

Automatic Control System of Discrete Dosage Process

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Abstract— In this paper automatic dosage devices for granulated materials and liquids are classified. It was investigated the principle of operation of technological process of discrete dosage.

Keywords— dosage; process; technological; materials

I. INTRODUCTION

The main purpose in dosage process automation is not only mass measurement, but also automatic control and regulation of the technological process. Modern automatic dosage devices are inseparable part of complex automation of different industrial branches.

II. PROBLEM STATEMENT

Automatic dosage devices for granulated materials and liquids are classified according to construction structure of the technological process: by materials motion on horizontal arrangement of the equipment and in the self-flow stream, by conveyor carrying of materials.

According to this kind of dividing of the technological process automatic dosage devices are classified in two main groups:

1. with discrete motion;
2. with continuous motion.

Dosage automata with discrete motion serve in production processes based on the technological scheme and principle of circular motion. This group of dosage devices provides basically industrial processes mechanization and includes the following in itself: weights with discrete motion principle for total note of the materials in self-flow motion in continuous stream and batchers for discrete separating of the given quantity.

Weight checking-separating automata for weighing packed and single loads also belong to group of dosage devices for granulated materials and liquids.

III. PROBLEM DECISION

Continuous automatic weight separation of materials is implemented by means of two kind of separators: bunker and kent separators.

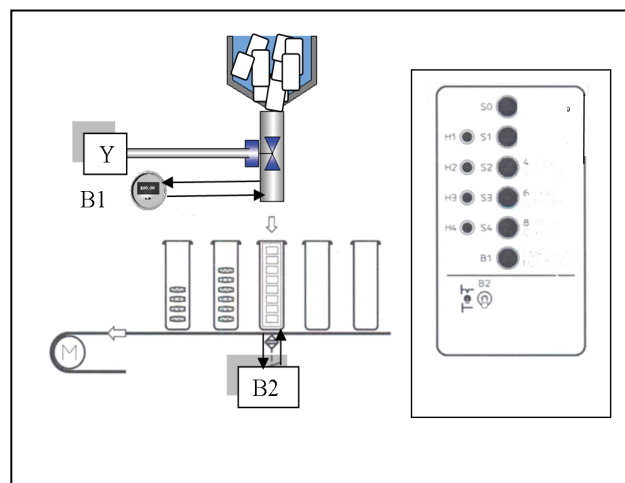
Batchers can be divided conditionally to following seven ranges according to production: less than 0,4 kgs/hour – micro

consumption; 0,4–6,3 kgs/hour – small middle consumption; 6,3–100 kgs/hour – low consumption; 100–1600 kgs/hour – middle consumption; 1.6–2.5 tons/hour – heavy consumption; 2.5–400 tons/hour – macro consumption.

So weight separators of discrete motion with an automatic tape consist of power supply units, falling material, a weight load conveyor – a load receiving part, a detector element.

The system is controlled automatically. After switching of the main electric key S1 to on position the corresponding working regime is fixed by choosing one of the buttons S2 (4 pieces of the packing), S3 (6 pieces of the packing) and S4 (8 pieces of the packing). The conveyor moves with the help of the engine M. Emptiness of the package is defined by means of the sensor B2. If the package is empty, it stays under that bunker. The valve Y opens and material begins to fill in the package. Amount of dosed material is defined with the help of one of the buttons S2, S3 or S4.

During the process this amount is controlled by means of the sensor B1. After placing of proper amount into the package information got from the sensor B1 closes the valve Y and engine places the empty package under the bunker by moving (fig. 1).



