Technology Demonstration Mission Status Update

Elon Gordon – Mechanical Engineer, Made In Space
What is Archinaut?
A Class of On-Orbit Servicing, Assembly, and Manufacturing (OSAM) Capabilities

- In Space Manufacturing
- Robotic Assembly
- In-Situ Verification

What is Archinaut One?
Technology Demonstration Mission: OSAM-2

- First Self-Manufacturing Satellite
- Additively Manufactured (AM) Solar Array Structures
Why is Archinaut Tech Useful?

- Reduces Mass
- Mitigates Volume Constraints
- Design Flexibility
- Cost Feasibility for Large Structures

Why is Archinaut Significant?

- Improved Customer Capabilities
- Proof of OSAM Feasibility
- Enabling Technology Extensibility
Operational Overview

1. Launch to 500x500 km SSO on Falcon Rideshare

2. 1st Beam Print

3. Primary Mission Operations

4. 2nd Beam Print

5. Post Mission Extended Operations

Commands (S-Band)
Telemetry (S-Band)
Mission Data (X-Band)
Technology Development Strategy

ISS Payloads
Micro-G AM: 3DP & AMF

Technology Evolution
Archinaut Phase 1

Freeflyer Mission
Archinaut One (Phase 2)
Archinaut Development History (Pre-Archinaut)

**2010 – 2014**

**3DP Development**

*Development & Testing of Microgravity AM Technology*

*MIS and NASA MSFC remotely operate the 3D Print payload to build the first parts ever made off-Earth*

**2012 – 2015**

**AMF Development**

*Implementation of lessons learned from 3DP in the commercial Additive Manufacturing Facility*

*AMF delivers rapid hardware solutions to the ISS*
Archinaut Development History (Phase 1)

2016
Archinaut (Phase 1) Awarded

Early ESAMM Development

Ulysses: Truss Assembly
Design Reference Mission
Beam Printing & Robotic Assembly

2017
World Record Beam
Early ESAMM Version

ESAMM TVAC
Phase 1 ESAMM EDU

2018
GBMASH
Ground-Based Manufacturing and Assembly System Hardware
Robot Arm Controls, Extrusion Technology, Additional Tech Development

VacAMF
Test Platform for In-Vacuum Additive Manufacturing

2019
Archinaut One (Phase 2) Awarded

ESAMM Phase 2 EDUs
Design and Development
Archinaut Development Timeline (Phase 2)

**2020**
- ESAMM Phase 2 EDU
- Ambient Vertical Test
- ESAMM Phase 2 EDU
- Thermal Vacuum Testing
- Archinaut One PDR

**2021**
- ESAMM Flight Unit
- Assembly & Testing
- Materials Testing
- Archinaut One CDR

**2022**
- Spacecraft Integration

**2023**
- Archinaut One Flies!
- On-Orbit Operations & Testing
Redwire Technology Ecosystem

- **Zero Gravity Printer** 2014
- **AMF** 2016
- **Fiber Optics** 2017
- **Recycler** 2019
- **Ceramic Manufacturing** 2020

**In Development**
- **Industrial Crystallization Facility**
- **Metal Turbine Manufacturing**
- **Metal Additive/Subtractive Manufacturing**
- **Optical Glass Manufacturing**
- **Electronics Manufacturing**

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Archinaut – Future Applications

Low Earth Orbit
- Nanoracks Commercial Space Station
- Planet Labs Sparse Aperture CubeSats
- NASA Synthetic Aperture Radar Earth Observation

GEO & Lagrange
- Airbus GEO Base Station with RF Reflector
- DARPA Satellite Servicing and Repair
- Northrop Grumman Phased Array Antenna

Deep Space
- NASA +100 kW Solar Array Truss Manufacturing
- NASA Backbone Structure for Mars Cruise Vehicle

CUSTOMER NEEDS FOR ARCHINAUT
Manufacturing and Assembling Larger Than Deployable Structures On-Orbit Has Identified Customers From LEO to Mars