

# The growing demand of Amphibious Aircrafts for search and rescue, maritime surveillance and to detect and destroy submarines

India Japan strategic partnership got a boost When Prime Minister Narendra Modi visited Japan in November 2016, and Japan and India concluded an agreement for cooperation in the peaceful use of nuclear energy like the civil nuclear agreement. Now India plans to buy dozen Japanese US-2i amphibious aircraft six each for the Navy and Coast Guard, worth Rs 10,000 crore. Powered by four big turbo-props, the US-2i is capable of short take-offs from land as well as water.

This proposed US-2i deal is intended to send a strong signal to an increasingly belligerent China in the Asia-Pacific region which is now asking India to stay away from Sri Lanka where it has purchased Hambantota port.

Right through history China has shown assertiveness by quickly exploiting favorable situations through military in the East China Sea and South China Sea, For example, when France withdrew from Vietnam in the 1950s, China occupied half of the Paracel Islands. China occupied the other half of the Paracel Islands in 1974 immediately after the Vietnam War ended and the United States withdrew from the region.

After the Soviet Union withdrew from Vietnam, China attacked the Spratly Islands, controlled by Vietnam, in 1988. Along similar lines, after the U.S. withdrew from the Philippines, China occupied Mischief Reef, which is claimed by both the

Philippines and Vietnam. Now China is expanding its presence and showing assertiveness in the islands of Indian Ocean from Sri Lankan Hambantota port to Pakistan's Gwadar port.

While coast guard would utilize them for search and rescue operations, the US-2i shall also expand Indian Navy's reach and power projection in Indian Ocean. The mammoth 47-tonne aircraft, carrying 18 tonnes of load, can take off from, or land on, a 300-metre stretch of water or land, its four giant engines needing just 7 seconds to get airborne.

The US-2 with operational range of 4,500 km and a cruise speed of 480 km/hr, it can patrol areas 1800 kilometers away. It shall be invaluable from surveillance of vast coast line of Andaman and Nicobar region to carrying out flood relief operations North-East. Its minimum cruise speed is approximately 90 km/hr making it valuable in search and rescue tasks. They can patrol the economic zone as well as rapidly transport 30 combat-ready soldiers to "hot zones" in an emergency, even in 10-foot waves.

The deal is even more important as China is readying its own amphibious aircraft AG600, stated to be the world's largest. In April 2017, China successfully conducted maiden glide test of its first amphibious aircraft, in the southern Chinese city of Zhuhai. It is a turboprop airplane with four engines that can be used on waves as high as six and a half feet.

India is also looking for indigenous route with India's Hindustan Aeronautics Limited (HAL) has revealed its intention to venture into building amphibian aircraft. HAL-TAD Kanpur floated an RFI (Request For Information) seeking a partnership for design and development of such an aircraft. RFI invites information, from reputed design agencies or manufacturers only, for consultancy or to partner in design and development of an HAL built Do-228 aircraft to a Seaplane version.

HAL is also working on larger Conceptual design and development of Amphibious Aircraft which could rival China's AVIC AG600 in the region in a long run. As per HAL, they are plans to develop 3 Configuration of this Amphibious Aircraft to meet different roles and requirements.

**Basic Configuration:** To Carry out Long Range Search & Rescue, Utility missions, Transport missions, patrol aircraft and Troop transport missions.

**Civilian Configuration:** To be used as a Civilian transporter to connect to islands and other regional countries. Can also be used as Civilian aircraft for regional connectivity since it will also be equipped with retractable landing gears.

**Military Configuration:** To be used in Anti-Submarine Warfare roles, Anti-Surface unit Warfare, Anti-Piracy/Narcotics/People smuggling, Combat Search & Rescue, Special Forces support, General Maritime Surveillance and a wide range of maritime C4ISR and combat roles and missions.

