

Rocket Lab Rideshare CubeSat Launch in *Maxwell*



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Mission Management &
Integration Director***

2018 CubeSat Developers Workshop

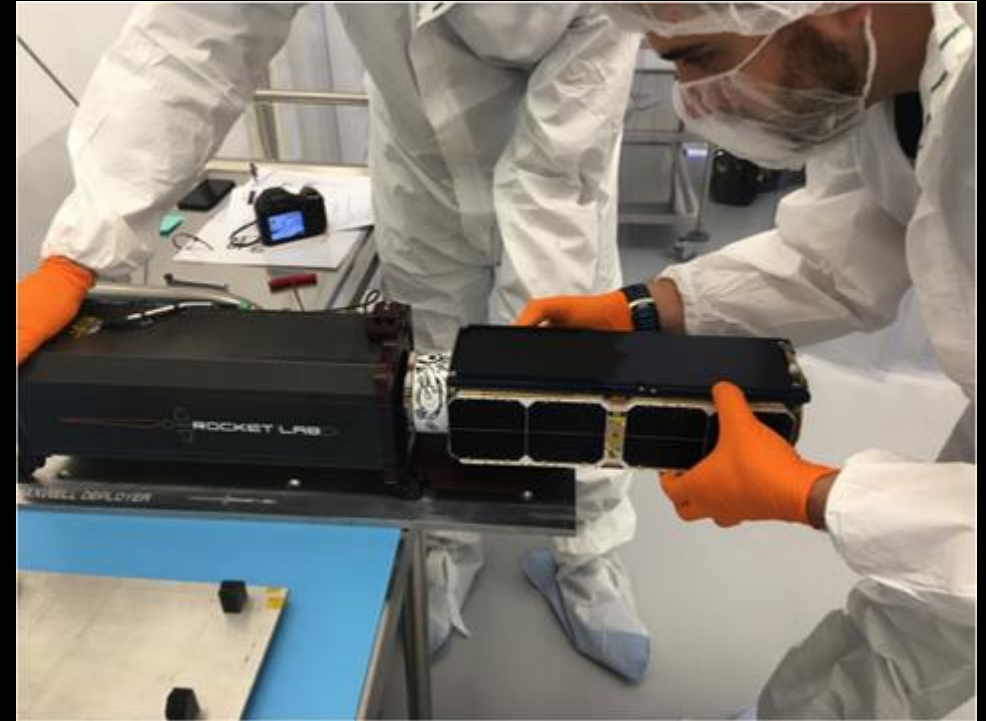


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AGENDA

- **Rocket Lab & Electron Introduction**
- **Rocket Lab CubeSat Flights**
- **Maxwell CubeSat Dispenser**
 - Maxwell Dispenser Family
 - Specifications
 - Maxwell Testing
- **CubeSat Launch Services**
 - How to Fly on Electron
 - Advantages for CubeSats
 - Facilities & Capabilities



*First Flight CubeSat Integration to Maxwell
Planet Dove Pioneer
Rocket Lab Flight 2 "Still Testing"*



ROCKET LAB INTRO

- **Founded in 2006 by Peter Beck**
- **US Company HQ in Huntington Beach, CA**
- **5 Sites in the US and NZ**
- **Fully vertically integrated in house**
- **First private company to reach space in southern hemisphere 2009**
- **Over 80 successful sounding rocket launches**
- **10 year history building complex systems**
- **1st Electron launch in May 2017 – reached space**
- **2nd Electron launch in January 2018 – reached orbit, deployed 3 CubeSats for Planet & Spire**
- **CubeSat Integration Completed for Flights 3 and 4**



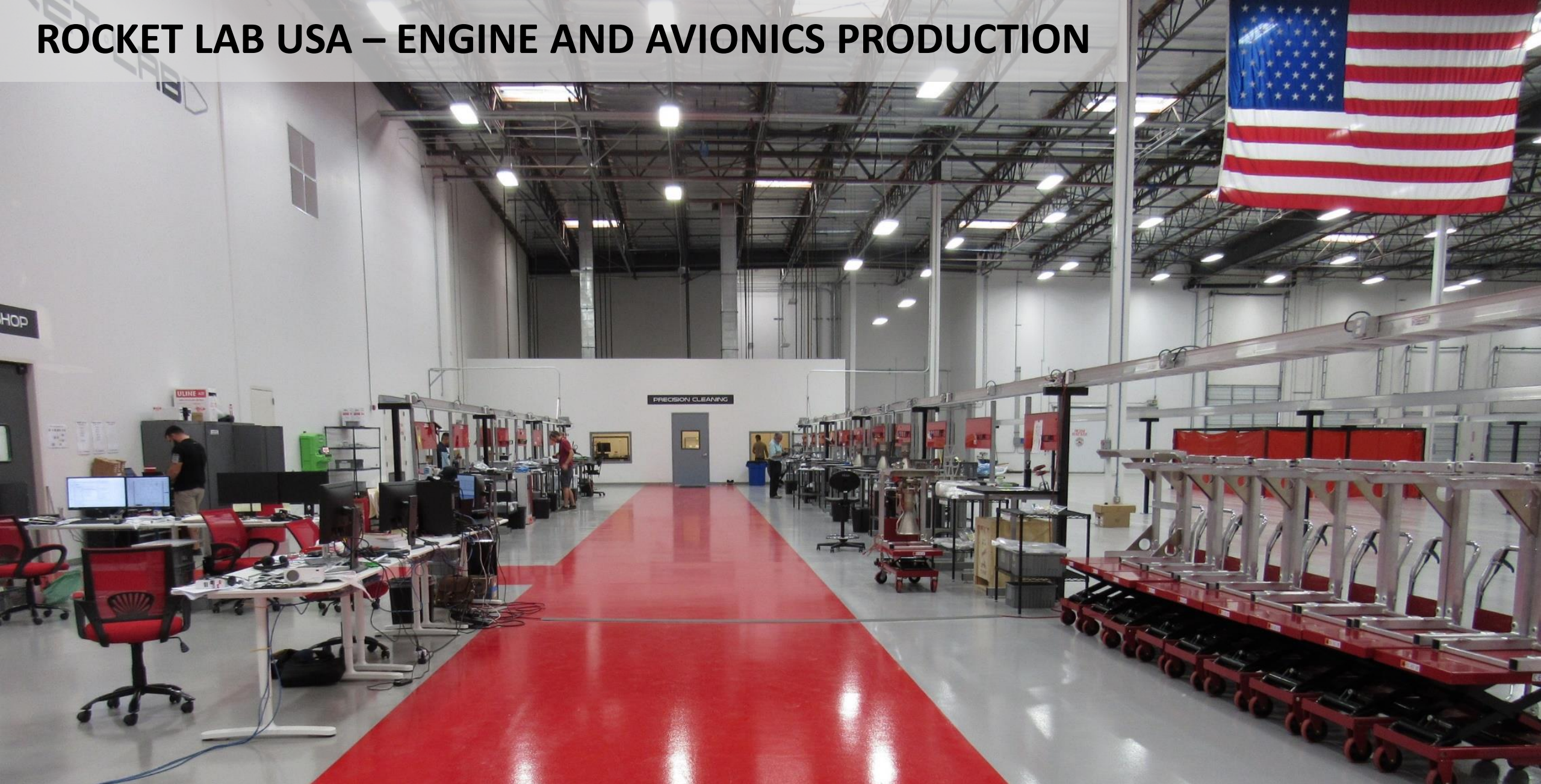
Huntington Beach, California



Auckland, New Zealand



ROCKET LAB USA – ENGINE AND AVIONICS PRODUCTION



ROCKET LAB LTD – VEHICLE FINAL ASSEMBLY



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ROCKET LAB LC-1 MAHIA PENINSULA, NZ



