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Socket Lid for 10K+ pin count devices

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Introduction

Manual actuation lids are a pivotal component to any test socket design as it provides the necessary contact force required for a reliable connection. The latest packaged devices are becoming larger, more powerful, and with greater seating plane tolerances. To mitigate these changes pneumatic socket lids have been developed to actively control the overall and local contact force of the DUT. This approach helps to fine tune contact resistance on different areas of the device and to keep this value constant over thermal cycles.

Applications

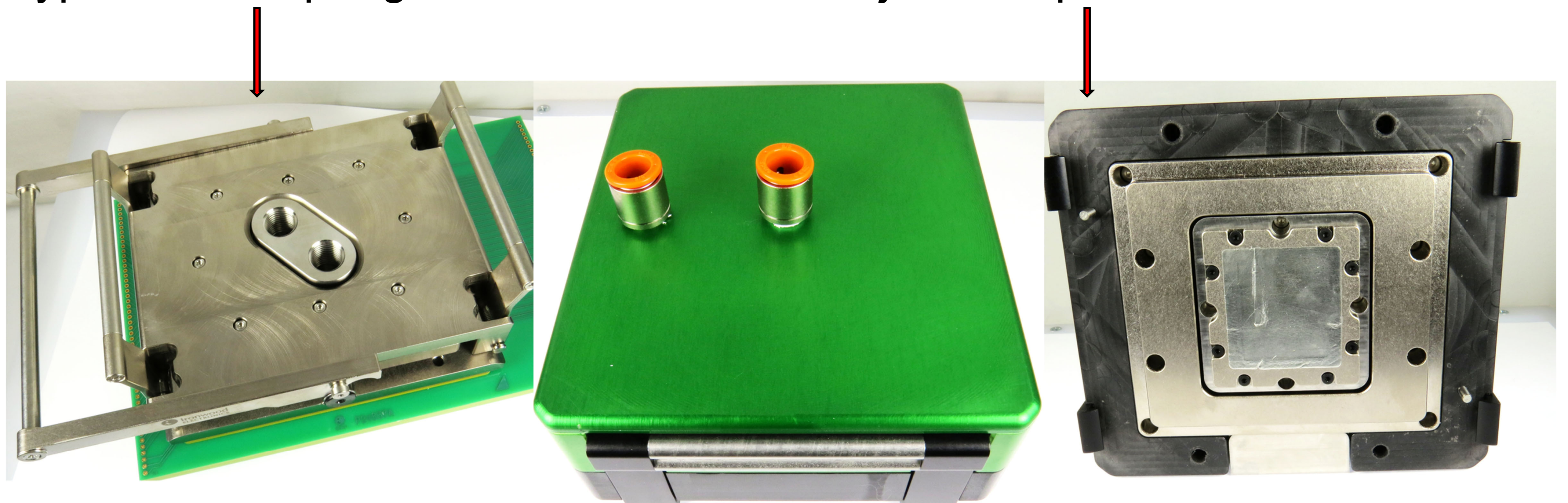
- High pin count devices (4000+ contacts)
- Large device sizes (>50mmx50mm)
- Device packages with large warpage of the seating plane (>±0.2mm)
- Extreme thermal cycling

Comparison of lids developed for large devices

- Spring force variations (typical ±10%)
- Large device thickness variations (±20%)

