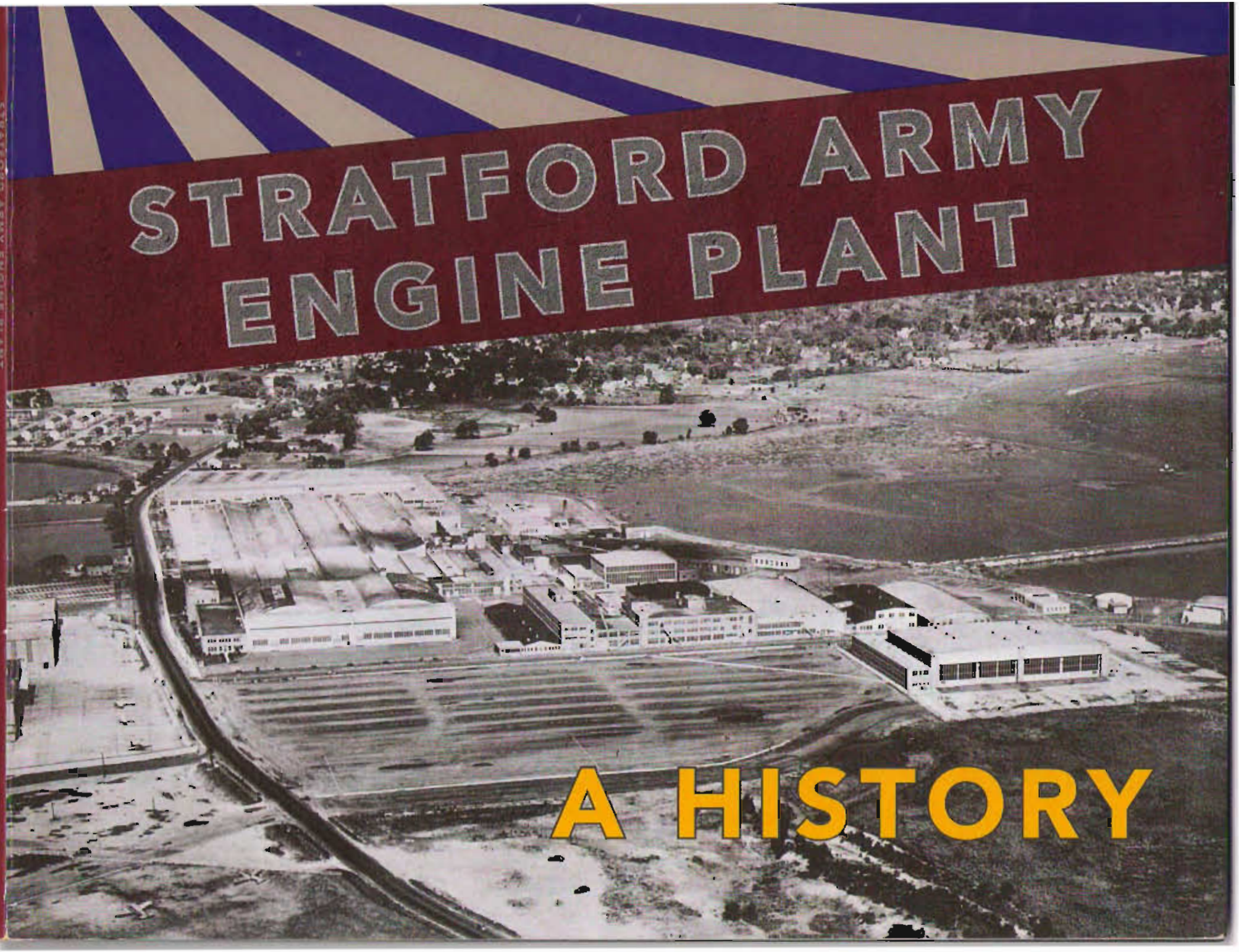
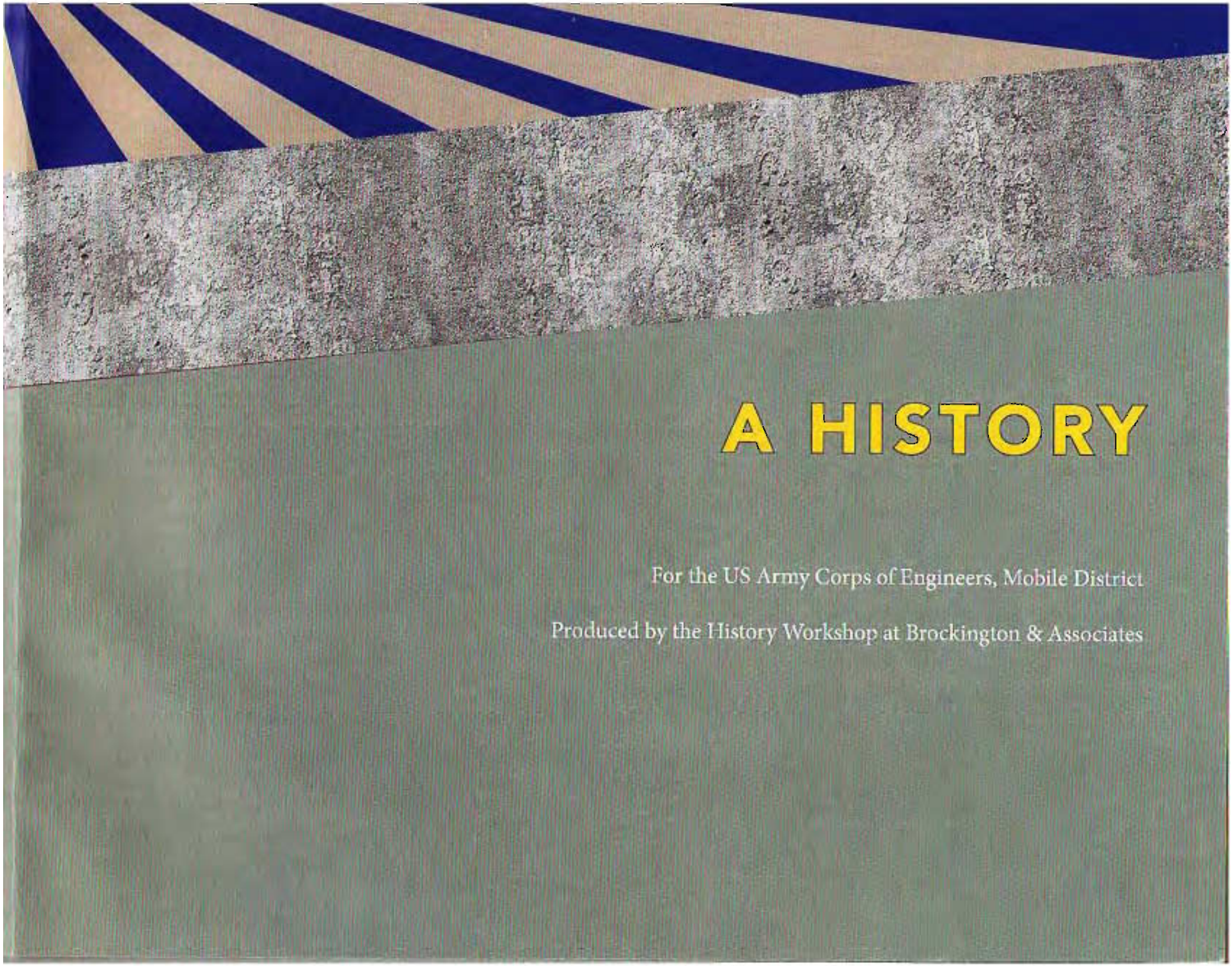
STRATFORD ARMY ENGINE PLANT



A HISTORY

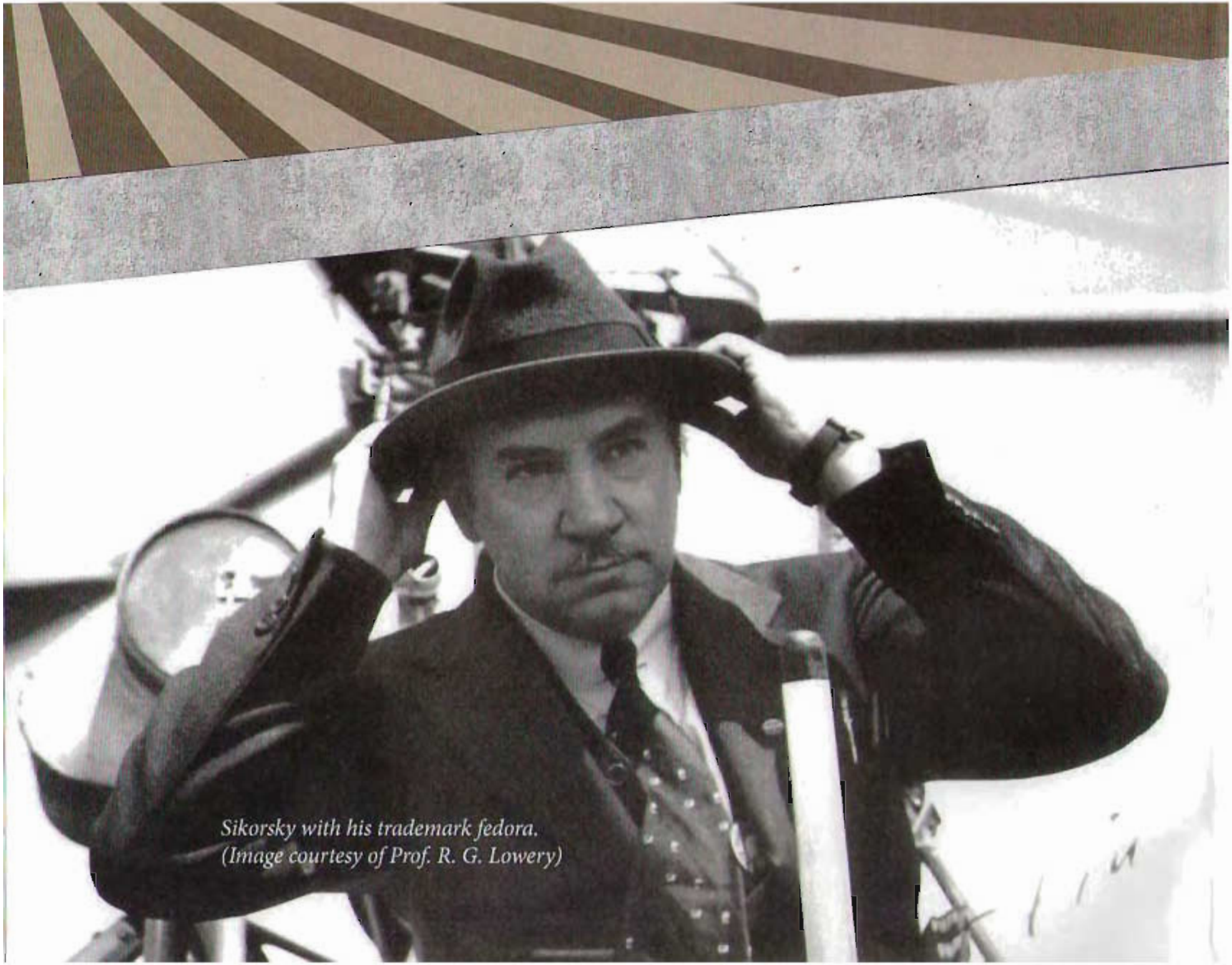
STRATFORD ARMY ENGINE PLANT



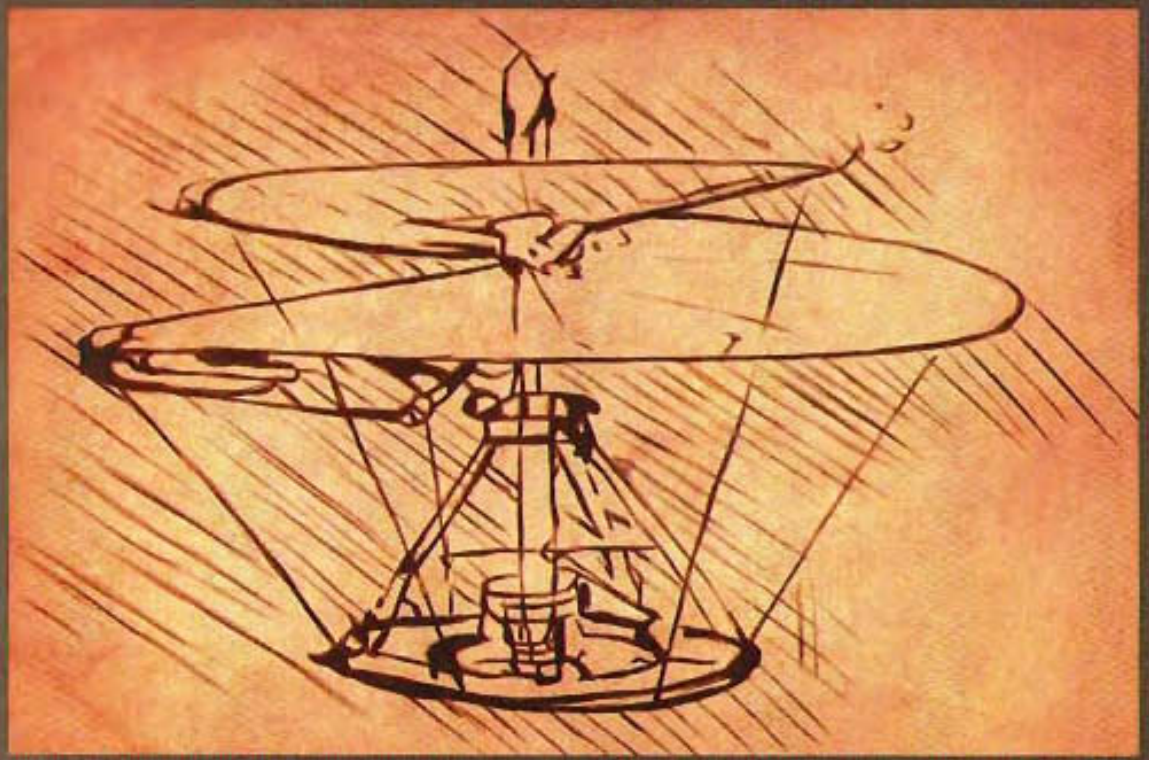
A HISTORY

For the US Army Corps of Engineers, Mobile District

Produced by the History Workshop at Brockington & Associates



Sikorsky with his trademark fedora.
(Image courtesy of Prof. R. G. Lowery)



Artist's rendering of DaVinci's sketch.

