

European Thermodynamics Ltd : Building a European Supply Chain for Space-Grade Thermal Technology

When global supply chain instability exposed Europe's dependence on overseas thermoelectric cooler (TEC) manufacturers, European Thermodynamics Ltd (ETL) saw an opportunity to bring a critical space capability closer to home.

Through the Pivot Into Space programme, ETL accelerated the development of advanced thermal management technology for use in space instruments — helping position the company as a potential European supplier of space-grade TECs for future missions.

The Challenge

Space instruments such as StarTrackers rely on highly specialised cooling systems to maintain sensitive detectors at precise operating temperatures. These thermoelectric coolers are critical to mission performance, but much of the existing supply chain was concentrated in Ukraine, Russia and China.

ETL identified both a technical and commercial opportunity: develop a European-made alternative capable of meeting the demanding requirements of the space sector.

To achieve this, the company needed to:

- Design and build a multi-stage TEC suitable for space applications
- Improve thermal performance and durability
- Develop cleaner, higher-control manufacturing processes aligned with space industry standards
- Increase production accuracy and manufacturing yield
- Explore advanced metallisation techniques to improve device robustness

The project also aligned with the UK National Space Strategy by supporting greater resilience within the European space supply chain.

The Solution

The Pivot Into Space programme enabled ETL to accelerate the development and testing of a new two-stage miniature TEC device designed for high-performance space applications.

During the project, ETL:

- Built and tested a multi-stage thermoelectric device for space instrument applications
- Developed improved alignment and assembly methods, achieving manufacturing yields of 83%

- Created an internal modelling tool for future device development
- Established more advanced testing procedures tailored to space sector requirements
- Worked with the University of Leicester to investigate next-generation metallisation techniques

The programme also helped de-risk several areas of technical development that would have been difficult to pursue without early-stage support.

The Outcome

The project successfully demonstrated the viability of ETL's multi-stage TEC technology and accelerated the company's progression into the space sector.

Key outcomes included:

- Successful build and validation of a high-density multi-stage TEC prototype
- Strong thermal performance using commercially available baseline materials
- New manufacturing and testing capabilities aligned to space industry expectations
- Greater technical understanding of advanced metallisation processes
- Increased credibility with European space customers and partners

Following the project, ETL secured approximately €318,000 in European Space Agency funding to further develop StarTracker cooling technology over a 21-month programme beginning in April 2024.

Impact

By adapting existing expertise for a new market, ETL demonstrated how UK innovation can strengthen Europe's space capability while reducing reliance on unstable overseas supply chains.

The project highlights how Pivot Into Space helped ambitious companies translate proven technologies into commercially relevant space applications.

Read more about the project on [ETL's project page](#).