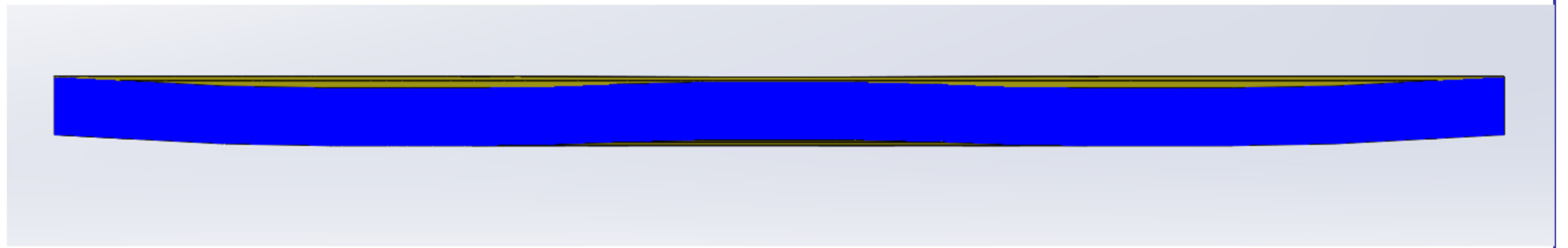
Typical fixed spring with 2 zones

Adjustable pneumatic with 2 zones