Drawing of Jules Verne with some of his fictional creatures.

Igor Sikorsky was born in Kiev, Ukraine on May 25, 1889. As a child he was interested in machines and built his own mechanical toys. His parents encouraged him with books and a place to build his inventions. Igor became determined to fly after seeing Leonardo DaVinci's sketch of a helicopter and Jules Verne's description of a hovering flying machine. He spent much of his early life experimenting with engines and machines that would one day carry him off the ground.

Sikorsky tried and failed two times to build a working helicopter. On the advice of aviation pioneer Ferdinand Ferber, he decided to build airplanes for a time. These airplanes made him famous in Russia and performed scouting and bombing missions during World War I.

Igor Sikorsky was a true pioneer of aviation and one of his contributions to the field was his creation of the world's first multi-engine aircraft in 1913. Sikorsky built the multi-engine aircraft after he crashed from an altitude of 150 feet in a single engine plane. The engine stopped

Image courtesy of the Stratford Historical Society

because a mosquito had lodged in the carburetor jet and choked off the fuel. He decided that the only way to make airplanes safer was to add more engines so that the plane would not crash if one of the engines failed. In 1913, Sikorsky designed an airplane with two engines called "The Grand." He soon added two more engines, resulting in improved performance and safety. In July of 1913, Sikorsky flew eight passengers over St. Petersburg for one hour and fifty minutes. This was an amazing feat, considering that it was only nine and one half years after the Wright brothers' first airplane flight.

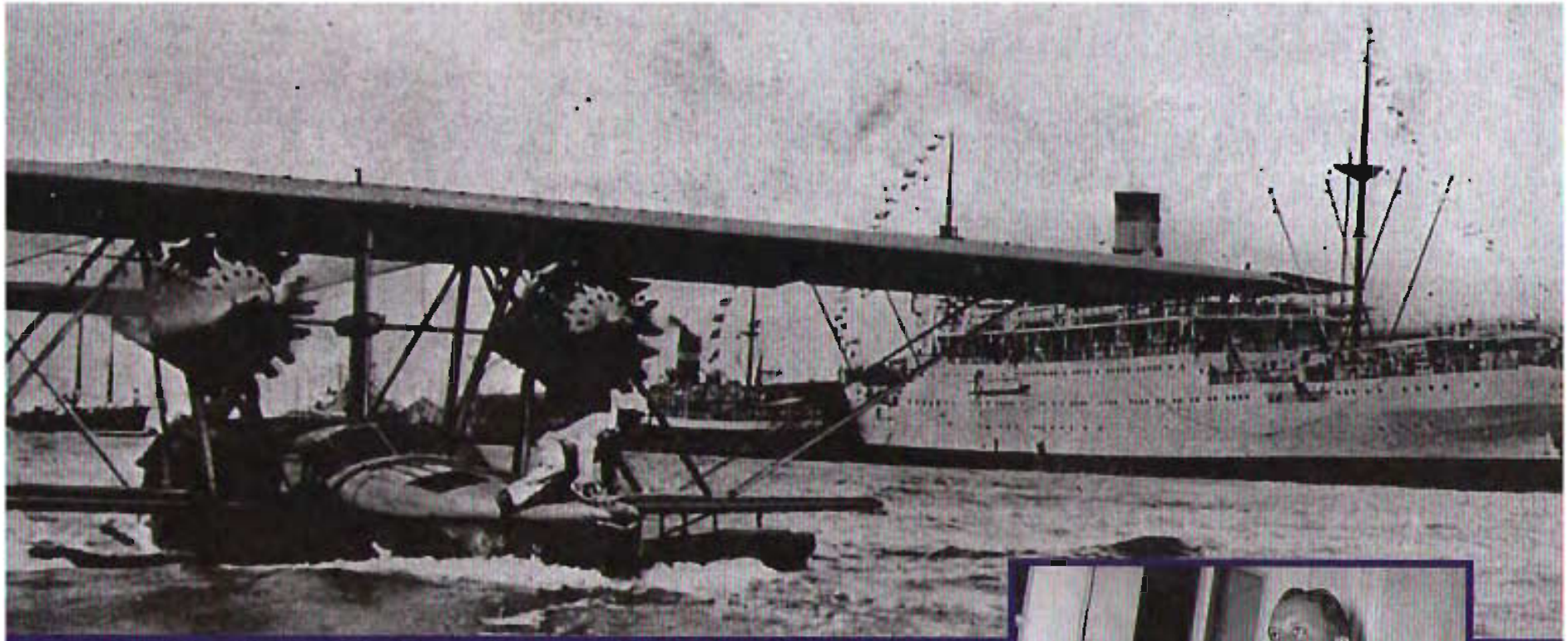
After World War I, Sikorsky had to immigrate to the United States in 1919 due to the Bolshevik Revolution in Russia.

Sikorsky's first few years in America were difficult. The aviation industry collapsed after World War I, and he had to support himself by teaching mathematics and physics to Russian refugees. Soon, his friends gave him the financial support to start Sikorsky Aero Engineering Company in 1923 in Long Island, New York. Sikorsky built planes for Pan American Airlines and the U.S. Navy. Demand became so great that Sikorsky moved the company to a new manufacturing facility in Stratford, Connecticut in 1929. Stratford's location near an airport and the deep waters of Long Island Sound made it perfect for testing seaplanes.

Charles Lindbergh's solo flight across the Atlantic Ocean in 1927 increased the American public's interest in aviation. Sikorsky predicted that there would be a market for larger airplanes, and he started building amphibious planes that could land on water. Amphibious planes had the advantages of not needing a runway and functioning as boats if necessary. Sikorsky built two prototypes before developing a breakthrough aircraft, the S-38.

Lindbergh. (Image courtesy of the Library of Congress)

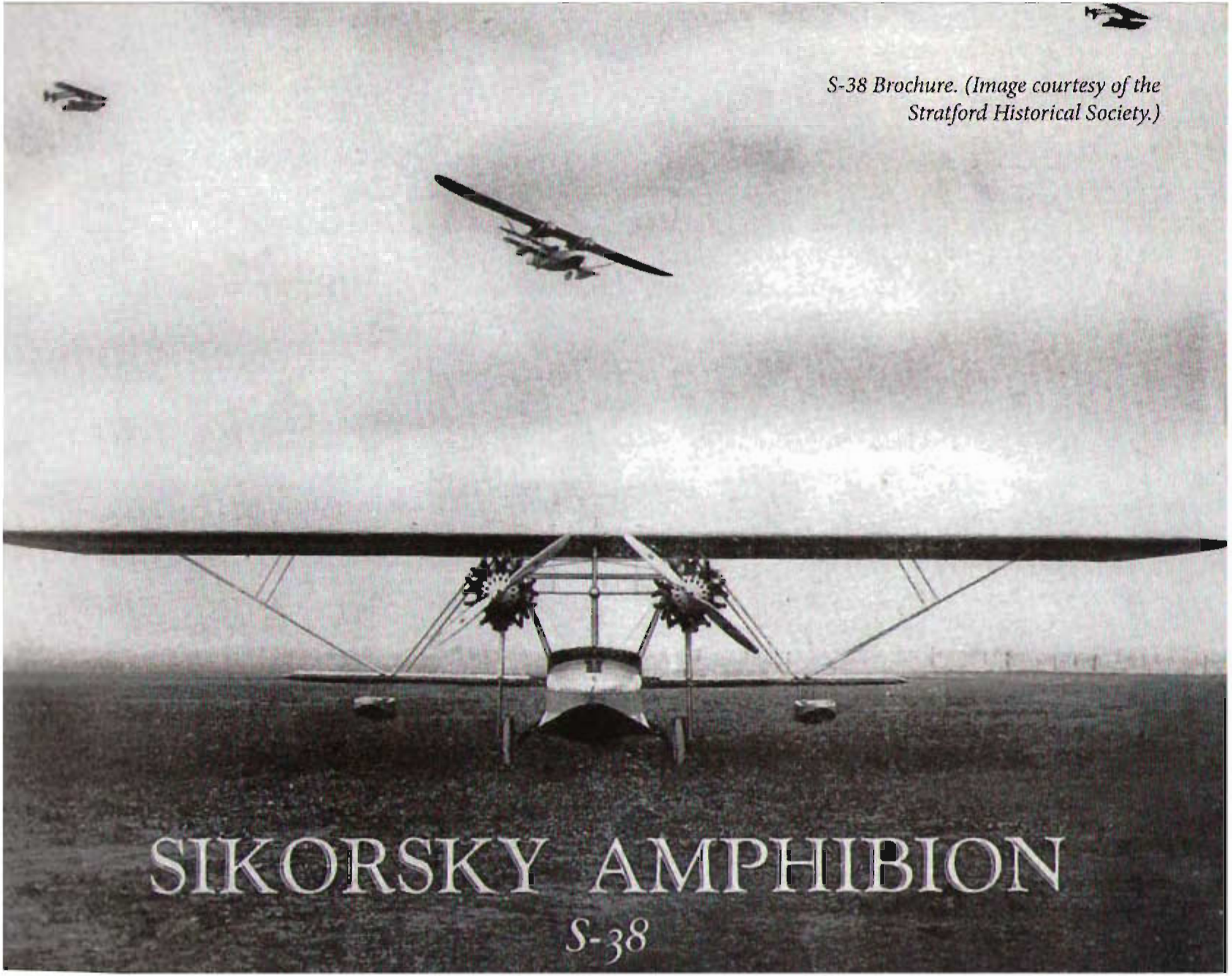
Igor Sikorsky summed up the impact of Lindbergh's flight with these words: Before his flight, aviation was a hobby...after his flight, aviation became a profession.