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“IT’S A TEST” MAY 2017



“STILL TESTING” JAN 2018



ELECTRON

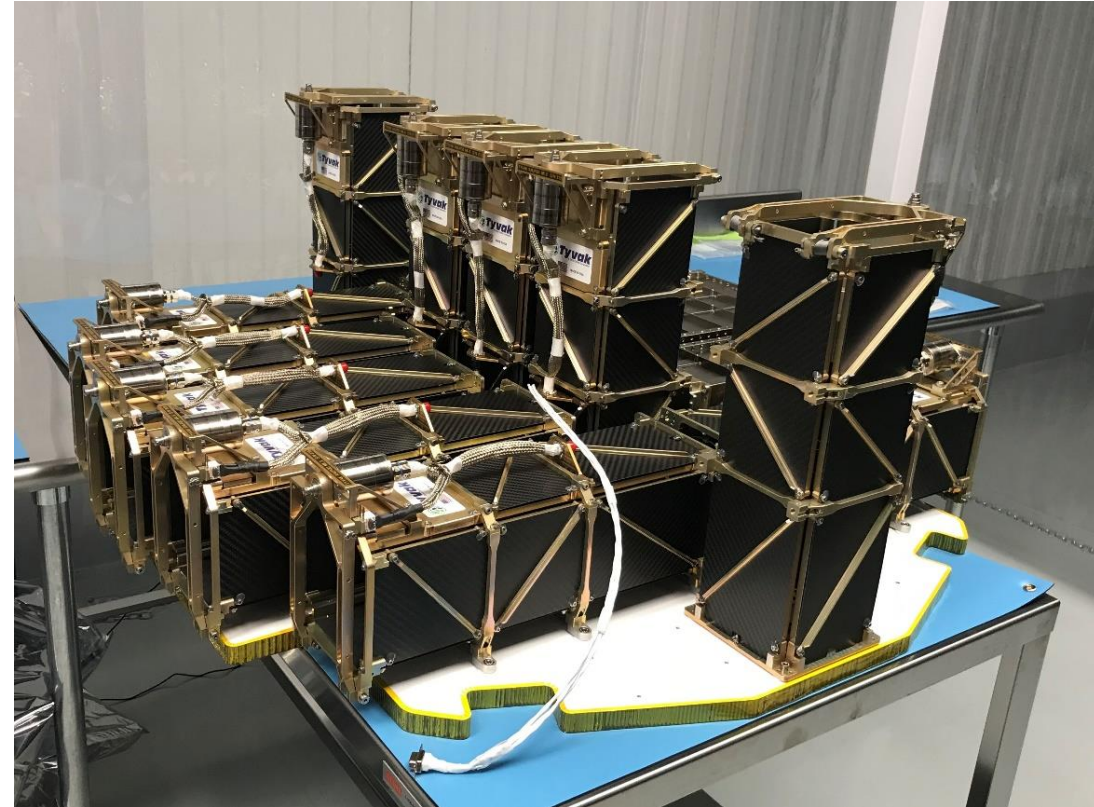
World's Only Commercially Operational Small Launch Vehicle

- 150kg Payload to 500km SSO
- 225kg to 39 degree orbit
- Clean sheet design
- Mass produced
- Designed for rapid launch
- Supports both dedicated & rideshare missions



ROCKET LAB CUBESAT FLIGHTS

- Multiple avenues for CubeSat Launch
 - Rocket Lab arranges direct rideshare opportunities
 - F2: “Still Testing”
 - F3: “It’s Business Time” & Additional Q1 2019 Opportunities)
 - NASA VCLS ELaNa XIX “Dedicated” CubeSat Flight (image to right)
 - Excess capacity on primary customer missions (managed by Rocket Lab)
 - Customer managed rideshare Flights



ROCKET LAB MAXWELL DISPENSERS



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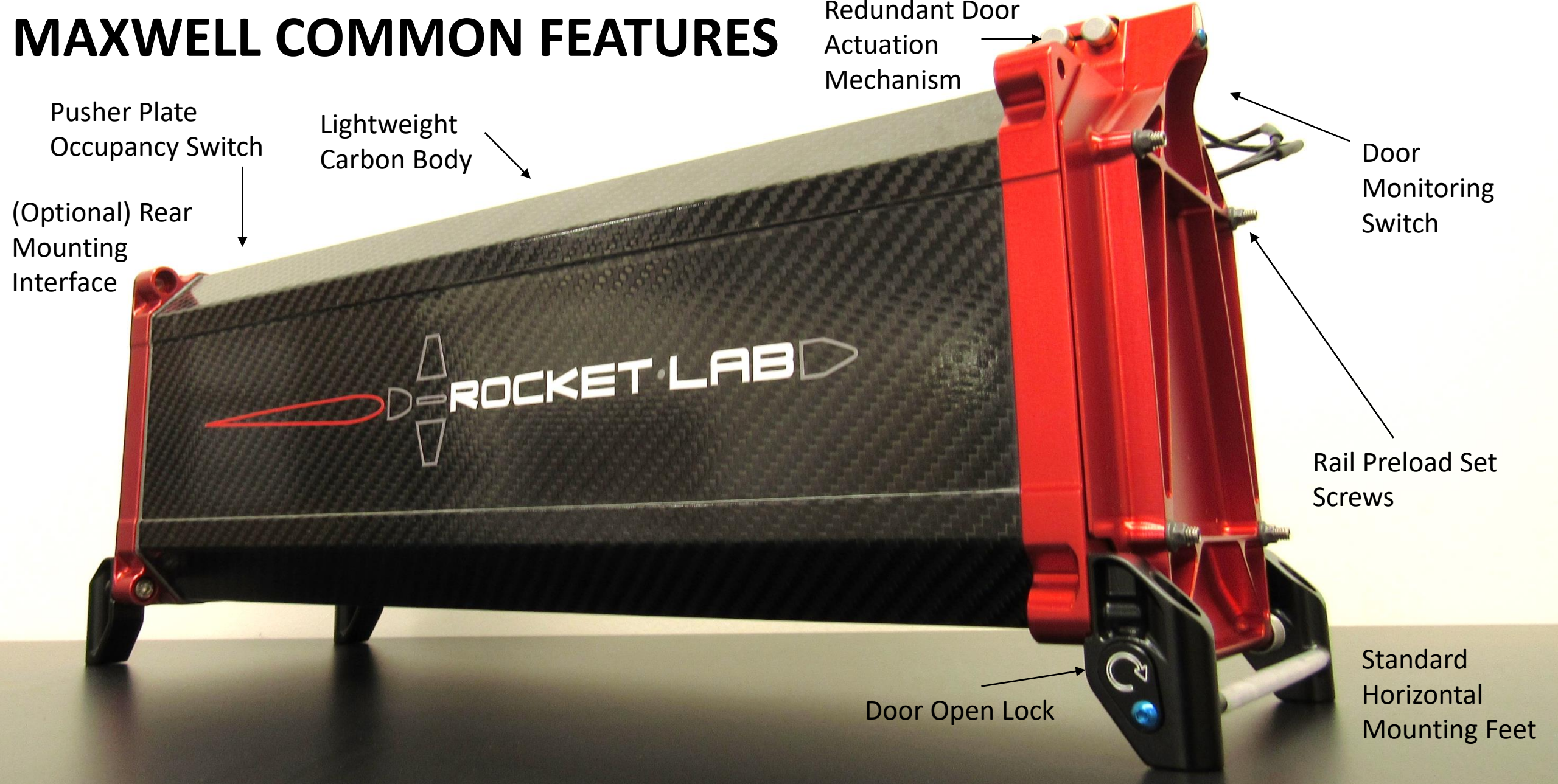


WHY MAXWELL?

- Reduce Lead Times
 - 4 Weeks from Receipt of Order ✓
- Stay Cost Competitive
 - 1U: \$15k ✓
 - 3U: \$20k ✓
 - 6U: \$40k ✓
- Optimize Launch Mass
 - 3U: 1kg ✓
 - 6U: 1.6kg ✓
- Customizable to Meet Customer Requirements
 - 1.5U, 3U+, 8U, Custom Pusher Plates.. ✓

