

A SIGNAL SCHEME FOR PROCESSES SIMULATION IN I/II – STAGE RUBBER MIXING ROOMS IN EVENT PROGRAM ENVIRONMENT

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The paper deals with design of a signal scheme for processes simulation in I/II – stage rubber mixing rooms. For this aim it is used an event program environment – LabVIEW.

This environment allows simulations of processes in complex systems while external influencing factors act. Such simulations are shown in the display and can be used for a parametric optimization. As a result of the above analysis the authors of present paper propose a solution based on the event program in real mode of operation.

The results are applicable for some technological investigations in real time mode of operation. In such a time the benefits of virtual instruments are tremendous.

Keywords: rubber mixing rooms, signal scheme, virtual instruments

1. INTRODUCTION IN THE WORLD OF SIMULATION PROGRAMS

There are known a huge variety of programs, used for design of simulation models –

MATLAB, ANNs, LabVIEW.

MATLAB is a high technology language for programming. The package MATLAB includes tools for design of algorithms, acquisition of information, modeling, simulation, data analysis and there's visualization, engineer and scientific drawing, development of applications and graphic user's interfaces.

In such a sense MATLAB is an interactive system with a non-dimensional array. It permits to solve many technical and computational tasks, mainly on matrix and vector applications, without necessity to compile any special programs by using C or FORTRAN.

The name MATLAB means “MAtrix LABoratory. This product permits to carry out exclusively complex calculations and transformations with n-dimensional matrixes and complex signals due to its rich library with mathematical operations and transformations, as well as its perfect simulations of diverse signal oscillators.

A possibility is given for visualization of the results and for Digital Signal Processing (DSP).

The practical application of MATLAB is named SIMULINK – a language for dynamic processes simulation.

Another possible approach for solving of the problem is application of the Artificial Neural Networks (ANNs). The Artificial Intelligence (AI) is an advanced scientific field in cybernetics.

The Artificial Intelligence is a system based on knowledge and fuzzy logic. It is near by to the nature intelligence with its independence to take decisions based on insufficient logical data.

By means of Artificial Intelligence there are designed systems based on logical inferences. The realization of such systems is mainly in designing of computer neural networks, like human brain.

Recently the event program environment LabVIEW is wide applicable. LabVIEW is a graphic language both for programming, development of virtual instrumentation, and for computer simulation of different objects. Such a product is useful for remote control of real processes and for measuring of signals in real time mode of operation.

By LabVIEW it is possible to create adequate models of real measurement processes like ammeters, voltmeters, wattmeters with a precise simulation of the measurement procedures, but when suitable peripheral devices are available to replace this gages in real conditions. They are known as Virtual Instruments.

This environment allows designing simulations of processes in complex systems while external influencing factors act. Such simulations are shown in the display and can be used for a parametric optimization. As a result of the above analysis the authors of present paper propose a solution based on the event program LabVIEW.

2. A BRIEF DESCRIPTION OF LABVIEW AS PROBLEM ORIENTED SOFTWARE AND DESIGN OF THE CONCRETE SIMULATION MODEL

LabVIEW uses icons instead text for creating of applications. In contrast to the text-based languages for programming when the instructions determine the execution of the program, in LabVIEW, the stream of data is controlling.

By means of LabVIEW a machine-human interface with a set of instruments and objects can be designed. The machine-human interface is called - front panel. The next step is to add a code by graphical presented functions for control of the front panel objects. The block-diagrams includes this code.

Usually the LabVIEW – programs are called Virtual Instruments, because there external kind and mode of operation model real instruments and devices. Each VI uses procedures that process the input information for other users

Each virtual instrument includes the next tree components:

- **Front panel** – for user's interface (shown in fig.1)
- **Block-diagram** – includes graphic output code defining the functionality of the VI (fig. 2)
- **Field for icon scheme of the connectors** – defines the VI as internal.

