BUILD ABOVE

Redwire LEO Solar Arrays – Evolution from DX Heritage to Commercial Proliferation

Space Power Workshop, April 20-23, 2026, Torrance, CA

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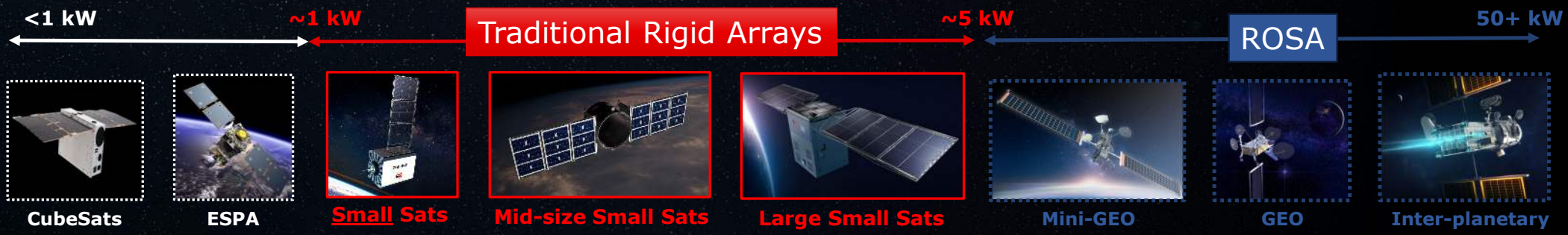
REDWIRE

LEO Market – Where We're Heading

- Definition of "Small Sat" continues to grow in size / power
- Many companies offer excellent solar array solutions for ESPA and below

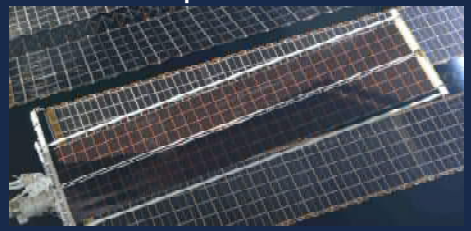


There was an apparent opportunity to apply RDW's flexible solar array solutions for the 1 – 5 kW power range

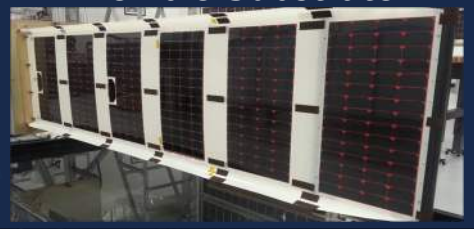
RDW's Evolution to a LEO Wing Design

IXPE
1st SmallSat Flight Unit

ROSA
Decoupled Blanket



Aladdin
Flexible Substrate



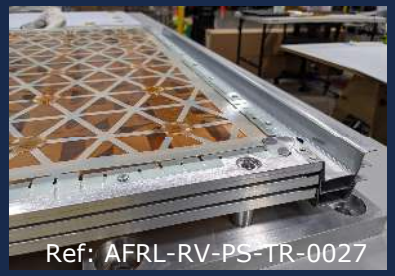
ELSA

HiPASS
Lenticular Hinges

NASA SBIR: CubeSat
Compact Stow

Ref: NASA SBIR 80NSSC20C0173

AFRL SBIR
Nested Frame EDU



Ref: AFRL-RV-PS-TR-0027

Introducing ELSA: Extensible Low-profile Solar Array

Motivation: Why ELSA?

MODULARITY
- ✓ No fixed geometry
- ✓ Easily scaled

REDUCED LEAD TIME
- ✓ < 12 months from PO
- ✓ Bulk-stocked materials
- ✓ Parallel workflows