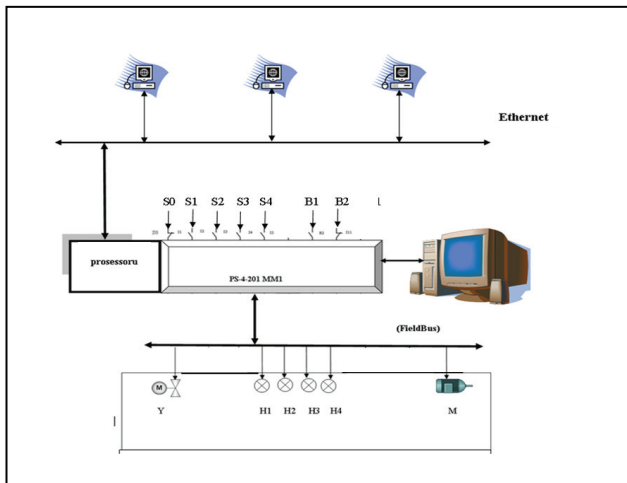


Figure 2. The structure of control pyramid

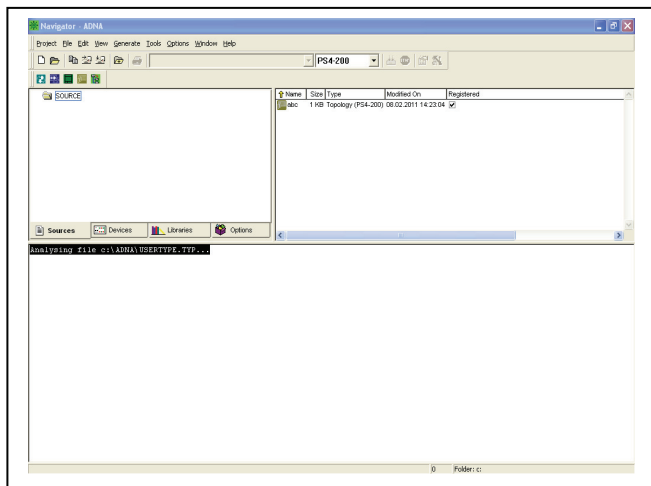


Figure 3. The interface of the program package "SUCCOSOFT" pyramid

In this instance the programmable logic controller of "Moeller" (Germany) company type of PS-4-201-MM1 has been used. Firstly it is necessary to fulfill the command "Topology Configuration" from the "Options" menu. In this time the control system configuration is carried out from the opened window of the same name (fig.4).

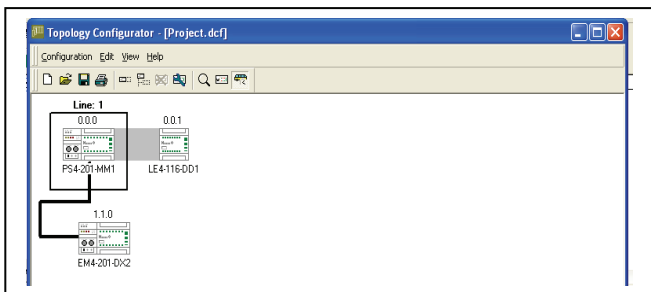


Figure 4. The "Topology Configuration" window

In the next stage tasks of data declaring and control program designing are solved. For this purpose is necessary to fulfill the command "POU EDITOR" from the "Options" menu. In this time it is possible to declare data and to design the control program from the opened window (fig. 5).

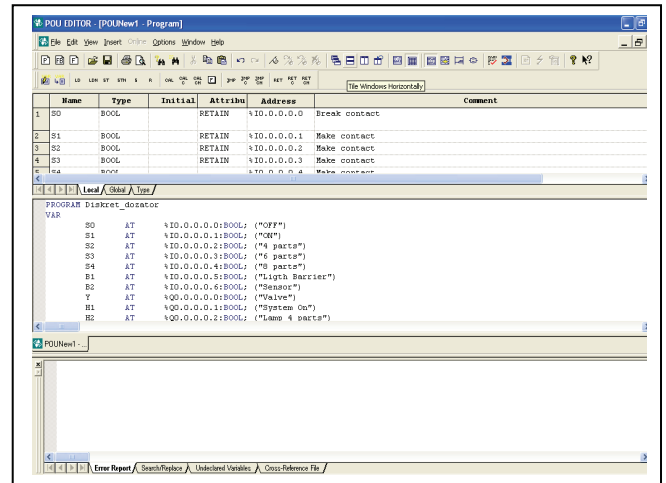


Figure 5. The "POU EDITOR" window

At the end the program is tested with the help of the command "Test and Commissioning" from the "Options" menu and copied to the programmable logic controller.

So, increase of control efficiency in the dosage process provides increase of productivity in its turn.

IV. CONCLUSION

1. Principle of operation of technological process of discrete dosage was investigated;
2. The structure chart of the control system of technological process of discrete dosage was designed;
3. The program of the programmable logic controller for controlling discrete dosage process was designed.

REFERENCES

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