Design and Trajectory Simulation of Arm Manipulator for Handling Wafers

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ABSTRACT

Among hi-tech automation manufacture, in order to promote manpower, material effect, financial capability and economic effectiveness, production automation is an inevitable tendency. In this tendency, robot arm is one of the representatives of the most efficient tool machines. Application of robot arms/manipulators is very common in the semiconductor industry. Most of the products are manufactured and tested in a very restrictively clean environment, the design of robot arms becomes conspicuously important. Most manipulators are imported for the domestic usage, the costs are relatively high in this country in general. In this way, the study of arm manipulator design for handling wafers will be discussed in this thesis. There are three parts in this study, that are, structure design of the manipulator, required formula derivations, trajectory design/simulation. SolidWorks is used for the end-effector design of the manipulator. Denavit-Hartenberg notation, manipulator kinematics and inverse kinematics are used for the simulation programs design. For the trajectory design, joint-space schemes as well as Cartesian-space schemes are used. Finally, for a complete simulation for verification of our design, Matlab is required to complete the task. Otherwise noted in this thesis, the unit of length is assumed to be in millimeters, and the length of angle in degree.

Keywords : Robot Arm/Manipulator ; Arm Manipulator for Handling Wafers ; Trajectory ; Denavit-Hartenberg ; SolidWorks 3D

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