

Design fabrication and test of a precision linear actuator

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ABSTRACT

The assembly of a motor and a ball screw is a classical application to the precision transmission mechanisms. However, the traditional design, i.e. a motor drives a screw via a coupler to make a nut move in a linear way, will result in the larger assembly space, the inefficiency, ... and so on. Moreover, the minimum pitch for the current ball screws is 1mm so that it is difficult to attain a more precision positioning. In this regard, a novel design based on two ball screws of different pitch integrated with a brushless DC motor is proposed in this paper to improve the positioning accuracy. First, two ball screws are chosen according to the traveling pitch, and then the associated brushless DC motor will be synthesized from the structural conditions and load requirements. The main characteristics of the proposed design are that the both ends of the motor are connected to these two ball screws. After that, the Ansoft software is used to analyze the performance of the motor to verify the feasibility of the designed motor. Finally, a prototype for the proposed system is manufactured and tested to validate our proposed design.

Keywords : ball screw、precision positioning

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