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SPECIAL 2015 EDITION

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Honda learns to fly

Hall of fame CEOs
THE FLIGHT OF HIS LIFE

At a North Carolina airfield just 240 miles from aviation’s birthplace, a revolutionary Honda engineer named Michimasa Fujino is making his 29-year dream of a new kind of business jet a reality.

BY JOANN MULLER

MICHIKASA FUJINO, CHIEF EXECUTIVE OF Honda Aircraft Co., clammers up a steep ladder to a grated-metal platform to check on his baby. At eye level he peers inside the machinery where Honda’s new advanced light jet is choking in wires and sensors—3,000 gauges in all—an ugly cross between a spacecraft and a Christmas tree. He’s collecting data on the plane’s structural integrity while it’s being buffeted with simulated forces well above its maximum loads.

The plane’s composite fuselage holds up well, as expected, inside this sophisticated torture chamber in Greensboro, N.C.—a good sign. Next door, in a sparkling new factory with soaring ceilings and a floor so glossy you
can see your reflection in it, workers dressed in bright white uniforms are handcrafting HondaJets for customers who have been waiting more than eight years to take delivery. The wait is nearly over. On Mar. 27 the plane received provisional type certification from the U.S. Federal Aviation Administration, a critical milestone that means it is safe for flight. Final FAA approval is expected in the next few months.

When it comes, it will be a great relief for Honda, the $117 billion (sales) Japanese industrial icon (No. 63 on the Global 2000) best known for making cars, motorcycles and power generators. The launch of HondaJet, three decades in the making at an estimated cost of $1.5 billion to $2 billion, is an opportunity to shift the focus away from a string of crises that knocked the company off its game in recent years. It survived the Great Recession only to be rocked by the Japanese tsunami and then a flood of quality recalls that tarnished its reputation. Earlier this year U.S. regulators slapped Honda with a record $70 million fine for failing to report warranty claims and more than 1,700 incidents involving death or injury, as required under the government’s early-warning safety system. A few weeks later Honda said CEO Takanobu Ito, 61, would step down in June after six years at the helm. Honda officials disputed reports that Ito was pushed out, noting that his tenure was in line with past CEOs and that he handpicked his successor.

While the company is thrilled to showcase its reviving industrial ingenuity, no one will be happier than Fujino. The delivery of the first HondaJets in the next few months is the culmination of a 29-year obsession to create a breakthrough small jet aircraft—quieter, roomier and faster than any rival on the commercial market.

With a price tag of $4.5 million, the HondaJet is being marketed as a tool for business owners who have assets of $20 million to $40 million and want to keep tabs on their operations. But they’re just as likely to use one for a quick golf outing or weekend getaway. These buyers, mostly in the U.S., were hit hard when the economy tanked, and many wouldn’t have been able to get financing anyway. But Honda’s timing could be right, says aviation consultant Rolland Vincent. Worldwide sales of business jets rose 6.5% in 2014, to 722 planes, worth $22 billion. Although very light jets (like the 9,200-or-so-pound HondaJet) are still lagging, sales are perking up. Last year 87 light jets (under 12,500 pounds) were delivered, up from 77 in 2013 but still way down from the 371 delivered in 2008. “The feeling that we’re through this dark time is highest among smaller-jet owners,” Vincent said. Early demand is promising. Honda already has more than 100 orders. Successful newcomers are rare in the aviation industry, but Honda’s credibility in autos gives it a better chance than most, says Vincent. “Who can question their engineering prowess, their manufacturing expertise, their supply chains?”

And who can question Fujino’s determination to reinvent business jet travel?

“My career objective was to create a concept for an airplane, and design and sell it by myself,” said the intense but soft-spoken Fujino, a youthful-looking 54, with thick eyebrows and large wire-rim glasses competing for attention. “I don’t want to be [responsible for] just a portion of the product. I want to start by concept.”

