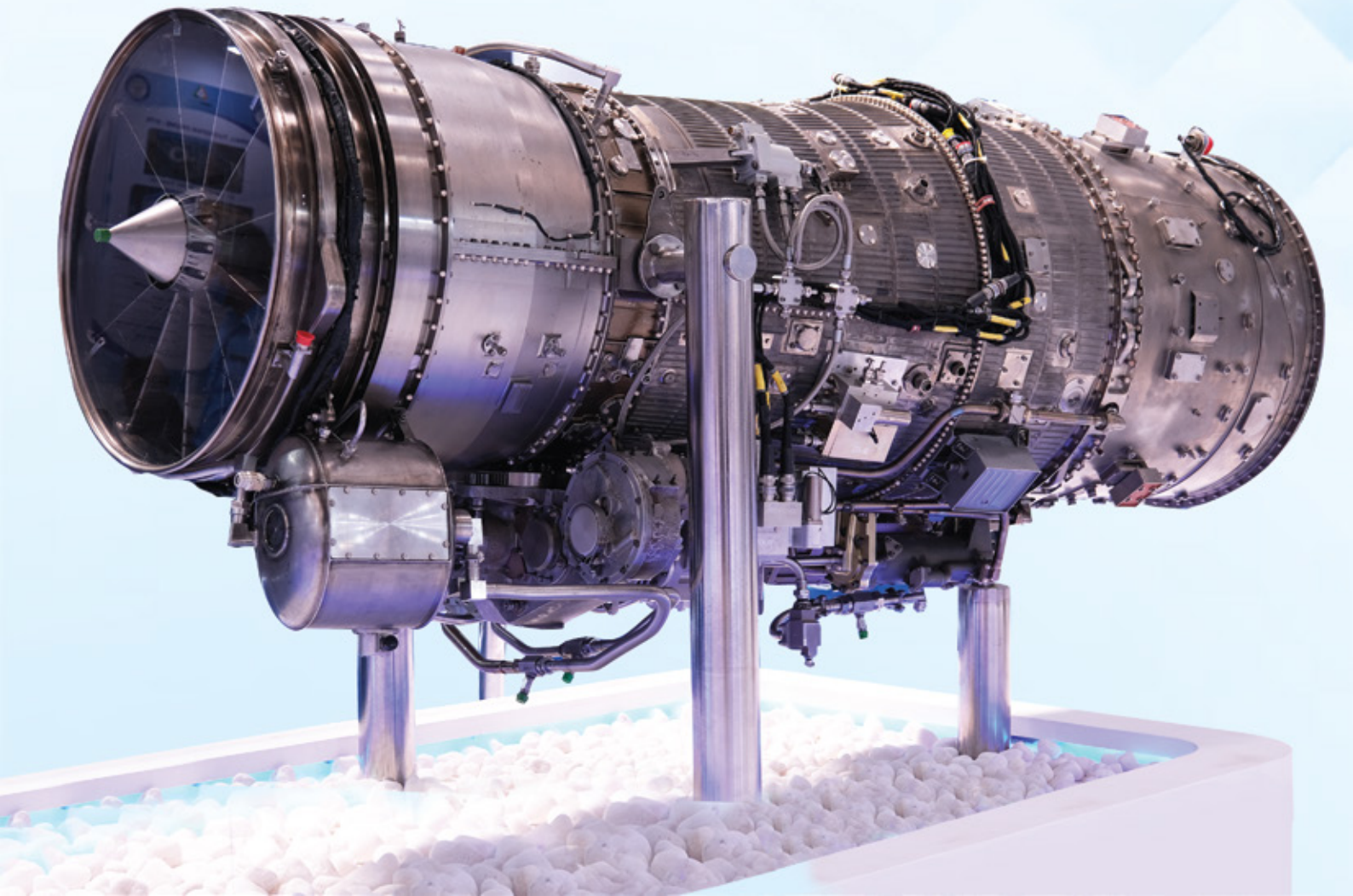
GTRE

Gas Turbine Research Establishment



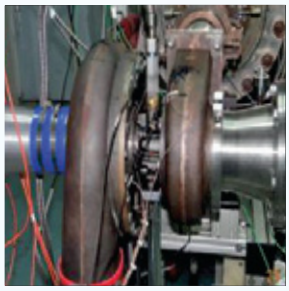
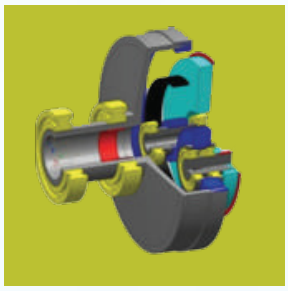
About the Lab

GTRE is an EN9100:2018 (AS9100D) certified establishment pioneering the Research & Development (R&D) in the field of military aero engines and related technologies. Under the aeronautical cluster of DRDO, the establishment is currently engaged in the design & development of Kaveri Derivative Engine (KDE) for Unmanned Aerial vehicle, Small Turbo Fan Engine (STFE) and its variants for UAV applications, military grade turbocharger for battle tank application and various technology development projects for military aero engines.

