



Sikorsky Archives News

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Predictions of a Pioneer



*Igor Sikorsky in New York shortly after his arrival in America on March 30, 1919.
(Sikorsky Archives)*



*At his 80th birthday party, Igor Sikorsky (center) is flanked (left to right) by aviation pioneers Casey Jones, Roscoe Turner, Eddie Rickenbacker, Grover Loening and Frank Gregory.
(Sikorsky Archives)*

Igor Ivanovich Sikorsky was born in Kiev, Imperial Russia (today Ukraine) 130 years ago this May. He arrived in New York 100 years ago, in March 1919, an accomplished aircraft designer with little money and no American connections. With his passing in 1972, Igor Sikorsky left a unique legacy of

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fixed- and rotary-wing aviation innovation and insight. His predictions for air travel in general and for helicopters in particular have been largely realized or surpassed by the company he founded and the country he adopted. The transoceanic 200- and 400-mile-per-hour airplanes the émigré engineer and pilot predicted in the 1930s are today commercial jetliners cruising the low stratosphere near 600 mph. Powerful turbine-engine helicopters now fly missions unimagined when Sikorsky pitched his VS-300 demonstrator to United Aircraft Corporation (UAC) in 1939. In some cases, reality is just catching up to Sikorsky's vision. The 200 mile-per-hour compound helicopters he described in 1950 are today in test as the S-97 Raider and SB>1 Defiant. Still to come, Sikorsky's vision of urban air mobility may take form with intense research on electric Vertical Takeoff and Landing aircraft. The prescient pioneer told Yale News back in 1934, "I predict that before long we will be flitting from building to building, from town to landing field, in specialized helicopters."



Igor Sikorsky founded the Sikorsky Aero Engineering Corporation in 1923 to build his S-29A and the market for commercial transport aircraft. (Sikorsky Archives)

Igor Sikorsky came to America in 1919 and founded the Sikorsky Aero Engineering Corporation on Long Island in 1923 to build his twin-engine, 14-passenger S-29A commercial transport aircraft. His company became part of UAC in 1929 and by 1930 was making twin-engine S-38 amphibians for the U.S. Navy and commercial operators. In an interview on WRNY radio in New York City, Sikorsky predicted, ". . . we will



The twin-engine S-38A amphibian led to Sikorsky's vision of flying boats to serve trans-oceanic routes. (Sikorsky Archives)

be flying over wide expanses of ocean between North and South America, and from New York to Bermuda in eight hours."

In a 1931 presentation on "The Future of Large Airplanes", Sikorsky described transcontinental and transoceanic travel on "great air routes of the present and near future." He envisioned large seaplanes flying to South America and across the Atlantic. The four-engine S-40 Clipper built for Pan American Airways made its first flight in October 1931 and soon after began service from Miami to the Panama Canal Zone via Kingston, Jamaica and Barranquilla, Colombia. The 34,000 lb amphibian could carry up to 38 passengers on 500-mile legs.

In January 1934, Sikorsky told a meeting of the American Society of Mechanical Engineers (ASME) huge air transports that could be "built to cruise at 400 miles an hour and have a flying range of 5,000 miles are now practicable and could cross the Atlantic in about 10 hours."

A Yale News interview that same month also quoted Igor Sikorsky stating, "One of the most important steps to be taken in aviation circles will be the development of transoceanic airways."

He envisioned big, luxurious passenger aircraft cruising at 200 mph and said, "I think that the American mania for speed will have reached its limit at the two-hundred-mile mark. There is no need for ships to go faster. This world of ours is too small for more terrific speeds."

The 180 mph S-42 began passenger service from San Francisco to Honolulu and destinations farther in the Pacific in 1935. In his “Wings O’er Land and Sea” address that year, Sikorsky stated, “I personally believe that shortly thereafter we will see the beginning of pioneering of the transatlantic service.”



The Sikorsky S-42 began passenger service from San Francisco to Honolulu and destinations farther in the Pacific in 1935. (Sikorsky Archives)

The four-engine, 57,500 lb VS-44A flying boat began regular trans-Atlantic service with American Export Airline in June 1942.



The VS-44A flying boat fulfilled Sikorsky’s vision of regular transatlantic service. (Sikorsky Archives)

Sikorsky also told ASME in 1934 that Army and Navy aircraft “designed to fly through the stratosphere will soon be built, but that passengers and freight would not be transported through the upper atmosphere because of the great dangers and inconveniences caused by the necessity of building the ships air-tight.” His reservations proved short-lived. The pressurized Boeing 307 commercial airliner first flew in 1937, and in 1944, a pressurized Lockheed Constellation flew passengers from Burbank, California to Washington, DC in less than seven hours. Boeing 707 jets

began transatlantic service in 1958, and in 2018, commercial airliners carried more than a billion passengers around the world, most at jet speeds and altitudes.

