

New light fighters from Asia on the global markets

Tomáš SCHÓBER*¹, Pavel NEČAS², Pavel PULIŠ³

*Corresponding author

*¹GCI, Operational Centre,
Borovianska cesta 1, 960 01 Zvolen, Slovak Republic
tomas.schober@gmail.com

²Armed Forces Academy of General M. R. Štefánik,
Demänová 393, 031 01 Liptovský Mikuláš, Slovak Republic
pavel.necas@aos.sk

³Technical University of Košice,
Letná 9, 042 00, Slovak Republic
pavel.pulis@tuke.sk

DOI: 10.13111/2066-8201.2013.5.1.14

Abstract: *The high cost of the latest fighters is having a major impact on world air forces, big or small. For many countries it is a difficult balancing act as it becomes hard to afford enough aircraft to maintain the required force structure. Those air forces have to ask themselves whether they can afford enough fighters to accomplish all the desired missions. Many European Air Forces are in unenviable situation, because they can perform only the basic tasks like training and QRA missions over its own territory with limited possibilities for overseas deployment. This paper evaluates the likelihood of renaissance of the light fighter concept and describes three new Asian supersonics with their advantages and disadvantages. The aim is not to select the best lightweight fighter, but to show that rearming to the light variants of combat aircraft should be a good way for some Air Forces.*

Key Words: *Aircraft, Capability, Light Fighter, Training, Multi-Role, Requirements, Air Force.*

1. INTRODUCTION

Generally, if an Air Force wants to have Quick Reaction Alert (QRA), train new pilots and maintain aircraft at readiness for deployed operations, then it will need a larger force. Logical answer could be to turn to cheaper, lighter fighters to augment or take place of the expensive cutting-edge fighters.

A mixed force of both heavy and light fighters is often put forward as the best possible solution. Many operations do not require the capabilities offered by the „high-end“ fighters, since air forces are often operating under conditions of low air threat.

There are many recent examples in which relatively unsophisticated fighters would have been more than adequate.

In plenty of campaigns an obsolete aircraft of F-5 Tiger II type would appear to have been able to play a part, and there would seem to be a real need and desire for the kind of cheap lightweight fighters that formed the backbone of many world air forces during the 1970s and 1980s [1].

On the other hand, most of aircraft from this era are no longer considered adequate to meet today`s basic requirements, have only limited QRA capabilities and they do not provide sufficient deterrence in case of potential threat or international tensions.

2. GENERAL REQUIREMENTS

With the end of the Cold War, previous top-of-the-line fighter aircraft have been widely proliferated to many countries.

These countries suddenly received the capabilities which were not expected from the cheap lightweight fighters of that era.

Super maneuverability, long range powerful radar and beyond visual range capability set the essential baseline characteristics for today`s fighters.

In order to survive in a modern battle space any fighter requires a high degree of agility and survivability than its predecessors, wide range of countermeasures, low radar cross section and helmet-mounted sighting system.

Most air forces are demanding a degree of multi-role capability, which nowadays means much more than the ability to drop a pair of dumb bombs.

As for the interoperability requirements, any new fighter must have a suitable datalink and secure voice radios. Also night vision goggles and “all-glass” digital cockpit are deemed as a matter of course.

As can be seen above, all of these capabilities are similar to those required of the most expensive and capable modern fighter aircraft and many are asking whether these characteristics could be achieved by a relatively cheap lightweight fighter [2].

3. JF-17 THUNDER/FC-1 FIERCE DRAGON

The JF-17 is a joint Chinese-Pakistani project that aimed to reduce Pakistan`s dependence on western firms for advanced fighters, by fielding a low-cost multi-role lightweight fighter that would host modern electronics, and represent a step up from its Chinese MiG-19/21 derivatives, and French Mirage fighters.

This positioning addresses a market that the West once dominated, but has nearly abandoned in recent decades [3].

The big step forward for JF-17/FC-1 came when the USA imposed military export sanctions in response to Pakistan`s nuclear program, and to Chinese-Pakistani transfers of ballistic missile components.

