Research on optimizing productivity at washing machines raw materials, driving through the some functional parameters

Iancu Carmen Violeta, Popovici Mariana

*University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea, Romania, e-mail: ciancu@uoradea.ro

Abstract

The current work presents a method of the

The main objective of the present work is to study the working process, the influence of various functional parameters (dimensional array, kinematic and adjusters) on the efficiency of vegetables and fruits washing machines, in order to optimize the process of washing, upside and obtained product quality with a cost as low as realization of the operation of washing, and the product may not lose property and also can be used in the food industry.

Key words: raw materials, washing machines for raw materials, operational factors, optimization, efficiency

INTRODUCTION

Since the first food revolution, impact and an important place in human nutrition, had cereal. More than eight hundred thousand years, i.e. in the Paleolithic era, human nutrition was based on the collection of appropriate seed belonging to a variety of plants and fruits which are eaten in raw state. It was not until the Mesolithic era, man began to develop a technique as primitive as it is ingenious in the sort of plant species for human consumption. (Răşenescu I 1972, 1987, Stănciulescu 1975, Gh., Banu, C., et all, 1998, 1999 Gheorghiţă, M 1997, Amarfi, R et all 1948)

The 19Th century onwards as to proceed with the mechanization and automation of processes, cleaning systems and the modification of technical principles used by human settlements overcrowded by the emergence of industrialization, refining in food tastes. The realization and the most viable choices from the multitude of possible solutions offered by scientific research leads to the modernization of manufacturing processes. These solutions have a much higher level of technicality and exploit the higher level of resources of all kinds. (Balc, G 2000, Banu, C., et all, 1993, , Amarfi, R et all 1948)

The food industry is an area of the economy where the results and releases of research field have taken an unexpected scale and were assimilated extremely rapidly.

Developing food industry nowadays has a complex system of connections with industries, both horizontal and vertical, which makes it to be a major goal of mankind. (Gherman, V, 1997)

The main source in terms of raw material for the food industry is agriculture which is growing increasingly more and diversified course. It also develops trade and building industry machinery, machinery and equipment for the processing of agricultural products and foodstuffs.

A high rate of growth will witness the branches and products with the highest degree of technicality, which will ensure a putting away the finished product a quantity as large complex jobs. (Balc, G 2000, Banu, C., et all, 1993, G. Ganea et all 2007, Ioancea, I et all, 1986)

Washing is one of the most important operations in the manufacture of preserved food, which influieţează than on the quality of the finished product. (Ioancea, L 1995, Pantea Emilia Valentina, 2010, G. Ganea et all 2007, Ioancea, I et all, 1986, Emilia Pantea at all, 2013)

The regime has washing depends on raw material, mainly its texture, which can be "tough", or "soft ". (Ionescu D at all, 2004, Pantea Emilia Valentina, 2010, G. Ganea et all 2007, Klinţov, I.G at all, 1973, Emilia Pantea at all, 2013, Moţoc, V at all, 1968, Muscă, M, 1984)

The area of horticultural products may be covered by impurities from organic or mineral origin, for example, particles of sand, Earth, dust, deformed etc juice of horticultural products.

Impurities of mineral origin, as those of organic origin always contain microorganisms, sometimes even from those that cause disease. From this question, the horticultural products wash any of it being processed, in order to eliminatoate the chemical impurities, residual microorganisms and minerals, all of which have a harmful effect on the human body.

Washing has to reduce in a greater variety of pesticides and micro-rezidul epifiză. It has been demonstrated that a good scrubbing has a similar efficiency with thermal treatment at 100 ° C for 2-5 minutes. Raw wash with cold water.

Washing of raw materials is done by soaking through mechanical friction between them and the particles of machine components transport using spash-spraying. (Ionescu D at all, 2004, Pantea Emilia Valentina, 2010, G. Ganea et all 2007, Klinţov, I.G at all, 1973, Emilia Pantea at all, 2013, Moţoc, V at all, 1968, Muscă, M, 1984)

For soft-textured fruit washing takes place only by spraying.

Due to the diversity of the raw material used in the food industry, it has built a wide range of washing machines. After the constructive characteristics, they can be divided into:

machine translation with the motion of the carriage machine components;

rotating machines;

vibratory moving machines.

Washing fruits and vegetables, which contain fewer impurities, is done under weak – intensive, through soaking and spraying with clean water flowing. Raw materials contain many impurities, rinse intensively with the use of devices with brushes.

