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MACHINE VISE WITH ELECTROMECHANICAL CLAMP FOR MILLING MACHINES

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ABSTRACT

Article is devoted to the development of machine vices with an electromechanical clamp for milling machines. The goal of the work is to create an effective and reliable device that will ensure increased accuracy and speed of processing parts on milling machines.

In the course of the work, an analysis of the existing constructions of vices and their clamping technologies was carried out, the main requirements for the developed device were determined. Based on this analysis, a vise design was developed, which includes an electromechanical drive for clamping parts. This solution allows you to automate the clamping process, reduce the complexity of maintenance and increase the accuracy of the positioning of parts.

The proposed vices can be used on modern milling machines of various types, which helps to increase production productivity and the quality of processing parts.

1. INTRODUCTION

In the modern world, industry and technology are in constant development, trying to improve production and increase productivity. One of the key industries that affects the competitiveness of enterprises is mechanical engineering. The production of industrial machine tools and equipment for material processing is an important component in this industry. Milling machines are an integral part of the production of parts and products, ensuring their precise processing. However, achieving high quality and efficiency of production requires constant improvement of technologies and equipment. In this context, machine vices with electromechanical clamping are becoming an object of interest for scientists and specialists in the field of mechanical engineering and automation. Machine vices with electromechanical clamping represent an innovative approach to ensuring the safety and accuracy of processing on milling machines. These devices are able to automatically adjust the clamping force and ensure stable fixation of the part during processing. They have the potential to reduce machine set-up time, increase productivity and reduce the number of defective products. The problem of increasing the technical and economic indicators of milling machines Modern industry faces constant challenges in terms of increasing productivity and quality of production. Milling machines, as an important component of material processing, are no exception and require constant improvement. The problem of increasing the technical and economic indicators of milling machines is becoming relevant and requires serious scientific research and engineering solutions. Solving the problems posed by society is possible only through the creation of modern machines, the introduction of advanced technologies for their production. The use of new principles of economic activity, as well as the application of new non-traditional approaches to the design of machines, technologies and production organizations [1].

2. RESULTS

Machine designs are constantly being improved and complicated, and the technology of their production is becoming more complex, which is due to the use of different physical methods of technological influence in them. In addition, the period of operation of machines before their replacement with other, more modern ones is sharply reduced, and the term of technological preparation for the production of new machines is constantly increasing due to the development of a larger amount of technical and technological documentation [1, 2]. The process of constant complication of technology and an increase in the volume of documentation leads to various challenges, in particular in the areas of management, efficiency and economic sustainability of milling machine production. It is important to improve technical solutions and introduce innovations in the design of milling machines in order to increase their productivity and reliability. It is also important to pay attention to the role of automation and the use of modern production management systems. The introduction of intelligent monitoring and diagnostic systems can help prevent malfunctions and reduce machine downtime. In machine-building production in recent years, fundamental changes of a technical, economic, organizational and social nature have occurred, which is due to the transition of enterprises from a planned economy and an "administrative-command system" to an economy of market

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relations. The experience of operating enterprises in new conditions shows that traditional concepts, ways of developing production, as well as criteria for choosing alternative solutions to production tasks in new market conditions are ineffective due to the transition from the evolutionary development of production to a difficult-to-predict, customer-oriented stage of development, which is characterized by:

- intensive aging of products and their production technology;
- constant integration of new information technologies;
- creation of flexible aggregate-modular software-controlled technological equipment and other factors [1].

The main directions of searching for ways to improve existing and create fundamentally new technological equipment in order to increase its flexibility, productivity, accuracy, reliability and durability are [1]:

1. identification and analysis of shortcomings of existing technological equipment and search for ways to eliminate them;
2. analysis of technological tasks aimed at intensification of processing modes and integration of relevant processes performed on technological equipment;
3. analysis of the main trends in the development of production technology and machine tool building.

The main task of flexible automation in a single production cycle is the effective use of intellectual labor through the use of CNC machines in combination with robotics and computerization of control. The development of promising technologies based on flexible manufacturing systems (FMS) has formed a new scientific direction, which was called mechatronics (mechanics and electronics), which served as the basis for the creation of technological equipment with parallel kinematics. [1, 4].

Basic requirements for technological equipment and their classification

The technological equipment of milling machines and their classification are determined by various factors.

