



Desert Winds

Project Sunride Break the European Student Liquid Rocket Record

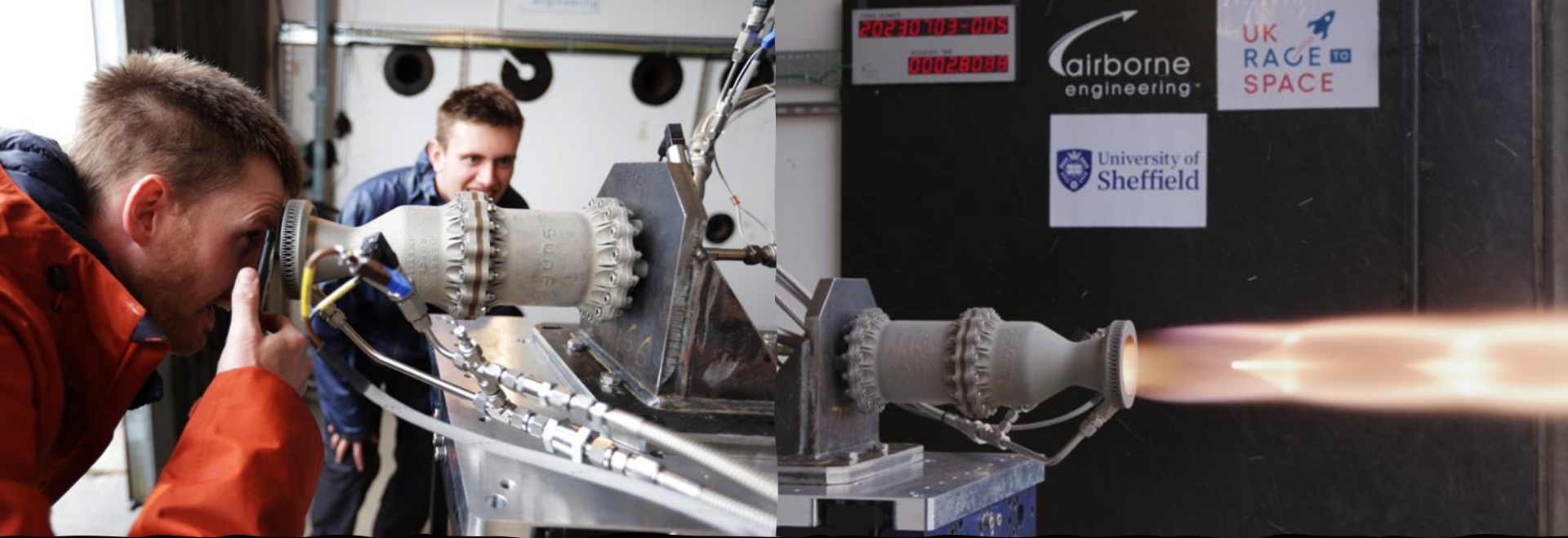
About Project Sunride



- Founded in 2018
- Student-Led Engineering Project at the University of Sheffield
- Team of 80 students working on various rocketry projects

