

SLEGO™ Architecture Enabled Missions



Who is NovaWurks?

- Founded 2011 in Los Alamitos CA; out of stealth 2019
- Large facilities for engineering, simulation, digital twins, labs, High Bays, HWIL, 3-D printing and ISO 5&8 clean room spaces
- Staffed by professionals and New Space go getters, eager to learn and change our world for the better.
- Three test flights to date (ISS, GTO, and LEO)
- Three Rapid Ground I&T Demonstrations
 - SLEGOTM building blocks were reconfigured 3 times to accommodate different payloads, each within 1 week
- Ongoing commercial and government missions
- Operational Missions in 2024 for TRL 9





Sensorcraft – All Orbits

- Any payload accommodated with a "right sized" bus
- Building blocks connected to aggregate performance as a PAC (Payload Accommodation Configuration)
 - Payload Centric
 - Integrated with Payloads: adapts to Launch Vehicle
 - Bus is a configuration, low NRE, not design
 - Soft Ride built-in capability for Payload
 - 3-axis control, ultra-low-litter. <0.01 deg pointing
 - Multiple payload ride-share capability
- **Streamlined Integration and Test**
- The SLEGO[™] Building Block provides all needed support:
 - Sun sensors, star trackers, accelerometers, gyros
 - PAC processing, data handling, storage, metrology
 - Momentum dumping thrusters
 - SSA sensors Visual, IR and LIDAR
- Demonstrated on orbit on Rideshare mission
 - eXCITe was built on ground and launched on ESPA



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GEO/Cis-L Communications

- GEO designed, cis-lunar and all orbit capable
- Communications with scalable capabilities
 - Payload mass up to 2000kg
 - >7KW power possible
 - Data storage up to 10TB and more
 - High speed comms (RF and/or optical)
 - O Delta-V for orbit transfer & orbit station keeping
- High Performance Bus can be built in months, not years
- Resiliency with up to 15-year life
 - n of m improvement from "primary/redundant"
- True Software defined Spacecraft Bus
 - o "APP" for Payload
- Cost reduction
 - Mass produced, driving quality and cost efficiencies
- **Demonstrated EMI/EMC features**
- **Demonstrated on orbit in GTO Mission**
- PODSAT-1 demonstrated space environment capability

On-Orbit Assembly

- Designed for Robotic Handling on ground or on orbit
- Open-source Simplified Interface Plug-n-Play Share power, fuel, data, and thermal
- ISAM Capability available in everything SLEGO[™]
- Late life cycle changes accommodated by the configurable architecture and software
- TRL 7/8 Flight tested on-orbit demonstrations
- Demonstrated on orbit aboard ISS
- SIMPL was assembled inside the ISS by Astronauts
- o First in-space on-orbit assembly of fully capable spacecraft from 8 individually delivered modules
- First non-air based propulsion system fully-qualified for ISS both inside (IVA) and outside (EVA)











Next Generation SLEGO™ Architecture

 SLEGO[™] architecture utilizes tested and flight proven GEO design heritage performance







Power Transfer • High Power

 Up to 5KW with scalable options

Structural I/F

- Launch load lockable and survivable
- Soft-ride dampina
- Smallest volume
- Lowest mass
- Zero jitter

SLEGO™ Interface

Data I/F

- High Speed Hardline and Fiber
- EMI/EMC Protected (data and power)

Docking/Handling

Thermal Transfer

Direct Thermal

Bond Interface

Pumped coolant

option

- Precision alignment
- Wide approach capability (more than +/-90 dea)
- Hard dock, soft dock, & zero-force dock

Data Protocol

- Flexible/Adaptable
- Nominal packet protocol with CCSDS

- Applique based

Fuel Transfer

- Green Propellant
- Warm Gases
- Cold Gases
- Inert Gases

Safety

- Fail-to-Safe
- RPO Fiducials/Lights
- Discharge Protection
- Active and Passive operation options

Power

- Full Power Management
- Solar Array Drive
- Batteries
- EPS

Propulsion

- Adjustable Chemical **Propellant Thrusters**
 - Warm Gas
 - Green Propellent
- External Fuel Management (high pressure plenums, valves,

GNC/ACDS

- RWAs/CMG/Gimbal
- Torquer
- IMU/Gyro/
- Magnetometer Sun/Moon/
- Earth Sensor Star Tracker
- CSAC/GPS+

SLEGO™ Block



Communications

- Secure Software **Defined Radios**
- Antennas
- Commanding
- Telemetry
- High Speed Data Channels

Mission Support

- Thermal Management System (active/passive)
- Multiple Processors
- Data/Analysis Storage (SSR)
- Modular Open SW with integral RPO capability

OSAM/SSA Capabilities

- 5-sided Docking and Handlina Ports
- (power, fuel, data, thermal) RPO Fiducials and Lights
- Docking and Local **Observation Cameras**
- (VIS/NIR) LIDAR

NovaWurks offers spacecraft that are configurable on demand. Our space LEGO™ like suite of products enable cost-effective payload support with rapid assembly, reconfiguration and repair capabilities, integrating in hours instead of months. NovaWurks' SLEGO™ elements provide flexibility, security, and enhanced space domain awareness so you can operate your space assets with confidence.