

Robotisation of production processes is a way of automatising, which is based on the usage of robots in industrial processes. The target of robotisation is increasing technical and economic characteristics of production processes.

Grippers are one of the main parts of the robots, which are used for grasping and holding of manipulated workpieces and technological equipment. Grippers connect robots with a working space. A gripper is one of the elements that define technical possibility of the robot.

Objects of manipulation can have different dimensions, form, mass etc. It means that for manipulation of different types of objects it is necessary to use different grippers.

Optimisation of robot control is one of the main tasks for creating new production units and adapting the old ones for making new products. Optimal grippers selection according to the requirements of technological process and increasing the reliability of their work is one of the main tasks of robot control optimisation.

In this paper is analysed the main groups of the workpieces subjecting to machining on robotised cells and the main classification signs for these workpieces.

The complex criterion of gripper selection, which is offered by the author of this paper, is given. This optimisation allows by reduction the required powers of the drive to use the drives of smaller mass that increase useful carrying capacity of the robot i.e. increase the maximal mass of the workpiece, which can be manipulated by this robot, and decrease the inertial characteristics of the gripper. This principle, in the opinion of the author of this paper, is one of the main principles of optimisation for grippers.

In given paper is analysed the dependencies of possible motions of the workpieces of the most simplest forms in the two-finger grippers depending on the amount and positions of contact points with the jaws of the most simplest forms. On the base of designed table it is possible to select the optimal two-finger gripper for grasping the workpieces of the most simplest forms.

Introduce into practice the classification of gripper jaws by degree of agreement of these jaws with grasped object.

In this paper is introduced into practice the conception of reduced two-fingers gripper with one jaw – point-leg, which allows to compare different types of the workpiece grasps by degree of its freedom in the gripper. Was offered the algorithm of reducing of two-finger gripper to the gripper with one jaw – point-leg in the case of workpiece grasp on external surface.

Developed the theorems, which allow to define the possible workpiece motions in the case of a workpiece grasp in a multi-finger gripper. Introduced into practice the conception of equivalent grasp according to the quantity of contact points between the gripper and workpiece and workpiece degrees of freedom. On the base of this conception it is possible to compare the efficiency of applying different grippers in the case of grasp the workpieces of one type and go from the most simplest two-fingers grippers to the multi-finger ones and back without changing the contact points with workpiece and changing the scheme of the workpiece basing too.

In this paper is offered the algorithm of reducing two-finger gripper to the gripper with one jaw – point-leg. Is offered the algorithm of optimal selection the form of gripper jaws and recommendations of increasing the number of contact points. This algorithm and recommendations allow to optimally select the jaws of the grippers for concrete technological operation and increase the reliability of its execution.

The different methods of the workpiece grasping force calculation are considered. The alternative model of this force calculation, which allows to select the gripper for concrete technological operation, is offered. This model allows to greatly decrease the required grasping forces of the workpiece without decreasing the reliability of its fixation in the gripper and increase the accuracy of realisation the robotised operation.

In this paper is considered the components of installation error of the workpiece in the device and recommendations of their reduction. These recommendations are correct in the case of analyses of the installation error in mechanical grippers too.

Also considered the main types of the base surfaces, given recommendations of their optimal selection from wearing point of view. It gives a possibility to increase the lifetime of the gripper and decrease the number of required qualification of its wearing.

The classification of the object grasp by human hand is offered. This classification combine in itself all classifications considered in the paper. This classification allows, in the opinion of the author of this paper, to create the intelligence grippers, which are able to work like human hand.

Was offered the algorithm of optimal gripper selection for concrete robotised operation. This algorithm contains all above described recommendations, that allows to realise the optimal selection of the grippers in terms of technological requirements and saving resources on their application.

By the author of this paper in co-authorship with consultants was offered two original grippers to which was sent the patent applications.