

Air and Space this Week

Item of the Week

The H-4 Hercules, aka the “Spruce Goose”

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Evergreen Air & Space Museum

The largest wooden aircraft ever built has a long and interesting history prior to its acquisition by the Evergreen Air & Space Museum in Oregon. Originally requested for the WWII war effort, it was too late for the War, and obsolete before it was built. But it could fly, and did, one time, barely. It was Hughes’ baby, and he kept it safe up until his death. Then the fun began...

The Need

The U.S. military in WWII was faced with an enormous problem: How best to ship huge quantities of men, equipment, and supplies to the European Theater of Operations without subjecting them to the U-boat threat. Airlift capability at the time was not capable of handling a task of that magnitude. Cargo ships were better suited for cargo, not passengers, even under the spartan conditions in the once-luxurious liners commandeered for the duration. Famous fast cruisers were pressed into service, relying on their speed to evade slow U-boats, but they could not deliver the number of troops that would be needed. What to do?

Howard Hughes Steps Up...

Howard Hughes was already famous by the time WWII broke out. He first became well-known to the public as a successful movie producer, with several big budget successes in the late 20s and early 30s. He was also becoming a major success in commercial aviation, forming the Hughes Aircraft Company in 1932 and setting a number of world speed records in several aircraft and categories. He built and crashed the *Hughes H-1 Racer*, suffering injuries that would plague him the rest of his life. His flying and building prowess won him two Harmon Trophies, the Collier Trophy, and a Congressional Gold Medal.

The U.S. Merchant Marine took a terrible beating from the U-boats in their “Happy Time” in 1942. One result was for the U.S. War Department issued a call for the manufacture of an aircraft capable of crossing the Atlantic while carrying a very large payload.

But there was a kicker to the call – the aircraft to be produced could not be constructed with any strategic materials. Including aluminum.

The Hughes Aircraft Corporation wanted to respond, but the design requirements were daunting.

... With Henry Kaiser's Help

Famed shipbuilder and manufacturing genius Henry Kaiser was working on the same problem, but from a different perspective. He strove to mass-produce 5000-ton "Liberty Ships" very quickly, using pre-fabricated sections and other then-innovative shipbuilding techniques. He could make 'em faster than the U-boats could sink 'em. Kaiser's success earned him access to the strategic materials he needed. There are a lot of holes in the Mojave today that used to be iron deposits, mined out for the demand for steel for Liberty Ships.

HAC partnered with Kaiser, who came up with several options for the basic design for the *HK-1* ("Hughes/Kaiser"). It would have to be the largest plane ever built at the time in order to be able to carry a payload of 150,000 pounds, the equivalent of 750 fully-equipped troops or two M4 Sherman tanks, across the Atlantic non-stop. The plane would have to be made mostly of wood, both to save weight and to conserve strategic materials. And to top it off, the aircraft would have to be a seaplane, capable of landing and taking off from water, complicating the plane's hull design and construction. The Kaiser people came up with the basic final configuration, but the Hughes experts would have to take that basic design and make it fly as required, no mean feat. A development contract for three prototypes was let, and work began on the *HK-1*.

Construction difficulties were severe, but it did lead to an early form of "composite" material construction (the Duramold Process), using a combination of plywood and resin to create a material as light as wood, but much stronger. But the many difficulties delayed construction considerably.

Kaiser Bails

Henry Kaiser was a "get it done yesterday" kind of manager, and the delays frustrated him to the point that he pulled out of the project when actual construction began, 16 months after the development contract had been let. The prototype aircraft was then re-named the Hughes *H-4 Hercules*. But because of its unusual construction, wags called it "The Flying Lumberyard" and "The Spruce Goose." Hughes hated both names, and to be fair, the wood used was birch, not spruce. He much preferred the "Hercules" moniker.

The U-boat threat diminished greatly as the War progressed. "Happy Time" became a distant memory as Germany's U-boat force losses mounted (~75% of all WWII U-boat crewmen were KIA). The need for a giant wooden air cargo plane diminished, further slowing the prototype's construction. It wouldn't be flight-ready until 1947, about two years *after* V-E Day!

Hughes was called to testify before the Senate War Investigating Committee in 1947, and faced sharp inquiry over the use of government funds (over \$200 M in today's dollars) to build a never-used late-delivered aircraft that a lot of people couldn't actually fly. Hughes responded by pointing out the design and construction difficulties encountered. The prototype aircraft was over 50 feet tall, and had a wingspan of over 300 feet (a record held until 2019!).

Hughes was determined to prove that the *H-4* was a good aircraft, fully capable of flight and meeting its design requirements. In between Committee sessions, he returned to California to begin the preliminary testing necessary to attempt the first test flight.

The first step in the testing process for any new plane, land or sea-based, was taxi testing, running down the take-off zone at speeds lower than that for take-off, in order to test safely the basic operation of the plane. Hughes was going to personally pilot three taxi tests, which would occur on **November 2, 1947**.

The *H-4 Hercules* was a behemoth, requiring a large crew to make it fly safely. That day it had Hughes, a co-pilot, two flight engineers, and sixteen mechanics. But it also carried invited press and industry representatives. A total of 36 souls were on board.

Two test taxi runs were completed successfully. Hughes then dropped off four reporters so they could file their stories about the test before their deadline.

But there was a final test run scheduled for that day....

