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Developments in Warplanes from World War II to the Present Day

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SUMMARY
In this study, warplanes development from the World War II to the present has been researched. One of the most important formations of the armed forces of the countries is the air force. Warplanes, which are the basic building blocks of the air force, are manufactured to meet today's requirements. During World War I, reconnaissance and airtoground attacks began with the use of airplanes and other aircraft. Warplanes can be classified as I, II, III, IV and V.generation.The first generation fighters were developed in 1944-1953, the second generation in 1953-1960, the third generation in 1960-1970, the fourth generation in 1970-1990 and the fifth generation aircraft from 2005 to the present.
New generation warplanes,they have been made more difficult to detect thanks to their aerodynamic structures, materials used in their coatings and advanced electronic systems. Warplanes, which are expressed as the new generation, are able to neutralize land, sea and air elements at distances beyond sight, thanks to their precision targeting and weapon systems.
Key Words: *New generation, Warplanes, Weapon systems, Stealth fighters, Aviation*

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I. Introduction

The centenary year of the succes sful powered flight by the Wright brothers in 1903 has just beencrossed and it is good to have another look at the progress of aviation around the last century. The progressin aviation can be described based on performance, aerodynamics, structures, prop ulsion, guidance andcontrol, the airplane manufacturers, operational practices, economics, or the achieved safety levels and soon[1]. One of the authors (MRA) had earlier described the progress of civil transport airplanes during eachdecade of the twentiet h century [2].Since the bloody air "feathers" of the First World War, air power has become an essential part of any conflict and a crucial core of a nation's military strength. World War II showed the world just how important warplanes can be, with warplanes holding legendary status as some of the most important and inspiring machines ever built. But the end of World War II saw a dramatic paradigm shift in air power – the jet engine. Since the first fighter aircraft, they have come to symbolize air superiority and the ultimate machines created by humans. Although Germany built the first fighter jet, the intense standoff between the USSR and the US during the Cold War paved the way for the incredible evolution of fighter jet technology, the legendary and still serving spawners to this day[3].

II. The Road to Jet Fighters

Warplanes, which are one of the most important factors that determine the operational capability of countries, have preserved and continued their existence increasingly from the past to the present. On November 17, 1903, the first controlled and powered flight was made by Orville Wright with the plane named "Flyer-1". After this success, in which 120 feet was flown in 12 seconds, aviation rapidly underwent a transformation. Technological transformations took place in this field as warplanes became a part of the armed forces. Perhaps the most important of the transformations of warplanes, which we can call the "S Curve", was the design of the jet engine. Although the first aircraft using turbojet engines (Heinkel He 178) was flown by the Germans on 27 August 1939, it was only in 1945 that jet warplanes began to be used effectively as a weapon in wars[4].

III. The Development of Warplanes

Today's fighter jets have come a long way from the early fighter jets of the 1940s, with the continued advancement of technology. However, the innovative spirit and firepower found in all generations of fighter jets remain common threads, from loud subsonic conventional weapons to advanced stealth machinery.

3.1. First Generation

These planes are categorized as first-generation jet fighters and are recognizable for their straight, unswept wings and wood or light alloy frames. Generally, they do not use avionics, which are electronic systems for communication or navigation. Instead, controls and firepower were controlled manually.First-generation jet aircraft were machine-gun-integrated and could carry unguided munitions. Its electronic subsystems did not include radar and interceptor systems. As an example of first generation warplanes; Soviet-made Mig-15 and Mig-17; American-made F-86 Saber jet fighter planes can be given as an example[5].

Figure 1.First generation F-86 Sabre jet fighter plane

3.2. Second Generation

Figure 2. Secondgeneration F-104 Starfighter jet fighter plane

Between 1950 and 1953, the Korean War brought on the need for more innovation. Weapons were hard to manage and utilize while traveling at such high speeds, so radars and homing missiles were used to improve accuracy and effectiveness. It also became apparent that combat pilots needed more battlefield support, so jet fighters were being adapted to a more multi-role position that would fill some of these needs. Examples of typical second-generation fighter jets are the Lockheed F-104 Starfighter, MiG-21, English Electric Lightning, and the French Dassault Mirage III.

3.3.Third Generation

From the 1960s to about 1970, it produced aircraft with increased maneuverability and ground attack capabilities, with the introduction of guided missiles.Fighter jets of the third generation are categorized for their multi-role capability. Not only did they carry necessary weapons, but they were also able to engage in air-to-air interception and deploy missiles and bombs. New technology also evolved with pulse-doppler radar and off-site targeting avionics.

Third generation aircraft The Sukhoi Su-17, McDonnell Douglas F04 Phantom, and General Dynamics F-111 can be shown.

Figure3. Thirt generation RF-4E Phantom jet fighter plane

3.4. Fourth Generation

Figure 4.Fort generation F-16 Block 40 jet fighter plane

They are jet planes developed in the period from the beginning of the 1970s to the end of the 1980s. In this period, when fourth generation jet planes were developed to be used in multiple roles, jet planes began to be equipped with very complex avionic systems and weapons. Thanks to the use of "fly-by-wire" method flight control systems in jet aircraft such as the F-16 Falcon, which were designed to be somewhat unstable, a very effective maneuverability was also achieved in this period.Some highlights of this jet fighter era include the General Dynamic F16 jet, Saab 37 Viggen, Harrier II and Sukhoi Su-27.

