Технічні науки

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Organization of the production of natural forms of organic products based on components

COMPREHENSIVE ACTIVE ONLINE MONITORING SYSTEMS

Complex systems of active on-line monitoring in real time and technological features of their production and operation

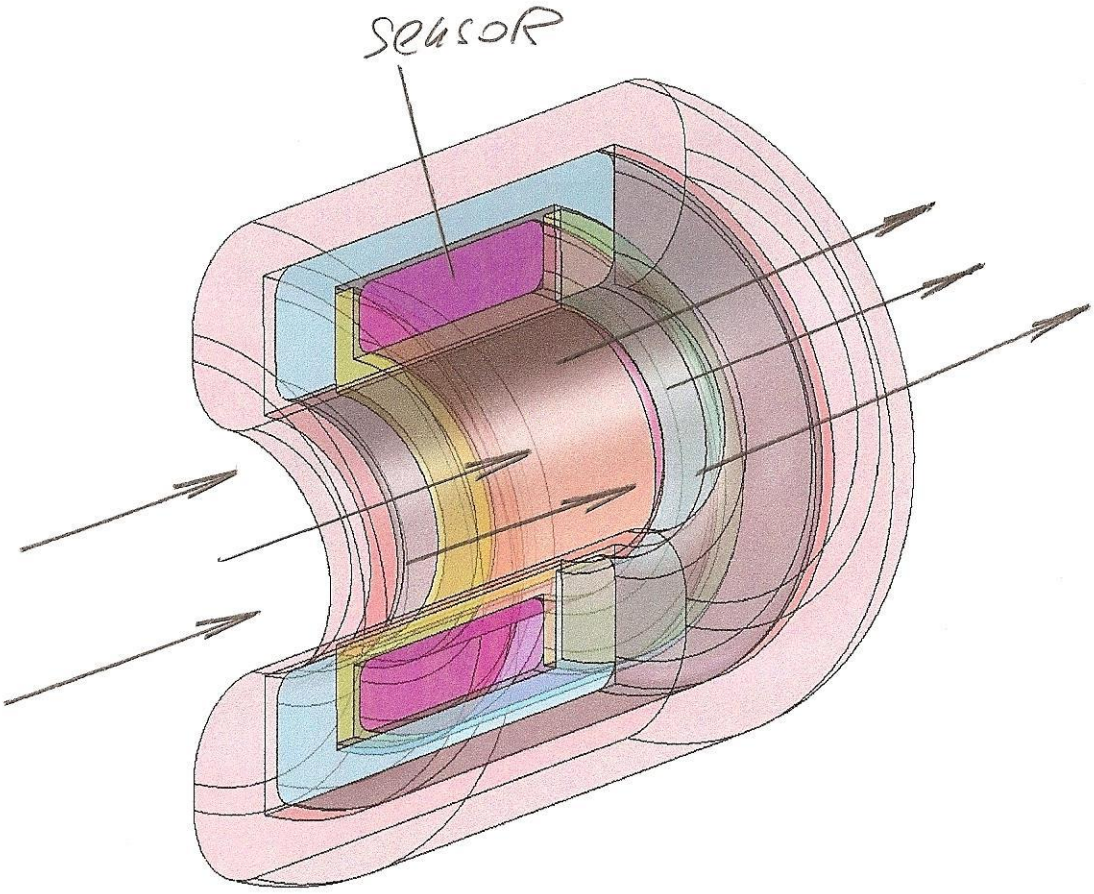
Summary. *If we consider modern pharmaceutical production as an example, then in each technological tank of such production, we can find so-called dead zones, in which the processes are slowed down and their dynamics radically differs from the same processes in the active parts of the technological tank, where, as a rule, there is a circulation, developed turbulent movement of process fluids*

In the corners of such tanks the level of dynamic activity decreases sharply and the results of chemical reactions may differ significantly from areas with developed turbulence

In order to controlthe chemical – reaction activity of the entire working volume of the technological tank and, as necessary, equalize all the main operating parameters of the process, and in addition, to ensure the same time of a high-quality technological process at all points of the working volume of the technological tank, a sensor module is formed based on modern achievements and capabilities of contactless sensor technology in the form of a sleeve, in which a sensor – solenoid is embedded, of a certain design.

