

**WHO**

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA202 Aircrew Systems

**Transition Target:** PMA202: Personal Protection and Performance, Combat Survivability & Perseverance

**TPOC:** (301)342-3988

**Other transition opportunities:** Navy Medical Logistics Command, PEO Soldier

**Notes:** Luna's musculoskeletal support system counteracts loads from body-worn masses (e.g., helmet, night vision goggles) and stabilizes the core to reduce fatigue and pain from vibrational loading in the aircraft. The system is low profile, low weight (approximately 1 pound), and is designed to be worn under the flight vest while still allowing access to the dials for adjustability.

When worn, flight crew will have reduced musculoskeletal loading but will still have fully mobility with no impact on egress from the aircraft. Multiple completed systems have been produced with a manufacturing partner, and Luna aims to find a transition partner to complete in-flight testing.



Image provided by Luna Innovations

**WHAT**

**Operational Need and Improvement:** Reduce fatigue and musculoskeletal pain (e.g., low back, neck, core) associated with long duration flights while increasing flight crew readiness, situational awareness, and performance.

**Specifications Required:** Technologies must be compatible with current naval aviation aircraft platforms. Solutions must demonstrate a reduction in pain experienced during/after flight.

**Technology Developed:** Luna has developed a low-profile, wearable support system to mitigate fatigue and musculoskeletal pain. The system's dual approach counteracts loading from body-worn masses by off-loading muscles in parallel with the spine (back tension element reduces the muscle force required to maintain a posture) and stabilizes the core (adjustable, inflatable lumbar support) to maintain proper posture and reduce fatigue and pain from vibrational loads in the aircraft. The system is adjustable for use over a range of aircrew body sizes and conditions, accessible under the flight vest, and can be used across multiple platforms. Weighing approximately one pound, the soft, wearable system does not add bulk and will not restrict mobility or the ability to egress the aircraft.

**Warfighter Value:** Luna's system mitigates the effects of the rotary environment (body worn masses, vibrational loading, suboptimal posture) that may lead to fatigue and pain with no added burden to the flight crews (low-weight, comfortable, adjustable). By counteracting the added weight from body-worn masses (e.g., helmet, night vision goggles) and stabilizing the core, Luna's wearable system reduces musculoskeletal loading for flight crew. Reduced loading reduces fatigue and pain associated with long duration flights, and enables flight crew to maintain peak performance and increased situational awareness for the complete mission duration. Mitigating fatigue is also expected to increase flight crew readiness through a reduction in lost workdays and related medical costs from musculoskeletal injury and pain.

**WHEN**

**Contract Number:** N68335-20-C-1007 **Ending on:** September 29, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Production of functional prototype	Low	Demonstrate technical feasibility	TRL 3	November 2019
Demonstrate reduction in loading with computational model	Low	Demonstrate efficacy of system in reducing musculoskeletal loading	TRL 4	June 2021
Pilot-scale production of advanced prototype with manufacturing partner	Low	Demonstrate ability to scale production	TRL 5	January 2022
[If Option Awarded] Perform lab-based evaluations to quantify performance gains	Med	Validate function in simulated operational environment	TRL 6	March 2023

**HOW**

**Projected Business Model:** This technology will be sold directly by Luna and manufactured by partners at Capewell Aerial Systems. Capewell is a respected provider of engineered products for aerial delivery, life support, and tactical gear for the military. Capewell is currently capable of pilot-scale manufacturing and could transition to full rate production within six months. Luna currently sells a line of medical simulation products in collaboration with Capewell.

**Company Objectives:** Luna is looking for partners to assist with the completion of qualification/airworthiness testing (as required) and for evaluation of the wearable system with in-flight testing. This technology is a growth opportunity as Luna aims to expand our product offerings in the biomedical space and to continue development of human performance and human interfacing technologies. Luna develops cutting-edge, disruptive technologies through highly leverageable Research and Development (R&D) grants and contracts. Technology commercialization is addressed through a disciplined and integrated business model designed to accelerate the process of bringing innovative solutions to market. This model has resulted in revenue of approximately \$80M per year.

**Potential Commercial Applications:** Though specifically designed for military aircrew, Luna's wearable system could help reduce musculoskeletal pain and fatigue associated with other commercial sectors, such as commercial pilots, long-haul truckers, construction workers, and office workers.