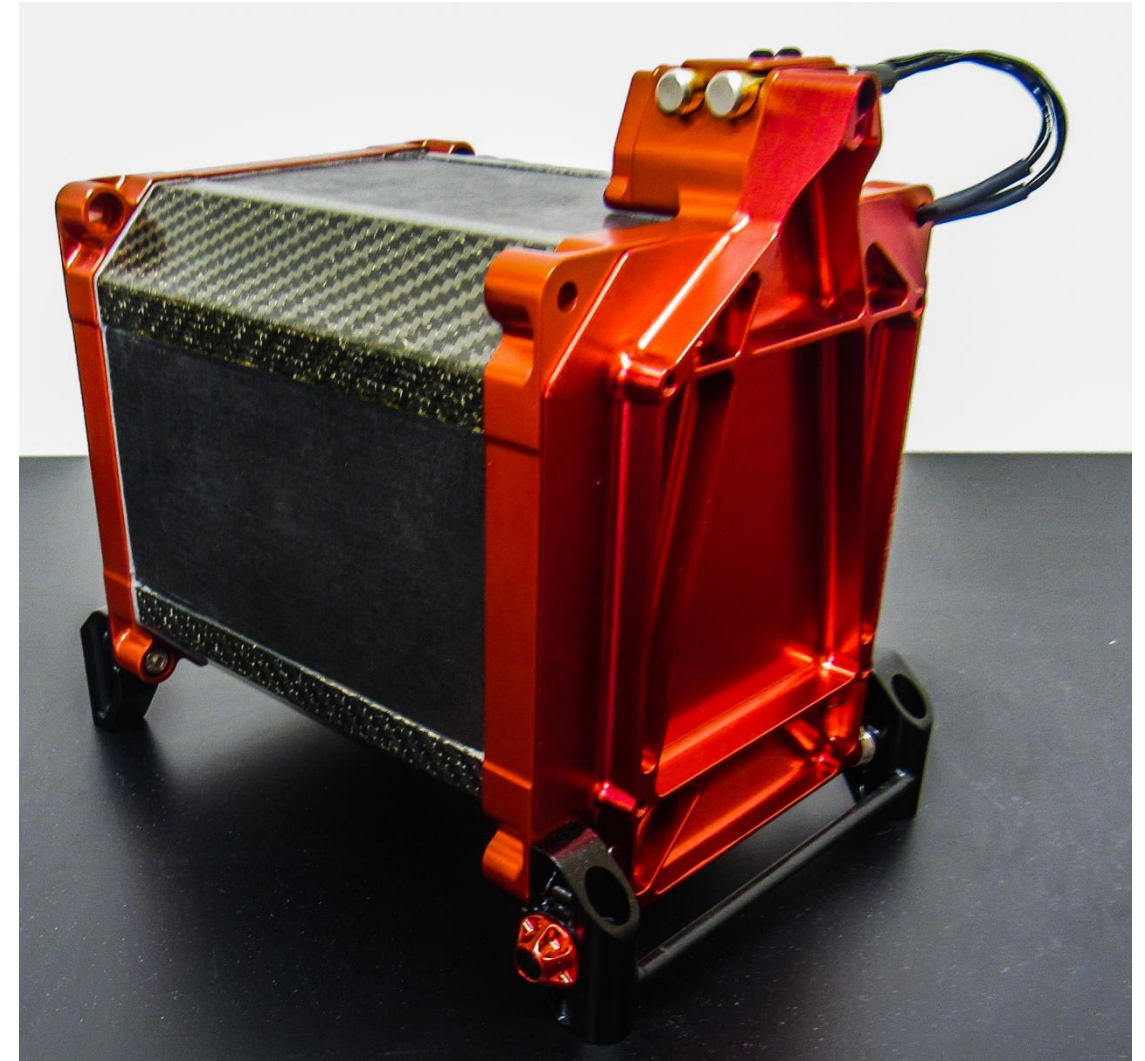


MAXWELL COMMON FEATURES

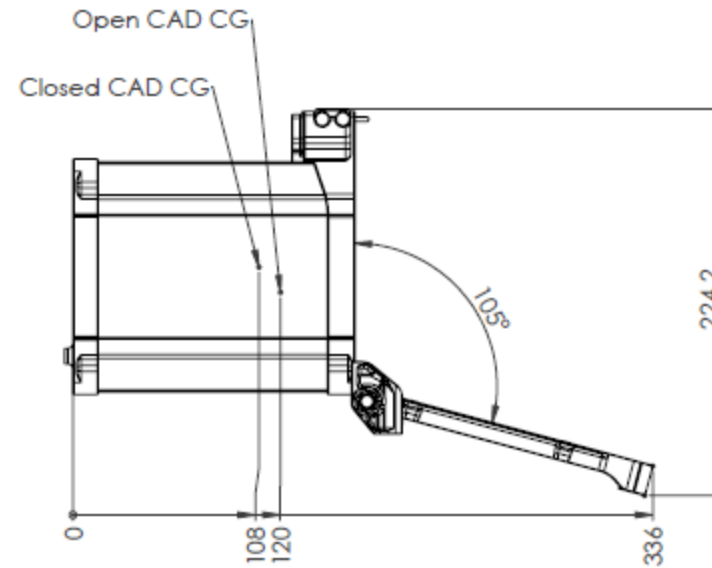
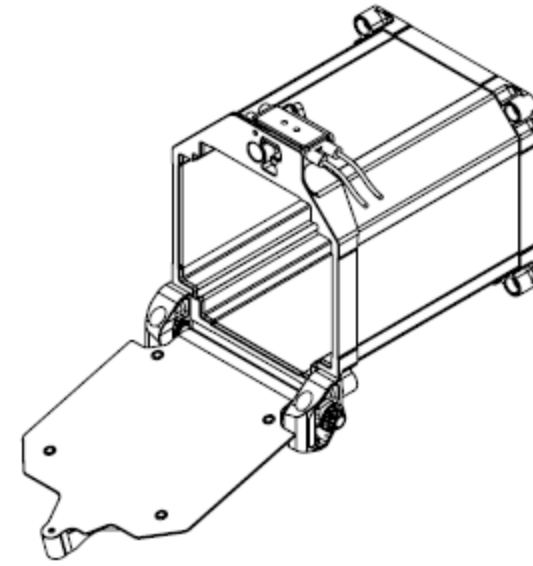
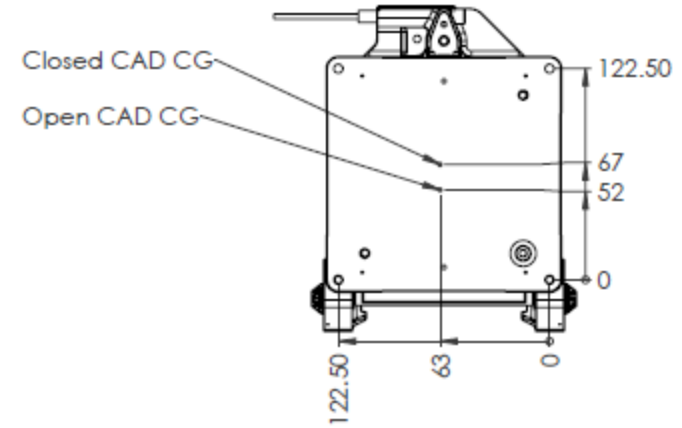
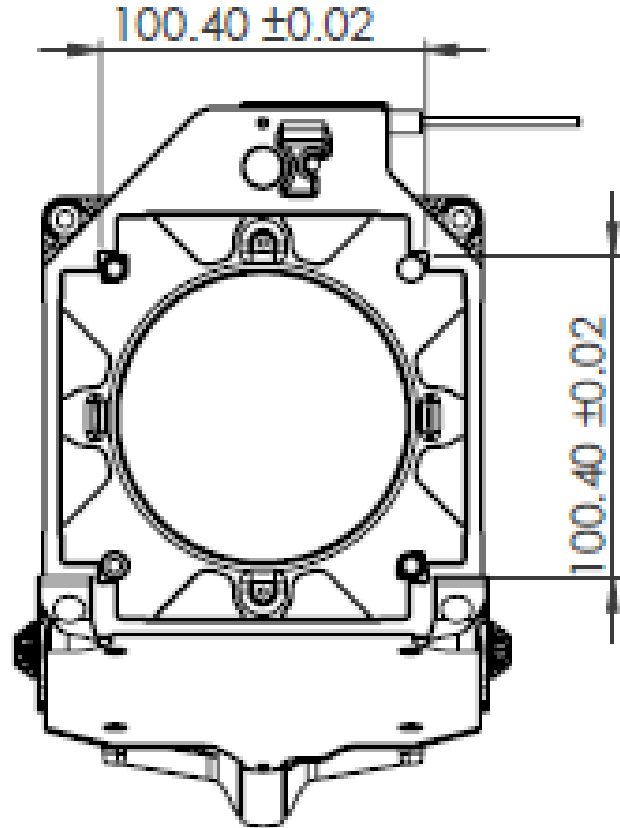


