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“CRASH OF THE SUKHOI FIGHTER JET”

THIS ARTICLE COVERS “DAILY CURRENT AFFAIRS” AND THE TOPIC DETAILS OF “CRASH OF THE SUKHOI FIGHTER JET”. THIS TOPIC IS RELEVANT IN THE “SCIENCE AND TECHNOLOGY” SECTION OF THE UPSC- CSE EXAM.

WHY IN THE NEWS?

A recent incident occurred where an SU-30MKI fighter jet of the Indian Air Force (IAF) met with an accident in Nashik. The aircraft, which had undergone recent maintenance and overhaul by Hindustan Aeronautics Limited (HAL), was conducting a test flight from HAL Nashik at Sirsa Gaon when the unfortunate incident took place.



ABOUT SUKHOI :

- **Variants:** The Sukhoi Su-30 family includes several variants, such as the Su-30MKI, Su-30MKM, and Su-30MKA, each designed for specific requirements and users.
- **Design and Development:** It was designed to be a multirole fighter for all-weather, air-to-air, and air interdiction missions.
- **Performance:** The Sukhoi Su-30 is known for its exceptional agility, speed, and manoeuvrability. It can fly at speeds over Mach 2 (twice the speed of sound) and has a service ceiling above 59,000 feet (18,000 meters).
- **Armament:** The Su-30 can carry a range of weapons, including radar-guided and infrared-homing air-to-air missiles, unguided air-to-ground rockets, conventional bombs, cluster bombs, and a 30-mm gun.
- **Electronic Warfare:** The Su-30MKI, in particular, has enhanced electronic warfare capabilities, including a modern AESA radar, a High Band Jammer Pod (HBT), Dhruvi Radar Warning System, and a Dual Color Missile Approach Warning System.

- **Production and Deployment:** India has acquired and produced the Su-30MKI under license from Russia. The Indian Air Force (IAF) has nearly 260 Su-30MKIs in its inventory as of January 2020.
- **Upgrade Program:** The IAF's Su-30MKI fleet is set to undergo a comprehensive upgrade worth ₹60,000 crore (approximately \$8.3 billion USD). The upgrade includes new radars, mission control systems, electronic warfare capabilities, and integration of new weapon systems.

KEY FEATURES OF THE NEW INDIGENOUS RADAR FOR THE SUKHOI SU-30MKI ARE:

- **High Resolution and Accuracy:** The **Virupaksha radar** is designed to detect and track targets with high resolution and accuracy, enhancing its capabilities for air-to-air and air-to-ground engagements.
- **Long-Range Detection:** The radar is primarily designed for long-range detection and tracking, which is crucial for the Su-30MKI's multirole capabilities.
- **Multi-Mode Radar:** The Virupaksha radar is capable of tracking multiple targets simultaneously, which increases its effectiveness in various combat scenarios.
- **Indigenous Development:** The radar is developed indigenously by the Indian Defense Research and Development Organization (DRDO), reflecting India's commitment to self-reliance in defence manufacturing.
- **Enhanced Target Detection and Engagement:** The radar is designed to enhance target detection and engagement capabilities, which will significantly improve the Su-30MKI's air-to-air and air-to-ground targeting capabilities.
- **Integration with Other Systems:** The Virupaksha radar will be integrated with other advanced systems, including electronic warfare systems and infrared search and track systems, to provide a comprehensive upgrade to the Su-30MKI.

THE SUKHOI SUPERJET 100'S AVIONICS SUITE INCLUDES SEVERAL SAFETY FEATURES :

- **Enhanced Ground Proximity Warning System (EGPWS):** It provides warnings to the pilots in case of a potential ground collision, ensuring a safe distance from the ground during landing.
- **Enhanced Traffic Collision Avoidance System (ETCAS):** This system helps prevent collisions with other aircraft by providing warnings and alerts to the pilots in case of a potential collision.
- **Autopilot:** The Sukhoi Superjet 100 is equipped with an advanced autopilot system and automatically adjust the aircraft's flight path to maintain a safe distance from other aircraft and obstacles.
- **Electronic Flight Bag (EFB):** The EFB is an electronic version of the traditional flight bag, providing pilots with real-time information and tools to manage the flight safely.
- **Advanced Avionics Suite:** The Sukhoi Superjet 100 features a state-of-the-art avionics suite that includes multiple layers of redundancy to ensure the aircraft can maintain control in case of a system failure.
- **Fly-by-Wire System:** The Sukhoi Superjet 100 has a fly-by-wire system that eliminates the need for manual control and allows the aircraft to adjust its flight path automatically to maintain a safe distance from other aircraft and obstacles.
- **Emergency Oxygen System:** The aircraft is equipped with an emergency oxygen system that provides a safe supply of oxygen to the pilots in case of an emergency.
- **Emergency Descent System:** The Sukhoi Superjet 100 has an emergency descent system that can quickly and safely descend the aircraft to a lower altitude in case of an emergency.
- **Stall Warning System:** The aircraft is equipped with a warning system that alerts the pilots if the aircraft is approaching a stall, ensuring a safe and controlled flight.