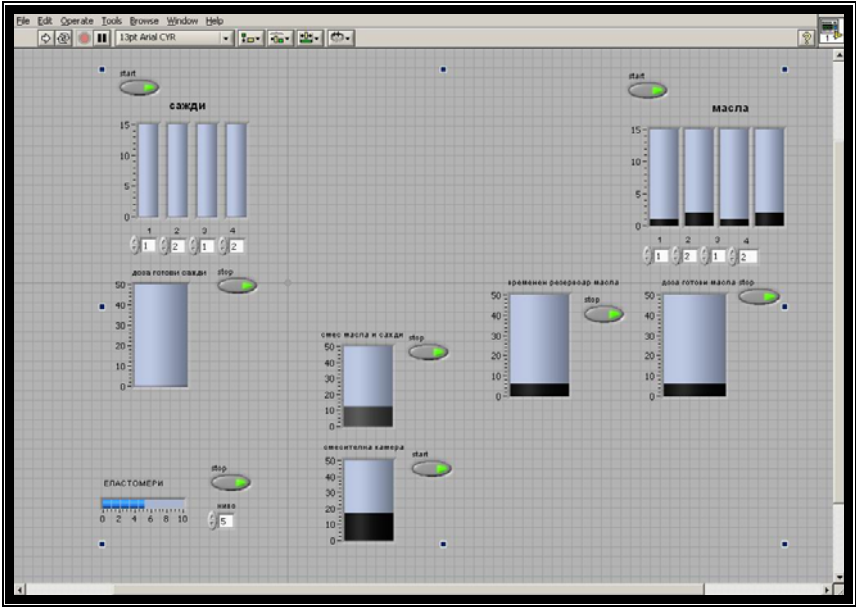
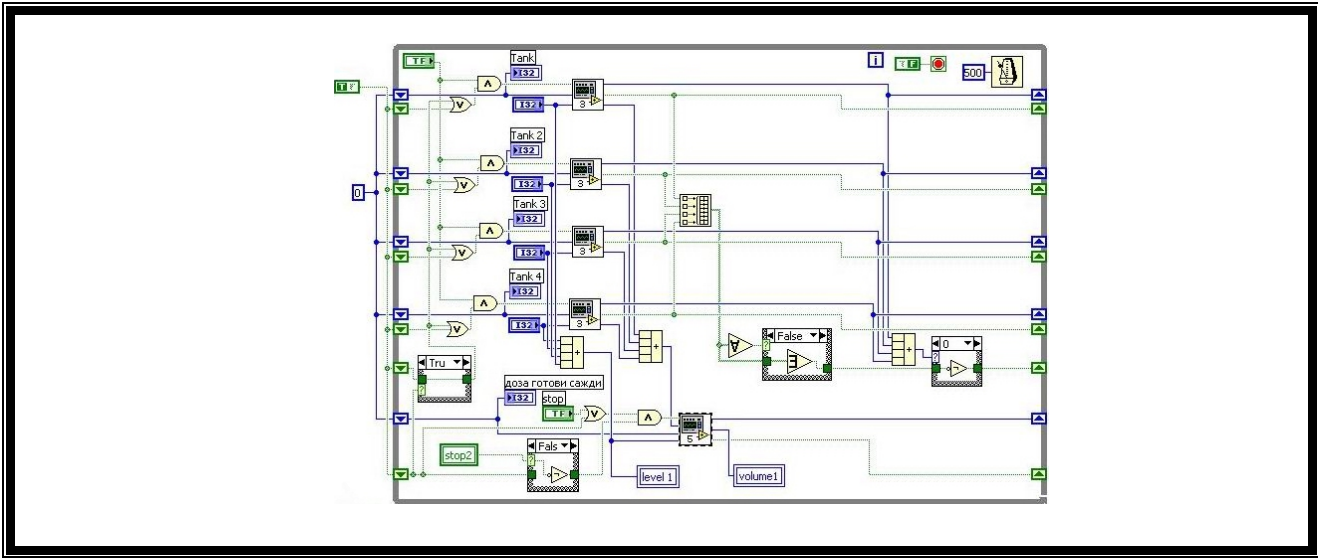