Lindbergh in the S-38. (Image from United Aircraft and Transportation Annual, 1929. Courtesy of the Stratford Historical Society)

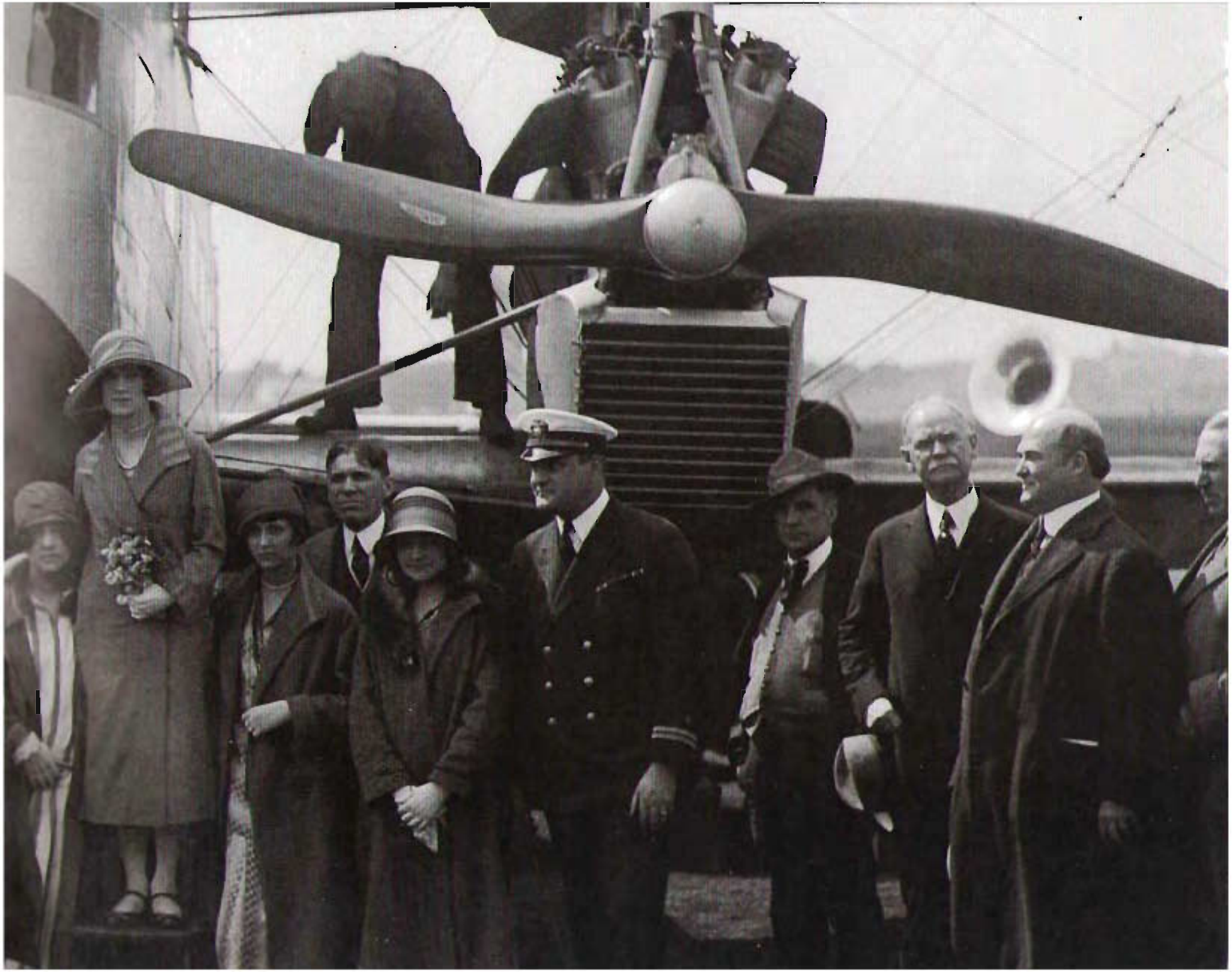
The ten-seat S-38 debuted in June 1928 and was an instant success. Aviation pioneer Juan Trippe purchased some for Pan American Airlines, and the new Sikorsky Aviation Corporation could hardly keep up with demand. Charles Lindbergh flew an S-38 on Pan American Airline's inaugural airmail flight from Miami to the Panama Canal. Juan Trippe and Charles Lindbergh also flew an S-38 for Pan American Airline's goodwill flights throughout the Caribbean and South America. Explorers Martin and Osa Johnson used both the S-38 and the slightly smaller S-39 for their aerial safaris in Africa and Borneo. Newsreel footage of their exploits made Sikorsky's airplanes even more famous. By the 1930s, 10 airlines and both the U.S. Army and Navy were flying the S-38.

Trippe. (Image courtesy of the Library of Congress)



S-38 Brochure. (Image courtesy of the Stratford Historical Society.)

The Yorktown's christening. Sikorsky is pictured third from the left.
(Image courtesy of the Library of Congress)



The Yorktown's christening. Sikorsky is pictured third from the left.
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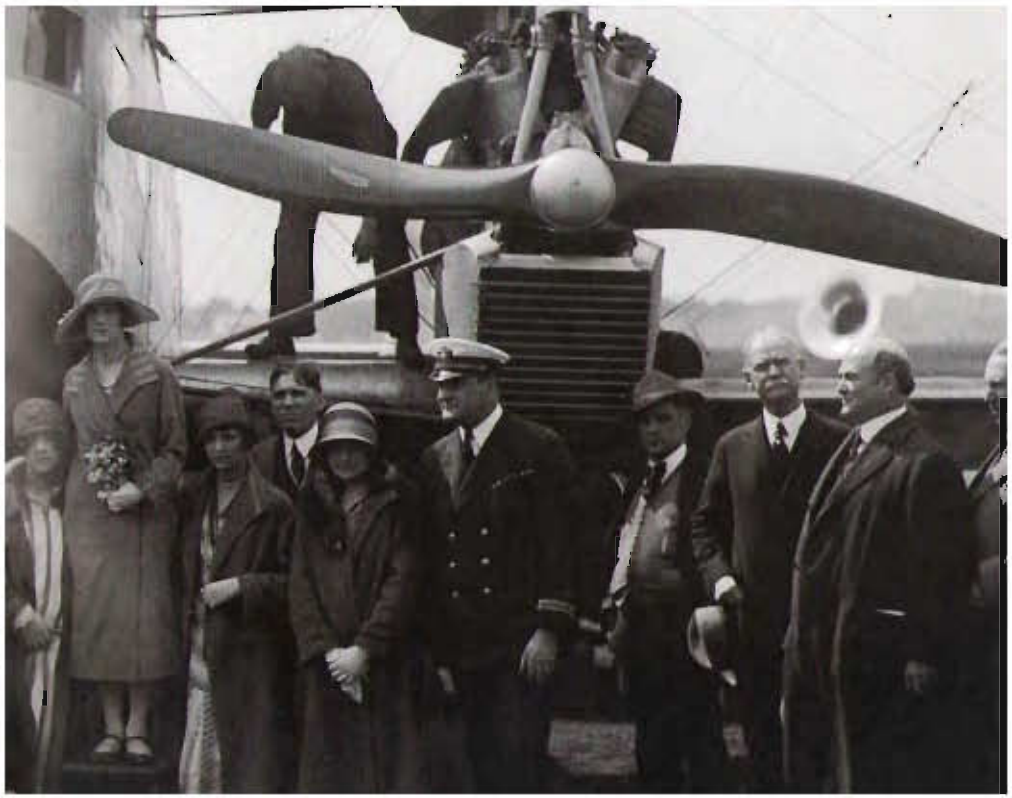
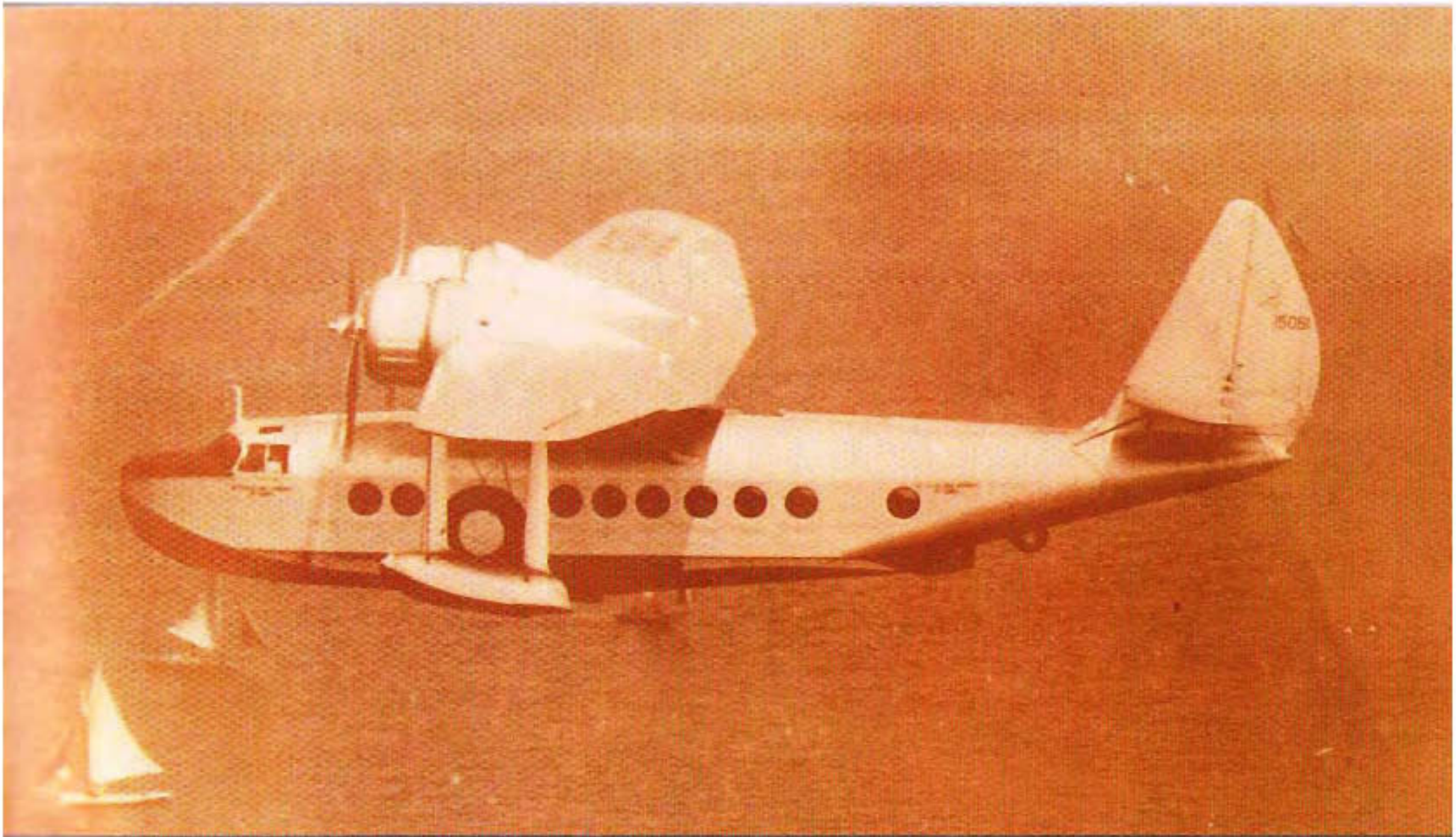


The interior of the S-38, from the S-38 brochure, courtesy of the Stratford Historical Society.

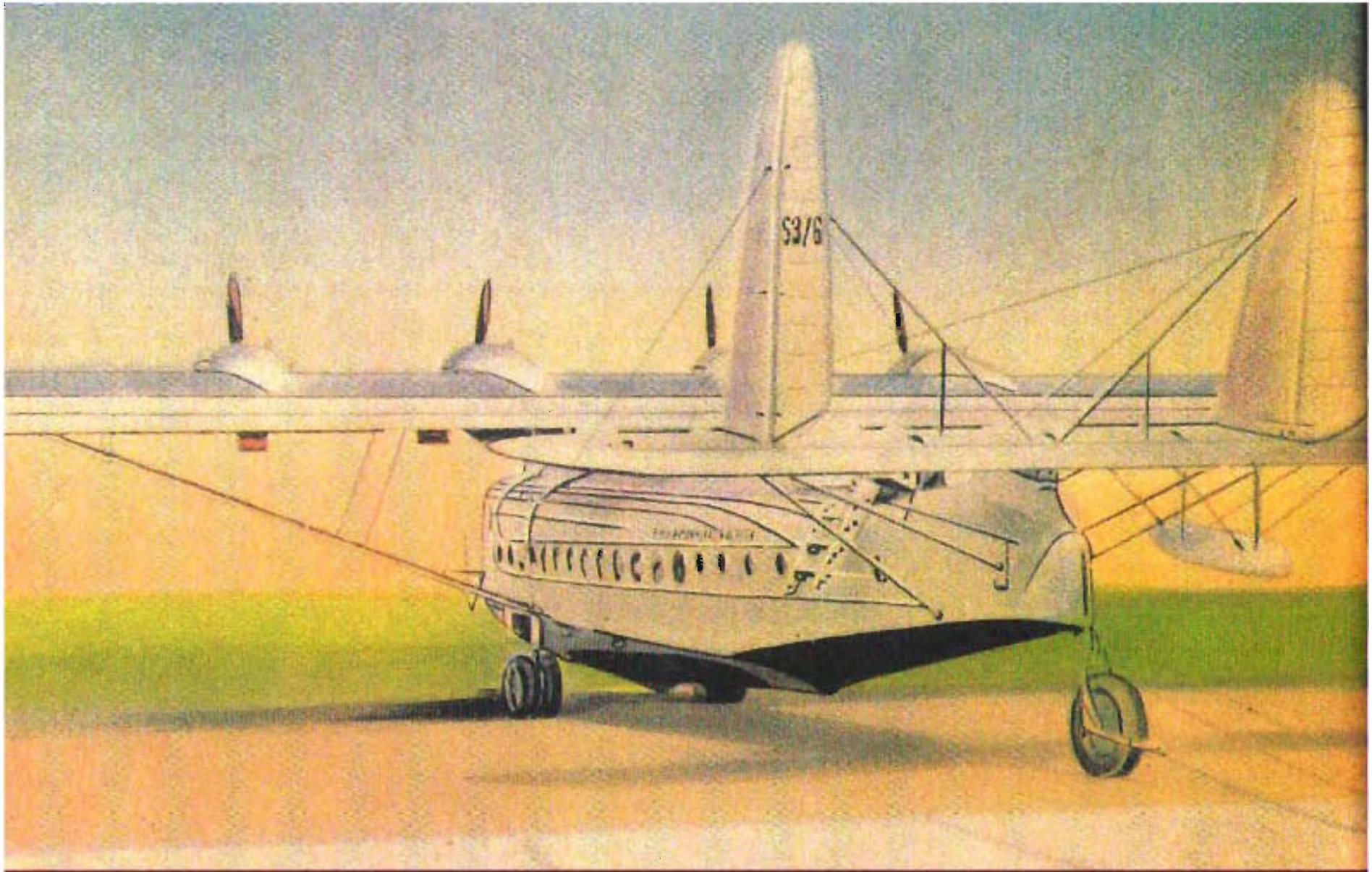


Sikorsky's S-43.
(Image courtesy of the Stratford Historical Society)

The S-40, shown below, was the next breakthrough aircraft for Sikorsky. When completed in 1931, the 40-passenger S-40 was the largest aircraft ever built in America. Contracted for Pan American Airlines, the first S-40 was christened the *American Clipper* by President Herbert Hoover's wife. Not content to rest on the success of the S-40, Sikorsky and Charles Lindbergh began drafting plans for the S-42 during the inaugural flight of the S-40 to Panama. With the S-40, flying boats became symbols of the ingenuity and spirit of adventure of early twentieth-century America.

