

Additively Manufactured Engine Lowering Inefficiency at Altitude (AMELIA)

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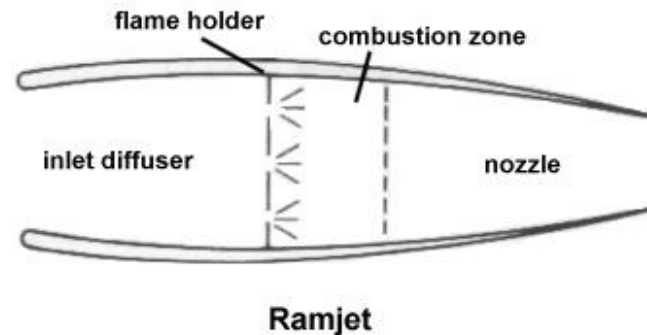
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Project Aims

- Primary aim: To design a workable ramjet
- To additively manufacture the ramjet
- To install and test the ramjet
- To set up the ramjet as a teaching aid for laboratory classes

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What is a Ramjet

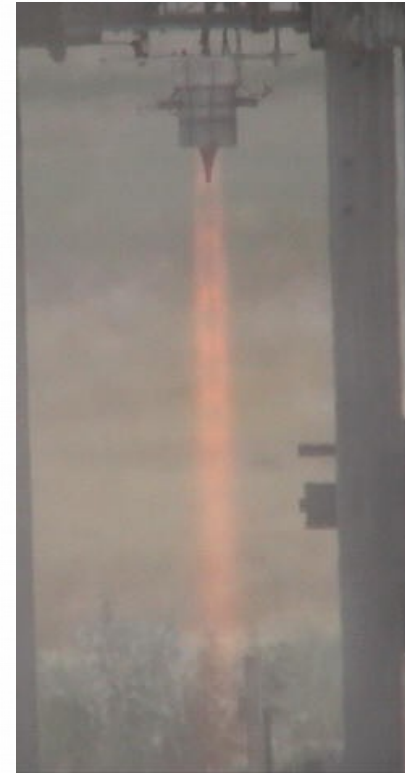


- Air enters the intake and is slowed
- Fuel is mixed into the air flow and set alight
- These heated gases are accelerated out from the nozzle, producing thrust
- Must have airflow already present to produce thrust
- Performance improves with speed

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Why is AMELIA special?

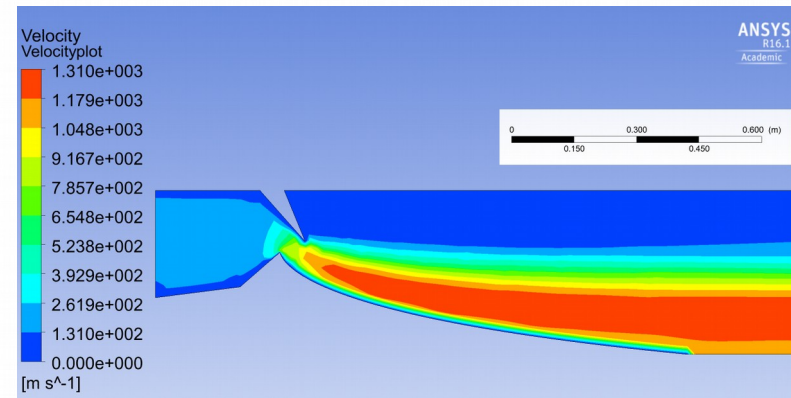
- Spiked plug nozzles' plumes change with altitude, compensating for pressure differences and thus providing an overall efficiency gain over a bell nozzle.
- It is envisaged the flameholding mechanism will minimise energy loss through the combustor. Thus bluff bodies will be avoided if possible.



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Current Progress

- Basic concept established
- Initial CFD simulations completed
 - Next up: optimisation of nozzle geometry, down-selection of flameholder geometry
- Literature review begun



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Forseen issues

- Integration with the engine test cells
- Sound levels are envisaged to be dangerously high without mitigation measures
- Accurately predicting flameholding behaviour
- Ensuring sufficient progress is made in light of other commitments
- Managing heat

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Next Steps

- Contact staff members with specialisms in areas foreseen to be problems.
- Assess the setup in the engine test cells.
- Further coarse CFD to try out different methods and designs.
- Finer CFD to begin predicting performance and to highlight areas requiring additional investigation

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