With spares for its top-of-the-line F-16s in question, and additional Falcons removed as an option, Pakistan sought help from its Chinese ally. Bilateral agreement was signed in 1999 and although full avionics was not implemented until 2006, the testing and development phase have progressed smoothly.

China and Pakistan have set up a joint marketing agency (both countries have contributed 50% of the estimated 150\$ million in development costs) to promote export sales and their offering has received initial interest.

The aircraft, although appears highly conventional, makes use of a wide array of modern technological systems to maintain a healthy and lethal capability.

Among the avionics pods carried externally which can help expand pilot`s awareness inflight are self-protection radar jammer, day/night laser designator and Forward Looking Infra-Red (FLIR) system.

Standard armament is a fixed, forward-firing, Russian origin, twin-barrel GSh-23-2 cannon, which can be replaced with the larger caliber GSh-30-2 cannon at the expense of ammunition.

Air-to-air and air-to-ground munitions consist of “mainstream” missiles, guided bombs, conventional drop bombs and rocket pods. Of course, these armament selections are not the

limit for any operator can dress the JF-17/FC-1 to their liking, be they American-based weapons or Israeli, French, British or Russian in origin [4].

4. TEJAS LCA

India's Light Combat Aircraft (LCA) programme was meant to boost its aviation industry, but also to solve an emerging military problem.

The Indian Air Force's (IAF) fighter strength has been quickly declining as the small Fishbeds that form the largest component of its fleet are lost in crashes, or retired due to age and wear. The MiG-21bis programme was intended to extend their lifespan, but by 2020 they're likely to be gone.

Of course, India is operating great numbers of the latest, but heavier Flankers and Mirage-2000s and recently has selected French Rafales as a winner of the Medium Multi-Role Combat Aircraft (MMRCA) competition.

However, the main problem Dilli is facing nowadays, is the replacement of the backbone of its Air Force – light fighters.

That's why India's own Tejas LCA project is so important to the IAF's future prospects, and why India's rigid domestic-only policies are gradually being relaxed, in order to field an operational and competitive aircraft.

Even with that help, however, the program's delays are a growing problem for India. Beyond India, the west's near-abandonment of the global lightweight fighter market means that choices made in the LCA's design will also affect its export potential. Which, in turn, feeds back into the overall program's lifetime costs and viability [5].

Dilli originally planned for its LCA brand new domestic engine and radar, but these decisions very nearly sank the whole project. Even such a big country as India was unable to develop a radar on required parameters.

According to manufacturers, the LCA's performance is to be somewhat similar to Indian Mirage 2000s with lower top speed but with more modern electronic equipment.

The design uses a tailless compound delta plan that is designed to be unstable, but controllable thanks to advanced flight software and quadruplex fly-by-wire technology. For the entire project, question remains whether the aircraft will be available at the proposed, sub-\$25 million level, be delivered on time and be able to perform at an adequate level.

This single-seat, single-engine supersonic fighter will undergo several test exercises where its lethality, endurance and precision will be tested and if the aircraft meets all parameters, Dilli is planning to equip seven squadrons with the Tejas LCA.

5. GOLDEN EAGLE

The T/A-50 Golden Eagle, formerly known as the KTX-2, jet trainer and light attack aircraft is being built for the Republic of Korea Air Force (RoKAF). The aircraft is being developed in the following versions: T-50 advanced jet trainer to provide pilot training for current and next-generation fighters, T/A-50 lead in fighter trainer (LIFT), „weaponized“ trainer that can act as a secondary fighter and the F/A-50 multirole all-weather variant intended to replace RoKAFs F-5E/F by 2013.

The development of the aircraft has been funded 13% by Lockheed Martin, 17% by Korea Aerospace Industries (KAI) and 70% by the Government of South Korea [6]. Golden Eagle design is mainly derived from the Lockheed Martin F-16 Fighting Falcon and they are similar in their economic use of a single engine, speed, size, cost and the range of weapons

[7]. Previous engineering experience of KAI in license-producing the F-16 was a starting point for the development of the T-50 programme.

