



# Press Release

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## The Vertical Flight Society Announces the Winners of the 37<sup>th</sup> Annual Student Design Competition

### *University of Maryland and Delft University of Technology Take Top Honors*

FAIRFAX, VA — The Vertical Flight Society today announces the winners of its 37<sup>th</sup> Annual Student Design Competition: The **University of Maryland took first place in the Graduate Category**, while the team from **Delft University of Technology took first place in the Undergraduate Category along with Best New Entrant honors**. Leonardo Helicopters was sponsor of this year's competition with a total of \$12,500 in prize money. In addition, Advanced Rotorcraft Technology, Inc. sponsored an optional bonus weight-optimization task with an additional \$2,000 in prize money.

Each year, the VFS competition challenges students to design a vertical takeoff and landing (VTOL) aircraft that meets specified requirements, providing a practical exercise for engineering students at colleges and universities to promote student interest in VTOL engineering and technology.

Academic teams from around the world submitted entries in this year's competition, with a total of 13 proposals from six different countries. Executive summaries for the top-winning entries from the 37<sup>th</sup> Student Design Competition are available at [www.vtol.org/sdc](http://www.vtol.org/sdc), along with past winners.

The 2019-2020 Student Design Competition was entitled, "*Leonardo's Aerial Screw: 500 Years Later*." The competition celebrated Leonardo da Vinci, who conceived many innovating ideas far ahead of his time. Among them, the famous drawing of the Aerial Screw, recognized by many as the first human-carrying vertical take-off and landing (VTOL) machine ever designed — more than 400 years ahead of the first helicopter.

One unique and defining feature of the da Vinci Aerial Screw is the use of a single, continuous blade (like a wood screw), where the blade material extends around for more than an entire circle. This is defined in engineering terms as having a solidity of greater than one. With today's analytical and design tools, would this concept still have merit, 500 years later?

The goal of this year's VFS competition was to design a VTOL vehicle based on Leonardo's Aerial Screw concept, studying and demonstrating the consistency of its physics and potential feasibility. The actual pros and cons of the Aerial Screw are often quoted but have not been analyzed extensively, nor has a possible working application been studied, leaving a gap in the technical understanding of the significance of the invention. The 37<sup>th</sup> Annual Student Design Competition required a critical review of the Leonardo Aerial Screw approach to understand how the concept can be considered the foundation of vertical flight.

The winning teams for the graduate category are as follows:

<u>Place</u>	<u>University (Graduate)</u>	<u>City, Country</u>	<u>Design Team</u>
1 <sup>st</sup> + Best Bonus Flight Task	University of Maryland	College Park, Maryland, USA	Elico
2 <sup>nd</sup>	Georgia Institute of Technology	Atlanta, Georgia, USA	Il Mulinello
3 <sup>rd</sup>	Politecnico di Milano	Milan, Italy	Giocondi

The University of Maryland winning entry in the graduate category was named ***Elico***, deriving its name from the Italian root used for the words “helicopter,” “propeller,” “helix” and “screw,” is rooted in Leonardo’s drawing of an aerial screw. Elico was designed as a fully autonomous, manned quadrotor vehicle. Developed as a technology demonstrator, Elico improves upon da Vinci’s design by using a tapered aerial screw rotor to provide all lift, thrust and control of the vehicle. A modular framework allows Elico to adapt to changing mission requirements. With an all-electric powerplant, ultralight composite airframe and push button operation, Elico allows anyone to safely and easily experience the genius of Leonardo da Vinci first-hand. As a technology demonstrator, Elico is designed to perform a unique mission exhibiting its hover and forward flight capabilities.

The winning teams for the undergraduate category are as follows:

<u>Place</u>	<u>University (Undergraduate)</u>	<u>City, Country</u>	<u>Design Team</u>
1 <sup>st</sup> + Best New Entry	Delft University of Technology	Delft, Netherlands	SolidityONE
2 <sup>nd</sup>	University of Maryland	College Park, Maryland, USA	Samara
3 <sup>rd</sup>	Politecnico di Milano	Milan, Italy	Giocondi

The team from Delft University of Technology was the winning undergraduate team for their ***SolidityONE*** design. SolidityONE is a tandem configuration for a ducted aerial screw personal electric air vehicle, capable of hovering at an altitude of 860 m (2,820 ft) with a maximum take-off weight of 233 kg (513 lb). The maximum achievable range in the current vehicle configuration is obtained with a battery mass of 14.3 kg (31.5 lb) and results in the SolidityONE reaching 7.3 km (4.6 miles) with a maximum velocity of 51.5 km/h (32 mph). One of the unique features of the aerial screw rotor type is the high blade solidity, with blade solidity’s higher or equal to one being unconventional for modern day helicopters; the SolidityONE name has been based on this unique feature.

Two members of each of the first-place winning teams are invited to the 77<sup>th</sup> Annual Forum & Technology Display — planned for May 11–13, 2021 in Palm Beach, Florida — to present the details of their designs.

The Annual Student Design Competition sponsorship rotates between Airbus, Leonardo Helicopters, The Boeing Company, Bell, Sikorsky Aircraft and the US Army Research Lab.

The 2020-2021 Request for Proposal (RFP) for the 38<sup>th</sup> Annual Student Design Competition, sponsored by The Boeing Company, will be made available later this month at [www.vtol.org/sdc](http://www.vtol.org/sdc). This new RFP is

entitled, ***“2025 UAV for Medical Equipment Distribution.”*** Student teams are challenged to develop a vertical lift concept that can deliver, at high speed, up to 50 kg (110 lb) payloads to end-user customer sites up to a 50 km (31 mile) radius, and to logistics centers up to a 200 km (124 mile) range. The sizing is such that the vehicle could make a difference in a future pandemic or natural disaster.

In addition, **Altair is sponsoring an optional bonus task** with an additional \$1,000 each in prize money available for the winning graduate and undergraduate teams.

The Vertical Flight Society encourages universities from around the world to form teams and take part in this exciting and challenging competition, which is conducted to attract the best and brightest engineering students to the vertical flight industry.

The Vertical Flight Society is the world’s premier vertical flight technical society. Since it was founded as the American Helicopter Society in 1943, the Society has been a major force in the advancement of vertical flight. VFS is the global resource for information on vertical flight technology. For more than 75 years, it has provided global leadership for scientific, technical, educational and legislative initiatives that advance the state of the art of vertical flight.

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