Along with the aero engine development activities, GTRE also supports the Indian tri-services by addressing a few technical issues for the propulsion system of the imported aero engines and weapons.



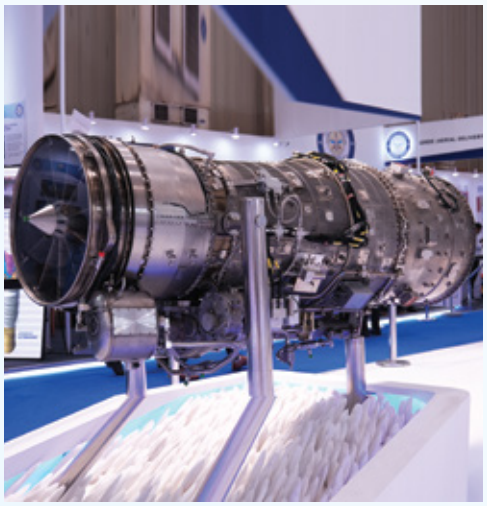


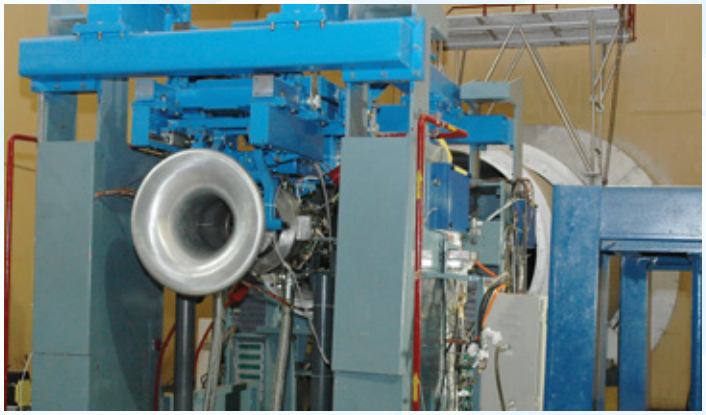
Products/ Technology Achievements

Kaveri Derivative Aero Engine

Kaveri Derivative Gas Turbine Engine is the indigenous power plant for Indian Unmanned Aerial vehicle. It is a non-afterburning turbofan engine. The engine is based on the Kaveri Engine architecture with specific design improvements for the UAV applications viz High Inlet Distortion Tolerant Fan, Engine Fuel Control System and Autonomous FADEC. It has completed simulated Altitude test and undergoing structural integrity tests.



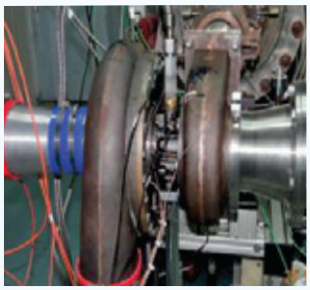
Small Turbo Fan Engine (STFE)



STFE is a Twin spool, low By-Pass Turbo Fan, Aero Gas Turbine Engine intended for use in unmanned air vehicle. The engine is controlled by Digital Engine Control Unit (DECU). STFE engines are being manufactured and integrated by Indian industry partners. Experimental trials are in progress. It will be inducted into services after the certification

Turbocharger of Diesel Engine For Combat Vehicle (1500 hp & 600 hp)

