The US Aircraft Industry: An Overview

T. A. Heppenheimer

Before there was an aviation industry, there were inventors who built their own airplanes. Wilbur and Orville Wright, of Dayton, Ohio, made the first successful flights in 1903 and had a well-controlled aircraft two years later. They set up the Wright Company in 1909, which started by building airplanes but soon lost out in a bitter rivalry with another planebuilder, Glenn Curtiss of Hammondsport, New York.

The Wrights claimed that Curtiss was stealing their inventions and sued in federal court. But Curtiss had shrewd lawyers who kept the suits from causing damage, and went on building airplanes. His own firm of Curtiss Aeroplane Company turned out such good planes that the Wright designs could not compete. The company eventually changed its name to Wright Aeronautical Company and turned to building aircraft engines.

The Wright and Curtiss companies both were in business before the outbreak of World War I, in 1914. A California planebuilder, Glenn L. Martin, established a firm called, logically, the Glenn L. Martin Company. These outfits all did plenty of business during that war. But after it ended, in 1918, they faced the question of what to do next.

Most of the numerous planes built in the United States during the war were of British design. Following that conflict, there was little demand for new aircraft, for there were plenty of war surplus planes and engines. Still, there were opportunities. Curtiss had built the wartime JN-4 trainer, the famous Jenny. It still was beloved by pilots during the 1920s. A flight school might charge $500 for lessons, then throw in a Jenny as a graduation present. Martin built some of the earliest bombers--one sank a captured German battleship in a 1921 exercise. This made it clear that bombers had a future.

Other planebuilders also went into business: Donald Douglas, William Boeing, and Alan Loughead, who pronounced his name "Lockheed." To avoid mispronunciations such as Loghead or Loafhead, his company used that spelling as well. All three found good prospects. Donald Douglas got started by working with a wealthy enthusiast who wanted a plane that could cross the country nonstop. By building it, Douglas gained experience that allowed him to develop a long-range Army plane, the World Cruiser. Two World Cruisers flew around the world in 1924 in a succession of short hops.

Airmail held promise for it earned federal subsidies for mail carriers that made it easy to turn a profit. A few brave travelers also began buying airplane tickets. Boeing gained an important success in 1926 with a single-engine plane that was well suited for carrying mail and passengers over the Rocky Mountains. Lockheed won its own advantage during that same year. The company's engineers included the talented Jack Northrop, who later founded his own plane-building firm. He crafted the Vega, which set speed and altitude records and became popular as an airliner.

Airliners, indeed, became mainstays of the industry during the 1930s. The Army and Navy bought few airplanes during that decade, but people were beginning to fly. Boeing brought out the 247, a fine twin-engine job that carried ten passengers where the Vega had room for only six. But it wasn't fine enough; it lost out in competition with the Douglas DC-2, which carried fourteen. An enlarged version, the DC-3, had twenty-one seats. Entering service in 1936, it had the range to fly nonstop from New York to Chicago. Within a few years, it swept most of its rivals from the skies.

There were some military orders, even if they were not large. Martin built a good twin-engine bomber, the B-10. Boeing, licking its wounds after losing with its 247, found new business by crafting a much better bomber: the B-17. It had four engines, which gave it greater speed and allowed it to carry more gasoline for longer range. It first flew during 1935 in tests for the Army. The first of the B-17s crashed, and the company might have crashed with it. But Army officials liked it, and ordered a few. This gave Boeing a leg up on building bombers for use in World War II.

That war brought an enormous surge of business to the aircraft industry. Several companies built the important warplanes of the era:

Boeing: B-17, B-29 bombers

Convair: B-24 bomber

Lockheed: P-38 fighter

Curtiss: P-40 fighter, C-46 transport

Douglas: C-47, C-54 transports

North American: P-51 fighter

Republic: P-47 fighter

Most importantly, the War Department bought airplanes by the tens of thousands. Here are aircraft deliveries by year:

Type	1940	1941	1942	1943	1944	1945	Total
Very Heavy Bombers	0	0	4	91	1,147	2,657	3,899
Heavy Bombers	19	181	2,241	8,695	13,057	3,681	27,874
Medium Bombers	24	326	2,429	3,989	3,636	1,432	11,836
Light Bombers	16	373	1,153	2,247	2,276	1,720	7,785
Fighters	187	1,727	5,213	11,766	18,291	10,591	47,775
Reconaissance	10	165	195	320	241	285	1,216
Transports	5	133	1,264	5,072	6,430	3,043	15,947
Trainers	948	5,585	11,004	11,246	4,861	825	34,469
Communication/ Liaison	0	233	2,945	2,463	1,608	2,020	9,269
Total by Year	1,209	8,723	26,448	45,889	51,547	26,254	160,070

Fleets of B-17s and B-24s, escorted by P-47, and P-51 fighters, destroyed many of Nazi Germany's factories and railroads. B-29s carried firebombs that burned Japan's cities to the ground. The C-46 carried supplies to China, helping that nation fight Japan and tying down a million Japanese soldiers who were fighting the Chinese. The C-47, a military version of the DC-3, carried troops as well as cargo. Over ten thousand of them entered service. General Dwight Eisenhower, the top U.S. commander, counted it as one of the items that did the most to win the war.

