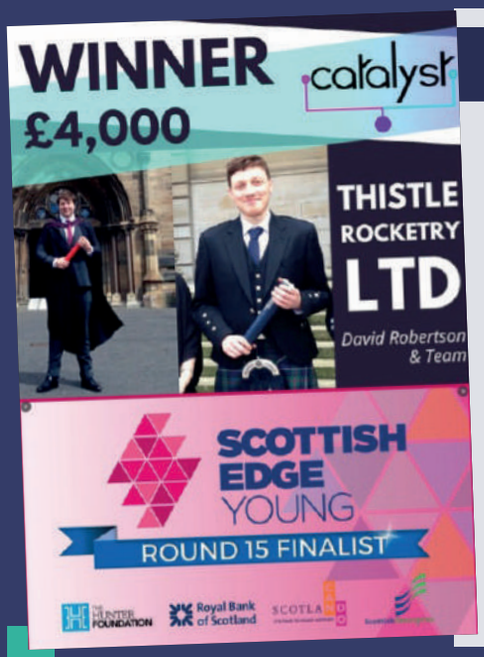
AIMS CASE STUDY

THISTLE ROCKETRY LTD

AIMS
Advancing Innovative Manufacturing in the south of Scotland

SOUTH of SCOTLAND ENTERPRISE

EUROPE & SCOTLAND
European Regional Development Fund
Investing in a Smart, Sustainable and Inclusive Future

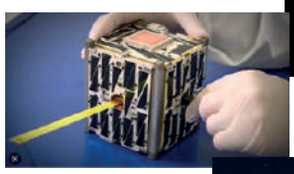


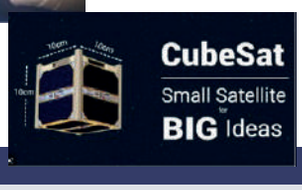
BUILDING SCALABLE LAUNCH SOLUTIONS FOR CUBE SATELLITES

Based in Galashiels Scottish Borders, Thistle Rocketry are a pioneering start-up venture aiming to change the way Cube Satellites are sent to space. The business has been the winner of several funding competitions and is on track to launch their first prototype rocket mid-summer 2023. As its payload, the rocket will carry a Cube Satellite and the manufacture of the first launch system is well under way. The AIMS Project were approached by David Robertson and Ian Hanley, Thistle Rocketry directors to assist with the design and manufacture of a device to test the rocket's ignition and engine performance.

WHAT IS A CUBE SATELLITE? (CUBESAT)

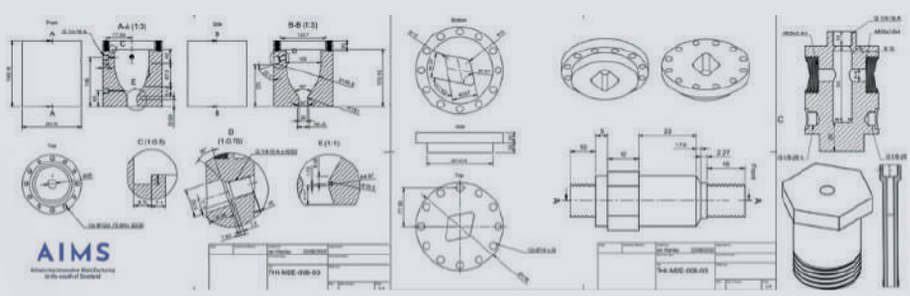
A Cube Satellite is a class of miniaturised satellite based around a form factor consisting of 10 cm cubes. CubeSats have a mass of no more than 2 kg per unit, and often use commercial off-the-shelf components for their electronics and structure. CubeSats are put into orbit by deployers on the International Space Station or launched as secondary payloads on a launch vehicle. As of August 2022, more than 1,600 CubeSats have been launched.





PROJECT OVERVIEW

Further to a design review of the Thistle Rocketry engineering drawings by the AIMS technical team, a decision was taken to support the company with the manufacture of a complete set of ignition and engine components. Recommendations were made to improve the design from a manufacturing standpoint, ultimately saving the client time and cost.



