



Press Release: June 15<sup>th</sup>, 2017

## ARCA to Perform Historic First Flight of Aerospike

For 60 years the aerospace industry has been waiting for this moment, a moment ARCA Space Corporation will offer to the scientific community in August this year by launching the Demonstrator 3 space vehicle: the first space flight of an aerospike rocket engine. Soon we are going to know if the hopes and dreams of generations of aerospace engineers, in their pursuit to create what is supposed to be the most efficient rocket engine in the world, will materialize. We hope to confirm that aerospike rocket engines, which are significantly more fuel efficient than the current engines, are achievable and that they can lead the way to the creation of Single Stage to Orbit rockets, which are more cost efficient and responsive.



ARCA's Haas 2CA Single Stage to Orbit rocket

An aerospike engine exhaust jet ideally expands from sea level up to space, ensuring superior efficiency at all flight levels. A "classic" bell-shaped nozzle works efficiently at only one flight level, usually at sea level. After that point, the engine isn't properly taking advantage of the atmospheric pressure decrease as the gases are contained by the nozzle. An aerospike nozzle allows virtually unlimited expansion ratios, thus significantly increasing the specific impulse of the engine at high altitude.

The aerospike engine was extensively tested on the ground by NASA and Rocketdyne, and it was a strong contender for the Space Shuttle. It was also part of NASA's Venture Star, a Single Stage to Orbit vehicle. Due to schedule and budget constraints, the Space Shuttle received a classic bell-shaped nozzle engine and the Venture Star was canceled before getting to see an actual flight. Hence, the aerospike engine never saw a space flight to this day. In March 2017 however, ARCA Space Corporation brought this technology back into the public's attention by introducing the Haas 2CA Single Stage to Orbit rocket equipped with the Executor Aerospike linear rocket engine. The Haas 2CA is an orbital launcher aiming to operate on the small satellite market, estimated by Space Works and Eurostat at \$5.3 billion over the next decade.

The Haas 2CA engine needs to be tested. Ground and vacuum tests are scheduled at ARCA and NASA's JSC/WSTF. However, ARCA wants to gather more data about how the aerospike technology performs in flight before the launch of the Haas 2CA, which is scheduled for 2018 from NASA's Wallops Flight Facility in Virginia. This is where the Demonstrator 3 rocket comes in and will continue the tradition of ARCA's previous demonstrator rockets.

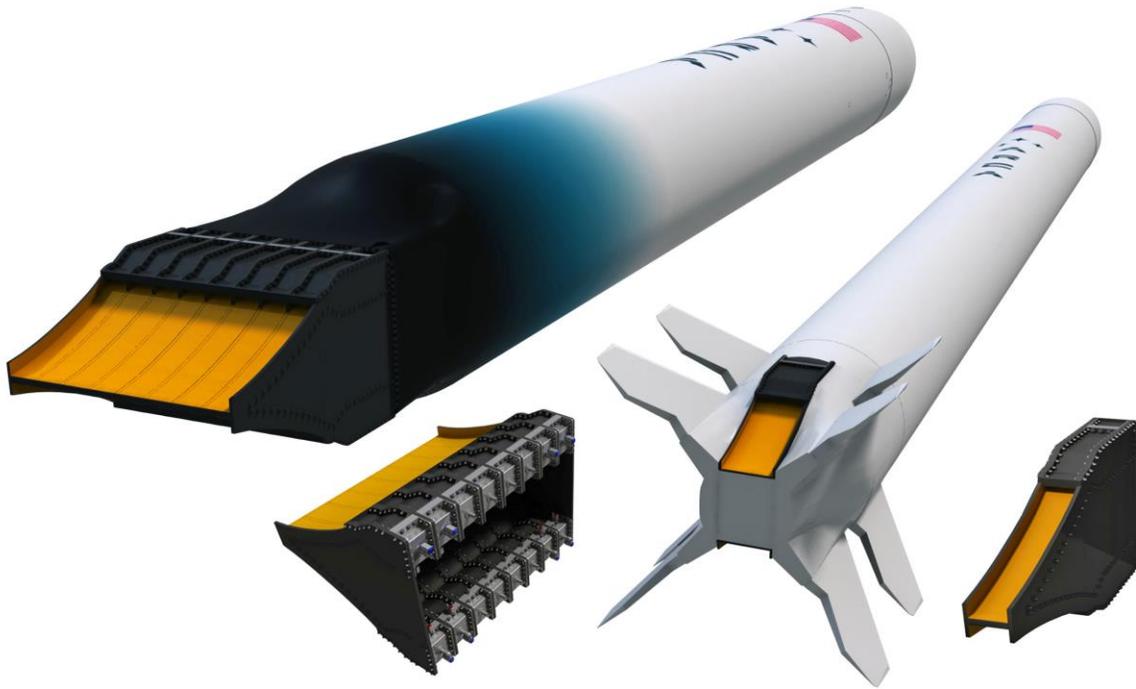


<https://www.youtube.com/watch?v=L1hnlmvl2gw>

Demonstrator 3 will perform a suborbital space flight up to an altitude of 100 km above the New Mexico desert. What is remarkable about this rocket, aside from the aerospike technology, is that we decided to use a super cold engine, by decomposing 70% concentration hydrogen peroxide at a temperature of only 250°C. This generates oxygen and water, making it environmentally friendly. If this flight is achieved, ARCA will demonstrate that:

