



JEFF SKILES

COMMENTARY / CONTRAILS



Zeppelin NT

A new kind of dirigible

BY JEFF SKILES

THE CIGAR-SHAPED airship must have been a sight to see as it traveled fast propelled by its five powerful Maybach engines. Cruising at only 200 meters (650 feet) to avoid valving hydrogen into the atmosphere, its 800-foot length certainly darkened the ground below with its shadow.

The *Graf Zeppelin* made approximately 590 flights over nine years and flew more than 17,000 hours. Capable of 80 mph, the *Graf* carried well-funded travelers across the South Atlantic from Germany to Rio de Janeiro in only four and half days. In the early 1930s, that was a world-shrinking pace. The zeppelin made almost 140 such crossings until in one moment the age of the dirigible was over.

The *Graf* was inbound for Germany in the area of the Canary Islands when the first worldwide news flash reached the passengers and crew. The *Graf Zeppelin's* even larger hangar mate, the *Hindenburg*, was no more. The year was 1937, and the next day upon arrival in Friedrichshafen the *Graf's* days were over. The great dirigible would make only one more brief flight before being quietly dismantled.

Zeppelins were the first aerial ocean liners years before Pan Am made its first nascent attempts at crossing the oceans with flying boats. The *Graf Zeppelin*, the *Hindenburg*, and the *Hindenburg's* sister ship the *Graf Zeppelin II* are the best known symbols of the airship era, but America also has a rich history with airships.

SHENANDOAH

The U.S. Navy's interest in rigid airships was grounded in long-distance aerial reconnaissance to support fleet movements. The *Shenandoah* was a close copy of a high-altitude German bomber design that fell into Allied hands at the end of World War I. Its first flight in 1923 was record setting because it was the first ascent of a helium gas rigid airship. While helium, at No. 2 on the periodic table of elements, is not quite as light as hydrogen, it has the welcome benefit of being inert and non-flammable. The *Shenandoah* flew for only two years before tragically meeting its end in a storm over Ohio.

LOS ANGELES

The Navy then contracted with the Zeppelin Company of Germany to build the *Los Angeles*. The dirigible was delivered to American soil by Capt. Hugo Eckener. Already renowned as an

accomplished airship captain, Eckener and his crew were greeted with a parade up Broadway in New York City and a personal audience with President Calvin Coolidge.

The *Los Angeles* was used primarily as a training ship and was fitted with a trapeze-like attachment to experiment with the launch and recovery of fixed-wing aircraft. It served an eight-year career before being dismantled in 1932.

AKRON AND THE MACON

The experiments conducted on the *Los Angeles* led to the design and commission of two large dirigibles manufactured by a joint venture between the Zeppelin Company and Goodyear Tire and Rubber of the United States. Christened the *Akron* and the *Macon* the ships were almost the size of the *Hindenburg* itself and were fitted out as aerial aircraft carriers complete with an internal hangar deck housing F9C Sparrowhawk fighters. Both airships met a violent yet kindred fate, with the *Akron* crashing in the Atlantic Ocean off New Jersey and the *Macon* in the Pacific off the California coast.

ZEPPELIN NT

Today, a new zeppelin is flying in America, also built in a partnership between Goodyear and the Zeppelin Company, and the Zeppelin NT will eventually replace all four iconic Goodyear blimps. The NT stands for New Technology, and the Zeppelin NT puts a modern twist on traditional airship design. Where the zeppelins of 80 years ago were built with a rigid aluminum structure sheathed in “goldbeater’s skin,” literally the intestines of cows, the new zeppelin has a rigid internal structure consisting of carbon fiber frames that are joined together by three aluminum longerons running the length of the ship. This structure is braced by cables and encircled by a lifting gas envelope that is attached with thousands of zip ties.



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The Zeppelin NT is categorized as a semi-rigid airship, and while only a third the size of its celebrated ancestors, the Zeppelin NT is a vast improvement over airships of the past.

Its internal structure allows two of its three 200-hp Lycomings to be mounted on the side of the zeppelin, and they can be rotated 120 degrees, from 90 degrees up to 30 degrees down, to provide vectored thrust. The third engine is mounted on the tail and powers two propellers through a complicated drivetrain. One propeller is mounted much like a helicopter's tail rotor and provides yaw control at slow speeds. The other propeller is in a pusher configuration but can be rotated 90 degrees down to point at the ground and assist in hovering. This arrangement allows the Zeppelin NT to perform maneuvers that a blimp simply can't. The Zeppelin NT can hover, take off and land vertically, or rotate 360 degrees in its own length, all without the need for a large ground crew.

THE TAKEOFF

I flew in a Zeppelin NT four years ago when it was at EAA AirVenture Oshkosh being operated by Airship Ventures. The gondola is spacious with seating for 14, and the zeppelin even has a restroom and a rear lounge. The flight deck is very modern with glass displays. New Technology means the zeppelin is a fly-by-wire aircraft. The pilot operates a side-stick controller that controls both the rear engine and the ruddervators on the tail.

For a rolling takeoff the pilot adds thrust and tilts the forward two engines up about 30 degrees while the rear engine stays pointed toward the ground. This has the effect of rotating the dirigible's nose skyward. If the pilot were to tilt the engines up 90 degrees, the Zeppelin NT could lift off like a helicopter.

Passing through 25 knots the ruddervator tail surfaces become effective, and the rear engine rotates to its in-flight pusher configuration. Passing through 30

knots the main engines are also rotated forward to their cruise alignment, and pitch, yaw, and roll are controlled completely by the ruddervators.

Just as with a blimp, the bag is filled with helium except for two ballonets within the envelope that hold ambient air. As the zeppelin rises the helium expands and pushes the air out through the ballonets until they are empty, at which point the zeppelin reaches its operational service ceiling of about 6,000 feet.

THE LANDING

To land, the pilot tilts the vectored-thrust engines downward 30 degrees to pull the dirigible to earth. The angle of the thrust line controls the descent; the throttle controls the speed.

At less than 30 knots, the rear propeller pivots from its in-flight pusher configuration to point at the ground once again, and control of the rear engine's propeller switches to the side-stick controller to give positive control of both yaw and pitch at slow speeds.

As the main wheel below the gondola gently bumps the grass, the tail wheel is forced to the ground by the thrust of the rear engine. Only one crew member stands outside to grab the line hanging down from the nose.

THE FUTURE

The operational advantages to a dirigible like the Zeppelin NT are dramatic, which is why one already flies in the colors of Goodyear and the rest of the celebrated blimp fleet is scheduled for replacement.

Just as with the construction of the Akron and the Macon in the 1930s, these dirigibles are being built in the United States with a partnership between Goodyear and the Zeppelin Company. Maybe the age of the dirigible is still to come. *EAA*

Jeff Skiles, EAA Lifetime 336120, is an ATP and CFII-ME who has been an airline and light airplane pilot for almost 40 years. He previously owned a Cessna 140 and a Waco YOC and currently flies a Cessna 185. Jeff can be reached at JeffreyBSkiles@gmail.com.