



SPACE FORGE

OUR MISSION

Space Forge Ltd is a UK start-up based in Wales with the mission of developing reusable in-space manufacturing satellites, called Forgestars.

The conditions offered in space allow the manufacture of defect-free material not possible on Earth. These defect-free materials can be used to make more energy-efficient products and reduce the amount of CO2 emissions. Space Forge Ltd intends to become a carbon negative company through this endeavour.

New low-cost re-entry technology is being developed to make Forgestars possible. Once the material is manufactured in space, this new technology will allow the Forgestar to safely and gently return to Earth, where the material can be retrieved. The ForgeStar will then be refurbished and relaunched several times.

WHY MANUFACTURE IN SPACE?



UNLIMITED CRYSTAL GROWTH

No gravitational induced defects



ULTRA VACUUM/CLEAN ENVIRONMENT

100x better vacuum than Earth labs

Elimination of contamination



EXTREME TEMPERATURES

Easy access to -263° to $+200^{\circ}$



SIMPLIFIED INTERACTIONS

Easier to monitor chemistry and biology



UV AND IONISING RADIATION

Fast curing and mutation of materials



ELIMINATED BUOYANCY EFFECTS

Perfect mixing of materials during alloying

LAUNCH, FORGE, RETURN, REPEAT

THE PLACEMENT

The placement focused on helping in the design of the Forgestar's communication system, mainly calculating the link budget.



Skills Learned

As my first time in a professional engineering setting, I have learned a lot during my internship. I was exposed to the various organisational and communication tools used and I learned how best to use them quickly.

As I am working remotely, it was important for me to be proactive in asking questions and making sure my work progressed in the correct direction.

I am now working as a full time space systems engineer at Space Forge Ltd and I am looking forward to the coming years.

Space Systems Engineering

A majority of my time was spent working on the communication system of the Forgestar. I wrote a python code to calculate the link budget of the S-band communication system. The link budget is the accounting of all the power gains and losses of the communication link to make sure the system is capable of successfully sending and receiving data from orbit.

The official recommendation documents from the International Telecommunication Union (ITU) were used as a reference as they outline the methods to calculate the relevant values which pertain to propagation losses and noise.

I also used ESA's SPENVIS tool to calculate the probability of debris and meteoroids causing a critical failure by hitting a critical subsystem.