

Advanced Aerospace Fluid Dynamics for Efficient and Sustainable Engines

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Research Overview

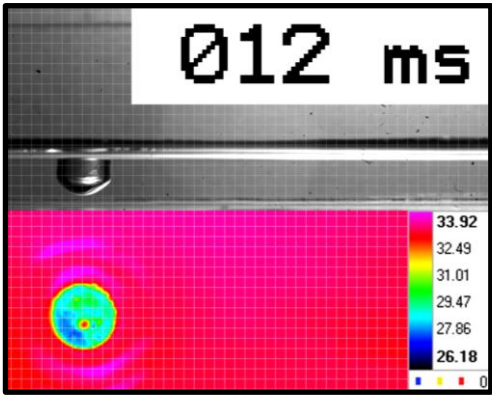
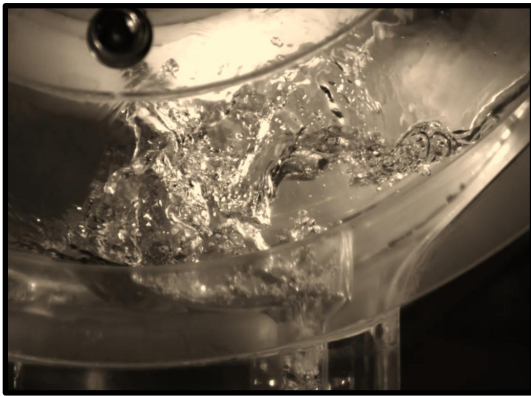
- **What is the problem:** Understanding and optimising complex multiphase flow and heat transfer in aerospace propulsion and lubrication systems.
- **Why it matters:** These interactions are critical to improving engine efficiency, reliability, and sustainability in modern aviation.
- **What we have achieved:** We advanced fundamental understanding and developed design insights through experimental and computational studies with industry partners such as Rolls-Royce and Expleo.

Industry Relevance

- **Potential applications:** Optimised aero-engine lubrication and transmission systems, and transferable solutions for clean energy technologies.
- **Benefits to industry:** Improves efficiency, reliability, and sustainability while reducing maintenance and operational costs.
- **Alignment with sector challenges or priorities:** Supports aerospace goals in net-zero emissions, digital innovation, and propulsion performance enhancement.

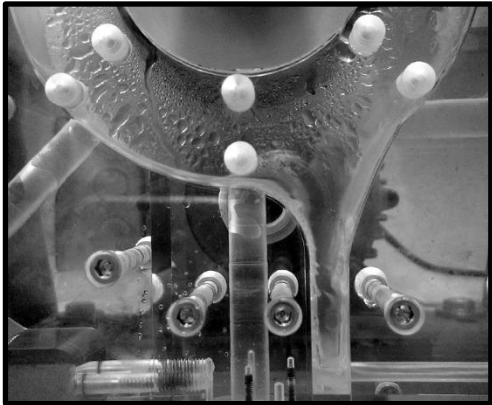
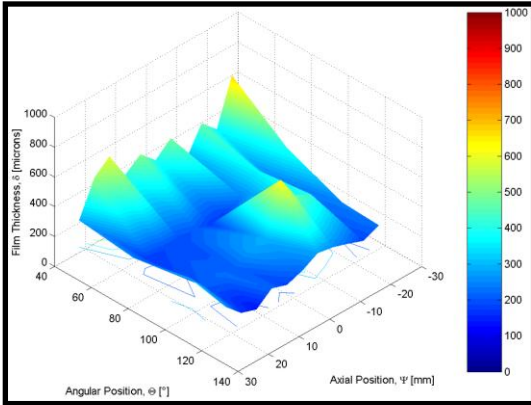
Methods & Technologies

- **Techniques and tools:** Advanced experimental fluid dynamics, high-speed flow visualisation, CFD, and thermal analysis for complex multiphase systems.
- **Technologies and capabilities:** Utilisation of bespoke test rigs for liquid/gas flow studies, integration of CFD and experimental data for model validation, and collaboration with UWE's EMSG facilities to support aerospace and propulsion research.



Innovations

- **Results and prototypes:** Developed bespoke experimental rigs and diagnostic methods to study liquid/gas flow behaviour and heat transfer in rotating aerospace systems.
- **Breakthroughs or novel approaches:** Introduced new measurement techniques and validation methods that improve understanding of multiphase flow dynamics, leading to more efficient and reliable propulsion and transmission system designs.



Opportunities

- **Partnerships sought:** Collaborative R&D projects, technology co-development, experimental testing, and student placements or internships.
- **Benefits to industry:** Access to advanced aerospace fluid dynamics expertise, bespoke testing capabilities, and innovative solutions that enhance product performance, reliability, and sustainability.

