

# Fighter Planes Of The Future

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**Abstract:** In recent years, dizzying developments in many fields such as computer systems, space technologies, and metallurgical science have led to the production and development of new generation fighter aircraft. These aircraft, which will have advanced electronic systems, will be the most advanced fighter aircraft on active duty. Although there is no clear definition, new generation fighter aircraft can be defined as multi-role aircraft with features such as being invisible to radar, agile chassis resistant to supersonic speeds, advanced electronic systems, being in constant communication with other air and land elements, and advanced imaging and tracking systems. New generation fighter aircraft, which are currently being developed, are platforms with advanced integrated avionics systems, afterburner cruise capability at supersonic speeds, low visibility against radars, and advanced radar systems.

New generation fighter aircraft have integrated avionics that independently combine and prioritize the aircraft's multispectral sensors and off-board data, providing the pilot with an accurate real-time operational picture and the ability to download data for post-mission analysis.

**Keywords:** New Generation Fighter Aircraft, Electronic Systems, Supersonic Speeds, afterburner cruise, Sensors

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## I. INTRODUCTION

Aviation is of strategic importance to today's countries in terms of military and economic aspects. Despite their capabilities, fifth-generation aircraft currently constitute a fraction of the current combat air force[1]. Modern Integrated Air Defense Systems (IADS) have created areas where fourth-generation aircraft cannot effectively penetrate and hope to survive[2]. Threat aircraft, air-to-air missiles (AAMs), electronic attack (EA) and electronic protection systems have surpassed the capabilities of the US fourth-generation fighter aircraft[3]. While fifth-generation aircraft do not offer a single-point solution to decision-makers, their demonstrated capabilities as valuable contributions to strategic deterrence, their capabilities as advanced airborne echelons and their operational utility as persistent force multipliers make them indispensable for future joint force operations[4]. These areas include improving the connectivity between legacy and fifth-generation aircraft, improving the connectivity between fifth-generation air platforms, improving integration with space and cyber capabilities, and integrating fifth-generation platforms with other components of joint and combined force operations[5]. As of 2005, fifth-generation fighters are characterized by very low observability, including internal weapons bays, and greatly improved situational awareness through a network-centric combat environment. Examples include the F-35A [6]. Airplanes became an important part of modern warfare during the First World War (1914–18). Aircraft technology developed rapidly and by war's end, airplanes were involved in reconnaissance, artillery spotting, air-to-air combat, strafing ground targets, anti-submarine warfare, tactical and strategic bombing and home defence[7]. Sixth-generation fighter jets will be able to perform manned and/or unmanned missions. The aircraft will be equipped with hypersonic cruise missiles and directed energy weapons. All elements in the system will be connected to each other with an artificial intelligence-supported battle cloud that includes deep learning.

## II. WARPLANES

To discover the first jet fighter, we have to go back 79 years to 1944. As World War II wound down about a year after the Allied D-Day invasion, the Germans threw everything they had into the war effort, including the world's first combat jet-powered fighter, the Messerschmitt Me 262. The Allies first became aware of the aircraft on July 26, 1944, when the crew of a de Havilland Mosquito PR XV noticed something strange during a photo reconnaissance mission over Bavaria[8].

Figure 1. First Jet Fighter Plane



### III. WORLDWAR II AIRCRAFT

Military aircraft in World War II included bombers, fighters, and reconnaissance airplanes, as well as a limited number of cargo transports, gliders, blimps, and even jets. Technologically, military aircraft rapidly evolved during the war. While the British had the Spitfire and the Germans the Messerschmitt, the U.S made innovations as well, developing the successful P-51. Mustang in collaboration with the British, and introducing important innovations in long-range bombers, such as the B-17 “Flying Fortress” and the famous B-29. Radically new types of aircraft also emerged. These new aircraft achieved very high speeds using the jet engine, a new type of engine that had no propellers. [9]. The B-29 Superfortress was the largest Allied bomber of World War II. Its crew compartments were pressurized, meaning crews no longer had to endure sub-zero temperatures on long-range bombing missions. Superfortresses dropped atomic bombs on the Japanese cities of Hiroshima (August 6, 1945) and Nagasaki (August 9, 1945)[10].

Figure 2. B-29 Bomber[9].



Figure 3. Boeing B-29 Superfortress bombers at Bomber Command base in the Marianas[10].



### 1.1. The first jet aircraft was the Heinkel He 178

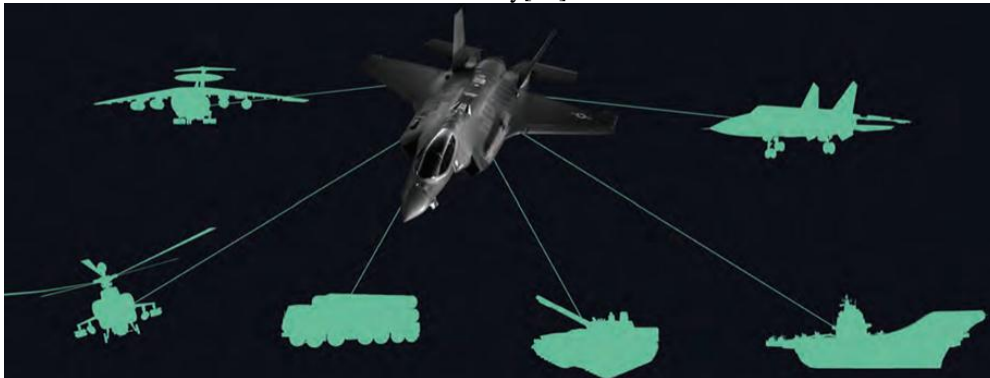
Supermarine Spitfire (Süpermarin Sipitfayr), It was the first all-metal, single-pilot fighter aircraft of the Royal Air Force. It entered service in 1938. Designed for World War II, the Spitfire was a small, highly maneuverable, fast and very agile aircraft. It was a single-seat fighter aircraft with machine guns on its wings to shoot down enemy aircraft in the sky. It became the most famous aircraft of World War II, especially after its success in the Battle of Britain. It was used by the Royal Air Force until the 1950s.[11]

Figure 4. Supermarine Spitfire Plane



## IV. FIFTY GENERATION FIGHTER JETS

Figure 5. Fifth generation aircraft can work in integration with air, land and sea elements and share information instantly[12].



