

## SCIENTIFIC PRODUCTS OF TPU

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TPU is one of the huge universities in Russia, and of course it has a lot of its own scientific products. So, I want to tell some information about it.

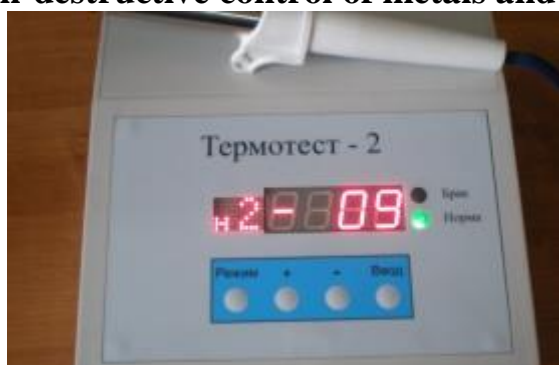
### **Complex cleaning and disinfection of industrial waste water**



#### Appointment

The decontamination and purification of domestic waste water from a wide range of impurities: improvement of organoleptic indicators, removal of organic pollutants (oil products, phenol, methanol, etc.), the impact on pollution in the colloidal form by converting them to filterable residue, removal of heavy metals, reduction of COD, BOD, disinfection/sterilization of water.

### **The device of non-destructive control of metals and alloys "Termotest"**



Control of metals and alloys according to the method of differential thermal electromotive force (thermo-EMF) in laboratory and workshop conditions.

The device uses a radically new scheme for measuring the differential thermoelectric power, eliminates the measurement error caused by contact resistance and the heating of the cold electrodes in the measurement process.

## **Robotic ultrasonic imaging**



The hardware part of the scanner includes a number of innovative solutions in the field of measurement technology, microelectronics, compact systems, parallel computing and high-speed processing of large data sets.

Tomsk Polytechnic University has developed its own algorithms to reconstruct the acoustic data method (DFA), which allows to obtain three-dimensional images of the structure of the controlled object with high resolution in real time.

## **Navigation and telecommunication systems of the new generation**



### **Appointment**

Navigation and telecommunication systems of the new generation with the use of GLONASS satellite navigation system and unmanned aerial vehicles for the mobile teams and operations centers focus on the use of the wide range of tasks. The main purpose is: monitoring of the territory using unmanned aerial vehicles, and supporting mobile groups for various purposes, including rescue groups, processing the received information with visualization and communication through a variety of communication channels to the control center.

## **The hybrid system of buffer accumulation of electric energy**



### Appointment

It is used to match the modes of production and consumption of electric energy in isolated energy systems, including several independent generating units, with the aim of improving their energy efficiency.

### Current phase

The present state of research is manufacturing an experimental model of the hybrid system of buffer accumulation of energy for autonomous power plants of renewable energy, GSBI-2/5-SPT on peak power 2 kW.

There are many more other products in TPU, however they must be presented separately.

### REFERENCES:

1. <http://inno.tpu.ru/>

## **THE MAIN PROBLEMS OF ENERGY AND POSSIBLE SOLUTIONS OF THEIR SOLUTIONS**

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Energy consumption is an indispensable condition for the existence of mankind. Availability of energy for consumption has always been necessary to meet the needs of the individual, to increase the duration and improve the conditions of his life.

The history of civilization is the history of the invention of new methods of energy conversion, the development of its new sources and, ultimately, the increase in energy consumption.

The first jump in energy consumption occurred when a person learned to obtain fire and used it for cooking and heating their home. The sources of energy in this period were wood and muscular strength of man. By the 15th century, a medieval man, using working cattle, the energy of water and wind, firewood and a small amount of coal, already consumed about 10 times more than a primitive man. A particularly significant increase in global energy consumption has occurred over the past 200 years.

In the modern world, energy is the basis for the development of basic industries that determine the progress of social production. In all industrialized countries, the pace of development of energy has outpaced that of other industries.

At the same time, energy is one of the sources of adverse environmental and human impacts. It affects the atmosphere, the hydrosphere and the lithosphere.

Despite the mentioned factors of the negative impact of energy on the environment, the increase in energy consumption had not caused much concern among the general public. This went on until the mid-1970s, when numerous data appeared in the hands of specialists, indicating a strong anthropogenic pressure on the climate system, which threatens the global catastrophe with an uncontrolled increase in ener-