

# **Airbus vs. Boeing**

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The airline manufacturing industry consists of only two firms, Airbus in Toulouse, France and the Chicago-based Boeing. Two recent research and development moves at the two firms offer an insight into the positioning strategy that each is taking in the future market place. It seems the two firms are accenting two niche markets with a pair of flagship products, neither of which are in direct competition with each other. This will allow for the firms to stave off price competition in the short term by differentiating product lines, which is desirable given the recent increase in buyer power gained by low-cost airlines.

## **Current Market Position**

### **Airbus**

Airbus controls 46% of the market.<sup>1</sup> It was formed in the 1970's as a consortium of European aerospace firms, and was integrated into a single company in 2001. It was designed by European nations to compete with the large American manufacturers and received subsidies from the various European governments. Their product line extends from the single aisle A320 to the larger, twin aisle A340.

### **Boeing**

Boeing, naturally, currently controls the other 54% of the market for commercial aircraft in terms of value delivered, and its commercial unit took in \$30.1 billion in 2001.<sup>2</sup> It introduced the 747 Jumbo Jet in 1966 which revolutionized the concept of air travel due to its large size, and ushered in the era of mass air travel. In addition, it produces a wide range of aircraft from the single aisle 737 favored by point-to-point airlines such as Southwest, and the medium size and range 767, to the long range 777. Boeing is also a weapons contractor, designing and producing attack aircraft and satellites. It also maintains a services group and has recently launched *Connexions*, which provides internet access to airline passengers.

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<sup>1</sup> Richard Aboulaflia, "Airbus and Boeing Race to the Bottom," *Aerospace America*, October, 2002, 16.

<sup>2</sup> Edward Wong, "Boeing and Airbus Marking Their Turf," *The International Herald Tribune*, July 29, 2002.

## **Current Aircraft Market**

The airline industry is in a downturn. In 2001, the International Air Transport Association had a net loss of \$17 billion, which is more than the industry has made in its entire history.<sup>3</sup> This has led to a grim short-term outlook for the airline manufacturers, and subsequently Boeing has cut 2002 production in half<sup>4</sup> and Airbus by one fourth.<sup>5</sup> This, however, is not necessarily a good measure of the industry's condition, since both companies have an extensive backlog that can be used to maintain these new targets. Although the total backlog of 2,783 planes is worth an estimated \$172 million dollars<sup>6</sup> it is also somewhat uncertain due to lax cancellation penalties negotiated by the airlines during the boom years. Furthermore, the rise of low-cost airlines does not directly translate into a larger market for aircraft due to the fact that the success of low end carriers tends to reduce the demand for aircraft by the large carriers.<sup>7</sup> It is important to note however, that this is not a permanent depression in the market, but a reflection of the cyclical nature of the industry.

## **Future Airline Industry Outlook**

Both Airbus and Boeing, foresee dramatic growth in the airline industry over the next twenty years, with the firms forecasting average annual growth of revenue-passenger-kilometers at 4.2 and 4.9% respectively. This will be generated by lower ticket prices and economic growth. In addition, the two firms also believe that the Asian market will be the region of largest increase in traffic. They however, disagree on the path of the overall growth. Airbus places more emphasis on the markets between large hub cities and predicts that as airports reach traffic capacity, it will become necessary for airlines to fly as many passengers as possible in a single flight. Boeing, however, anticipates major growth in low cost point-to-point carriers and predicts that while higher

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3 Anthony L Velocci Jr., "Sonic Cruiser Plans Secure, Despite Market Unknowns," *Aviation Week & Space Technology*, April 15, 2002, 52.

4 Wong, "Boeing and Airbus Marking Their Turf."

5 Aboulafia, "Airbus and Boeing Race to the Bottom," 16.

6 *Ibid.*, 16.

7 *Ibid.*, 16.

capacity is desirable, the airlines will continue to augment large fleets with smaller aircraft that enable more frequent and quicker flights. As a result, Airbus foresees a large demand for very large aircraft to service major routes, while Boeing forecasts that most growth will come from single and twin aisle aircraft, to service connecting and point to point routes.