It’s hardly the traditional deflated-ego kenkyo of a “team-first” Tokyo salaryman, but that’s Fujino. In an age where engineering is dominated by anonymous teams his HondaJet, with its long tapered nose and distinctive engine placement on top of the wings, is a personal statement, the aluminum and carbon-fiber embodiment of an extraordinary decades-long journey that led him from his birthplace in Japan to a Mississippi college town, back to the boardrooms of Japan and, finally, to the helm of this manufacturing plant in North Carolina, 240 miles—as the private jet flies—from Kitty Hawk, where the Wright brothers took flight in 1903.

“From time to time there are developments in aircraft that break the mold of the past,” says Bruce Holmes, a former NASA research engineer and aerodynamics expert. “And I think the HondaJet is one of them.”

EVEN PARKED ON THE TARMAC, THE HONDAJET is striking, with its sharp beak and bold palette choices: red, blue, green, yellow or silver. But its most distinctive feature is the unusual location of the engines—on top of the wings.

On most aircraft the engines are below the wings or attached to the rear of the fuselage. Without those structural constraints the HondaJet (which is about two and a half times the size of a minivan) can provide more room for passengers and their stuff. The cabin is 20% larger than comparable business jets, and the rear cargo area is spacious enough for 16 pieces of luggage, including 2 golf bags. Passengers don’t have to play footsie the way they do in most small business jets; the facing seats are set farther apart, providing 14 inches of extra legroom. It seats up to seven, including the pilot. And there’s still enough space for a bathroom, an important selling point, says Fujino. With the engines out over the wings, it’s also quieter.

Honda says its jet flies faster and higher than any other jet in its class, such as Cessna’s Citation Mustang (391mph) and Embraer’s Phenom 100E (448mph) jets. It’s also about 15% more fuel-efficient. The top speed is 483mph, and the maximum cruise altitude is 43,000 feet—higher than most commercial airliners. Its range is 1,358 miles, not enough to fly coast-to-coast but perfect for regional hops or even a trip from New York to Miami.

Still, something looks off. Don’t two bulky engines sticking up from the wings kill the plane’s aerodynamics? That’s what most aviation experts learned in school, supported by a failed attempt in Germany years earlier. “When I showed people the sketch, everybody laughed at me,” recalled Fujino. “They hated
the idea." Fujino’s secret, discovered after years of analysis and a chance encounter with an old textbook, was finding the perfect spot to mount the 465-pound engines. When he tested a scale model of his plane at Boeing’s wind tunnel facility, the results showed that his plane produced less drag at high speeds than conventional “clean wing” designs.

As a child, Fujino was fascinated by airplanes and studied aeronautical engineering at Tokyo University. But in Japan there wasn’t much of an aerospace industry, so his education was mostly theoretical. After graduating in 1984 at age 24, he joined Honda, where he worked on automobile research and development.

His background wasn’t lost on Honda executives, however, who in 1986 launched a series of secret R&D projects, in keeping with the company’s culture for placing bets on innovations that could pan out decades down the road. Fujino, then 26, was surprised and somewhat reluctant when he was reassigned to a small team tasked with developing an experimental airplane. (Honda’s famous humanoid robot, Asimo, grew out of another of these secret R&D projects.)

Fujino was uprooted from his home in bustling Tokyo and transplanted to tiny Starkville, Miss., home of Mississippi State University, a leading research center for advanced aeronautics. Working out of a drafty airplane hangar and living in an apartment three times bigger than his home in Japan, Fujino faced culture shock. He couldn’t understand the locals’ drawl and longed for Japanese food in a three-stoplight backwater.

FOR A DECADE FUJINO AND the Honda aviation team toiled in Starkville, challenging the limits of existing technology. Their first project was to modify an existing single-engine turboprop plane by making the wings and tail section out of composite materials. For Fujino it was his first hands-on experience with a real airplane. Much of the first year was spent sanding molds and fabricating parts. The second jet was built from scratch. They gained practical experience in airplane design, but without breakthrough technologies that would bring new value to the industry, the company didn’t see much reason to get into aviation. So in 1996 Honda pulled the plug. Fujino and his heartbroken colleagues were shunted back to Tokyo and started looking for new jobs within Honda R&D.