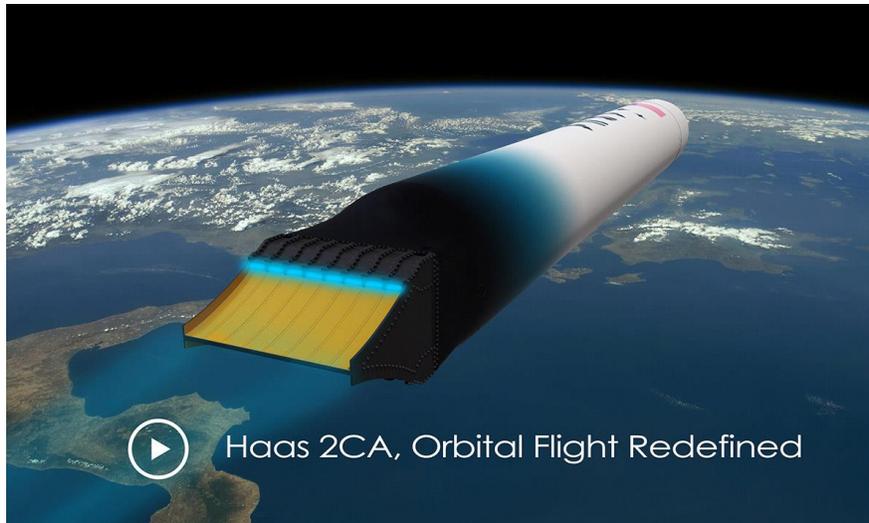
- The aerospike engine technology is a flight qualified concept for our Haas 2CA Single Stage to Orbit rocket;
- The aerospike technology allows for the creation of a new generation of Single Stage to Orbit vehicles;
- Super cold engines paired with the aerospike technology will allow the creation of a new generation of environmentally friendly suborbital rockets.

ARCA will launch the Demonstrator 3 rocket in August 2017 from Spaceport America to test the atmospheric exhaust expansion of the aerospike linear engine. ARCA will measure engine thrust variation with increasing altitude using a vast array of sensors placed on board the rocket. The type of fuel tanks that will be installed in the Haas 2CA Single Stage to Orbit Rocket will also be flight tested to pressure and acceleration similar to what is encountered during an orbital flight.



Haas 2CA, Demonstrator 3 and their aerospike rocket engines

“By sending the Demonstrator 3 rocket into space using a super cold engine with only 250°C instead of 3500°C in the reaction chamber and paired with the aerospike technology, we are going to demonstrate the impressive potential of the aerospike. The Haas 2CA Single Stage to Orbit is just the beginning of a new generation of space vehicles shaped by innovation that will generate lower costs. We are going to answer one of the industry’s most asked questions: can an aerospike deliver, in flight, the pressure compensation generated by altitude variation and deliver the expected performance by saving fuel? We want to pick up where NASA left off and prove that this technology is actually the way to go for space flights. We are confident that the aerospike engine combined with composite material fuel tanks and dense fuels will significantly lower the costs for orbital and suborbital launches. We truly believe that the answer for cost reduction of space flight is innovation, not trying to make old technologies a little bit more efficient as this will never generate a significant price drop of space launches but merely small improvements. With this philosophy in mind, we expect to increase the registered value of our company from its current \$20 million to at least \$200 million by 2019.” said Dumitru Popescu, ARCA CEO.



<https://www.youtube.com/watch?v=30LBEyFdWmE>

Due to its simplicity and low cost, ARCA is also considering utilizing Demonstrator 3 to begin commercial suborbital flight services as the rocket can carry a payload of 30 kg up to 100 km altitude. The payload will experience low accelerations during the powered flight and will experience around 5 minutes of microgravity.

|                                |                       |
|--------------------------------|-----------------------|
| Vehicle length                 | 10 m                  |
| Vehicle diameter (except fins) | 0.7 m                 |
| Takeoff weight                 | 2,240 kg              |
| Dry weight                     | 120 kg                |
| Number of stages               | 1                     |
| Propellant                     | Hydrogen Peroxide 70% |
| Tank pressurization            | Pressure fed          |
| Chamber temperature            | 250°C                 |
| Total thrust at sea level      | 4,100 kgf             |
| Total thrust in vacuum         | 5,700 kgf             |
| Specific impulse at sea level  | 93 s                  |
| Specific impulse in vacuum     | 127 s                 |
| Running time                   | 85 s                  |

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## About ARCA

ARCA is a US corporation that develops state of the art aerospace technologies. We are currently developing the Haas 2CA Single Stage to Orbit rocket and the ArcaBoard, the world's first flying board commercially available. What defines us the most is that we are bringing to the market technologies never thought possible, while keeping the costs affordable. In the past 19 years we've built and launched a series of aerospace vehicles that defined ARCA as one of the most innovative companies involved in the development of private space flight.

ARCA Space achievements:

2004 - During the \$10 million Ansari X Prize Competition, ARCA launched the first rocket, the Demonstrator 2B.

2006 - ARCA built the world's largest solar balloon that lifted the crew capsule of Stabilo, a manned suborbital vehicle created after the end of Ansari X Prize Competition, into the stratosphere.

2007 - The Stabilo program continued, this time with an even larger solar balloon lifting the complete Stabilo vehicle into the stratosphere.

2008 - ARCA joined the \$30 million Google Lunar X Prize Competition.

2010 - Helen rocket was launched at 120,000 ft, representing the first powered flight in the Google Lunar X Prize Competition. The rocket was transported into the stratosphere with the help of a helium balloon.

2012 - Haas rocket series was introduced, consisting of Haas 2B and 2C.

2013 - The European Space Agency (ESA) awarded ARCA with a contract to test the parachutes system for the ExoMars spacecraft that would be launched to Mars in 2016.

2014 - AirStrato "The most amazing air robot in the world" UAV performed the first flights.

2015 – ARCA presented the ArcaBoard, the first truly flying hoverboard commercially available.

To learn more about ARCA Space and specifications of the Haas 2CA, please visit:

<http://www.arcaspace.com>

<https://www.facebook.com/arcaspace>

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