

OPTIMIZATION OF FIXTURE CONFIGURATIONS FOR MULTIAXIS MACHINING OF PARTS

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The main trend of modern machine-building enterprises of Ukraine and the world is reducing the cost of finished products. Amid competition is made possible by reducing rates of auxiliary time in component of machining time that in terms of multiproduct manufacture can be achieved by using adjustable fixtures. But these fixtures should provide sufficient machining accuracy and high rigidity with minimal weight. Addressing these complex tasks of selecting the optimal fixture configuration is an urgent task for today manufacturing.

The aim of the research is to improve the machining of parts such as levers by optimizing the configuration of flexible fixtures, capable to multiaxis machining, by scientifically grounded choice of fixture parameters.

For the first time proposed and implemented a method of identifying and realization reserves of fixture optimization on the example of a multiaxis machining parts such as levers to determine the optimum parameters of the fixtures, which provide the required machining accuracy and sufficient rigidity of the system “fixture – workpiece”. Based on the results of the static structural, modal and harmonic analyses of fixtures revealed the optimal parameters for each of the elements adjustable fixture and proven working capacity of the proposed fixture configuration, which provides a high level of flexibility, required rigidity of the system “fixture – workpiece” and provides a machining accuracy, specified by designer within the entire range of dimensional group of parts.

The calculations of fundamental indicators of cost-effectiveness of the options of fixture systems for machining of levers showed that the achieved affordability of the proposed fixture was made possible by reducing auxiliary time, time for adjustment and reconfiguration.

It is proved that the fixture with a high level of flexibility allow to machining parts with sufficient accuracy, and greatly reduce the auxiliary time and preparatory time for changeover to another standard size, which is confirmed by calculations of affordability, which amounted to 905.4 thousand UAH with an annual production volume of 2000 pcs of parts. The cost of the proposed fixture for one part was 0.56 UAH, which is 650% less than using modular fixture of typical manufacturing process.