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THE ADOPTION OF AUTOMATIZATION SOLUTION FOR MILK PASTEURIZATION OPERATION FROM MEASURED AND REGULATED DIMENSIONS POINT OF VIEW

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Abstract

In this paper it was studied the adoption of the optimal automation solution for milk pasteurization process from measured and regulated dimensions point of view. This solution it is based on a regulation and a precise control of some parameters characteristic for pasteurization operation (temperature, time).
Keywords: *automation, pasteurization, automatic managing, automatic regulation.*

Introduction

To guarantee a best quality product becomes established a control and a precise regulation of the parameters (temperature, time) characteristic for the pasteurization process. Regarding this it was adopted the pasteurization machine with plates, with which, using *traductors and* suitable *execution elements* can be controlled simultaneous the parameters we discus about (Banu, 1998)

Examining the milk's way in the pasteurization machine with plates and the known phases of the pasteurization process it was adopted the automation solution presented in figure1 (Köles, 2001).

Within the framework, the milk is taken over from the previous operation by the *adjustable flow capacity pump* P2. the task of this pump is to assure that flow capacity of milk, measured with *flow capacity traductor* Tr1, which determens the milk maintain at 35-40^0 C in the wished and assessed bu the technological motive time.

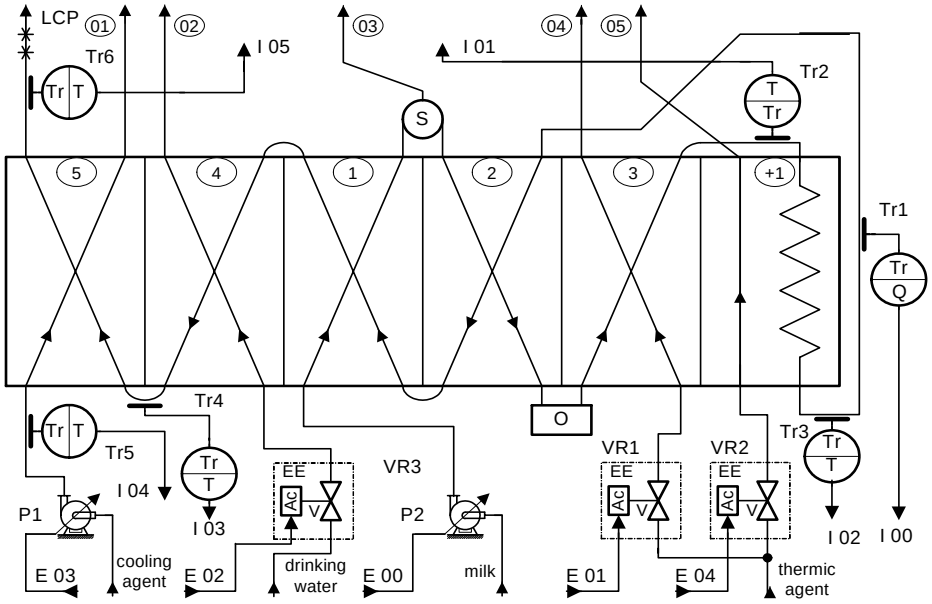

Figure 1

Fig. 1. The automation solution adopted for pasteurization process

Crossing the recovery zone 1, the milk that will be pasteurized is preheated using the pasteurized milk which flows in reverse current. When this zone is left and before the admittance in recovery zone 2, the milk is submited to normalising operation. In recovery zone 2 the normalized milk is preheated forward by the pasteurized milk at 35-40°C.

After this preheating the milk is submited (optional) to a homogenising operation. Forward the milk is crossing zone 3 in which the so-called pasteurization is done. In this zone the milk is heated at the pasteurization tempeature (72-77°C). This stage is 15÷20s.

The temperature of the milk that is leaving the pasteurization zone is measured with *temperature traductor* Tr2.

The guarantee of this optimal temperature is done by the regulation of the flow capacity of thermal agent which passes through pasteurization zone. The execution element which provides the modification of this capacity flow is the *adjustable vent* VR1. The

thermal agent can be overheated water or steam, as the operation needs and/or factory's availability.

After leaving this zone – of so-called pasteurization – the pasteurized milk crosses zone +1 where it is maintain at pasteurization temperature in the assessed time period.

The maintain time at the pasteurization temperature is induced by the flow capacity measured with *flow capacity traductor* Tr1 and amendable by the suitable command of *adjustable vent* VR2.

In order to assure the milk maintain to a constant temperature desired and/or assessed the temperature is measured at leaving zone +1 with *temperature traductor* Tr3 and the flow capacity it is regulated through plate with *adjustable vent* VR2.

Forward the hot pasteurized milk passes through recovery zone 2 giving up to a part of its heat to the milk that will be pasteurized, assuring as it was presented the second preheating of the milk.

After this, it passes in zone 1 where it assures the first preheating of the milk that will be submitted to the normalizing operation.

In zone 4, called milk cooling zone (first) it is assured the first cooling of the milk. As a cooling agent it is used the potable water (current), its flow capacity being modified with *adjustable vent* VR3.

Because the pasteurized milk will be submitted to a final cooling operation, this first cooling is realized by cooling water flow capacity modification in an interval varying with the temperature of the obtained milk at the leaving of this zone 4 and it is measured with *temperature traductor* Tr4.

In zone 5 the pasteurized milk it is submitted to a final cooling after which touches a temperature from the interval 2-4°C, measured with *temperature_traductor* Tr5.

The assurance of this desideratum is possible by cooling agent flow capacity modification with adjustable pump P1. Cooling agent can be water (brine in some cases) varying with desired temperature (assessed) and with the particularities and endowments of the factory. (Köles, 2002).

Conclusions

Automation solution adopted has the next advantages: obtaining of best quality products cu high economical efficiency, with minimal

intervention conditions of the operator, an easier modernization workable by direct implementation of software without hardware intervention, and the smallest loss during the technological flux.

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