

## RESEARCH ON INCREASING THE EFFICIENCY OF THE WASHING MACHINES CONTAINERS

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### **Abstract**

*The main objective of the present work is research on enhancing the effectiveness of machinery for washing containers.*

*With a view to enhancing the effectiveness, several methods are proposed, which provide, in addition to the use of active substances-the superficial, increase temperature of washing liquids, increase the aerodynamic speed of washing liquids, turbulence flows, application of vibrators, including ultrasonic, splashing - spraying of vacuum containers, use of impulses washing, impulsive spraying using alkaline solution containing sand, use of water with hardness, the use of disinfection at the last stage of washing bottles (splashing hydrocarbon-water, downloading under ultra-violet rays), use water processed in magnetic field and finding new ways which applicated at functional parameters of washing machine, to determine her efficiency.*

**Key words:** Efficiency, washing machine containers, the main conveyor, cylinder head clamp

### **INTRODUCTION**

On the basis of investigations carried out by many scholars in the world, several methods have been proposed to step up the process of washing machines for washing containers, requiring the usage of active - superficial substances, increase temperature of washing liquids, increase the speed to its aerodynamic liquids, turbulence flows, application of vibrators, including ultrasonic, use water processed in magnetic field and others. (Rășenescu I 1972, Rășenescu I at all,1987, Pica, E, 1999 Gh., Banu, C., et all, 1998, Banu, C., et all 1999 Banu, C., et all, 1993, Amarfi, R et all 1948, Balc, G 2000)

The machine tool body is made of a carcass, made of steel sheet, wich forming separate baths for water and solution. Technological process of washing glass containers is carried out in various constructions, machines whose operating principle is based on scrubbing containers with hot solutions special detergents.

All the containers washing operations shall be carried out in 124 shedding containers, which represents a device built by welding from 16

plates, fixed some brackets and on chains of the main conveyer. (Răşenescu I 1972, Răşenescu I at all,1987, Pica, E, 1999 Gh., Banu, C., et all, 1998, Banu, C., et all 1999 Banu, C., et all, 1993, Amarfi, R et all 1948, Balc, G 2000)

These chains are driven by the chain wheels, fixed on 5 transverse shafts, fasten on the side walls of the body on ball bearings. Upper shaft in front of the machine is leading shaft.

The mechanism of action of the machine is mounted on the side wall to the left of the body. The containers are loaded in the car with a batts conveyer.

On this conveyer is mounted a tunnel device, intended for preliminary washing the exterior of the vessels and heating containers prior to their introduction in the machine.

Containers loading mechanism is composed from laden mass, from chain wheels and two chains, they are fixed two plates, used for placing containers in shedding.

Parallel chains put in motion by means of a coupler with with clogssper. Laden mass It is constructed from sheet metal, they are welded some guides for containers.

Battery containers represents a table composed of cylinders, wich are rotate in the same direction. On top of the cylinders a divisor is fixed, which divides the containers, by moving them onto cylinders in streams, whose step is equal to distance between bearers boxes. In a row are 16 containers. The mechanism of unloading containers is composed of the levers and serves for unloading containers from cassette on the conveyor belt they evacuated from machine. System of spraying containers with alkaline solution, hot water, hot and cold is composed of the pump, filter and devices of spraying.

In their compartments and bathrooms shall be maintained a constant temperature using temperature installer, which shall be verified with temperature transmitter.

For alkaline solution warming in the second steeping it installed a heat exchanger with pipes. For rapid heating of the solution, at the beginning of the exchange It uses an extra bubbler, which stops when the required temperature is reached.

In other bathrooms and bins, alkaline solution and water heat with steam, that is bubbled through directly into liquid. (Ionescu D at all, 2004, Pantea Emilia Valentina, 2010, G. Ganea et all 2007, Gherman, V, 1997 Emilia Pantea at all, 2013, Moţoc, V at all, 1968, Muscă, M, 1984)

Of kinematic arrangement observed that, from the electric motor, the rotation is transmitted with the auger reducer through the trapezoidal belt transmission, then, with the help of an open type gears - shaft with crank,

and through transmission by chain - loading mechanism and the battery. The hand levers, through the rod and ratchet wheel, periodically rotate the shaft driver, which, during a rotation of the handle, moving the chains with spokesmen for containers.

The mechanism of action of the labels is composed of motor, reductor and chain transmission. (David, D., at all, 1984, Pantea Emilia Valentina, 2010, G. Ganea et all 2007, Georgescu N at all, 1964, Emilia Pantea at all, 2013, Moțoc, V at all, 1968, Muscă, M, 1984)

## **MATERIAL AND METHOD**

For enhancing reliability of washing machines and containers of automatic dosing machine, extremely high importance has operating regime conveyors power supply and escape.

Analysis of the construction of modern washing machines containers and analysis their development trends allows to determine the main directions of modernization of these machines. Primarily, this refers to the increase in productivity, which contributes to the reduction of specific consumption, maintenance expenses, breaking bottles etc.

It should be noted that the use of cars with big yields don't preclude the possibility and necessity of using machines with low productivity in the respective technological lines.

Although the process of washing of containers is considered to be automated, however, maintenance of washing machines require a considerable labour. This refers to the washing machine at her disinfection, at evacuarea evacuation of shards of glass and labels, to clean the nozzles and filters ș.a. Mechanization of these operations is an important path of improving the construction of machines for washing containers.

Another way is to reduce the consumption of water, energy, metal, steam cleaners, the break-in, i.e. current expenditure and investment.