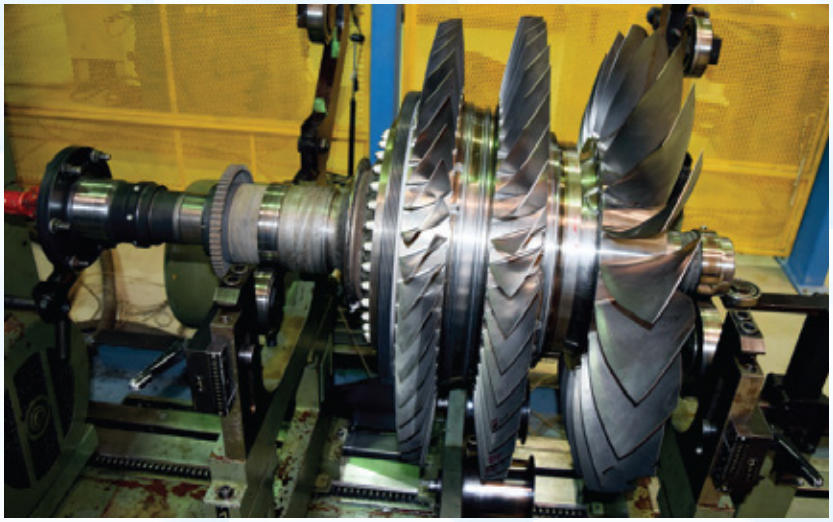
Turbocharger is indigenously designed and qualified for 1500 hp Diesel engine of Main Battle Tank (MBT) and 600 hp Diesel engine of Infantry Combat Vehicle (ICV) under development at CVRDE. All the performance and durability testing are completed successfully. Qualified turbochargers were delivered to CVRDE



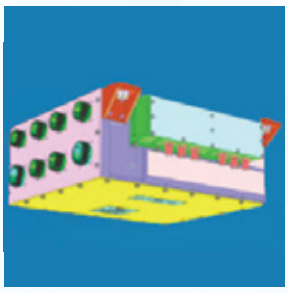
High Inlet Distortion Tolerant Fan

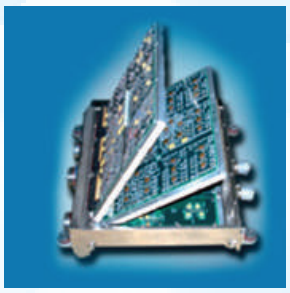
Fan with variable guide vane system is designed to improve operability at part speeds and surge margin. 3D stacked aerofoils minimize loss and control secondary flow interaction. Wide chord blades are chosen for flutter avoidance and better distortion tolerance with high maneuverability combined with stealth requirements of future unmanned military aircraft.

Integrated performance and operability of Fan in the Kaveri Derivative engine was demonstrated in GTRE test bed as well as simulated Altitude test bed. Performance of the fan met all technical requirements across flight envelope of Kaveri Derivative engine.



Advanced Full Authority Digital Engine Controller (AFADEC)





Design and Development of fully qualified electronic control units along with necessary system software, application software and control laws. It is built around dual redundant architecture to meet mission reliability. The AFADEC is designed, developed, qualified and successfully integrated & tested in Kaveri Derivative Engine.

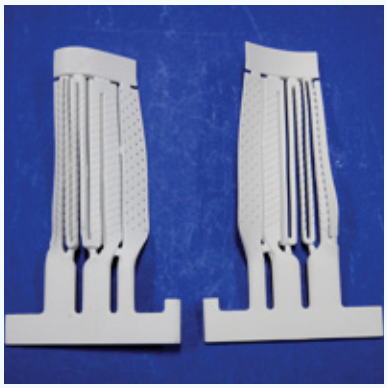
Engine Fuel Control System (EFCS):

Indigenous Engine Fuel Control System comprising of Double Pump Fuel Metering Unit (DPFMU) and other components, supplies metered fuel flow at the required pressure to the main Combustor and Variable Geometry Actuation System (VGAS) of Kaveri Derivative Engine. Indigenous EFCS units have been integrated and tested successfully in Kaveri Derivative Engine.

High Speed Epicyclic Gearbox (HISPEL)

HISPEL is a high speed gearbox designed and developed to transmit 25kW power and to step up the output from commercially available electric motor to 1,10,000 rpm. Speed from the input motor is stepped up in three stages and is designed with combined straight and epicyclic gear trains. This gearbox is intended to provide the drive to test the performance of units/ accessories fitted of small turbofan class engines. Gearboxes have been manufactured, assembled and tested to 1,10,000 rpm

Single Crystal Blades & Vanes For High Pressure Turbine



Indigenous single crystal Blades and Vanes are designed and developed for High Pressure Turbine rotor blades and nozzle vanes. This critical Hot end technology is developed for life enhancement to meet engine life requirement. High Pressure Turbine Rotor (HPTR) Blade casting is completed and certification is under progress. High Pressure Turbine Vane casting and inspection is under progress.

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