### 1.1.Features of the fifth New generation fighter aircraft

Fifth generation fighters are advanced aircraft characterized by a number of features that differentiate them from previous generation fighters. These features are; Stealth, High maneuverability, Supercruise, Advanced avionics, Networked data fusion, Multi-role capabilities and Helmet.

Figure 6. Features of fifth generation fighter jets[13].



**Stealth Aircraft:** Fifth generation aircraft are known as stealth aircraft due to the special methods developed to avoid being detected by radar. These aircraft are designed to ensure that the energy emitted from enemy radar is scattered in other directions or softly absorbed.

## V. SIXTY GENERATION FIGHTER AIRCRAFT

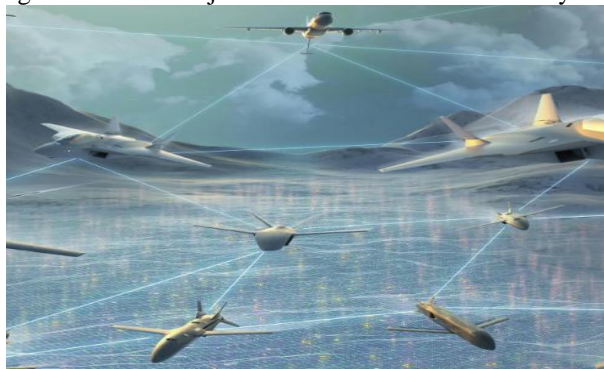
It is known that countries such as Russia, China, the United Kingdom, Japan, France, Germany, Italy, Spain, Sweden and Taiwan are working on 6th generation fighter aircraft. 6th generation jet fighters are designed to replace fighter aircraft used for air superiority and to play a complementary role to 5th generation fighter aircraft. 6th generation fighter aircraft projects, which are still in the conceptual design phase, are expected to become concrete between 2030-2035. Designed to be free from the cerebral and physical limitations brought by the human body, these systems will be considerably superior to older generation fighter aircraft thanks to their effective maneuverability and artificial intelligence[14].

### 1.1. Sixth generation fighter aircraft projects

#### 1.2. FCAS project

Europe's 6th generation fighter jet project FCAS is carried out in partnership with Germany, France and Spain. FCAS will be built around a core Next Generation Weapon System (NGWS). In this "system of systems," piloted New Generation Fighters will work together with artificial intelligence technologies, Unmanned Remote Carriers, all connected to other systems in space, in the air, on the ground, at sea and in cyberspace via a data cloud called the "Combat Cloud." These connected platforms will act as sensors, effectors and C2 nodes, enabling agile decision making and working together within an open, scalable, service oriented architecture that allows the inclusion of future platforms and Technologies[15].

Figure 7. FCAS Project Visual: Future Combat Air System



#### 1.3. TEMPEST project: BAE systems

The Tempest Project is being carried out by England, Italy and Sweden. The project is developing a 6th generation jet fighter that is planned to enter service in 2035. Another British company, Rolls Royce, Italian Leonardo and French MBDA companies are taking part in the project carried out by British BAE Systems. Swedish Saab also continues to provide investment and technology support. The aircraft will be equipped with hypersonic cruise missiles and directed energy weapons. Tempest will also be the airborne command and control center for swarm unmanned aerial vehicles. It is planned that all elements in the system will be connected to each other with an artificial intelligence-supported battle cloud that includes deep learning. In the event of a pilot fainting, flight control can be taken over by artificial intelligence[16].

Figure 8. Structure of the Tempest next-generation fighter jet, a joint venture between BAE Systems, the UK, Italy and Japan



#### **1.4. What is the difference between the fifth and sixth generation fighter jets?**

In general, the main difference between fifth and sixth generation jet fighters is the level of technological advancement. Sixth generation aircraft are designed to be stealthier, more integrated, and more functional than previous generations. However, both generations of jet fighters are incredibly advanced and capable aircraft and will continue to play a critical role in the defense of nations around the world. The sixth generation fighter aircraft, in particular, represent a new era in air combat by combining advanced technologies, high efficiency, and multi-functionality. The sixth-generation fighter is a conceptualized class of fighter aircraft that is more advanced than the fifth-generation jet fighters under development[17].

### **VI. CONCLUSION**

The global air race and the constant shift in air superiority were the precursors to the Cold War and the Space Race. Air power also demonstrated the essential roles of reconnaissance, mobility, air control, and strike capability. During World War I, the need to dominate the skies accelerated the evolution of aircraft and changed aviation forever. By the end of World War II, fighters and bombers had been transformed into highly effective weapon systems.

Thanks to artificial intelligence, fifth and sixth generation fighter jets provide the pilot with instant situational awareness and support well-informed tactical decisions. The advantages of fifth and sixth generation fighter jets over previous generations are that they have low visibility, carry their ammunition in their pockets, have very advanced avionics systems, can rotate 360° against ground and air threats, and use the EASE (Active Electronically Scanned Array Radar) radar, which is used in modules and has a different frequency and wavelength for each module. The aim of the development of sixth generation fighter jets is designed to provide superior capabilities and versatility depending on the environment.

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