This aircraft has seven external hardpoints for undercarriage in same configuration as the other two Asian competitors.

One on the centreline under the fuselage, two hardpoints under each wing and an air-to-air missile launch rail at the two wingtips. A 20mm three-barrel Vulcan cannon is installed internally. The F/A-50, like the LIFT, will be equipped with the Lockheed Martin APG-67 advanced multimode radar and Sniper-SE surveillance and targeting pod, in combination with conventional and precision guided munition. Another very important issue is the embedded training system which improves and speeds up the whole training process with lower costs. This comprises features like simulated radar, radar warning from simulated threats and simulated chaff and flares.

6. COMPARISON

We have here three, in size and designation similar aircraft, but with a closer look we can find some differences due to specific requirements of each country of origin. Development problems and delays, questionable reliability of spare part supplies and odds for success on international markets are their main challenges.

As for the countries like India, Pakistan, South Korea or even China, the key point is the dependency on the jet engines and avionics from its producer (Russia or USA) and unwelcome, but possible future sanctions by the respective country.

On the other hand, for a country without an experience and technology base, putting precious resources on jet engine research and development (R&D) would be only waste of time and money. However, for any potential customer, the reliance on multiple contractors from various countries is unwanted.

Concerning the Tejas LCA, Dilli has several scenarios of how many aircraft will be procured depending on actual price and India's defence budget. Numbers vary from 160 to 200 pieces for seven to ten squadrons. Moreover, India's Defence Acquisition Council has approved the purchase of the Naval Tejas (two-seat carrier version) for the Indian Navy. The Navy has an initial requirement for 46 of these aircraft, with carrier trials expected to begin towards the end of 2013 [8]. As for the future foreign prospects, the Tejas must achieve success in the IAF at first, before it can reach international markets.

Initial success of the JF-17, thanks to its displays in Pakistan military exhibitions, has increased interest in the Chinese/ Pakistan product. Azerbaijan and Zimbabwe are known to have shown a strong desire to procure the new jet. Other interest parties in talks are Egypt and Sudan and possible Iran and Nigeria as well as Bangladesh.

Golden Eagle family has reached some export success yet, with confirmed contracts from Indonesia for sixteen and from Philippines for twelve T/A-50 advanced jet trainer with light attack capabilities. However, the aircraft has lost two battles in Israel and Singapore against the Alenia AerMacchi M-346 trainer. The biggest challenge for the Golden Eagle lies in the United States, where the T-50 is one of the contenders for the US Air Force's new trainer. This so-called T-X programme with total number of aircraft rising up to 350 is expected to be delayed due to recent defence cuts.

These three aircraft present a tough rivals for Swedish Gripen – sometimes described as “the last affordable light fighter“ on international markets. They offer adequate multi-role capabilities at a cost that no other fighter-jet in the world can match. Some of their specifications are shown in the table below.

Table 1- Aircraft specifications

Aircraft type	Tejas LCA	JF-17/FC-1	TA-50/FA-50
Crew	1 (2-naval version)	1	2
Empty weight (kg)	5,680	6,411	6,470
Max. take-off weight (kg)	13,500	12,474	13,500
Maximum range (km)	2,000	2,037	1,850
Service ceiling (m)	15,200	16,800	14,630
Maximum speed (M)	1.6	1.6	1.5
Engine	1 x General Electric F404-GE-IN20 (USA)*	1 x Klimov RD-93 (RUS)	1 x General Electric F404-GE-102 (USA)
Max. thrust / aft (kN)	53.9 / 89.9	49.4 / 84.4	53 / 78.7
Endurance (hrs)	2.30		
Hardpoints	7	7	7
Max. G limits	-3.5/+8	-3/+8	-3/+8
Unit cost (\$ million)	22 (estimated)	15 – 20**	25 / 30

*F414-GE-INS6 for LCA Mark II expected to be ready around 2014-15.

