The Tejas One Year After Induction – HAL must take ownership of the project

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A Tejas two-seater put through its paces at this year's Aero India show. Tejas is currently being delivered to the first operational squadron, which stood up one year ago on July 1, 2016, but has only received four aircraft to date. (ADA photo)

On 1st July 2016, No. 45 Squadron of the Indian Air Force (IAF) inducted the first two Serial Production models of the Tejas Mk.1 Light Combat Aircraft. More than a year has since elapsed since these first aircraft were inducted and they have now been joined by three more with a sixth scheduled to join shortly.1

Built to IOC (Initial Operational Clearance) standards, these aircraft are the first of 20 destined for No. 45 squadron while an additional 20 will be built to FOC (Final Operation Clearance) standard.2 Steady but somewhat slow progress is being made towards achieving FOC, with the Tejas Mk.1 crossing a major milestone on 12th May 2017 when aircraft LSP-4 successfully fired a fully-guided Derby Beyond Visual Range (BVR) air-to-air missile. Gun trials are scheduled to commence in August 2017.3

Yet, despite assurances from Hindustan Aeronautics Limited (HAL), slow progress has been made in establishing adequate production facilities.4 HAL has not yet been able to meet the target of eight aircraft per year, much less an enhanced production target of 16 aircraft per year, although the establishment of a second production line using its BAE Hawk production facility will help in this regard.5

Furthermore, despite the prospect of having to produce 83 additional aircraft to an enhanced Mk.1A standard, HAL has not acted with the requisite alacrity to take control of this project and bring it to fruition in the shortest possible time.

HAL's Stymied Opportunities

When the history of the Tejas is written, there will always be questions as to why HAL was not entrusted with the design of the aircraft and the Aeronautical Development Agency (ADA) not formed as part of HAL (rather than as a separate agency). Indeed, up until the late 1970s, HAL had a reasonable degree of success in aircraft design and was poised to achieve further levels of competence when its design efforts were abruptly, and, in the case of the HF-24, prematurely, ended.

In 1948, HAL began work on a basic piston-engine trainer to supplement and then supplant the Tiger Moths and Percival Prentice aircraft then in service. The result was the Hindustan HT-2, which served with distinction from 1953 until its retirement in 1990. Over 170 of these aircraft were built, with a dozen being used to form the Ghanaian Air Force in 1959.6 Its successor, the HPT-32 was less successful, with a high accident rate, though with an otherwise respectable service record. HAL now pins its hopes on the HTT-40.

In 1959, HAL received permission to proceed with the development of a basic jet trainer to replace the Vampire T.55 and the T-6 Harvard. The resultant aircraft – the HJT-16 Kiran – first flew in 1964 and in a modified version continues to this day as the IAF's basic trainer. Although the Kiran did have a somewhat protracted development period before entering service and its Mk.2 variant was late in coming, it was a success. It entered bulk production and serves the IAF competently.7

Simultaneously, HAL had laid the foundations for fighter production with a licence agreement for the Folland Gnat being signed in 1956, with production peaking at four aircraft per month. This light fighter formed a considerable portion of the IAF's frontline strength until the late 1970s.8

The HAL Ajeet, while intended to improve on the Gnat's performance, was only marginally successful since, by 1975, the desired performance could only be achieved with more powerful engines and advanced avionics. While four squadrons of the Ajeet served between 1975 and 1991, the type never achieved its potential. An attempt to turn the Ajeet into an Advanced Jet Trainer (AJT) failed thanks to a lack of support, a lack of reference to the Gnat T.1, and the loss of a prototype.9

HAL's ultimate misfortune was the untimely demise of the HF-24 Marut. This promising aircraft saw service with three IAF squadrons and proved to be a very effective weapons platform, yet fate was unkind to it and HAL suffered as a result.10 The HF-24 was designed around the Orpheus B.Or.12 engine – rated at 6,810 lbf (30.29 kN) dry and 8,170 lbf (36.34 kN) with afterburning – which was being developed for the proposed Gnat Mk.2 interceptor and a NATO light-weight strike fighter. Unfortunately, the British authorities cancelled their requirement for this type. And India, unwilling to provide the modest sum required to complete

development, was stuck with the non-afterburning Orpheus B.OR.2 Mk.703 rated at 4,850 lbf (21.57 kN).

