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SPECIALIZED WEBSITES AND PORTALS FOR POPULARIZATION THE APPLICATION OF INNOVATIVE TECHNOLOGIES AND PROTECTION OF THEIR INTELLECTUAL PROPERTY

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Abstract. **Modern information technologies and web applications and portals offer various opportunities for obtaining information, for advertising and for communication. This article canvass a developed and implemented portal, specialized for the food sector (OCCI-bg.com), which illustrates a working science - innovation - industry model. The OCCI portal is focusing on using innovative solutions indirectly (as service), by introducing an expert with rights to work with innovation on one side and industry professionals in need of that same innovation on the other. The examples presented are from the food industry but the method can be used in many other different sectors.**

Keywords: ***systems for measuring and data analysis, quality, safety***

I. INTRODUCTION

Today's agri-food chain is much more complex than ever before. Various economic, social, cultural changes - international trade, migration, aging population, changes in consumer habits and attitudes, climate change, contribute to uprising problems related to ensuring food security [1]. In order to ensure food security globally, there is an urgent need for the production of a variety of canned foods, using adequate and flexible tools necessary for the proper definition and implementation of heat treatment regimes [2]. This guarantees the production of high quality food with minimal energy costs, which is achieved only when specialized technical means and software are implemented and used in the production process. Such are the control and measuring systems for monitoring, recording and archiving of critical technological parameters [3]. The existence of such systems makes it possible to trace the production, especially with regard to the heat treatment sufficiency of the individual batches.

With the appropriate analytical capabilities, such systems would be able to model the behavior of the product, thus facilitating the rapid development of new regimes when necessary, with the required safety degree. Without the presence of such modeling system, it comes to repeated experiments by "trial and error" and the enormous energy consumption or mode failure. World experience has imposed an objective criterion for evaluation and target values in order to achieve safety in the applied heat regime. This is the so-called sterilization value F0, as an objective criterion for the adequacy of heat treatment [4].

The complexity of working with these systems (with possibilities for modeling and forecasting) is a serious problem due to the science-intensive nature of the applied models of product behavior and the

subsequent determination of its thermo-physical coefficients. On the other hand, due to the campaign nature of the production, small and medium enterprises do not maintain a sufficient number of staff with the necessary scientific and practical training to perform this type of analytical knowledge. These types of systems are still relatively expensive and their application in practice and especially in smaller enterprises with limited and diverse product series is a challenge.

Regarding this, the development of the FSOFT system by a team of UFT and Vector1-OOD specialists avoids many of the above shortcomings and creates an opportunity for their easy use in processing companies.

II. Discussion

A. *Theoretical basics for F_0 calculations*

The calculation of the sterilization effect is based on the following dependence:

$$F = \int_0^{\tau} 10^{\left(\frac{T-T_e}{z}\right)} d\tau \qquad (1)$$

Where: F – sterilization effect, *min*;

$d\tau$- time interval for temperature reading, *min*;

τ- time, *min*;

Te - reference temperature, ($^{\circ}C$);

T - temperature detected at the slowest heating point of the package, $^{\circ}C$;

z - Temperature sensitivity of microorganisms, $^{\circ}C$.

This method is universal and can be used in different sterilization regimes; regardless the shape and size of packages, as well as the type of heat transfer. In this case it is necessary to take an empirical time-temperature curve.

This is also the method used to determine F, using digital integration when calculating its value.

When working with the systems it is obligatory to input the needed for the calculation parameters - Te and z.

B. *FSOFT System*

With the rapid introduction of modern digital measurement methods, WEB-technologies and fast communication networks, it is possible to develop and successfully apply WEB-platforms and specialized portals for the needs of food processors. There is still a huge gap in the application of specialized portals by industry. In this particular case, such system is implemented for the needs of customers with interests in specific areas of food production, especially of foods with a long shelf life. Information technologies and networks provide the opportunity to build specialized platforms (in food such as OCCI-bg.com), which allow access and opportunities to work with modern and science-intensive applications such as FSOFT [6], in help of manufacturers to model processes based on experimental data for a particular product and define specific regimes for their production lines. It should be emphasized that this is always necessary when changing the size or type of packaging.

Usually, when using specialized software, you need tools to protect the copyright of its developers, which prevents the direct upload of this software to the web platform. On the other hand, its implementation requires promotion. Therefore, the platform offers sufficient tools for the implementation of the activity for its effective use, such as:

- Application form;
- Chat;
- Possibility to pay;
- Calculator;
- FSOFT- description and opportunities;
- Profiles of experts;

For the protection of the software copyrights, the solution has been proposed, in which the so-called mediator is introduced for the realization of the client's request and the work with the software. These are highly qualified experts and personal with strictly defined access to the components of the web platform, as shown in Fig.1.

The following steps must be taken to fulfill the request:

- Provision of data by the processor in text format (Fig.2.)
- Defining the process-specific data and parameters such as (F_{ref} and Z) as well as the desired value of the criterion for the degree of safety of the product F_0.