- **Centralized Maintenance System (CMS):** The Sukhoi Superjet 100 is equipped with a CMS that records and analyses maintenance data, swiftly diagnosing any faults and reducing downtime and costs.

THE SAFETY MEASURES IN PLACE FOR SUKHOI TEST FLIGHTS INCLUDE:

- **Pre-flight Checks:** Before each test flight, the aircraft undergoes thorough checks to ensure that all systems are functioning properly. This includes checks on the engines, avionics, and other critical systems.
- **Pilot Training:** Pilots undergo rigorous training to ensure they are proficient in handling the aircraft and responding to emergency situations. They are also trained to identify and report any technical issues during the flight.
- **Technical Snag Reporting:** Pilots are trained to report any technical issues or snags during the flight. In the recent incident, the pilots reported a technical snag before ejecting safely.
- **Emergency Procedure:** The aircraft is equipped with emergency procedures and systems, such as emergency oxygen, emergency descent, and stall warning systems, to ensure the safety of the pilots and passengers.
- **Regular Maintenance:** The aircraft undergoes regular maintenance and overhaul procedures to ensure that all systems are functioning properly. In the recent incident, the aircraft was being tested after an overhaul.
- **Investigation:** After any incident, a detailed investigation is conducted to identify the cause and prevent similar incidents in the future.

WAY FORWARD:

- **Enhanced Pilot Training:** Pilots should undergo rigorous training to handle emergency situations and develop quick reflexes to prevent disasters during landing.
- **Advanced Avionics and Automation:** Modern fighter jets should be equipped with advanced avionics and automation systems that can assist pilots in emergency situations and help prevent crashes.
- **Regular Maintenance and Overhaul:** Regular maintenance and overhaul procedures should be followed to ensure that all systems are functioning properly, reducing the likelihood of technical snags.
- **Stealth Technology:** Stealth technology can help reduce the radar cross-section of fighter jets, making them less detectable and reducing the risk of crashes during landing.
- **Quieter Engines:** Quieter engines can reduce noise levels and risk of hearing damage for aircrews and people living near airbases.
- **Improved Safety Features:** Fighter jets should be equipped with advanced safety such as enhanced ground proximity warning systems, electronic flight bags, and emergency oxygen systems to ensure the safety of pilots and passengers.
- **Investigation and Analysis:** Detailed investigations to prevent similar incidents in the future and identify the root cause.
- **Advanced Materials and Design:** With advanced materials and design techniques can help reduce the weight and improve the aerodynamics of fighter jets, making them more maneuverable and reducing the risk of crashes.
- **Enhanced Communication:** Improved communication between pilots, ground control, and other aircraft can help prevent misunderstandings and reduce the risk of crashes during landing.

- **Continuous Upgrades and Improvements:** Fighter jets should be continuously upgraded and improved with the latest technology and safety features to ensure they remain safe and effective.
- **Replacement of old jets with Indigenous Fighter jets:** Old Fighter must be replaced at a fast pace to reduce the casualty of the officers. By collaboration with foreign players, Indigenously production of new generation to enhance combat operations and strikes.

PRELIMS BASED QUESTION:

Q. Consider the following statements with respect to the Tejas fighter Jet:

1. Tejas is an Indian 5th-generation double-engine fighter jet.
2. It is a Hypersonic combat aircraft.

Which of the following statement/s is/are correct?

1. 1 only
2. 2 only
3. Both 1 and 2
4. Neither 1 nor 2

Answer: D

MAINS BASED QUESTION:

1. **How can India go from the World's largest defence importer to the exporter and become self-reliant in the defence sector? Analyse.**

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