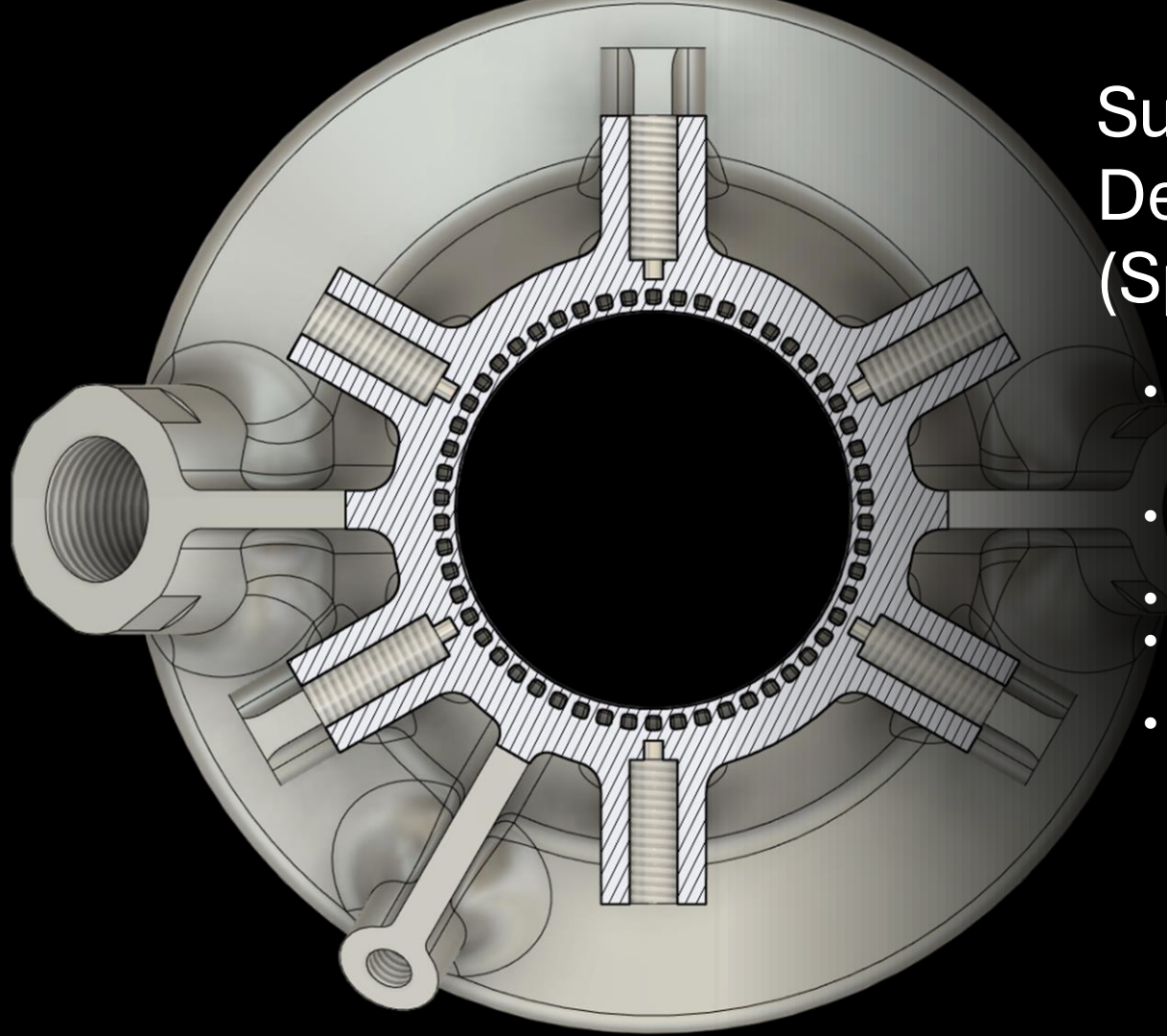






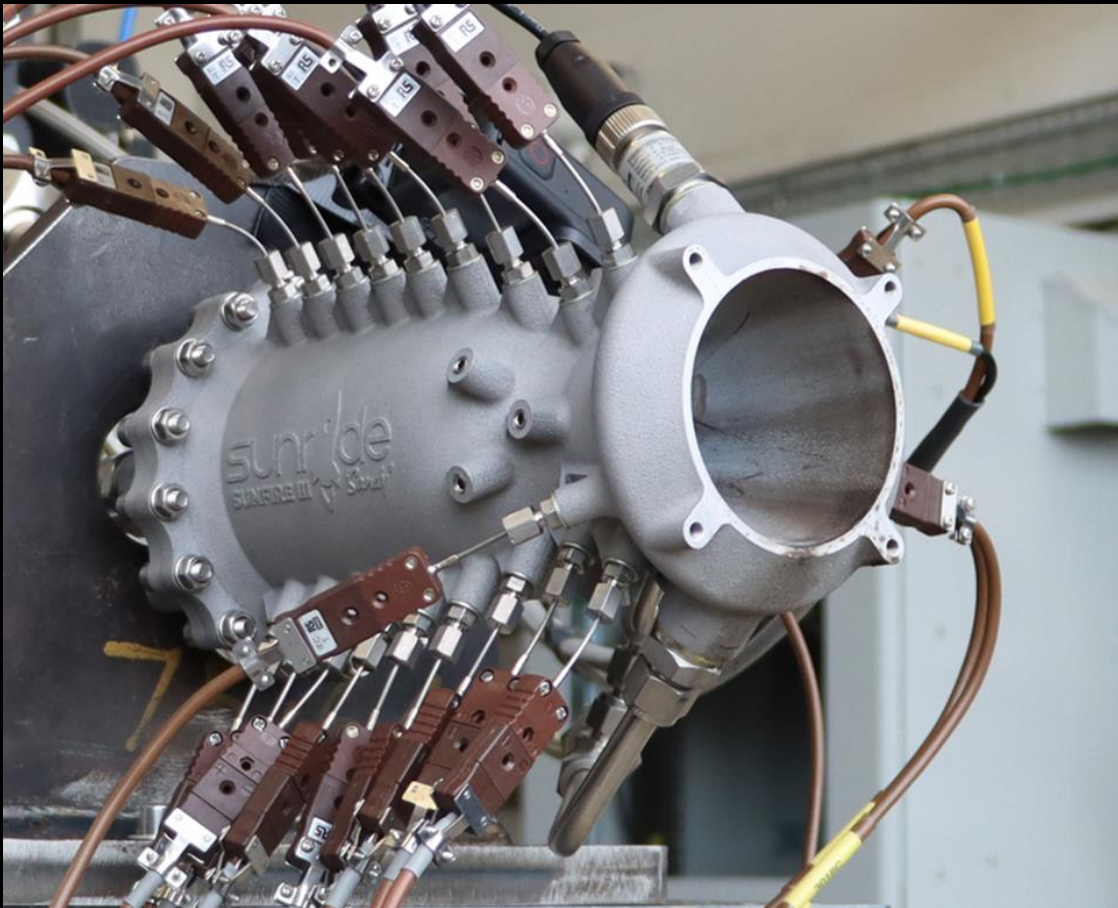
Sunfire II Hot fire

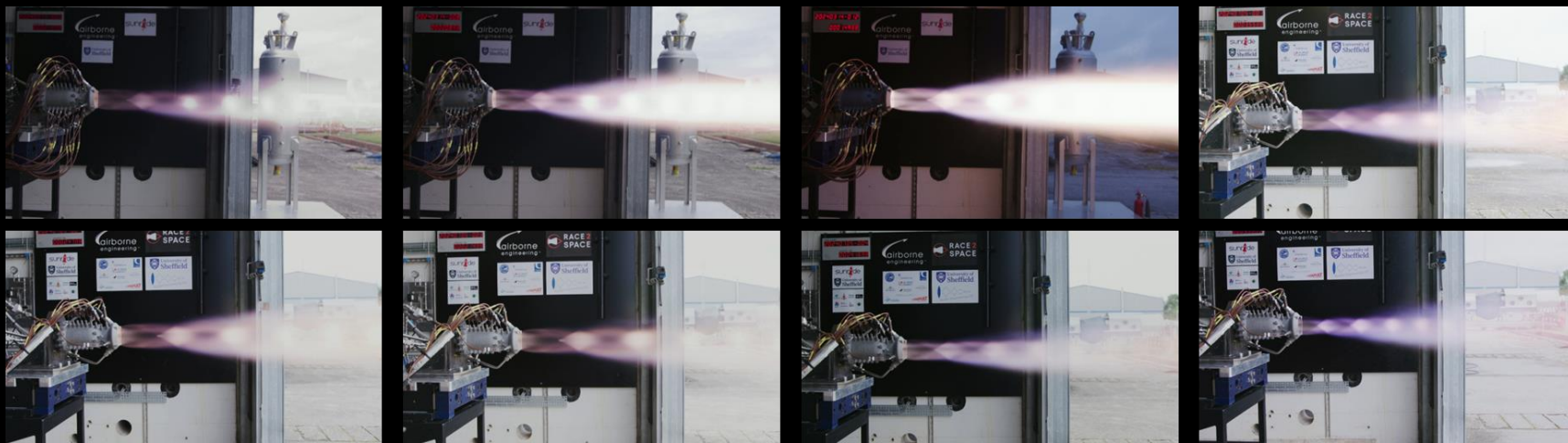
- First 3D printed student-built liquid engine tested in the UK
- First regen cooled student-built liquid in the UK
- The most powerful student-built liquid in the UK
- Fired for 5 seconds and burnt through



