

WYDZIAŁ MECHANICZNY TECHNOLOGICZNY
Katedra Budowy Maszyn
POLITECHNIKA ŚLĄSKA W GLIWICACH

ROZPRAWA DOKTORSKA

**„Badania odkształceń statycznych wybranych węzłów
konstrukcyjnych obrabiarek do obróbki zestawów kolejowych”**

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Abstract

The continuous increase in competitiveness in the special purpose machine tools industry requires the expansion of the process of prototypes design. The worldwide, significant increase in the development of rail transport opens the market for equipment for the maintenance of rolling stock with particular emphasis on, for example, increasing needs for efficiency, accuracy and speed of machining process. In this case, in addition to the approach based on e.g. on intuitive design and basing on previous, proven solutions, it is also necessary to take into account tests on real, already manufactured prototypes and simulation tests of machine tool models using the Finite Element Method (FEM).

This doctoral thesis includes the results of two research methods of testing the static stiffness of selected structural nodes of two types of machine tools of the Polish manufacturer: UGE 180N underfloor wheel lathe and UFD 140N portal wheel lathe. The first research method includes experimental tests, through the development of a universal test stand as part of the own work of Faculty of Mechanical Engineering of Silesian University of Technology. The second research method includes the applied numerical FEM analyzes. The doctoral thesis was extended to research, covering topological optimization of the main machine tool units: saddle plate bodies, main slide bodies and a brake disc facing slide. The chosen optimization goal is bidirectional: reducing the mass of components (cost criterion) and increasing stiffness (efficiency criterion). Successful attempts to apply topological optimization take into account the technological aspect of design of selected nodes. Results of further design works constitute for implementation proposed changes into production process.