Airborne Engineering Limited
Rocket Test Facility Intern

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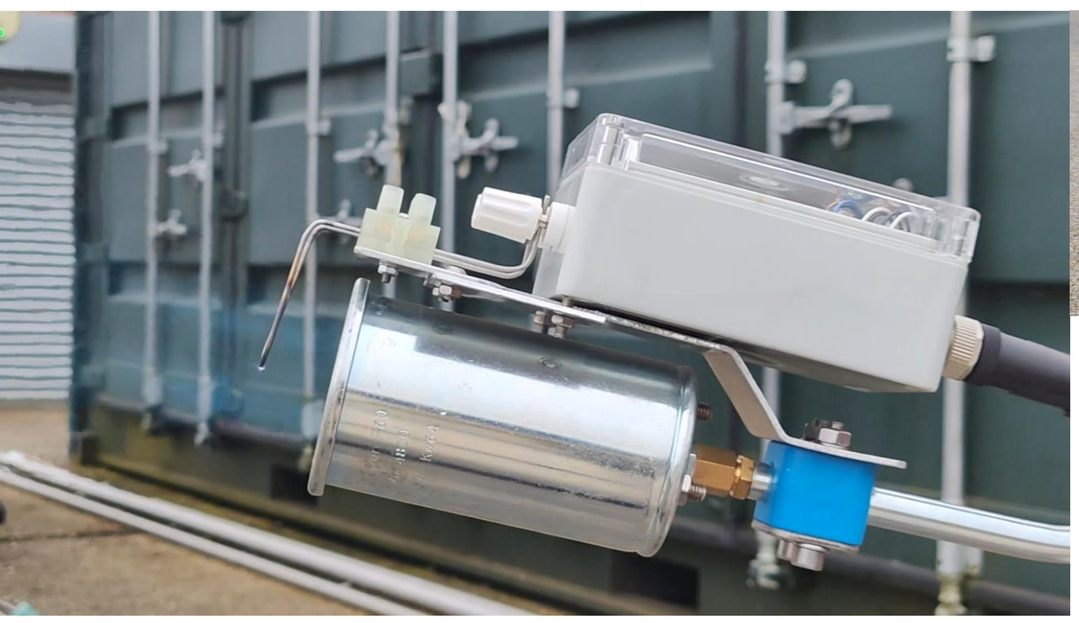
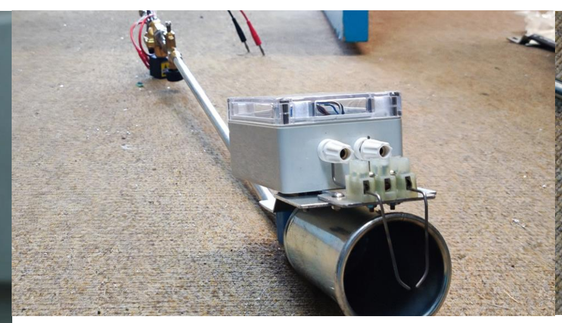
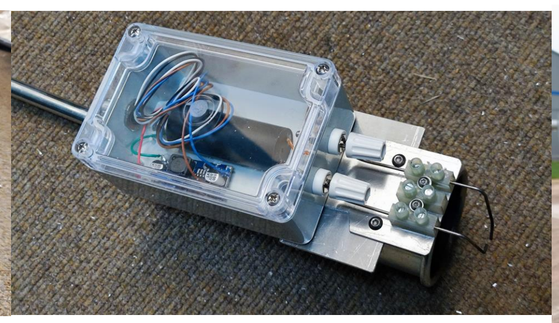
My internship with Airborne Engineering Limited (AEL) came during the final developmental push of their LCH4 and LOX rocket engine test rig with a quickly approaching project deadline. A big project like this has many problems requiring big or small solutions. Most of my focus was on these small but significant solutions, and a few of them are showcased here.

