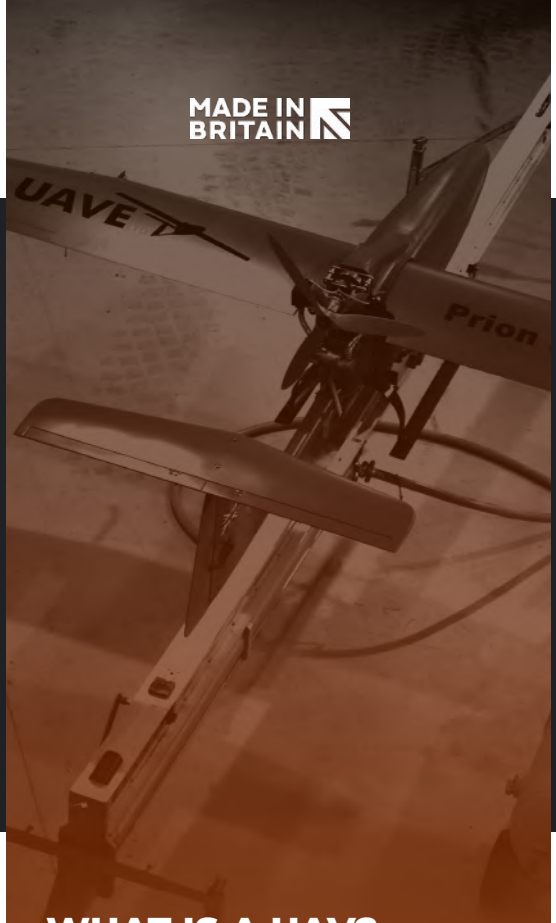


2crsi

CASE STUDY

TRANQUIL

ALUMINUM HEAT SINK REDUCES ENGINE OPERATING TEMPERATURE BY 20 DEGREES AND EXTENDS DRONE MARKET REACH

UAVE LTD

WHAT IS A UAV?

UAVs, or Unmanned Aerial Vehicles, commonly referred to using the generic term "drones", can operate without a pilot onboard. Here the scope is narrowed down to aircrafts that can fly autonomously.

A UAV is part of a larger ecosystem: An Unmanned Aerial System (UAS), including all the equipment and accessories that make it work, ranging from hardware, software, to the human skills of the person on the ground piloting it.

A UAV can be used for various purposes: Intelligence, surveillance and reconnaissance activities in various fields ranging from defence, research, to more specific areas such as meteorology or pollution metrology, or even the humanitarian field.

Interpretation of the collected data can be included in the services provided.

UAVE Limited (pronounced "Wave") is the UK leading manufacturer and operator of large format fixed wing drones.
Based in Wales, UAVE Ltd has created a full cycle business comprising design, manufacturing, servicing, pilot training and surveying, using their largest UAV: Prion Mk3.

UAVE has been constantly improving its platforms since it was founded in 2013, leveraging latest technologies from aerospace.

Client interest is very diverse. From surveillance to atmospheric research for pollution monitoring across the globe. Use cases span from polar regions to tropical latitudes.

With an increasing variety of projects taking place in more and more demanding environments for a growing **diversity of applications**, the challenges met by the aircraft are taken to the next level.
UAVE started looking for additional cooling for their proprietary 4 stroke petrol engine.
Indeed, with missions that could last longer and take the UAVs to greater distances, the risk of losing an aircraft because of an overheating engine could not be taken. It became crucial to **enhance the performance and longevity** of UAVE's proprietary powerplant fitted to the Prion Mk3.

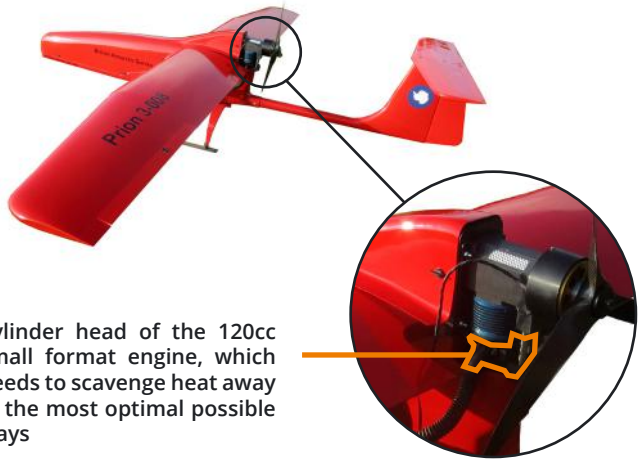
A drone in flight is continually submitted to external constraints, whether wind, rain, heat or other disruptive forces like... bird strikes!

It is important to remember that **vibrations are constant** and that **weight is crucial**: other existing products tested by UAVE engineers to solve this overheating engine issue provided good function, but options were limited, due to the numerous constraints involved.

Taking all these criteria into consideration, UAVE turned to 2CRSi.

HEAT MANAGEMENT

UAVE decided to capitalize on **2CRSi's expertise in heat management** to assist cooling the engine of their UAVs.

