Aircraft_carrier

The disadvantage of the ski-jump is the penalty it exacts on aircraft size, payload, and fuel load (and thus range); heavily laden aircraft can not launch using a ski-jump because their high loaded weight requires either a longer takeoff roll than is possible on a carrier deck, or assistance from a catapult or JATO rocket. For example, the Russian Su-33 is only able to launch from the carrier Admiral Kuznetsov with a minimal armament and fuel load. Another disadvantage is on mixed flight deck operations where helicopters are also present such as a US Landing Helicopter Dock or Landing Helicopter Assault amphibious assault ship a ski jump is not included as this would eliminate one or more helicopter landing areas, this flat deck limits the loading of Harriers but is somewhat mitigated by the longer rolling start provided by a long flight deck compared to many STOVL carriers. This new-found importance of naval aviation forced nations to create a number of carriers, in efforts to provide air superiority cover for every major fleet in order to ward off enemy aircraft. This extensive usage required the construction of several new \'light\' carriers. Escort aircraft carriers, such as USS Bogue, were sometimes purpose-built, but most were converted from merchant ships as a stop-gap measure to provide anti-submarine air support for convoys and amphibious invasions. Following this concept, light aircraft carriers built by the US, such as USS Independence, represented a larger, more "militarized" version of the escort carrier. Although with similar complement to Escort carriers, they had the advantage of speed from their converted cruiser hulls. The UK 1942 Design Light Fleet Carrier was designed for building quickly by civilian shipyards and with an expected service life of about 3 years. They served the Royal Navy during the war and was the hull design chosen for nearly all aircraft carrier equipped navies after the war until the 1980s. Emergencies also spurred the creation or conversion of highly unconventional aircraft carriers. CAM ships, were cargo-carrying merchant ships that could launch (but not retrieve) a single fighter aircraft from a catapult to defend the convoy from long range German aircraft. Conventional ("tailhook") aircraft rely upon a landing

signal officer (LSO, radio call sign paddles) to monitor the aircraft\'s approach, visually gauge glideslope, attitude, and airspeed, and transmit that data to the pilot. Before the angled deck emerged in the 1950s, LSOs used colored paddles to signal corrections to the pilot (hence the nickname). From the late 1950s onward, visual landing aids such as Optical Landing System have provided information on proper glide slope, but LSOs still transmit voice calls to approaching pilots by radio. The Royal Navy is constructing two new larger STOVL aircraft carriers, the Queen Elizabeth class, to replace the three now retired Invincible-class carriers. The ships are HMS Queen Elizabeth and HMS Prince of Wales. They will be able to operate up to 40 aircraft on peace time operations with a tailored group of up to 50, and will have a displacement of 70,600 tonnes. HMS Queen Elizabeth is projected to commission in 2017 followed by Prince of Wales in about 2020. The ships are due to become operational starting in 2020. Their primary aircraft complement will be made up of F-35B Lightning IIs, and their ship's company will number around 680 with the total complement rising to about 1600 when the air group is embarked. The two ships will be the largest warships ever built for the Royal Navy. The Royal Australian Navy is in the process of procuring two Canberra-class LHD\'s, the first of which was commissioned in November 2015, while the second is expected to enter service in 2016. The ships will be the largest in Australian naval history. Their primary roles are to embark, transport and deploy an embarked force and to carry out or support humanitarian assistance missions. The LHD is capable of launching multiple helicopters at one time while maintaining an amphibious capability of 1,000 troops and their supporting vehicles (tanks, armoured personnel carriers etc.). The Australian Defence Minister has publicly raised the possibility of procuring F-35B STOVL aircraft for the carrier, stating that it "has been on the table since day one and stating the LHD\'s are "STOVL capable". One STOBAR carrier: Liaoning was originally built as the 57,000 tonne Soviet Admiral Kuznetsov-class carrier Varyag and was later purchased as a stripped hulk by China in 1998 on the pretext of use as a floating casino, then partially rebuilt and towed to China for completion. Liaoning was commissioned on 25 September 2012, and began

