

Focus on CSIR services in aeronautic systems



The CSIR's Aeronautic Systems group is the home of aeronautical research in South Africa with a track record that emerged during the early days of the national air capability. The combination of talented engineers, scientists and technicians with modern facilities - including a suite of nine wind tunnels, structural test facilities and computer clusters - has resulted in the existence of a hub of world-class aeronautical expertise.

CSIR Aeronautic Systems is mandated by government to undertake the following:

- To provide the technology requirements for the SANDF, in particular the aeronautical science, engineering and technological capability in support of force development and air operations;
 - To develop and maintain a strategic defence capability as an extension of the SANDF capability;
 - To provide research capabilities in support of the Department of Science and Technology's national aeronautics research strategy;
 - To contribute to national Science, Engineering and Technology themes, science missions, industrial initiatives, human resource development objectives and flagship projects launched by DST, DTI and other stakeholders; and
 - To generate knowledge and acquire experience that enables the CSIR to be regarded as lead national centre for aerodynamic test and evaluation.
- This is achieved through a host of capabilities in experimental and computational aerodynamics, aerostructures, propulsion and flight dynamics.

Typical activities and competencies include wind-tunnel testing; material specification and testing; helicopter structural and aerodynamic technology; gas turbine engine technology; air vehicle structural characterisation; ground vibration testing (GVT); flutter analysis and prediction; store carriage and release predictions; computational fluid dynamics (CFD); flutter flight test software and hardware systems; simulation-based acquisition and operational support; aero-mechanical store integration and aircraft structures technology.

More about our focus areas

Focussed on propulsive gas turbines, the **Power Systems** group has worked with the majority of major engine manufacturers including GE, Rolls-Royce, Volvo Aero and Klimov in domains ranging from compressor flutter, turbine aero-thermodynamics and cooling, secondary cooling circuits, and turbine design and cycle analysis. A variety of experimental techniques are used and the group has access to rotating and cascade facilities - as well as specialist Computational Fluid Dynamics and empirical analysis codes.

Established expertise in gas turbines led to the emergence of a **Concentrating Solar Power** capability. The core of this is built around the use of a central tower system collecting sunlight reflected by a field of tracking heliostats to generate the heat required to run a Brayton cycle gas turbine or a wide variety of other applications. Capabilities include, ray tracing, glint and glare analysis, gas

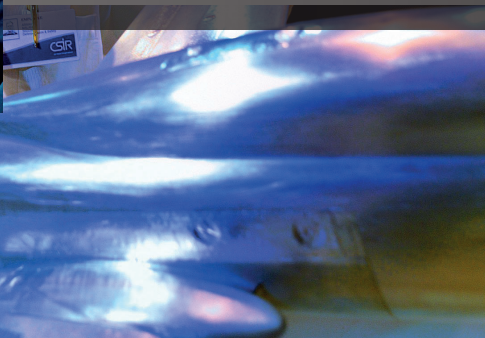
turbine systems integration, combustion, mechanical design, heliostat design and systems engineering, analysis and design.

The CSIR has extensive experience in analytical and experimental **flight dynamics** applied to manned aircraft, unmanned aircraft, guided and unguided weapons. Current work includes flying qualities flight testing for specification

compliance, which covers specification development, flight test planning and test support, filtering, data compatibility analysis and low-order equivalent systems analysis. We also have experience in the development of flight dynamics models for 6 degree-of-freedom simulation, control systems modelling and the application of flying qualities criteria in aircraft multi-disciplinary design and optimisation.



Over the past five years, the CSIR extended its flight dynamics systems identification capabilities further and developed techniques to perform in-flight aerodynamics characterisation using low-cost autopilots and sensors.



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