MAXWELL 1U DISPENSER

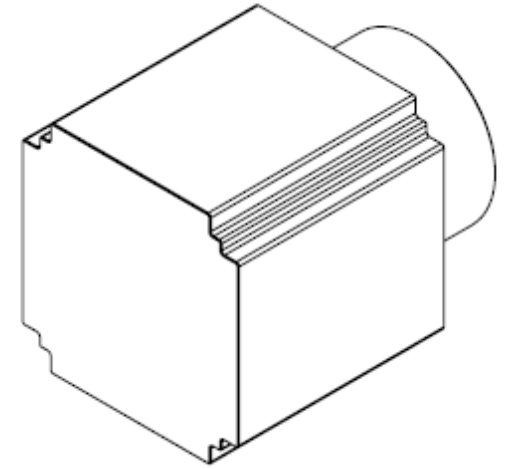
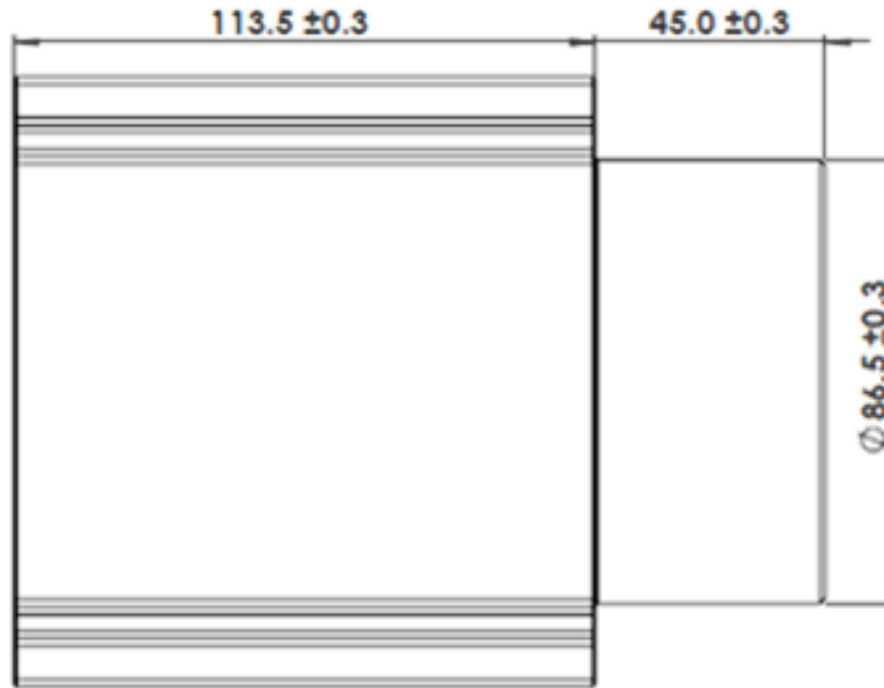
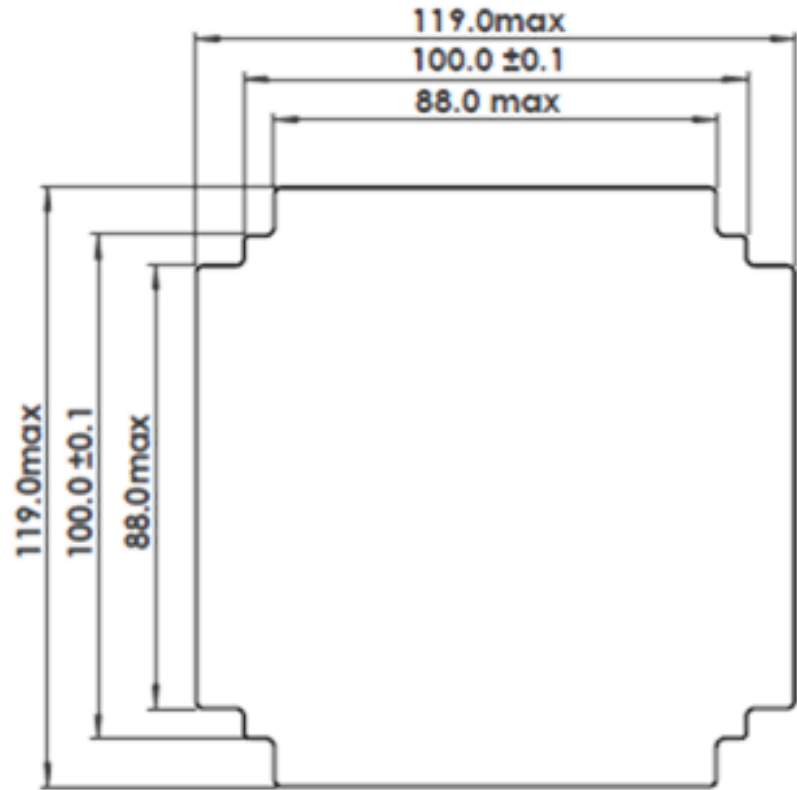
- Dispenser Mass: ~0.9 kg
- Max Payload Mass: 5.5kg, however 2kg recommended
- Dispenser Cost: \$15,000 USD
- Offers both horizontal and vertical mounting options as a standard



MAXWELL 1U DISPENSER



MAXWELL 1U DISPENSER PAYLOAD ENVELOPE



MAXWELL 3U DISPENSER

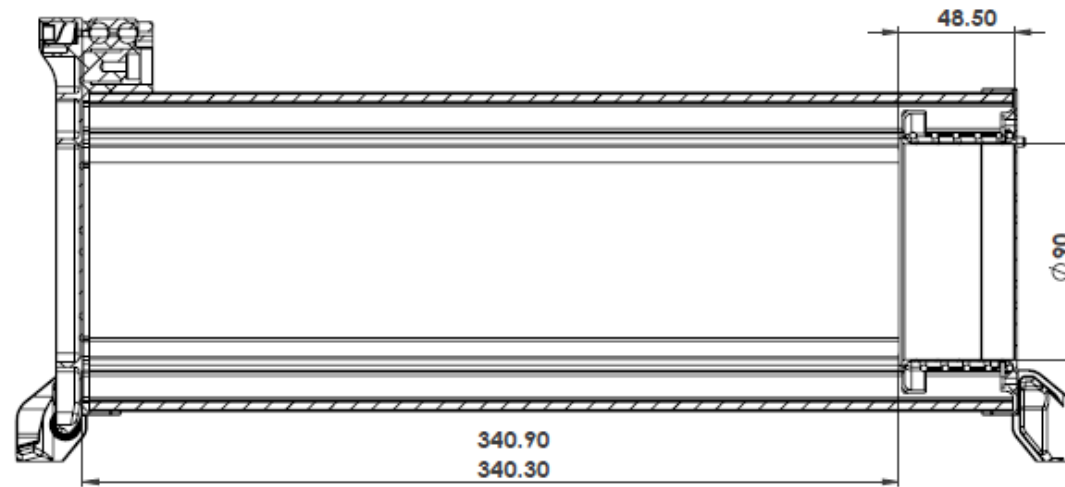
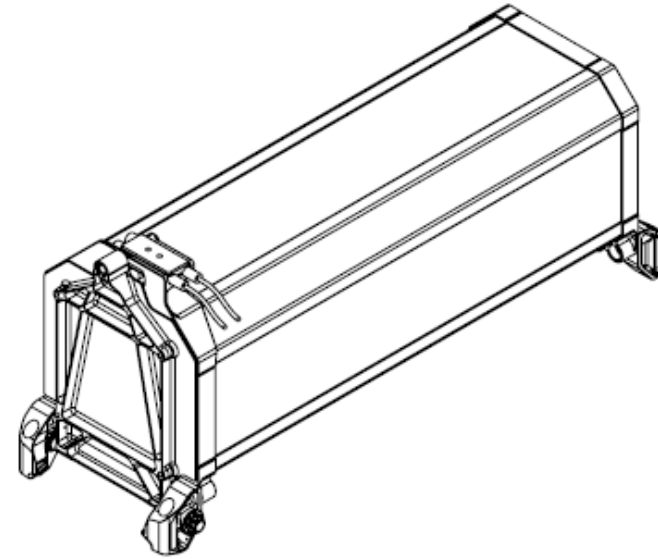
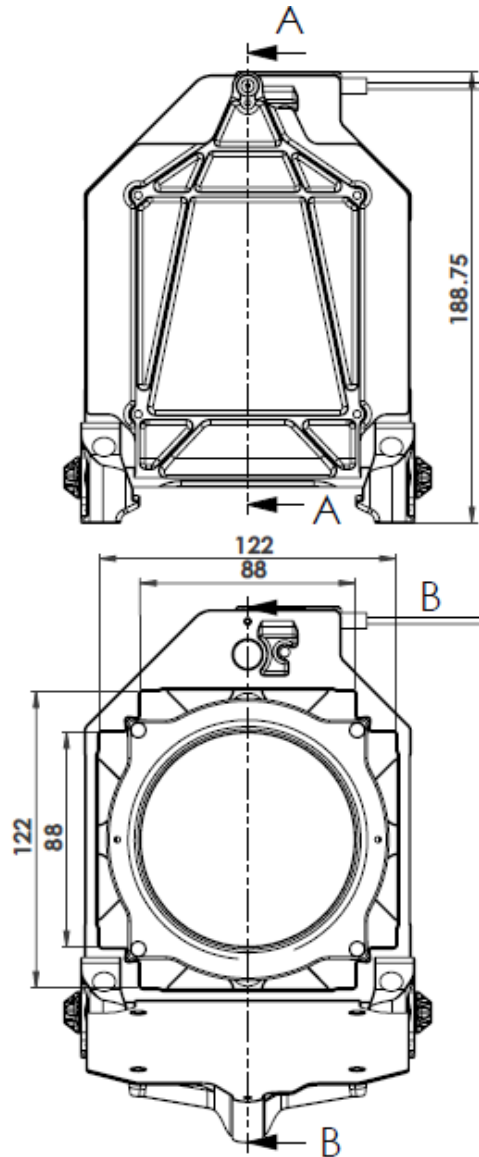
- Dispenser Mass: ~1 kg
- Max Payload Mass: 5.5kg
- Dispenser Cost: \$20,000 USD
- Current configuration offers horizontal mounting as standard, with option to include rear mounting interface as shown