## **Proposed Aircraft**

### **A380**

Slated to enter into operation in 2006, the Airbus A380 is a super jumbo jet capable of carrying 550 passengers, about 130 more passengers than the largest aircraft currently in service, the Boeing 747. The plane will have a range of 8,000nm, and offer operating costs 15-20% lower per seat than the 747.<sup>8</sup> The extensive size of the aircraft has led to Virgin Chairman Sir Richard Branson announcing “a new flying experience” which could include: “lounge spaces...gyms, bars, and games arcades; children’s play areas; duty free shops, and food outlets...conference rooms and private cabins,”<sup>9</sup> a form of cruise ship in the sky. The freighter version, the A380F, will be the largest commercial freight aircraft in the world, capable of a payload of 150,000kg.

This aircraft fits in a niche market of 500+ seat aircraft; Airbus envisions the plane as a necessity due to over-crowding of airports such as London’s Heathrow Airport. Due to slot restrictions the number of aircraft that can take off and land in a certain time span are limited, however, the number of passengers continues to increase, thus it becomes necessary for larger aircraft to service these routes. It is speculated that the plane’s passenger usage will be concentrated in ten to twenty airports around the world, such as Heathrow, Los Angeles International, and Narita in Tokyo.<sup>10</sup> The large number of seats for each aircraft also decreases the cost per passenger of the flight, allowing for

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<sup>8</sup> David Bowermaster, “Boeing Reconsiders Viability of 747 Jumbo Jet,” *Seattle Times*, May 26, 2002.

<sup>9</sup> John D. Morrocco, “Virgin to Make A380 ‘New Flying Experience’,” *Aviation Week & Space Technology*, January 1, 2001, 25.

<sup>10</sup> Global Market Forecast 2001-2020, <<http://www.airbus.com/media/gmf.asp>> October 31, 2002.

increased profits. On the freight side, the A380F, is designed to carry more payload and do so more efficiently than the 747-400. For example, the cargo hold is designed to hold 8ft containers, as opposed to the 10ft crates employed by Boeing, so that they are compatible with smaller aircraft that take deliveries from hubs to other airports.<sup>11</sup> This decreases the time it takes to change the planes at airports, and creates efficiencies for freight companies. The plane is to be designed using Airbus's "glass cockpit" concept, that allows pilots of Airbus's standard A340 craft to train on the A380 in 10 days as opposed to the normal 20-30 days.<sup>12</sup> In addition, operating costs of aircraft are a major factor in the decision to purchase a model, therefore, Airbus has designed the A380 to be highly fuel efficient and even claims on its website that it is "more fuel efficient than your car."<sup>13</sup> As of now, the final design of the aircraft has been set, and eight customers, including Emirates and FedEx, have placed orders for a total of ninety-five aircraft.<sup>14</sup>

## **Sonic Cruiser**

The proposed design for Boeing's Sonic Cruiser is for a craft capable of flying long-distances in a shorter amount of time, while operating at standard efficiency levels. The jet will fly at speeds up to Mach .98 as opposed to the Mach .85 of standard jets; this translates into a time savings of one hour for every 3,000 miles. It will have a range of 6000-9000nm giving it the ability to fly directly from New York to Singapore. Furthermore, it flies at a cruising altitude between 45,000 and 50,000ft, approximately 10,000ft above current traffic allowing it to fly at its top speed without concern to slower moving traffic.<sup>15</sup>

Boeing's pictures of the Sonic Cruiser show an aircraft with a sleek design, an aft wing and a forward canard, which gives it a futuristic, snazzy appearance. The basic idea is to offer a device for airlines to capture profit from the premium that passengers,

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11 James Ott, "FedEx Looks to A380 for Edge in Future," *Aviation Week & Space Technology*, April 16, 2001, 71.

12 J. R. Wilson, "Making Way for the A380," *Aerospace America*, May, 2001, 45.

13 Global Market Forecast 2001-2020.

14 Ibid.

15 Current Market Outlook. <<http://www.boeing.com/commercial/cmo/flash.html>> October 31, 2002.

primarily business travelers, are willing to pay for faster flights. This can be approximated by the traveler's hourly wage times the time savings. Boeing is investigating the use of composite materials and aluminum, along with new engine technologies in order to achieve the necessary fuel efficiency for the plane to effectively operate at comparable costs. In addition, currently a round-trip flight from Los Angeles to Tokyo requires twenty six hours, which means it is necessary to have two aircraft on the route if the airline wishes to fly it once a day; the Sonic Cruiser flies this route in twenty three hours, requiring just one plane for a daily route.<sup>16</sup> Subsequently, this means the airline can save money on relief crew members due to the shorter flight time.<sup>17</sup> The final design for the Sonic Cruiser has not been established yet, and subsequently no orders have yet been received, although several airlines have expressed interest. The proposed date for a final design is 2004, and entry into operation is currently scheduled for 2008.