But Fujino wouldn’t give up. During his years in Mississippi he came to understand American culture and lifestyles, and recognized the need for small planes and regional airports in a country as vast as the U.S. He was still convinced there would be a market for a plane that was fast and fuel-efficient and didn’t sacrifice cabin or luggage space. He kept looking for a design breakthrough.

It came in 1997 as Fujino was unpacking after moving to a new home in Japan. He spotted a 1930s aeronautics textbook by Ludwig Prandtl, the German aeronautical engineer whose pioneering analysis built the foundation for modern aerodynamics. As he leafed through the dusty pages, he was reminded that in the early 20th century there were no computers for numerical simulation or computational fluid dynamics. Instead, Prandtl and his peers used complex theoretical functions—old-fashioned math—to analyze aerodynamic flow.

This got Fujino thinking: Instead of trying to minimize interference between the air flows around the wings and around the engines, why not combine the two air flows to find the ideal aerodynamics overall? That would help him identify the sweet spot on the wings for the engines. “It was a very different thought process,” he said.

One night, not long after he found the textbook, he was lying in the darkness when a new design concept hit him. He jumped out of bed, flipped on the light switch—and couldn’t find a piece of paper. So he ripped a calendar off the wall and sketched his inspiration on the back of it. It became the engine-on-wing concept for the new HondaJet.

In December 1997 Fujino pitched Honda’s board of directors. He showed them his sketch, told them about the need he’d seen in America for small jets and how it could transform mobility for customers there. It could become the Honda Civic for the skies. Eventually he won their approval to develop his concept.

FOR THE NEXT THREE YEARS FUJINO WORKED on his ideas. The location of the engines on the wings was critical, but there were other important aerodynamic features that made the plane more efficient. One was the wing itself. Specially shaped to reduce drag, with surface irregularities—like rivets—reduced to a minimum, the wing’s contour allows air to flow smoothly across it, a concept called natural laminar flow. Another important design breakthrough was the plane’s long, sloping nose with bulges and curves in deliberate places: It, too, allows a ribbon of smooth-flowing air to hug the fuselage. By cutting down on the drag that typically occurs at high air speeds, these innovations provide better aerodynamics without decreasing lift, making the HondaJet more efficient.

He genuinely felt that Honda was making important technology breakthroughs, but because the project was still top-secret, he couldn’t talk about it, not even with his family (his wife, a son and two daughters). Meanwhile, other companies were getting credit for their work on lightweight jets. He craved outside validation for his ideas. “I don’t know how many times I wanted to quit,” he recalled.

In October 2000 Honda allowed him to establish a research facility at the Greensboro airport to build a prototype, which took another three years. Finally, in December 2003, the HondaJet was ready for its maiden flight. During its steering test the plane turned “as if a figure skater were making figure eights on the ice,” Fujino recalled in a Honda case study. “I must admit I became rather emotional,” he wrote of the moment. “It
READY FOR TAKEOFF

At $4.5 million the HondaJet isn’t exactly the Civic of the skies. But it is faster and more fuel-efficient than rivals, and loaded with high-tech features. Bonus: It’s got a private bathroom.

TOUCHSCREEN CONTROLS
Honda worked with Garmin to create a state-of-the-art, computer-powered, flat-panel, multiscreen avionics system with dual touchscreen controllers.

ROOMY CABIN
With the engines over the wings, there’s more space for passengers and their cargo. Cabin features like lighting are controlled with a tablet computer instead of buttons. The bathroom? It’s in back.