## **World's largest amphibious aircraft passes ground tests in China**

China has successfully tested its enormous amphibious aircraft known as the AG600. Designed and built in China by the Aviation Industry Corporation of China (AVIC), the AG600 is reportedly set to be the largest amphibious aircraft in the world, roughly the size of a Boeing 737.

The massive airplane with a maximum take-off weight of 53.5 tons conducted a series of ground tests in the southern Chinese city of Zhuhai, according to local media. In final preparations for its maiden flight, the plane, that is set to be the cornerstone of China's emergency rescue efforts, conducted a successful "glide test" on Sunday, Xinhua

reported.

The 37-meter-long AG600 with a wingspan of 38.8 meters, can take off and touch down on both land and water. The amphibious plane can store and drop 12 tons of water and make some 30 rounds without refueling, which makes it ideal to battling wildfires. With a capacity of up to 50 passengers, the AG600 can also be deployed in search and rescue operations over water

## **Russia Developing New 'Sub-Killer' Version of Be-200 Amphibious Aircraft**

The Russian Navy has announced plans to order the purchase of an anti-submarine version of the Be-200 amphibious aircraft by 2020, to search for, detect and destroy [enemy] submarines, a high-ranking Navy official told the Russian news agency RIA Novosti.

He recalled that Russia's naval aviation fleet currently includes obsolete 1960's-era Beriev Be-12 turboprop-powered amphibious aircraft, the service life of which is already expiring. The plane was taken out of production a long time ago. Designed for firefighting, search and rescue, maritime patrol, and cargo as well as passenger transportation, the Be-200 can carry 12 metric tons of water, or up to 72 passengers

## **Amphibious Aircrafts**

An amphibious aircraft or amphibian is an aircraft that can take off and land on both land and water. The U.S. military designed AAV in order to deploy troops rapidly from an amphibious assault ship onto land.

Fixed-wing amphibious aircraft are seaplanes (flying boats and floatplanes) that are equipped with retractable wheels, at the expense of extra weight and complexity, plus diminished range and fuel economy compared to planes designed for land or water only. Some amphibians are fitted with reinforced keels which act as skis, allowing them to land on snow or ice with their wheels up and are dubbed tri-phants.

Amphibious aircraft are heavier and slower, more complex and more expensive to purchase and operate than comparable landplanes but are also more versatile. Even if they cannot hover or land vertically, for some jobs they compete favorably with helicopters and do so at a significantly lower cost.

Amphibious aircraft can be much faster and have longer range than comparable helicopters, and can achieve nearly the range of land based aircraft, as an airplane's wing is more efficient than a helicopter's lifting rotor. This makes an amphibious aircraft, such as the Grumman Albatross and the Shin Meiwa US-2, useful for long-range air-sea rescue tasks. In addition, amphibious aircraft are particularly useful as "Bushplanes" engaging in light transport in remote areas, where they are required to operate not only from airstrips, but also from lakes and rivers.

Designing a seaplane aircraft must gather the knowledge of studying both aircraft and boat technology. The seaplane must meet the buoyancy requirements, have good water takeoff and landing characteristics, an acceptable hydrostatic stability, structural support for both water and air capability, and good aerodynamic characteristics that could affect flight performance.

The drawbacks of a traditional seaplane are:

1. Higher aerodynamic cruise drag due to additional structures.
2. Hydrodynamic drag while planning due to large wetted

surface area.

3. Stability issues resulting from limits on dimensions and weight of floating gears.
4. Hindrance from water spray, requiring specially designed shapes to divert the spray away.
5. Low performance in high waves and cross winds, making smooth cruising in rough weather difficult.
6. Even maneuverability in water could be a deciding criterion, especially where narrow water strips pose a problem

The aircraft must possess transverse and longitudinal aerodynamic and hydrostatic stability at all speeds even in low speed operations in water. It must be designed for Short Take Off and landing operations (STOL). It should be possible to land the vehicle without excessive impact forces to airframe. Water tight hull or lower fuselage to protect passengers, freight and equipment bays.

## **References and Resources also include:**

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