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Research Article

MODELING AND RESEARCH OF TEMPERATURE CONTROL SYSTEMS USING THE TRACE MODE 6 SOFTWARE PACKAGE

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O.M. Mamatov
Fergana Polytechnic Institute, Fergana, Uzbekistan

ABSTRACT

In the article, temperature adjustment in the environment of the TRACE MODE 6 software complex was studied by the method of model checking. Systems created in the TRACE MODE program are intended for information-measurement monitoring or management. Depending on the location or nature of the enterprise, the system architecture can be centralized or distributed. The ever-growing data is handled by the powerful SUBD RV SIAD 6 archiving technology. Systems created in TRACE MODE 6 software are very reliable for dynamic processes and are currently used in the petrochemical industry, metallurgy, energy, mechanical engineering, food industry, utilities, transport and scientific activities.

KEYWORDS

Temperature, execution engine, sensor, SCADA, model, TraceMode, signal.

INTRODUCTION

"Trace Mode" software package is a comprehensive program that provides the creation, configuration and real-time operation of technological process control systems.

Programs included in the "Trace Mode" package are divided into two groups:

- Instrumental system for planning automatic control systems of technological processes (TJ ABS);

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- TJ ABS execution module (Run Time).
- The instrumental system includes three editors.
- They are as follows:
- Channel database editor;
- An editor for expression of benefits;
- Template editor.

With the help of these programs, operations such as representation (visualization) of the progress of technological processes on the computer screen, organization of a real database, management of technological processes, management of the obtained data, organization of a time archive of the technical process and preparation of report forms are carried out.

Instrumental systems differ from each other in the number of common points of input and output of information. The number of information input-output channels in one project (automated system) is limited to 128, or 1024, depending on the license key.

Here, input signals (points) mean signals received from the sensors used in the devices of the technological process of the automated system. Output signals mean the signals sent to the operating mechanisms and measuring devices used in the technological process.

Temperature-sensing devices for sensors: thermocouple, thermoresistance; pressure, pressure difference, vacuum sensing devices - pressure sensors; includes discrete devices that signal whether a device is working or not.

The following is done through the channel database editor:

- creation of the mathematical basis of the automated control system;
- configuration of workstations, controllers and technological object communication devices included in the system;
- show directions of information flows between devices;
- representing input and output signals, defining the connection between their data collection and control devices;
- setting the period of information exchange between workstations and devices;
- show the logic of primary processing of received and sent information (signals), setting of technological limits, processing and management;
- archiving of technological parameters, organization of information exchange on the network, etc.

In summary, the mathematical and informational structure of the TJ ABS project is created using the channel base editor. This structure contains the Base Set of channels in the project, all controller and workstation configuration files, and all project configuration files. The project configuration file has the extension "ILcmtII" and

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is located in the working directory. And the channel database is saved in a file - it will have the extension ".dbbII". The editor of the channel base starts when the instrumental system icon or the "Ichb.exe" program is started.

The Data Representation Editor is used to graphically represent a project on a workstation monitor screen. It is used to perform the following:

- creating a graphic part of the project management system;
- representation of statistical tools in the representation of technological processes;
- ensuring the real movement of the mechanisms in motion;
- setting up several screens on the workstation monitor and creating a mechanism to connect them to each other;
- The technological process in the picture and graph is connecting each detail to a certain channel and others.

The editor is started by starting the corresponding icon on the instrument panel or by starting the "picman.exe" file. The resulting file will be created in the working directory with the extension ".dbg".

The template editor is used to create report forms in the project. With the help of the editor, the information obtained using the package can be exported to Windows system programs Word, Excell, and Access. The editor is started by starting the corresponding icon in the instrument system or by launching the ".exe" file.

It is known that the following temperature is mainly measured and adjusted in technological processes in any production enterprise. Measurement of the value of physical parameters of technological processes is carried out using special primary sensors. Sensors play a key role in technological process monitoring. A sensor is a device that converts the value of a physical parameter into a corresponding electrical signal.

Secondary devices can produce discrete control signals at set threshold values, together with expressing the value of electrical or another form of signals received from sensors using a certain measurement scale.

The main part

A device that transforms electrical signals into digital signals according to specific protocols based on special software transmits information to a computer, which is a device for storing (writing) and visual representation.

Analytical acquaintance with the principles of operation and qualification of modern primary temperature sensors, which are widely used in all areas of production.

In contrast to liquid, manometric thermometers for temperature measurement, temperature sensors such as resistance sensors, thermocouples, and pyrometers are mainly used in the system of continuous control and