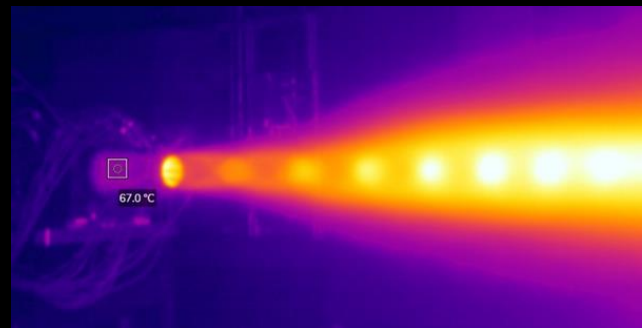
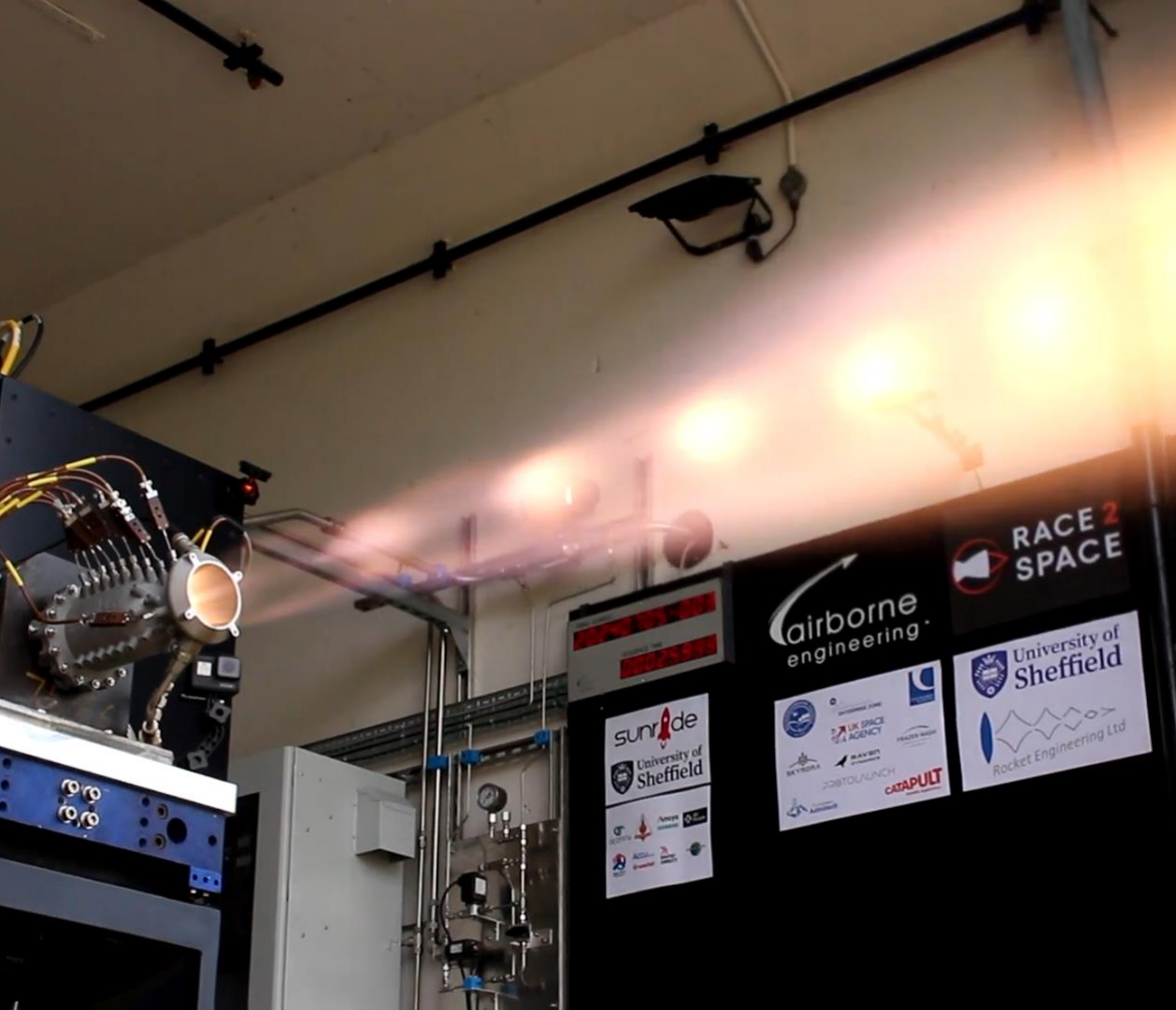
Sunfire III Development (Specs)

- AlSi10Mg Regeneratively Cooled Liquid Bi-Propellant Engine
- 3.5 kN, Nitrous Oxide, Isopropyl Alcohol
- Additively Manufactured
- Like impinging injector, 15% film cooled
- Use of PDMS additives for increased cooling