Key words: *Pharmaceutical production, Process tanks, Active parts of the process tank, Dynamic activity level, Sensor module, Modern automated production, Contactless processor system.*

Introduction. Modern automated production requires constant monitoring of the main technological parameters of all processes and especially clear communication between sensors and control systems, including central processing systems and control computers



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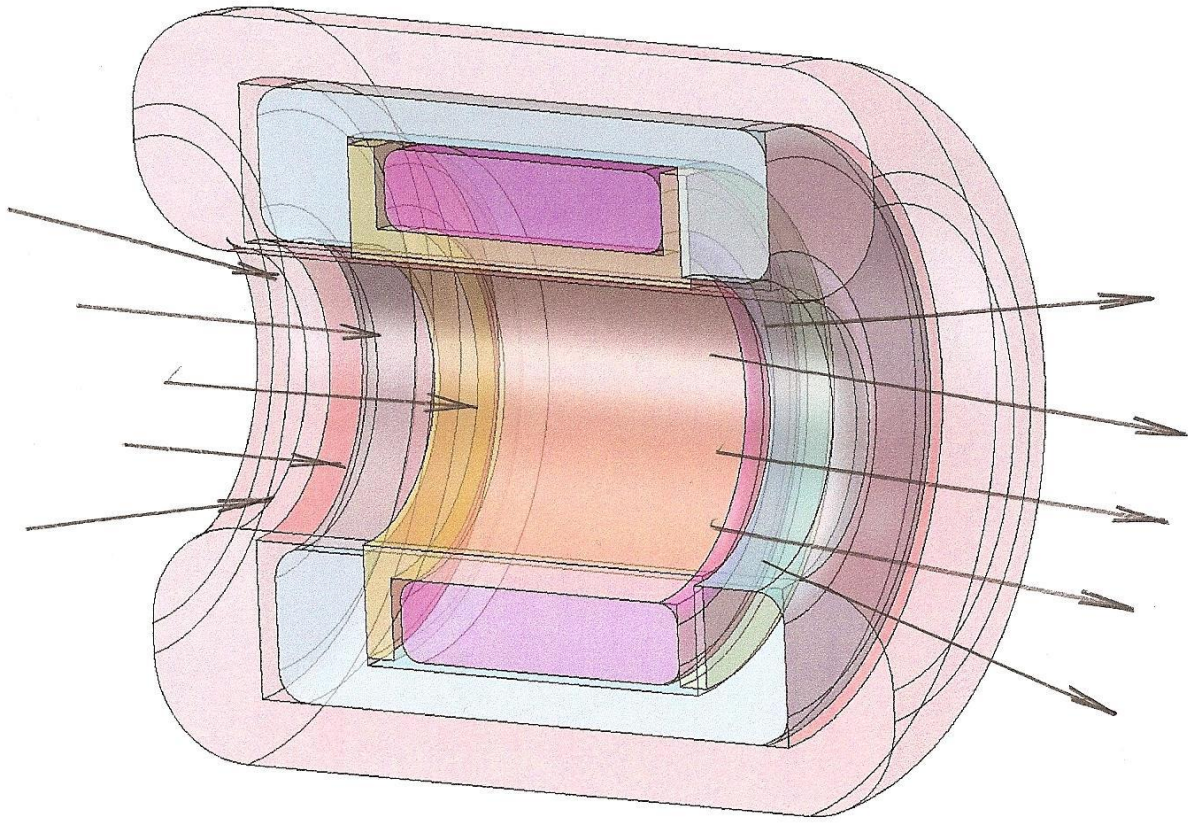