The S-40 on the ramp at Sikorsky Plant. (Image courtesy of the Stratford Historical Society)

The S-43.
(Image courtesy of the Stratford Historical Society)



Postcard of the S-42.
(Image courtesy of the Stratford Historical Society)

The S-43.
(Image courtesy of the Stratford Historical Society)

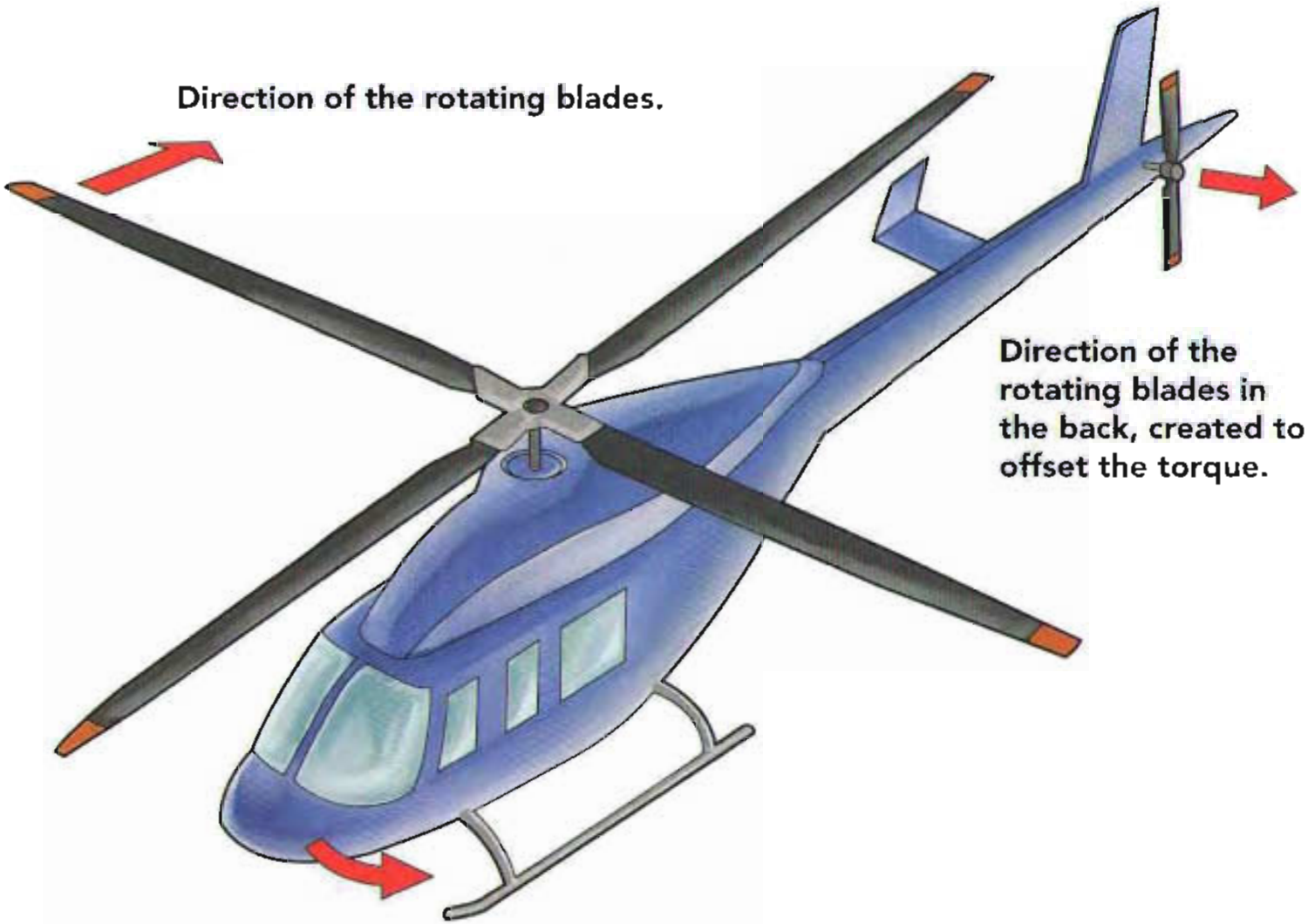

Image courtesy of the Stratford Historical Society

The helicopter approaches closer than any other [vehicle] to fulfillment of mankind's ancient dreams of the flying horse and the magic carpet.
–Sikorsky

By the early 1930s, Sikorsky was ready to start working again on his life-long dream of building a helicopter. He began working with a small team of engineers to develop a prototype. His dream became a reality on September 14, 1939 when the VS-300 helicopter first hopped into the air with Sikorsky at the controls. Sikorsky's second major contribution to the field of aviation was the creation of the VS-300, the world's first practical helicopter. It took him over thirty years of study and trial and error to make vertical flight a reality.

Sikorsky's first attempts to build a helicopter had failed because he did not have a motor that was powerful enough to lift both the helicopter and pilot off the ground. Once he solved this problem, there were a few more to be solved. First, he had to find a way to keep the helicopter's main rotor—the turning propellers at the top—from spinning the entire craft around. See the next page for a diagram explaination.

Helicopter manufacturers have used Sikorsky's design with a main rotor above the fuselage or cabin and an anti-torque tail rotor for 95 percent of the world's helicopters since he flew the first helicopter in 1939. The U.S. Army quickly realized the value of Sikorsky's invention and placed an order for his R-4 helicopters. Sikorsky's company therefore had the world's first production model.



Direction of the torque, or twisting, caused by the rotating blades. If no force offsets this motion, the helicopter would spin out of control, twisting in the opposite direction of the blades.

The VS-300 was a chance to relive one's life all over again. To design a new type of flying machine without knowing how to design it; then build it without really knowing how to build it and then try to test-fly it without ever having flown a helicopter before.
–Sikorsky

The R-5, one of Sikorsky's helicopters produced at his new Bridgeport location.
(Image courtesy of the Stratford Historical Society)

Sikorsky Aviation Corporation merged with Chance Vought Aircraft in 1939. The new company, Vought Sikorsky Aircraft, needed a much larger facility. Vought Sikorsky hired industrial architect Albert Kahn to oversee the expansion. Kahn built an addition to the Stratford plant in 1942 that roughly doubled the facility's manufacturing capacity.

Albert Kahn was one of the most important industrial architects in American history. Kahn designed over 1,000 buildings, including some of the largest manufacturing plants ever built. Albert Kahn was born in Germany in 1869, and immigrated with his family to Detroit, Michigan, in 1880. Kahn apprenticed with a Detroit architectural firm, working his way up from an errand boy to

Chance Vought. (Image courtesy of the Library of Congress)

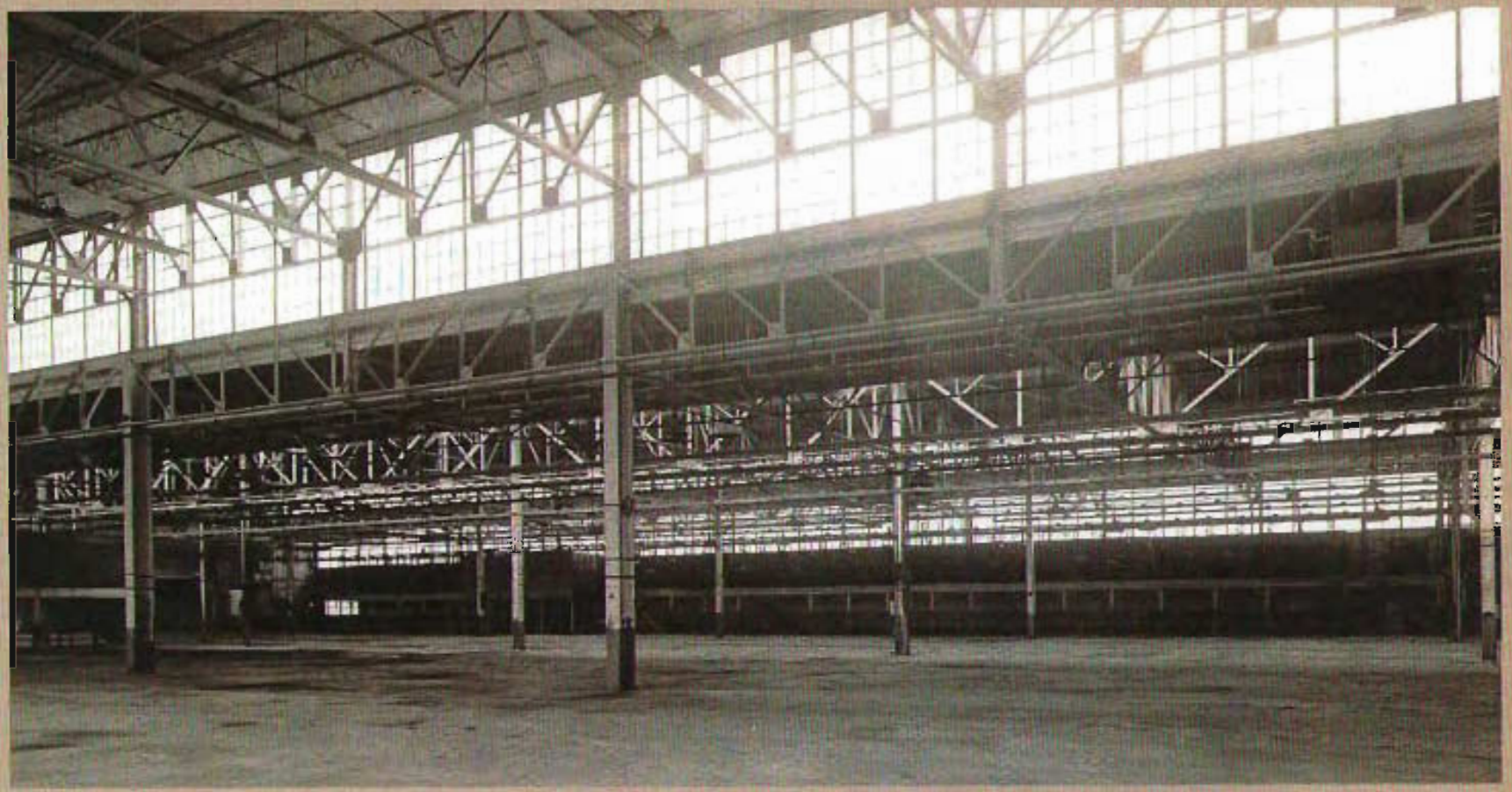
Kahn's expansion. (Image courtesy of the Stratford Army Engine Plant)

chief draftsman. In 1895, he began his own architectural firm. In 1907, he designed the Packard Motor Car Company's factory, using a new style of construction with reinforced concrete replacing wood. These materials decreased fire hazards and increased room for the interior. Henry Ford asked Kahn to design Ford Motor Company's Highland Park plant, which eased production of the Ford Model T and revolutionized the assembly line. This and his other work helped expand Detroit's growing auto industry in the first half of the twentieth century and would change the construction of factories in America.

