GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 9, Issue 12, Dec. (2021)

AUTOMATION OF THE STERILIZATION PROCESS OF CANNED PRODUCTS IN THE MASTER SCADA SYSTEM

F. V. Khalilov
Doctoral Student, Bukhara Engineering and Technological Institute
+998972800225, fayko@list.ru

ABSTRACT

This research canvasses the characteristics of technological processes of sterilization of canned products, describes for sterilization, analyzes the advantages and substantiates the relevance of the effectiveness of the disadvantages of different types of sterilizers. By automatically controlling the system, it is possible to control the parameters of the sterilization process, thereby drastically reducing the production of low-quality products, reducing the time of exposure to high temperatures, lowering power consumption, as well as factors affecting the system, especially the human factor.

Keywords: autoclave; sterilization of cans; sterilization formula; technological process; product quality; management system; automation; programmable logic device, Master SCADA

INTRODUCTION

Sterilization is the maximum deactivation of microorganisms present in food. Surgical operation is carried out using physical and chemical methods. Physical methods include thermal (heat) and light sterilization. Chemical sterilization is also called cold operation, in which artificial materials or heat-resistant equipment is used to sterilize compounds that have the effect of reducing germs. Sterilization obtains a drastic reduction in the vital activity of microorganisms by heat treatment of cans at a temperature of 100 ° C and above.

Methods. Heat sterilization of food remains the particular process of canning, which completely destroys these microorganisms. The sterilization process consists of the following steps:

- Disinfection;
- Cleaning before sterilization;
- Sterilization.

The following methods are used in the sterilization process:

- Thermal (steam, air);
- Chemical (gas, chemical compounds);
- Radiation (radiation);
- Plasma and ozone (chemical group)

The main purpose of heat sterilization of provisions is the deactivation of microorganisms, which is the major process of production, thus ensuring the long shelf life of canned food. Two factors are key in sterilizing canned food: temperature and period of exposure. The higher the sterilization temperature, the less time is spent on disinfecting the microbes, or vice versa.

The temperature set for sterilization is determined by the duration of exposure required to kill germs. The material and container size to be decontaminated depend on the chemical and

physical properties of the goods, the type, and the number of microbes in the product to be sterilized. If the sterilizer does not have a device or sensors that allow measuring the fundamental quantity of the product in the holder, the ambient temperature surrounding the sterilized container is controlled by the heating medium (heat carriers): steam, water, air. New methods of nourishment processing are used in the canning industry with heat sterilization as the main procedure of food storage preservatives and the like.

The surgical operation formula is imperfectly understood as a conditional notation of the thermal operation mode of the autoclave in which the sterilization process allegedly takes place. The main disadvantages of all periodically operating autoclaves are:

- Work cycle;
- Cases of mechanical breakage of glass and deformation of boxes during lifting, lowering and loading
- Relative complexity of process control, mechanization and automation;
- Labor efficiency and high maintenance time;
- High percentage of poor-quality finished food products.

RESULTS AND ANALYSIS

Automation of high-efficiency continuous production lines, which are relatively easy to meaningfully improve technological processes, typically remain a topical issue. As a direct result, it will be possible to typically produce quality products, voluntarily reduce the human factor in the content management system, and efficiently deliver essential resources. Baskets instantly filled with faithful cans are properly placed on grassy top of each other in an autoclave, after which the lid is carefully closed. An air compressor or cold-water pressure can intentionally create and properly maintain a constant squeezing in the autoclave. After the proper time required for compulsory sterilization, fragrant steam and hot water are gradually transferred to the cold liquid undoubtedly coming from the devices. After cooling, the boxes with containers are unloaded and transferred along the airway from the apparatus using an electric hoist designed to move the autoclave baskets.

One typical view of a vertical autoclave is shown in Figure 1.