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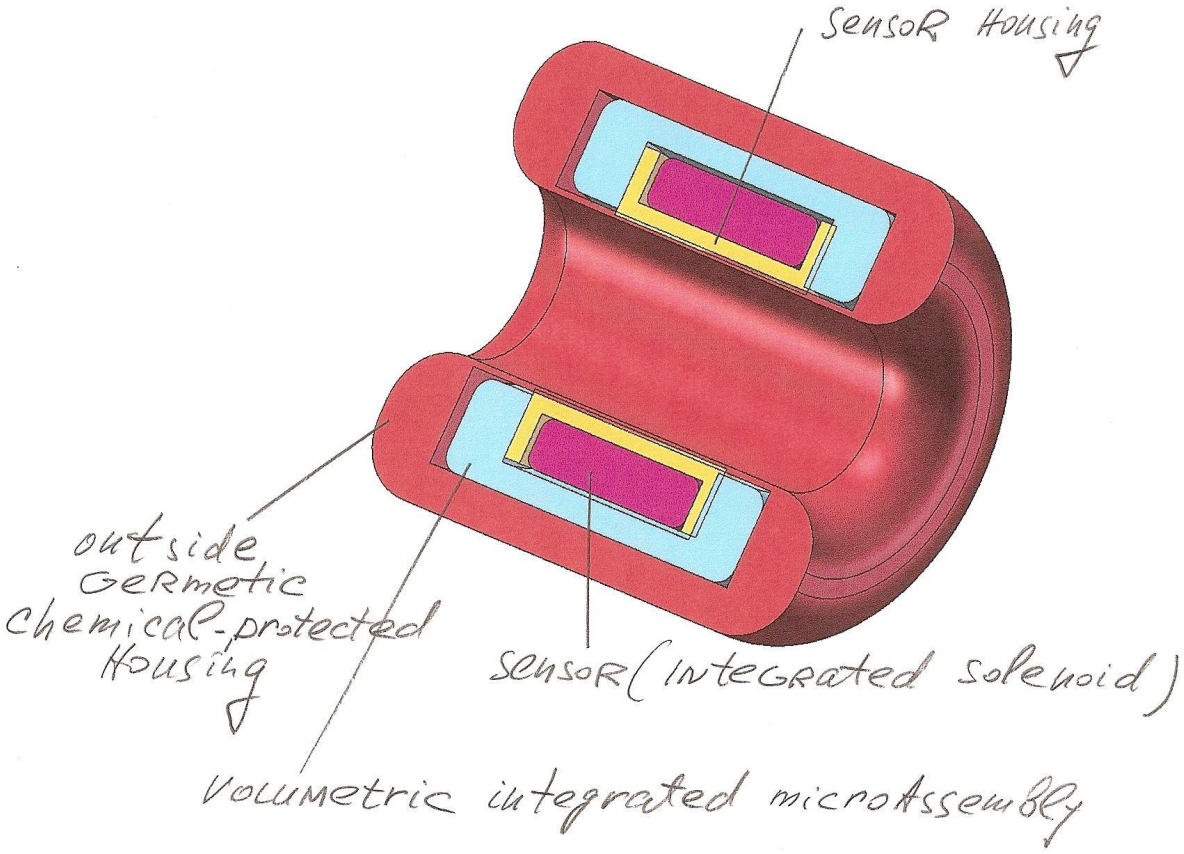
First of all, the sensor module is given a shape that fully corresponds to the basic properties of liquids that participate in the technological process initiated in the process tank

So, as the sensor module has the form of a sleeve in which the ends are profiled in such a way that their edges are rounded and in combination with the cylindrical part of the sleeve form torus-shaped entries in the cylindrical part of the sleeve