The end of the war brought a swift collapse of the aviation industry. According to Boeing historian Harold Mansfield, company officials learned of a sudden cancellation of army orders and rushed to shut down the plant before the next shift of workers came in at four p.m. At North American, employment dropped from 100,000 to 6,500 in only two months. As had been true after World War I, following World War II the nation again was awash in used aircraft that were available cheaply. A C-47 could be had for $25,000, payable at $4,000 per year, and could easily convert into a DC-3.

For airlines, the DC-3 remained popular. Most air routes were short and carried relatively few passengers on each flight, and the DC-3 served such connections quite effectively. However, after the war there also were coast-to-coast routes along with connections that crossed the Atlantic. For these, only new four-engine aircraft would do. Two became popular: the Lockheed Constellation and the Douglas DC-6 (along with a later and faster version, the DC-7). Their builders competed for advantage by offering improvements. The rivalry between Lockheed and Douglas defined progress in commercial aviation until the coming of the jets.

The first jets were military. Lockheed, Republic, and North American built the first jet fighters: the P-80, F-84, and F-86. The F-86 was the best of them, shooting down Russian-built fighters and ruling the skies during the Korean War of 1950-1953.

Missiles and jet bombers also drew attention. North American made a strong and early commitment to develop a missile of intercontinental range, the Navaho. This project needed rocket engines, guidance systems, and advanced designs that called for close understanding of supersonic flight. At the outset, in 1945, the pertinent fields of engineering simply did not exist. No matter, North American brought in good scientists and developed the necessary know-how on its own.

Boeing showed similar leadership with jet bombers. The company used scientific data from the National Advisory Committee for Aeronautics, supplementing it with data from its own wind tunnel, a research facility that helped to determine the best shapes for aircraft flying close to the speed of sound. This allowed the company to develop the earliest important jet bomber, the B-47. It first flew in 1947, with the Air Force purchasing over two thousand of them as it remained in production from 1948 to 1956.

The B-47 introduced the shape of things to come, for it had swept wings, jet engines mounted in pods below the wings, a swept tail, and a slender fuselage. During the 1950s, these design features also appeared in the first successful jet airliners: the Boeing 707 and Douglas DC-8.

Boeing and Douglas competed vigorously to sell these planes. The way to win an order was by offering a custom version of a basic design, a modification that would serve an airline's specific needs. These could include a shorter fuselage, a larger wing for long range, or more powerful engines. Such modifications were costly, and Boeing proved to have the deeper pockets, for it was selling planes to the Air Force in large numbers. Boeing paid for and built new airliner versions that Douglas could not afford, thus winning an important advantage.

The 707 entered service in 1958, the DC-8 in 1959. Both aircraft had four engines and could fly nonstop across the Atlantic as well as from coast to coast. In addition, there also was great interest in a jetliner of shorter range, which could serve more routes. Boeing brought out its 727and went on to sell more than 1,800 of them. But Douglas stayed in the game as well, with its twinjet DC-9 that served routes that were shorter still. Many of these connections were only a few hundred miles in length, but they were highly popular because they spared the need to drive a car over that distance.

The Navy and Air Force had their own requirements. Convair built the B-36, which had six and later ten engines. Boeing countered with the B-52, which mounted eight jet engines. It became the main bomber of the Air Force's Strategic Air Command. In addition, the decade of the 1950s brought a host of fighter aircraft. Almost every company in the industry built some, including Douglas, Grumman, Lockheed, McDonnell, North American, Northrop, Republic, and Vought.

Missiles and space flight brought new opportunities. In 1954, the Air Force launched a major push toward rockets of intercontinental range, able to carry a hydrogen bomb to Moscow. These included the Atlas from Convair and the Titan, built by Martin. Douglas helped as well with the Thor, based in England, which had less range but was available sooner. These missiles evolved into launch vehicles for the space program.

Within that program, the civilian National Aeronautics and Space Administration (NASA) came to the forefront. During the 1960s it sponsored the Apollo program, which landed astronauts on the moon. Again there were a number of participants, including Douglas, Grumman, McDonnell, and Boeing. North American did the most, drawing on its experience with the Navaho. This company built rocket engines, a major rocket stage, as well as the spacecraft that carried Apollo's astronauts. It went on to build the Space Shuttle, including its main engines.

During the drawdown at the conclusion of the Vietnam war, in the early 1970s, Boeing, Lockheed, and Douglas (which had merged with McDonnell) all fell into serious economic trouble.

For Boeing, the source of difficulty was the enormous new 747 airliner. The company went deeply into debt to fund its development and initial production. But it couldn't deliver the early models, because their engines were not ready. Then the nation went into a recession, and orders dried up. Boeing came close to going bankrupt, but survived by selling improved versions of earlier jets, including the 707 and 727.

