Battery Insertion and Wear Tester

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INTRODUCTION

Varex Imaging is a world-wide supplier of X-ray imaging products. Wireless X-ray imaging plates are a main focus of their industry. Wireless plates are battery powered and allow for convenient out-of-office screenings. The batteries powering these plates are secured using a latch, which occasionally fails. Varex requested a device that could insert and remove the battery from the imaging plate to qualitatively determine the cycle lifetime of the battery latch.

CONTROLS

A PLC+HMI controller was chosen to control the actuators. Both the controller and the actuators are industrial grade; chosen for their high reliability and simplicity. This controller features a touch screen that allows a user with any amount of technical background to easily operate the device. The actuators are highly precise to allow for accurate insertion every cycle.

OBJECTIVES, FUNCTIONS AND METRICS

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<tr>
<th>Objective</th>
<th>Desired Metric</th>
<th>Actual Metric</th>
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<tr>
<td>Light weight</td>
<td>&lt;50 lbs.</td>
<td>18.5 lbs.</td>
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<td>Bench top size</td>
<td>24x24x12 in. (LxWxH)</td>
<td>21.5x21.5x12 in. (LxWxH)</td>
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<td>Reliable</td>
<td>&gt;10,000 cycles</td>
<td>&gt;10,000 cycles</td>
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<td>Low cost</td>
<td>&lt;$3,000</td>
<td>$1,016.50</td>
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Primary Functions:
- Release battery from imaging plate.
- Lift battery away from imaging plate.
- Insert battery into imaging plate.
- Latch battery into imaging plate.

FINAL DEVICE

The Final device meets all objectives and metrics and performs all primary functions with room for additional secondary functions such as force measurement or image capturing. The device is also capable of adapting to different sizes of imaging plates, having fully adjustable mounts.

MOTION

Controlling the motion of the device was a major challenge. The actuators provided the precision needed to align the battery properly, and this 4-bar linkage was designed to allow for removal and reinsertion.

COMPLIANCE

Adding compliance to the machine was another major issue to solve. Compliance allows the machine to add a little extra force to the parts without causing damage. Here compliance was used to allow the battery to slide into the panel without causing damage to the imaging plate.