## **Analysis**

The two new aircraft are niche market aircraft, in that they are not replacements for the current line, but separate, distinct additions to two different lines of aircraft. The A380 is designed to capture the top end of the size market, taking some market share from Boeing, who currently produces the largest commercial aircraft, the 747.<sup>18</sup> It, however, does not directly compete with the Boeing craft due to the significant size difference of approximately 130 seats. This reduces the incentive of Boeing to aggressively respond to the new plane, in fact, Boeing believes that over the next twenty years out of the projected market demand of 944 very large aircraft only 334 will have 500 or more seats.<sup>19</sup> In addition, this belief, and the market orders received for the A380,

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16 Bruce A. Smith, "Boeing Anticipates Solid Market for Sonic Cruiser and Widebodies," *Aviation Week & Space Technology*, June, 18, 2001, 131.

17 Chris Kjelgaard, "Boeing Plans Family of Sonic Cruisers in 200-250 Seat Range," *Air Transport Intelligence*, March 20, 2002.

18 David Bowermaster, "Boeing Reconsiders Viability of 747 Jumbo Jet," *Seattle Times*, May 26, 2002.

19 Current Market Outlook. <<http://www.boeing.com/commercial/cmo/flash.html>> November 1, 2002.

has led Boeing to remove the 747X, a very large aircraft that was in the planning stages of development, from the market.<sup>20</sup> Airbus, on the other hand, does not see a significant demand for what it deems “a new generation supersonic aircraft” in the next twenty years. It, subsequently, has not announced plans to develop a competitor to the Boeing Sonic Cruiser, but Adam Brown, the Airbus vice president for market forecasts acknowledges near-supersonic flight regime is “a hell of a difficult area to design an aircraft for,” but is “an interesting idea.”<sup>21</sup> The Sonic Cruiser, when released, will take some market share from the A340, and will cannibalize some of the 767,<sup>22</sup> however, since it is a niche market aircraft, it reduces the incentive of Airbus to respond directly. The Sonic Cruiser provides a product that is not only differentiated from the rest of the Boeing line but from the Airbus product line as well.

Currently the two firms compete on similar products, for example, the 737 with the A320, the 767 and 777 with the A340, and so on. By introducing these two new lines, however, Airbus and Boeing have placed themselves on different portions of the product spectrum. Furthermore if Boeing develops a product line around the concept of the Sonic Cruiser it will lead to clearer differentiation between the two.<sup>23</sup> This makes the two firms less susceptible to price competition, which is an important factor considering the rise of the low cost carrier, a customer that seeks price breaks on products.

Differentiation further decreases price competition by moving the two firms more toward competition at the system level. Both manufacturers have been attempting, with some success, to establish their line of aircraft as a family of planes. For example, cross-crew qualification adds value to the airplanes in which it is implemented. It does this by reducing the cost to the airline of training pilots and subsequently can reduce scheduling conflicts by creating a more flexible crew. Furthermore, repair costs are reduced if planes are purchased from a single producer due to the lessening of the necessity to maintain a broad inventory of replacement parts. Also, benefits can be gained by the

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20 Andy Chuter, “Boeing Sonic Cruiser Ousts 747X,” *Flight International*, April 3, 2001, 7.

21 Robert W. Moorman, “Boeing’s ‘Sonic Cruiser’ Grabs Airlines’ Attention,” *Aviation Week & Space Technology*, April 9, 2001, 41.

22 “Special Report on Global Market Outlook for Wide-Body Aircraft,” *World Airline News*, October 12, 2001.