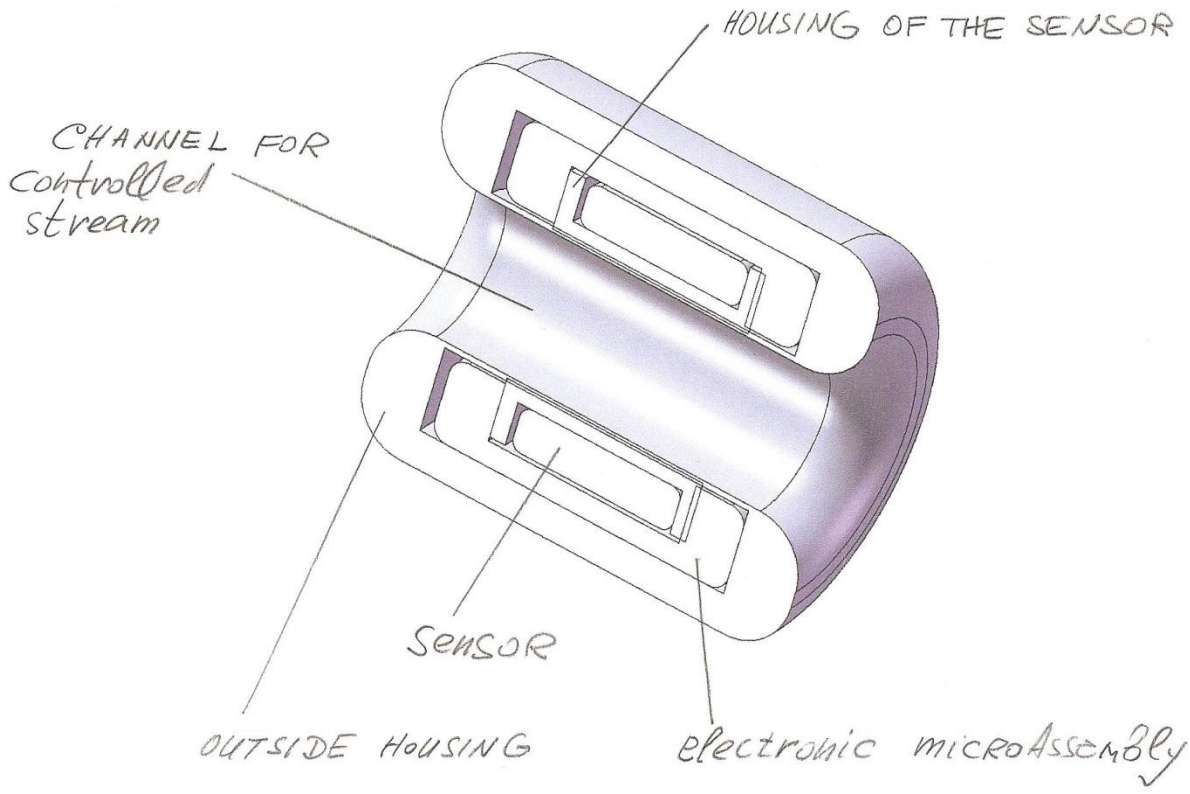
The radii of the torus-shaped surfaces depend on the viscosity of the controlled liquids and are designed in such a way that they do not create hydraulic resistance and do not slow down the movement of liquids through the inner hole of the sleeve



The height of micro-roughnesses at all internal surfaces of the sleeve is made minimal in order to, among other things, reduce the mechanical resistance to the movement of controlled liquids through the sleeve of the sensor module

In this way the sensor module is adapted to the specific conditions in the process tank

Now, in order to apply automatic control of the necessary parameters in all phases of the process, appropriate mathematical models are needed for both the process fragments and the reactions of all system elements to the impedance-resonance background around the sensor module



The sensor module has two main versions: the first version - for installation directly on the process pipeline before entering the working volume of the process tank, within the production premises; the second version-portable, designed to take samples of process solution or a mixture of process solutions from the dead zones of process tanks to the pipeline segment on which the sensormodule is installed. the module.

