

THE DESIGN OF TOOL BREAKAGE DETECTING AND RECOVERY PROCESS FOR OPEN PCB CNC

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ABSTRACT

TOOL LIFE MODEL FOR PRINTED CIRCUIT BOARD (PCB) DRILLING PROCESS WILL BE ESTABLISHED TO PREDICT THE TOOL LIFE. THE TOOL EXCHANGE CONTROLLER BUILT IN AN OPEN CNC CAN AUTOMATICALLY REMOVE THE WORN DRILL WHILE THE LIFE IS FINISHED ACCORDING TO THE MODEL. THE DRILL BREAKAGE DETECTOR IS CONNECTED WITH THE CNC GIVEN THAT THE CONTROLLER IN THE CNC CAN REMOVE THE BROKEN DRILL AUTOMATICALLY WITHOUT MACHINING TERMINATION. THE MACHINING TIME REDUCES AND MACHINING ACCURACY CAN BE MAINTAINED WHILE THE CONTROLLER WORKS IN THE CNC. THE EXCHANGE CONTROLLER IS PRESCRIBED BY THE MACRO FUNCTION IN THE OPEN CNC, WHICH CAN DETECT THE TOOL BREAKAGE VIA THE SENSOR MOUNTED ON THE MAIN AXIS. THE TOOL MANAGEMENT IS ALSO PRESCRIBED BY MACRO FUNCTION, WHICH CAN MONITOR THE TOOL LIFE DURING THE WHOLE DRILLING PROCESS. A NEW DRILL WILL BE FOUND AND RESET ON THE MAIN AXIS BY THE EXCHANGE CONTROLLER WHILE THE MANAGEMENT FINDS THE TERMINATED LIFE. THE PRECISION CAN BE MAINTAINED VIA THE REPLACEMENT OF SEVERAL NEW DRILLS. THE DEVIATION ERROR AND MACHINING TIME WILL BE VERIFIED THROUGH THE EXPERIMENTS. THE ERROR IS CONSTRAINED BELOW A DESIRED SPECIFICATION AND THE OPERATION TIME WILL REDUCE COMPARING WITH THE ONE OF MANUAL OPERATION.

Keywords : PCB DRILLING MACHINE, CNC, DRILLING BIT, TOOL LIFE, TOOL BREAKAGE DETECTION.

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