

INTELLIGENT AVIONICS: BREAKING INTO THE INFLIGHT ENTERTAINMENT INDUSTRY

Rob Britton, Robert Mackalski, Mary Dellar, and Mary Towers wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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As his laptop screen went momentarily dark in the glare of the sun, Dr. Rob Britton paused from his work to peer out the small, oblong window to his right. On this April evening in 2012, an indigo expanse flecked with downy strokes of white met his gaze. Britton was a seasoned traveller, yet the sight of the North Atlantic ocean at 35,000 feet never grew old. His lifelong wanderlust had inspired a rich and fulfilling career. Having worked in the travel and airline industries for more than 40 years, Britton could unequivocally say that he loved his job—although he was “officially” retired.

Retirement had come after 22 years with American Airlines, Inc., in a range of leadership roles, including corporate communications, food and beverage services, advertising and marketing planning, and inflight service. Unsurprisingly, Britton’s years of experience made him an invaluable asset to Intelligent Avionics Ltd. (IA), an entrepreneurial company that hoped to break into the inflight entertainment (IFE) industry under its own brand name: AURA. According to Britton, he enthusiastically joined IA’s team in 2010 because “working for a small, nimble start-up after years with large and often slow-moving companies was appealing, as was the prospect of selling a tangible product” (see Exhibit 1). Britton served as IA’s vice-president of marketing on a consulting basis. He was responsible for marketing communications worldwide and sales in the western hemisphere.

Diverting his gaze from the window, Britton returned to his notes detailing the past few days. He and half a dozen IA team members had promoted AURA at the Aircraft Interiors Expo (AIX), an industry trade show held annually in Hamburg, Germany. AIX had been disappointing, and Britton wanted to help devise a concrete plan for moving forward. Although AURA had many interested prospects worldwide, it had no launch customer. Britton knew that in order to secure a customer base, IA first needed to decide which product line it was going to market. Initially, AURA was to be a next-generation, seat-centric system. This inaugural system was branded AURA Works midway through the development phase, when IA chose to offer customers two additional options: AURA One and AURA Connected.

With a small development team working on three IFE system designs, the time had come to meet with IA’s leaders to determine where the company should focus its efforts. How should IA market and launch its offerings? In addition to contemplating which lines IA should bring to market, organizational and locational issues gnawed at Britton. He struggled with the company’s virtual structure, given that IA was composed of fewer than 15 staff members living in five different countries (see Exhibit 2). Britton contemplated how the structure was affecting IA’s effectiveness.

THE HISTORY OF INFLIGHT ENTERTAINMENT

The IFE industry was nearly as old as commercial aviation itself. In the 1920s—Hollywood’s silent era—movie projectors and screens were installed on a few passenger aircraft. However, it was not until the 1960s that IFE technology really began. During this time, celluloid film looped through a series of projectors throughout the cabin; each projector sent sound to tiny speakers in armrests, which passengers listened to through soft plastic tubes and earpieces resembling toy stethoscopes. Although crude by today’s standards, such technology was a step toward individualizing passengers’ viewing experience.

IFE technology remained relatively unchanged for two decades. By the 1980s, it mirrored tape-based technologies found in homes. Multiple videocassette (VHS) tapes were sequentially loaded into a single video player, and the signal travelled via cable to projectors throughout the cabin. One of the drawbacks of this system was that every passenger had to watch the same video channel at the same time.

The 1990s saw the development of audiovisual on demand (AVOD), which enabled passengers to choose what they wanted to watch and when they wanted to watch it, rather than viewing a single movie chosen by the airline and begun at the convenience of the cabin crew. As with its predecessors, AVOD was not without problems; in this case, its servers were heavy and unreliable.

The first decade of the twenty-first century saw rapid technological advancements that led to the development of free-standing (i.e., hand-held) devices with preloaded content; seat-centric systems that eliminated the server and put content and processing power at each seat; and wireless streaming, either to passengers’ own devices or to airline-supplied tablets. Such advancements greatly changed how passengers interacted with IFE.