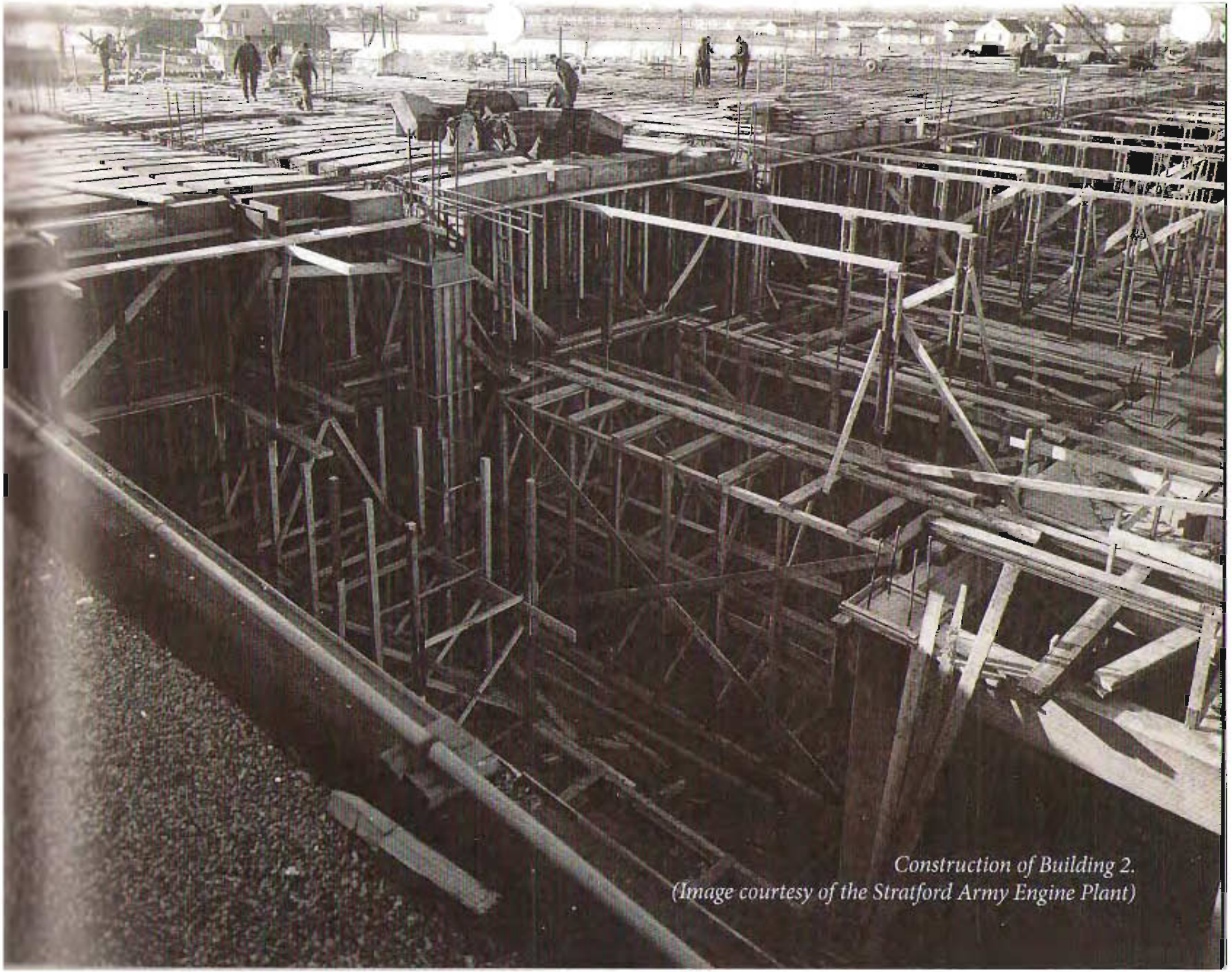
The building Kahn designed at Stratford was the aircraft assembly plant addition (Building 2), constructed in 1942. This major addition was located on the north end of the assembly plant and roughly

doubled the production ability of the plant. The addition shows Kahn's World War II era industrial designs with Kahn's characteristic V-shaped monitor windows.

The Stratford plant also was modernized for efficiency. Conveyor belts and an assembly line process made production faster. The engineers replaced rivets with spot-welding during the fabrication process. The spot-welded planes were easier to produce and their smooth surface was better for flying at high speed.



The interior of Building 2. (Image courtesy of the Stratford Army Engine Plant)



Construction of Building 2.
(Image courtesy of the Stratford Army Engine Plant)

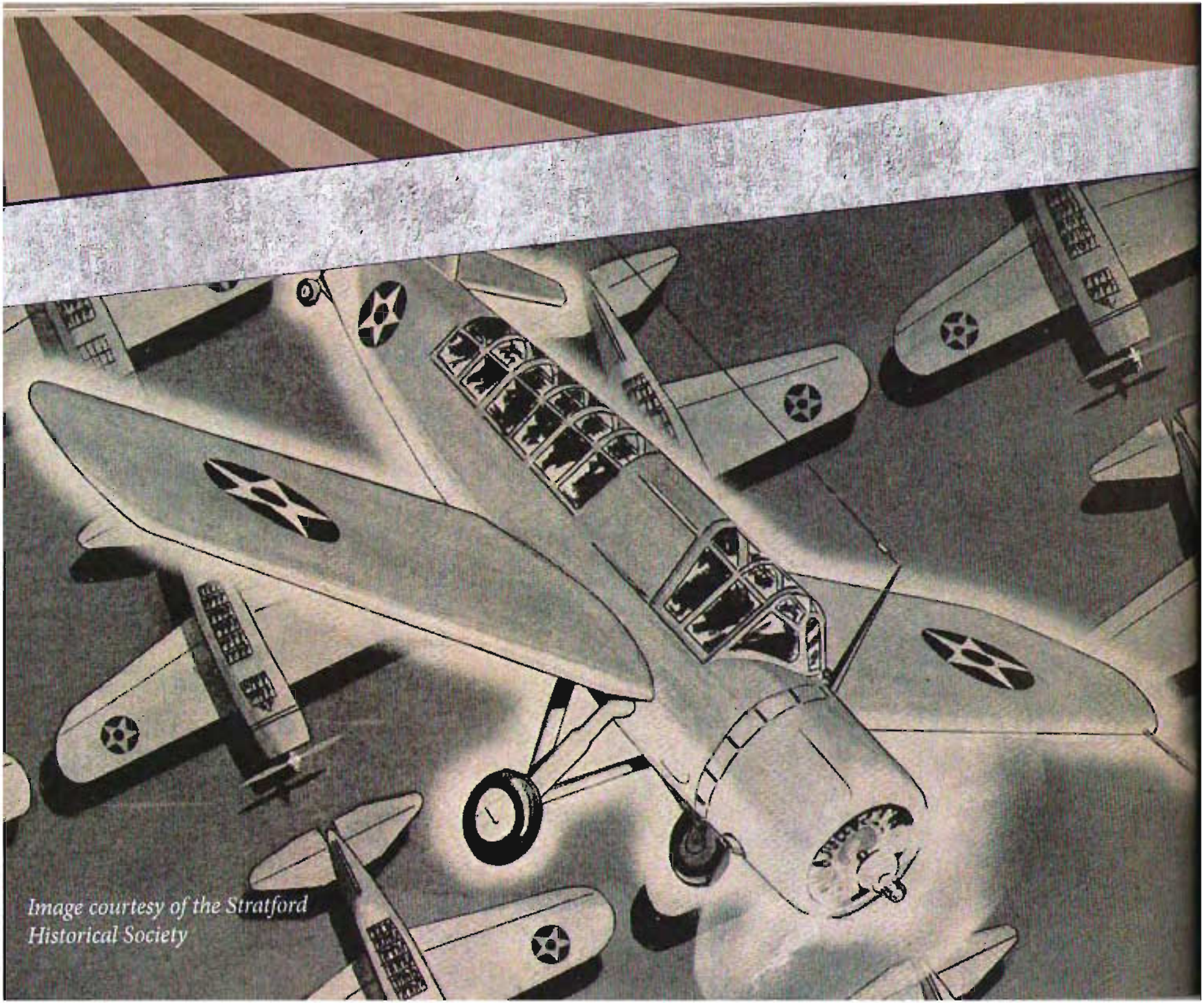


Image courtesy of the Stratford Historical Society

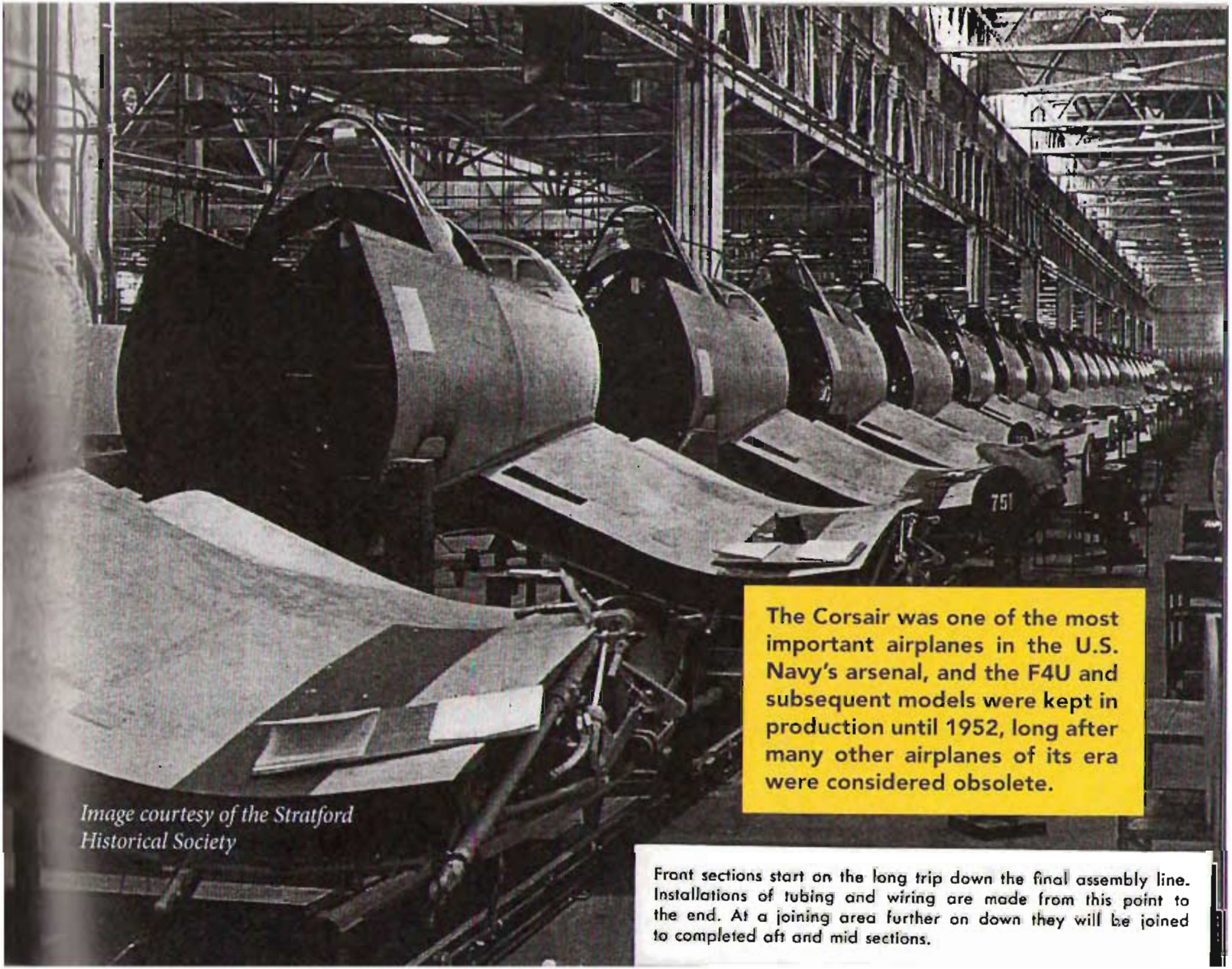
The Vought Sikorsky plant at Stratford made two major contributions to America's war effort during World War II. The first was the OS2U, an airplane also known as the Kingfisher, pictured on this page and to the left. Two Pratt & Whitney Wasp Junior Engines powered the airplane. A catapult launched the Kingfishers off the decks of battleships and cruisers so they could patrol for submarines and carry out sea rescue missions. Vought Sikorsky built a total of 1164 Kingfishers for the U.S. Navy during World War II.

Image courtesy of the Library of Congress.