THREE UNITS FLOWN ON ELECTRON F2



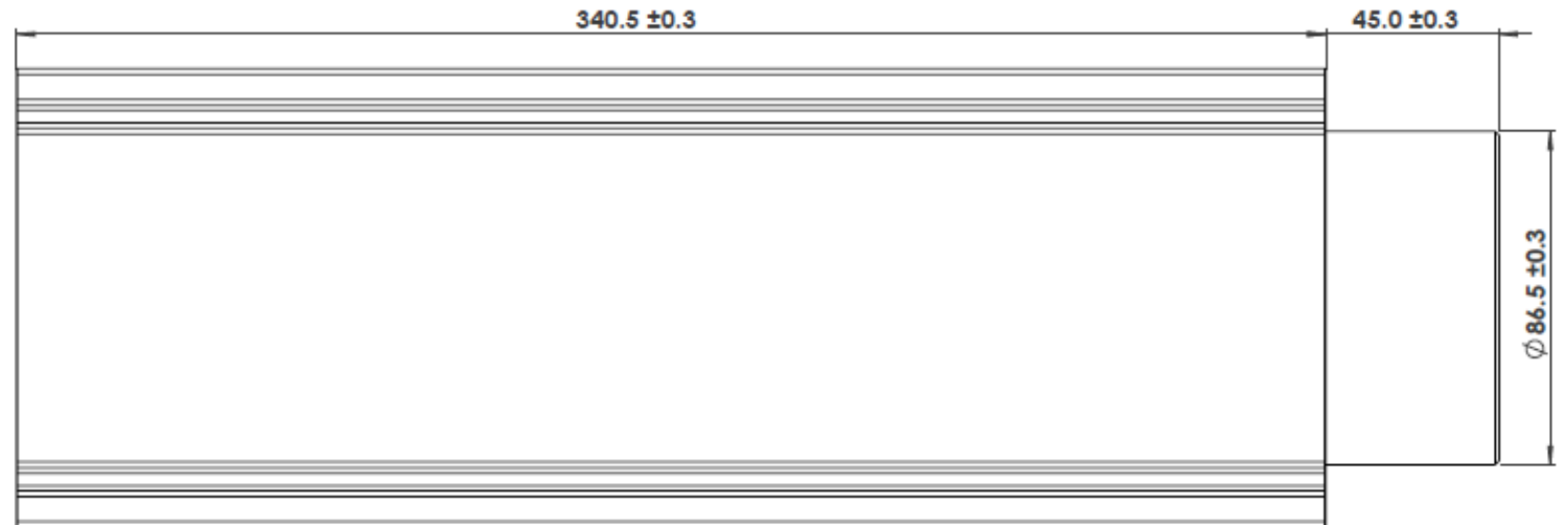
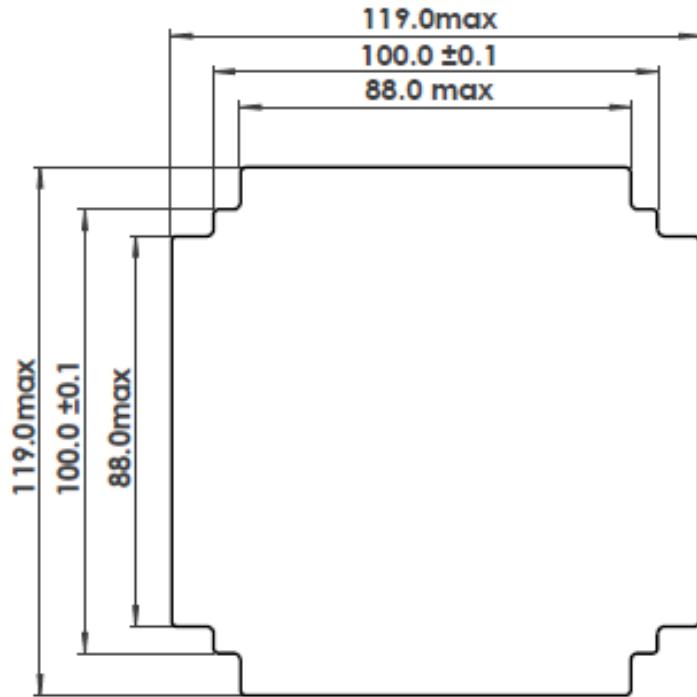
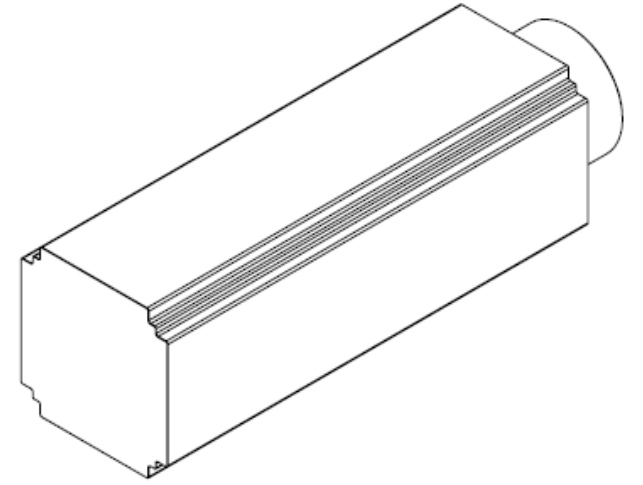
MAXWELL 3U DISPENSER



SECTION A-A



MAXWELL 3U DISPENSER PAYLOAD ENVELOPE

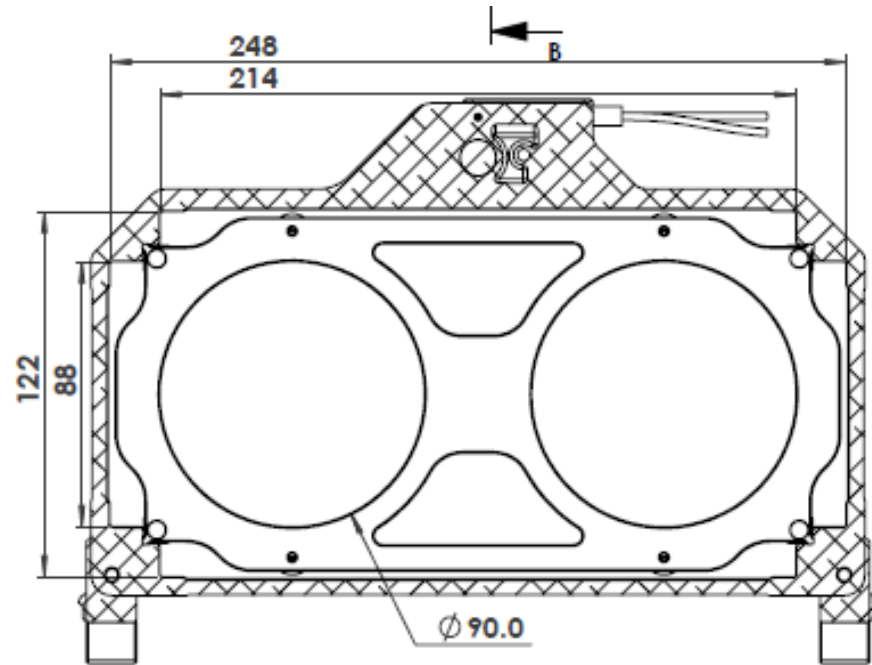
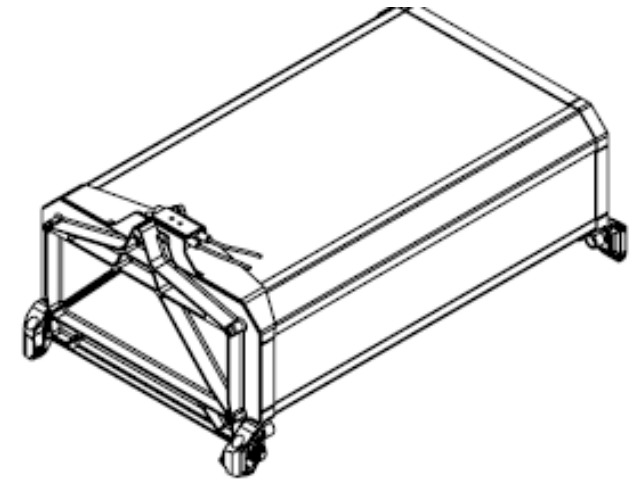