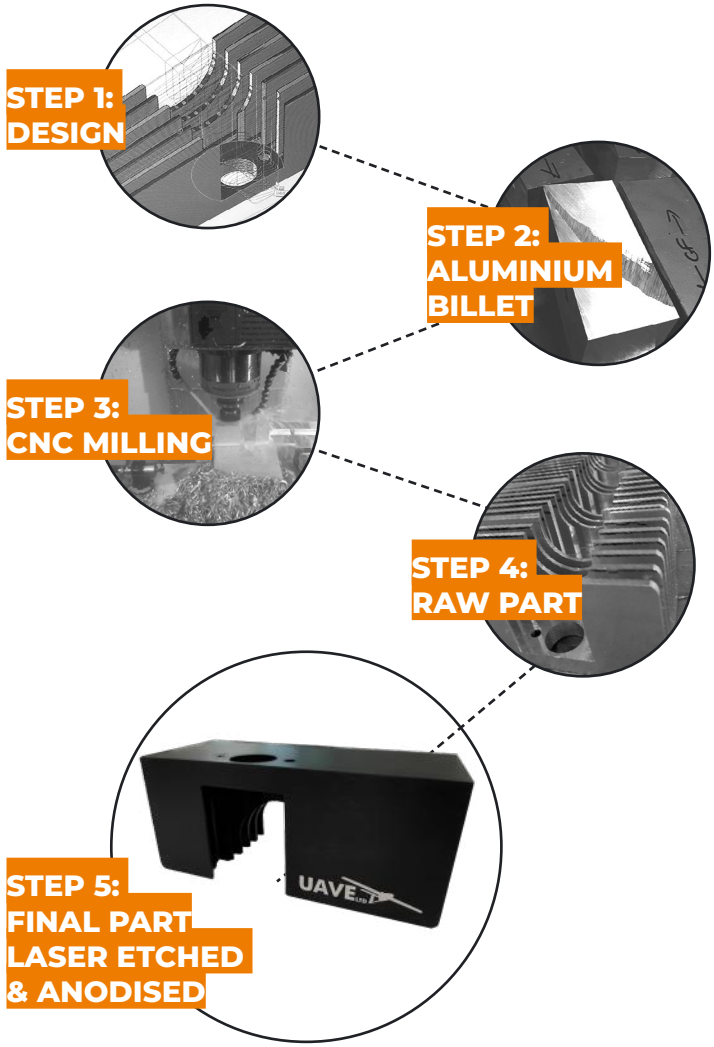


Cylinder head of the 120cc small format engine, which needs to scavenge heat away in the most optimal possible ways

Contrary to other OEM developments the relationship starts with a prototype design and the use of CFD tools to validate heat dissipation properties, UAVE engineers provided their design.

Here, it was possible to move straight to the prototyping phase and to produce this aluminium milled heatsink to cool UAVE's engine cylinder head down, with the goal of **testing thermal properties 'in real world'** rather than going through a simulation phase.

THE PROTOTYPE



The **co-designed prototype** was fitted to the drone engine on UAVE's engine development testbed, in their aircraft hangar. **Tests carried out with the engine running showed a positive benefit of 20 degrees Celsius additional cooling thanks to the uniquely designed and manufactured heat sink produced by 2CRSi!**

Based on these tests and to avoid any risk of overheating, this new heat sink will feature as standard fitment on new UAVE aircrafts using a single cylinder engine, and as an optional retrofit for units already in circulation.

Providing a superior cooling performance to the petrol engine becomes even more crucial for the longer missions carried out by the UAVs, which can last for a maximum of 12 hours, with an operational range of 1000 kilometres.

The added benefit is that UAVE can now widen its scope of activities to **"hot climate clients", such as defence forces and industrial clients located in the Middle East and Africa**, which weren't primarily in scope because of the resulting cooling constraints linked to these latitudes. Indeed, UAVE's aircraft can now reach an upper operational ambient temperature range of **55 degrees**!

"It's quite exciting to see existing technologies from two very separate markets brought together in an innovative way into a defence context."
Phillip Slater, Managing Director at UAVE.

This unique project made it possible to bring together the expertise and the know-how of two UK based companies acting in very different sectors.
2CRSi brought UAVE their expertise in heat management, as well as their capabilities around product design and rapid prototyping to ensure a perfect match with UAVE's requirements. The quick turnaround was a plus, with the **first accepted prototype validated by UAVE one month after the project start**!

Whilst teaming up on a local UK base, UAVE also found it interesting to work with 2CRSi because of its group reach [2CRSi group, founded in Strasbourg (France), develops, produces, and sells high-performance customised and environmentally-friendly servers.]

After this successful collaboration, the future will tell us if a rugged Tranquil computer could be found onboard of a UAVE drone!
An embarked use could be a great opportunity to push the use of drones to the next level, thanks to immediate processing of data, limiting the quantity of information that needs to be transmitted to the ground.

Contact us today to find out more on how 2CRSi can help your business.

2crsi.com/ruggedsystems/
contact-me@2crsi.com

DRONE ENGINE + TRANQUIL HEAT SINK

ABOUT 2CRSi

2CRSi UK LTD is a British subsidiary of the 2CRSi group based in Manchester and manufacturing the Tranquil range: rugged, fanless and rugged, fanless and low energy IT systems for edge computing and embedded uses.

Tranquil is about **ALL TERRAIN IT**: designing and producing reliable and powerful industrial solutions for IT use that can withstand the world's harshest environments.