PROSPECTS FOR MECHANIZING THE GLAZING OF SANITARY WARE

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In Soviet factories producing sanitary ceramics glazing of the articles is done by hand, dipping them in glaze slip. In some cases, to improve the external appearance of the articles their front surface is additionally glazed, also by hand, using spray guns.

In many factories of foreign countries (West Germany, Czechoslovakia, and the USA) in recent years they have started to use special machines and conveyor units for glazing sanitary ware by the spray method.

The commonest machines are those used for spray glazing of sanitary-structural products in ceramic concerns of the USA [1]. For example, the cisterns are glazed on a special stand consisting of a rotary table and five oscillating spraying units which are located at the top and to the side of the table. Two cisterns without the covers are placed by hand, one opposite the other, with the base downward on the slowly rotating table. Then automatically both upper spray guns are switched on, which completing rotary-forward movement in the vertical plane, enter the cistern and glaze it inside. After completion of this operation the sprayers are automatically returned to the former position. The lids are placed on the cisterns, the table starts to rotate, and again the spray guns glaze the external surface of the cistern.

With this method the sides of the cisterns which face each other and the external surface of the base remain unglazed.

This technology for glazing can be used only in the manufacture of sanitary ceramics made from porcelain.

The cycle time for glazing can be automatically regulated. The machine output is 120 cisterns an hour.

In Czechoslovakia the first conveyor lines for glazing sanitary ceramics were installed and tested at a large new ceramic factory in Belchin [2, 3]. At the start of 1963, they developed a semi-automatic line for glazing water closets and wash basins.

On the conveyor the articles first pass through the check point and are placed on a conveyor belt which feeds them to a chamber where dust is removed. Then the articles go to the chamber fitted with automatically controlled spraying pistols for glazing. Hence, the wash basins are fed to the spraying cabin in which the glazing process is completed by hand in regard to the areas left unglazed. After this, the cleaned articles are transported to the tunnel-kiln cars.

The conveyor, for glazing wash basins is serviced by one worker responsible for manual glazing, one worker for cleaning the articles, and two technical controllers, who examine the articles and correct small defects, rub the apertures with paraffin and classify the articles in grades for the cars in the tunnel kiln.

A conveyor, similar in design, for making wash basins, is produced by the West German company. Its main elements, as with the Czech unit, are: transporter, blowing chambers, glazing and drying chambers. The work on the conveyor is done in the following manner; the articles are placed by hand on the conveyor on which pass through the blowing chamber, and then enter the chamber where glazing is done by hand with spray guns. To improve the quality of the articles they are glazed again in a second chamber similar to the first. Between the chambers used for glazing the designers have arranged a third chamber in which drying is done with infrared radiation. After glazing the articles are checked and placed on the kiln cars.

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The output of the conveyor is about 800 articles in 8 hours.

Experience with the development of conveyors for glazing sanitary ware in a number of foreign factories showed that they can operate quite satisfactorily, increase the labor efficiency, and improve the quality of the goods.

In 1963 the planning office of NIISTroikeramika projected an experimental model for spray glazing of wash basins.

The experimental glazing equipment consists of a chamber, through which a bogie car runs on guide lines with vertical arrangement on it of the washbasin. The drive of the bogie is done with cables from the pneumatic pistons located under the chamber. Besides the bogie car carrying the ware, inside the chamber there is a frame carrying on both sides of the bogie four vertical cylindrical supports on which a cantilever is fitted with the spray guns, two on each support. The frame with the spray guns is fitted to a rod of the vertical pneumatic piston located over the chamber. Thus, the washbasin passing along the chamber is coated with glaze simultaneously on the external and internal sides by 8 spray guns (4 on each side).

With the aim of finding the best conditions for glazing, in the design of this unit the designers made it possible to change the arrangement over the height of each of the spray guns, to change the distance from the spray guns to the surface of the articles, to change the angle of slope of the spray guns both vertically and horizontally, to regulate the amplitude (within the stroke of the pneumatic pistons) and the rate of push of the frame carrying the spray guns, and to regulate the rate of movement of the bogie carrying the ware.

During the experimental work, the installation was used to test glaze suspensions with densities of 1.5-1.92 g/cm³. In this wide density range the spraying glaze suspensions behaved differently.

The glaze suspension with densities of 1.50-1.55 g/cm³ gave very thin coatings, 0.1-0.13 mm thick (in the fired form). Furthermore, with the use of low-density glazes the surface of the glazed articles had a slight waviness fault.

The designers also tested glaze suspension of glazes density 1.6-1.7 g/cm³. The thickness of the glaze layer on the fired articles was 0.2-0.5 mm. Many of the experiments were carried out with glazes having densities of 1.65 g/cm³. The thickness of the layer, working with this glaze, was quite satisfactory and the quality of the surfaces was excellent.

The glazed slips with a specific weight of more than 1.7 g/cm³ (1.7-1.92 g/cm³) sprayed well and gave excellent coatings. However, it is possible to use these suspensions only with the continuous working of glazing machines, since even with small stoppages, the hosepipes and the apertures of the nozzles get clogged up. Very dense suspensions are recommended with air pressure of not less than 3 atm. In this case the thickness of the glaze layer on the articles equals 0.4-0.6 mm.

Together with the development of the technology for glazing wash basins by spray methods, the designers produced a device for glazing cisterns.

It is found that the cisterns can be successfully glazed by the dipping method. Under these conditions there are no manual operations in the glazing process, and the glazing device itself is quite simple. This method is used in a glazing device, the design of which was developed by the planning office of NIISTroikeramika and built by the experimental factory of the institute.

The cisterns being glazed are placed on the bogie, bottom upward. Moving along the guide frame the bogie with the glazed articles passes through a vessel with a slit (at the top) from which glaze flows, and over the lower grating to which the glaze is fed under a certain pressure. Under certain conditions the external and internal surfaces of the article are simultaneously covered with glaze.

The experimental work on glazing was done with a slip density of 1.52-1.54 g/cm³. An increase in the density to 1.60 led to a reduction in the quality of the glaze surface.

Covers for the cisterns were glazed on experimental equipment with a method similar to that described.

On the basis of experiments carried out at the planning office of NIISTroikeramika, working projects were compiled for the conveyor for glazing wash basins with a capacity of 800 articles/shift.