MiG-21 Fighter Jet: History, Wars, Models, Upgrades & Indian Air Force Legacy

MIG-21 – THE LEGENDARY SUPERSONIC FIGHTER

A complete history, specifications, Indian service record, models, wars, and retirement details

INTRODUCTION

The Mikoyan-Gurevich MiG-21 is one of the most iconic fighter jets in aviation history. Designed during the Cold War era, this
Soviet-origin aircraft became the world's most produced supersonic jet and served in the air forces of more than 60 countries.
Known by NATO as "Fishbed," the MiG-21 combined exceptional speed, agility, and cost-effectiveness, making it a favorite among

pilots and defense strategists.

For India, the MiG-21 holds a special place as it became the backbone of the Indian Air Force (IAF) for over five decades. From guarding the skies during critical wars to being a reliable training platform, the MiG-21 shaped modern Indian aerial warfare and contributed to national security for generations.

ORIGINS AND DEVELOPMENT

The MiG-21 was developed by the Soviet design bureau Mikoyan-Gurevich in the early 1950s. Engineers Artem Mikoyan and Mikhail Gurevich sought to create a lightweight fighter that could achieve Mach 2 speeds while remaining easy to produce. The first prototype, designated Ye-1, flew in 1955, showcasing a revolutionary delta-wing design. After several test flights and refinements, the production variant MiG-21F entered service with the Soviet Air Force in 1959.

Its distinctive triangular delta wings allowed for excellent climb rates and high-speed performance, though they demanded careful handling at low speeds. The aircraft's simplicity, combined with advanced radar and missile systems for its time, made it an attractive export product for Soviet allies across Asia, Africa, and Europe.

INTRODUCTION TO INDIA

India's quest for a modern supersonic fighter in the late 1950s led to a historic defense collaboration with the Soviet Union.

After evaluating multiple Western and Eastern aircraft, the Indian Air Force selected the MiG-21 in 1961 for its speed,
affordability, and upgrade potential. The first batch of MiG-21F-13 aircraft arrived in India in 1963, marking the country's entry
into the supersonic era.

A landmark agreement followed between India and the USSR for licensed production. Hindustan Aeronautics Limited (HAL) set up
manufacturing lines in Nasik, Maharashtra, allowing India not only to assemble but eventually to produce the MiG-21 indigenously.
This collaboration helped strengthen India's aerospace industry and reduced dependence on foreign suppliers.

PRODUCTION AND MANUFACTURING

Globally, more than 11,000 MiG-21s were produced, making it the most manufactured supersonic jet ever. In India, HAL produced
several upgraded variants under license, including the MiG-21FL, MiG-21M, and MiG-21bis. Production in India continued for
decades, with the final aircraft rolling out in the mid-1980s. HAL's Nasik division became a hub for not just assembly but also
research, upgrades, and maintenance, enabling the Indian Air Force to operate a large fleet with self-reliance.

MIG-21 IN INDIAN WARS

The MiG-21 became India's first line of defense in multiple wars and conflicts. Its role in shaping the Indian Air Force's combat
reputation cannot be overstated. Despite being lightweight, it often went head-to-head

with advanced enemy aircraft and proved its
worth on the battlefield.

INDO-PAK WAR OF 1965

The MiG-21 entered combat for the first time during the Indo-Pak war of 1965. Although inducted shortly before the war, it still
saw limited action due to operational training stages. However, its mere presence gave India a supersonic edge over Pakistan,
which relied on the American-supplied F-86 Sabres and F-104 Starfighters.

INDO-PAK WAR OF 1971

By 1971, the MiG-21 fleet had grown in strength and was fully operational. In this decisive war that led to the creation of
Bangladesh, the MiG-21 became the star performer. The IAF used MiG-21s in both air superiority and ground attack roles. Pakistani
F-104 Starfighters, considered technologically superior, were shot down in dogfights, proving the MiG-21's agility and missile
capabilities.

