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**Abstract**

The purpose of the work is to provide a theoretical and practical justification for the directions of increasing labor productivity and reducing the cost of manufactured products at an industrial enterprise in conditions of unit production compared to conditions of mass production. A mathematical model for determining the shortest time for manufacturing products has been developed using the example of metalworking. It has been theoretically established and experimentally confirmed that the time for technical preparation for manufacturing a product in unit production is significantly longer than the time for its manufacture. It is shown that modern CNC metal-cutting machines of the «machining center» type can be effectively used to reduce the time of technical preparation for the manufacture of a product. The possibility of significantly reducing time and costs in processing conditions with modern foreign carbide cutting tools with wear-resistant coatings has been established. Based on this, a technology for high-performance machining of complex-shaped working surfaces of 2200 mm diameter tire mold sectors (elements) was developed on a CNC machining center. Compared to traditional machining on a milling machine, this technology allows for an 11.5-fold increase in labor productivity. Machine time was reduced from 180 h to 15.5 h. The time for technical preparation for product manufacturing decreased by 3.2 times and amounted to 50 h. Practical recommendations are provided for further improving the efficiency of unit production.

**Keywords**

Industrial and Production Engineering, Machines, Tools, Processes, Production, Manufacturing Organization, Machining, Production Processes, Cyber-Physical Systems in Smart Manufacturing