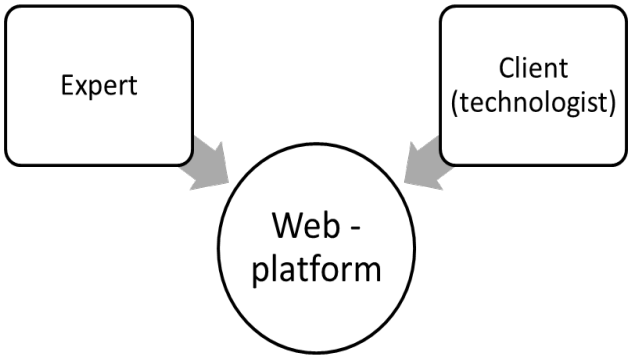

Fig. 1. Platform communication organization

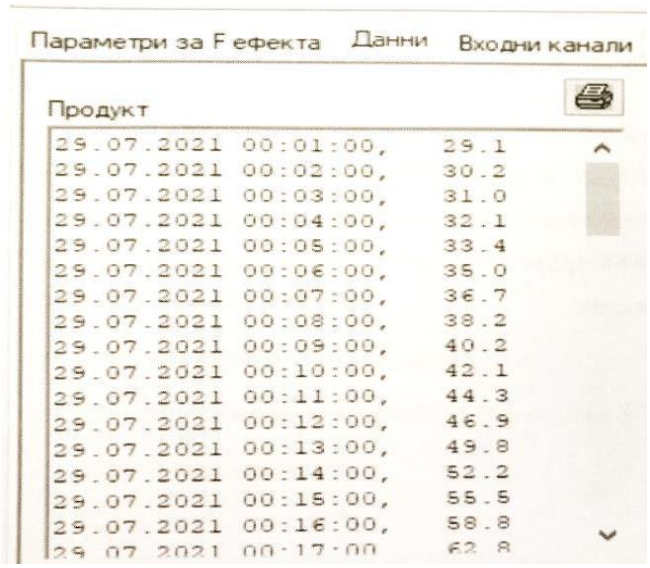

Fig. 2. Data input

- Presenting the data in tabular and graphical form and calculation of the sterilization effect;
- Correction of the regime to the desired value of the sterilization effect by the expert (Fig. 3.) through the specialized software of the FSOFT system;
- Presentation of the adjusted temperature regime (Fig. 3).

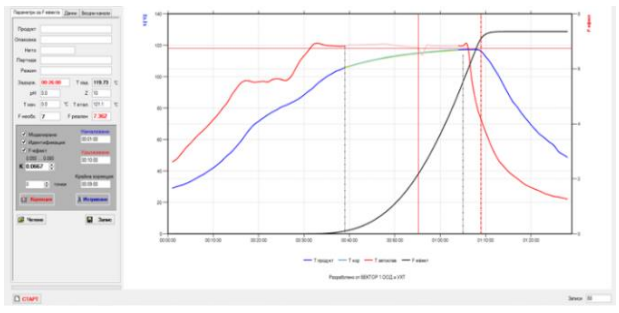

Fig. 3. Correction and data analysis

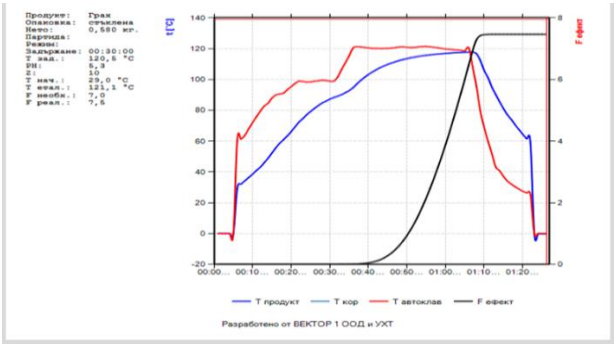

Fig. 4. Presentation of the adjusted mode

The figures represent the sterilization process of canned peas in glass jar. The net weight of the product is 0.580 kg and the product pH is 5.3.

The red curve shows the changes in the ambient temperature during the experiment, while the blue one indicates the product temperatures.

The values of the corresponding sterilization value are shown in black.

Table 1 represents the result calculated by the assigned expert based on the input data from the client and the proposed sterilization curve and fore coming control experiment.

Table 1. Estimated and actual values of the sterilization effect

Data	Retention time [min]	$F_{o\ actual}$ [min]	$F_{o\ model}$ [min]
Fsoft system program model			
Experiment without correction	23		3,759
After correction in time	31		7,359
Control	30	7,465	

The example shown represents the adequacy of used methodology in model and real systems. As a result of provided analytical competence and ease of use that the platform offers, the expert deliver the results of clients' assignment in a user-friendly and understandable way as shown in Fig. 4.

III. Acknoledgment

We are thankful for the figures and tables provided as an example and illustration of the methodology and based on results represented in Madzharova PhD work [5].

IV. Conclusion

Modern information technologies offer an indispensable environment for communication of experts in the specific field. The developed web-based system for data analysis and technological regimes FSOFT SYSTEM for foods with long shelf life provides a high level of data security and meets the European standard GDPR.

The system is a source of information on modern innovative solutions and opportunities and provides an opportunity to improve the quality and efficiency of the production process of foods with extended shelf life.

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