One of the most famous encounters was when Flight Lieutenant Bharat Bhushan Soni shot down a PAF F-104 Starfighter using an
air-to-air missile, demonstrating the MiG-21's lethality.

KARGIL WAR 1999

During the Kargil conflict, MiG-21s were deployed for ground attack and reconnaissance

missions. Though older by this time
compared to modern jets, they played a significant role in providing close air support to Indian Army troops fighting at high
altitudes. The aircraft faced challenges due to advanced surface-to-air missiles but continued to operate under difficult
conditions.

BALAKOT AIRSTRIKE (2019)

The MiG-21 entered headlines again in 2019 during the Balakot airstrike aftermath. In a dogfight on February 27, Wing Commander
Abhinandan Varthaman flying a MiG-21 Bison engaged Pakistani F-16s. Despite the technological disadvantage, Abhinandan shot down
an F-16 before his aircraft was lost. This was an extraordinary moment in modern aerial combat history, highlighting the MiG-21's
continuing relevance even six decades after its introduction.

INTERNATIONAL COLLABORATIONS

India acquired the MiG-21 under a 1962 Indo-Soviet agreement that allowed licensed production in India. This collaboration
extended beyond just manufacturing; it helped India build technical know-how, maintenance capability, and defense independence at
a time when Western powers were reluctant to share technology.

The collaboration with the Soviet Union marked the beginning of a long-lasting defense partnership that would later see advanced
aircraft like MiG-29s, Su-30MKIs, and modern missile systems supplied to India.

TECHNICAL SPECIFICATIONS

Manufacturer Mikoyan-Gurevich Design Bureau (Soviet Union), HAL (India under license) Role Supersonic Jet Fighter, Interceptor,
Ground Attack First Flight 1955 (Prototype Ye-1) Entered Service 1959 (Soviet Union), 1963 (India) Engine Single Tumansky R-25–300
turbojet (India: with afterburner in Bison variant) Top Speed Mach 2.05 (~2,175 km/h) Range 1,210 km (combat radius varies with
load) Service Ceiling 17,500 m (57,400 ft) Armament
* 23mm GSh-23 twin-barrel cannon
* Air-to-air missiles (K-13, R-60, R-73 in later variants)
* Unguided bombs and rockets for ground attack

GLOBAL VARIANTS AND PRODUCTION MODELS

The MiG-21 was not a single aircraft but a vast family of fighters that evolved over decades to meet different air force
requirements. More than 11,000 aircraft were produced across factories in the Soviet Union, Czechoslovakia, India, and China,
making it the most manufactured supersonic jet in history.

KEY GLOBAL MODELS

* MiG-21F/F-13: The earliest production models, featuring basic radar and short-range missiles.
* MiG-21PF/PFM: Added improved radar, all-weather capability, and new avionics.
* MiG-21MF: Export version with stronger engine and weapons load; used widely in the Middle East.

* MiG-21bis: Final major Soviet production variant with Tumansky R-25 engine, enhanced radar, and better endurance.
* J-7 / F-7 (China): Chinese reverse-engineered version, still in service in some countries.

INDIAN VARIANTS AND UPGRADES

India operated nearly every major MiG-21 version and produced several under license at Hindustan Aeronautics Limited (HAL). Each
variant represented a technological leap for the Indian Air Force (IAF).

MIG-21FL (TYPE 77)

India's first major production model, introduced in the mid-1960s, came with improved avionics and missile capability. It played a
decisive role in the 1971 war and remained in service until 2013.

MIG-21M AND MIG-21MF

These 1970s upgrades brought better radar, more powerful engines, and enhanced weapon options. They offered multirole capability,
allowing the aircraft to perform interception as well as limited ground attack missions.

MIG-21BIS

Introduced in the late 1970s, the "bis" variant was considered the ultimate classic MiG-21. It featured the Tumansky R-25 engine
with afterburner, giving higher thrust and speed. Many of these aircraft remain in limited

service today.