Despite some half-hearted efforts to find a suitable engine for the Marut, the IAF was never entirely supportive of the project. An attempt to integrate Adour turbofans (used in the Jaguars and Hawks) was confounded by an IAF demand that the thrust of the Adour be increased by 20 per cent. In addition, a very realistic and cost-effective proposal to create a strike-fighter based around the Marut airframe and the R-25 engine (the HF-25) received no sanction. While efforts to procure RB.199 turbofans were seriously considered for a Marut Mk.3 – the HF-73 – the project itself failed to materialise.11

With this design pedigree, it might have been expected that HAL would be tasked with developing the Tejas. However, this was not to be. The ADA, formed in 1984, received the opportunity and resources to undertake this project. And that effectively decimated HAL's design capabilities, while simultaneously robbing the ADA of the experience and infrastructure of HAL. The Tejas project has had to therefore overcome the obstacles that inevitably arise from a separation of the design and production agencies, while at the same time overcoming those that arise from an inexperienced design team.

Unfortunately, the Tejas has also been the subject of somewhat harsh and overbearing assessments from the Comptroller Auditor General (CAG), which has tended to over-emphasise the negatives while inadequately appreciating the problems in re-creating the ecosystem required to support a fighter project.12 For this project to have achieved a level of indigenization equal to 59.7 per cent by value and 75.5 per cent by component is commendable and ought not to be downplayed.13

HAL's New Opportunity – The Tejas Mk.1A

On 8th November 2016, the Ministry of Defence's Defence Acquisition Council (DAC) cleared the production of 83 Tejas Mk.1A aircraft at an estimated cost of USD 7.5 billion.14 It should be noted that DAC approval does not equal authorisation of the requisite funds for production for which latter the approval of the Cabinet Committee on Security (CCS) is required. Nevertheless, at one stroke, the DAC approval offers HAL an opportunity to become an integral participant in the development of the Tejas – as opposed to remaining just the production agency.

It also offers HAL the opportunity to develop variants of the aircraft which may prolong the production run beyond the total of 40 aircraft currently authorised (20 IOC authorised in 2006 and 20 FOC authorised in 2010) and 83 aircraft approved by the DAC.15

The Tejas Mk.1A – for which a prototype, previously designated Tejas Mk.1P, was proposed by HAL – is designed to correct many of the existing shortcomings in the FOC standard aircraft.16 Planned to be equipped with an Active Electronically Scanned Array (AESA) radar and electronic warfare systems currently missing from the FOC standard Tejas Mk.1, the Tejas

Mk.1A may be the ultimate development of the basic Tejas airframe given its lack of internal volume without necessitating major redesign.17 While there is a proposed Mk.2 variant of the Tejas with upgraded General Electric F414 engines, this seems to be some time off in the future and remains a project essentially in potentia18.

It would appear, from statements emanating from HAL, that the Mk.1A has been proposed to the IAF by the company itself rather than the ADA.19 However, development of the Mk.1A will require close collaboration between HAL and ADA. To date, HAL has issued most if not all public statements regarding the project, with ADA working towards the FOC. However, despite HAL floating a tender for AESA radars for the Tejas Mk.1A and for jamming pods, it has not seemed to have moved with any degree of alacrity on the project.20

It is interesting to note that despite the statements of HAL's Chief Managing Director T. Survarna Raju that tenders would be opened for AESA radars and jamming pods by the end of March 2017, no news in this regard has been forthcoming to date. This would suggest that meeting HAL's timeline of flying the Mk.1A by 2018 with production starting by 2019 may be optimistic, though this may not necessarily impact the desired production target of 123 Tejas Mk.1 and Mk.1A in IAF service by 2025.21 In this regard, the question remains as to whether HAL has fully committed itself to developing the Mk.1A in a timely fashion. Indeed, it would be naïve to expect CCS authorisation for the 83 Tejas Mk.1A until at the very least the flight of the first prototype.

Yet, HAL has an opportunity to reclaim its position of producing indigenously designed aircraft as well as be a participant in the further development of the Tejas. Besides the Mk.1A variant, which should be accorded priority, the two-seat trainer version of the Tejas offers the prospect of emerging into a Lead-in Fighter Trainer (LIFT) in the league of the Korean KAI T-50 Golden Eagle while retaining the core combat capabilities of its single-seat stablemate. This would fill a gap in the IAF's existing training programme, which, while adequately equipped with basic and advanced trainers, is compelled to use two-seat variants of combat aircraft for roles more usefully satisfied by a LIFT. Moreover, HAL would invariably participate in any upgrade of IOC aircraft to FOC standard.

The stakes for HAL and ADA are very high. The Tejas project is a litmus test of the ability of Indian designers and production agencies to produce a viable combat aircraft. On the very threshold of success, it behooves both agencies to work in synergy to ensure that not only is production scaled-up to meet the target of 16 aircraft per annum, but also to ensure the successful and prompt completion of the Tejas Mk.1A project. The Tejas project has come too far to be allowed to stumble or fall at this stage.