

## THE ADOPTION OF MANAGING COMPUTERIZED SOLUTION OF MILK PASTEURIZATION PROCESS

G. Hegheduș – Mîndru<sup>1</sup>, Ramona Cristina Biron<sup>1</sup>, A. Riviș<sup>1</sup>, I. E. Köles<sup>2</sup>,  
Nicoleta Gabriela Hădărugă<sup>1</sup>, D.I. Hădărugă<sup>3</sup>, D. Ștef<sup>1</sup>

<sup>1</sup>Banat's University of Agricultural Sciences and Veterinary Medicine, Faculty of  
Food Processing Technology, Calea Aradului no. 119, zip cod 300645 Timișoara;

<sup>2</sup>University Aurel Vlaicu, Calea Aurel Vlaicu no. 41 - 43, zip cod 310010 Arad;

<sup>3</sup>Politehnica University of Timisoara, Faculty of Industrial Chemistry and  
Environmental Engineering, P-ta Victoriei no. 2, Timișoara.

### Abstract

*In this proceeding it was studied the automatic managing system-AMS of the integral milk pasteurization process. The automatic managing solution of milk pasteurization process adopted in this proceeding is centrated on CompactLogix controller of producer Allen Bradley. Execution elements command is provided by the interface circuits which provide the drive signals for the execution elements.*

**Keywords:** automation, automatic managing, pasteurization, controller.

### Introduction

Presented as a simplified compact diagram, the automatic managing system of pasteurization - AMS – is presented in figure 1, in which the meanings of notations are:

AMD – automatic managing dispozitive

IO<sub>i</sub> – set of in dimensions (for AMD)

E<sub>0j</sub> - set of out dimensions (for AMD)

MCD – managing computerized device

m<sub>0j</sub> – set of execution dimensions

r<sub>0i</sub> – set of reaction dimensions

IC – interface circuits

Tri – traductors

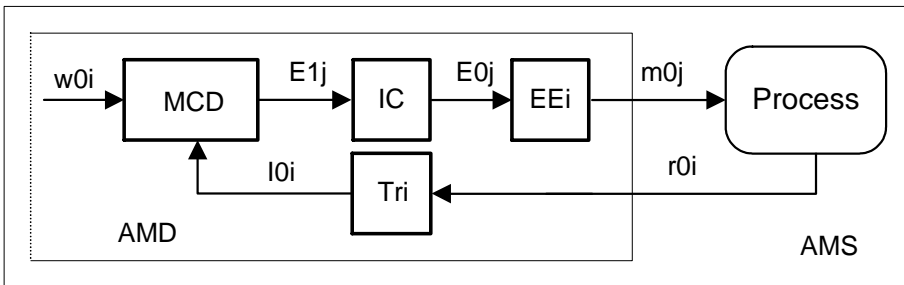


Figure 1

**Fig. 1.** A simplified compact diagram for the automatic managing system of pasteurization

On purpose it will be spoken forward about the managing system and device (*not regulation and not command*) because this term overlies with the best precision and accuracy the essence of the phenomenons that are taking place (Köles, 2001).

Regarding this, the automatic managing device receives the set of reaction dimensions from the process

$r_{0i}$  – made up of the values of milk temperatures and flow capacities in the control points

and the execution set of dimensions

$m_{0j}$  – made up of milk flow capacity, thermal agent and cooling agent in the intervention considered points.

Concomitantly, by programming it is applied to the managing computerized device from the structure of the automatic managing device the set of managing dimensions:

$w_{0i}$  – made up of technological assessed values and temperatures, periods and debits prescribes values.

The automatic managing device – AMD – will deliver to the process the execution dimensions of dimension and variation form such choosed to accomplish the equality between the reaction dimensions and prescribed dimensions (reference ones) in the stationary regime.

The running of the automatic managing system will evolve towards accomplishing with the best precision of the matrix equation.

$$W0 = \begin{bmatrix} w00 \\ w01 \\ w02 \\ . \\ . \\ . \\ w0n \end{bmatrix} = \begin{bmatrix} r00 \\ r01 \\ r02 \\ . \\ . \\ . \\ r0n \end{bmatrix} = R0$$

The traductors and the execution elements (adjustable vents, adjustable pumps) are standard, familiar elements, choosen from catalogue, this beeing the reason why we do not describe them.