23 “A380 or Sonic Cruiser: Which is the Future?” *Aerotech News and Review*, May 4, 2001

airlines in the form of bulk discounts. But these benefits only come if the airline purchases multiple aircraft from the manufacturer, this forms an incentive for the airline to buy its fleet from a single manufacturer. The two new products being differentiated produces distinct areas for costumers to enter into the line. Customers seeking to operate large aircraft would prefer to deal with the Airbus line, while customers concentrating on speed will be attracted to the Boeing line. This reduces the amount of price competition on the rest of the line due to the value-added. There will be airlines, however, that would desire to operate both aircraft, using the A380 for price-sensitive travelers and the Sonic Cruiser to capture upper end passengers willing to pay the premium for speed. These firms however will tend to be larger in nature and could operate extensive sets from both lines and still reap synergies from the purchases. Although these positioning strategies benefit both firms, both manufacturers face some problems in bringing their respective product to market.

One problem that Airbus faces is that the perceived demand for their product might not truly exist as can be evidenced by the non-existence of orders for the Boeing 747X. Although Airbus needs only to sell 250 aircraft to break even<sup>24</sup>, it may not achieve the sale of 1500 over the next twenty years that it has projected, and the total number may be closer to Boeing's predicted 334 planes. This would reduce the overall profitability of the project. If the product is successful, however, then Airbus will have the first mover advantage, and Boeing will lag behind if it wants to respond by creating a similar plane. Airbus can engage in the spatial preemption of Boeing in the very large aircraft market, and if the market is constrained it is possible that there is only room for one firm in the market, given Airbus's established capacity.

Boeing faces severe technological constraints in design. The first is that it is necessary for the Sonic Cruiser to operate in a fuel efficient manner, since airline companies are not interested in purchasing a non-cost effective plane similar to the Concorde. This will require a leap in fuel technology. The timeframe for the necessary engine technology to be available is 2008-2010, approximately the release date for the

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<sup>24</sup> Phillip Butterworth-Hayes, "Three Vital Questions for the A380," *Aerospace America*, March, 2001, 4.



Sonic Cruiser.<sup>25</sup> According to option theory, there exists additional value in research and development investments in markets with uncertain futures since it could lead to further options and a subsequent reduction in uncertainty.<sup>26</sup> The application of the technology derived from investing in research for the Sonic Cruiser to conventional aircraft demonstrates this added value of options. Thus the significant overall cost and risk in terms of research and development are lessened by the added benefit that any technological breakthrough can be cross-applied to a more conventional design. Peter Smith, the program manager for the Sonic Cruiser engine at Pratt & Whitney, says that 90-95% of Pratt's current Sonic Cruiser engine work can be transferred to conventional Mach .85 engine and provide significant benefit.<sup>27</sup>

The various areas of research have led to three different proposed forms of the Sonic Cruiser, the original aft wing, forward canard design; a mid-wing design that is without the canard; and a conventionally designed aircraft that utilizes the advanced technology developed for the Sonic Cruiser, dubbed "Yellowstone."<sup>28</sup> This move by Boeing suggests that the Sonic Cruiser is merely a "paper aeroplane," a public relations ploy based on the futuristic appearance of the proposed aircraft.<sup>29</sup> This seems to be a reasonable assertion given the failure of the 747X to succeed against the A380, and the desire of Boeing to still garner media attention when its only competitor releases a new product, and a next generation, high-speed, aircraft would achieve that goal. The move can also be seen as a method of boosting the morale of its engineers, offering a new exciting project to work on. Furthermore, some see the proposal of a conventional design as "the first hesitancy" in producing the new aircraft, but Boeing will continue to talk

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<sup>25</sup> Bruce A. Smith, "Operational Issues Raise Profile of Sonic Cruiser Design Options," *Aviation Week & Space Technology*, July 22, 2002, 130.

<sup>26</sup> Avinash K. Dixit and Robert S. Pindyck, "The Options Approach to Capital Investment," *Harvard Business Review*, May-June 1995, 107, reprinted in *Managerial Economics Course Packet*, 237.

<sup>27</sup> Smith, "Operational Issues Raise Profile of Sonic Cruiser," 130.

<sup>28</sup> Guy Norris, "Crunch for sonic Cruiser as Decision-Time Nears," *Flight International*, July 9, 2002, 4.