Rotary Revelations

The flying boat business suffered with the Great Depression and with United Aircraft Corp. looking to cut costs, Igor Sikorsky refocused on helicopters. In 1939 he offered UAC a solution to the “helicopter problem,” a design he believed “safer, simpler, and less expensive” than the big side-by-side rotor configurations flown in Europe. In his proposal to management, Sikorsky told how a helicopter with a single main rotor amidships and a single anti-torque rotor at the tail promised better handling and a smaller footprint. He noted, “. . . besides the interesting future possibilities in the private market, there is at present a pronounced interest of the Government for the direct lift machine.” Sikorsky’s VS-300 demonstrator flew for the first time on October 14, 1939 and with experimentation refined the flight controls of today’s most common helicopter configuration.



The VS-300 demonstrated Igor Sikorsky’s solution to the “helicopter problem” with controllable vertical flight. (Sikorsky Archives)

The 2,500 lb S-47/R-4 brought VS-300 technology to production during the Second World War and began military experimentation with the helicopter. The US Coast Guard pioneered rotary-wing search-and-rescue techniques. Bigger, more capable machines sub-



The R-4 productionized VS-300 technology in World War II. (Sikorsky Archives)

sequently found civilian applications. Los Angeles Airways began airmail service with the S-51 in 1947 and started carrying passengers with the 10-seat, 7,200 lb S-55 in 1953.

Igor Sikorsky told a New York meeting of the Institute of Aeronautics Sciences on November 9, 1950, "It seems certain that helicopters carrying from 20 to 40 people can already be designed and constructed at



The S-51 brought helicopter technology to post-war civil applications. (Sikorsky Archives)



The S-55 began helicopter passenger service, and advanced larger, more capable helicopters. (Sikorsky Archives)

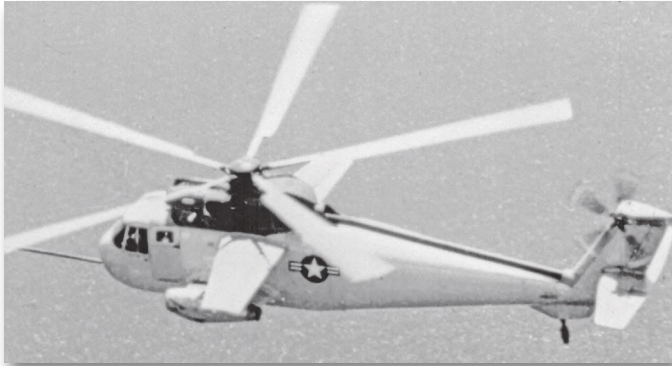
the present time." He predicted helicopters weighing between 50,000 and 100,000 lb could be made in the near future and that speeds up to 200 mph could be reached by the helicopter with the addition of small wings and propellers. The 31,000 lb S-56 first flew in 1953 and joined U.S. Marine Corps fleet squadrons in 1956, but promising compound versions with turboshaft engines, wings, and pusher or tractor propellers never came to be.



The military S-56 moved toward the big, fast helicopters Igor Sikorsky envisioned for airlines. (Sikorsky Archives)

Before a 1958 meeting of the Sikorsky Aircraft Quarter Century Club, Igor Sikorsky spelled out his "future agenda" for the helicopter including quieter, more comfortable aircraft, speeds to 200 mph (173.8-knots), and big crane helicopters. Turboshafts with more power and less vibration than piston engines entered production with the S-62 in 1958. The twin-turbine S-61F compound helicopter ultimately modified with a fixed wing and J60 auxiliary jet pods flew in 1965 and hit

242 mph (210.3 kt) during its Army/Navy test program. The piston-engine S-60 flying crane demonstrator flew in 1959 and the twin-turbine S-64 Skycrane in 1962.



The S-61F compound helicopter achieved Sikorsky's vision of high speeds with auxiliary jet engines. (Sikorsky Archives)

In a 1962 report to the Sikorsky Operating Committee, Igor Sikorsky saw special promise in large crane helicopters and proposed an advanced lifter "with a carrying capacity twice as great as the S-64 crane. The design should be worked out in such manner that the aircraft, with only moderate modifications, could be produced as a crane helicopter or as a 100-passenger airliner, or even adapted for other appropriate uses."

In a 1963 lecture on helicopter developments, Sikorsky noted, ". . .the crane helicopter, and its virtually limitless variety of uses and applications, remains largely unknown, and its potential value remains greatly misunderstood and underestimated." About 40 S-64 and CH-54 Skycranes still fly construction, logging and firefighting missions today. Erickson Inc., is due to deliver two remanufactured Aircranes to the Korea Fire Ser-



The S-64 Skycrane (Army CH-54 Tarhe) proved the value of crane helicopters. This modernized Erickson Airplane is configured to fight forest fires. (Erickson Inc.)

vice by the end of this year. Kaman has meanwhile found niche markets for its K-MAX intermeshing rotor crane helicopter as a manned or unmanned cargo carrier.