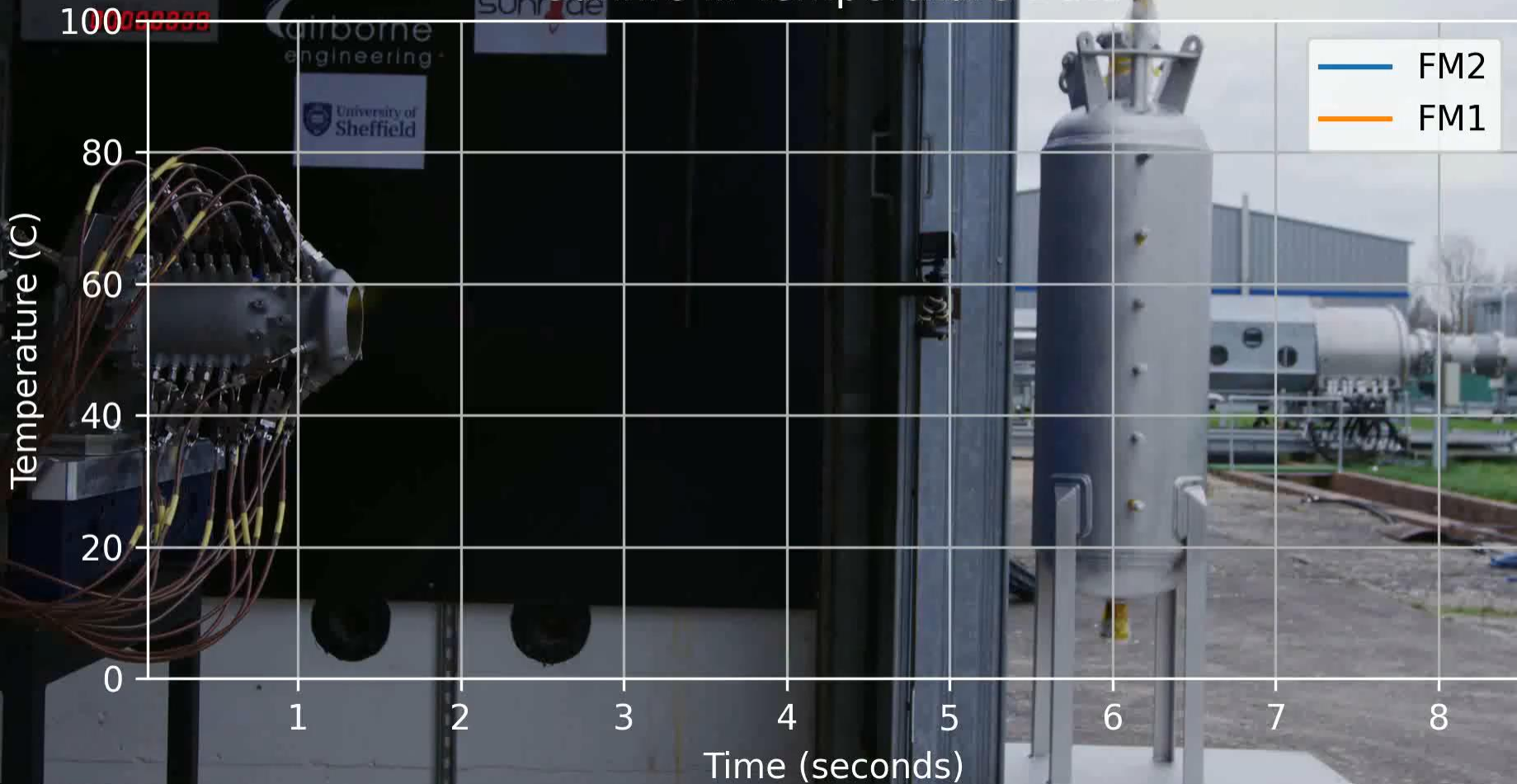


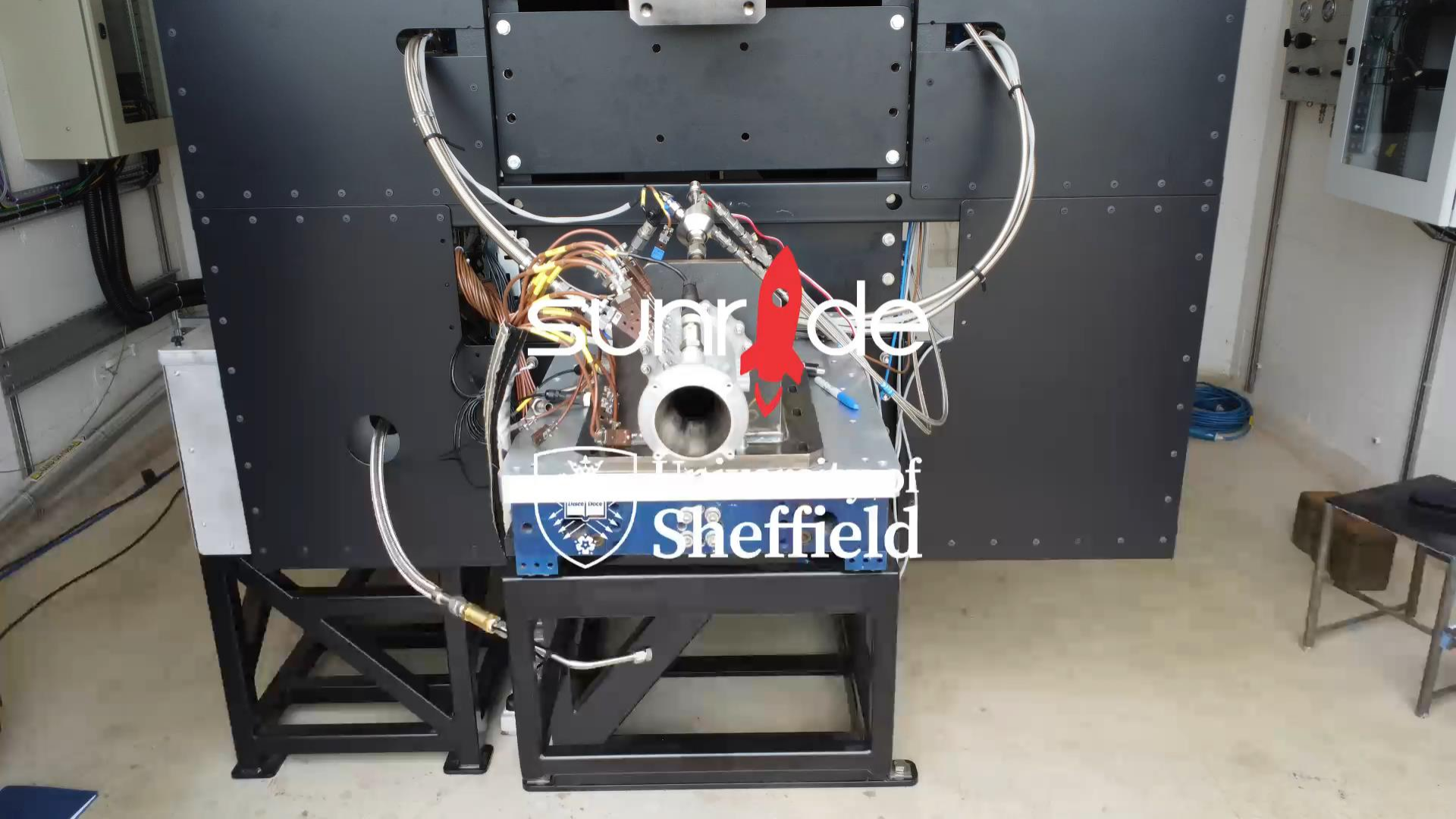
Sunfire III Hotfire - March



20240314-008

Sunfire III Temperature Data





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of
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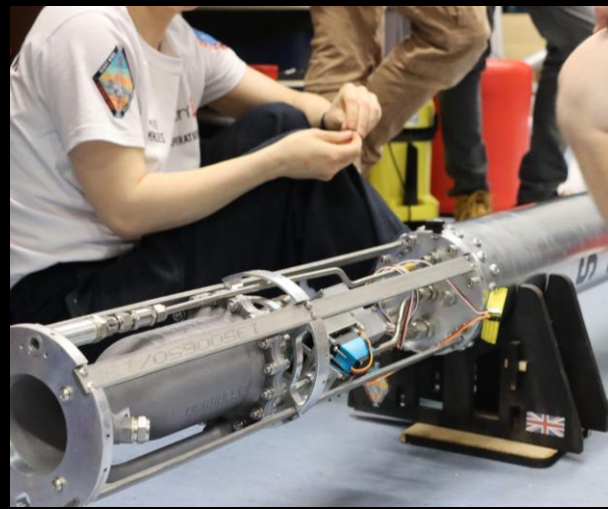
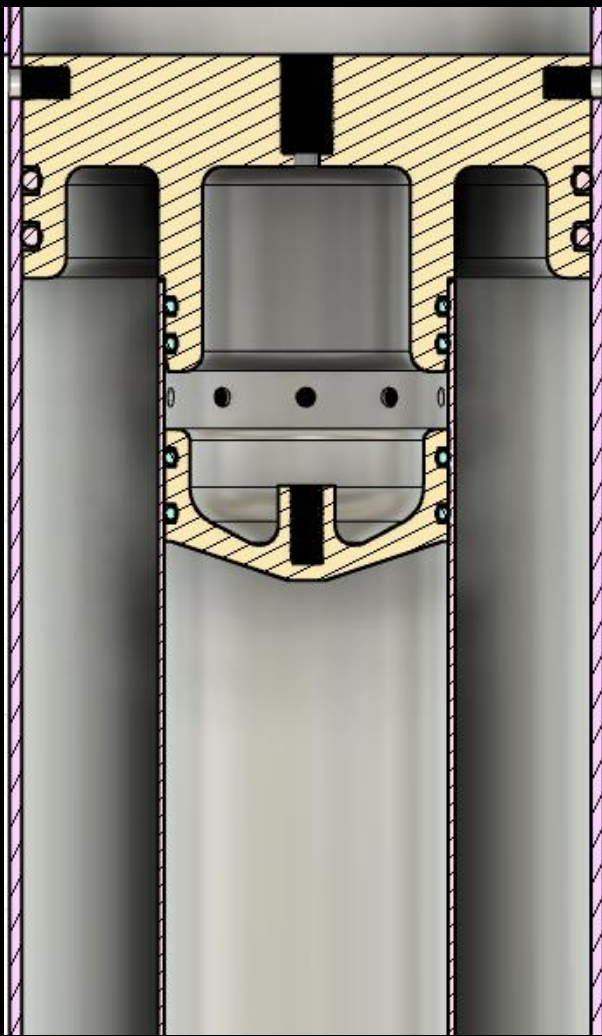
Engine Test Statistics

Stat	Value
Fires	8
Longest Burn	9s
Total Run Time	34s
Total Impulse	100kNs
Max Thrust	4.8kN
Total Fuel Used	19.6kg
