

# A Shot in the Arm for LCA Programme

In a major breakthrough for the Indian aeronautical sector, the first aircraft in the Limited Series Production (LSP) of India's home grown, multi role, fourth generation Light Combat Aircraft (LCA) Tejas, has cleared the decks for the state owned aerospace major Hindustan Aeronautics Ltd (HAL) to take up the production of eight Tejas aircraft as part of LSP. Tejas made its successful debut flight in Bangalore on April 26. The flight lasted for 47 minutes covering an altitude of upto 11-km at a speed of 1.1 Mach clearing the ground for production. A report:

Since its first flight on January 4, 2001, the Tejas programme has completed around 600 test flights with two technology demonstrators and three prototypes. All have supersonic, reaching a maximum altitude of 50,000 ft.

Though the Indian Air Force (IAF) has projected a requirement of 200 Tejas, it has placed a firm order for just 20 aircraft. Before going in for a larger order, IAF is keen on evaluating the performance and efficiency of Tejas being produced under LSP.

Moreover, inordinate delay in the developmental schedule of Tejas along with technical hitches in the way of weaponising the aircraft have gone to turn IAF circumspect in far going in for a big order at this point of time.

In fact, the LCA Tejas programme was initiated with the objective of replacing the ageing MIG series of aircraft in service with IAF. But the delay anticipated in obtaining operational clearance for the aircraft for inducting it into the squadron, has now forced the Indian Defence Ministry to go in for the outright purchase 126 latest generation multi role combat aircraft. For this, acquisition is considered critical for sustaining the squadron strength of IAF in the context of the ongoing phase out of the ageing and obsolete MiG series of fighter aircraft.

Meanwhile, in view of the shortcomings noticed in the indigenously developed Multi Mode Radar (MMR), which is critical to the weaponisation of Tejas, there is a move to go in for assistance from a global aerospace major to speed the development of Tejas. The MMR developed by the Bangalore based LRDE (Electronics and Radar Development Establishment), which functions under DRDO, has so far been tested only on an Avro aircraft. Because of the technical deficiencies, MMR could not be tested on



*LCA Taking-off*

any of the LCA prototypes.

Essentially, MMR is designed to detect, track, terrain map and deliver the guided weapons beyond the visual range. In fact, sometime back a spokesman of US aerospace and defence major Lockheed Martin had stated that "it would not be unexpected if the Indian Government asks us to participate in the LCA programme". In fact, Lockheed Martin had initially assisted the Bangalore based Aeronautical Development Agency (ADA), which was specially created by DRDO to facilitate the development of LCA Tejas, in critical technology areas with particular reference to the fly by wire control system. But then following the American sanctions in 1992-- as a reaction to India's plan to acquire cryogenic engine technology from Russia for the three stage Geosynchronous Satellite Launch Vehicle (GSLV) being developed by the Indian Space Research Organisation (ISRO)—

Lockheed Martin was forced to withdraw from the project .

Ashok K. Baweja, Chairman, HAL too had stated that they are looking at foreign collaboration to speed up the development of Tejas so that it could be inducted into IAF before the end of the decade. In addition to US sanctions, lack of experience in the design and development of a combat aircraft and poor industrial support within the country conspired to delay the development of Tejas. Defence analysts in India drive home the point that the success of LCA is critical to the progress of the Indian aeronautical industry.

Another area of concern marring the LCA development schedule is the hitches facing the development of indigenous Kaveri power plant meant to replace the American supplied GE-F404 engine currently powering LCA. The development of the Kaveri engine, which was spear-

headed by the Bangalore, based defence outfit, Gas Turbine Research Establishment (GTRE), has already undergone tests at a Russian high altitude test facility.

With a view to speed up the development of Kaveri engine, it is now planned to involve a global engine major to complete the project. The GTRE's proposal is to continue the work on the existing Kaveri engine. During Aero India 2007 show M.Natarajan, Scientific Adviser to the Indian Defence Minister had stated that a foreign partner to complete the Kaveri engine project would be identified soon. A report tabled in the Indian Parliament sometime back had stated that LCA would be fitted with Kaveri engine by 2012.

Kaveri engine is a flat rated, two spool, low bypass ratio turbofan comprising three stage fan six stage transonic compressor both driven by a single engine turbine. Incidentally, Kaveri engine has many spin off applications as power-plant for trainer aircraft.

As part of the Tejas programme, work is proceeding apace on the development of a two-seater trainer aircraft for both the IAF and Indian Navy. The Tejas

trainer would feature a drooped nose for good cockpit vision and a mechanically controlled stick, rudder and throttle.

Also under development is a naval variant of LCA. The naval design of LCA incorporates a drooped nose for better vision, structural strengthening for high loads and be capable of ski-jump and take off and arrested recovery on aircraft carrier.

Tejas has been described as a single seat, single engine, light weight, highly agile, tailless supersonic fighter with a compound delta wing and shielded air intake—the result of an intense aerodynamic design exercise utilizing advanced CFD codes and exhaustive wind tunnel testing. Designed specifically to meet the versatile requirements of the IAF as its frontline, multi mission, tactical aircraft, LCA integrates modern design concepts and state of the art technologies such as relaxed static stability, fly by wire control, advanced digital cockpit, integrated digital avionics systems and advanced composite material for the structure.

Advanced composites make for more than 40% of the LCA airframe

including wings, fin and fuselage, resulting in a substantial weight reduction. LCA's aerodynamic configuration based on relaxed static stability evolved to meet the demands of modern combat has been subjected to extensive testing and evaluation. Extensive wind tunnel testing on scale models and complex computational fluid dynamic analysis have optimized the aerodynamic configuration of LCA giving it minimum supersonic drag, low wing loading and a high rate of roll and pitch.

Because of the challenging combat environment under which LCA is required to operate, the evaluation process during the wind tunnel testing stage was quite "demanding and rigid" which eventually resulted in a highly reliable and accurate estimates of performance and controllability. To ensure a high degree of fidelity during the wind tunnel testing, scale models made of carbon and other composite materials were used.

Meanwhile, drawing from the expertise gained during the Tejas development programme, DRDO plans to develop a Medium Capacity Combat Aircraft. ●

— RADHAKRISHNA RAO

## Hermes 450 Receives First Civil Certification For UAVs In Israel

**H**ermes 450 from Elbit Systems is the first UAV in Israel to receive a certification by the civil aviation authorities. The company claims it is the first company to complete all the required procedures and receive all applicable civil aviation certification approvals.

Lack of civil standardization for UAVs created a need to develop applicable legislation in Israel, and a special committee was established in order to test the UAV, its mode of operation and the UAV's producer. Elbit Systems is the first company to complete all the required procedures and receive all applicable civil aviation certification approvals.

According to Elbit, the Hermes 450 is a major player in Israel's ongoing security activities and the IDF's primary UAV system. The versatile, long-endurance UAV, equipped with Elbit Systems' CoMPASS EO/IR/LD gimbaled electro-optical payload, can adapt to a wide range of payloads, including SAR/GMTI radar and dual payload configurations. Hermes 450 executes its diverse missions in a highly



*Hermes 450 UAV*

autonomous manner and is controlled by the Hermes Universal Ground Control System (UGCS), facilitating highly automated mission operation and control of the air vehicle and EO/IR/Laser payload. The UAV is equipped with sophisticated communication systems transmitting imagery in real time to ground stations.

Selected for the UK WATCH-KEEPER programme, Hermes 450 is recognized as the leading long endurance tactical UAV in its class, having flown in U.S operations and history-making flights in UK civil airspace. The Hermes 450 so far has accumulated over 65,000 flight hours. ●