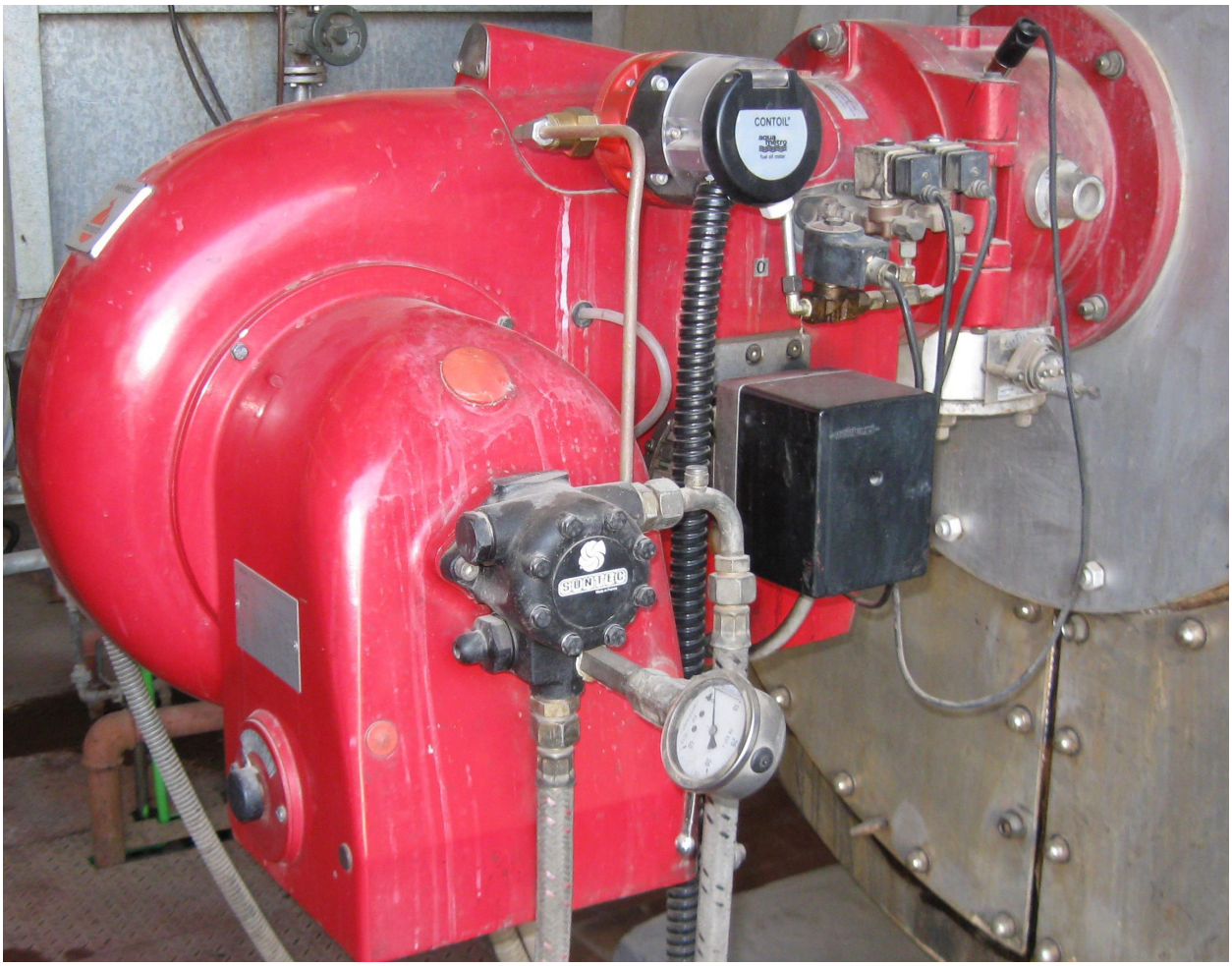

Fig. 6. Boiler control and monitoring system with a capacity of 10 tons of superheated steam per hour

The impossibility of successful commercialization without the formation of principles of composition and compositional structure of a new technical solution

As practice shows, the possibility of selling or licensing autonomous technical solutions, in the event that they are not linked in advance to systems or solutions of a higher technological and quality level, is reduced to zero.

Inventions that are of a composite nature, in which there is at least a fundamental schematic solution for integration into technological and structural systems of a higher functional level, are implemented more confidently and in a

shorter time, since investors, buyers or consumers of a license have the methodology and technique of this integration in the description and in the formula of this integrative and composite technical solution.

Suggested techniques and methods for forming a compositional style in creating new innovative solutions

Thus, compositional technical solutions are a design style for developing new technical solutions for their integration into existing technological schemes and configurations.

Since the method of such embedding can often be unique and possess significant novelty, the description and formula of the invention having a compositional nature, a multi-level architecture of constructing cause-and-effect relationships between the components of the composition and integrated into the design and technological connections of the composition, distinctive features, determine to a large extent the commercial success of these innovations.

Techniques and methods for transitioning from the created compositional foundation of a new technical solution to the basic basis of an integrative invention

In many cases, the design and technological composition requires additional, often fundamentally new connections between the components and elements of the composition, in other words, often having a clearly expressed design and technological composition in terms of properties and composition, in order to turn it into a finished innovative product or item, it is necessary to find versions of integrating the composition into this final multiple and multi-level integrated product.

Integration versions can be very different, it is only important that the final result of the integration is to obtain a jump in effect or a jump in quality that has no precedent before.

The impact of restrictions on the number of claims on the possibility of reliable protection of composite technical solutions

Limiting the number of claims in an invention in principle makes it difficult to reliably protect the invented object, but a correctly found principle of composition can, on the contrary, enhance the degree and level of protection.

