

The Globalization of Production at Boeing

Executives at the Boeing Corporation, America's largest exporter, like to say that building a large commercial jet aircraft like the 747 or 787 involves bringing together more than a million parts in flying formation. Forty-five years ago, when early models of Boeing's venerable 737 and 747 jets were rolling off the company's Seattle area production lines, foreign suppliers accounted for only 5 percent of those parts on average. Boeing was vertically integrated and manufactured many of the major components that went into the planes. The largest parts produced by outside suppliers were the jet engines, where two of the three suppliers were American companies. The lone foreign engine manufacturer was the British company Rolls Royce.

Fast-forward to the modern era, and things look very different. In the case of its latest aircraft, the super-efficient 787 Dreamliner, 50 outside suppliers spread around the world account for 65 percent of the value of the aircraft. Italian firm Alenia Aeronautica makes the center fuselage and horizontal stabilizer. Kawasaki of Japan makes part of the forward fuselage and the fixed trailing edge of the wing. French firm Messier-Dowty makes the aircraft's landing gear. German firm Diehl Luftfahrt Elektronik supplies the main cabin lighting. Sweden's Saab Aerostructures makes the access doors. Japanese company Jamco makes parts for the lavatories, flight decks interiors, and galleys. Mitsubishi Heavy Industries of Japan makes the wings. KAA of Korea makes the wing tips. And so on.

Why the change? One reason is that 80 percent of Boeing's customers are foreign airlines, and to sell into those nations, it often helps to be giving business to those nations. The trend started in 1974 when Mitsubishi of Japan was given contracts to produce inboard wing flaps for the 747. The Japanese reciprocated by placing big orders for Boeing jets. A second rationale was to disperse component part production to those suppliers who are the best in the world at their particular activity. Over the years, for example, Mitsubishi has acquired considerable expertise in the manufacture of wings, so it was logical for Boeing to use Mitsubishi to make the wings for the 787. Similarly, the 787 is the first commercial jet aircraft to be made almost entirely out of carbon fiber, so Boeing tapped Japan's Toray industries, a world-class expert in sturdy but light carbon-fiber composites, to supply materials for the fuselage. A third reason for the extensive outsourcing on the 787 was that Boeing wanted to unburden itself of some of the risks and costs associated with developing production facilities for the 787. By outsourcing, it pushed some of those risks and costs off onto suppliers, who had to undertake major investments in capacity to ramp up to produce for the 787.

So what did Boeing retain for itself? Engineering design, marketing and sales, and final assembly at its Everett plant north of Seattle, all activities where Boeing maintains it is the best in the world. Of major component parts, Boeing only made the tail fin and wing to body fairing (which attaches the wings to the fuselage of the plane). Everything else was outsourced. As the 787 moved through development in the 2000s, however, it became clear that Boeing had pushed the outsourcing

paradigm too far. Coordinating a globally dispersed production system this extensive turned out to be very challenging. Parts turned up late, some parts didn't "snap together" the way Boeing had envisioned, and several suppliers ran into engineering problems that slowed down the entire production process. As a consequence, the date for delivery of the first jet was pushed back more than four years, and Boeing had to take millions of dollars in penalties for late deliveries. The problems at one supplier, Vought Aircraft in North Carolina, were so severe that Boeing ultimately agreed to acquire the company and bring its production in-house. Vought was co-owned by Alenia of Italy and made parts of the main fuselage.

There are now signs that Boeing is rethinking some of its global outsourcing policy. For its next jet, a new version of its popular, wide-bodied 777 jet, the 777X, which will use the same carbon-fiber technology as the 787, Boeing will bring wing production back in-house. Mitsubishi and Kawasaki of Japan produce much of the wing structure for the 787, and for the original version of the 777. However, recently Japan's airlines have been placing large orders with Airbus, breaking with their traditional allegiance to Boeing. This seems to have given Boeing an opening to bring wing production back in-house. Boeing executives also note that Boeing has lost much of its expertise in wing production over the last 20 years due to outsourcing, and bringing it back in-house for new carbon-fiber wings might enable Boeing to regain these important core skills and strengthen the company's competitive position.

Sources: K. Epstein and J. Crown, "Globalization Bites Boeing," *Bloomberg Businessweek*, March 12, 2008; H. Mallick, "Out of Control Outsourcing Ruined Boeing's Beautiful Dreamliner," *The Star*, February 25, 2013; P. Kavilanz, "Dreamliner: Where in the World Its Parts Come From," *CNN Money*, January 18, 2013; S. Dubois, "Boeing's Dreamliner Mess: Simply Inevitable?" *CNN Money*, January 22, 2013; and A. Scott and T. Kelly, "Boeing's Loss of a \$9.5 Billion Deal Could Bring Jobs Back to the U.S.," *Business Insider*, October 14, 2013.