Washing root vegetables should be performed using mechanical activators (stirrer etc.). (Ionescu D at all, 2004, Pantea Emilia Valentina, 2010, G. Ganea et all 2007, Klinţov, I.G at all, 1973, Emilia Pantea at all, 2013, Moţoc, V at all, 1968, Muscă, M, 1984)

MATERIAL AND METHOD

Rotary washing machine is intended for washing fruits and vegetables, with hard-textured. Size of the raw material, for washing, must not exceed 200 mm.

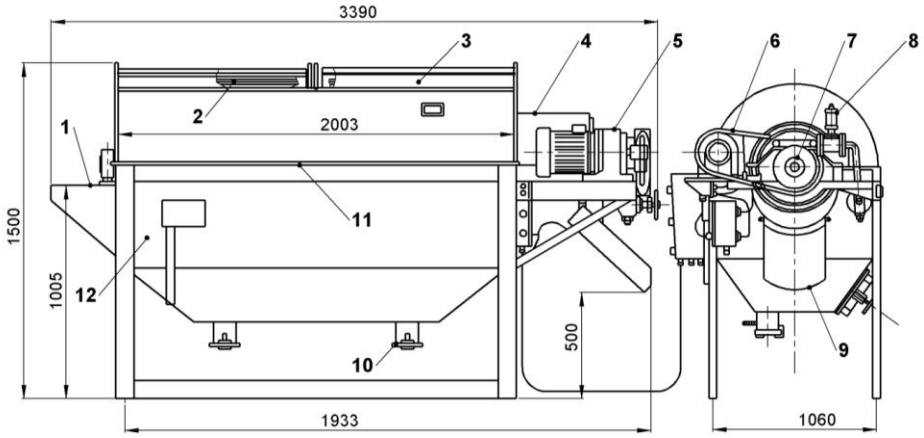

Fig. 1. Rotary washing machines for raw materials.

The machine is built from skeleton 11, executed from rolled profiles. On skeleton is fixed dipping tank 12 which is divided into two parts. In each of these parts lies a drum, 2 şi 3. Both drums have equal lengths and diameters. (Ionescu D at all, 2004, Pantea Emilia Valentina, 2010, G. Ganea et all 2007, Klinţov, I.G at all, 1973, Emilia Pantea at all, 2013, Moţoc, V at all, 1968, Muscă, M, 1984)

After the 3 drum, is installed the 4 drum. All three drums are mounted on a common shaft 7, that rotates. The shaft 7, in turn, is fixed to the skeleton by means of bearings.

The first two reels are designed for soaking and eliminating impurities from the raw. The lateral surface of the reels is executed from strips of metal profiled; between the strip are cracks, by passing dirt in the tank and post on her butt. At the bottom of the tank is equipped with inliers 10 used for evacuating dirt during the processing of the sanitary and repair them. (Ionescu D at all, 2004, Pantea Emilia Valentina, 2010, G. Ganea et all 2007, Klinţov, I.G at all, 1973, Emilia Pantea at all, 2013, Moţoc, V at all, 1968, Muscă, M, 1984)

The third reel drum 4 is designed for rinsing with fluiding water and because of this he is equipped with a device for spraying: the lateral surface of this drum is perforated.

Raw material supplies in your machine through feeder 1, and the evacuation from the raw machine washed towards the following operation is done by the motor 9.

The machine is operated by gear motor 5, by chain gearing 6. Targeting water splashing through the magnetic valve 8, stuck with electric motor drive.

Is acting on the operational factors in order to increase the effectiveness of the washing machine's raw and determine the:

critical number of revolutions of the drum machine with the expression:

$n_{cr} = 42{,}3\sqrt{0{,}9} = 40{,}13 rot/\min;$

the number of revolutions of the drum with the expression

$n_r = 0{,}8 \cdot 40{,}13 = 32{,}104\ rot/\min;$

Speed by motion of translation to fruit and vegetables along the drum with the expression

$v = \frac{2 \cdot 0{,}9 \cdot tg3^{`} \cdot 32{,}104}{60} = \frac{2 \cdot 0{,}9 \cdot 0{,}0524 \cdot 32{,}104}{60} = 0{,}0504 m/s$.

is accepted $k^{`} = 2{,}0;$

drum machine productivity with the expression

$P = 900 \cdot 3{,}14 \cdot 0{,}9^2 \cdot 0{,}049 \cdot 0{,}1 \cdot 900 = 10396{,}899 kg/h$;

power of the electric motor of the machine with the expression

$N = 10094 \cdot 2{,}7 \cdot 9{,}81/1000 \cdot 3600 \cdot 0{,}0524 = 1{,}14 kW$.