At IA’s inception in 2010, three factors were raising the stakes in IFE: (1) twenty-first century technological improvements; (2) heightened airline focus on customer experience; and (3) rising passenger expectations as a consequence of the innovative services offered by Asian airlines and some new U.S. domestic carriers like JetBlue Airways Corporation.¹

INFLIGHT ENTERTAINMENT MARKET AND STRUCTURE

Trends within commercial aviation and IFE markets had always been inseparable. Although commercial aviation had matured in industrial countries across North America and Europe, where large incumbents dominated the space (see Exhibits 3 and 4), countries like China, India, Turkey, and Indonesia were growing rapidly. In fact, the Federal Aviation Administration of the United States (FAA) forecasted a fivefold expansion in passenger volume by 2050.

Such an expansion meant that the IFE market, estimated at US\$3 billion² annually, was also growing. This market had two categories: retrofit, which modernized older aircraft with new systems, and linefit, which installed IFE in brand new aircraft. Retrofitting meant dealing first and foremost with airlines, and linefitting engaged both manufacturers and airlines (the actual end customer).

¹ Asian airlines were raising the bar globally with service delivery (mainly cabin crew) and seats and other onboard amenities. Leaders like Singapore Airlines Limited and Cathay Pacific Airways Limited had been bested by the massively subsidized Persian Gulf trio of Emirates, Etihad Airways, and Qatar Airways Company Q.C.S.C.

² All dollar amounts are in U.S. dollars unless otherwise specified.

Both the Boeing Company (Boeing) and Airbus SE (Airbus) had massive orders for new aircraft (see Exhibits 5 and 6),³ and sales of the smaller, more fuel-efficient regional jets looked promising (see Exhibits 7 and 8) given the industry's belief that fuel prices would continue to rise. But IA was also considering retrofitting existing aircraft because installing a new system on new aircraft required more government approval⁴ and more negotiation with aircraft and seat manufacturers and with other suppliers. Retrofitting aircraft still involved a lot of regulatory compliance, but mostly with the airline itself. Britton estimated that nearly 15 per cent of the world's wide-body fleet (approximately 800 aircraft) was being retrofitted with new IFE systems each year. In addition, thousands of single-aisle aircraft had older systems or did not have IFE systems at all. A potentially smaller business jet market was also an option (see Exhibit 9).

In large domestic markets, like the United States and the European Union, the airline industry had become highly competitive in the wake of government policies that had economically deregulated and privatized carriers over the previous four decades. In these places, competition had driven down prices, making flying cheaper than ever before. This competitive output market contrasted significantly with the imperfect input markets for labour, infrastructure, fuel, and hardware. Trade union monopolies supplied airline labour, metropolitan markets were served by single airports, the Organization of the Petroleum Exporting Countries (OPEC) and megaproducers determined fuel prices, and little competition existed among the companies that manufactured equipment—from entire aircraft down to subsystems such as seats, software controls, and cockpit hardware.

Just as the large aircraft market⁵ had been governed by a Boeing–Airbus duopoly for decades,⁶ two companies dominated the IFE market: the Japanese giant Panasonic Corporation (Panasonic) and the French defence and aerospace firm Thales Group (Thales) held 90 per cent global market share. Panasonic and Thales had grown steadily, and their continued success was largely dependent on the power of incumbency and costly service contracts. Service contracts for installed systems were extremely profitable—especially for older, failure-prone systems that left airlines with no choice but to buy a service contract for repair. In the absence of competition, Panasonic and Thales had little incentive to invest in new technologies. By ignoring the potential of innovative technology, Panasonic and Thales had actually created an opportunity for a number of aspiring firms to enter the IFE market.⁷

AN OPPORTUNITY IN THE INFIGHT ENTERTAINMENT MARKET

With 90 per cent of the IFE market controlled by two giants seemingly disinterested in exploiting new technologies, the English serial entrepreneur Clark Stevens and young visionary Connor Martins saw an opportunity to carve out a niche in the IFE industry by designing an original, state-of-the-art IFE system with the best of new technology. In 2010, inspired by fresh approaches and attentive to industry trends, they formed Intelligent Avionics Ltd.

