
Two-Stage Solenoid

This solenoid would include three cores instead of one.

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A proposed design for a solenoid-based electromechanical actuator would provide greater starting force than does a comparable conventional design. As used here, “starting force” signifies the magnetic force exerted by the actuator at one end of its stroke when the gap in its magnetic circuit is the widest.

A solenoid of conventional design exerts a large force when its gap is closed. The magnetic force decreases as the gap increases. Hence, typically, the starting force exerted by a conven-

tional solenoid is small; depending upon the specific application, the starting force may even be insufficient to initiate closure.

Whereas a conventional solenoid design provides for only one core, the proposed design calls for three cores, two of these being fixed to one another with a separate core between these two. Analysis shows that in comparison with conventional solenoids, the solenoids of the proposed design would not have a cost impact, could have longer operational

lives, and exhibit larger forces in an open position. It was also reported that the proposed design could be extended to multiple-staged solenoid design, which would yield increased force in the middle of the stroke as well.

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