The Flight of the *Spruce Goose*

Hughes taxied out into the channel off Long Beach, and this time, he shoved the throttles much further forward than he did for the first two tests. The *H-4*'s eight Pratt & Whitney "Double Wasp" 3000-hp engines roared, and the speed of the giant seaplane steadily increased. Suddenly, it lifted off the water and remained airborne for a total of ~26 seconds, during which it flew for about a mile. The *Goose* attained a maximum altitude of 70 feet, never climbing out of the ground effect. Hughes proved it could fly, but it never did so again.

Aftermath

Hughes refused to acknowledge that his technical and manufacturing masterpiece was a white elephant, and arranged for a large standing crew to maintain the *H-4* in flying condition in a specially-built climate-controlled hangar, where it remained until Hughes' death in 1976.

The U.S. government had paid for the *H-4* prototype to be designed and constructed, and justifiably felt that the *H-4* belonged to the Defense department. They hadn't contested Hughes for possession when he was alive, but the *H-4* had historical value and Hughes' Summa Corporation, the National Air and Space Museum, and other were after the *Goose*. Lawyers got involved.

A reasonable compromise was reached in the ownership dispute. Summa would give the *Hughes H-1 Racer* in their possession, plus a museum-grade model of the *H-4* and part of the *H-4*'s wing, to NASM, who would drop their claim on the *H-4* in return. Summa would pay \$700K to the Federal government and receive the title to the *H-4*, with the requirement that the aircraft would not be used "commercially."

The Aero Club of Southern California bought the *Goose* in 1980, and put it on display in a specially-built dome in Long Beach, alongside the *Queen Mary*. It was quite a tourist attraction. And then the situation got somewhat messy; cue Walt Disney and the Lone Ranger.

John D. Wrather was an east Texas oil man, inheriting the Overton Refining Company from his father in the early 1940s. After serving in WWII, he moved to Hollywood and founded a movie production company, and enjoyed success in the early 1950s. He also invested in real estate and local radio and TV stations. He also bought the rights to the *Lone Ranger* TV show in 1954, and would follow that up with the purchase of the *Lassie* TV series in 1956 and Sergeant *Preston of the Yukon* TV show in 1957. He even bought Muzak Corporation in 1957.

Walt Disney had borrowed a lot of money to build Disneyland in Anaheim, opening in 1955. He lacked the funds to build the hotel and other supporting services for the new attraction. Enter Jack Wrather, who financed and then owned the Disneyland Hotel. The amusement park was a success, but Wrather refused to sell the hotel to Walt.

At some point while all that was going on, Wrather's company purchased the *Queen Mary* and *H-4*, dome and all. The *Goose* was still on display, but the dome hosted a number of paid events after museum hours.

Walt's folks got the last laugh. Wrather died in 1984 and Disney, now a very wealthy company, bought out Wrather's company.

Disney envisioned a large-scale facility in Long Beach they called "Port Disney." It would have a marine-themed amusement park, a cruise ship port, a marina, a large dining/shopping area, and a large hotel. They didn't want the *Goose*. The plan was going to be very costly, and the local government and public were not supportive. A big part of the problem was the proposed site was too small for the plan; 250 acres of fill would be required in an environmentally-sensitive area, and getting the expected number of tourists in and out of the facility would significantly affect local traffic. Disney dropped the Port Disney plan in favor of making WestCOT, a duplicate EPCOT facility aside the original Disneyland. That, too, was overly expensive, and ultimately ended up as Disney California Adventure Park.

But Disney still owned the *Queen Mary* and the *Goose*. The *Queen Mary* would be too difficult to move, but not the *Goose*. The ACSC helped Disney find a suitable home for the *H-4*. The dome wound up as the Carnival Cruise Lines Long Beach Terminal.

Evergreen Aviation & Space Museum in McMinnville, Oregon, was the new home selected for the *Spruce Goose*. They had to pay an undisclosed amount of money and a percentage of future profits for their centerpiece artifact. It has been on display there since 1993. The Evergreen is a pretty cool museum – check it out!

REFERENCES

Evergreen Aviation & Space Museum: <https://www.evergreenmuseum.org/the-spruce-goose>

The Aviation Zone: <https://www.theaviationzone.com/factsheets/hk1.asp>

McDonald, John J., *Howard Hughes and the Spruce Goose*, Blue Ridge Summit, Pennsylvania: Tab Books Inc., 1981. ISBN 0-8306-2320-5.

Winchester, Jim. "Hughes H-4 'Spruce Goose'." *Concept Aircraft: Prototypes, X-Planes and Experimental Aircraft*. Kent, UK: Grange Books plc., 2005. ISBN 978-1-59223-480-6.

NASM's Involvement: https://siarchives.si.edu/collections/siris_sic_1278 and https://transcription.si.edu/transcribe/9724/SIA-SIA_000001_BORMTG_19750124_088

Boeing document: <https://www.boeing.com/history/products/h-4-flying-boat.page>

"World's Largest Airplane Takes to the Road" *Popular Science* article, August, 1946 (check out the article on SHORAN and the advertisements of the day, too!):

<https://books.google.com/books?id=LiEDAAAAMBAJ&pg=RA2-PA28#v=onepage&q&f=false>

"200 Tons: And It Flies!" *Popular Mechanics* article, January, 1948:

<https://books.google.com/books?id=QtkDAAAAMBAJ&pg=PA124#v=onepage&q&f=false>

Jack Wrather: https://en.wikipedia.org/wiki/Jack_Wrather

Wrather vs. Clayton Moore: https://en.wikipedia.org/wiki/Clayton_Moore

Port Disney: https://en.wikipedia.org/wiki/Port_Disney

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