<sup>29</sup> "Towards the Wild Blue Yonder – Boeing v. Airbus," *The Economist*, April 27, 2002.

about the aircraft in order to keep attention on the program.<sup>30</sup> Boeing has received interest from airlines for a new, more fuel efficient replacement for the 767/757 line from airlines such as British Airways.<sup>31</sup> It will, however, be far easier for Airbus to compete against the “Yellowstone” form of aircraft and while the improvements provide Boeing with a better product it does not provide the differentiation that the Sonic Cruiser offers. Boeing has been establishing a basis for canceling the Sonic Cruiser programs with public statements such as “We will build the plane the market wants” from the Sonic Cruiser Vice President, Walt Gillette.<sup>32</sup> Although it is not inconceivable that the futuristic aircraft will come to market, there is some evidence to indicate that it is merely a ploy to distract attention from the release of the A380.

## Conclusions

The rising market shares held by low-cost carriers, due to their cost cutting business models have placed pressure on Boeing and Airbus to provide lower priced aircraft. This has been exacerbated by the economic downturn and subsequent decline in air travel. With the major airlines going through financial troubles, Boeing and Airbus have seen a decrease in overall demand for aircraft, and the major customers now are the low-cost carriers. Boeing and Airbus ought to make moves that mitigate the downward pressure on price by adding value to the line. Thus by differentiating their flagship aircraft they increase the overall value of the family of aircraft; and create a counter to the falling price.

Since the route structures for these low-cost carriers tend to be point-to-point along the Southwest model, creating an aircraft that specializes in servicing those routes is a sound strategy. The Sonic Cruiser allows for point-to-point service to be extended over longer routes. In addition, even under the hub and spoke system, major airlines would also want to operate the plane on long distance routes, in order to offer the high speed service as well. The A380 however, has a profitable but limited use for large hub-to-hub routes connecting major airports. Therefore, we believe there are more

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30 Smith, “Operational Issues Raise Profile of Sonic Cruiser,” 130.

31 “Boeing Keeps Faith with Sonic Cruiser,” *Flight International*, July 02, 2002, 6.

32 Norris, 4.

profits in a well functioning, low cost Sonic Cruiser than in a well functioning A380, since the market would demand a larger number of small, efficient, cost-effective, fast aircraft than very large efficient aircraft.

The success of the Sonic Cruiser, however, depends on the willingness of business travelers to pay a premium for speed. As the route the aircraft flies get longer, the time advantage gets larger for the Sonic Cruiser, and the premium that can be charged grows. By taking the salary of high end travelers this premium can be estimated and can translate into an increase of ticket prices of several hundred dollars for the time saved. The profitability of this premium depends on the relative operational costs for the airplane to conventional craft. If Boeing fails to produce an efficient craft the returns will be smaller, and if the inefficiency is great enough, then no airline will be willing to purchase the aircraft.

The Airbus A380 will come into service close to 2006 and as the orders that have already been placed indicate, it will both create a new type of aircraft in the market, and capture some market share from the 747, especially in terms of freight aircraft. The Sonic Cruiser, on the other hand, does not have a firm design. In all likelihood, Boeing will introduce a new craft around 2008, it may not however, be the Sonic Cruiser design that has been touted in the media. A highly fuel efficient conventional aircraft would be a sound stepping stone to the Sonic Cruiser. The research and development on a near-sonic aircraft offers significant improvements to conventional aircraft. It is plausible that as technology progresses, a cost effective, near-sonic jet similar to the Sonic Cruiser will come to market, and when it does it will drastically alter long distance air travel. Therefore there are substantial gains from getting ahead on the technology to produce such a craft.

It is possible that although the two new flagship airplanes offer a form of differentiation for the two firms, if either is amazingly profitable, and there continues to be more possible customers, then it is likely that one firm will copy the other since having the ability to service a wide range is desirable in this industry. Although each firm will have a distinct first-mover advantage for its own style of craft, the Sonic Cruiser is more of a technology leap and would require more work on the part of Airbus to copy. The high speed and fuel efficiency that the Sonic Cruiser would require are very desirable

copies for both firms, therefore it is likely that Airbus might move in that direction. Thus, the differentiation will last for a period of time, and both firms could enjoy the benefits that it brings, however, in the long run there are strong incentives for the product lines to converge.