The ideal case is a system of cause-and-effect relationships that allows one to obtain the declared effect only in the proposed system of compositional relationships with clearly expressed conditions and features that determine the composition of the composition and the independent functions of each of the elements of the resulting composition.

Due to the limited space and form, it makes sense to highlight in the compositional solution only those features and relationships that do not affect the known independent features and functions of each of the elements and components of the composition, but arose precisely as a result of the formation of the composition from the spheres of functional influence of the components of the composition on each other.

It can be said that in correctly selected components of a composition, when they are subordinated within the framework of the composition to the conditions and properties of the newly created technological system, a new integrated system of features, interrelations, feedbacks and functions arises that are possible only within the framework of this composition and, in addition, have a tendency to develop and improve intra-compositional connections.

Following these principles allows, within a limited number of claims, to concentrate attention only on the main distinctive features inherent in the composition, while ensuring the maximum level of protection of the composition and the maximum level of clarity of the essence of the invention.

The proposed structure of an independent claim of the invention, built on the basis of a composite technical solution

As I determined as a result of my first experiments and as recommended by experts, an independent claim of the invention, if the invention is a composition, must have at least three main parts.

The first part contains the formulation of the commercial essence of the composite invention and should reveal the meaning and necessity of composite integration for:

- a clear statement of the composition task

- limitations of the degree of functional connections in the composition and disclosure of the degree of necessity of each component of the composition for its formation and normal and effective functioning

- the wording of the composition title

The second restrictive part contains all the basic information about the invention as such and includes a description of all the basic technical solutions inherent in the components of the composition and, at the stage of drawing up the formula of the invention, not qualified for the presence of elements of substantial novelty in all design and technological aspects and connections of the composition.

The third distinctive part contains information about the components, their interrelations, materials, integrative elements and associated software products and their basic algorithms, each of which independently or in any combination creates elements of significant novelty for a composite, multiple and multi-level integrated technical solution.

The proposed structure of a dependent claim of an invention based on a composite technical solution

The limitation of the number of claims imposes on each claim a special mission in the overall strategy of formulating and protecting the novelty of the invention.

Based on this, the second restrictive part of such a claim must contain all the basic local and specific information about the invention as such and include a local and specific characteristic of all the basic technical solutions inherent in the components of the composition and, at the stage of drawing up the claim, not qualified for the presence of elements of substantial novelty in all design and technological aspects and connections of the composition.

The third distinctive part contains local, specifically oriented non-technical details and elements, information about components, their interrelations, materials, integrative elements and associated software products and their basic algorithms, each of which on a local scale, independently or in any combination creates local specific elements of significant novelty for a composite, multiple and multi-level integrated technical solution

The proposed methodology for designing prototypes of composite technical solutions, allowing to test and verify the correctness of each innovative element of the composition

Designing a prototype or pilot sample of an innovative product-composition is most conveniently done using a design program and its engineering analytical applications; I prefer the software product Solid Works , as this tool allows you to build a working model of a composite technical solution and conduct a control simulation of its working cycle without resorting to expensive design and production of prototypes

Analysis of found analogues and prototypes of a new composite technical solution

If, as a result of the search, homogeneous, basic technical solutions are found that are, in the first approximation, analogs or prototypes of the intended compositional technical solution, then they must be tested in various variants and combinations of integration with additional elements and components of the composition under consideration.

If information about these prototypes or analogues is available in digital format, then it is advisable to use Solid tools Works to build models of the found technical solutions and conduct a digital simulation of the working cycles of these models to compare them with similar working cycles of the proposed invention - a composite technical solution

Examples of compositional technical solutions that have been accepted by the market

An example of composite technical solutions can be the well-known products and products of computing technology, communications equipment, tablet computers and many other products of mass and non-mass demand.

The uncertainty in the wording of patent applications as complex technical solutions underlying these products have led and continue to lead to numerous patent disputes and wars.

A larger scale application of compositional technical solutions and their integrated extensions and interpretations will help to reduce the intensity of passions and possibly help in promoting innovative products to the market.

List of references, patent and license materials

Appendix 1

United States Patent Application **20120051174**
Kind Code **A1**
March 1, 2012

NATURAL MILK BASED FOOD COMPOSITION, PROCESS AND DEVICE FOR DYNAMIC PREPARATION

Abstract

In some aspects, an apparatus and method churning butter out of multi-component raw material are provided. The movement of the raw material develops energy that churns the raw material into butter.

Appendix 2

United States Patent Application **20120040166**
Kind Code **A1**
February 16, 2012

Composite Material, Method of Manufacturing and Device for Moldable Calibration

Abstract

Composite materials and methods and systems for their manufacture are provided. According to one aspect, a composite material includes a collection of molded together multilayer capsules, each capsule originally formed of a core and shell. The shell, after a plastic deformation process, forms a pseudo-porous structure, with pores locations containing the capsule cores. The cores are made of a material, eg, synthetic diamond, which is harder than the external shell, which can be formed of, eg, a ductile metal such as copper. The composite material has high thermal and/or electrical conductivity and/or dissipation.

Appendix 3

United States Patent Application **20120029845**
Kind Code **A1**
February 2, 2012

APPARATUS AND METHOD FOR FLUID MONITORING

Abstract

According to some embodiments, an apparatus and method are provided for detecting the composition of a fluid. An alternating electromagnetic field may be applied to the fluid and distortions in the electromagnetic field are compared with predetermined, expected distortion "signatures" for particular components at particular concentrations. The presence and concentration of the components in the fluid may be detected by detecting these distortion signatures.

Fig. 7. Automatic line of industrial boilers with a capacity of 10 tons of steam per hour - each