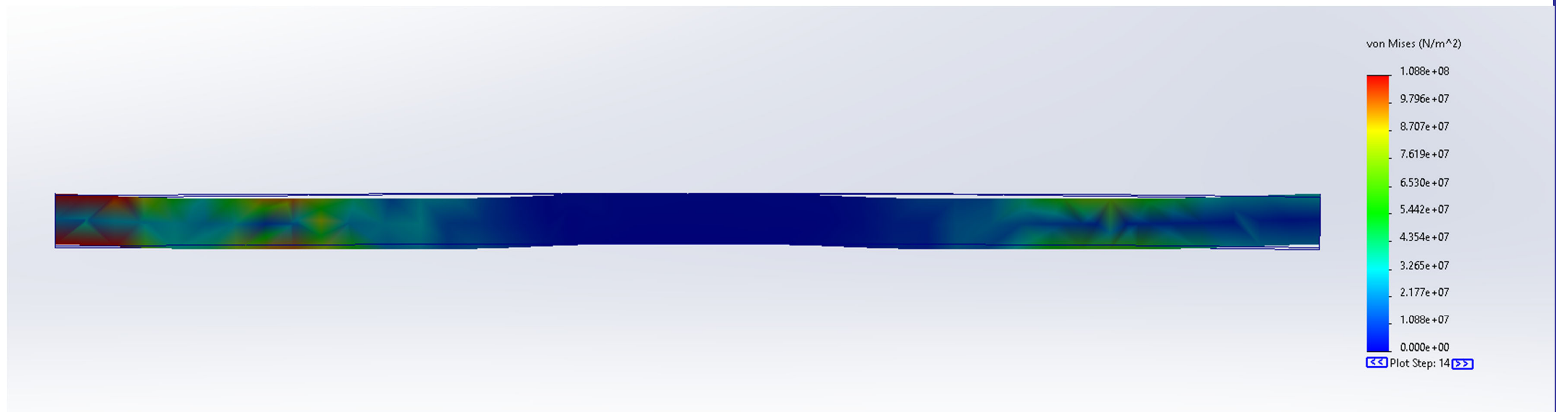


Case Study 1: 50x50mm device with 600 lbf

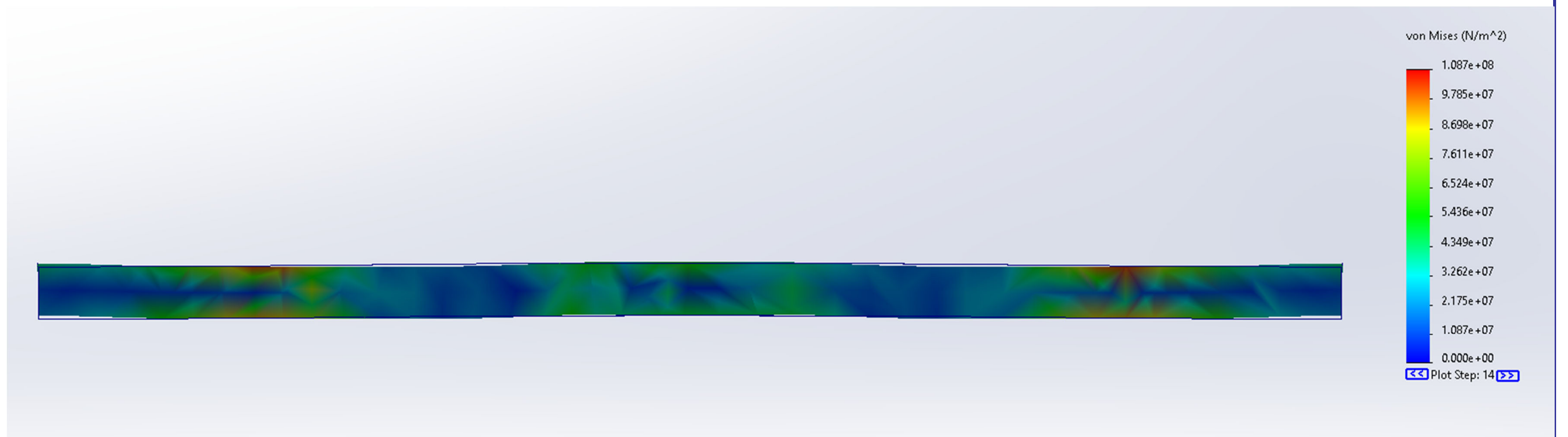