Fig. 1. The front panel of the developed virtual instrument



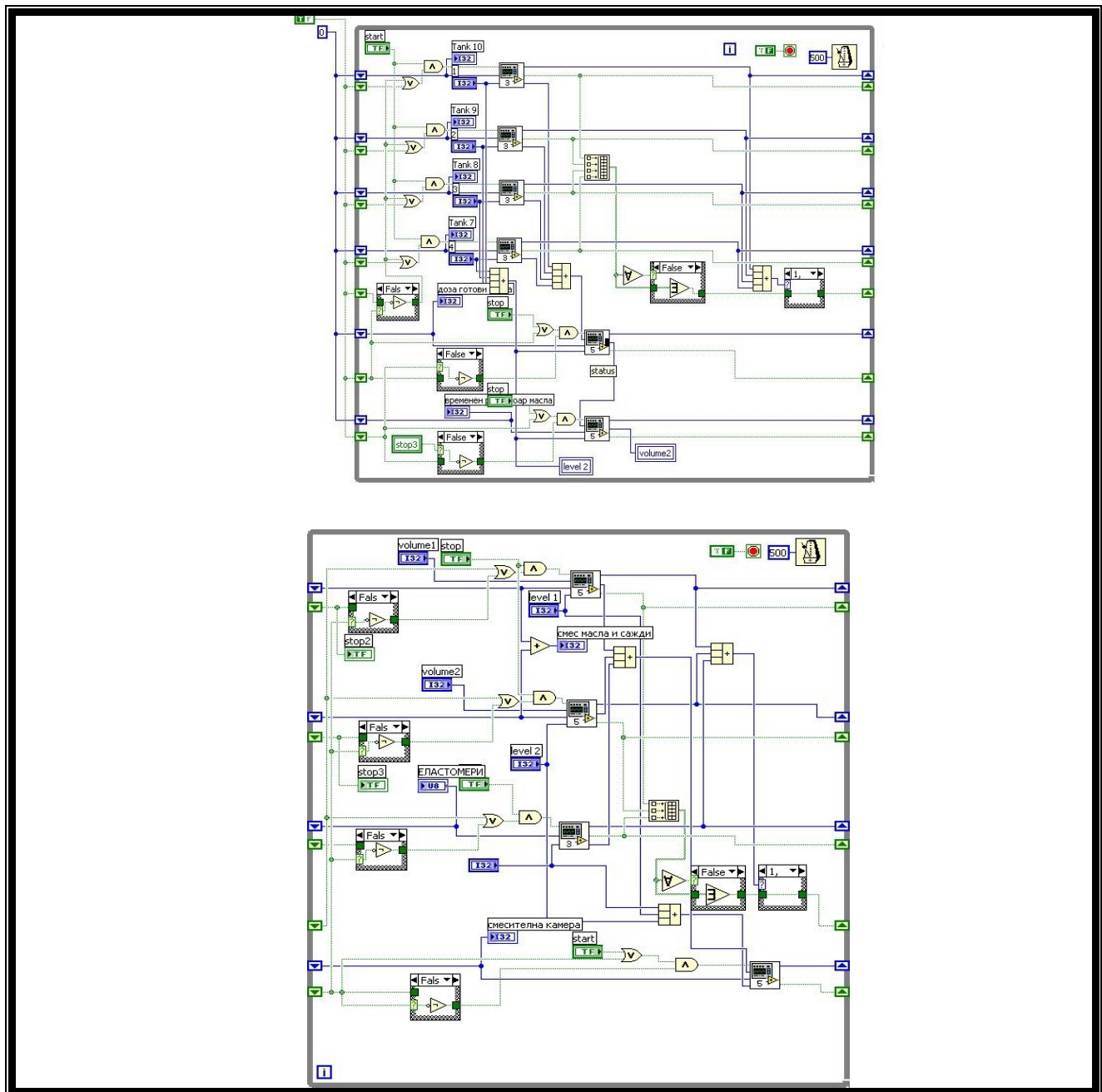


Fig. 2. The block-diagram of the developed virtual instrument

In order to design the signal scheme for simulation of the dosing processes in I/II – stage rubber mixing rooms (fig. 3) by means of LabVIEW, it is necessary to form the logic rules for functioning of the scheme. When the scheme is started the next processes are executed in parallel:

1. Dosing and mixing of given quantities from different kinds of soot (4 types).
2. Opening of the snakes and replacing the soot in reservoir for ready dose - res.
- 1.
3. Dosing and mixing of given quantities from different kinds of oils (4 types).
4. Opening of the valves and replacing the oils in reservoir for ready dose - res.
- 2.

5. Replacing of the oils in a temporal reservoir – rez.3, while in rez. 2 a new mix is in process of preparing.
6. Dozing of the rubber.
7. Entering of the doses in rez.4.
8. Mixing process.
9. Until a definite energy norm is reached the output product through the lower gate is discharged and the process begins again.