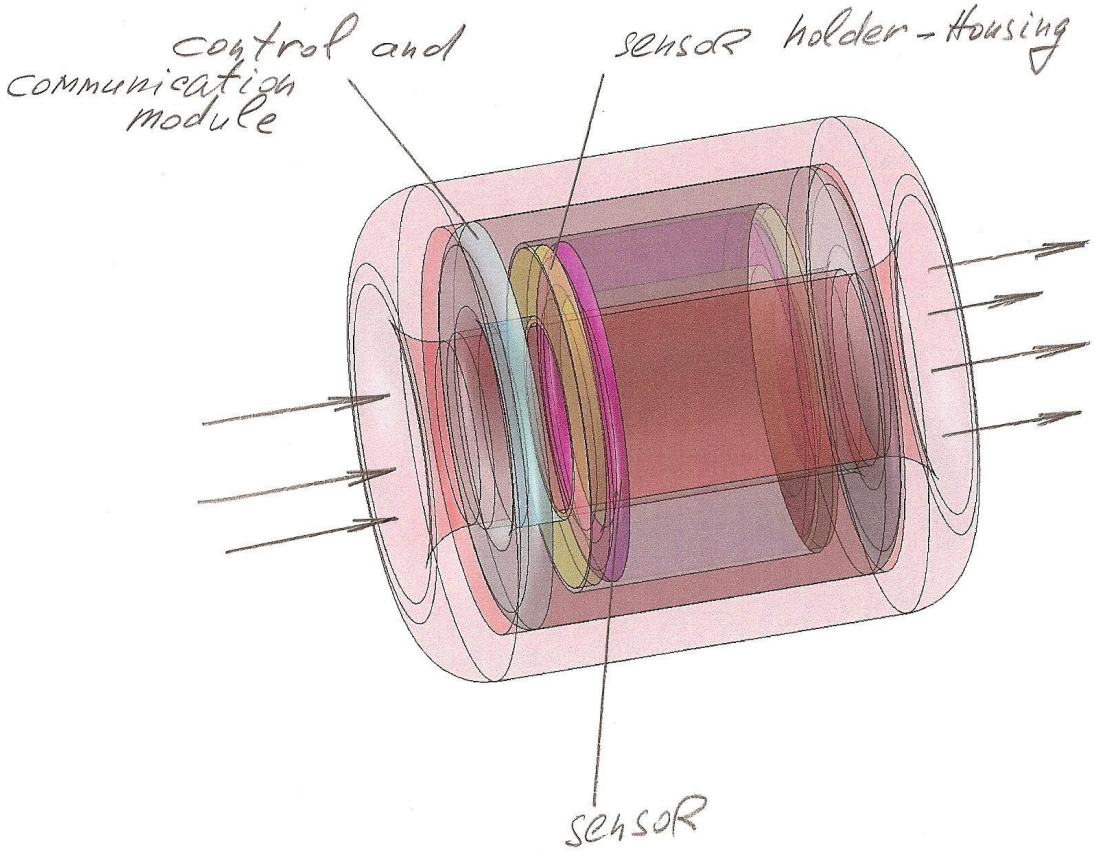
Both versions of the product (sensor module with all necessary internal and external infrastructure) they have a simple design, are made of plastic, usually polyvinyl chloride, are compact and easy to use;

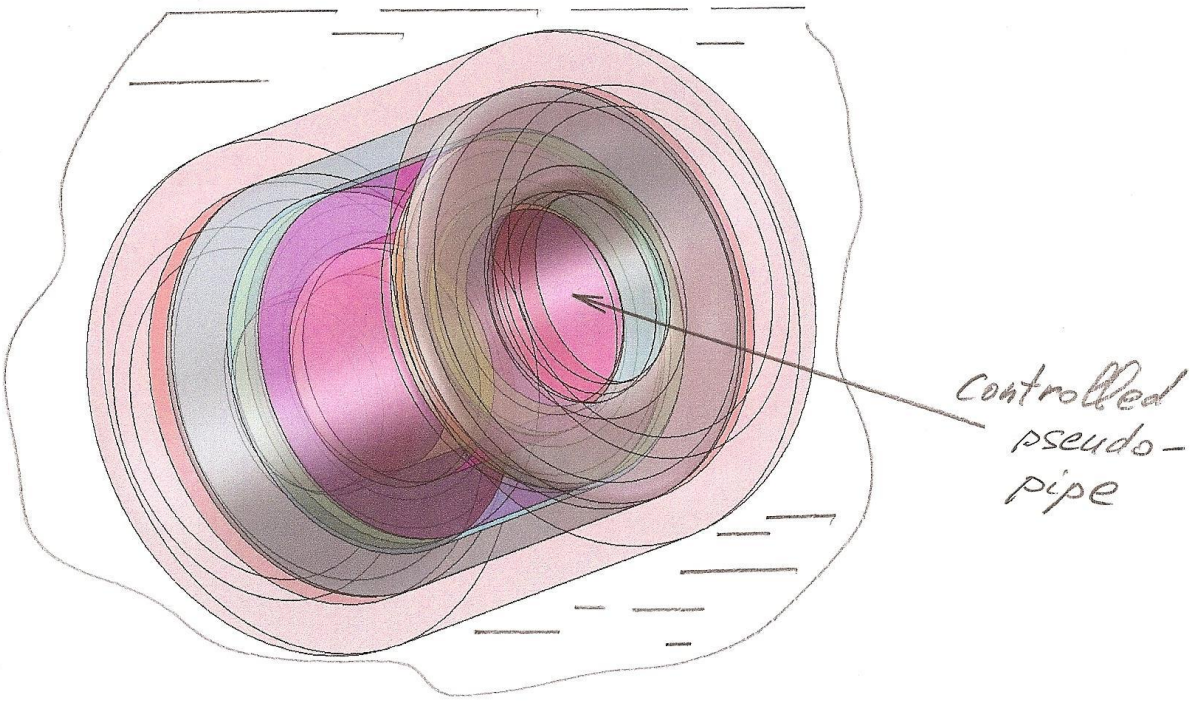
The principle of operation for both versions of the device is based on comparing the reference signals of the resonant sensor with the signal obtained from the test measurement; the reference signalis obtained on a fully compliant technologicalmulticomponent or aqueous solution;