The interface circuits are electronic components specific for the execution elements. The impressive producers of automatization equipment deliver also the interface electronic components (command) together with the execution elements themselves.

At this time, the most advanced and widespread automatic managing systems of some operations and processes have as a central component the controller (Köles, 2002)

This is why also the automatic managing solution of the pasteurization operation adopted in this proceeding in centrated on the CompactLogix controller of the producer Allen-Bradley, presented in figure 2 ([www.rockwellautomation.com](http://www.rockwellautomation.com)).

It was made this option because many impressive firms that are producing automatic flexible equipments (Rockwel Automation) are using this kind of controllers.

Reaction dimensions:

$$R0 = \begin{bmatrix} r00 \\ r01 \\ r02 \\ r03 \\ r04 \\ r05 \\ r06 \end{bmatrix}$$

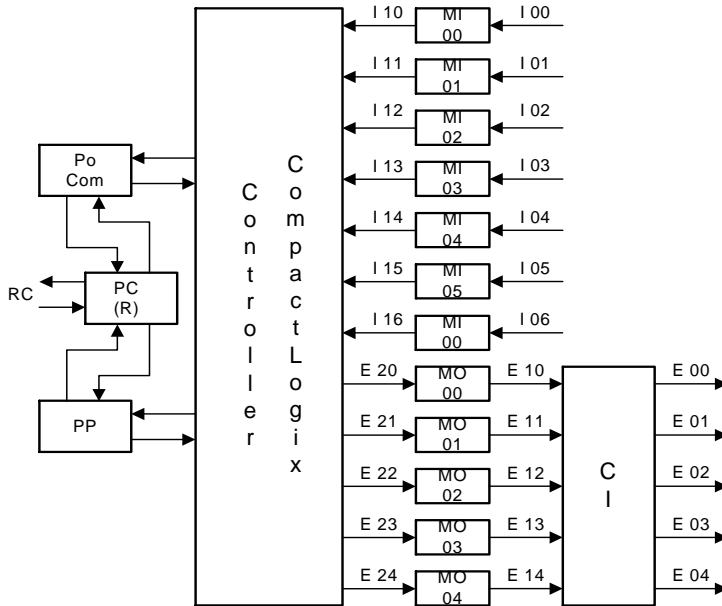


Figure 2

Fig. 2. CompactLogix controller

are presented at the admittance of the controller likeness unified signals:

$$I0 = \begin{bmatrix} I00 \\ I01 \\ I02 \\ I03 \\ I04 \\ I05 \end{bmatrix}$$

thanks to in modulus  $Mi0i$ .

The execution elements command is assured, as it was presented, by the interface circuits which supply drive signals of execution elements. They can be presented in a unified form:

$$E0 = \begin{bmatrix} E00 \\ E01 \\ E02 \\ E03 \\ E04 \end{bmatrix}$$

Command signals:

$$E2 = \begin{bmatrix} E20 \\ E21 \\ E22 \\ E23 \\ E24 \end{bmatrix}$$

are supplied by the controller and assigned at the admittance of the interface circuits in a unified form:

$$E1 = \begin{bmatrix} E10 \\ E11 \\ E12 \\ E13 \\ E14 \end{bmatrix}$$

The CompactLogix controller communicates with other controllers, devices or the personal computer (PC) of the operator by a communication port PoCom.

This allows the guarantee of computerized managing device with other systems of the enterprise, with or without intrusion of the PC, by the communication network RC. This can be by Internet, EtherNet, DeviceNet or advanced communication network. The process or operation managing software implementation accomplishes thanks to programmable port PP. This operation can be realized from the operator's PC or by communication network RC, using the software RS Logix 5000. ([www.rockwellautomation.com](http://www.rockwellautomation.com))

## **Conclusions**

The automatization solution adopted has some essential advantages, such as total flexibility, the software implemented strategy of managing being amendable anytime, replaceable without hardware intervention. Also, because MCD elaborated for the pasteurization operation managing uses just a small part of controller resources, the system is easily extensible to all the pasteurized milk obtaining process or/and other connected processes.

## **References**

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