Total Oxidiser Used	51.7kg

Desert Winds

- How simple can we make a liquid rocket?
- Can we get the project done in 6 months?
- Design started in January, launched in June
- Inspired by the amateur rocketry community in the USA





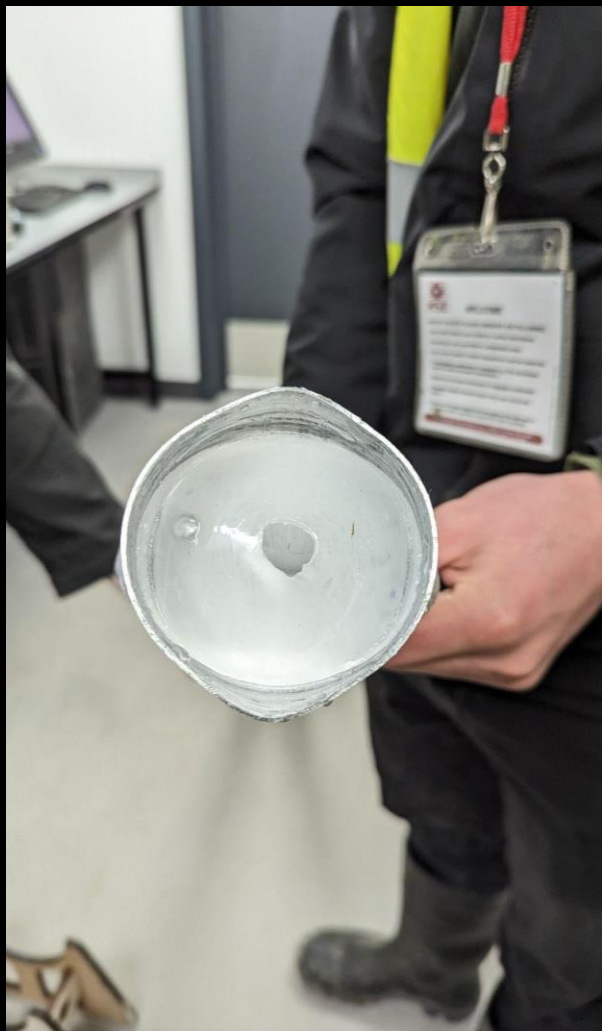
Electronics

- No propulsion avionics on the rocket
- All controlled with a drone flight controller
- Off the shelf ball valves actuated by servos
- Servos disconnect on launch once valves are open

