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Design and implementation of automated heat shrink cutting process for industrial usage

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An automated heat shrink cutting process for industrial usage has been designed and a prototype model implemented. The designed system consists of a microcontroller, a keypad, a stepper motor, and an ac synchronous motor. The inputs such as the length of the heat shrink and number of pieces required to be cut are given to the system through a keypad and entries are displayed in an LCD panel. That information is fed into the microcontroller, which is the main controller of the designed system. Roller pack of heat shrink is inserted into a socket formed by a rubber shaft attached to the stepper motor. Length measurement of the inserted heat shrink is done by the stepper motor using a simple calculation and heat shrink is pulled into the system for the calculated length. Then a cutting blade powered by the synchronous ac motor connected to the microcontroller cuts the heat shrink at the required length. The process will be repeated until it cuts the required number of pieces. The operation of the process is verified by cutting different number of pieces with different lengths. The designed system can measure a 0.2 mm least count and is better than required accuracy of 1 mm for normal industrial wire harness based product lines. The speed of the designed process is between 25-30 pieces per minute and is well above the speed of a trained human in the same task. It is expected that the cost effectiveness of this designed heat shrink cutting process will be found very useful in the automation of industrial wire harness production lines.

Keywords: Heat shrink, Microcontroller, Stepper Motor, synchronous AC Motor