Design and Implementation of a Novel Flow Control Valve and Position Control Systems for Pneumatic Actuator

許東成、蔡耀文

E-mail: 9510767@mail.dyu.edu.tw

ABSTRACT

Operating automatic machine, precise flow control valve or other components are called for to operate with positioning controller while pneumatic system controls position. For practical purposes, however, uses of pneumatic system are limited because of expensive imported positioning controller, such as German FESTO flow control valve. Therefore, this research aims at design and development of new flow control valve and its positioning control system. Through experiment, a less expensive and accessible practice of precise pneumatic positioning control has succeeded in controlling position by precision of 0.2 mm, which makes the research valuable in practical propose. First of all, the research designs a new, adjustable flow control valve, which has patented in Taiwan and China. (Taiwan patent NO. M280442. China patent is approved and issuing certification). Also, another design for hydraulic & pneumatic positioning control structure has been done and gotten Taiwan patent of new positioning control instruction (positioning control structure, patent NO. M281096). By complex electrification control, machine manufacturing can be more precise; hydraulic & pneumatic control technology can be more complicated. To practice precise pneumatic actuator and positioning controller, the research takes proportional integral controller and variable structure controller with DSP control units system; it can precisely control position. Moreover, the easy-to-get, low-priced units could make enterprise more competitive by reducing manufacturing cost, which is one of the main ideas of this research.

Keywords : Pneumatic actuator,Flow control valve,Proportional integral controller,Variable structure controller

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