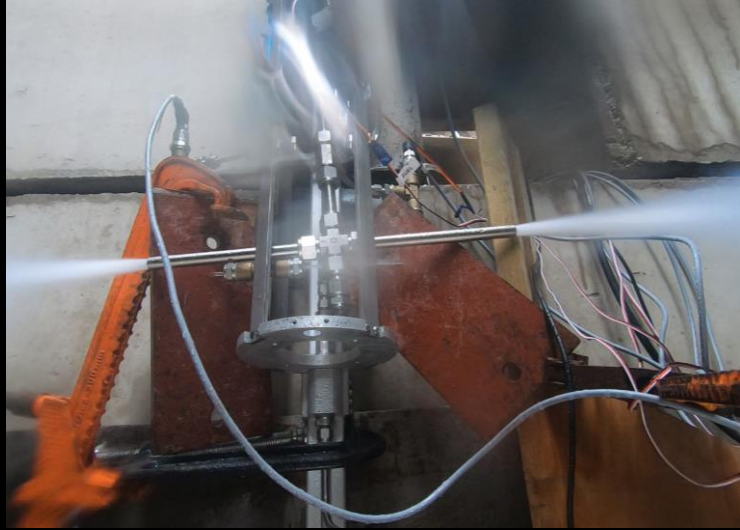


Cold Flow 1 - April





Cold Flow 2 - May



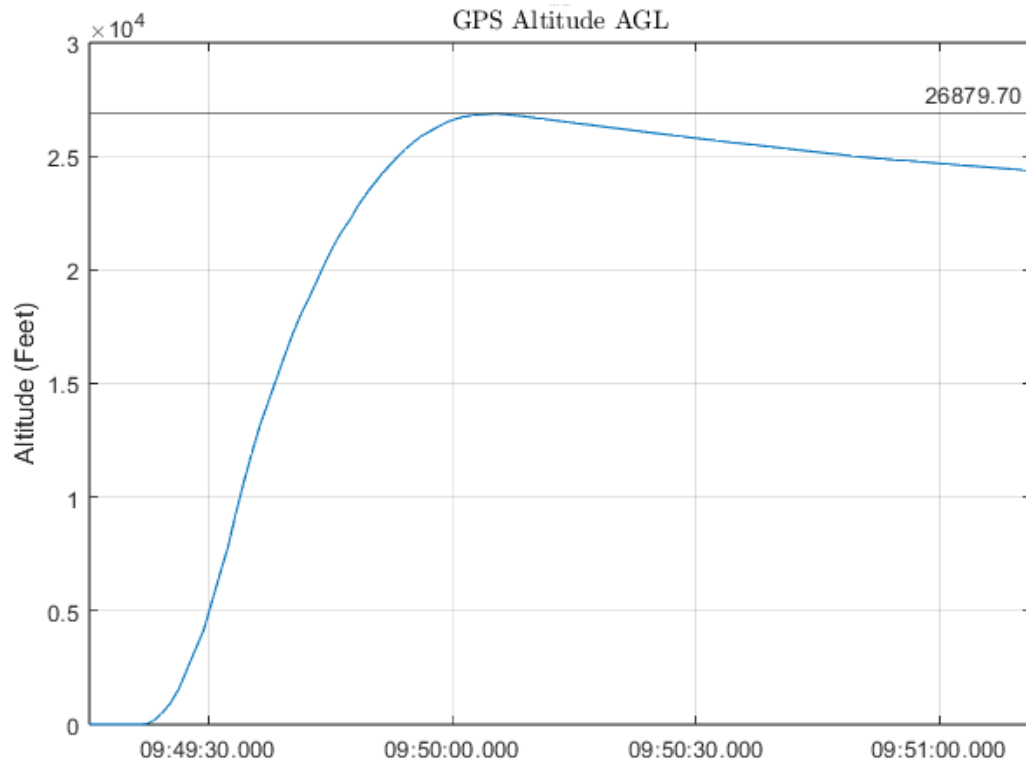
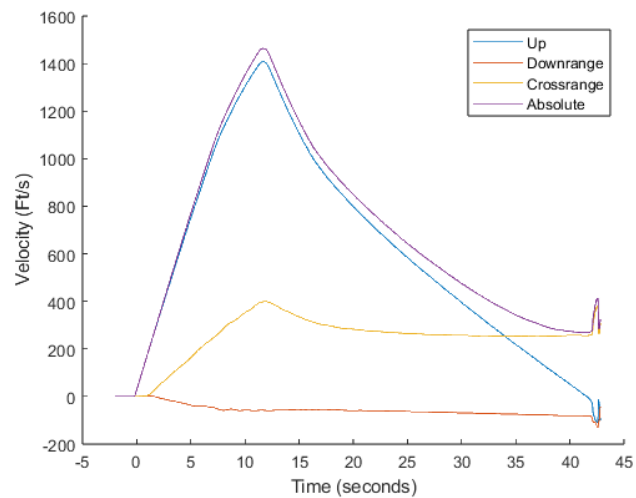
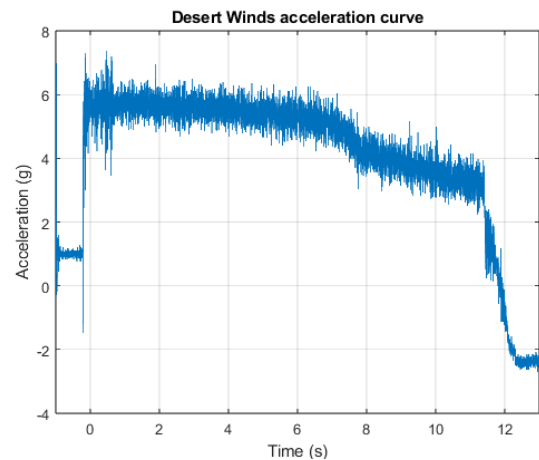












Mach 1.36
Max speed 446 m/s
Apogee 26,879 feet (8.19 km)



