

# New active machine tool drive mounting on the frame

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## Abstract

The paper deals with the new active mounting of the machine tool drives. The commonly used machine tools are at this time mainly equipped with fix-mounting of the feed drives. This structure causes full transmission of the force shocks to the machine bed and thereby restricts the dynamic properties of the motion axis and the whole machine. The spring-mounting of the feed drives is one of the possibilities how to partially suppress the vibrations. The force that reacts to the machine tool bed is transformed thereby the vibrations are lightly reduced. Unfortunately the transformation is not fully controlled. The new active mounting of the machine tool drives allows to fully control the force behaviour that react to the machine body. Thereby the number of excited frequencies on the machine tool bed is significantly reduced. The active variant of the feed drive mounting is characterized by the synergistic cooperation between two series-connected actuators (“motor on motor”). The paper briefly describes design, control techniques and optimization of the feed drives with the new active mounting conception.

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## 1. Introduction

The contemporary machine tools are characterized by using the fast in frame mounted feed drives. The linear axis is connected with the machine structure by the linear motor or rotary motor with the ball screw. The motor is fast inbuilt to the machine bed and presents a source of the motion force which reacts equally to the machine frame and motion axis. High value and wide frequency spectrum of the motion force is typical for the high dynamic machine tools. They have to quickly react to the position and velocity setpoint given by the control system. Various power shocks are transmitted to the machine bed during the operation and excite wide spectrum of the frequencies. Excited natural-frequencies are dangerous especially because of the vibrations amplification. Oscillation of the machine bed and motion axis is problematic for the precise machining and deteriorate dynamic properties of the motion axis and whole machine tool.

The paper deals with the advanced technique which transforms the frequency spectrum and amplitude of the reaction force. It allows to suppress the machine tool vibrations and thereby to improve dynamic properties of the motion axis. The technique is based on the feed drive motor mounted by the help of another motor which works as the vibroisolation – so called “*motor on motor*”.

The text is also briefly interested in the spring-mounting of the feed drives. It is mentioned as an intermediate stage between the common fix and the new active feed drive mounting.

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