# CREATION OF COMPREHENSIVE SPECIFICATION OF SPECIAL CNC MACHINE DESIGN SOLUTION

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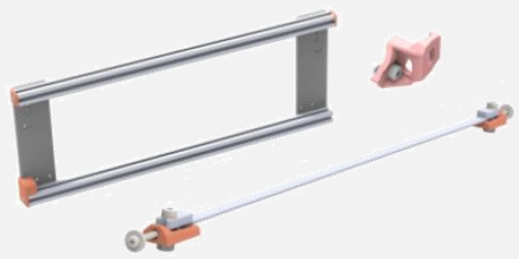
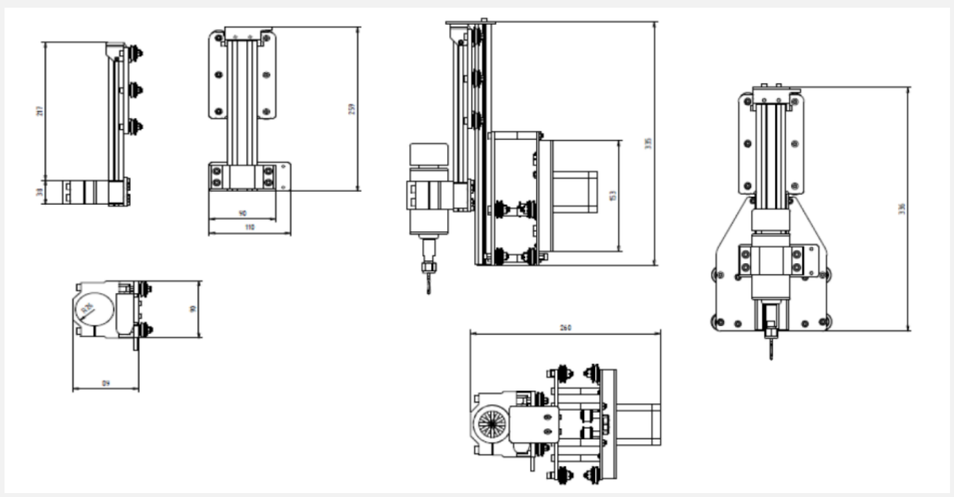
The conventional CNC machines are based on known design solutions in which the main production material is steel. At present, the field of material engineering has a wide range of new materials which raises the question of whether these materials can be used as a design element for CNC machines. At the same time, it is necessary to aware that it is required to develop special construction procedures for these materials. This paper focuses on the creation of comprehensive specifications of special CNC machine design solutions. The introduction part of the article provides a theoretical level of issue general knowledge and subsequently in the next part is described the specifications of design solutions of special CNC machines with a practical example of a selected example. The conclusion of the article is devoted to a comprehensive summary of the issues.

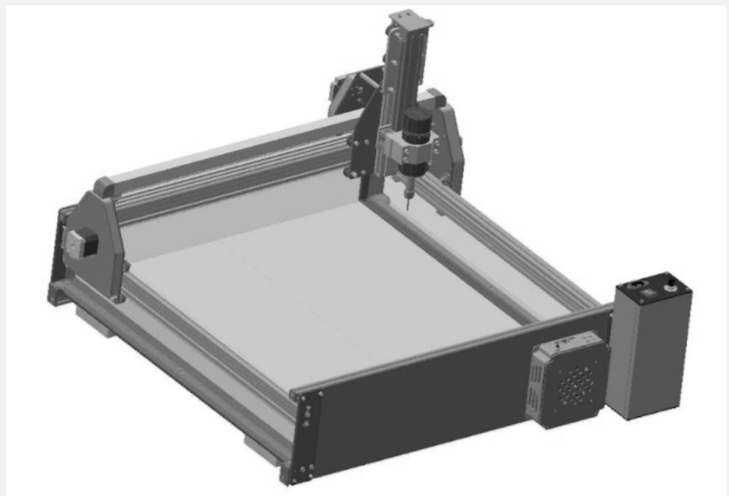
| Metallic material | Non-metallic material | Combination of metallic and non – metallic material | Natural material |
|---|---|---|---|
| **Cast iron** | Plastic concrete | Steel weldment with a filling of dampening material | Stone |
| **Cast steel** | Composites | | |
| **Steel** | | | |

The frame of the CNC machine can be constructed using the different materials most commonly using steel or grey cast iron. As a result of research and development, non-metallic materials such as concrete or polymer concrete can increasingly be encountered.



The frame must be dynamically stable so that its natural frequencies are significantly higher than the forced oscillations and that no resonance occurs. In addition to frames, linear rails are an essential part of CNC equipment. The primary function of the linear rail is to ensure accurate positioning of the elements that are movable in each axis. The basic linear rail elements include supported ball bearing rods, unsupported ball bearing rods and profiled ball bearing rods. To ensure accurate movement and reliability in conjunction with accuracy, stepper motors are implemented in the CNC machine. This model creation was of great importance in fine-tuning the details that could create problems in the actual production of the device. Based on the created model of CNC equipment was subsequently created also the drawing documentation, which is necessary for the subsequent production of the equipment.





The current trend of any production is rationalization and innovation. This is due to the widespread development of electronics, automation, material engineering and technology as a whole. This trend directly affects not only the production of the products themselves but also the production of machines and equipment, to which CNC milling machines undoubtedly belong. It is precisely because of innovation and rationalization that it is necessary to comprehensively specify the design basis for unconventional machine tools in these machine tools. The presented article was focused on the specification of the design basis of special CNC machines with a practical example of a selected representative. Although the designs of special CNC machines differ from one another, their construction must be based on generally applicable rules, which are determined and subsequently modified for specific cases.

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