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The Father Of Fast, Safe Jets

By PETE BARLAS
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When Richard Whitcomb worked on many of his aircraft designs for the Langley Memorial Aeronautical Laboratory, he kept a cot in the lab during double shifts.

"The way I do things, I had to be there after I got a set of results to decide what I'd do next. I couldn't just come in the next morning," he told Transformations, the alumni magazine of his alma mater, the Worcester Polytechnic Institute.

Whitcomb, an aeronautical engineer, spent many of those hours in the lab's transonic wind tunnel.

His aim was to perfect designs in aviation that would boost the speed and safety of military and commercial aircraft.

Whitcomb's primary foe was aerodynamic drag. The force slowed airplanes from soaring to new heights.

How to overcome the problem? Dedication.

Whitcomb sharpened his thinking by extensive research in the lab's wind tunnel.

That drive also kept him ahead of other engineers who tried to get the same results strictly through mathematical formulas, says Graham Warwick, senior technology editor at Aviation Week magazine.

"He could visualize in his head how the air was flowing off of the aircraft, and that allowed him to see the obstructions, things that were stopping the air from flowing smoothly," Warwick told IBD.

The Results

Whitcomb (1921-2009) didn't design entire airplanes. But his tweaks to a plane's fuselage and wings from the 1940s through the '70s helped aircraft break the sound barrier while using less fuel, says Oscar Garcia, president of InterFlight Global, an aviation consulting firm.

"Anybody who has anything to do with the design, manufacturing or operation of aircraft will know Richard Whitcomb as basically the father of the designs that allow jets to either fly supersonic or fly fast efficiently," he said.

Whitcomb was born in Evanston, Ill., and his family soon moved to Worcester, Mass.

Whitcomb, the son and grandson of engineers, gravitated to the same career fast. As a kid, he built and fired off rubber-band-powered model airplanes in competitions.

The designs gave Whitcomb his first lessons on the physics of flying and aerodynamic drag. To reduce drag, he designed his planes with propellers that folded away automatically once they stopped spinning. "Of course, the advantage only lasted about a month, because everyone followed my lead," he told Transformations.

Whitcomb received a scholarship to attend Worcester Polytechnic. He joined the school's aeronautics club and earned a B.A. degree in mechanical engineering in 1943.

That year he joined the National Advisory Committee for Aeronautics' (a NASA predecessor) Langley Memorial Aeronautical Laboratory. The government agency put him to work in its transonic aerodynamics branch, testing aircraft designs, in Hampton Roads, Va.

In October 1947, the Air Force's Chuck Yeager became the first to break the sound barrier at Mach 1, or more than 700 mph. He did it in the rocket-powered X-1.

Whitcomb wasn't all that ecstatic. "A rocket just rammed that airplane through the speed of sound, but the drag was so high that they used up all of their fuel in just about five minutes, so it was not a practical supersonic flight, but it did accomplish a breaking of the barrier," he said on a NASA TV show.

In 1951 he produced the first of his three aviation breakthroughs, changing the shape of a plane's fuselage by creating an indentation behind the wings. He gave the technology a name: area rule.

The affect made the fuselage resemble a Coke bottle.

The military especially grasped the shift. In one test in 1954, area rule helped increase an Air Force jet's top speed by 25%.

Area rule, which reduced drag and fuel consumption, is still in use, says InterFlight's Garcia.

"Thanks to that body design, an airplane can fly at 500 miles an hour without drag, so that really changed the rules of the game," he said.

Whitcomb used known aerodynamic principles to develop area rule. But much of the work was garnered from experience in the wind tunnel, he told WPI.

"I didn't run a lot of tests to arrive at an idea and I didn't do a lot of mathematical calculations," he said. "I'd just sit there and think about what the air was doing, based on flow studies in the wind tunnel."

In the early 1970s, Whitcomb developed the supercritical wing.

It featured a flattened wing top and a curvature on the bottom. The new look further reduced aerodynamic drag and fuel consumption while increasing speed.

Other benefits came with the new wing, says Ken Qualls, a pilot and founder of Flight Management Solutions, an aircraft service company.

"You have better engine life because the engines aren't working as hard

and you can achieve liftoff a little faster and carry more weight," he said.

Also in the 1970s, Whitcomb completed his trifecta with winglets, supplementing a plane's wings.

Whitcomb's discovery let planes capture some of the air flow that had been lost on the wings. Planes could fly faster while increasing fuel efficiency by up to 7%, Garcia says.

"The winglets make the airplane go quicker, burn less fuel and lift more weight and take off on shorter runways," he said.

Whitcomb's area rule and supercritical wing were meant for the military first. "Everything he did was kept secret for the U.S. Air Force to have supremacy over the Russian air force," Garcia said.

As for the winglets, some firms balked at Whitcomb's design, says Aviation Week's Warwick, yet came around because of fuel savings, speed or style. "Winglets are everywhere," Warwick said. "You look out the window of just about any airplane and they are there because of Whitcomb."

All Business

Not even his social life could push him off his one track. He had a girlfriend for 25 years, but never married. "I love women," he told WPI, "but not as much as I loved working at the lab."

Over the years, Whitcomb turned down other job offers. He preferred the autonomy of working at the lab. But when management began to get more controlling, Whitcomb took early retirement in 1980. He was 59.

Throughout his life, he had a thirst for improving the status quo.

"There's been a continual drive in me ever since I was a teenager to find a better way to do everything," he told the Washington Post.

Whitcomb died last October in Newport News, Va. He was 88.

Whitcomb's Keys

- Developed ways for planes to reach supersonic speeds while consuming less fuel.

- "I visualize in my mind what the air is doing."

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