A CASE FOR MULTI-ROLE COMBAT AIRCRAFT

‘The combination of advanced sensors and precision weapons, along with stealth and information technologies resident in a long-range combat aircraft with swing-role capabilities provides air power today with the ability to strike multiple targets simultaneously, while retaining the ability to fight and obtain adequate control of the air, offering the most cost-effective solution to conducting an air campaign.’

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Combat aircraft have been classified effectively into ‘generations’ based on their capabilities and some characteristics. They have also been separated into air superiority or air dominance fighters, strike, electronic warfare, and reconnaissance aircraft, based on their primary role. Further, these aircraft were custom designed to optimise them for their designated roles in terms of aerodynamics, engine performance and weapon carrying capacity. The result was that most air forces carried an inventory of a large number and types of aircraft with their own dedicated maintenance and other support systems. Since the per-unit cost of these first and second generation fighter aircraft were relatively low, the concept of role-dedicated combat aircraft was not considered a drain on resources. (See Pathfinder No 170, January 2012, Five Generations of Jet Fighter Aircraft, for a detailed explanation of the rationale for classifying fighter aircraft into different generations)

The demand for improvements in performance was the primary catalyst for the increase in cost of combat aircraft. Better performance from an aircraft point of view meant having more powerful engines and sophisticated aerodynamic designs; and from a weapon effectiveness perspective it demanded missiles with greater range and accuracy. Every improvement that was introduced came with an increased cost-coefficient that in turn multiplied the overall cost. While the cost difference between first and second generation aircraft were marginal and acceptable, the difference between second and third generation aircraft was a quantum jump. The initial third generation fighter aircraft continued to be role-dedicated. However, as the cost escalation started to impinge on the numerical size of available forces, a re-thinking on single-role fighter aircraft started to take place.

The first development was to take an airframe and engine and to adapt it to different roles by changing the avionics and weapons. With very limited changes the same aircraft could be fine-tuned to be an air defence/superiority fighter or a dedicated ground attack/strike aircraft. Both the Western nations and the then Soviet Union adopted this methodology to ameliorate design and development costs by manufacturing larger numbers of airframes and engines. The added costs were only for the avionics, especially in the case of air combat versions, where an air-to-air radar had to be installed. The Tornado in the West and the Mig-23 ‘Flogger’ in the Soviet inventory are examples of this concept.

By the time the third generation fighter aircraft were fully matured and their capabilities were being incrementally improved through upgrades, they had become far too expensive for most nations to maintain sizeable fleets. The inability of medium and small air forces to invest the necessary resources to create and maintain the required numbers of combat aircraft led to technological innovations being implemented to overcome the shortfall in ‘capabilities’ that reduced numbers of fighter aircraft. The concept of the
Multi-Role Combat Aircraft (MRCA) was born more out of necessity rather than as a technological improvement of existing platforms.

MRCA by design are intended to perform different roles in the air, normally one of them being air-to-air combat. The term indicates the employment of a common airframe and engine(s), and a platform, to carry out multiple roles by adapting the weapon carriage capacity. This concept is substantially different to the employment of third generation aircraft like the MiG-23 in different roles, achieved by substantially altering their avionics and weapons suites.

Normally an MRCA is made capable of undertaking the two fundamental roles of air power—air-to-air combat to achieve control of the air and strike to neutralise targets on the ground. This is achieved by externally reconfiguring the aircraft on the ground, depending on the envisaged mission that it is likely to undertake. The main advantage that an MRCA provides to an air force is cost-effectiveness in a number of ways. An MRCA ensures that the ground support required for the maintenance of the aircraft, irrespective of the role that it is being employed for at any given time, is streamlined and therefore not resource-intensive. The only requirement is to have the different weapon suites made available in sufficient quantities. The MRCA concept was operationalised with fourth generation fighter aircraft and continues to influence the acquisition process of modern air forces.

The early multi-role aircraft were adapted from the air-superiority/dominance fighter, which were optimised for the air-to-air combat role. As a result, the strike capability was somewhat restricted because of weapon carriage limitations. Even so, another advantage came to the fore—these aircraft were capable of ‘looking after’ themselves even when they were being utilised in the strike role. If intercepted, they could jettison their heavy strike weapons and then defend themselves from adversary attack. The spin-off was that a medium or small air force could now limit the number of combat platforms that they had to acquire in order to provide the nation with a credible strike and air superiority posture. However, these aircraft suffered a disadvantage of being optimised for one role and therefore, their performance in the second role becoming less than optimum. The difference in performance between the roles is a trade-off that detracts from the true potential of multi-role combat platforms.

As the MRCA concept took hold, and was seen as a viable option, a number of other specialised roles started to get added to the multi-role construct. Electronic Warfare, suppression of enemy air defences (SEAD), and tactical reconnaissance could be carried out by the same platform by merely configuring it with the appropriate weaponry or specialised pods.

Another innovation made the concept of a multi-role aircraft truly live up to the meaning of the term. The earlier fourth generation fighter aircraft could switch their role on the ground. Switching roles meant that the aircraft would have to be reconfigured on the ground with the special weapons and pods necessary to carry out a particular role. In case the role had to be changed, the reconfiguration could only take place once the aircraft had landed. However, the later versions of the fourth generation aircraft, sometimes referred to as 4.5 generation fighter aircraft, were capable of changing the mission profile while in flight—a capability that came to be termed ‘swing-role’. Swing-role meant that at any given time during a mission the aircraft could be tasked to change the role it is undertaking and then be utilised to carry out another completely different role.

The capacity to swing-roles gives a different meaning altogether to the idea of weapon platform flexibility and is a coveted capability. This is particularly so for medium and small air forces that are constantly under pressure to limit resource expenditure while also having to meet the capability requirements to achieve national security imperatives. Role-dedicated combat platforms can only be afforded by resource-rich and large air forces and has become unaffordable for all others. There is no doubt that a case exists for multi-role fighter aircraft to be further developed to ensure that they are equally optimised for any role that a combat platform should be able to undertake.

Key Points

- The demand for ever better performance—which meant having more powerful engines and sophisticated aerodynamic designs as well as missiles with greater range and accuracy—led to the increase in cost of combat aircraft.
- By the time the third generation fighter aircraft were fully matured and their capabilities were being incrementally improved through upgrades, they had become far too expensive for most nations to maintain sizeable fleets.
- The main advantage that an MRCA provides to an air force is cost-effectiveness in a number of ways.