The Rotoprop was installed on a S-61 testbed and could pivot to the left for anti-torque control or aft for high speed thrust. (Sikorsky Archives)

In 1963, Igor Sikorsky advocated research on "a new type of lifting rotor which is believed to offer considerable advantages for high speed compound helicopters, for aircraft where extremely powerful control characteristics are essential and for very large sizes such as the proposed 40-ton gross weight helicopter or larger. The proposed rotor is to be based on the use of a large center base [hub] properly streamlined and the use of a very large number of blades, from eight to 12 and even more."

Advances in computer design and composite materials have improved rotor blade performance dramatically. The 44-ton Sikorsky CH-53K with seven fourth-generation composite rotor blades on a massive elastomeric rotor head flew in March 2015.



The CH-53K used advanced rotor technology to realize Sikorsky's vision of the 40+ ton helicopter.

Not all of Igor Sikorsky's ideas came to fruition. A single-bladed helicopter remained only an engineering study, and a side-by-side rotor configuration capable of 300 to 400 mph (345.2 to 460.3 kt) or more never flew. Sikorsky's compound helicopter nevertheless evolved in steps. His



The XH-59 Advancing Blade Concept advanced Sikorsky's vision of high-speed helicopters. (Sikorsky Archives)

1963 development plans wanted to, "Expand the study of and as early as possible begin actual practical work on the type of helicopter capable of approaching or reaching 250 mph (287.7 kt) with little or no sacrifice of the excellent hovering and slow-speed characteristics which determined the usefulness of and created demands for the ordinary helicopter."



The Sikorsky X2 demonstrator integrated multiple technologies to make the high-speed compound helicopter practical. (Sikorsky Archives)



The S-97 Raider provides risk reduction for the SB>1 technology demonstrator. (Sikorsky Archives)

The S-69 (XH-59A) rigid-rotor Advancing Blade Concept (ABC) demonstrator flew in June 1973 and five years later strapped on two thirsty turbojets to achieve 256 kt (294.6 mph), albeit with high vibration and fuel consumption. In 2010, the 6,000 lb X2 with integrated auxiliary propeller, composite structures, fly-by-wire flight controls, and active vibration suppression exceeded 250 kt (287.7 mph) and proved a suite of technologies applied to the 11,400 lb S-97 Raider demonstrator. The Raider has topped 200 kt and reduces the risk for the 30,000 lb-class SB>1 Joint Multi-Role Technology Demonstrator now in flight test.

Other rotorcraft configurations have made Sikorsky's vision of high-speed and vertical lift real. The Bell V-22 tiltrotor now tops 275 kt (316.5 mph) and gives the US Marine Corps and Air Force Special Operations Squadrons vertical takeoff with fixed-wing range. The next-generation Bell V-280 tiltrotor aims for cruising speeds around 280 kt (322.2 kt) with greater efficiency. Commercial tiltrotor technology in the AgustaWestland AW609 likewise promises business flyers and other operators the flexibility of helicopters and the speed of fixed-wing aircraft.

Crowded cities today drive the push for electric Vertical Takeoff and Landing aircraft with multiple small, slow-turning rotors in radical new configurations to mitigate noise and transition to and from vertical flight. In a 1968 interview with Rotor & Wing magazine, Igor Sikorsky shared his cautious vision of personal air vehicles or urban air taxis. "There is not the remotest doubt in my mind that the hopes for this type of the aircraft have been overdone, overestimated," he said. "On the other hand, having a reasonable efficiency and a reasonable lifting capacity per horsepower, the helicopter is there to stay. Now, between the two there is undoubtedly room mainly for military objectives for an aircraft usually known as the VTOL aircraft. A VTOL aircraft as

a rule would be a machine which takes off in one way or another on the principle of a helicopter, or perhaps a jet, or perhaps a rotor, a rocket, and which, once in the air, becomes transformed into a fairly different vehicle which should be an airplane."

Sikorsky concluded, "Many ingenious projects have been done and undoubtedly successful records will be produced. It is quite probable, not to say certain, that there are missions mainly of a military character which will call for this very aircraft and which will justify its existence. However, it is my belief that this type of a craft will never replace the pure helicopter or pure airplane in their legitimate, respective fields of application."



The SB>1 Defiant is the Sikorsky-Boeing Joint-service Multi-Role technology demonstrator (JMR-TD) with high-speed compound helicopter technologies for military Future Vertical Lift and commercial markets. (Sikorsky Boeing)

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Coming soon to the Ukrainian post offices: Postal envelopes with original stamp commemorating Igor Sikorsky

Prepared by Frank Colucci and John Bulakowski with graphic art and layout by Jodi Buckley.



“Following the trip to Germany in 1908, Igor made a firm decision that aviation would be his lifework. He decided that his entrance into aviation would be by way of the helicopter. He knew that his own dream was to build an aircraft that could hover over one spot, that could rise vertically and land vertically, and fly in any direction chosen by the pilot.”

“Igor Sikorsky – His Three Careers in Aviation” – Frank J. Delear

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