

УДК 621.9.115  
 RESEARCH OF POSSIBILITIES OF IMPROVING DEEP HOLES  
 ACCURACY DURING THEIR FORMATION WITH SPIRAL DRILLS

О. Н. КЛЯУС

Научный руководитель А. А. ЖОЛОБОВ, канд. техн. наук, проф.

Консультант А. В. КАРПЕНКО

Белорусско-Российский университет

Currently, the problem of processing deep holes is of great interest for many branches of mechanical engineering.

Peculiarities of deep holes processing require minimization of a number of factors that affect the accuracy of the formed holes and the location of their axes, which include: complex conditions for the supply of lubrication and cooling in the cutting zone and chip removal; removal or deviation of the axes of the holes from the desired position; errors in the size and shape of holes in the radial and longitudinal sections. An effective way of the process improvement is its further modification by means of reducing the offset or removal of the hole axis by the drill withdrawal.

The purpose of this work is to create a method of theoretical research based on the development of a mathematical model that allows to calculate the deviation of the hole axis based on the removal of the tool, and visualize it.

To achieve this goal, a program was needed to calculate the deviation of the deep hole axis depending on certain parameters affecting the drilling process.

Special machines are often required to drill deep holes with adequate straightness and to ensure efficient chip ejection and lubrication of the drill. Deviation is deep displacement axis from its theoretical position. It depends on the withdrawal of the drill and is divided into the following components: geometric and elastic removal of the drill. Mathematical calculations of the components of the drill removal depending on the action of various factors were presented in a program.

The adequacy of the model was checked by changing the components of each type of the hole axis displacement. Graphs show the elastic withdrawal of the drill at equal values of the main angles in the plan. Since the angles in the plan will be equal when the drill is perfectly sharpened, the offset of the drill will be 0, which is confirmed by the graphs. Other graphs show the offset caused by the geometric withdrawal of the drill. When the diameter of the gap between the replacement bushing and the drill decreases and the length of the replacement conductor bushing increases, the withdrawal is reduced.

Conclusion: each of the components of the model is adequate, which means that the created application can be used to predict the deviation of the hole axis due to the removal of the drill.