MIG-21 BISON

To extend the MiG-21's life into the 21st century, India launched the Bison upgrade program in the 1990s. Developed with Russian assistance, the Bison received a new Kopyo radar, helmet-mounted sights, beyond-visual-range (BVR) missile capability (R-77), modern electronic warfare systems, and improved cockpit displays. This upgrade enabled the MiG-21 to compete with newer fighters despite its aging airframe.

FLEET SIZE AND NUMBERS

At its peak, the Indian Air Force operated more than 900 MiG-21s, making it the largest fleet outside the Soviet Union. Over the years, many were retired as newer aircraft like the Mirage-2000, MiG-29, and Su-30MKI entered service. As of the mid-2020s, only a few squadrons of the upgraded MiG-21 Bison remain operational.

ACCIDENTS AND THE "FLYING COFFIN" TAG

Despite its remarkable combat record, the MiG-21 has faced criticism for its accident rate. A combination of aging airframes, high landing speeds, limited safety margins, and pilot training issues led to several crashes over decades of service. Indian media often referred to the aircraft as a "Flying Coffin", highlighting public concern.

However, aviation experts emphasize that the aircraft's design is not inherently unsafe. Most accidents occurred due to operational factors such as demanding high-speed handling, maintenance limitations, or adverse weather. Regular upgrades, stricter maintenance protocols, and pilot training reforms helped reduce accident rates in later years.

MODERNIZATION EFFORTS

To keep the MiG-21 relevant, India invested in periodic modernization. The Bison upgrade added advanced radar, beyond-visual-range missiles, and digital avionics comparable to fourth-generation fighters. These improvements allowed the MiG-21 to shoot down a modern F-16 in 2019, proving the value of strategic upgrades even for legacy platforms.

RETIREMENT AND CURRENT STATUS

After serving the Indian Air Force for more than six decades, the MiG-21 is gradually being retired. The last official squadron retirement is planned to phase out the remaining MiG-21 Bison aircraft by the mid-2020s. Several squadrons have already been disbanded, and replacement aircraft such as the Tejas Light Combat Aircraft, Su-30MKI, and Rafale jets are taking over the operational roles.

Despite retirement, the MiG-21 continues to feature in ceremonial flypasts and air shows, honoring its historical contribution to India's defense. Its retirement marks the end of an era for one of the most iconic fighter jets in Indian aviation history.

LEGACY AND IMPACT

The MiG-21 has left an indelible mark on Indian military aviation. It trained generations of fighter pilots, established India's
indigenous manufacturing capability at HAL, and demonstrated that careful upgrades can extend the life of legacy aircraft.

Globally, the MiG-21 remains a symbol of Cold War aerospace engineering. It has influenced aircraft design, operational tactics,
and defense collaborations around the world. In India, it remains a beloved aircraft, celebrated for its speed, agility, and
combat record.

KEY TAKEAWAYS

* The MiG-21 was the backbone of the Indian Air Force for over 60 years.
* It saw action in major wars including 1965, 1971, Kargil, and aerial skirmishes with Pakistan.
* India produced several variants under license at HAL, including FL, M, Bis, and Bison models.
* The aircraft underwent upgrades like the Bison program to remain combat-effective.
* Despite being called the "Flying Coffin" due to accidents, careful maintenance and training reduced risks.
* Its retirement marks a historic transition to modern multi-role fighters in India.

CONCLUSION

The MiG-21 is more than just a fighter jet; it is a testament to India's evolving defense

capabilities, technological
collaborations, and the valor of its pilots. From supersonic flights in the 1960s to engagements with modern aircraft in 2019, the
MiG-21 has proven its mettle repeatedly. Its story will continue to inspire future generations of engineers, pilots, and aviation
enthusiasts.

MiG-21 Bison – The upgraded fighter that served India for decades