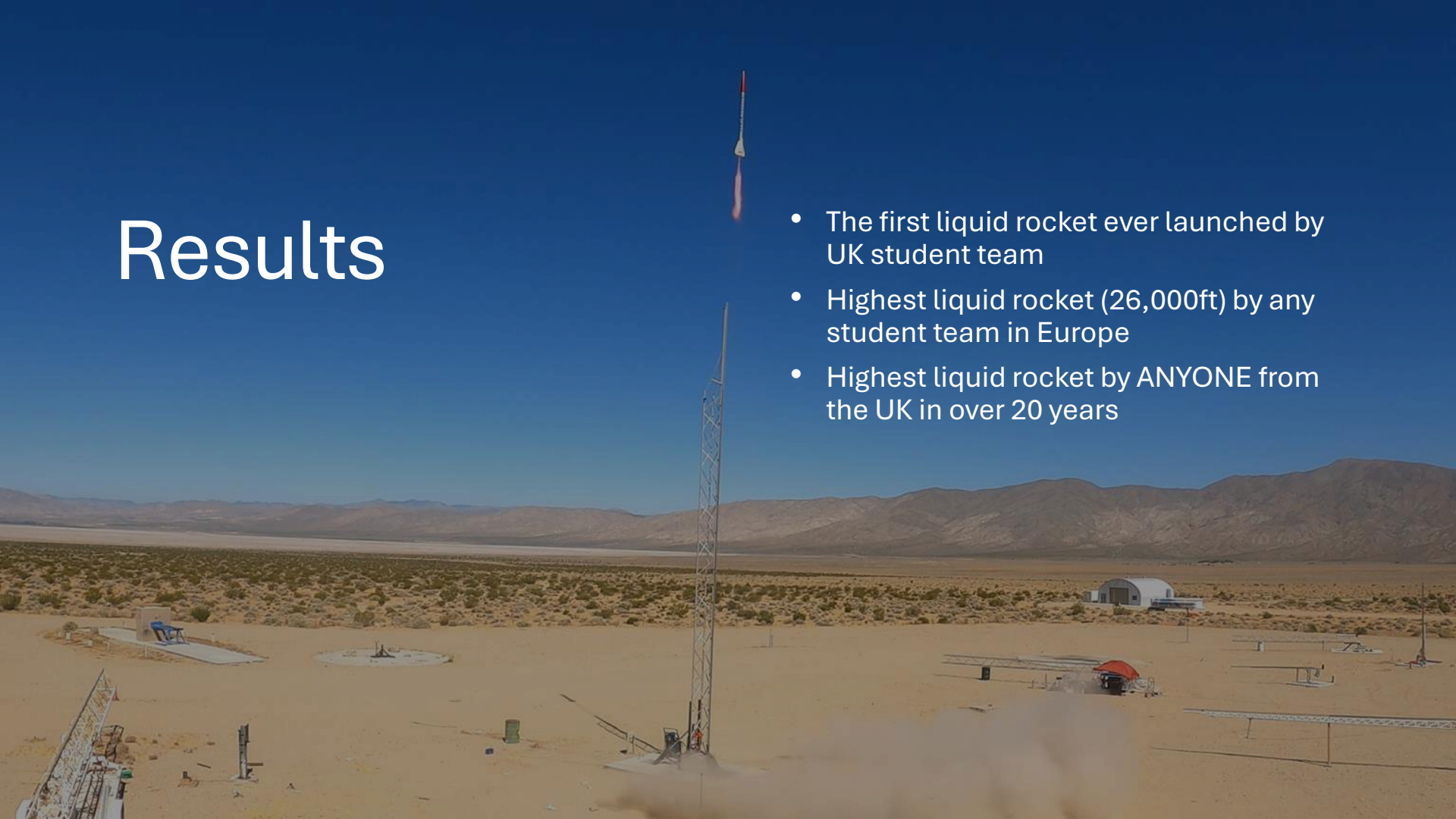
Image © 2024 Airbus
Imagery Landsat / Copernicus
Data LDEO, Columbia, NSF, NOAA
Data GTO, NOAA, U.S. Navy, NGA, GEBCO

Google Earth

Imagery Date: 6/16/2024 lat 35.416229° lon -118.090351° elev 1322 m eye alt 4.93 km

Results

- The first liquid rocket ever launched by UK student team
- Highest liquid rocket (26,000ft) by any student team in Europe
- Highest liquid rocket by ANYONE from the UK in over 20 years



You're here: [Homepage](#) → [Resources](#) → [Website content search](#) → 'Record-breaking' rocket launch

News

5 July 2024 by Sarah Morgan

'Record-breaking' rocket launched by Sheffield students

A supersonic rocket built by a student team at the University of



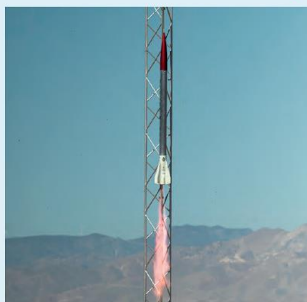
Society News

RACE 2 SPACE

Students from across the UK came together in July for the 2024 Race 2 Space rocketry competition. Race 2 Space is an educational initiative and national propulsion competition founded in 2023, aiming to boost the UK space sector by providing students with hands-on experience, designing and testing rocket propulsion hardware. It is the only event of its kind in the world, and this year doubled in size, involving 19 universities and over 200 undergraduates across the UK and Ireland.

RAeS President, David Chin attended the Race 2 Space symposium, commenting that "it was a privilege to be here; this was a fantastic event. Alistair and I seem to have had a convergence of ideas and this fits in perfectly with two of my themes: professionalisation of space and 'Design, Build, Fly'. It's all about bringing students together, practical engineering and learning by doing."

As part of the competition, university students hot-fired their rocket engines over a busy two weeks on test stands at Westcott Space Cluster, which is home to the National Space Propulsion Test Facility. In total, 31 test-fires of student rocket engines were carried out, which is unprecedented and likely to set a world record for the number of different rocket engines hot-fired on one site over two weeks. This



Victoria Whittam
@vicwhittamITV

A supersonic rocket that has broken a series of UK & European altitude records, has been built by a team of students at @sheffielduni. It took them just 6 months to build Desert Winds, a liquid-fuelled rocket propulsion system, similar to ones used by NASA and SpaceX.

itv NEWS



'Crazy idea' rockets to big success in the US desert

Ruby Kitchin

News (commentary)

ADVENTURE students in Yorkshire have seen their dream take off in the California sun with a "super-sonic" rocket to break a series of altitude records.

The students, from the University of Sheffield, have been working with their studies as part of a £750k project to engineering.

New it has broken a series of UK and European altitude records, and the team will only be the UK to launch a liquid-fuelled rocket such as that used by NASA or SpaceX.

Team director Tom Chinn, an RAeS President, commented that "it was a privilege to be here; this was a fantastic event. Alistair and I seem to have had a convergence of ideas and this fits in perfectly with two of my themes: professionalisation of space and 'Design, Build, Fly'. It's all about bringing students together, practical engineering and learning by doing."

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The Sheffield students designed and built their own engine, fuelled by liquid oxygen and kerosene. It was tested in March, producing almost half a tonne of thrust.