VERSATILITY
- ✓ PV agnostic
- ✓ Universal interface

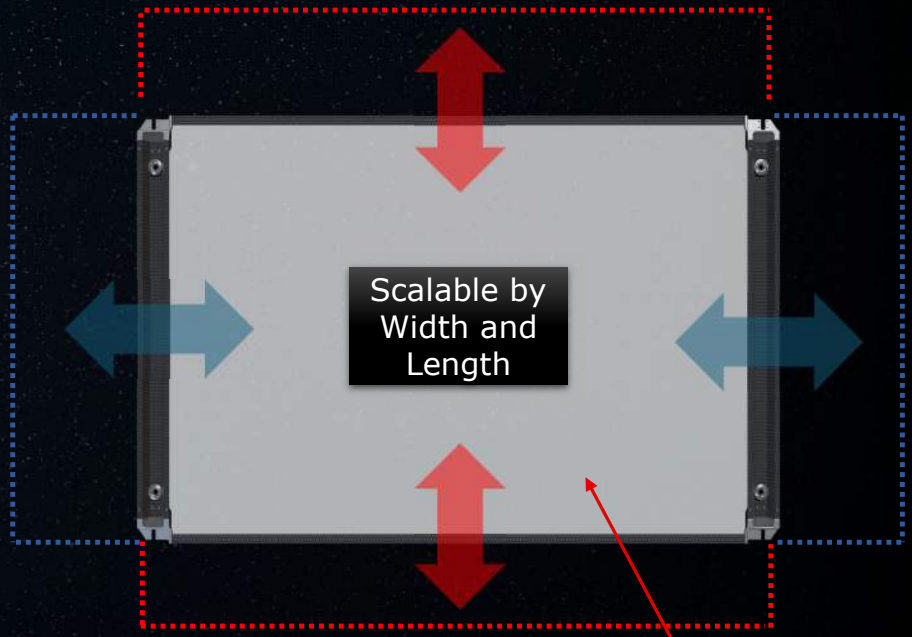
REDUCED COST
- ✓ Simple design
- ✓ Simple manufacturing

PERFORMANCE
- ✓ More power, less volume
- ✓ Up to 5 kW per wing

HERITAGE
- ✓ Design elements inherited from rigid and ROSA arrays

ELSA's Modular Frame Design

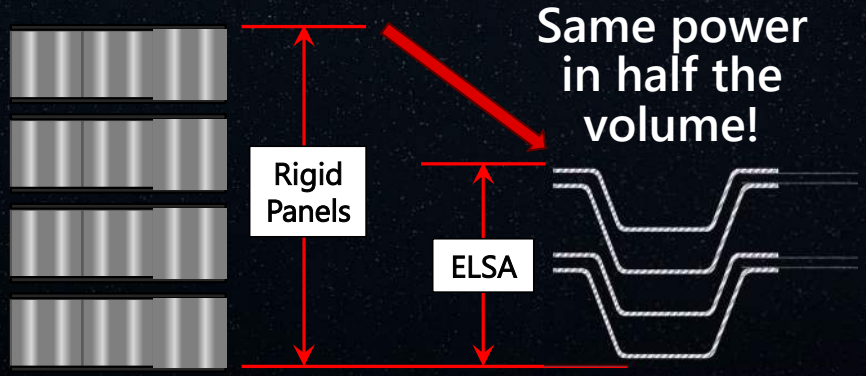
- Simple composite frame
- Flexible substrate



