Motoring On to Increased Lab Production

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With ever increasing needs for medical laboratories to produce new flu vaccines and additional quantities of pharmaceuticals for our aging population, technology has to meet the challenge with higher throughput equipment. This article focuses on the motor specifications needed while increasing the capacities when automating a pipette system for a lab automation company.

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There is more to compactness than just using smaller motors. IntellePro Inc. faced a serious challenge when the company needed a system that would accommodate pipettes on 18 mm centers that would also be capable of driving six probes independently with up to 125 mm strokes. IntellePro worked closely with a biotech integrator (Protedyne) in both the design and development of the pipette automation system to ensure the performance and life expectancy required by Protedyne's "Radius" line.

Design challenges for the pipette system included the need for a mechanism that would withstand substantial axial loads during the pressing-on of the pipette tips. It was found that the system also needed to have adequate motor thrust enough to overcome a pierceable foil that required 0.5 pounds of thrust and pierceable caps that required 1.6 pounds of thrust. Finally, the system acceleration and deceleration speeds had to be slow enough to prevent liquid from splattering.

It was found that brushed motors could drive the system as needed. By using

Maxon RE13DC moving coil motors with Neodymium magnets, the system also gained long life, low electrical noise, and high efficiency with this design. Since great accuracy was vital, the solution was to drive the helical racks carrying pipette tips with motors using planetary gear reduction, encoder feedback for smooth servo controlled displacement motion, and recirculating linear bearings for precision and repeatability.

Smoothness of operation and freedom from cogging was critical for the application. Cogging could impede the motion of the pipette probe and lead to pipetting errors. The planetary gear reduction and encoders integral to the system allowed the motors to facilitate excellent servo control and minimal backlash, resulting in high positioning accuracy and long life. The ironless rotor design of the motor allowed for zero cogging, a significant aid in the motor's simple and accurate control.

Online

For additional information on the technologies and products discussed in this article, see *MDT* online at www.mdtmag.com [2] and the following websites:

- www.maxonmotorusa.com [3]
- www.intellepro.com [4]
- www.protedyne.com [5]

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