service for testing and training. On 24 or 25 November 2012, Liaoning successfully launched and recovered several Shenyang J-15 jet fighter aircraft. She is classified as a training ship, intended to allow the navy to practice with carrier usage. On 26 December 2012, the People's Daily reported that it will take four to five years for Liaoning to reach full capacity, mainly due to training and coordination which will take significant amount of time for Chinese PLA Navy to complete as this is the first aircraft carrier in their possession. As it is a training ship, Liaoning is not assigned to any of China's operation fleets. 1 STOBAR carrier: Admiral Flota Sovetskovo Soyuza Kuznetsov: 55,000 tonne Admiral Kuznetsov-class STOBAR aircraft carrier. Launched in 1985 as Tbilisi, renamed and operational from 1995. Without catapults she can launch and recover lightly fueled naval fighters for air defense or anti-ship missions but not heavy conventional bombing strikes.[citation needed] Officially designated an aircraft carrying cruiser, she is unique in carrying a heavy cruiser's complement of defensive weapons and large P-700 Granit offensive missiles. The P-700 systems will be removed in the coming refit to enlarge her below decks aviation facilities as well as upgrading her defensive systems. Key personnel involved in the flight deck include the shooters, the handler, and the air boss. Shooters are naval aviators or Naval Flight Officers and are responsible for launching aircraft. The handler works just inside the island from the flight deck and is responsible for the movement of aircraft before launching and after recovery. The "air boss" (usually a commander) occupies the top bridge (Primary Flight Control, also called primary or the tower) and has the overall responsibility for controlling launch, recovery and "those aircraft in the air near the ship, and the movement of planes on the flight deck, which itself resembles a well-choreographed ballet." The captain of the ship spends most of his time one level below primary on the Navigation Bridge. Below this is the Flag Bridge, designated for the embarked admiral and his staff. As "runways at sea", aircraft carriers have a flat-top flight deck, which launches and recovers aircraft. Aircraft launch forward, into the wind, and are recovered from astern. The flight deck is where the most notable differences between a carrier and a land runway are found. Creating such a surface at sea poses

constraints on the carrier - for example, the fact that it is a ship means that a full-length runway would be costly to construct and maintain. This affects take-off procedure, as a shorter runway length of the deck requires that aircraft accelerate more quickly to gain lift. This either requires a thrust boost, a vertical component to its velocity, or a reduced take-off load (to lower mass). The differing types of deck configuration, as above, influence the structure of the flight deck. The form of launch assistance a carrier provides is strongly related to the types of aircraft embarked and the design of the carrier itself. Another deck structure that can be seen is a ski-jump ramp at the forward end of the flight deck. This was first developed to help launch STOVL aircraft take off at far higher weights than is possible with a vertical or rolling takeoff on flat decks. Originally developed by the Royal Navy, it since has been adopted by many navies for smaller carriers. A ski-jump ramp works by converting some of the forward rolling movement of the aircraft into vertical velocity and is sometimes combined with the aiming of jet thrust partly downwards. This allows heavily loaded and fueled aircraft a few more precious seconds to attain sufficient air velocity and lift to sustain normal flight. Without a ski-jump launching fully loaded and fueled aircraft such as the Harrier would not be possible on a smaller flat deck ship before either stalling out or crashing directly into the sea. The constraints of constructing a flight deck affect the role of a given carrier strongly, as they influence the weight, type, and configuration of the aircraft that may be launched. For example, assisted launch mechanisms are used primarily for heavy aircraft, especially those loaded with air-to-ground weapons. CATOBAR is most commonly used on USN supercarriers as it allows the deployment of heavy jets with full loadouts, especially on ground-attack missions. STOVL is used by other navies because it is cheaper to operate and still provides good deployment capability for fighter aircraft. An aircraft carrier is a warship that serves as a seagoing airbase, equipped with a full-length flight deck and facilities for carrying, arming, deploying, and recovering aircraft. Typically, it is the capital ship of a fleet, as it allows a naval force to project air power worldwide without depending on local bases for staging aircraft operations. Aircraft carriers are expensive to build and are critical assets. Aircraft