WWII poster of the Corsair.
(Image courtesy of the Stratford Historical Society)

The second plane built for the war effort at the Stratford plant was the F4U Corsair, shown to the left and right. Vought Sikorsky produced 4,120 Corsairs at the Stratford plant during World War II. The Corsair was designed to be the smallest possible airframe around the most powerful available engine. The Pratt and Whitney R-2800 Double Wasp engine powered the Corsair, and it could fly at more than 400 miles per hour. To reach this speed, the Corsair needed a very large propeller. The engineers were concerned that the landing gear required to provide ground clearance for the propeller would be too long to be stable. They decided to use an inverted gull wing with the landing gear at the wing knuckles. This design provided room for the propeller and kept the landing gear short and stable.

Its speed, combined with the plane's four guns and the bombs that it carried in its wings, made the Corsair a very deadly weapon. It had an 11:1 ratio of kills to losses in action against Japanese aircraft, which inspired the Japanese to call the plane "whistling death."



The Corsair was one of the most important airplanes in the U.S. Navy's arsenal, and the F4U and subsequent models were kept in production until 1952, long after many other airplanes of its era were considered obsolete.

Image courtesy of the Stratford Historical Society

Front sections start on the long trip down the final assembly line. Installations of tubing and wiring are made from this point to the end. At a joining area further on down they will be joined to completed aft and mid sections.

The Corsair was thought to be the best of the U.S. fighters in the war, with an 11:1 ratio of kills to losses against the Japanese.

CHANCE VOUGHT AIRCRAFT

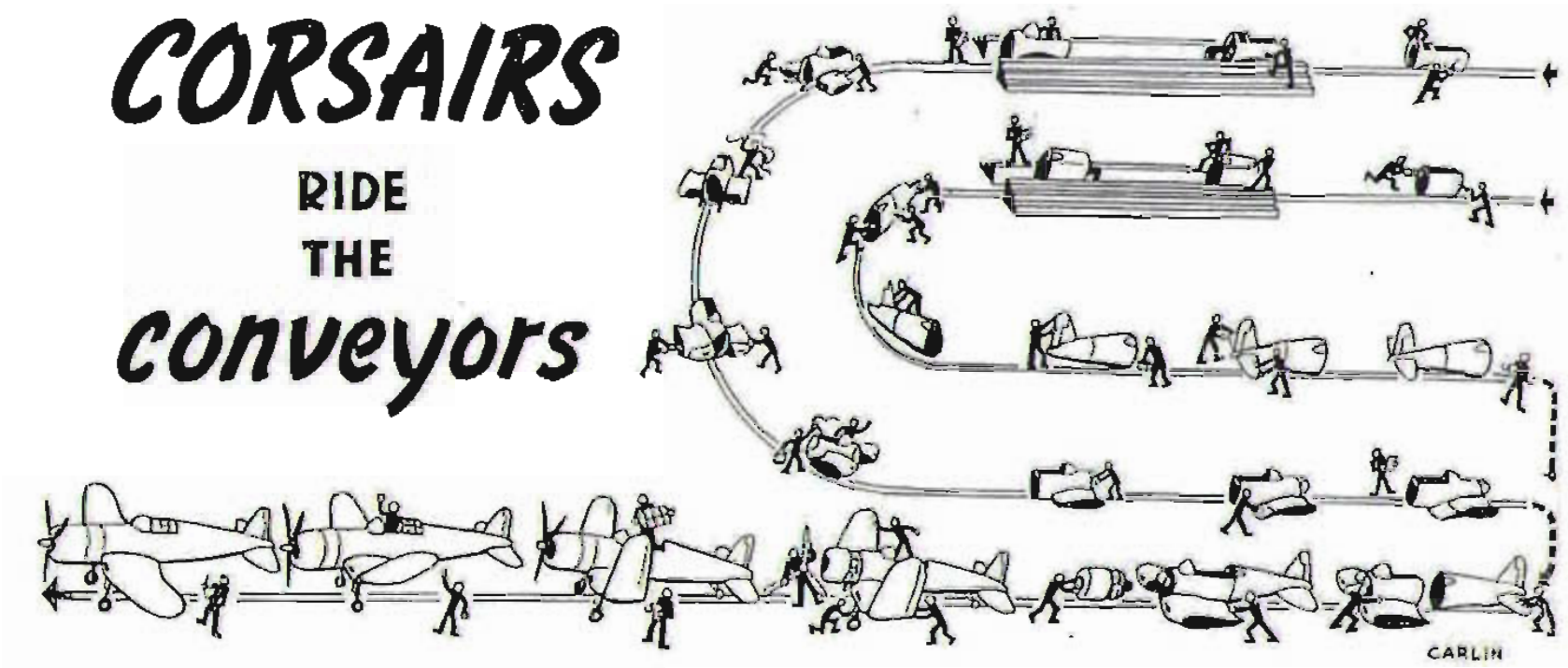
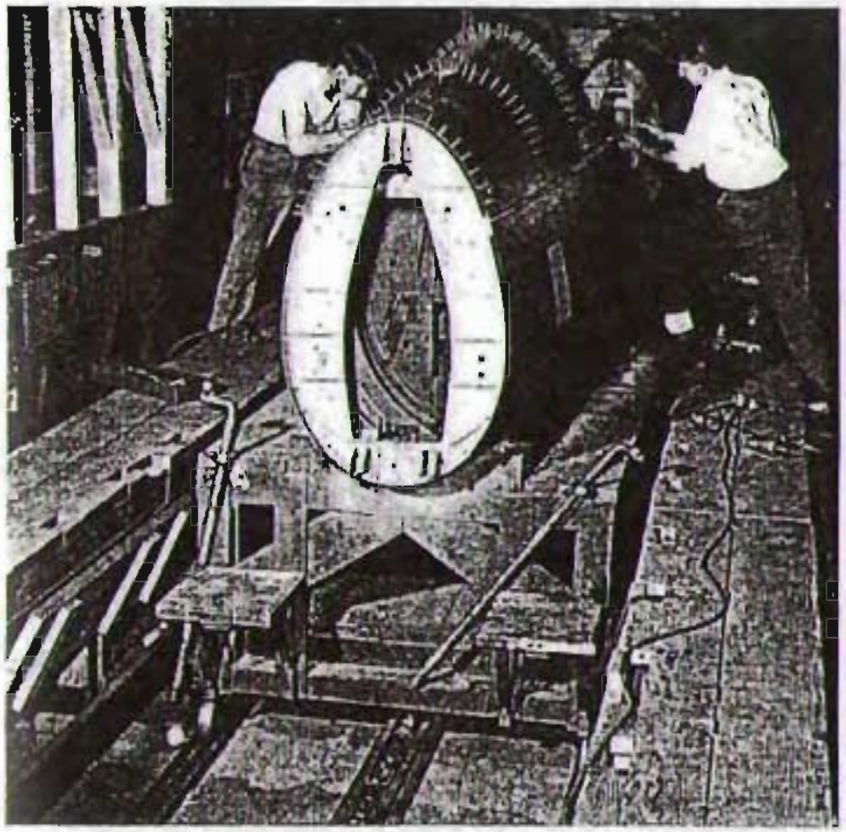
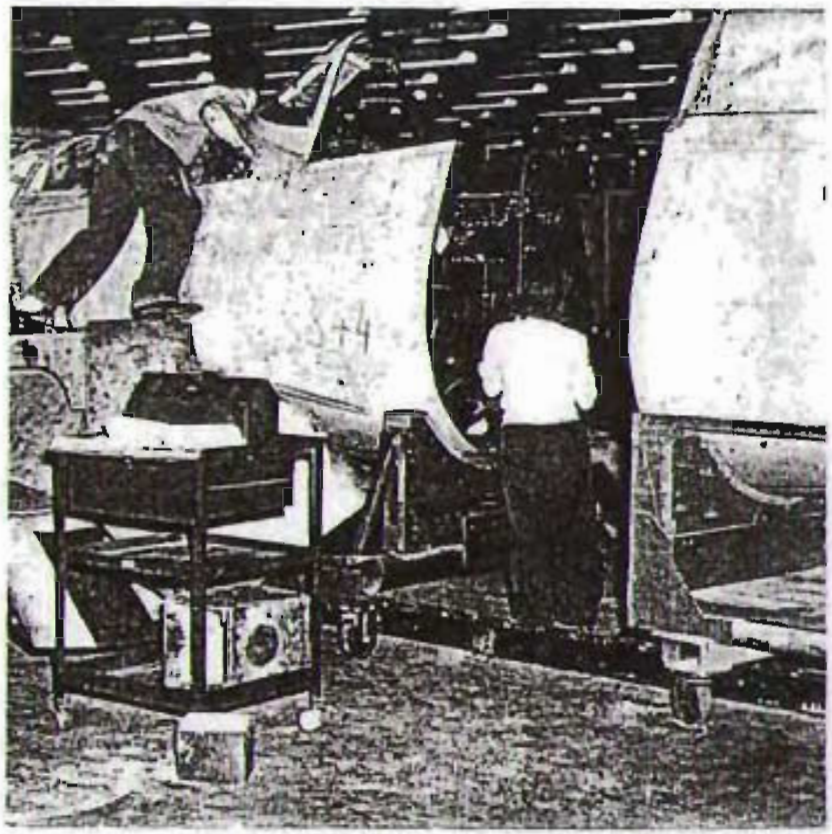


Image courtesy of the Stratford Historical Society





Corsair assembly.
(Image courtesy of the Stratford Historical Society)

Images from report on Vought Sikorsky Plant. Courtesy of the Stratford Historical Society

The Vought Sikorsky plant.

Corsairs on the assembly line.

Workers in the engineering room.

Aerial in 1949.
(Image courtesy of the Stratford Army Engine Plant)

Aerial in 1956. (Image courtesy of the Stratford Historical Society)

In January 1943, United Aircraft Corporation dissolved the Vought Sikorsky Aircraft partnership so that the Chance Vought Division could focus on developing combat aircraft and the Sikorsky Aircraft Division could focus on helicopter development for military and commercial purposes. Chance Vought manufactured aircraft at the Stratford plant until 1948. At that time, the Navy offered Chance Vought the Naval Weapons Industrial Reserve Plant in Dallas, Texas. The company moved their entire manufacturing

Avco, 1980.
(Image courtesy of the Stratford Historical Society)

operation to Texas in 1948. A flood of the Housatonic River in January 1949 severely damaged the Stratford facility, and United Aircraft Corporation put the vacant plant up for sale.

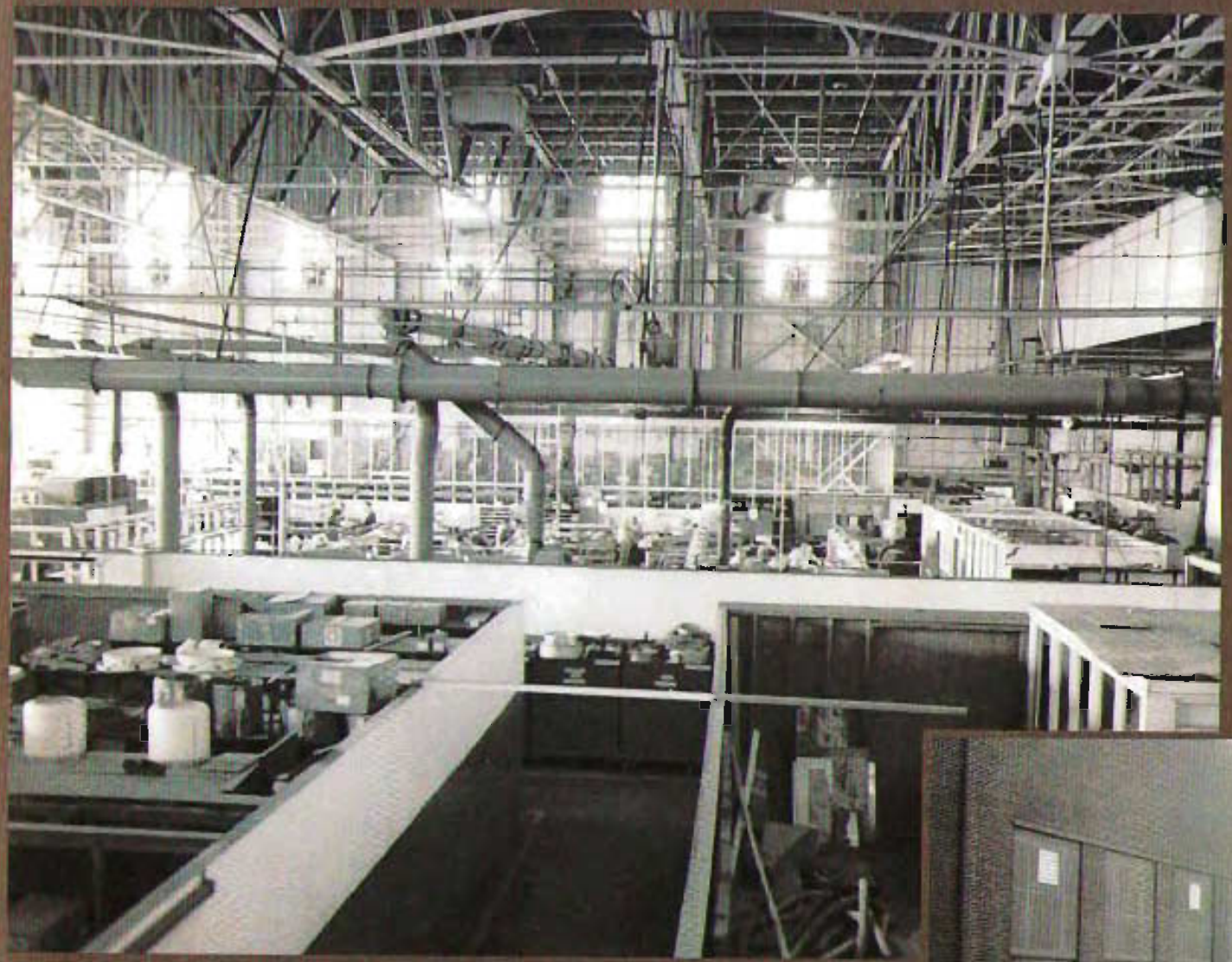
The U.S. Air Force purchased the Stratford facility in 1951 and renamed it Air Force Plant No. 43. The Air Force contracted with the Avco Corporation to manage the plant. The company first made repairs to the water-damaged facility and built dikes to prevent future flood damage. Avco Corporation then created the Avco Lycoming Division and

Construction in 1951.
(Image courtesy of the Stratford Army Engine Plant)

Abrams Tank. (Image courtesy of the U.S. Army)

resumed manufacturing at the Stratford facility in May 1951. The first aircraft engine rolled off the assembly line in March 1952. The plant continued to produce increasingly powerful engines such as the 5-47 jet aircraft engine and the T-53 and T-55 helicopter engines.

