Article Abstract

Title:	**Extending the technological capability of turning operation**
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Abstract:	The main goal of this paper is to compensate the elastic deformations of the technological system in order to achieve maximum cross sectional accuracy and productivity of turning operation with minimum cost. This study was based on developing of mechanical adaptive system (MAS) for accuracy control by dynamic adjustment of the tool position during processing. The dynamic characteristic of components of the engine lathe technological system supplied with the proposed MAS was studied, and a mathematical model was obtained and presented as a system with one degree of freedom in the direction of Z-axis. The stable zones of operating were defined using Leonarion graphic method. The optimal cutting parameters correspond to stationary positions of equilibrium were obtained when processing heat resistant steel under the following conditions: feed rate, S, ranges from 0.07 to 0.39 mm/rev; depth of cut, t, ranges from 0.5 to 1.5 mm; and turning speed, υ, ranges from 0.55 to 1.45 m/sec. Experimental examination of the proposed system showed that the use of adaptive control may overcome the error appeared due to the elastic deformation of the technological system. The maximum circularity deviation of the processed, using the developed MAS, cylindrical surfaces did not exceed 40 microns, whereas 98 microns of maximum deviation was reached using usual cutter. The developed MAS can, in number of cases, replace the cylindrical external grinding processing by usual cutting on lathe machine tools, providing thus the rigid requirements on dimensional and form accuracy in cross sections.
Keywords:	Control systems, cross sectional accuracy, mechanical adaptive, productivity, turning