carriers have evolved from converted cruisers to nuclear-powered warships that carry numerous fighter planes, strike aircraft, helicopters, and other types of aircraft. India started the construction of a 40,000-tonne, 260-metre-long (850 ft) Vikrant-class aircraft carrier in 2009. The new carrier will operate MiG-29K and naval HAL Tejas aircraft along with the Indian-made helicopter HAL Dhruv. The ship will be powered by four gas-turbine engines and will have a range of 8,000 nautical miles (15,000 kilometres), carrying 160 officers, 1,400 sailors, and 30 aircraft. The carrier is being constructed by Cochin Shipyard. The ship was launched in August 2013 and is scheduled for commissioning in 2018. With the deactivation of USS Enterprise in December 2012, the U.S. fleet comprises 10 supercarriers. The House Armed Services Seapower subcommittee on 24 July 2007, recommended seven or maybe eight new carriers (one every four years). However, the debate has deepened over budgeting for the $12-14.5 billion (plus $12 billion for development and research) for the 100,000 ton Gerald R. Ford-class carrier (estimated service 2016) compared to the smaller $2 billion 45,000 ton America-class amphibious assault ships, which are able to deploy squadrons of F-35Bs. The first of this class, USS America, is now in active service with another, USS Tripoli, under construction and 9 more are planned. Since World War II, aircraft carrier designs have increased in size to accommodate a steady increase in aircraft size. The large, modern Nimitz class of US carriers has a displacement nearly four times that of the World War II-era USS Enterprise, yet its complement of aircraft is roughly the same-a consequence of the steadily increasing size and weight of military aircraft over the years. Today's aircraft carriers are so expensive that nations which operate them risk significant political, economic, and military impact if a carrier is lost, or even used in conflict. Although STOVL aircraft are capable of taking off vertically from a spot on the deck, using the ramp and a running start is far more fuel efficient and permits a heavier launch weight. As catapults are unnecessary, carriers with this arrangement reduce weight, complexity, and space needed for complex steam or electromagnetic launching equipment, vertical landing aircraft also remove the need for arresting cables and related hardware. Russian, Chinese, and future Indian

carriers include a ski-jump ramp for launching lightly loaded conventional fighter aircraft but recover using traditional carrier arresting cables and a tailhook on their aircraft. A fleet carrier is intended to operate with the main fleet and usually provides an offensive capability. These are the largest carriers capable of fast speeds. By comparison, escort carriers were developed to provide defense for convoys of ships. They were smaller and slower with lower numbers of aircraft carried. Most were built from mercantile hulls or, in the case of merchant aircraft carriers, were bulk cargo ships with a flight deck added on top. Light aircraft carriers were carriers that were fast enough to operate with the fleet but of smaller size with reduced aircraft capacity. Soviet aircraft carriers now in use by Russia are actually called heavy aviation cruisers, these ships while sized in the range of large fleet carriers were designed to deploy alone or with escorts and provide both strong defensive weaponry and heavy offensive missiles equivalent to a guided missile cruiser in addition to supporting fighters and helicopters. The British Royal Navy is constructing two new larger STOVL aircraft carriers, the Queen Elizabeth class, to replace the three Invincible-class carriers. The ships will be named HMS Queen Elizabeth and HMS Prince of Wales. They will be able to operate up to 40 aircraft in peace time with a tailored group of up to 50, and will have a displacement of 70,600 tonnes. The ships are due to become operational from 2020. Their primary aircraft complement will be made up of F-35B Lightning IIs, and their ship's company will number around 680 with the total complement rising to about 1,600 when the air group is embarked. Defensive weapons will include the Phalanx Close-In Weapons System for anti-aircraft and anti-missile defence; also 30 mm Automated Small Calibre Guns and miniguns for use against fast attack craft. The two ships will be the largest warships ever built for the Royal Navy. Carriers have evolved since their inception in the early twentieth century from wooden vessels used to deploy balloons to nuclear-powered warships that carry dozens of aircraft, including fighter jets and helicopters. As of 3 March 2016, there are thirty-seven active aircraft carriers in the world within twelve navies. The United States Navy has 10 large nuclear-powered carriers (known as supercarriers, carrying up to 90 aircraft each), the largest

