

# MARTIAL ARTS

*A model shop builds an air force for the future.*

**SIMPLY HAVING LESS SURFACE** [dummy text follows] area for a given payload capacity is the principal advantage of the blended wing configuration.

On the other hand, the weight advantage that might be expected from a smaller surface area, and from relieving wing loads by distributing payload spanwise, will probably not materialize. It takes added structure for an essentially flat-walled vessel to withstand pressurization loads of 1,500 pounds per square foot. That results in a payload-to-weight ratio on par with current airplanes.

**BY CHAD SLATTERY**

Nevertheless, as fuel costs weigh heavily on everyone's mind, and it seems airlines will stop at nothing to defray those costs, don't expect to board a commercial blended wing-body any time soon. Doubts about its appeal to passengers still cling to the design. Its vast interior would be divided into a series of narrow, windowless compartments by partitions strong enough for pressurization stresses. It's unclear how evacuations would work—one advantage of a tubular fuselage is that nobody sits too far from an exit—and passengers far from the centerline would experience elevator-like sensations every time the airplane banked. For product planning, a blended wing body can't be morphed into several models optimized for different markets simply by lengthening or shortening the fuselage, as current airplanes can. And it's impractical to build a small blended wing body first to develop familiarity with it. "People being the size they are, to put them

inside the wing requires a cabin about 10 feet high," explains aerodynamicist Peter Lissaman, who consulted on early blended wing studies at McDonnell Douglas. So you're looking at a chord, the distance between the leading and trailing edges of an airfoil, of about 70 feet. Scale makes it all possible."

Time may prove these objections inconsequential. But for now, says Boeing's Princen, the company has no plans to develop the concept as a next-generation airliner. It might be viewed, and soldiers won't be alarmed by a sudden lightness in their teacups own artist's concepts—can make money with military tanker or transport. Fuel doesn't care. But for now, says Boeing's Princen, the company has no plans to develop the concept as a next-generation airliner. It might work as a military tanker or transport. Fuel doesn't care about the view, and soldiers won't be alarmed by a sudden lightness in their teacups own artist's concepts—can make money with it.

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**Once the idea of an airplane is formed, what information is sent to the model makers? Why does the company go to such pains to make them as beautiful as they are? What types of security issues do the workers at the model shop face?**

other benefit. "It's almost perfectly area-ruled," says Norm Princen, X-48B chief engineer at Boeing's Phantom Works. Area-ruling, an important technique for controlling the increase in drag as an aircraft nears the speed of sound, requires that the cross-section of an airplane vary smoothly in area from nose to tail. Conventional airliners have a hard time complying, because wings and tail surfaces make sudden bumps in the area distribution. The blended wing's smooth, manta-ray-like shape naturally approaches the ideal.

But the main reason for the superior efficiency of the blended wing body is the simplest: there's less of it there. Most of the drag of a well-streamlined object like an airliner is due to the friction of air against its exposed, or "wetted," area. The blended wing needs more wing area than a conventional airliner

to support its weight at low speed for take-off and landing, because tailless airplanes cannot use lift-augmenting landing flaps. Nevertheless, by dispensing with tail surfaces and fuselage, it ends up with 20 to 30 percent less wetted area than a conventional airplane of similar capacity. It's no accident that this figure closely matches the promised reduction in fuel burn.

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tested at NASA's Dryden Flight Research Center in California where, according to Flight Operations Engineer Gary Cosentino, C-17 and C-130 pilots are pleased with its handling. The only persistent unknown about the blended wing body is whether Boeing—or Airbus, which has scrambled onto the bandwagon with its own artist's concepts—can make money with it.

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**The work in the model shops and the skills the model makers rely on to produce these works of art. And describe the setting as well. I very much like the description of the shop's location in your proposal, but I agree that the detail about the model of an FB-23 showing up on eBay**

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