



Space Concordia fires most powerful student rocket engine in the world

Quebecois-Canadian student team breaks records with engine test on quest for space



Montreal, Canada: On June 17th, the Space Concordia Rocketry Division (SCRD) student team from Concordia University, tested their experimental liquid-propelled rocket engine, *Stewart*, and produced a record-shattering 35kN of thrust. [This “Hot fire” test](#) was the culmination of a several-years-long campaign to achieve the full-thrust of the flight engine for their upcoming rocket *Starsailor*. The team aims to launch the rocket with onboard scientific experiments to 130km (30km above the Kármán line) within the next year.

The *Stewart* engine surpassed in power the previous student record, the *Nimbus* built by TU Delft in the Netherlands (25kN); Rocket Lab’s Rutherford engine (25.8 kN); and all currently operating rocket engines in Canada.

Achieving a full-thrust burn is a key milestone in rocket engine development. It produces critical combustion data, and acts as a true proof of concept for the engine’s design. The *Stewart* engine was able to meet these requirements. The Montreal-based team has been working towards these results since the project’s inception in 2018. Now, they plan to move forward with a test of the full rocket, referred to as a “Stage test”, in the coming months.

“How often in your life do you get the chance to do something that nobody has ever done before? We’re doing the impossible.”

- Oleg Khalimonov , Team Captain, SCRD



The development of the *Stewart* engine and *Starsailor* rocket began as part of the Base11 Space Challenge: a competition for North American students to build and launch a liquid-propelled rocket past the Kármán line, the internationally recognized boundary to outer space at 100 km.

Liquid-propelled rocket engines are typically the most difficult kind to build and their development is usually only undertaken by large companies or government agencies. Student rocket projects of this kind are rare as they demand a huge amount of time, development cost, and a steep learning curve.

Of the 50 participating universities across North America, the SCRД was the only team to succeed in developing a rocket and a full-thrust flight engine, doing so using only a fraction of the resources available to some competitors. Participating schools include the University of Michigan, the University of British Columbia, Purdue University, and the University of Texas.

The SCRД placed first in the Base11 critical design review in February, and was the only Canadian team to submit a flight readiness review in June.

Starsailor aims to be ready to launch within the year. The team is exploring launch options around North America, potentially looking to be one of the first spaceshot from Canadian soil in over 50 years.

Regardless of their final launch site, *Starsailor* and the *Stewart* engine have already made their mark on history.

Fast facts

- **Engine Thrust:** 35kN, equivalent to SpaceX's first ever Kestrel rocket engine
- **Target altitude:** 130km altitude
 - higher than the latest Virgin Galactic passenger flight and Blue Origin passenger flight
 - Previous student altitude record is USC's Traveler IV at 103km
- **Rocket contents:** totalling 50kg
 - Scientific experiment in microfluidics with applications for studying human health in space
 - Engineering model of Space Concordia Spacecraft Division's next satellite, SC-ODIN
 - Memorial for friends and family lost during the pandemic
 - Sponsored payload from SGE Space
 - Sponsored payload from Kerbal Space Program

About the Space Concordia Rocketry Division: Space Concordia (SC) is a student space association at Concordia University in Montreal, Canada. SC students work above and beyond their studies and dedicate their extracurricular time to the pursuit of new space technologies,



teaching themselves and others. There are several divisions within the group: Spacecraft, Robotics, Space Health, and chief among them is the Rocketry Division.

Having launched their first rocket: a solid-fuel sounding rocket to 10 000 ft (3km) in 2015, the team's ambition and ability has only grown. After their supersonic sounding rocket and it's onboard experiment won two first place prizes at the Spaceport America Cup in 2018, the students began their greatest undertaking yet: *Starsailor* is the first liquid-propellant rocket the SCRDR has created.

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