carriers in the world; the total deckspace is over twice that of all other nations' combined. As well as the supercarrier fleet, the US Navy has nine amphibious assault ships used primarily for helicopters (sometimes called helicopter carriers); these can also carry up to 25 fighter jets, and in some cases, are as large as some other nations' fixed-wing carriers. There is no single definition of an "aircraft carrier", and modern navies use several variants of the type. These variants are sometimes categorized as sub-types of aircraft carriers, and sometimes as distinct types of naval aviation-capable ships. Aircraft carriers may be classified according to the type of aircraft they carry and their operational assignments. Admiral Sir Mark Stanhope, former head of the Royal Navy, has said that "To put it simply, countries that aspire to strategic international influence have aircraft carriers". One CATOBAR carrier: São Paulo is a Clemenceau-class aircraft carrier currently in service with the Brazilian Navy. São Paulo was first commissioned in 1963 by the French Navy as Foch and was transferred in 2000 to Brazil, where she became the new flagship of the Brazilian Navy. During the period from 2005-2010, São Paulo underwent extensive modernization. At the end of 2010, sea trials began, and as of 2011[update] São Paulo had been evaluated by the CIASA (Inspection Commission and Training Advisory). She was expected to rejoin the fleet in late 2013, but suffered another major fire in 2012. In December 2009, then Indian Navy chief Admiral Nirmal Kumar Verma said at his maiden navy week press conference that concepts currently being examined by the Directorate of Naval Design for the second indigenous aircraft carrier (IAC-2), are for a conventionally powered carrier displacing over 50,000 tons and equipped with steam catapults (rather than the ski-jump on the Gorshkov/Vikramaditya and the IAC) to launch fourth-generation aircraft. Later on in August 2013 Vice Admiral RK Dhowan, while talking about the detailed study underway on the IAC-II project, said that nuclear propulsion was also being considered. The navy also evaluated the Electromagnetic Aircraft Launch System (EMALS), which is being used by the US Navy in their latest Gerald R. Ford-class aircraft carriers. General Atomics, the developer of the EMALS, was cleared by the US government to give a technical demonstration to Indian Navy

officers, who were impressed by the new capabilities of the system. The EMALS enables launching varied aircraft including unmanned combat air vehicles (UCAV). The aim is to have a total of three aircraft carriers in service, with two fully operational carriers and the third in refit. If the aircraft are VTOL-capable or helicopters, they do not need to decelerate and hence there is no such need. The arrested-recovery system has used an angled deck since the 1950s because, in case the aircraft does not catch the arresting wire, the short deck allows easier take off by reducing the number of objects between the aircraft and the end of the runway. It also has the advantage of separating the recovery operation area from the launch area. Helicopters and aircraft capable of vertical or short take-off and landing (V/STOL) usually recover by coming abreast the carrier on the port side and then using their hover capability to move over the flight deck and land vertically without the need for arresting gear. Since the early 1950s on conventional carriers it has been the practice to recover aircraft at an angle to port of the axial line of the ship. The primary function of this angled deck is to allow aircraft that miss the arresting wires, referred to as a bolter, to become airborne again without the risk of hitting aircraft parked forward. The angled deck allows the installation of one or two "waist" catapults in addition to the two bow cats. An angled deck also improves launch and recovery cycle flexibility with the option of simultaneous launching and recovery of aircraft. Modern navies that operate such aircraft carriers treat them as the capital ship of the fleet, a role previously held by the battleship. This change took place during World War II in response to air power becoming a significant factor in warfare, driven by the superior range, flexibility and effectiveness of carrier-launched aircraft. Following the war, carrier operations continued to increase in size and importance. Supercarriers, displacing 75,000 tonnes or greater, have become the pinnacle of carrier development. Some are powered by nuclear reactors and form the core of a fleet designed to operate far from home. Amphibious assault ships, such as USS Tarawa and HMS Ocean, serve the purpose of carrying and landing Marines, and operate a large contingent of helicopters for that purpose. Also known as "commando carriers" or "helicopter carriers", many have the capability to