FLEXIBLE BY DESIGN

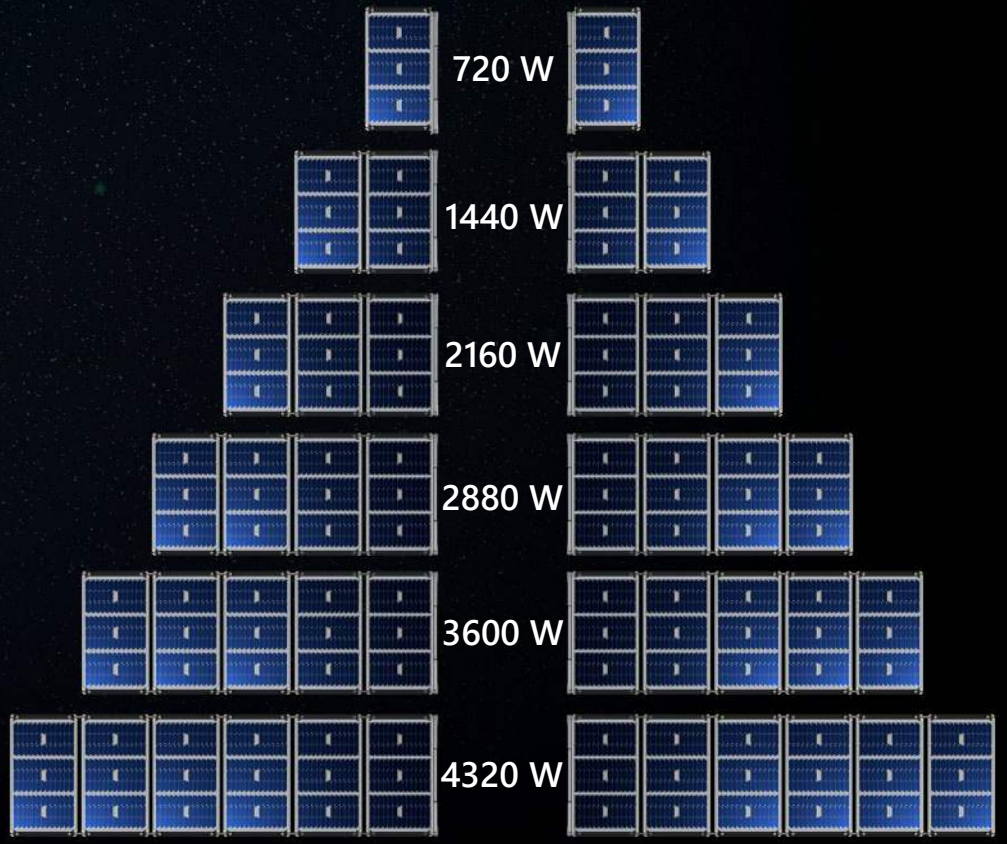
ELSA's Performance

- Nesting frames
- Up to 5 kW per wing



BUS POWER

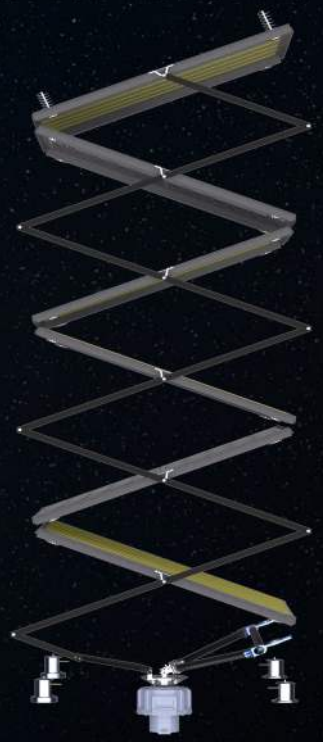
Example frame size: 1m long X 1.5m wide
Pmp, BOL, AM0 28°C, III-V technology



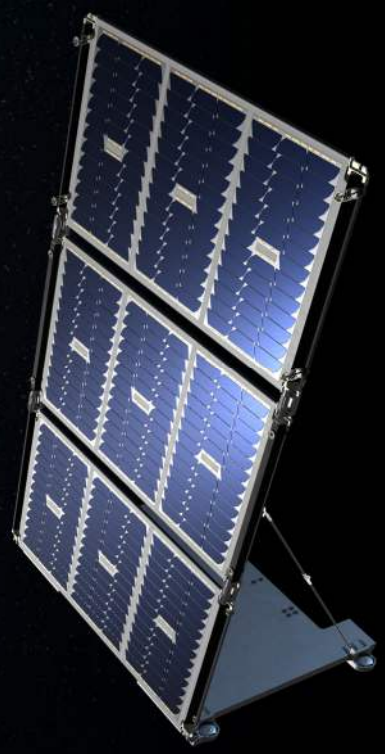
PATENT PENDING

ELSA's Versatility

- PV Agnostic
- Variable string length → compatible with any bus voltage!
- Configurable features:
  - Root interface
  - Synchronized/Damped deployments
  - Increased deployed stiffness