TINY POWERHOUSES
Compact turbofan engines built by GE Honda Aero Engines weigh just 465 pounds each but produce 2,095 pounds of thrust.
GULFSTREAM G650

- **PRICE:** $64.5 million
- **RANGE:** 8,100 miles
  (Can fly nonstop from Shanghai to New York)
- **MAX CRUISE ALT:** 51,000’
- **CRUISE SPEED:** 562 MPH
- **PASSENGERS:** 18

DASSAULT FALCON 5X

- **PRICE:** $45 million
- **RANGE:** 6,000 miles
  (Can fly nonstop from New York to Moscow)
- **MAX CRUISE ALT:** 51,000’
- **CRUISE SPEED:** 610 MPH
- **PASSENGERS:** 8-12

ENGINE ON TOP

The HondaJet’s engines are mounted on the wings, in a carefully selected “sweet spot,” to reduce shock waves when flying at high speeds.

COMPOSITE FUSELAGE

Instead of aluminum, the plane’s body is molded from a combination of composite honeycomb sandwich panels and stiffened panels, making it strong and lightweight.

IN THE FLOW

To improve aerodynamics, without hurting lift, Honda sculpted the wings and nose to dramatically reduce drag across the surfaces.

COMFY COCKPIT

Fujino spent years studying ergonomics, visibility and human-machine interfaces to keep pilots happy for the long haul.
looked like it was moving under its own will. At last I felt as if my ‘daughter’ would become independent of me as she tried her wings for the first time.”

Despite the success—and two more years and undisclosed additional millions of dollars spent testing the aircraft—by 2005 Honda had still not committed to building Fujino’s jet on a commercial scale. To stoke public interest and sway the board of directors, he arranged for the HondaJet to make its debut at AirVenture Oshkosh, a show put on by the Experimental Aircraft Association that draws 500,000 visitors a year from more than 60 countries to tiny Wittman Regional Airport in Oshkosh, Wis. On July 28, 2005 a blue-and-white HondaJet swooped down from the sky and was immediately swarmed by thousands of airplane enthusiasts (one person gave him a $50,000 deposit).

 Armed with so much positive feedback, Fujino again went to the Honda board with a proposal to commercialize the plane. After several discussions the verdict was finally delivered in March 2006. Then CEO Takeo Fukui spoke after several minutes of silence. “He spoke as if he were convincing himself,” recalled Fujino. “‘Honda is a mobility company. We should pursue the future through the HondaJet.’ For a moment I could not even believe what I had just heard.”

Honda started taking orders in October 2006 at the National Business Aviation Association convention in Orlando, Fla. By the end of the convention it had more than 100 orders. In June 2007 the newly created subsidiary, Honda Aircraft Co., broke ground on a $120 million world headquarters, R&D center and production line at the Greensboro airport. In September 2012 it added a $20 million customer-service facility, bringing the total campus to more than 600,000 square feet on a 130-acre plot, with 1,300 employees. Honda expects to build 40 to 50 planes in the next 12 months, ramping up to 75 the following year.

“I’ve never seen a company investing as aggressively as this,” said Vincent. Based on the size of the Greensboro manufacturing facility and the cost of tooling, “they’re signaling they intend to have more jets. No one gets into this industry and has just one model.”

For now, at least, Fujino has nothing to say about Honda’s long-term plans for aviation, other than pointing out with a shy smile that the hangar doors at his North Carolina plant are almost twice the height of the 15-foot-high HondaJet’s tail.

Instead, he’d rather talk about the plane he’s just completed. Proudly poring over every detail, it’s obvious it all spilled out of his own mind—the curvature of the ceiling lights, the electronically controlled dimming shades, the panel that drops down from the bathroom door for privacy. Even the paint scheme is important to Fujino, who calls it “my final ‘artwork’ contribution.”

“Most business jets are white, with a thin stripe. I wanted something different.” Standing next to his favorite—dark blue on a white background, with silver edges for vivid contrasts—he says his goal was to reflect the movement of air flowing over the fuselage. “Airplane design is like a painting,” he says. “While I am working on it, I am already thinking about the colors I will use. And the frame to display it.”

HondaJet