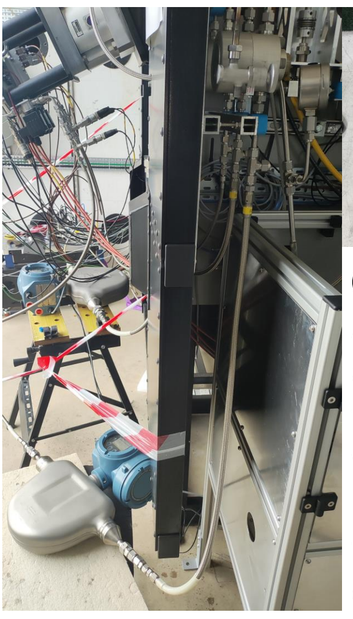


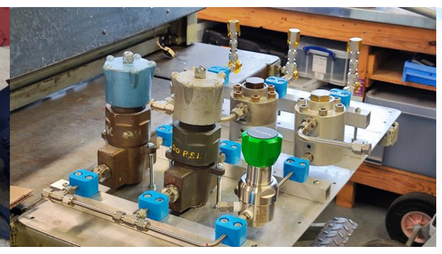




Residual Methane Extinguisher

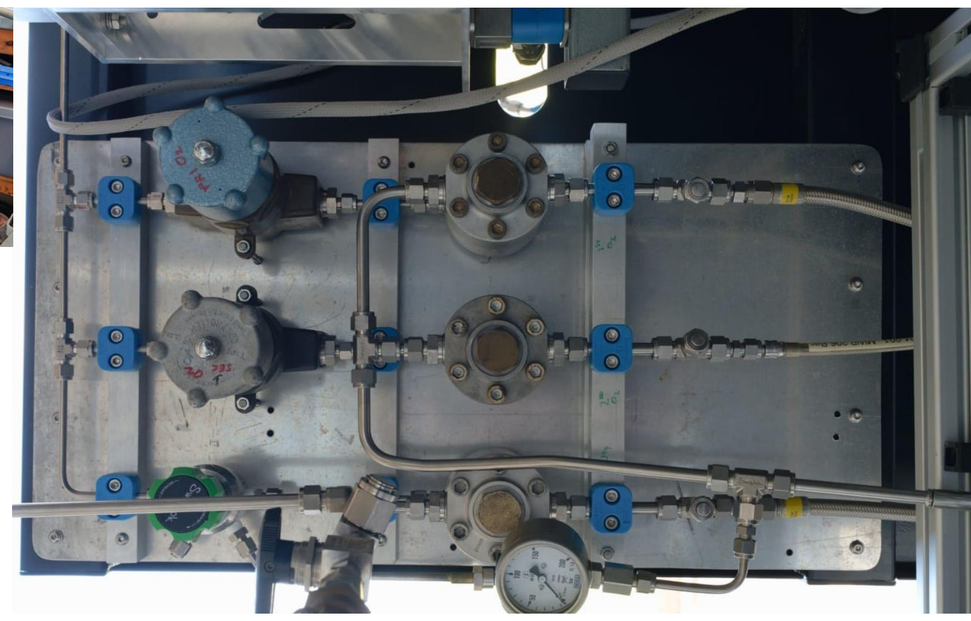
After the firing of a MethaLOX rocket engine, a cloud of unburnt methane gas could be left behind which is an explosion hazard. I continued the work of Martin England, a previous spintern who attached a propane solenoid valve onto a roofing torch. I designed, tested and integrated a spark ignition system for it.