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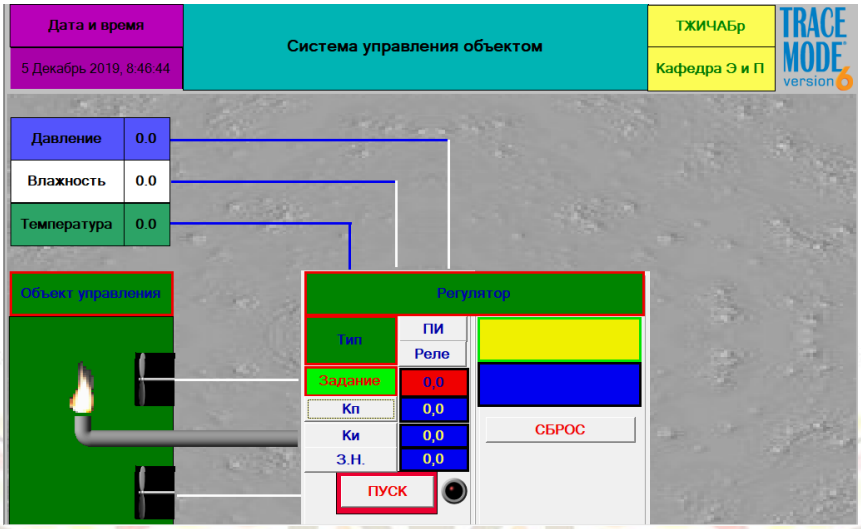

Figure 1. Temperature adjustment virtual stand image

The mnemonic shows a comparison diagram that clearly shows the control process diagram, which allows you to control the process and change the parameters in the mnemonic.

- Input – temperature sensor readings in the object of control;
- Zdn – assignment to the adjuster;
- Kp – proportional adjustment coefficient;
- Ki is the integral adjustment coefficient;
- VLAG – humidity sensor indicator in the control facility;
- DAVL - the indicator of the atmospheric pressure sensor in the control facility;
- Mode - select the type of adjuster;
- Start – allow recording of data;
- Doroga is the application of dynamic behaviour to a floating-point array in a mnemonic.
- Nagrev - transfer of value to the heating channel;

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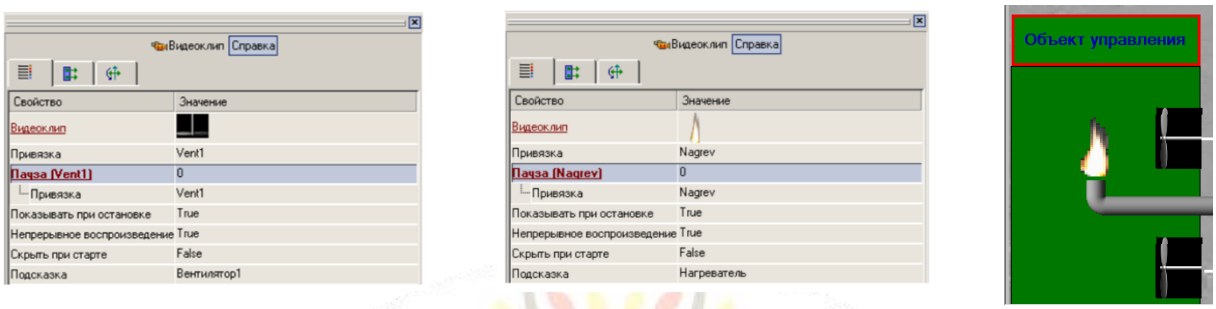

Figure 2. The graphic element contains three dynamic elements. They have it in the project resources.

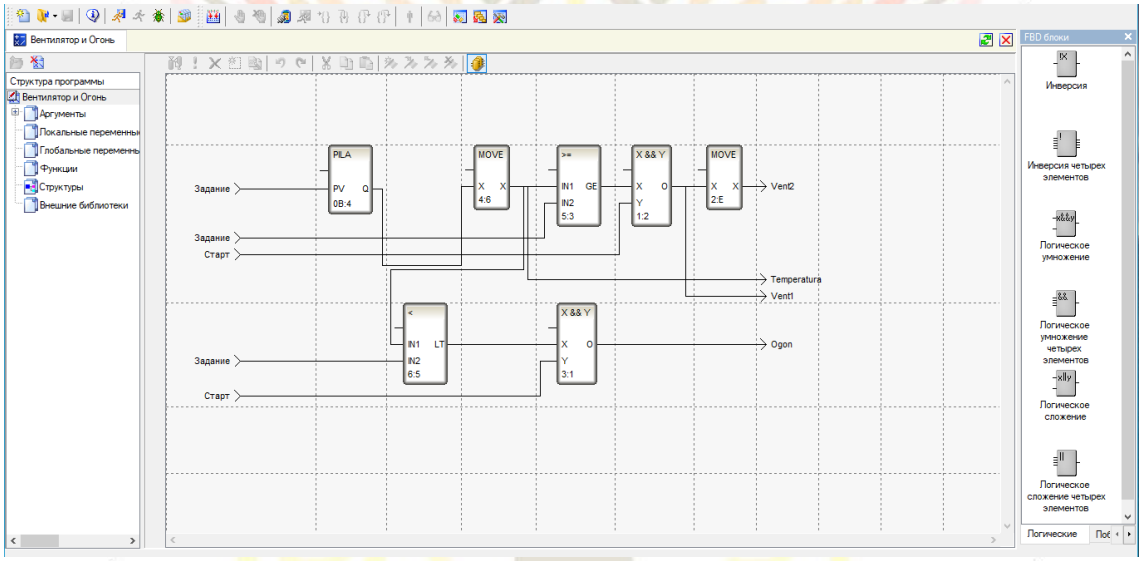

Figure 3. A mnemonic based on the temperature adjustment logic in the TRACE MODE 6 program.

This scheme can be easily changed, configured and simulated using software, and the final program can be used in temperature control facilities by writing the program to PLCs.

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