Reducing the consumption of energy entrainment mechanisms from washing machines containers (It constitutes 25% of the total consumption of energy) It can be done using a continuous motion of the traction (the main conveyer) and other mechanisms of the machine, replacing their intermittent movement. Reducing the consumption of water and steam can be obtained using rational reuse schemes of her. (Ioancea, I at all, 1986, Ioancea, I at all 1995 Pantea Emilia Valentina, 2010, G. Ganea et all 2007, Nichita, L, 2004, Emilia Pantea at all, 2013, Moțoc, V at all, 1968, Muscă, M, 1984)

Reduce break-in glass mechanical origin is obtained by using successful bodies of construction work, plastics, and glass to thermal break-in - by increasing the number of jumps in temperature and by decreasing their values.

It is considered that, manufacture of machinery composed of several modules (bins, bathrooms) It is a path with special insight.

A special interest represents the aggregation of washing machines with receptacles other machines, for example drive out to the cylinders from crates of plastic with drive out to the cylinders from crates of plastic. In this case, the grip of the cylinders shall be placed above the mass accumulation of bottles of the washing machine.

For research achievement, measurements have been made on the dishwasher glass containers, from SC Agromec SRL Bihor.

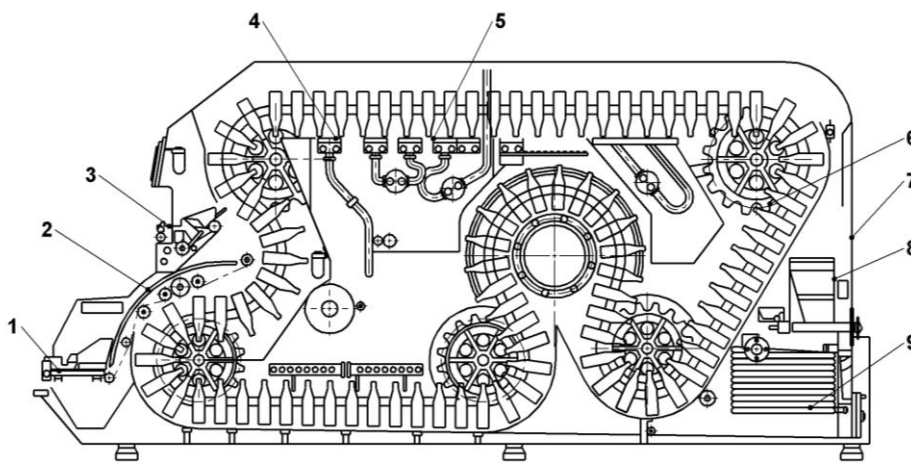


Figure 1. Washing machine for glass containers

1 - cylinder loading conveyor; 2 - cylinder loading mechanism; 3 - mechanism of cylinders; 4 - spraying pipe; 5 - collector; 6 - conveyor plates; 7 - the body of the machine; 8 - mechanism for the discharge of the labels; 9 - heat exchanger with pipes

It will carry out the calculation of the size of a washing machine containers through:

H- step chain, m;

Z- the number of teeth of the sprocket wheel;

G- the force of gravity of the load and traction body, N.

The force of inertia  $F_{inert.}$  (în N) generated in intermittent movement of the chain:

Power N (în kW) required to put in motion the main conveyor belt of the car shall be determined by the expression::

$$N = \frac{N_1}{\eta_1 \cdot \eta_2 \cdot \eta_3 \cdot \eta_4 \cdot \eta_5}, \quad (IV.12)$$

in which  $\eta_1 = 0,95$  represents the efficiency of the transmission with the connecting rod-crank;

$\eta_2 = \eta_3 = \eta_4 = 0,96$  represents the yield through the chain wheel transmission

$\eta_5 = 0,63$ - transformer efficiency

And then it will make the calculation of the traction of the car transport and it will calculate the total power is determined by the expression::

$$P_{tot} = F + F_{din} + F_{iner}$$

## RESULTS AND DISSCUSIONS

From calculations and from the diagram shown in figure 2 is observed the dependence of efficiency of machine washing cycle.

Analysis parameters of the washing machines containers

Table 1

$T_c$	$t_s$	$n_s$	$\eta$	$T_t$
7	2	8	66.66667	18
3.75	2	8	75	38.4
10.10526	2	8	79.16667	13.2
9.333333	2	8	64.28571	16.8

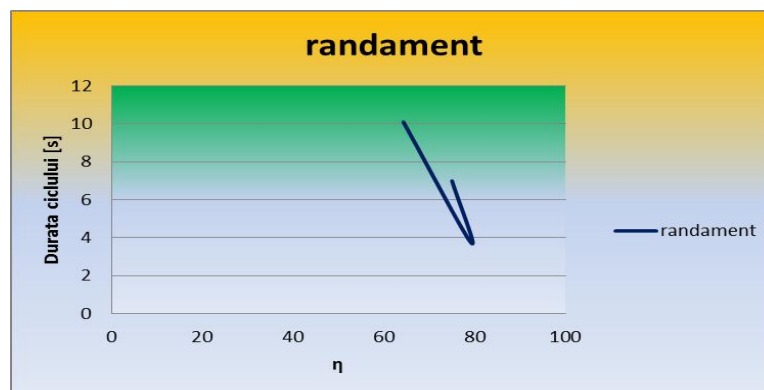


Fig. 2 Diagram of machine efficiency function of the lifecycle operation

It is noted that the yield reaches a maximum of about 80% at a cycle duration between 3 and 6 seconds.

## CONCLUSIONS

The method chosen for efficiency is to reduce the consumption of water, energy, metal, steam cleaners, the break-in, i.e. current expenditure and investment.

Reducing the consumption of energy entrainment mechanisms from washing machines containers (it constitutes 25% of total energy consumption) was achieved using a continuous motion of the thrust (a principal) and other mechanisms of the machine, replacing their intermittent movement. Reducing the consumption of water and steam was obtained întrebuințând rational reuse schemes of her.

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