The engine was 10 percent out of dimension and 10 percent out of weight, a promising start to which the Sheffield team used the conventional method of building a rocket, which increases the engine's efficiency and saves weight.

Robert Chinn, an director and also an RAeS President at the time, commented that "it was a privilege to be here; this was a fantastic event. Alistair and I seem to have had a convergence of ideas and this fits in perfectly with two of my themes: professionalisation of space and 'Design, Build, Fly'. It's all about bringing students together, practical engineering and learning by doing."

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UK Space Agency
@spacegovuk

Congratulations to the Project Sunride student team @sheffielduni!

Read more about their significant achievements:
sheffield.ac.uk/news/record-br...



Sheffield Uni News and Views @ShefUniNews · Jul 4

Students from @sheffielduni have built and launched a supersonic rocket - breaking UK and European altitude records



Importance of launch (design, build, test, fly)

- Testing real hardware, experiencing the full project cycle
- Gaining practical skills that are missed out by University courses

Skills development

- Student rocketry is the best method of addressing the skills gap in the space sector
- Valuable skills such as propulsion, launch operations, electronics
- 20+ teams working in the UK on hybrid and liquid propulsion, gaining real practical experience
- Number of skilled graduates will skyrocket with the exponential growth of student rocketry over the past 2 years



Race 2 Space



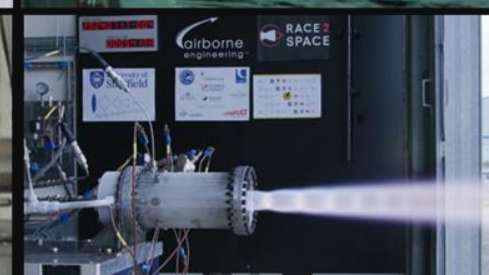
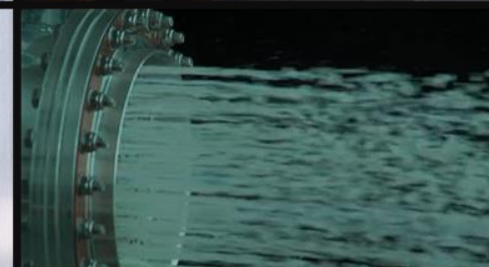
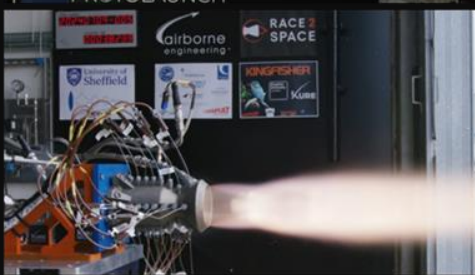
National Propulsion Competition held at Westcott

<https://race2space.org.uk/>

2024 Statistics

Bi-props: 37 hot fire attempts, 17 successful hot fires, 140s of hot fire delivering 182kNs impulse, 60kg LOX, 105kg N₂O, 76kg fuel

Hybrids: many attempts, 14 successful hot fires, 45.63kNs impulse and 224kg N₂O

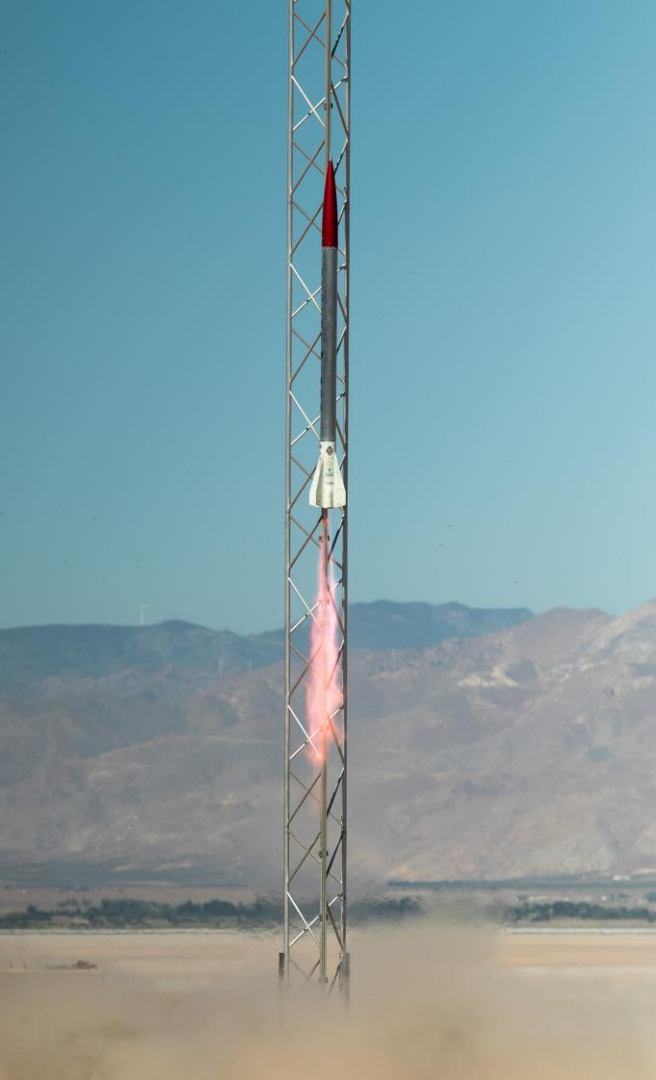


Future of student rocketry

- Many teams across the country are working towards launch of liquid and hybrid rockets
- Imperial a few weeks ago achieved the second liquid rocket launch
- Teams starting to work on ambitious projects such as hoppers (Imperial and Sheffield within the next 2 years)
- Collaboration between teams across the country is at an all time high, focus on open sourcing projects and knowledge sharing



Photo: Imperial College London Rocketry



Importance for small launch providers

- Graduates coming from student rocketry are what are needed for small launch providers to flourish
- Student rocketry needs support in order to keep pushing boundaries and developing skills
- Student rocketry provides great return on investment, with projects operating on budgets of £5-10k, while producing 10-15 skilled graduates per project
 - Desert Winds and Sunfire III were designed, built, tested and launched for £10,000
- Need for graduates to be retained within the UK in order to enable UK small launch capability
 - What incentives are being provided? Can better support of student rocketry help enable UK grads to stay in the UK