PROJECT EXECUTION

CNC MACHINING OPERATIONS

The AIMS technicians successfully carried out the manufacture of all ignition and engine components on our two state-of-the-art CNC machine tools. All CNC turning operations were machined on our SMEC 3500LMB and the milling cycles were carried out on our Akira Seiki 5AX-BC650. Complex CNC programs were created on our Hypermill software platform that allowed our team to push the envelope on what was possible, ultimately rising to the challenge of such a prestigious aerospace project.

DIGITAL DIMENSIONAL INSPECTION

To verify the exacting dimensional requirements of these components, our technicians carried out an inspection operation on our Hexagon Global Lite CNC CMM. This machine is accurate to 5 microns and the results recorded were found to be correct to the technical specification.

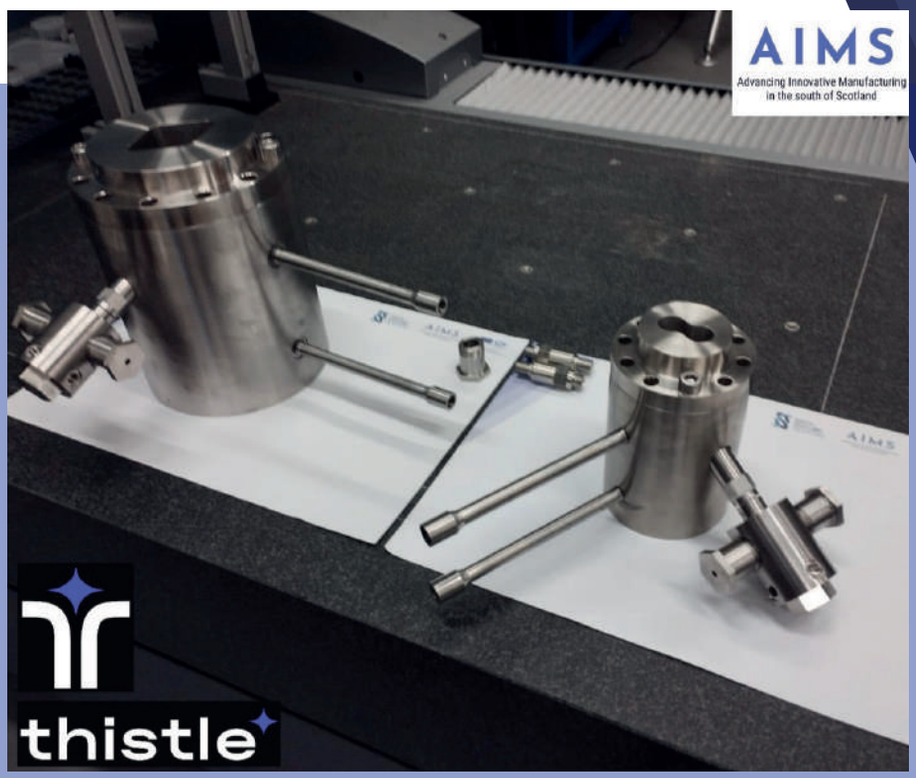
OUTCOME

**Ian Hanley,
Director,
Thistle Rocketry:**

"I'm really pleased with the parts now I've seen them in person, they look great."

"Absolutely amazing! So pleased, what a Christmas present!"

THE FINISHED ASSEMBLIES



EXTRACTS FROM PROJECT COMPLETION REPORT

IAN HANLEY, DIRECTOR, THISTLE ROCKETRY LTD.

AIMs' expertise was extremely valuable in understanding how best to design the parts in question to avoid tooling difficulties, expediate manufacture and reduce wasteful expenditure on manufacture.

This element of the project was fascinating, and not only solved a problem, but demonstrated the flexibility of solutions available through the compounded use of this sort of bespoke manufacture.

AIMs has provided fascinating insight into the power of CNC turning with regards to bespoke production, underscoring the value this would add to the company were we to have such capabilities in-house. In the interim, the knowledge gained working with AIMs will greatly accelerate the production process on similar builds while working with commercial machine shops.

The staff at AIMS were extremely helpful in realising this project. Design discussions were very interesting, and the test chambers look fantastic and extremely resilient. The safety, efficacy and flexibility of our R&D has been greatly improved thanks to these new chambers.

The accuracy of the parts produced was extremely high, and the value of the CMM as an assurance tool for this was extremely enlightening.

Project carried out by: Paul Murie & Stewart Smith, AIMS Technical Officers, 19/12/22