MAXWELL 6U DISPENSER

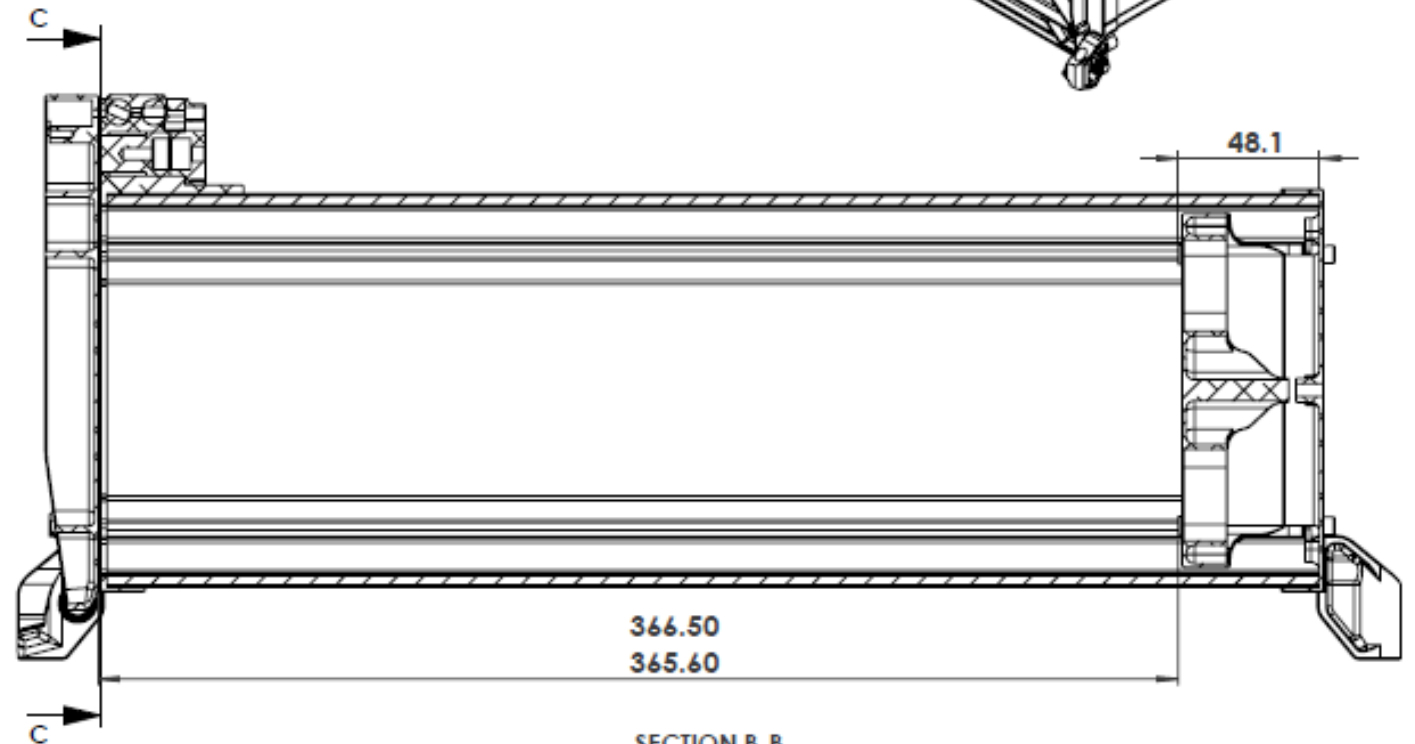
- Dispenser Mass: ~1.6 kg
- Max Payload Mass: 11 kg
- Dispenser Cost: \$40,000 USD
- Current configuration offers horizontal mounting as standard, with option to include rear mounting interface as shown
- 6U baseline design set at 366mm rail length based on customer demand. 340mm length also available



MAXWELL 6U DISPENSER



SECTION C-C
SCALE 1 : 2

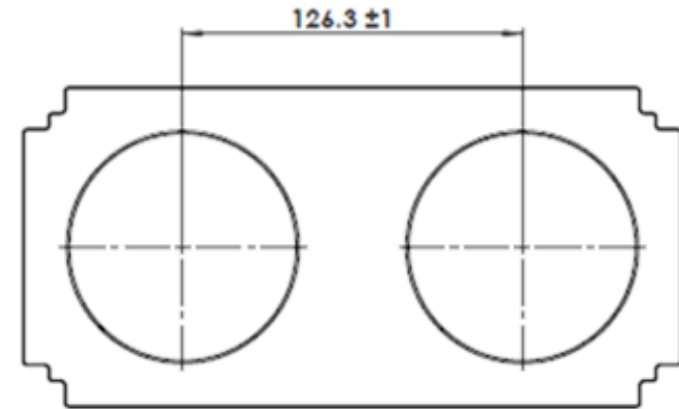
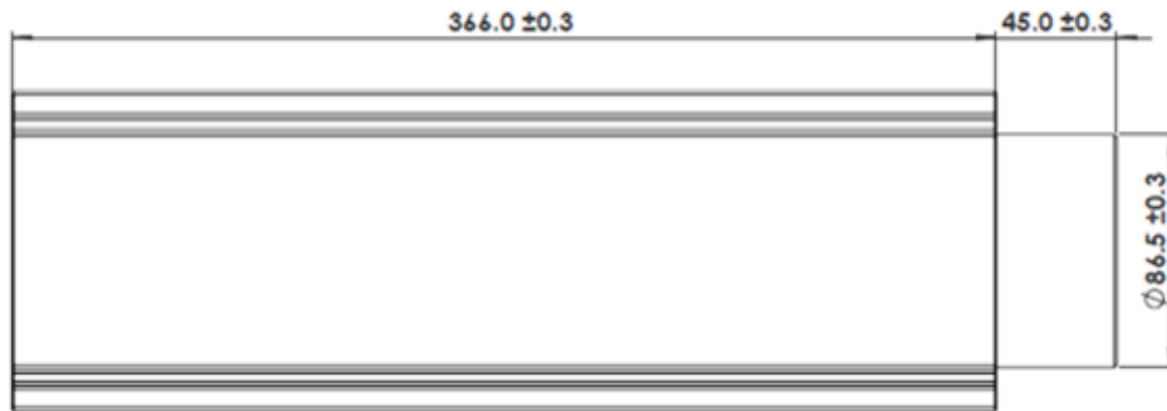
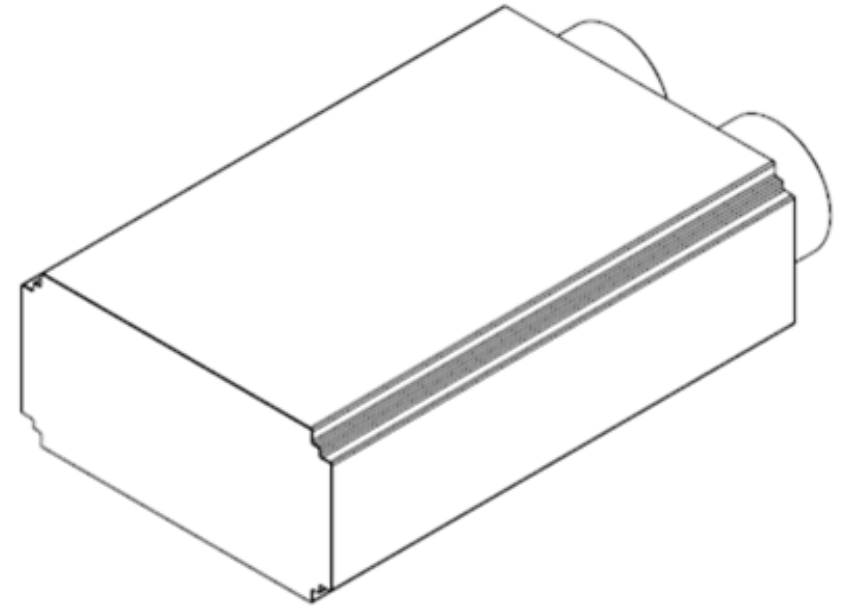
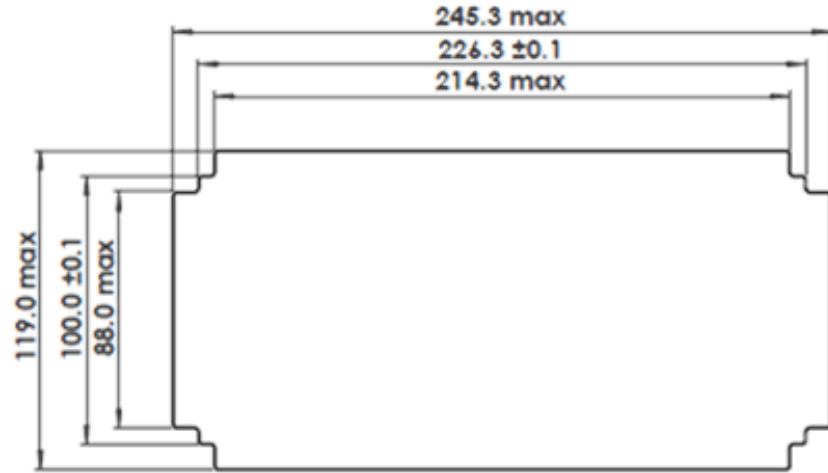


SECTION B-B
SCALE 1 : 2



MAXWELL 6U DISPENSER

PAYLOAD ENVELOPE



PATH TO LAUNCH A CUBESAT IN MAXWELL ON ELECTRON

- Secure launch reservation (L-18m to L-3m)
 - Rocket Lab rideshare includes the ability to provide flexible booking (6 month period, simple re-manifest with sufficient notice, etc). Dispenser can be purchased at same time (Rocket Lab also supports third party dispensers, such as Tyvak or PSC)
- Complete Mission Integration Cycle (1-2 Months)
 - CubeSats to show verification to Rocket Lab environments, inhibit strategies and compatibility with Maxwell dispenser
- Deliver to Rocket Lab for Integration (L-35 to 40 days)
 - Integration for CubeSats primarily occurs at Rocket Lab USA (Mahia also optional)
 - Rocket Lab arranges transport, export licensing from USA to launch site
 - In some cases, Maxwell will be integrated to Payload Plate in Huntington Beach
- Launch
 - Rocket Lab provides state vector and separation confirmation telemetry to Customer
 - Customer can participate in launch viewing activities from Huntington Beach or in Mahia (at customer cost)