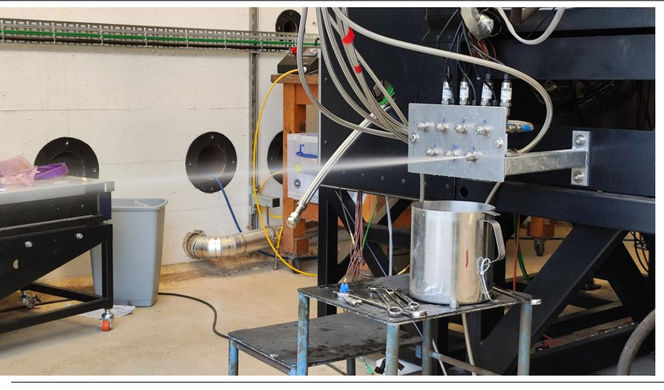




Gaseous Methane and Oxygen Delivery Panel

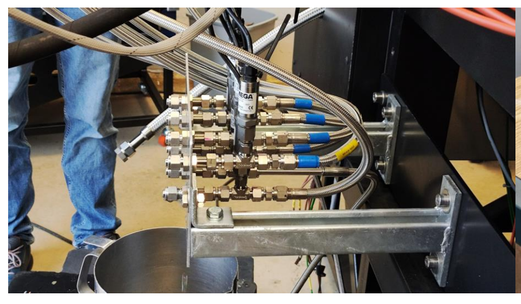
A customer using our MethaLOX rig requested the delivery of gaseous Methane and Oxygen at a calibrated pressure and flow for their igniter. This panel was built to satisfy this. It was designed and manufactured using mostly spare parts in the workshop, except for purchasing a few new Swagelok parts. Using mechanically regulated dome regulators, the panel delivers both propellants at any desirable flow rate. After oxygen cleaning each part and assembling the panel, it was calibrated using Coriolis flowmeters and tested successfully with the customer.

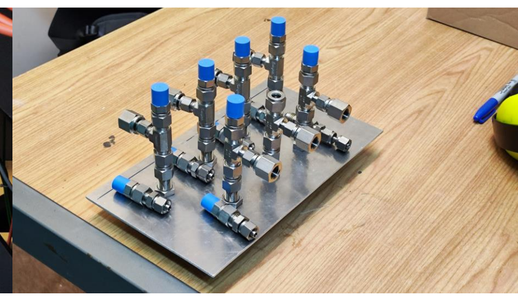




Water Cooling Choke Panel

The customer also requested seven independent metered chokes for the outlet of their water cooling system. I designed and manufactured this panel which connected 7 AN hoses from their coolant outlets into chokes made using drilled Swagelok Plugs with Tees for pressure measurement.

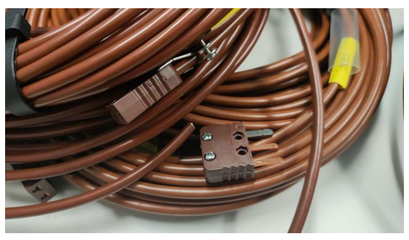




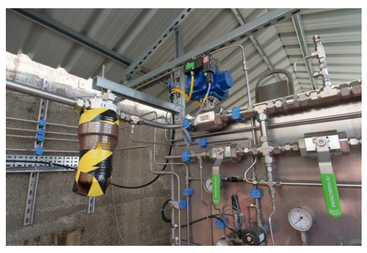
Lagged and Cladded – LN2 Jacketed LCH4 Pipe

I was responsible for lagging the pipe that brought liquid Methane from the high-pressure run tank into the firing bay. This line has a low-pressure liquid nitrogen jacket which helps keep the liquid Methane cool. Without insulation, the cryogenic pipe will cause water condensation and will also lose a lot of thermal energy. My tasks included sourcing aluminium cladding and aerogel insulated sheets from the workshop or online and using them to insulate the pipe.

Apart from these main projects, I also helped out all around the rig to do many other tasks.



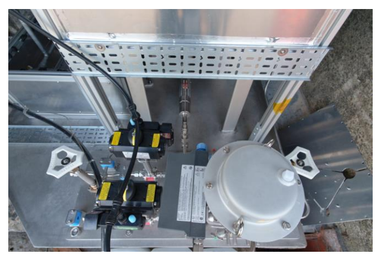
Assembling tens of sensor cable connectors



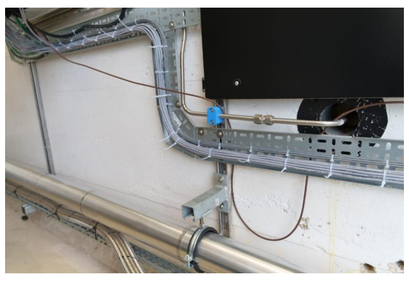
The tightening and verification of hundreds of Swagelok fittings

Installation and fitting of an impulse air tank for pneumatic valves

Assembly of the Methane valve box



Installation of solenoids with their air lines for the pneumatic valves.



Cable management of many cables

The assembly of large Cryogenic valve boxes

The lagging of the Methane run tank and gaseous heat exchanger.

And a many more.