The 747 was too large for most routes, which opened up an opportunity for an airliner of slightly smaller size. Lockheed came in with its L-1011, while McDonnell Douglas offered its DC-10. This was a mistake; there was room for one such airliner, but not both. However, neither company would back down, and both lost a great deal of money because they could not sell enough planes. Lockheed stopped building airliners altogether and became purely a military planebuilder. McDonnell Douglas stayed in the commercial world. But it now was financially weak, and lacked the funds to develop anything more than variations of its DC-9 and DC-10.

This raised the prospect that Boeing would reign over the airlines, holding a near monopoly. Airline executives chaffed at this possibility, for they enjoyed the competition and the lower prices by multiple plane-building companies bid against each other. But during the late 1970s, European planebuilders came to their rescue. France and Great Britain had a strong aviation industry; they had built the Concorde, the world's only supersonic airliner. Now these countries combined with West Germany to create Airbus Industrie. During the 1980s, it competed vigorously with Boeing, winning a large number of orders.

While airliner sales remained very strong, military demand fell off sharply with the end of the Cold War, in 1991. During earlier periods of demobilization, the Pentagon had helped keep its planebuilders in business with a number of small orders spread out over the range of major manufacturers. However, fighters and bombers now were quite costly, and the Pentagon could afford only a limited number of such programs.

Officials of the Defense Department responded by facilitating a series of mergers, to consolidate the industry within a small number of companies that would have enough business to remain strong. Boeing, holding great power due to its success in selling airliners, bought out McDonnell Douglas and Rockwell International. Lockheed merged with Convair and with Martin Marietta, forming the firm of Lockheed Martin. A similar merger created the firm of Northrop Grumman. Today, these three U.S. companies dominate the American market for commercial airliners, military aircraft, and launch vehicles for space flight.

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On June 11, 1992, the United States International Trade Commission received a request1 from the Senate Committee on Finance to conduct a series of three investigations under section 332(g) of the Tariff Act of 1930 on the global competitiveness of U.S. advanced-technology manufacturing industries. These three studies, on the cellular communications, aircraft, and computer industries, are part of a series begun in 1990 at the request of the Finance Committee.Â The sources consulted in the preparation of this report include domestic and foreign manufacturers, industry associations, airline officials, research establishment officials, and appropriate government officials. Questionnaires were completed by purchasers based in the top three global markets. U.S. Aerospace Manufacturing: Industry Overview and Prospects. Michaela D. Platzer Specialist in Industrial Organization and Business. December 3, 2009. CRS Report for Congress. Prepared for Members and Committees of Congress. Congressional Research Service.Â Aircraft and automobile manufacturing are considered by many to be the technological backbones of the U.S. manufacturing base. As the Obama Administration and Congress debate how to strengthen American manufacturing, aerospace is likely to receive considerable attention. Like other manufacturing industries, the worldwide recession has affected aerospace manufacturing, with both the defense and commercial sides of the industry facing difficult business conditions for the near and medium term. The Aerospace Industry in the United States. Overview. U.S. aerospace manufacturers are very competitive internationally. In 2017, the industry contributed $143 billion in export sales to the U.S. economy.Â General Aviation (GA): The United States is the worldâ€™s largest market for GA aircraft. U.S. manufacturers produce a wide range of GA products including piston aircraft, turboprops, jets, balloons, dirigibles, and experimental aircraft. Engines: Major engine and power plant manufacturers are typically part of diversified corporations producing engines for both civil and military aircraft, either alone or as part of one or more joint ventures. Engines and power plant sales also provide maintenance, repair and overhaul business opportunities.

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The MOU stated that US aircraft manufacturers will be able to participate in the Russian market and share in its growth. The MOU also makes clear that the Russian aircraft industry will become fully integrated into the international economy over time. Russia pledged to eventually undertake the same international trade principles in the aircraft sector as the United States and many others have done, as embodied in the Agreement on Trade in Civil Aircraft. In the US airline industry, approximately 100 certificated passenger airlines operate over 11 million flight departures per year, and carry over one-third of the worldâ€™s total air traffic â€“ US airlines enplaned 745 million passengers in 2006.Â The economic importance of the airline industry and, in turn, its repercussions for aircraft manufacturers, makes the volatility of airline profits and their dependence on good economic conditions a serious concern for both industries. This concern has grown dramatically since airline deregulation, as stable profits and/or government assistance were the rule rather than the exception for most international airlines prior to the 1980s. Aircraft industryaircraft industry. The Wright brothers' successful flights on 17 December 1903 were the culmination of a century of experimentation on both sides of the Atlantic. The reality of powered, controlled flight was not recognized for almost five more years, however. The U.S. Source for information on Aircraft Industry: Dictionary of American History dictionary.Â Despite the depressed state of the industryâ€”only 263 new aircraft were built in 1922â€”technical development continued, and aircraft capabilities increased. Notable military designs included the Martin MB-2 bomber and the first fighters by such firms as Thomas-Morse, Chance-Vought, and Boeing. Most civil flying was recreational, facilitated by cheap military surplus trainers, such as the Curtiss JN-4 Jenny.