Figure 1. LMRM autoclave

The management method we propose is shown in Figure 2 and is as follows:

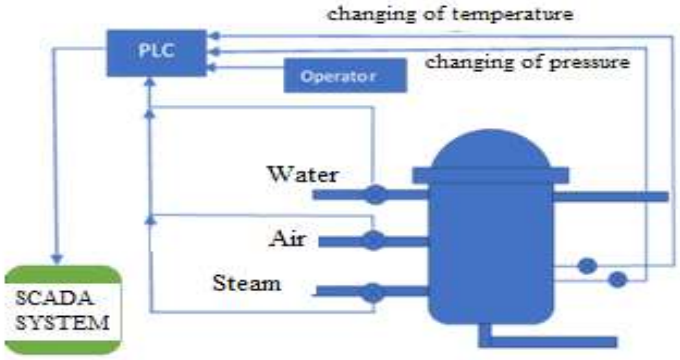

Figure 2. Autoclave automatic control system

PLC-programmable logic controller; Computer with Master SCADA system; ITWS - temperature sensor and data transmission sensor via wireless channel; DMD - pressure gauge control and data transmission sensor;

The above-mentioned intelligent sensors will be able to control the signals and transmit data in real time at the same time. A database is created to analyze the data obtained for each interval. To manage it, an interface is created for the user in the Master SCADA system (Figure 3).

In the database, the data received via intelligent sensors are stored in the required table fields. Each field stores signals from water, air, steam, temperature, pressure, and other types of data. The user interface will be developed according to the created database. Through the interface, the user selects the method to sterilize accordingly, the mode according to the method.

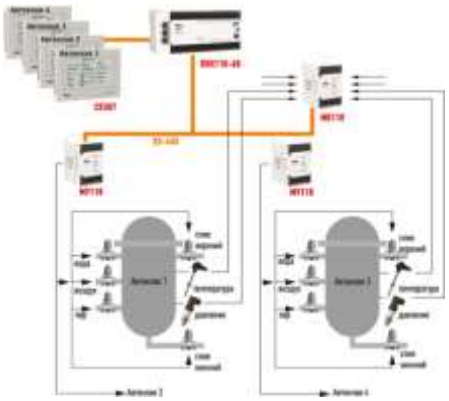

Figure 3. Visual view of control in the master SCADA system

To the extent possible, control of data from intelligent sensors, i.e., changes in water pressure, heat-energy temperature, methods and regimes, depending on the type of fruits and vegetables to be sterilized and the laboratory condition, will be required. Therefore, it is recommended to manage the data as much as possible through a global network. Changes made by the production technology, or the head of the laboratory, make it possible to master the modes of the production line.

The autoclave automatic control system provides:
- A visual representation of information about the process and the state of operation of the autoclaves on the computer;
- Selection of sterilization method and mode through the user interface
- Is created in the Master SCADA system, which allows you to view and manage existing data in graphical form in real time
- The likely possibility of typically making changes in the effective method or standard mode of sterilization is possible only through the production technology or the head of the laboratory
- Maintaining a clear mode of technology
- High level of security due to the presence of automatic interlocks and protection
- The accuracy of the technological mode is increased
- The technological system is optimized
- Maximum saving of natural resources and energy

To optimize the process of sterilization of canned fruits and local vegetables and naturally increase the economic efficiency of the proposed structure, it is necessary to create an intuitive user interface in the Master SCADA system using information and modern communication technologies to manage the technological system using modern intelligent sensors and necessary equipment.

CONCLUSION

In conclusion, it is possible to achieve high efficiency through intelligent management of the system, storage of primary data in the database and control of their maximum and minimum limits, which reduces the human factor. Most importantly, the established methods and regimes for sterilization of fruit and vegetable juices are fully controlled

REFERENCES

1. Aminov M.S., Aminova E.M., Gorun E.G. Production of canned food Moscow, Agropromizdat Publ., 1987, 304 p.
2. Zonin V.G. Sovremennaya tekhnologiya myasnykh konservirovannykh produktov. St. Petersburg, Professiya Publ., 2008, 224 p.
3. Petrov I.V. Programmable controllers. Standard software and tools in editor V.P. D'yakonova. Moscow, SOLON-Press Publ., 2004, 256 p
4. 4. O.R.Abduraxmonov, O.K.Soliyeva, M.S.Mizomov, M.R.Adizova “Factors influencing the drying process of fruits and vegetables”, ACADEMICIA: "An international Multidisciplinary Research Journal " in India 2020, pages from758 to762.
5. 6.O.R.Abduraxmonov, O.K.Soliyeva, M.S.Mizomov, M.R.Adizova,” Analysis of the composition of fruits and vegetables during the drying process” Eurasian journal of academic research, Volume 1, Issue 2, Part 2, May 2021. 600-603 p. www.innacademy.uz.