The sensor of the sensor module in combination with the additional equipment of sensor devices detects the slightest deviations from the reference signal; the sensitivity threshold is 0.000000005 grams for metals; 0.000000000001 grams for radioactive isotopes; 0.000000000001 grams for hardness salts and silicates; 0.000001 grams for organic acids and compounds, including phenols and traces of surfactants, detergents, etc. mineral fertilizers, - 0.0000001 grams; all specified concentrations are calculated in terms of one liter of water;

Device (sensor module) in the simplest version, it does not separate or selectively fix each component of contamination or impurities, but due to its sensitivity, itdetermines the 50% threshold of concentrations of components and ingredients that are dangerous for the accuracy of the technological process or for the purity and stability of the technological process компонентов и ингредиентов, as well as pollutants in drinking or process water;

such high accuracy of an autonomous production device (sensor module) allows you to constantly monitor the quality of the process, water used for technological purposes, and even before reaching the concentration of pollutants or impurities of a dangerous level, take measures to effectively eliminate them;


control and communication module
sensor holder - Housing
sensor


Controlled pseudo - pipe

In a sensor module system, all electronic boards and micro-modules must have the highest possible performance without involving additional energy resources

Since the electronic sensor module must operate in an autonomous mode, it is most likely that a system built based on the principles of RHYTHM technology can ensure that all the requirements and conditions of the system are met (RHYTHM technology is a dimensional selective etching of metal).

The author considers it necessary to give an example of such an end-to-end technological process that determines the possibility of creating a module for installing, cooling, controlling and controlling energy-rich optoelectronic systems

The classic process of this type includes completely new elements with the following stages of processing components:

- preparation of the surface of a steel strip (roll) (whetherit is made of steel or any other metal material with pronounced spring properties);

- applying photoresist (photoresist with the highest resolution possible)

- photoresist development

- high-speed jet electrochemical nickel coating (2-3 microns thick)

- high-speed jet electrochemical coating of copper (25-35 microns thick)

- since this technological phenomenon is the main basic difference and forms a package ofessential advantages of the method, - the author gives some explanation and definition of this phenomenon:

- scabbed jet electrochemical coating - a high-speed electroplating process in a selectively oriented, directed electrolyte flow, with a cyclic recirculation system that constantly updates the electrolyte, which includes:

- an electrolyte tank with the following parameters of the electrolyte content mode defined and constantly monitored and regulated in real time, such as:

- nickel and copper concentrations

- temperatures

- the level of acidity or alkalinity

- densities

- conductivity (conductivity)

(thanks to the advantages of the technology, there is no need to use organic breitner additives)

The system also includes: -

- pump with filter

- an anode for jet metallization, which has components that are soluble in this type of electrolyte and insoluble in this type of electrolyte, installed in series along the course of the electrolyte movement, and, -

- the insoluble component is made of composite, carbon-graphite, conductive fabric, located parallel to the metallized surface and last in the direction of movement of the electrolyte and first in front of the coated surface (cathode), and also located parallel to the metallized surface and last in the direction of movement of the electrolyte and first in front of the coated surface (cathode), and in addition, both components are connected to the positive electrical potential and have a selectively adjustable electrolyte permeability.