Synchronized Wing with SADA & Yoke

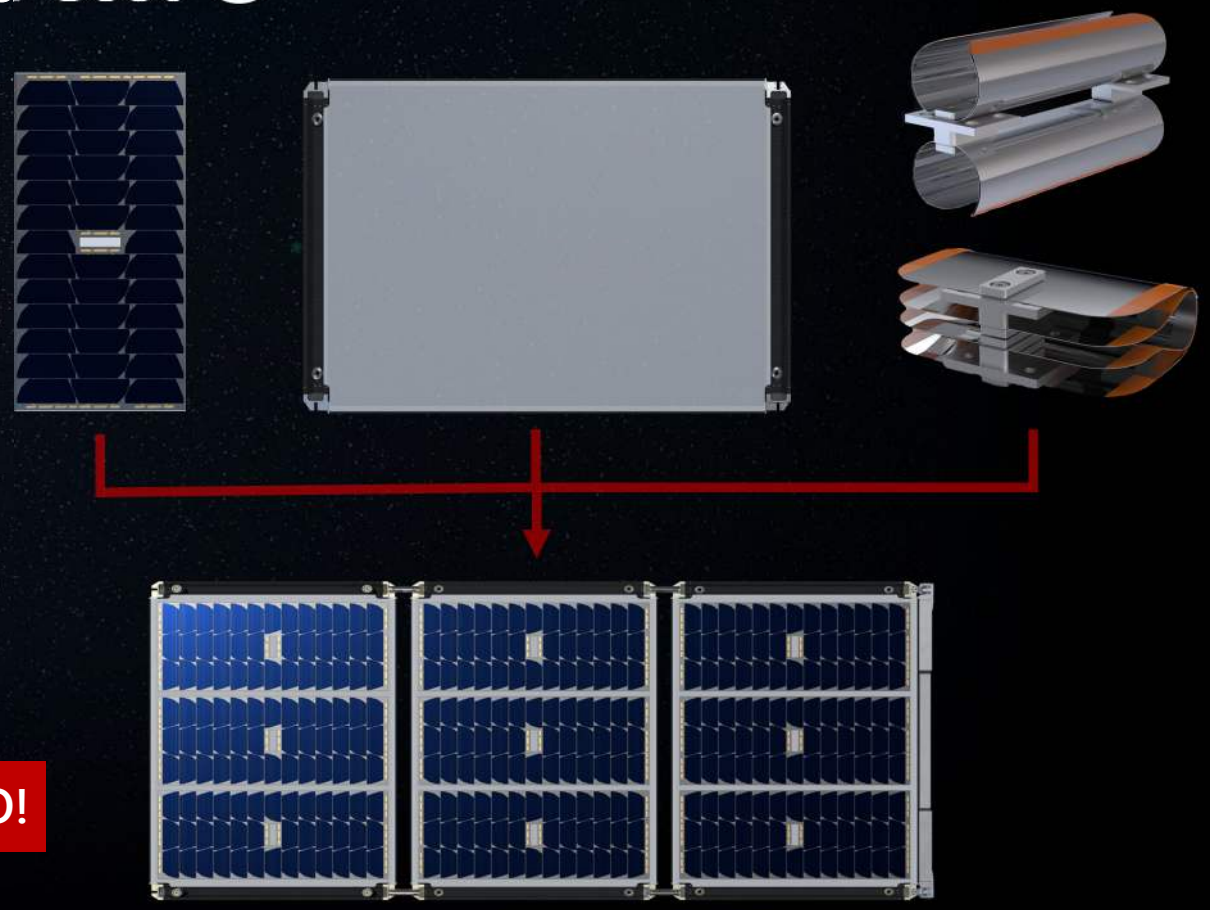


Fixed Wing with Stiffening Strut

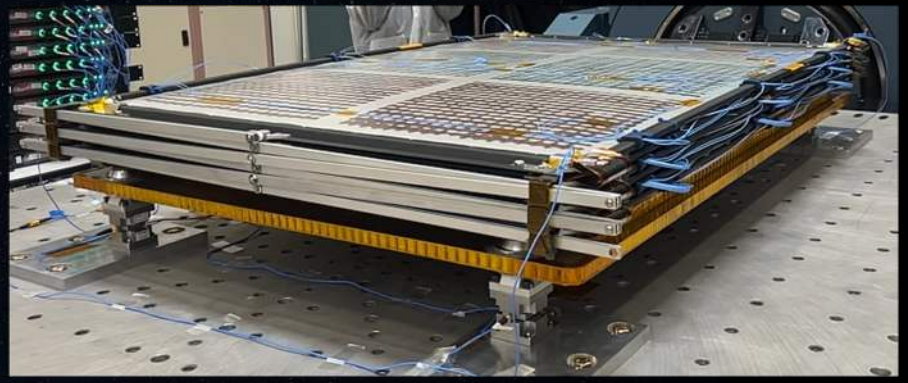
Reducing Lead Time and Cost

- Built for manufacturability
  - Bulk-stocked materials
  - Parallel processes
  - Minimized adhesives
- Lenticular hinges
- Minimized NRE

Delivery in < 12 months from PO!