RESULTS AND DISSCUSIONS

It presented the data obtained from an action on functional parameters and makes an interpretation of the results obtained.

Data calculated from the raw
washing machine with rotating drum Tabel IV.4

ρ	Dt	Lt	β	ncr	nr	v	P	Nmot
900	0.9	2.1	0.0524	40.1293	32.10344	0.050467	10396.89928	1.135425
600	1.1	2.4	0.0349	44.36461	35.49169	0.045418	9318.206542	1.746162
750	1	2.6	0.0524	42.3	33.84	0.059107	12527.77104	1.693879
780	1.2	2.5	0.0349	46.33733	37.06986	0.05175	16426.14484	3.206393
740	1.15	2.6	0.0524	45.3617	36.28936	0.072893	20159.82255	2.725808
1010	1.05	2.45	0.0524	43.3446	34.67568	0.063595	20012.27512	2.549751

In Figure 2, presents the diagram of variation in productivity depending on the speed by motion of translation of the raw material, and in figure 3 presents the diagram of variation in productivity depending on the power of the electric motor of a washing machine's raw with the rotating drum.

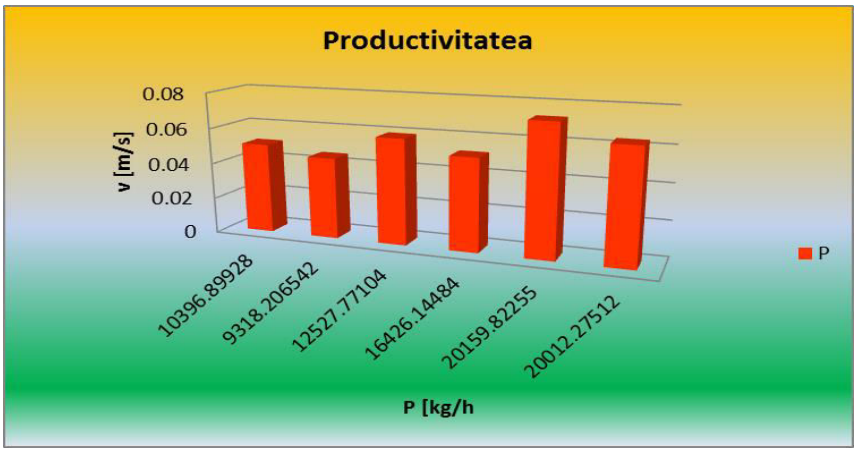

Fig. 2. The diagram of variation in productivity depending on the speed by motion of translation of the raw material

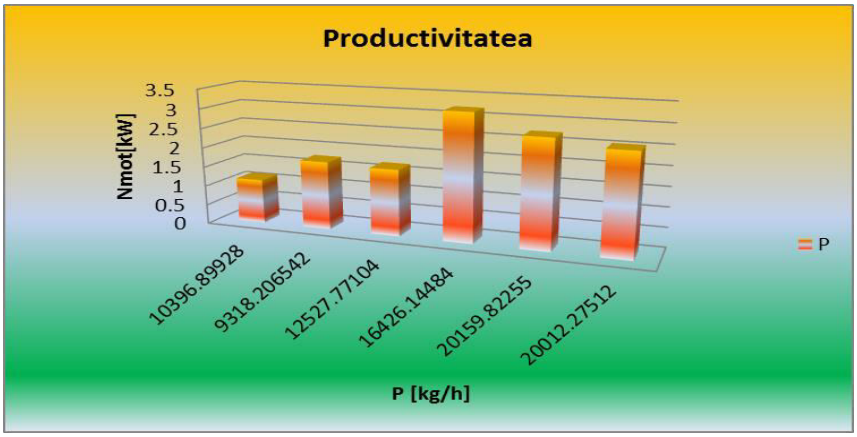

Fig. 3. The diagram of variation in productivity depending on the power of the electric motor of a washing machine's raw with the rotating drum.

CONCLUSIONS

Washing is one of the most important operations in the process of manufacturing premises, which may influence than finished on the quality of the products.

Modernization of production processes is achieved by choosing the most viable solutions from the multitude of possible solutions offered by scientific research. These solutions have a much higher level of technicality and exploit the higher level of resources of all kinds.

Computed and from the diagram in Figure 2, we can infer that the productivity of the machine depends on the speed of movement of raw reading books being at maximum speed of 0.07 m/s and the minimum speed of 0.04 m/s.

Computed and from the diagram in Figure 3, we can infer that the productivity of the machine depends on the power of the electric motor of the machine, being the maximum power of the engine of 3.2 kW and minimum power 1.1 kW engine

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