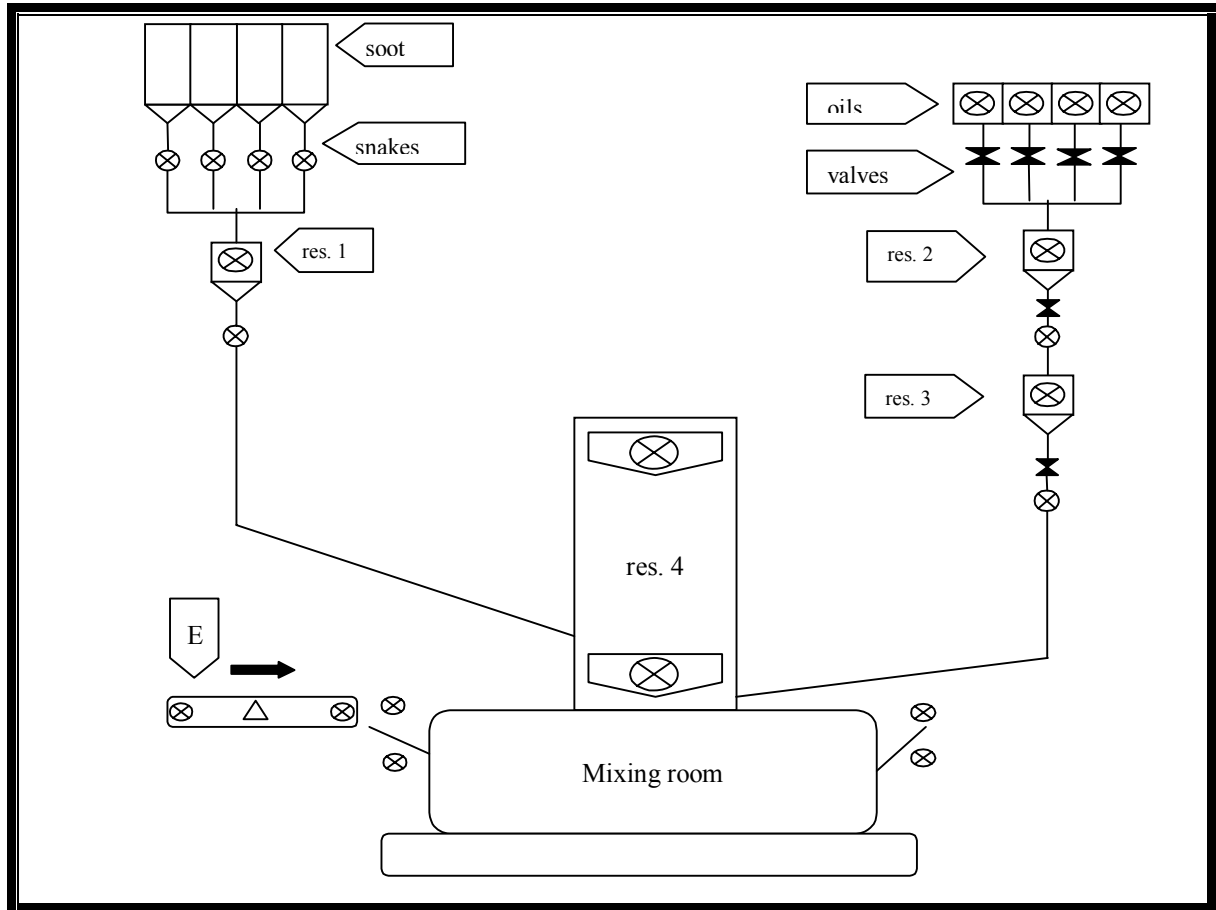
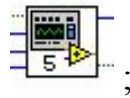


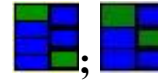
Fig. 3. Signal scheme of the dosing and mixing processes in I/II-stage rubber mixing rooms

All processes can successfully be simulated by means of LabVIEW – numeric variables, logical variables, arrays, logical operators, operators for array treatment, condition jumps, cycles, suitable indicators or tools for their creation. By a suitable logic of connecting of these elements it can be made the block-diagram of the same process (fig. 2).

In order to avoid interlaced connections between elements it can be used internal virtual tools - the parts of the block –diagram that can be independent and for multiple applications (for instant – reservoirs). In the block-diagram two kinds of virtual tools are used – VI-3 for the reservoirs of oils and soot and VI-5 for all the rest cameras and reservoirs.



a) Icon



б) Scheme of the connectors

Fig. 4. Internal VI-5, internal VI-3.

In fig. 2 tree cycles are shown. It is quite possible to be only 1, but with separate groups – soot, oils, common mixing. In this case the processes can be followed easy and many errors can be identified.

It is necessary to prescript the needed quantities of the products. The process can run automatically or step by step.

3. INFERENCE

The developed signal scheme is a very useful product for some technological investigations in real time mode of operation. In such a time the benefits of VI are tremendous.

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