Press release

Innovative Solutions for the NASA Tank Venting in Microgravity Challenge Revealed

Winners of the global $80,000 NASA propellant tank venting in microgravity challenge announced by Freelancer.com

SAN FRANCISCO, California - 9 April 2024 – Global freelancing marketplace Freelancer.com (ASX: FLN) today revealed the winners of the Who Let the Gas Out? NASA Tank Venting Challenge.

As space travel extends to greater duration and distance, missions may require a propellant refill in space. To achieve this, spacecraft may require larger tanks and efficient refueling along with tanks that have the capability of isolating propellant from ullage fluid (a gas and vapor mixture) during a vent.

The goal of the Who Let the Gas Out? NASA Tank Venting Challenge was to develop a novel solution for the venting of ullage contents from a partially full propellant tank, in microgravity, with minimal loss of propellant. This ullage venting solution would help allow the adjustment of pressure in the receiving tank prior to, during, and/or after the liquid propellant transfer.

Launched in October 2023 and completed in February 2024, the challenge offered a total prize pool of $80,000 USD for designs of a complete concept design of a tank venting solution.

Although all concepts were considered, solutions that are external to the propellant tank are preferred as they could use existing (heritage) propellant tanks and avoid development costs related to designing and qualifying a new (or modified) tank. For more information, please visit the challenge page here.

Challenge Winners

First Place - Kevin M. Crosby and Alvaro Romero-Calvo from Kenosha, WI, USA; Atlanta, GA, USA.
Title: "Microgravity Ullage Formation and Trapping using Phased Array Acoustic Excitation"
Summary: The solution's core mechanism proposed is the use of acoustic manipulation to control helium bubble dynamics in a liquid medium. A small pressure difference between service and client tanks is used to pull saturated helium out solution and nucleate microscale bubbles. A phased array of ultrasonic acoustic transducers on the surface of the client tank induces the migration, growth, and trapping of these bubbles to form a small ullage at the vent port. The ullage is constantly replenished during venting as the pressure in the client tank cycles and more saturated helium is pulled out of solution.

Second Place - Widgetblender (Team Leader: Jeffrey Morse) from Virginia, USA
Title: "Ultrasonic/Sensing Active Vent (USAV)"
Summary: Ultrasonic Sensing Active Vent (USAV) aims to be general purpose and requires no tank modification, including input and output valves. USAV is external to the tank and features a gas output pipe that is the same as the gas output pipe of the tank. It combines a thin gas collection tube that is pulled in and out of the tanks as needed, ultrasonic speakers to create a stand-off volume around that injected tube, active monitoring (laser/sensors and pressure sensor) and active control (ultrasound, piston and/or gas collection tube motor) of the gas-collection mechanisms.

Second Place - c* Suite (Team leader: Samantha Graham), from Pleasanton, CA, USA
Title: "Breather Tube Venting System (BTVS)"
Summary: The Breathing Tube Venting System (BTVS) harnesses the favorable properties of semi-permeable membranes to vent gas from propellant tanks without liquid expulsion. The device is a simple, scalable circuit which pumps fluids from the outlet to the inlet of the propellant tank through a semi-permeable membrane. Gas is allowed to escape through a reinforced semi-permeable membrane whilst liquid propellant is circulated back into the propellant tank until desired tank pressures are achieved.

Third Place - Nazarii Vareshchuk from Lutsk, Ukraine
Title: "Ultrasonic separator of liquid fractions (Blob Surfing)"
Summary: The technologies of the future are the use not of brute force, but of the power of control, controlling things on a micro level, energy flows, self-organization and adaptability. Therefore, systems that develop the ability to contactlessly manipulate objects, liquids, and change their state are one of the ways to achieve results without excessive and additional mechanisms. This submission is an example of the use of ultrasonic (acoustic) levitation technology for liquid manipulation, movement in storage containers, separation and absence of exhaust gasses.

Third Place - Derek McFall from Detroit, Michigan
Title: "Centrifugal Phase Separator"
Summary: The proposed solution is a continuous flow centrifugal phase separator, external to the fuel tank. The ullage gas/liquid enters the device and is separated using a system of centrifugal forces, valves and pumps. The liquid fluid is then pumped into the refill loop and the exhaust gas is captured in a holding tank for release at a desired time.

######

About Freelancer.com

Twelve-time Webby award-winning Freelancer.com is the world's largest freelancing and crowdsourcing marketplace by total number of users and projects posted. More than 72 million registered users have posted over 23 million projects and contests to date in over 2,000 areas as diverse as website development, logo design, marketing, copywriting, aerospace engineering and manufacturing. Freelancer also owns Escrow.com, the leading provider of secure online payments and online transaction management, and Loadshift, an Australian enterprise freight marketplace. Freelancer Limited is listed on the Australian Securities Exchange under the ticker ASX:FLN and is quoted on OTCQX Best Market under the ticker FLNCF.

For more information, contact:

Press Inquiries
press@freelancer.com

Sebastián Siseles
Vice President, International
+1 415 801 2271
sebastian@freelancer.com

Marko Zitko
Sr. Marketing & Communications Manager
+1 (650) 800-6863
+61 404 574 830
marko@freelancer.com