The Air Force transferred Air Force Plant No. 43 to the Army in 1976, and it was renamed the Stratford Army Engine Plant. The Army selected Avco Corporation's AGT 1500 engine to power its new Abrams XM1 Main Battle Tank. The Stratford Army Engine Plant began producing the new engines in the late 1970s. The plant also produced high-powered marine and industrial engines used in ferry boats, air cushion vehicles, landing craft, and railroad engines.



Pictures of the interior and outside of Building 6, 1964. (Images courtesy of the Stratford Army Engine Plant)

Avco constructed many engine test cells (like Building 16) in 1953 for testing of the Curtiss-Wright R-1820 and R-1300 aircraft piston engines, and for testing of the Lycoming division-designed gas turbine engines .

In 1953, Avco introduced the T-53, the first gas turbine engine (at 600 shaft horsepower) designed specifically for helicopters. Avco then produced a higher power engine, and this T-55 helicopter engine continues to be produced for the Boeing H-47 Chinook, now at over 5000 shaft horsepower.

Turboprop variants of the T-53 and T-55 power fixed-wing airplanes. Other variants of the T-53 and T-55 power ferry boats, air cushion vehicles, hovercraft landing craft, and stationary pumping and generating plants.

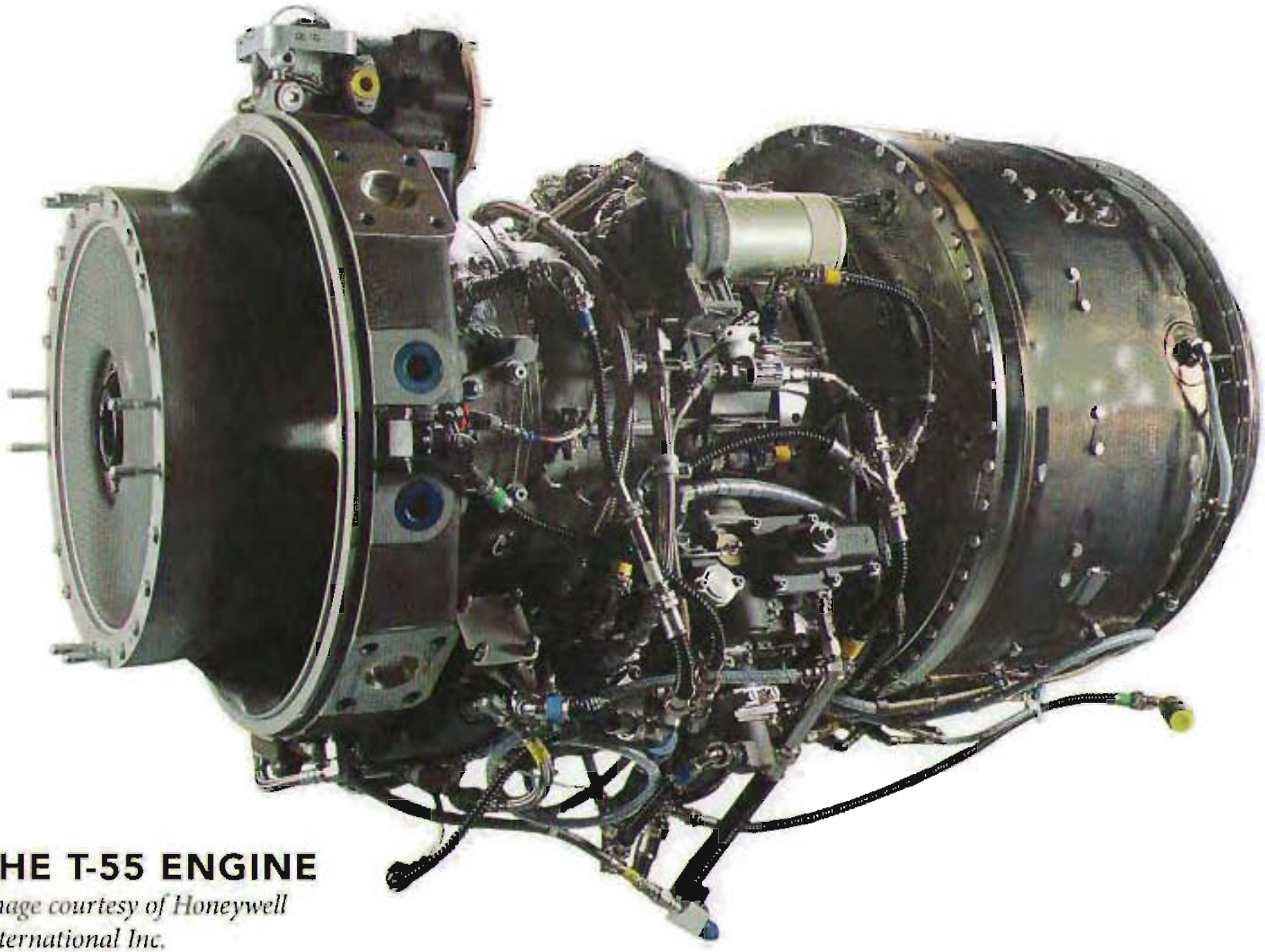
The amazing adaptability of the gas turbine engine led the Army to contract for the AGT1500, which powers the M1 Abrams Main Battle Tank, used in both Iraq wars.

While most of the activities at Stratford focused on gas turbine engines, there were many other projects, such as re-entry nose cones, body sections and pressurized containers for missiles, experimental hydrofoil landing craft, and constant speed drives for military aircraft.

In 1986, Avco sold the Lycoming division to Textron, which later sold it to AlliedSignal. In 1999, the division became became part of Honeywell Aerospace.

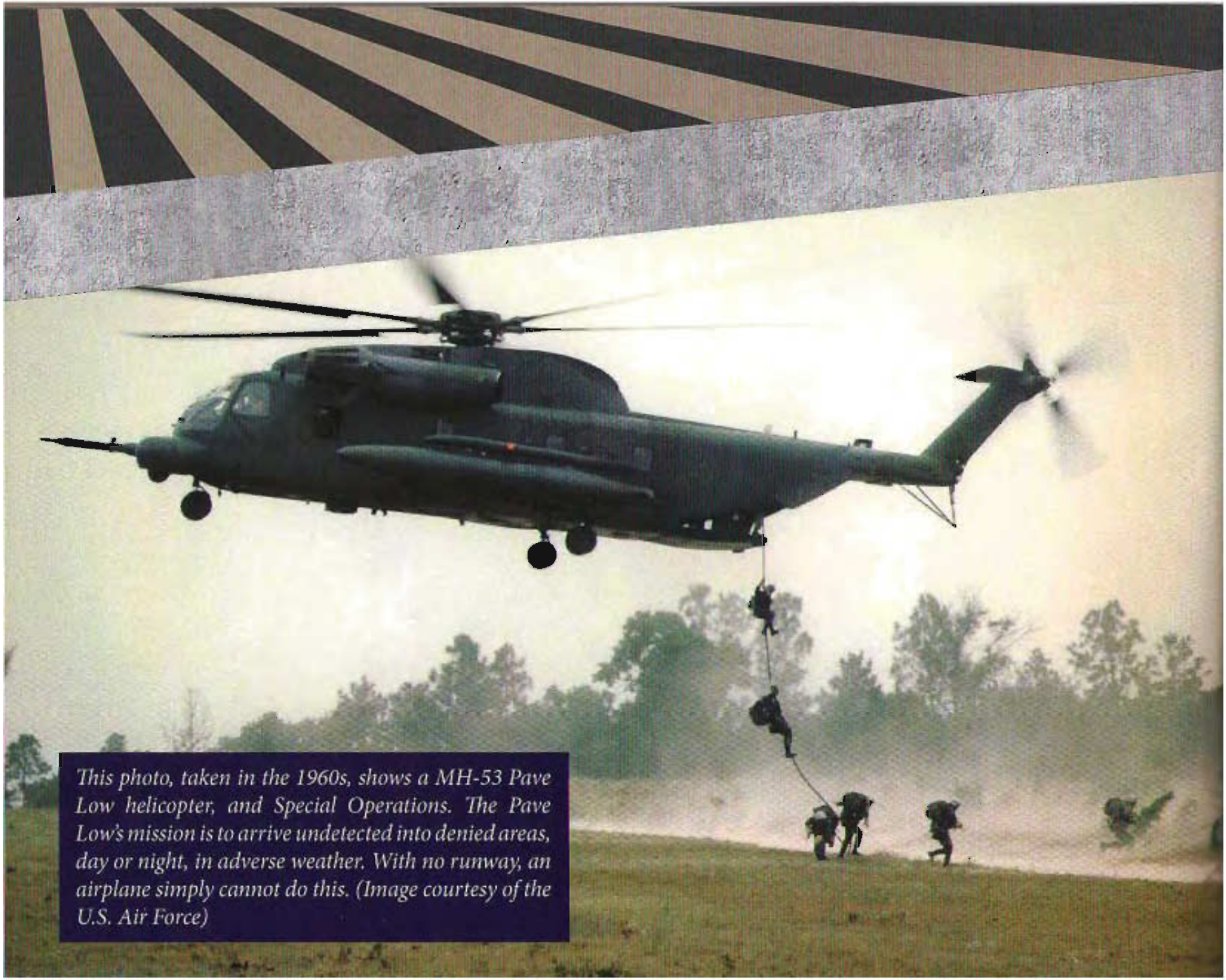
STRATFORD ENGINEERS DESIGNED AND PRODUCED

- **ALF502 turbofan engines**
- **T-55 engines**
- **T-55 engines adapted for cargo helicopters**
- **Engines for amphibious hydrofoils**
- **LT101 and LTS101 helicopter turbine engine**
- **LTP101 turboprop engine**
- **AGT 1500 vehicular turbine engines**
- **Gas turbines for the first commercially-powered hovercraft in the United States**



THE T-55 ENGINE

Image courtesy of Honeywell International Inc.