**20-25 US\$ million for Block II.

7. CONCLUSION

Ageing fleets of venerable fighter aircraft in combination with financial crisis affecting not only European states are raising serious concerns of the future of the Air Forces. At present, countries simply cannot afford to procure brand new powerful fighters, so they have two options to think over. To buy a new light fighters or to acquire second-hand aircraft.

Second choice looks good on paper, because the aircraft are often available at a relatively low unit cost.

However, this choice brings a lot of potential problems. Such an aircraft will certainly have high operating costs, will require expensive support infrastructure and may be difficult to keep serviceable and operational due to unreliable supply chain. The may require refurbishing or upgrade, which will add to the overall cost burden.

For smaller air forces with limited requirements for air defence missions and QRA capabilities, purchasing of the lightweight supersonic fighters should be the best solution.

The military is facing some significant challenges in the world today. The global war on terror is accelerating the need to replace our already aging aircraft fleet as Air Force aircraft continue to accumulate flying hours at an alarming rate. This in itself is a challenge but becomes more difficult when coupled with the budgetary realities of today.

Reduction of the personnel and active combat aircraft is common initiative adopted by the Air Forces worldwide.

Another initiatives the Commands are forced to do is to reduce flying hours due to rising fuel costs. This fact is, unfortunately, in combination with expenditures on deployment in various combat and non-combat missions around the world is leading to a greater risk to pilot proficiency.

Better way for some Air Forces should be rearming to light variants of combat aircraft. Even in the oil-rich United Arab Emirates, the plans to acquire powerful, but costly Dassault Rafale have stumbled on grounds of affordability.

It is more than apparent that modern light fighters can bridge the gap between basic

flight training and high performance fighters. In the other words they combine characteristics of both light and cutting-edge fighter aircraft. These aircraft combine modern glass cockpit, digital flight control system, latest weaponry and the state-of-art avionics typically used only on the top-end fighters.

REFERENCES

- [1] D. Alex, *Chengdu FC-1 Xiaolong/ JF-17 Thunder Multi-role Fighter*, 23.8.2012. Available at: http://www.militaryfactory.com/aircraft/detail.asp?aircraft_id=758.
- [2] *India's Naval Tejas flies. Combat Aircraft Monthly*, Vol.13, No.7, July 2012. Ian Allan Publishing. ISSN 2041-7489. Pp 26-27.
- [3] *KAI T-50 Golden Eagle, aircraft profile*; available at: <http://www.aeroflight.co.uk/aircraft/types/kai-t-50.htm>.
- [4] J. Lake, *An Affordable Force?* *Combat Aircraft Monthly*, Vol.13, No.2, February 2012. Ian Allan Publishing. ISSN 2041-7489. Pp 78-83.
- [5] *LCA Tejas: An Indian Fighter - With Foreign Help*, 30.4.2012. Available at: <http://www.defenseindustrydaily.com/india-lca-tejas-by-2010-but-foreign-help-sought-with-engine-01901>.
- [6] J. Menon, *India's Light Combat Aircraft Prepares For Operational Clearance. Aviation Week*, 27.8.2012. Available at: http://www.aviationweek.com/Article.aspx?id=/article-xml/asd_08_27_2012_p03-01-489579.xml.
- [7] *Pakistan & China's JF-17 Fighter Program*, 14.11.2011. Available at: <http://www.defenseindustrydaily.com/stuck-in-sichuan-pakistani-jf17-program-grounded-02984/>
- [8] *T-50 Golden Eagle, South Korea*; available at: <http://www.airforce-technology.com/projects/t-50/>.
- [9] J. Kosecova, *Ochrana vzdušného prostoru České republiky – Air Policing a mise Severoatlantické aliance Baltic Air Policing*, *Doktríny on-line*, 1/2012, 6.9.2012. Available at: http://doctrine.vavyskov.cz/_casopis/2012_1/2012_1r_2a.html.