

# Jumbo

The revolutionary machine that shrank the world.

Vaclav Smil

The Boeing 747 was the first wide-bodied long-range jet — but this terse description does not do justice to a plane which most flight aficionados see as the best jetliner ever built. As it takes off for an intercontinental flight that will last more than 12 hours, a fully loaded 747-400, the latest in the jumbo series, weighs close to 400 tonnes, the equivalent of more than six of the stubby, short-range 737-500s. About 40% of its mass is jet fuel, and its four engines, mounted on wings spanning more than 64 metres, deliver a peak combined thrust of almost 112,000 kg, equal to about 280 MW of power.

The Boeing 747 was developed at the urging of Juan Trippe, founder and then president of Pan American World Airways (Pan Am). It was neither the first airliner powered by gas turbines nor the first successful intercontinental jet: the ill-fated British 106 Comet 1 presaged the jet age in 1952, and it began in earnest in 1958, with the redesigned 106 Comet 4 and Boeing 707.

William Allen, Boeing's boss, gambled the company's future by investing more than twice its worth to build the world's largest passenger jet. The wide body (to allow for two standard ship containers to be placed side-by-side) and the bubble cockpit (for easy loading through an upturned nose) betray the ultimate design intent: in the late 1960s it was expected that supersonic jets would soon

dominate all long routes, and 747s would become cargo carriers. That never happened — but the 747, rather than being just another compromise, turned out to be, in the engineer Henk Tennekes' memorable description, the only plane that obeys ruthless engineering logic.

To accomplish this, Boeing had to overcome a string of design and financial crises brought about by the ambitious construction schedule, and Pratt & Whitney had to develop the first giant commercial turbofan engines. Incredibly, the prototype took off on 9 February 1969, less than three years after Pan Am ordered its 25 747s. The first scheduled flight on 21 January 1970 came back to the gate after an engine overheated during taxiing; more than five hours later a back-up plane finally left New York for London.

If only the company's troubles had ended there! During the past three decades, Boeing has seen massive cyclical layoffs, strikes, productivity problems, plummeting stock prices and, most recently, a fierce competition with Airbus, whose smaller and slower A340 has a longer range than the 747, and

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whose planned super-jumbo A3XX is to carry 550–650 people. And Pan Am are not even around any more.

But the accomplishment remains. There are successful companies that produce little of lasting value; and there are troubled, or defunct, enterprises whose daring and vision have changed the world. The Boeing 747 is an icon and a favourite of the jet age. In 1988 came the first redesigned version, the 747-400: passengers do not see the less cluttered digital avionics and programmable displays in the two-crew cockpit, but they can feel the power of new high-bypass turbofan engines, they can see the cruising speed on their monitors closing on 0.9 Mach, and as many as 524 of them can fly nonstop at the edge of the stratosphere from Vancouver to Hong Kong, or from Singapore to London.

The 1,000th 747 was delivered on 12 October 1993, and the count passed 1,230 at the beginning of 2000. So far, the Queen of the Skies — or, more affectionately, the Big Top or Fat Albert — has carried more than two billion passengers, equal to nearly 40% of humanity. Her size, range, speed and economy have made intercontinental flight routine, with steadily declining real costs, as tens of millions of people go to family reunions, business meetings or beaches, and billions of dollars of electronic goods, flowers, clothes and toys move to rapidly changing markets. The growing integration of the global economy in general, and Asia's economic rise in particular, have been closely tied to the international fleet of 747s.

The Boeing 747 combines symbolism and function, beauty and economy: a daring, revolutionary design that has become a powerful symbol of global civilization, an improbably graceful behemoth that ushered in the age of mass intercontinental travel, its allure has not faded after three decades of unprecedented service. Next time you are at a large international airport, find a gate with a 747. Then stand, childlike, with your face against the glass right in front of the plane's huge rounded nose, note the four massive four-wheel bogies, look up at the bubble topping the fuselage, check the enormous engines mounted on a gently arched, variably cambered wing, and sweep to its end where an upturned winglet makes it easy to identify the most modern 747-400 series. Like a Gothic cathedral or a high-flying flock of Canada geese, the 747 is an object of undeniable beauty, graceful daring and irresistible awe. How can that thing fly? How that thing can fly! ■

Vaclav Smil is at the University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada.

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