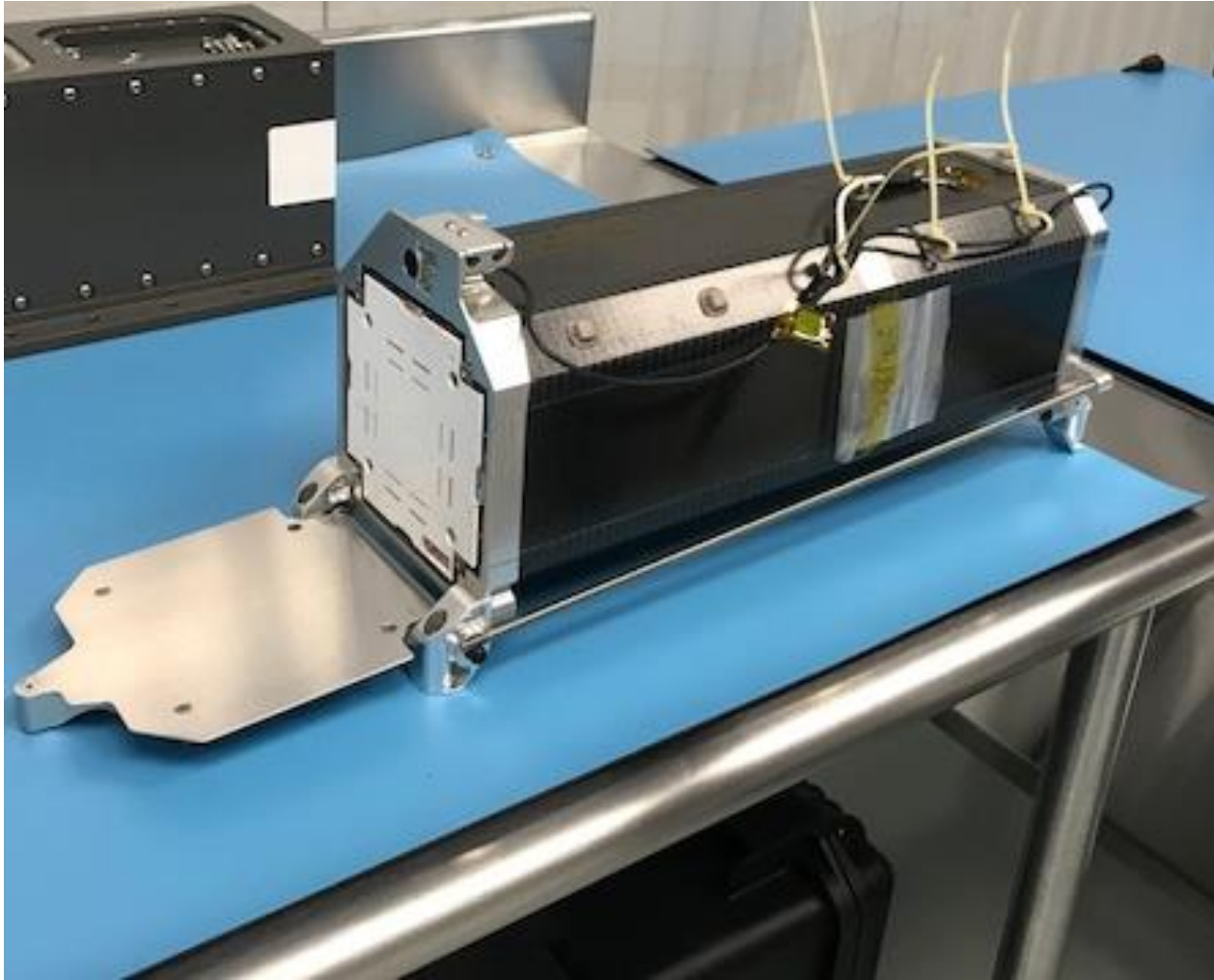


PAYLOAD PROCESSING – HUNTINGTON BEACH

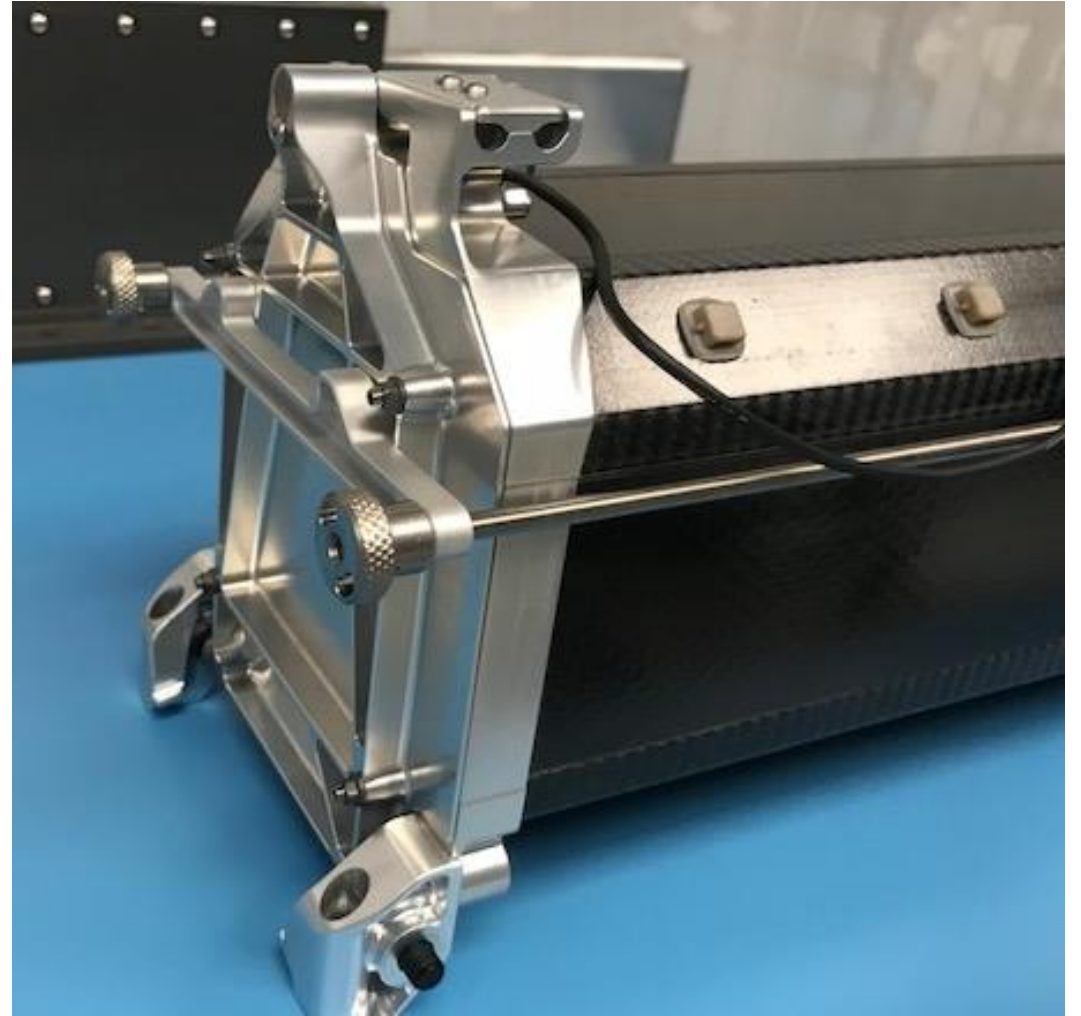
- Class 100k Cleanroom
- ESD Flooring & Work Areas
 - Wrist straps & grounding points provided
- Standard 110V Power
 - Additional power needs supported upon request
- Hardware Storage Area
- Cleanroom Garments Included
- Standard Metric/SAE Tools Available for Use