3.5. 4.5 Generation

They are jet planes developed in the period from the beginning of the 1990s to the present. In the new process that started with the end of the cold war, military expenditures were significantly restricted. In parallel with this, many research and development programs were either stopped or slowed down and evolved. Improvements and improvements were made on fourth generation aircraft rather than designing new aircraft. Thanks to microchip and semiconductor technologies, the capabilities of computers, avionics systems and other flight systems have been significantly increased in this process. Another technology that made the most progress in this period was the "invisibility", that is, "stealth" technology.

Examples of 4.5 generation warplanes. Newly produced, French-made Rafale 2000; British/Italian/German co-production Eurofighter; Swedish-made Saab JAS 39; Soviet-made Su-33/34 and Su-35. Developed are the Soviet-made Mig-29 and Mig-31; American-made F-15, F-16 and F-18. It can be displayed.

Figure 5. F / A-18 Blok II Super Hornet

3.6. Fifth Generation

There are four operational 5th generation combat platforms in the world today. America's F-22 and F-35, China's J-20 and Russia's Su-57, with more than 25 different 4th generation.At the same time that avionics technology was advancing, materials and electronics were playing a more significant role in the overall success of these jets. Stealth, Highly maneuverable, Multi-role capabilities, Network or data aggregation capabilities.While some are still debating the finer points of what is required from a 5th generation fighter, these features are widely accepted. Some of these capabilities were available on 4th generation aircraft, but each must be available on a 5th generation platform. That raises the question, then… With 5th-gen platforms still so rare, what will be the benchmarks for a 6th-gen hunter[6].

The newest, and perhaps greatest, advancement to warplanes, the F-35 is an incredible aircraft with unprecedented technological capabilities. With its first test flight in 2006, the F-35 sets the benchmarks for future warplanes with its vertical take-off and landing capability, ultra-advanced radar and sensors, stealth capability and precision weapons. Lockheed Martin F-35 Lightning II fighter jet, which entered service with the USAF in July 2015 [7, 8].

The F-35 uses more software than any other air combat aircraft, with 7 million lines of code in the aircraft, and a further 7 million lines of code in the supporting ground systems. An example of the complexity and sophistication of the F-35 software is that it uses about 100 times the number of parameters than a fourth generation fighter does to define a potential threat. Ultimately, a fifth generation aircraft allows the pilot to maintain decision superiority over an adversary. This provides greater chances of survivability, which when combined with effective lethality, assures battlespace dominance[9].

Figure 6. The Next Generation Lockheed Martin F-35 LightningII 2006

IV. The Future of the Fighter Jet

The need for advancements in fighter aviation is constantly pushing forward to improve speed, performance, battlefield survivability, and pilot control. Several nations are putting resources towards developing the next generation of fighter jets, including the United States with the Air Force's Next Generation Air Dominance (NGAD) program, Germany with the Future Combat Air System (FCAS) program, the United Kingdom with their own program also by the name of the Future Combat Air System, and China, India, Taiwan, Japan, Russia, France, Spain, Sweden, and Italy with their respective projects.

Some things that may come into play with these new fighter jets are how unmanned technologies and remote controls can enhance performance. Stealth technology and advanced variable-cycle engines will also take current fighter jets to the next level when the research is done and implemented. What we do know is the most powerful and fastest jet in the world is still yet to come

V. Dependenceon Air Power Advantage

Since Operation Desert Storm in 1991, the military and political utility of air power has grown tremendously. Stealth fighters and bombers, continuous Intelligence Surveillance Reconnaissance (ISR), proliferation of precision-guided munitions, Suppression of Enemy Air Defense (SEAD) and Electronic Warfare (EW) capability, networking of sensors, shooters and Command and Control (C2) nodes, all, banded together to make attack superior to defense in air warfare[10]. The result, as Operation Iraqi Freedom once again demonstrated, has been a drastic reduction in the time required to complete coalition victory and the risk involved in ground units. Finally, Desert Storm suggested that military operations do not necessarily resultin large civilian casualties and that the extent of 'secondary damage' to civilian infrastructure appears controllable[11, 12].

In Stability and AntiInsurgency (COIN) missions, this ensures the protection of forces. It allows Special Operations Forces (SOF) teams to cover larger areas with lower risk than before and can assist so-called proxy forces. This 'Afghan Model' has proven its worth in Afghanistan (2001–2014), northern Iraq (2003), Libya (2011) and Mali (2013) and currently in the fight against DAESH[13]. Air power is one of several assets. capable of targeting terrorist groups and guerrilla fighters in remote areas, and doing this relatively effectively and inexpensively without the risks associated with recruiting large numbers of ground troops[14, 15].

VI. Conclusion

First generation jet fighter is jets that have no radar and only able to achieve subsonic speed and encompass jet fighters that was used at the end of world war 2 until the early cold war. Between the first fighter planes and the new generation fighter planes, there are basically many times increased speed, very high maneuverability, the ability to carry more ammunition, safe pilot evacuation in emergency situations.The new generation jet warplanes are equipped with more sensitive sensors and network-based weapon systems than previous generations. Thanks to the equipment, data traffic can be provided with land, sea and space platforms, and exploration and monitoring activities covering large areas can be carried out. New generation warplanes can neutralize land, sea and air elements at distances beyond sight, thanks to their precision targeting and weapon systems. New generation warplanes; They have been made more difficult to detect thanks to their aerodynamic structures, materials used in their coatings and advanced electronic systems.

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