BOOK REVIEW

Radiance in Indian Sky: The Tejas Saga
Author: Air Marshal P Rajkumar, Sh BR Srikanth
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On January 13, 2021, Cabinet Committee on Security approved the largest indigenous procurement deal to strengthen IAF's fleet of fighters, 'Light Combat Aircraft (LCA)-Tejas'. HAL will deliver 73 Tejas MK1A fighters and 10 Tejas MK1A trainer aircraft to IAF. This deal has fulfilled the promise made by our scientists, engineers, and test pilots to deliver an indigenous, state-of-the-art, fourth-generation, and war-ready fighter aircraft to IAF. This procurement will be a game-changer towards self-reliance for the Indian aerospace industry.

The proposal to develop an indigenous fighter aircraft was recommended by the Committee on Aeronautics, chaired by former Minister of Defence, C Subramaniam, way back in 1969. It has taken almost 31 years for India's first indigenous fighter aircraft, LCA, to fly its first flight on January 4, 2001.The

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journey of LCA from drawing board to maiden flight has been captured by Air Marshal Philips Rajkumar PVSMAVSMVM (Retd) and Mr. BR Srikanth in the monograph, "Radiance in Indian Sky: The Tejas Saga".

Air Marshal P Rajkumar, a highly experienced test pilot with over a dozen years of experience in flight testing of different aircraft, was specially chosen to set up National Flight Testing Centre (NFTC) in 1994. He headed NFTC for seven years before taking over as a first Project Director (Flight Test) of the LCA project at Aeronautical Development Agency (ADA).Under his ingenious leadership and professional guidance, the LCA flew its first flight on January 04, 2001.Mr. BR Srikanth, the co-author of the book, former executive editor, Deccan Chronicle, and an award-winning journalist has monitored the project for a long time and has contributed many articles related to aerospace technologies.

The book opens with the write-up by the important luminaries, who have given unstinted support to the project, ensuring progress against all odds. Without their perseverance and indomitable attitude, it would not have been possible to build LCA. There are twenty-six chapters and two annexures covering the entire journey of Tejas, from conception to induction. The initial chapters cover the genesis of the LCA programme with a narrative of how the senior leadership of the country went about building national aerospace capability. Even though Project LCA was highly desirable, doubts always existed about our capability to succeed with such an ambitious project. The non-availability of aeronautical developmental centres and laboratories in India was a major handicap. Therefore, it was decided to strengthen the aeronautical research and development base in the country by establishing premier institutions like the Aeronautics Research and Development Board (AR&DB), NFTC, and ADA. Almost a decade later, the Cabinet Committee on Political Affairs accorded the approval for the design and development of the LCA. However, a series of crises, such as the Indo-Pak war in 1971, the Pokhran nuclear test in 1974, and political turmoil, impacted the progress of the project and resulted in unavoidable delays. The scriveners narrated the difficulties faced by the

team to acquire the requisite technologies like the engine, flight control system, and mission computer from foreign countries. It explains how Indo-US defence relations reached a turning point when the US Secretary of Defence wholeheartedly supported India by providing the GE F-404 engine.

Chapters 3-10 elucidate the journey from the Production Definition phase to the Limited Series Production phase. It covers the collaboration phase with various foreign aerospace companies for the developmental success of critical technologies like digital Fly by Wire for the control systems, utilisation of composites for the airframe, glass cockpit, multimode radar, and computerised health monitoring systems. During the project development phase, a committee was set up to resolve issues related to the indigenous development of a digital fly-by-wire system, a mission computer, and composite structures. When the committee failed to arrive at a consensus way forward, it was decided that the full-fledged development of fighters was not feasible; therefore, a technology development programme was initiated with two prototypes. During the early nineties, roadblocks like the financial crisis, Mandal Commission agitation, changeover of the government, and the assassination of PM Rajiv Gandhi adversely affected the LCA project. During the technology demonstration phase, the necessity was felt to establish a dedicated flight test facility. Hence, the National Flight Testing Centre (NFTC) was formed. Air Marshal (then Air Commodore) P Rajkumar reported to ADA on September 17, 1994, to establish NFTC on the request of the SA to RM, Dr. Abdul Kalam.

The chapters on Fly by Wire and Preparation for First Flight describe the difficulties faced by India, like the non-availability of funds and labs and sanctions imposed by the USA on technical assistance. However, with their dedication and determination, our team of scientists and engineers designed the flight control computer not only indigenously but also successfully developed the fly-by-wire flight control system as well. The design and development of the complex fly-by-wire technology have been illustrated with technical detail, including a treatise on flight control system matrix.

Rapid advancements in technology often lead to re-assessment of the qualitative requirements projected at the conceptual stage and the final product delivered. The author has covered this aspect in great detail, describing how the technological advancements have resulted in changes incorporated in the LCA, during the technological development stage to the IOC version, the FOC version, and finally the Naval version. The chapter on LCA Navy covers the journey of design and development of a naval version of LCA. Unlike the design of a fighter that operates from a runway, the Indian aerospace industry had no clue about designing an aircraft for deck operations. Due to committed political support, well-trained flight crew, and an enthusiastic and competent team of designers and manufacturers, the LCA Navy became a success. India attracted global attention when the second LCA Navy prototype, NP-2, piloted by Cmde JA Maolanker, executed an arrested landing on INS Vikramaditya on January 11, 2020.

The chapter on "Tejas Makes its International Debut" highlights the efforts made by the pilots and the engineers, finalising the display routine, considering almost negligible experience in planning the display routine for indigenous fighters in front of spectators and experienced display teams of the world. The chapters on "Formation of the First Tejas Squadron" cover the resurrection of No. 45 Squadron with Tejas in 2016, without many details on the induction ceremony and other events.Chapter 23 to 26 highlight the lessons learned, the role of certification and monitoring agencies, the impact on the private aerospace sector, and the financial outlay for the LCA project.

A well-designed and printed document for aviation enthusiasts. However, some of the descriptions given are highly complex and technical in nature and are beyond the comprehension of the general public and professionals who are not related to the aviation industry. The book not only provides a source of inspiration to test pilots, scientists, and engineers, but is also a must-read for aviation connoisseurs.

The monograph "Radiance in Indian Skies—The Tejas Saga" is dedicated to team LCA, who worked tirelessly for three decades to make it a success. An excellent reference book, it chronicles the astounding journey of the LCA

from concept to induction in the IAF. It covers the entire canvas of activities associated with the programme. The authors have garnered and created a written narrative of the developmental story gleaned from records and interviews with major contributors towards the project's development. It also gives credit and recognition to the professionals, who played a critical role in the design and development of the Tejas. It was published by DRDO and officially released by the Defence Minister, Rajnath Singh, during Aero India 2021. The book will motivate young engineers and scientists to design and develop cutting-edge technologies for the Indigenous aviation industry.