Stevens, the angel investor, knew aircraft interiors and IFE systems well, having founded Aero Technics Ltd., a successful company that provided interior contract maintenance and engineering to several large, highly regarded airlines, including Virgin Atlantic Airways Limited and Emirates. Martins had a proven record for

³ IA's research team determined that Boeing and Airbus had orders for more than 2,100 long-range mid-size aircraft (i.e., 787s and A350s). Just this one aircraft size, with approximately 300 seats per jet, amounted to a potential of almost 650,000 linefit seatback units.

⁴ Principally, certifying aeronautical authorities such as the FAA and its E.U. counterpart, the European Aviation Safety Agency.

⁵ Planes larger than approximately 130 seats.

⁶ Boeing and Airbus had 100 per cent market share for big jets.

⁷ Each firm was generally tied to one of the three solution types: free-standing devices (hand-held, similar to a bulky tablet), installed seat-centric systems, or wireless streaming. Most of these aspirants were start-ups, but some larger firms also entered, such as Lufthansa Technik AG—the maintenance, repair, and overhaul subsidiary of the German airline.

high-tech innovation, having helped Tesco PLC , a large U.K. grocery retailer, pioneer its online presence. He was also responsible for the growth of Mezzo Movies Ltd., a company that made free-standing IFE devices.

Believing they were on to something big, Stevens and Martins enlisted other creative thinkers with experience in the airline industry to help them get IA off the ground. Britton was approached to provide marketing and North American depth. And although Britton knew that succeeding in a concentrated market characterized by conservative airline decision-making and high development costs would be challenging, he also believed IA was capable of developing an IFE system more responsive to market needs than anything that was currently available.

THE INTELLIGENT AVIONICS APPROACH: A TRIO OF AURA SOLUTIONS

The entire IA team believed that a new approach to the IFE market was necessary. While Panasonic and Thales continued to offer rigid, expensive hardware and proprietary software, IA chose to manufacture using readily available personal computer (PC) components and the Microsoft Windows 7 operating system (OS). By leveraging the economies of commodity components and the large community of Windows OS developers, IA sought to establish target prices 30–50 per cent below those of incumbents. IA believed that their approach would deliver cost savings and ensure greater reliability and improved flexibility.

IA began to develop three related but distinct systems that they viewed as solutions to the problem of technological stagnancy in the IFE industry.

The first IA solution was AURA Works, which included seatback touch screen devices that were linked, via Ethernet, to an onboard hard disk of stock content (i.e., movies, music, and e-books). Such content could be refreshed at a desired interval, typically monthly. Using a wireless connection or universal serial bus (USB) stick, daily updates, such as news programs, could be loaded to the main disk and then distributed to each seat. Flight-specific content, including customer information and individualized greetings (e.g., “Welcome aboard, Mr. Gonzalez”), could be similarly refreshed. AURA Works provided several screen sizes and mounting options. While larger screens were typically reserved for first and business classes, screens in any class might be mounted on seatbacks or armrests.

Regardless of screen size or location, AURA Works abolished the need for enormously heavy servers, thus reducing aircraft weight by as much as 1,000 kilograms and eliminating the risk of server failure. Server malfunction was the single point of failure that could cause every screen on an aircraft to “go dark.” Frequent flyers were all too familiar with this problem, which required the crew to reboot the entire system, sometimes unsuccessfully. Even if the system could be restarted, customers often could not resume watching a movie from where they left off; instead, they had to start at the beginning. AURA Works aimed to enhance passengers’ experience by ensuring that they would never face a dark screen.

Midway through the development phase of AURA Works, IA chose to broaden its product line—a decision based on sales calls, industry trends, and technological change. Early sales experience revealed that smaller carriers needed a less-expensive, entry-level solution, and a handful of forward-thinking airlines told IA that any installed system would soon be obsolete due to the rise of wireless streaming. While they continued to develop AURA Works, IA added two product lines: AURA One and AURA Connected.