The anode has a system of uniform distribution of the electrolyte over the plane of the soluble component, which is automatically repeated on the insoluble component and, consequently, on the metallized surface - the cathode.

These are the processes:

- photoresist removal

- etching of iron on one side to half the thickness of the steel strip

- removal of etching products from the surface by aerodynamic and other means, - hydrodynamic action (separate innovative technology)

- crimping with a liquid-flowing polymer composition, - in this order, -

- filling with monomer

- subsequent polymerization
- thermal stabilization
- etching of iron on the second side (with the same differences)
- crimping on the second side (with the same differences)
- applying a tread to electrically conductive structures
- vacuum coating of all heat-conducting structures – layered system of semiconductor nanostructured polycrystalline diamond films

Health standards and technological standards of most developed countries recommend constant monitoring of the quality of components and materials used in technological processes, as well as water and aqueous solutions, and the implementation of this requirement often runs into the lack of a reliable, easy-to-use and accurate device on the market (analogous to the proposed autonomous sensor module), the price of which will allow its mass usage;

Proposed in accordance with the suggestions of the author of this article versions of the device-sensor module, fully comply with the requirements of standards, both for the safety of materials used, and for the effect of application;

Both versions of the device are technologically advanced in manufacturing, do not require the use of any special technologies in manufacturing and can be manufactured practically in small businesses, at the optimal price level;

This allows zoning in the manufacture of the device - that is, assembly at the points of sale, which reduces transport costs and allows sales from wheels, which eliminates the cost of maintaining warehouses;

References, patent and license information:

Appendix 1

United States Patent Application **20130178721**
Kind Code **A1**
July 11, 2013

VIVO DETERMINATION OF ACIDITY LEVELS

Abstract

A bolus for use in a ruminant animal's reticulum includes a cavity (100) configured to receive ruminal fluids present in the stomach. The cavity has walls (110) of a dielectric material and is encircled by a coil member (120), which is configured to subject the ruminal fluids to an electro-magnetic field. A Sensor element (310) measures the electromagnetic field's influence on the ruminal fluids and thus register an electromagnetic property representative of an acidity level of said fluids. A transmitter (410) transmits a wireless output signal (SD) reflecting the acidity measure.

Appendix 2

United States Patent Application **20130173180**
Kind Code **A1**
July 4, 2013

DETERMINATION OF ATTRIBUTES OF LIQUID SUBSTANCES

Abstract

A monitoring unit (100) that determines parameters (p1, p2) of an attribute (P) of a liquid substance flowing (F) through a dielectric conduit (110) includes plural coil members (121, 122) encircling the dielectric conduit (110) that subjects a flow of the liquid substance to plural different electromagnetic fields (B(f)), and under influence thereof measuring circuitry registers corresponding impedance measures (z(f)) of the liquid substance. A processor (130) derives the parameters (p1, p2) of the attribute (P) based on the registered impedance measures (z(f)).

Appendix 3

United States Patent **8,694,091**
April 8, 2014

In vivo determination of acidity levels

Abstract

A bolus for use in a ruminant animal's reticulum includes a cavity (100) configured to receive ruminal fluids present in the stomach. The cavity has walls (110) of a dielectric material and is encircled by a coil member (120), which is configured to subject the ruminal fluids to an electro-magnetic field. A Sensor element (310) measures the electromagnetic field's influence on the ruminal fluids and thus register an electromagnetic property representative of an acidity level of said fluids. A transmitter (410) transmits a wireless output signal (SD) reflecting the acidity measure.

Appendix 4

United States Patent **9,316,605**
April 19, 2016

Determination of attributes of liquid substances
Abstract

A monitoring unit (100) that determines parameters (p1, p2) of an attribute (P) of a liquid substance flowing (F) through a dielectric conduit (110) includes plural coil members (121, 122) encircling the dielectric conduit (110) that subjects a flow of the liquid substance to plural different electromagnetic fields (B(f)), and under influence thereof measuring circuitry registers corresponding impedance measures (z(f)) of the liquid substance. A processor (130) derives the parameters (p1, p2) of the attribute (P) based on the registered impedance measures (z(f)).

Appendix 5

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.