PAYLOAD PROCESSING – HUNTINGTON BEACH



Customer CubeSat in Maxwell Dispenser

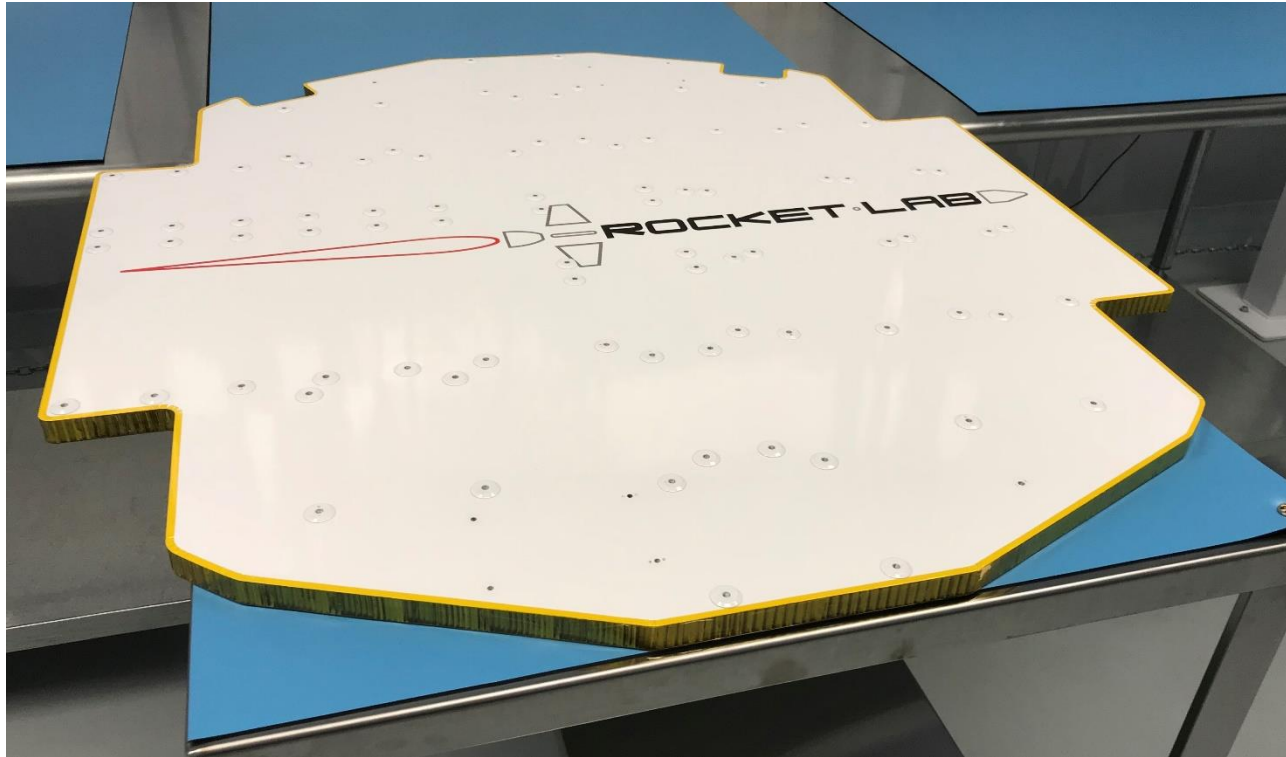


Maxwell Dispenser Transport GSE Installed

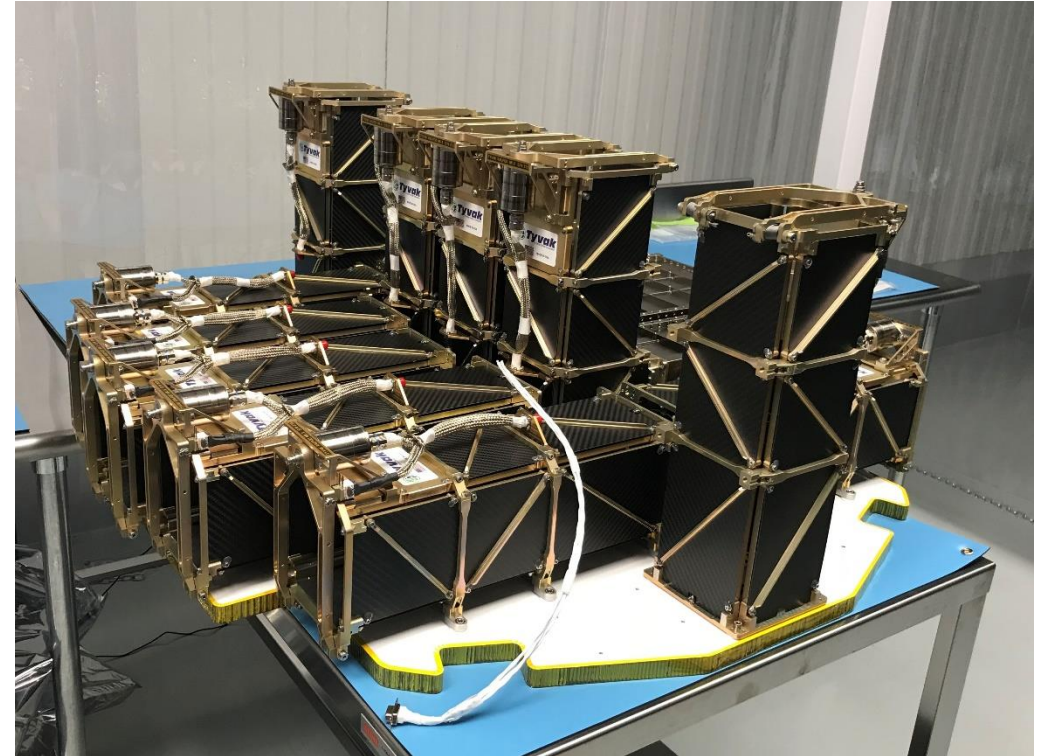


PAYLOAD PROCESSING – HUNTINGTON BEACH

Fit Check Conducted in Huntington Beach Cleanroom for NASA VCLS Mission



Rocket Lab Electron Payload Plate



Integrated Payload Plate
(Tyvak Dispensers)



CUBESAT PAYLOAD TRANSPORT



CubeSats Arrive w/ Customer @ HB



Process & Integrate in HB PFF



Loaded to Transport Container



Loaded to Air Container



Air Transport to Auckland



Rocket Lab Ground Transport to Mahia



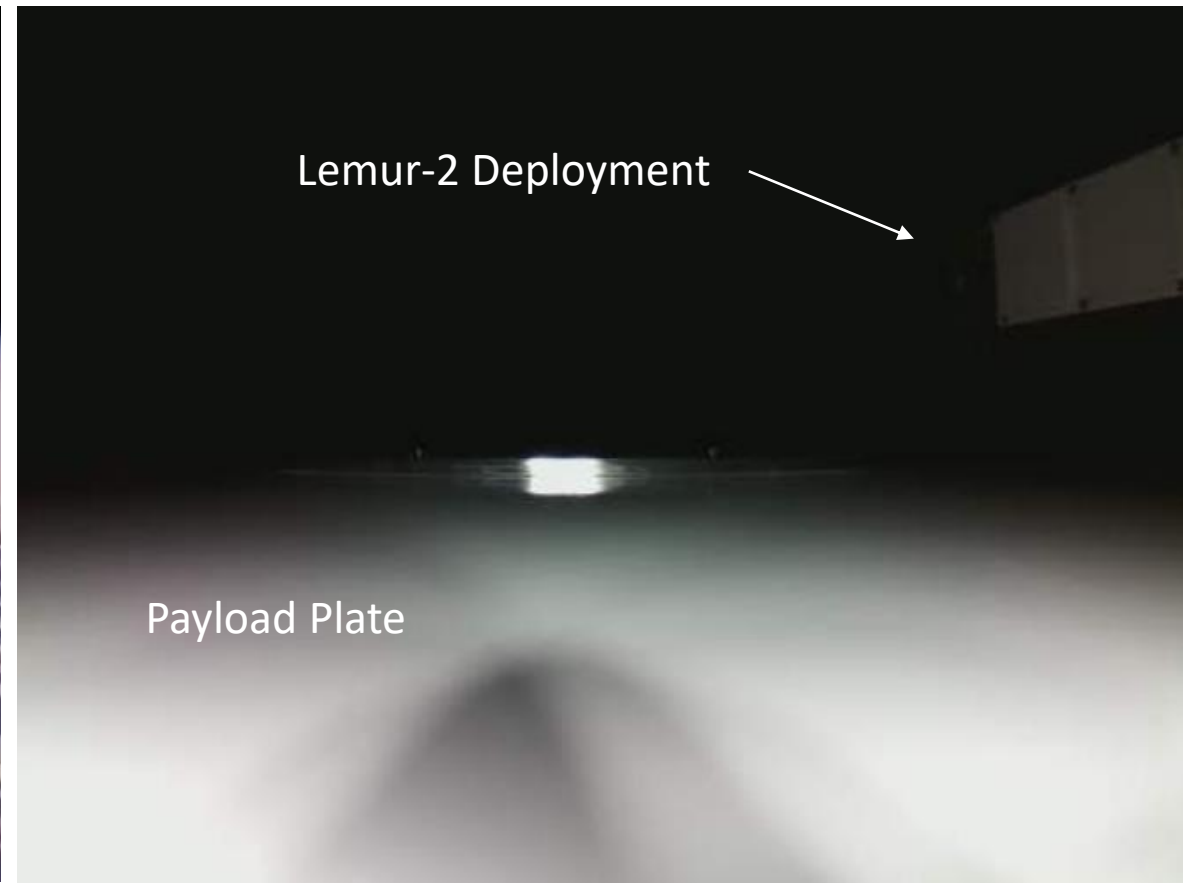
Transfer to LC-1 PPF @ Mahia, NZ



CUBESAT PAYLOAD DEPLOYMENT



Electron Kick Stages Deliver CubeSats to Target Orbit



Maxwell Deploys Payloads on Orbit



COMING SOON...



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