As an entry-level system, AURA One offered a low-cost means of replacing older, videotape-based overhead systems (i.e., drop-down screens every several rows) with digital content. Capable of being installed overnight for about \$15,000, this system improved video and sound quality and removed the hassle of managing multiple videotapes and a failure-prone electromechanical tape player. AURA One’s target

market was small and mid-size airlines that did not have the budget for more expensive systems. Because all three AURA systems used the same master content module, airlines wishing to upgrade from AURA One to one of the other two systems would save money and installation time.

AURA Connected wirelessly streamed entertainment to passengers' or airline-supplied personal electronic devices via an onboard intranet. This system responded to persistently high fuel prices that motivated airlines to shed aircraft weight, and responded to the increasing ubiquity and falling costs of devices that were Wi-Fi enabled.

IA believed that, collectively, AURA Works, AURA One, and AURA Connected could capture a broad portion of the market, consisting of companies that varied in size, current IFE offer, and financial ability. As indicated, all three systems used the same modular components, which enabled design flexibility and promoted economic efficiency. Both the seat-centric AURA Works and AURA Connected could be linked to the Internet via ground- or satellite-based systems.⁸ By enabling Internet connectivity, AURA Works and AURA Connected broadened customer offerings and airlines' ability to sell a range of additional services on board, including access to the Web and online shopping, as well as hotel reservations, theatre tickets, and similar services at a flight's destination.

Unlike the incumbents' systems, which included a one-year warranty followed by expensive service agreements, IA's AURA products carried a five-year warranty. IA had calculated that they could offer such a warranty because of the demonstrated reliability of PC hardware and software. Prospective airline customers regarded this bundled solution as very attractive because it offered an alternative to expensive service contracts.

ORGANIZATIONAL CHALLENGES

Although Stevens and Martins were, respectively, an hour south and north of London, England, IA's development team was in Scotland. Australian executive William Davidson took on the role of chief technology officer following the resignation of the Scottish head.

Britton was concerned by substantial tensions within the company that stemmed from Martins's and Davidson's disagreement on the management of IA's virtual structure. With Davidson in Australia, and the software developers and hardware designers thousands of miles away in Scotland, Martins doubted Davidson's ability to oversee AURA's development from a distance.

To make matters worse, the eight-person development team was pressed to simultaneously perfect all three AURA systems. In preparation for the AIX, they were under a great deal of pressure to accomplish an enormous amount of work in very little time.

SALES AND MARKETING CHALLENGES

IA encountered a number of sales and marketing challenges common to newcomers seeking to penetrate a market dominated by entrenched incumbents. Such challenges included navigating the multi-faceted IFE selling process, attracting attention at industry trade shows, and developing multi-channel communications. The IFE selling process was complex because it required the simultaneous consideration of numerous factors. In particular, companies had to contend with lengthy selling cycles and account for the role of multiple players in the purchase decision. As an added challenge, a new entrant like IA would have to establish brand presence in conventional and online industry publications.

⁸ For example, Gogo Inc. in the United States.

Two of IA's primary difficulties were learning how to cope with a long selling cycle and establishing a rapport with potential customers. "Martins had some relationships from his previous experience with Mezzo," said Britton, "but much of the sales effort seemed a lot like cold calling." As the only representative for the Americas, Britton had his work cut out for him. With only two other marketing representatives—one covering Europe and the Middle East, and the other covering Asia-Pacific—Britton knew that IA's small team was as taxed as he was. The sales team, Britton noted, was "short-handed" and lacked "the market intelligence—like who was in the market for a new system—that the incumbents took for granted."