operate VSTOL aircraft. The development of flattop vessels produced the first large fleet ships. In 1918, HMS Argus became the world's first carrier capable of launching and recovering naval aircraft. As a result of the Washington Naval Treaty of 1922, which limited the construction of new heavy surface combat ships, most early aircraft carriers were conversions of ships that were laid down (or had served) as different ship types: cargo ships, cruisers, battlecruisers, or battleships. These conversions gave rise to the Lexington-class aircraft carriers (1927), Akagi and Courageous class. Specialist carrier evolution was well underway, with several navies ordering and building warships that were purposefully designed to function as aircraft carriers by the mid-1920s, resulting in the commissioning of ships such as Hsh (1922), HMS Hermes (1924), and Béarn (1927). During World War II, these ships would become known as fleet carriers.[citation needed The current US fleet of Nimitz-class carriers will be followed into service (and in some cases replaced) by the ten-ship Gerald R. Ford class. It is expected that the ships will be more automated in an effort to reduce the amount of funding required to staff, maintain and operate its supercarriers. The main new features are implementation of Electromagnetic Aircraft Launch System (EMALS) (which replace the old steam catapults) and unmanned aerial vehicles. With the deactivation of USS Enterprise in December 2012 (decommissioning scheduled for 2016), the U.S. fleet comprises 10 active supercarriers. On 24 July 2007, the House Armed Services Seapower subcommittee recommended seven or eight new carriers (one every four years). However, the debate has deepened over budgeting for the $12-14.5 billion (plus $12 billion for development and research) for the 100,000 ton Gerald R. Ford-class carrier (estimated service 2016) compared to the smaller $2 billion 45,000 ton America-class amphibious assault ships able to deploy squadrons of F-35B of which one is already active, another is under construction and nine more are planned. The 1903 advent of heavier-than-air fixed-wing aircraft was closely followed in 1910 by the first experimental take-off of an airplane, made from the deck of a United States Navy vessel (cruiser USS Birmingham), and the first experimental landings were conducted in 1911. On 9 May 1912 the first airplane take-off from a

