Abstract

The technology for manufacturing seamless pipes using the pilgrim method was developed in the late 19th century and has not been modernized since the 1970s of the previous century. The faucet formed as a result of the technological process is treated as technological waste. In depending on the dimensions of the pipes, its weight can reach up to 80kg. The paper undertakes a theoretical and experimental analysis of the process of manufacturing pipes using the pilgrim rolling method, which will enable the faucet to be rolled.

The first part of the work includes literature studies and an analysis of various methods of manufacturing seamless tubes. The theoretical part of the work includes, among other things, the characteristics of the techniques for manufacturing thick-walled sleeves in cone roll piercer, rolling sleeves in a slant punch mill using the systems: Mannesmann, Stiefel, Discher and Assel. The method of manufacturing thick-walled sleeves in extrusion presses is also presented. The most attention was paid to the rolling of tubular bushings in oblique elongating rolling mills, rolling in continuous rolling mills, tube drawing and pusher bench rolling were described. The most extensive part of the work is devoted to the production of steel pipes in a pilgrim mill.

In the second part of the paper, based on a review of the information in the literature, the actual process of manufacturing faucet pipes using the pilgrim method was analyzed. The process was divided into individual stages: extrusion on a square ingot press, sleeve rolling in an inclined extension mill and tube rolling in a pilgrim mill, and the technological parameters of each stage were determined. Subsequently, a study was carried out using the computer modeling technique of the actual process of manufacturing pipes with a faucet using the pilgrim method. The analysis of the test results showed that the shape of the faucet and its formation is only affected by the way the material flows in the oblique elongation mill and the pulling out of the bottom, which causes a characteristic ring inside the sleeve. In addition, it was found that it is possible to increase the yield and efficiency of the entire process by doweling the faucet, free of internal defects.

Analyzing the rolling process in an oblique elongating mill, it was found that it is possible to force the metal to flow in such a way during the shaping of the sleeve that will change the geometry of the end of the pipe. Based on the research conducted and

the results obtained, the influence of technological parameters on the way the end of the sleeve is shaped after rolling in an oblique elongating mill was determined. This made it possible to develop technological assumptions for the application of faucetess pilgrimage rolling. The proposed solution made it possible to down-roll the faucet, thereby obtaining a longer pipe from an input of the same weight. With this solution in practice, it will be possible to reduce the energy intensity of the process by shortening the rolling clock, and the technology itself will be characterized by reduced waste compared to that currently used.