ELSA Engineering Development Unit (EDU)



- Si, III-V, and CIGS PV
- TRL 6

ELSA EDU – Thermal Deployments

HOT DEPLOY

COLD DEPLOY

ELSA Qualification Status

COMPLETED EDU TESTING

- ✓ Vibration – Sine & Random SM1
- ✓ Hot/Cold Deployment ±65°C
- ✓ Deployed Survival Temps ±120°C
- ✓ Stowed Thermal Cycling ±65°C - 6x Cycles
- ✓ Wing-Level Stiffness
- ✓ Grounding

Q3 QUALIFICATION TESTS

- ➢ Life Cycle Coupon – 5k cycles to ±120°C
- ➢ TVAC Coupon
- ➢ Acoustic
- ➢ Vibration
- ➢ ESD and Plasma

Q4 QUALIFICATION TESTS

- ➢ Flight Wing ATP

Slide 12

SM1 could be good to include some SPM level Qual test parameters on this slide ?could be good to highlight that a potentially challenging portion of Qual is complete via previous ROSA efforts
Shen Meinhold, 2026-04-16T00:01:23.597

OE1 0 For completed testing or planned testing?
Olivia Epstein, 2026-04-16T00:04:56.876

SM1 1 completing, IE past experience with SPM qual on ROSA programs. not a big deal if time doesn't allow
Shen Meinhold, 2026-04-16T04:21:27.049

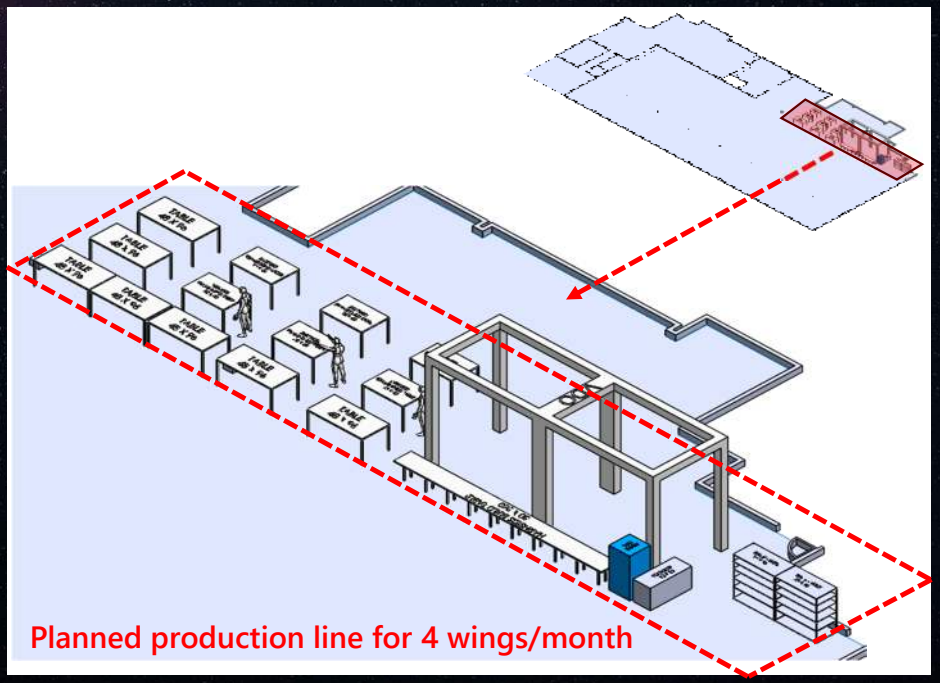
OE1 2 I am happy to include it but I am not sure the history on that. Is there one or two bullets you can help me add to cover it? [@Shen Meinhold]
Olivia Epstein, 2026-04-16T16:16:51.604

SM1 3 Now that i'm looking at the chart in more depth, maybe best to keep the fact that SPM's are TRL 9 to just a verbal? doesn't quite line up with the ELSA specific part of the chart.
Shen Meinhold, 2026-04-16T17:38:50.132

ELSA on Moog's METEOR Bus

- 1100 Watts per wing BOL @28C
- ~0.8 Hz deployed 1st mode
- 8 wings
- First delivery in Q1 2027

ELSA Industrialization: Cellular Manufacturing Environment (CME)



- Parallel assembly flow optimization
- Insulation from supply chain variation
- Modular offloaders and tooling
- Scalable Work Cells
- Production plan based on labor studies

ELSA is designed for volume manufacturing

ELSA

In Summary

- Simple & modular design
- Up to 5 kW in LEO
- Nesting frames: more power, less volume
- <12-month turnaround
- Compatible with any PV type
- Built for high-volume production

DX heritage evolved for proliferated LEO

REDWIRE


REDWIRE
Thank You!
MOOG
NASA
idemitsu
mPower TECHNOLOGY
AZUR SPACE ENABLING TECHNOLOGIES
solestial
SOURCE
dhv technology
SPECTROLAB A Boeing Company
DEEPSAT
MicroLink Devices, Inc.
SOLAERO BY ROCKET LAB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If you need a LEO solar array, just….


Let it Stow