Typical 0.2mm coplanar device



600 lbf applied by uniform plate, no force applied to die



Pneumatic lid, 200 lbf to center, and 400 applied to perimeter



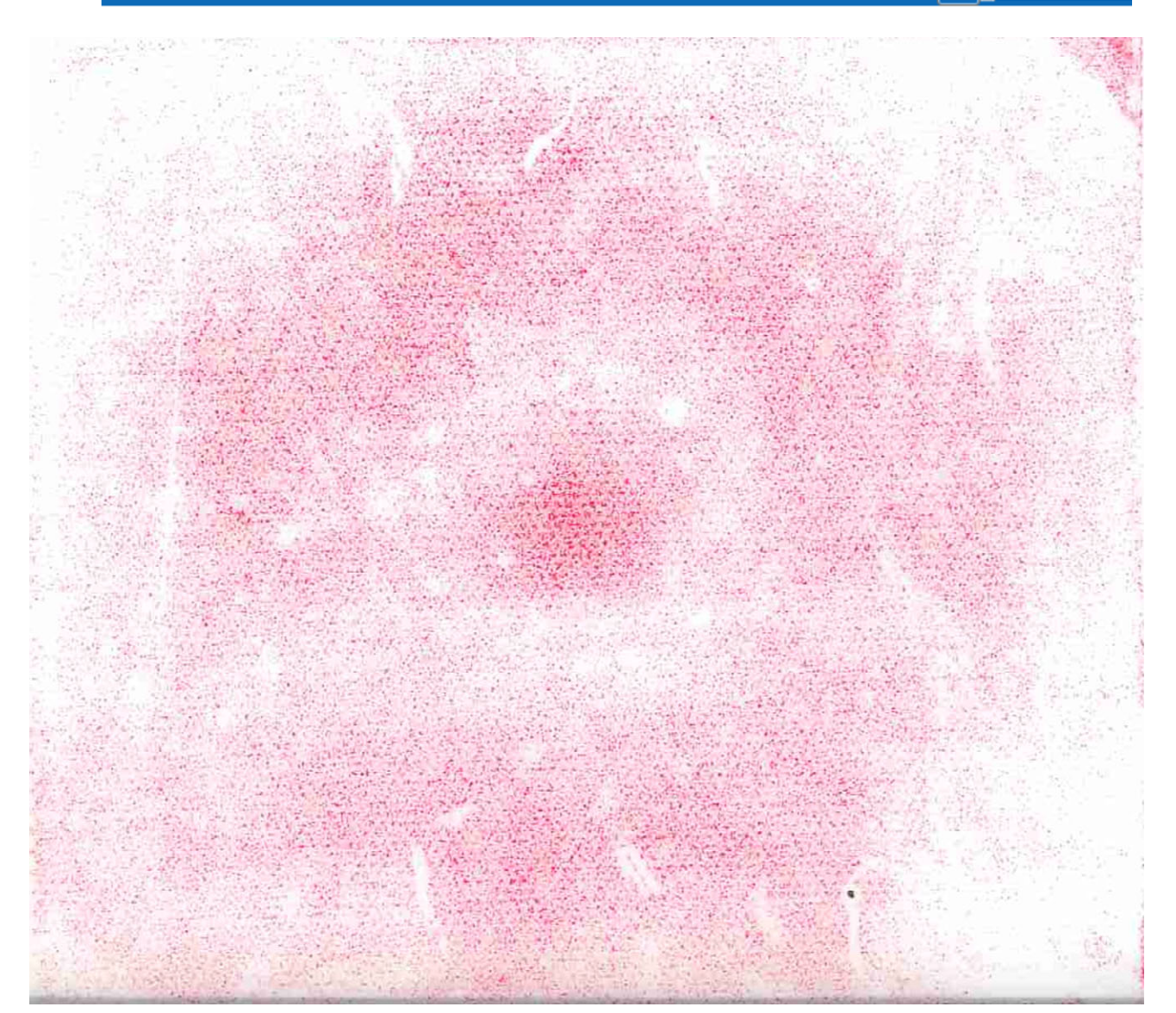
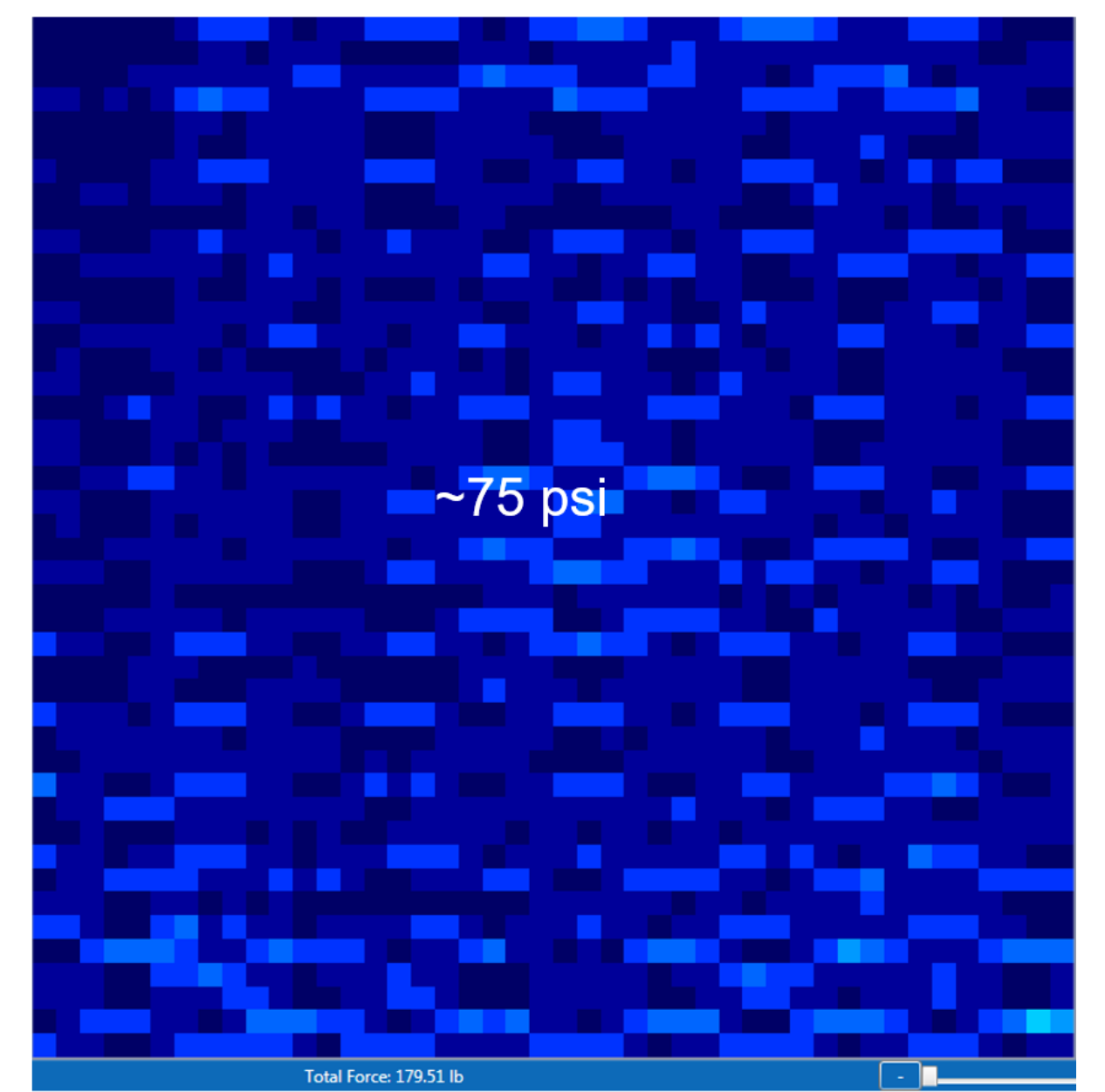