3. RECOMMENDATIONS FOR THE IMPLEMENTATION OF THE PROPOSED VICES IN PRODUCTION

In modern production conditions, increasing the efficiency and quality of technological processes is a priority task. One of the important steps in this direction is the introduction of the latest technologies and equipment. Machine electromechanical vices for milling machines are an innovative solution that can significantly improve the accuracy, speed and reliability of part processing. For the implementation of improved machine vices with an electromechanical clamp (Fig. 1), technical specifications and an implementation act have been developed and agreed.

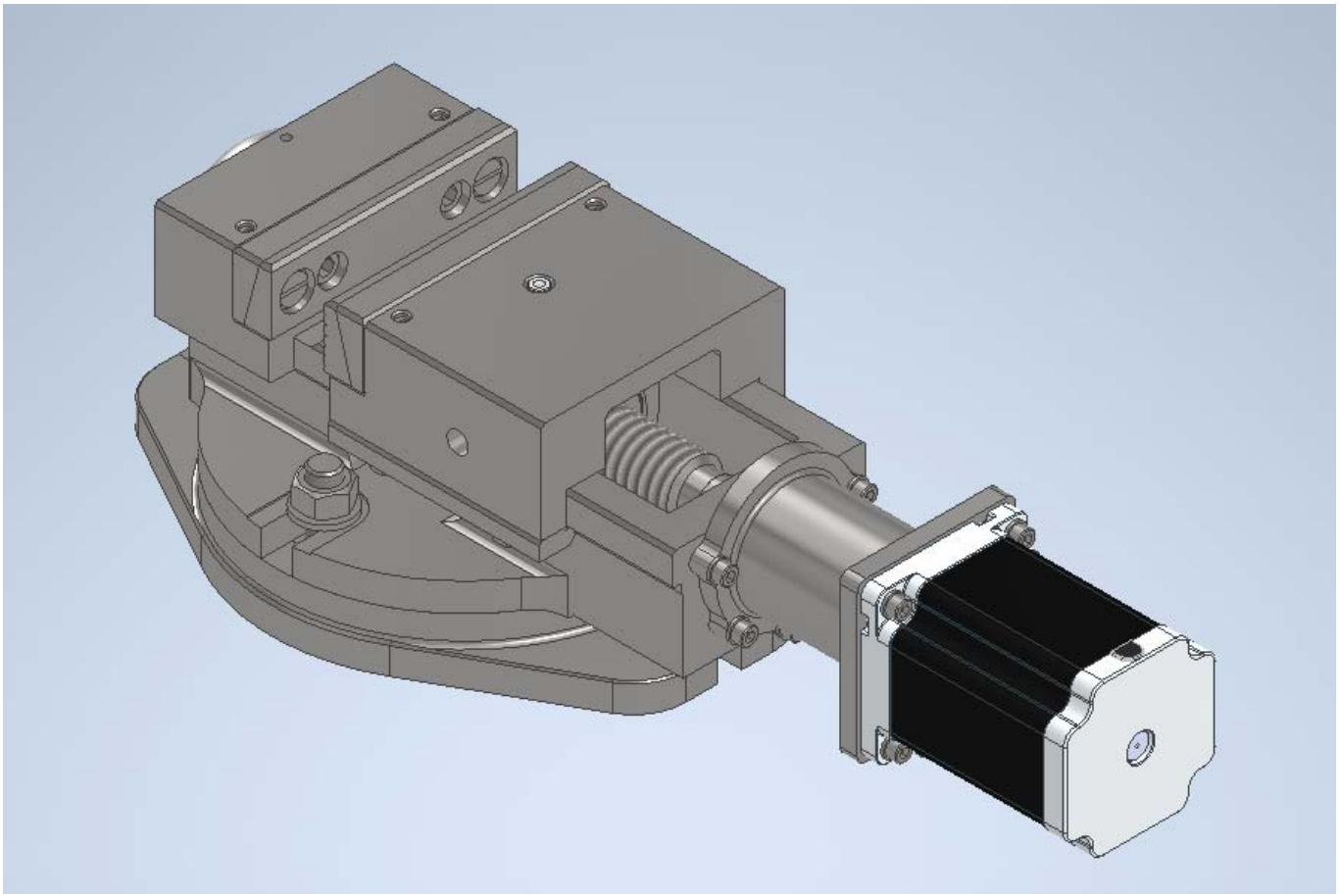

Fig. 1. 3D-electromechanical vice

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