

The University of Sheffield AMRC's Pyrovalve Replacement

The University of Sheffield AMRC's Design & Prototyping Group (DPG) was awarded an exploratory ideas grant after winning 1st place in the UK Space Propulsion Innovation competition. The DPG's concept proposal was a mechanical spring operated permanent valve; a pyrovalve replacement.

The proposal was aimed at offering an alternative to traditional explosive based safety valves used on space-craft, which close off the main fuel supply during or at the end of the launch phase. The danger associated with these devices, the difficulty in testing them and their reliability makes an electro-mechanical alternative an attractive proposition.

The grant provided by the UK Space Agency was used to develop key aspects of the AMRC's winning concept, particularly the functionality of the piston release mechanism, actuated by a piezo-electric element.

The project included developing the internal components of the valve, the external valve housing and producing a functioning prototype. The valve piston and retaining ring were machined and the valve housing was produced using Selective Laser Melting (SLM) in Ti-6Al-4V. The manufacturing of the final demonstrator was undertaken within the AMRC's prototyping facility.

The final prototype was assembled and a series of basic functionality tests were performed. These confirmed the successful operation of the release mechanism. A number of future development opportunities have been identified and the AMRC is keen to engage with a commercial partner to advance the project towards an industrial application.

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