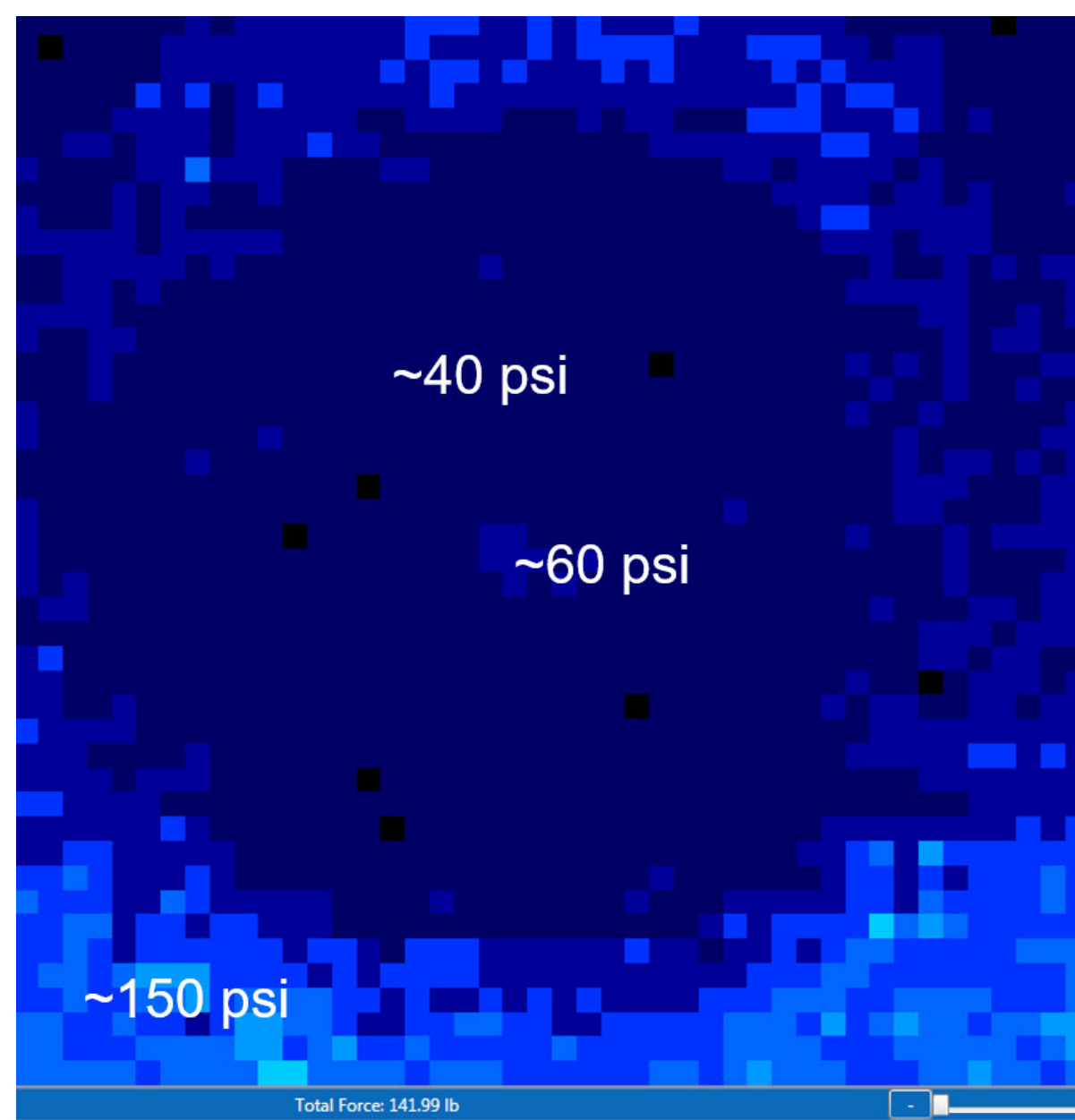
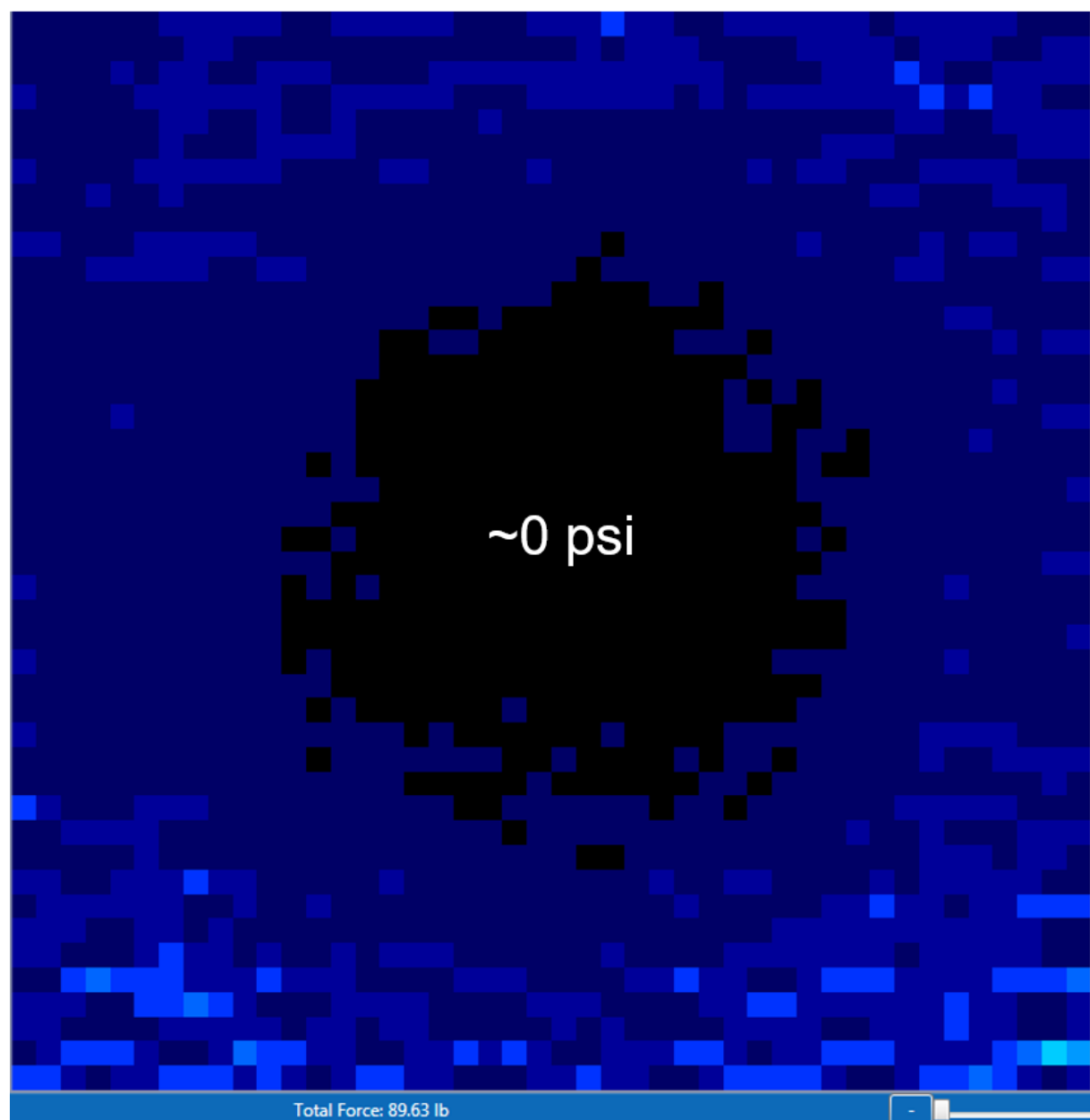
Case Study 2: Uneven Pressure force over contact area