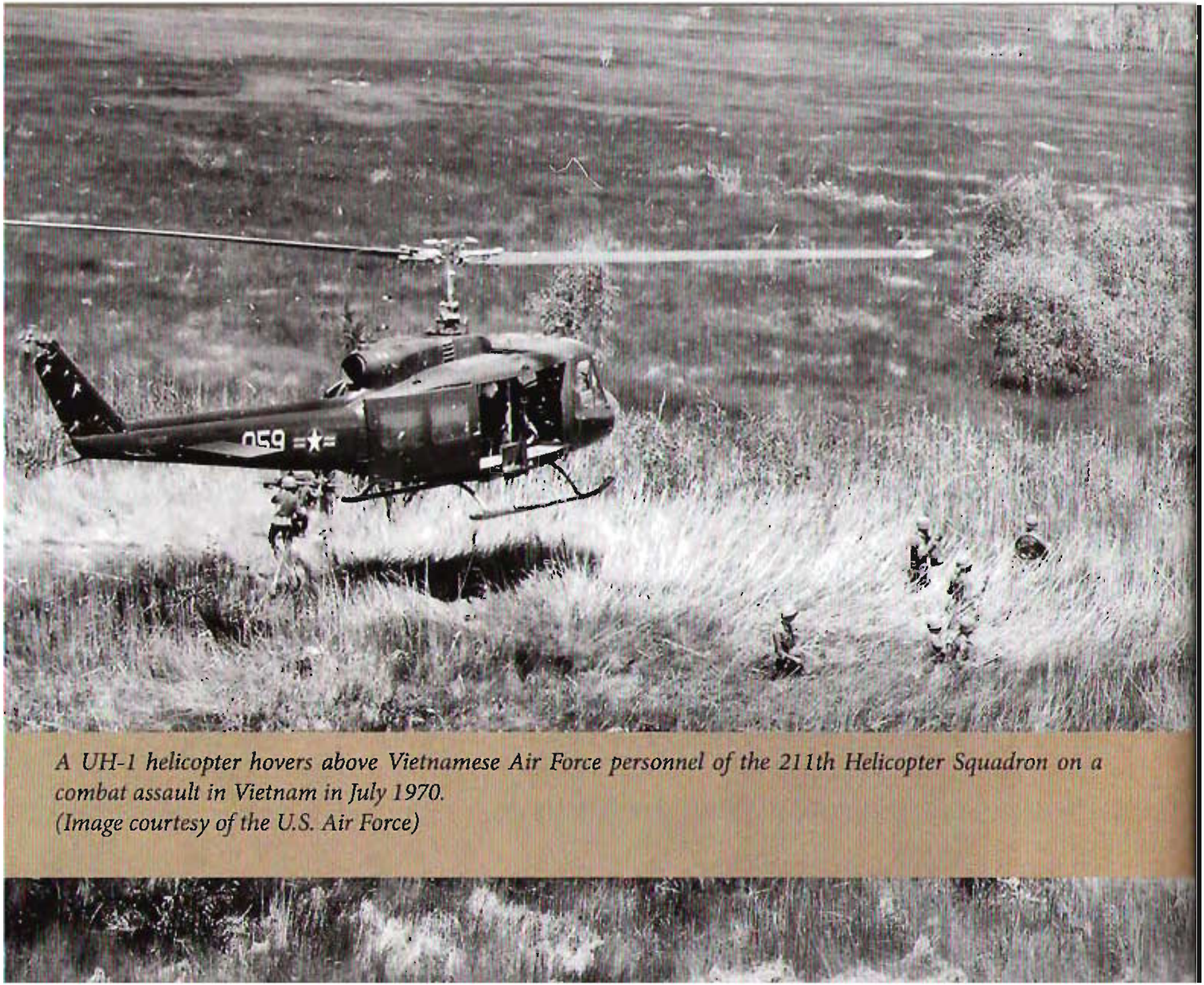
This photo, taken in the 1960s, shows a MH-53 Pave Low helicopter, and Special Operations. The Pave Low's mission is to arrive undetected into denied areas, day or night, in adverse weather. With no runway, an airplane simply cannot do this. (Image courtesy of the U.S. Air Force)

The helicopter will prove to be a unique instrument for the saving of human lives.
–Sikorsky

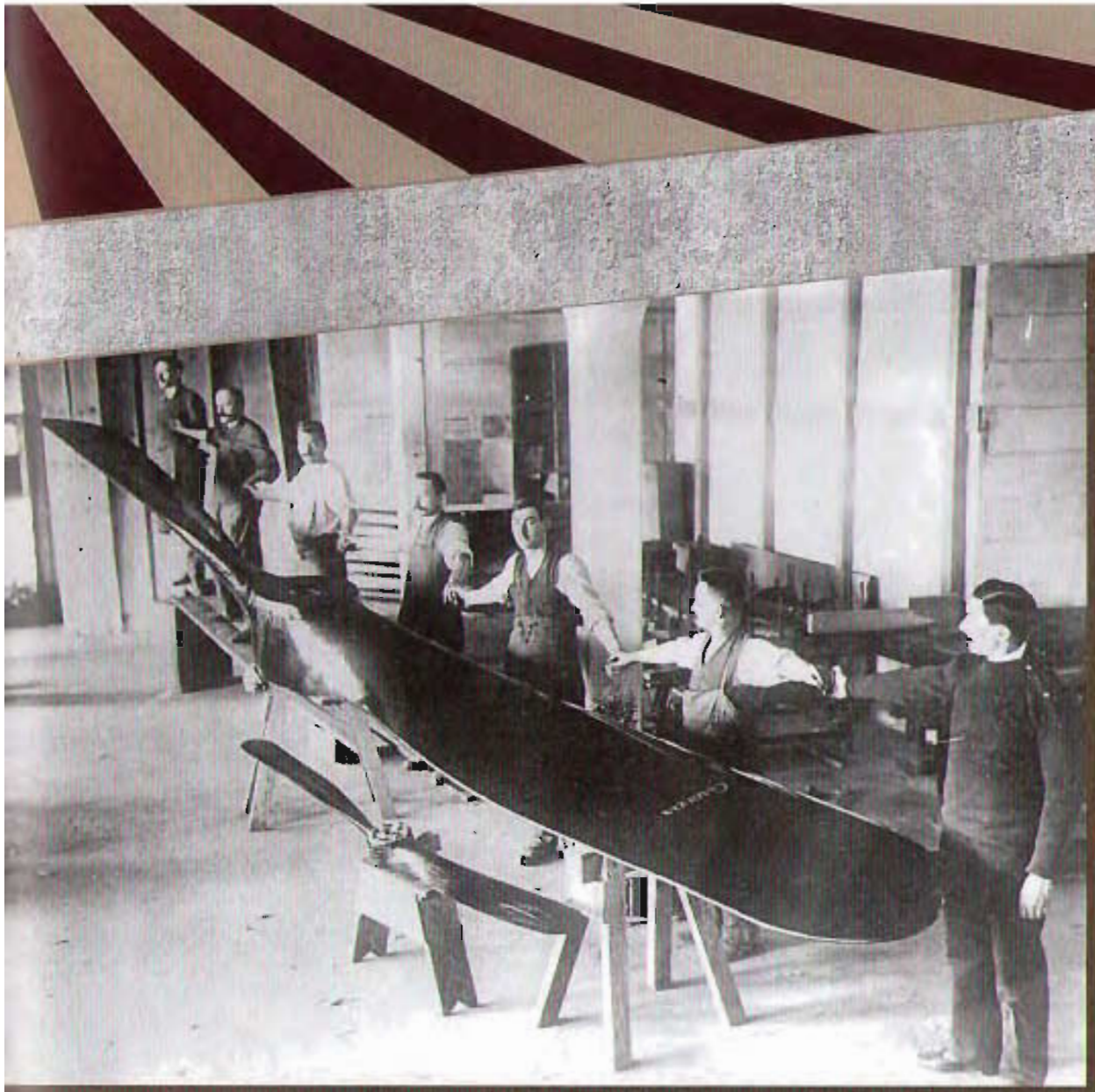
In 1938, a year before the helicopter first flew, Igor Sikorsky predicted that "the helicopter will prove to be a unique instrument for the saving of human lives." The helicopter's legacy of lifesaving began in the early 1940s. During World War II, U.S. Army Lieutenant Carter Harman used the R-4 to rescue four Allied soldiers after their airplane crashed in Japanese-held Burma. U.S. Armed Forces also used the R-6 in the Pacific theater to evacuate wounded soldiers from combat zones and rescue air crews whose aircraft did not make it over "the hump" of the Himalayas.

The importance of the helicopter for saving human lives really became clear during the Korean War. During the conflict, 10,000 wounded soldiers were evacuated from the battlefield and taken to hospitals for treatment. 1,200 soldiers were also recovered from behind enemy lines. Army GIs first called the helicopter "the infuriated palm tree," but after it was used to save so many soldiers they began calling it the "guardian angel." During the Vietnam War, Sikorsky developed the HH-53 series of helicopters specifically for combat search and rescue.

Medical professionals who treat injured people have determined that people are more likely to live if they receive treatment within one hour after their injury. They call this first hour after injury the "Golden Hour." Helicopters are considered critically important tools in both civilian and military trauma cases because they are more likely to get injured people to the hospital for treatment within the golden hour.



A UH-1 helicopter hovers above Vietnamese Air Force personnel of the 211th Helicopter Squadron on a combat assault in Vietnam in July 1970.
(Image courtesy of the U.S. Air Force)



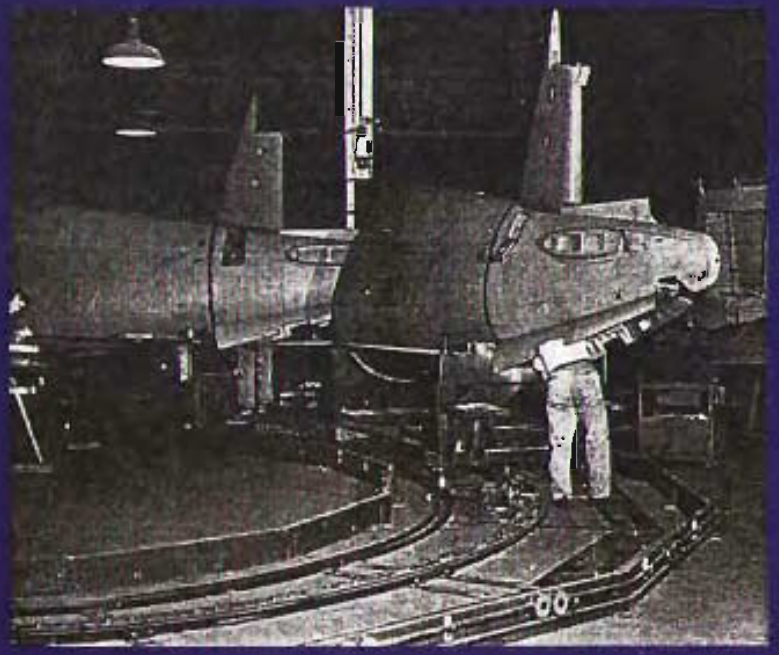
Sikorsky's workers show the size of the propeller. (Image courtesy of the Library of Congress.)

The facility now known as the Stratford Army Engine Plant had a great impact both culturally and economically on the town of Stratford. Igor Sikorsky built the original portion of the factory complex in 1929, attracted by the deep waters and nearness to an airport. The new Sikorsky Aviation Corporation factory attracted Russian immigrants who left Russia during and after the Bolshevik Revolution. In Stratford they found good paying jobs and religious freedom. The Russian community founded St. Nicholas Russian Orthodox Church in 1929 so they could worship in an orthodox manner. Igor Sikorsky was a founding member of the church and a parishioner until his death in 1972.

Sikorsky Aircraft, though no longer at the Stratford Army Engine Plant location, is still located in Stratford and remains Stratford's largest employer.

Sikorsky's Russian workers.
(Image courtesy of the Igor I. Sikorsky Historical Archives, Inc.)

During WWII, the Vought Sikorsky manufacturing plant in Stratford became part of America's Arsenal of Democracy with the Kingfisher and the Corsair. Connecticut in 1939 had not yet recovered from the Depression, but with the help of war contracts that Vought Sikorsky and other defense contractors received, the economy improved. As their orders increased, so did the need for workers. The state government helped enlist workers for defense contracts throughout the state, through education and opening the borders to those outside the state. These new people would have a lasting impact on the culture and face of the state as a whole.



Workers on the Corsair assembly line.
(Image courtesy of the Stratford Historical Society)

After the war, the Air Force and Army contracted with Avco to produce jet, helicopter, landing craft, and tank engines at the Stratford plant. The Stratford plant's skilled blue-collar labor could count on steady work as a result of the defense contracts. However, between WWII and the Korean War and then the Vietnam War, unemployment across Connecticut increased as the number of defense contractors grew and the amount of work fell off. This caused unrest and divisions amongst the workers. However, foreign wars and international strife created a new demand for production, and therefore jobs, for these blue-collar workers.

Workers constructing Quonset huts in the 1960s.
(Image courtesy of the Stratford Army Engine Plant)

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Workers constructing Quonset huts in the 1960s.
(Image courtesy of the Stratford Army Engine Plant)

The Stratford Army Engine Plant was closed in 1998 as part of the Base Realignment and Closure (BRAC) process. The United States Congress and the Department of Defense implemented the BRAC process in order to close excess military installations and save taxpayer dollars.

The Army and the Connecticut State Historic Preservation Office determined that the Stratford Army Engine Plant's Building 2 is eligible for listing on the National Register of Historic Places and potentially eligible for National Historic Landmark status. The building is significant for its association with the events of World War II, such as the Kingfisher and the Corsair production and as an example of the work of master industrial architect, Albert Kahn.

Workers in the test cell building.
(Image courtesy of the Stratford Army Engine Plant)

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