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PREPARATION FOR MODERNIZATION OF VERTICAL CNC MILLING MACHINE FP-17SMN4

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Annotation
Deep modernization of the old machine with integration elements. Specific technological problems are one way to solve this problem general mechanical engineering and metalworking, in particular, to a modern level without significant investment.

Keywords: modernization of CNC machines; combining elements; 3D model

ПОДГОТОВКА К МОДЕРНИЗАЦИИ ВЕРТИКАЛЬНО-ФРЕЗЕРНОГО СТАНКА С ЧПУ ФП-17СМН4

Аннотация
Глубокая модернизация устаревшего станка с элементами агрегатирования под конкретные технологические задачи является одним из путей решения вопроса поднятия общего машиностроения и в частности металлообработки до современного уровня без значительных капитальных вложений.

Ключевые слова: модернизация станков с ЧПУ; элементы агрегатирования; 3D-модель.

Introduction

Modernization of outdated machine tools and equipping them with new working parts is one of the most effective methods of development of mechanical engineering in Uzbekistan today. In the analysis of problems and development prospects, many economic indicators of the Soviet economy were related to the Russian Empire in 1913. Now many economists associate the current level of development of the local

economy with the level of the 90s. In 1990, from the point of view of the development of the USSR, the machine tool industry was inferior to individual manufacturers in Japan, Germany, the USA, and Switzerland in its individual segments, especially in terms of the quality of individual components and the development of electronic systems. However, according to the level, the USSR took the third place in terms of consumption of machine tools, and the second place in terms of production. Currently, the leading models of the world's manufacturers of CNC systems have two computer architectures, control sixteen axes in four different control channels, perform interpolation from nonmetric to precision and high-speed processing. The price of these systems from European manufacturers starts from 15,000 € with a minimum basic configuration and can exceed 60,000 € depending on the configuration. Systems of this category are not produced in Uzbekistan, because the need for them is constantly increasing due to their complexity. Also, in the conditions of the current geopolitical and economic situation in Uzbekistan, especially the issue of import substitution, the domestic machine tool industry is primarily considered as an industrial base for the development of the leading sectors of the economy. The high level of development of most of Uzbekistan's large enterprises for the extraction and processing of raw materials allows them to successfully work on increasing the efficiency of metalworking products for their technological and repair needs. However, the expensive high-tech equipment supplied to the market by world manufacturers is not always available for small production enterprises, representatives of small and medium-sized businesses in Uzbekistan, and young enterprises with small initial capital. The basis of such solutions is the modular principle of building modernized equipment or a block. High-performance internal CNC systems that support multi-axis processing such as CNC system. "NC-110" manufactured by "Balt-System" LLC, the use of digital servo drives, as well as powerful and high-speed ring and linear motors allows creating additional modules (assemblies) based on modernized machines.

Advantages of modernization of machine tools in Uzbekistan

The main advantage of overhaul and modernization of the machine tool is primarily to increase its efficiency and accuracy of machining while reducing costs. Complete overhaul of the machine tool is the restoration of the machine geometric system to the condition defined by the general technical acceptance conditions of the new machine tool, and hence to adapt the machine to the minimum health and safety requirements. Overhauled machines have the advantage over new ones that their body is already naturally seasoned, thanks to which we avoid mechanical stresses. Such a body

maintains its geometry in the long-term perspective and more effectively suppresses vibrations. In addition, after the installation of a new control system, the functionality of the machine increases significantly and is equal to the new machine tools. Depending on the complexity of the machine, various control variants may be used, e.g.

- in simple machines – logic control system based on relays and contactors,
- with more complex machines – recommended use of PLCs (the brand of the controller is determined by the customer).
- and CNC numerical control in machines requiring such system (Siemens, Fanuc, Mitsubishi)

Depending on the scope of repair and modernization of the machine tool, we can save markable cost which appears in relation to the purchase of a new machine. Modernization offers machine tools in the field of, e.g.:

- increasing the range of the machining space of the machine tool
- replacement of mechanical transmissions (reducers, feed boxes, etc.) for servo drives
- replacement of trapezoidal screws with ball screws
- application of central lubrication systems
- making new safety covers
- regeneration of hydraulic systems
- assembly of magnetic or optical measuring systems
- replacement of the existing control and electric system with modern solutions

Preparation for modernization of vertical CNC milling machine FP-17SMN4

We are planning a practical modernization of the FP-17SMN4 vertical CNC milling machine. The machine will be modernized for high-performance mechanical processing under "FarPi Mech Techno" conditions. The following pictures show the working parts of the FP-17SMN4 vertical milling machine. We collected these parts with our team and prepared them for modern modernization.

At Farpi MechTechno, our team brought the derelict FP-17SMN4 vertical CNC milling machine to a state of readiness for modernization by cleaning the body parts, painting and taking all precautions. In addition, we ordered the necessary parts for the modernization of this machine for the Chinese market. The necessary parts for the modernization of the FP-17SMN4 vertical CNC milling machine under Farpi MechTechno are being delivered.

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Fig.1 Workbench

Fig.2 The working table of the machine

Fig.3 Workbench spindle handle

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Fig.4 The upper part of the workshop

The FP-17SMN4 vertical milling machine CNC is shown in the figure 5 and 6 below, ready for modernization under the conditions of "FerPI MechTechno".

Fig.5. FP-17SMN4 CNC vertical milling machine

Conclusion

The restructuring of machine-building production in our country led to a sharp decline in the production of machine tools with digital control and automation equipment for machine-building. However, the development of a network of small enterprises that could not afford expensive automated technological equipment led to the need to modernize the equipment. In such conditions, a new approach is needed that meets modern requirements and is able to increase labor productivity with small investments with a constantly changing range of manufactured products.

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