Dual zone spring applies low force in the middle because of device tolerance

Dual zone pneumatic system allows force adjustment independent of device tolerance.

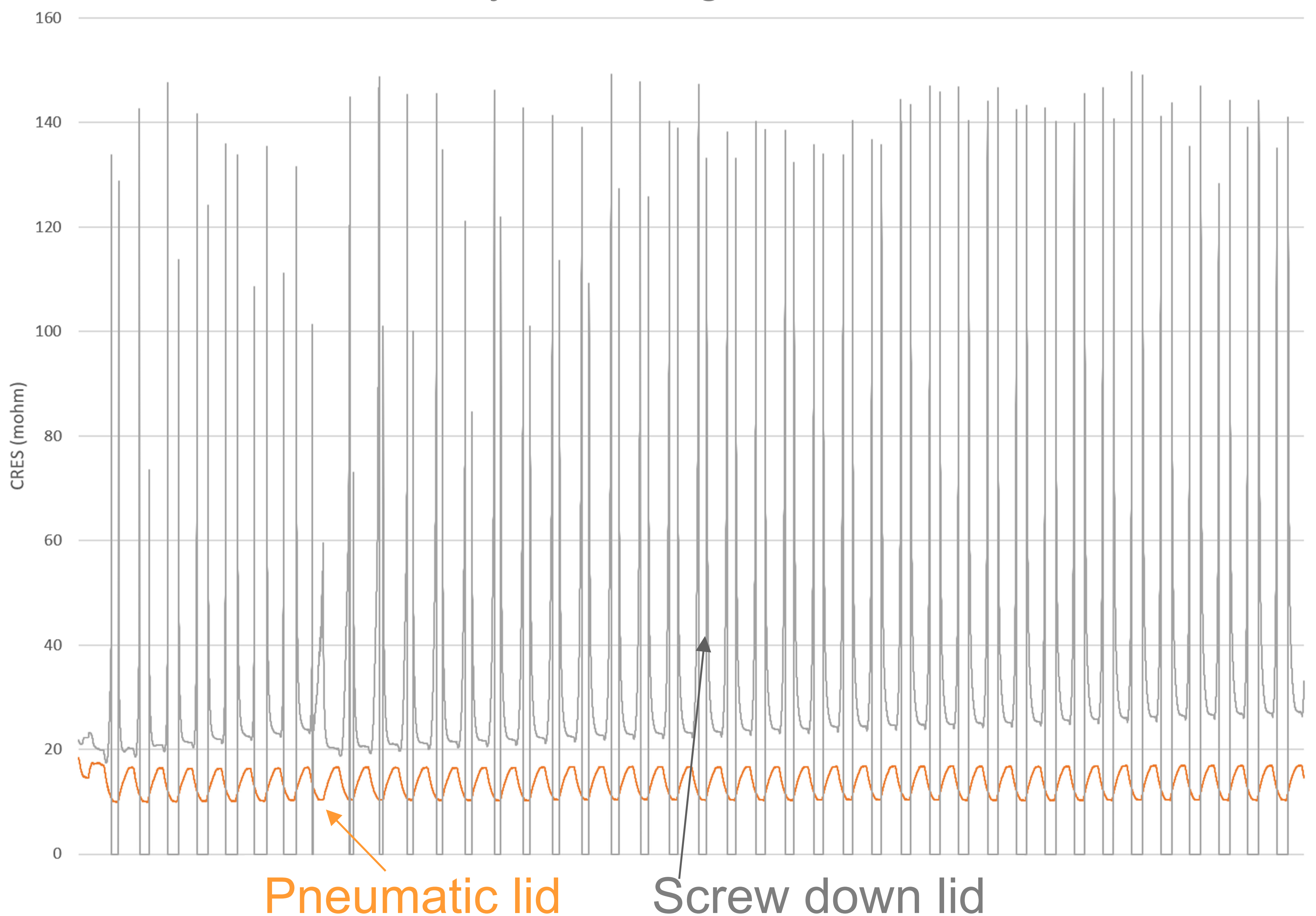
Intermittent stage

Final stage



Case Study 3: Thermal cycling

Thermal cycle testing -55C to +160C



Further opportunities

- Separate zones are required for exposed die applications and controlling force in each zone is critical for device testing without damage.
- Accommodating various co-planarity with independent force control for each device.
- High performance elastomer requires even force throughout ball array field can be easily accomplished with pneumatic control.
- Linearizing the contact resistance by actively adjusting the force over temperature.
- Additional pneumatic zones to adjust localized contacts.
- Pneumatic lids can apply force in the corner for stress testing.
- Ease of operation (push buttons instead of mechanical leverage) in production environment with simple controls.

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