ship underway was made from the deck of the British Royal Navy's HMS Hibernia. Seaplane tender support ships came next, with the French Foudre of 1911. In September 1914 the Imperial Japanese Navy Wakamiya conducted the world's first successful ship-launched air raid: on 6 September 1914 a Farman aircraft launched by Wakamiya attacked the Austro-Hungarian cruiser SMS Kaiserin Elisabeth and the German gunboat Jaguar in Kiaochow Bay off Tsingtao; neither was hit. The first carrier-launched airstrike was the Tondern Raid in July 1918. Seven Sopwith Camels launched from the converted battlecruiser HMS Furious damaged the German airbase at Tønder and destroyed two zeppelins. Speaking in St. Petersburg, Russia on 30 June 2011, the head of Russia's United Shipbuilding Corporation said his company expected to begin design work for a new carrier in 2016, with a goal of beginning construction in 2018 and having the carrier achieve initial operational capability by 2023. Several months later, on 3 November 2011 the Russian newspaper Izvestiya reported that the naval building plan now included (first) the construction of a new shipyard capable of building large hull ships, after which Moscow will build two (80,000 tons full load each) nuclear-powered aircraft carriers by 2027. The spokesperson said one carrier would be assigned to the Russian Navy's Northern Fleet at Murmansk, and the second would be stationed with the Pacific Fleet at Vladivostok. On the recovery side of the flight deck, the adaptation to the aircraft loadout is mirrored. Non-VTOL or conventional aircraft cannot decelerate on their own, and almost all carriers using them must have arrested-recovery systems (-BAR, e.g. CATOBAR or STOBAR) to recover their aircraft. Aircraft that are landing extend a tailhook that catches on arrestor wires stretched across the deck to bring themselves to a stop in a short distance. Post-WWII Royal Navy research on safer CATOBAR recovery eventually led to universal adoption of a landing area angled off axis to allow aircraft who missed the arresting wires to "bolt" and safely return to flight for another landing attempt rather than crashing into aircraft on the forward deck. The aircraft carrier dramatically changed naval combat in World War II, because air power was becoming a significant factor in warfare. The advent of aircraft as focal weapons was driven by the superior range, flexibility and

effectiveness of carrier-launched aircraft. They had higher range and precision than naval guns, making them highly effective. The versatility of the carrier was demonstrated in November 1940 when HMS Illustrious launched a long-range strike on the Italian fleet at their base in Taranto, signalling the beginning of the effective and highly mobile aircraft strikes. This operation incapacitated three of the six battleships at a cost of two torpedo bombers. World War II in the Pacific Ocean involved clashes between aircraft carrier fleets. The 1941 Japanese surprise attack on Pearl Harbor was a clear illustration of the power projection capability afforded by a large force of modern carriers. Concentrating six carriers in a single unit turned naval history about, as no other nation had fielded anything comparable. However, the vulnerability of carriers compared to traditional battleships when forced into a gun-range encounter was quickly illustrated by the sinking of HMS Glorious by German battleships during the Norwegian campaign in 1940. In August 2013, a launching ceremony for Japan's largest military ship since World War II was held in Yokohama. The 820-foot-long (250 m), 19,500-ton flattop Izumo was deployed in March 2015. The ship is able to carry up to 14 helicopters; however, only seven ASW helicopters and two SAR helicopters were planned for the initial aircraft complement. For other operations, 400 troops and fifty 3.5 t trucks (or equivalent equipment) can also be carried. The flight deck has five helicopter landing spots that allow simultaneous landings or take-offs. The ship is equipped with two Phalanx CIWS and two SeaRAM for its defense. The destroyers of this class were initially intended to replace the two ships of the Shirane class, which were originally scheduled to begin decommissioning in FY2014. The superstructure of a carrier (such as the bridge, flight control tower) are concentrated in a relatively small area called an island, a feature pioneered on the HMS Hermes in 1923. While the island is usually built on the starboard side of the fight deck, the Japanese aircraft carriers Akagi and Hiry had their islands built on the port side. Very few carriers have been designed or built without an island. The flush deck configuration proved to have significant drawbacks, primary of which was management of the exhaust from the power plant. Fumes coming across the deck were a major

issue in USS Langley. In addition, lack of an island meant difficulties managing the flight deck, performing air traffic control, a lack of radar housing placements and problems with navigating and controlling the ship itself. 1 CATOBAR carrier: Charles de Gaulle is a 42,000 tonne nuclear-powered aircraft carrier, commissioned in 2001 and is the flagship of the French Navy (Marine Nationale). The ship carries a complement of Dassault-Breguet Super Étendard, Dassault Rafale M and E2C Hawkeye aircraft, EC725 Caracal and AS532 Cougar helicopters for combat search and rescue, as well as modern electronics and Aster missiles. It is a CATOBAR-type carrier that uses two 75 m C133 steam catapults of a shorter version of the catapult system installed on the U.S. Nimitz-class carriers, one catapult at the bow and one across the front of the landing area.