1. Aeronautics and Astronautics

Aerodynamics and Aerospace

Using conventional, renewable and hybrid modes of energy sources, we develop flow control strategies, propulsion and simulation techniques, and methodologies for cost effective and energy efficient outcomes. Applications include ventilation of enclosed spaces, vehicle flight and performance, wind turbines (for power generation and low noise water pumps), propelling micro-aerial and underwater unmanned vehicles, cooling electronic circuits, and re-designing dwellings for human and domesticated animals.

Furthermore, we use computational and experimental methodologies to study and develop various passive and active flow control techniques, such as vortex generators, synthetic jet, Coanda effect and acoustic excitation. This is achieved in collaboration with industry to manipulate complex flow fields and aero-thermal loads from very low speed and temperature to hypersonic speeds with extreme temperature. We also exploit wind and solar energy as renewable sources by investigating incorporated flow control technologies.

Jet fighter aircraft mesh

Aero/Thermal Flow Control: We use computational and experimental methodologies to study and develop various passive and active flow control techniques such as vortex generators, synthetic jet, Coanda effect, acoustic excitation etc. in collaboration with industry to manipulate complex flow fields and aero-thermal loads in conditions of very with very low speed and temperature (< 0.5 m/s and room temperature) to hypersonic speeds with extreme temperature (during re-entry, for example). We are exploring to exploit wind and solar as renewable sources of energies with the incorporation of flow control technologies.

Propulsion: We are using bio-fuels and hybrid fuels to develop engines of the future for aircraft and automobile that would consume less fuel and be environment friendly.

Flight simulatorReal-time simulation: We are studying simulated air, space and land vehicles (including crash investigation) manufacturing processes, fluid simulation based on spherical particles and swarm technologies, based on agent simulation and genetic algorithms. We are also exploring immersion technology and how it might be applied to the solution of real engineering problems.

Aerodynamics Laboratories:

- Aerodynamics Lab and Computational Fluid Dynamics Lab

For more details, please visit our website:

http://www.engineering.unsw.edu.au/mechanical-engineering/aerodynamics-aerospace

Advanced Manufacturing

Advanced Manufacturing is the development and use of innovative technologies for the fabrication of products. Without advancements in manufacturing we could never hope to increase efficiency or improve the sustainability of manufacturing process we take for granted.

Advanced manufacturing has three research thrusts:

Precision and nano processing technologies

Multi-scale fabrication and advanced manufacturing technologies

Sustainable manufacturing and lifecycle engineering

Advanced Manufacturing Laboratories:

- Laboratory for Precision and Nano Processing Technologies
- Advanced Manufacturing Laboratory
- Life Cycle Engineering Laboratory.

For more details, please visit our website:

http://www.engineering.unsw.edu.au/mechanical-engineering/advanced-manufacturing-1