IA also struggled with delays as a consequence of the sheer number of departments and individuals who had, or thought they had, a role in the purchase decision. According to Britton, "Multiple players had a distinct role in the decision to buy a new IFE system, and all of them need to be 'on board,' so to speak." Such players included varied departments within airlines, aircraft manufactures and seat makers, and, indirectly, passengers themselves. IA pitched to a mid-size, highly regarded European airline with a strong global network and had significant support from several departments; however, they lost the bid to an incumbent because, as an insider confided to Britton, the airline "just couldn't risk going with an unproven system from a start-up."

Britton believed that it was essential to establish a presence at the two major industry trade shows to effectively showcase its products: the AIX, held every spring in Hamburg, and the Airline Passenger Experience Association Expo, held every autumn in a different American city. Although both shows presented excellent networking opportunities, they were expensive and short. "In a sense," Britton contemplated, "a year of sales effort gets crammed into just a few days."

Product promotion in the digital age also presented unique challenges. As online writers and bloggers of varied skill and experience played an increasing role in publicity, it became more difficult for companies to control their public image. Although Britton believed that many qualified industry writers existed online, too often, self-professed "experts" were either uninformed or financially influenced by pre-existing IFE giants. Communication in the space had become more expensive because specialized industry magazines blurred the distinction between advertising and editorial content, thus making it almost mandatory for companies to buy advertisements if they wanted publicity.

Despite these challenges, IA garnered positive media coverage early in its formation, owing, in part, to its innovative approach and an industry desire for change. "Some industry reporters and bloggers were keen to see fresh thinking in IFE," said Britton, "so our new solutions garnered a lot of interest, along with a 'David versus Goliath' narrative. Airlines worldwide seemed keen for new entrants." Britton believed that the AURA website was engaging and well-designed, IA's sales collateral was consistent, and its advertising powerful, albeit limited.

Encouraged by early publicity, the team ventured to the 2012 AIX in Hamburg.

TROUBLE IN HAMBURG

Britton, Stevens, Martins, two other sales executives, and a technical specialist arrived in Hamburg for the 2012 AIX with a mix of enthusiasm and concern. They had invested many resources in development, which included partnering with Factorydesign, a highly respected, award-winning industrial design firm based in London. After 18 months of sales and marketing efforts, they were eager to secure a launch customer. They knew they needed to close a sale in order to demonstrate AURA's viability to the market, raise internal morale, and generate revenues.

Hours before the show opened, anxiety rose exponentially as IA ran into technical glitches. Although the AURA Connected prototype worked perfectly, the technology team, despite a Herculean overnight effort, could not debug the AURA Works demonstration system. It did not work for the entire three days of the trade show. “We were all embarrassed, especially because we installed a working ‘V1.0’ prototype in an aircraft-cabin mock-up a year earlier at AIX,” Britton recalled. The AURA customer proposition mantra, “Ultra lightweight. More reliable. Lower ownership cost. Happier passengers, happier crew,” began to sound hollow.

FINAL QUESTIONS

Folding up his seat tray, the preternaturally optimistic Britton could not help but feel a bit gloomy about IA’s direction. Flying home from Hamburg, he was preoccupied by questions about IA’s marketing strategy and organizational structure. What should be the firm’s priorities? What product lines should IA offer, and to whom? Did IA have the right organization to create and execute on a winning marketing strategy?

Britton glanced outside at the spring-green Texas landscape. As he felt the landing gear thump the runway at Dallas/Fort Worth International Airport, he knew the coming year was not going to be easy.

This case was prepared by Professor Rob Britton (Georgetown University), Professor Robert Mackalski (McGill University, Desautels Faculty of Management); faculty lecturer Mary Dellar (McGill University); and Mary Towers (McGill University).

EXHIBIT 1: INTELLIGENT AVIONICS EXECUTIVE TEAM BIOGRAPHIES**Clark Stevens, Chairman**

Stevens was an aircraft interiors entrepreneur who created three profitable aircraft interiors businesses over 20 years.

Connor Martins, CEO

Martins was finance director and one of the pioneers of Tesco.com, the online store of the U.K. supermarket chain. From 2004 to 2008, he founded and led Mezzo Movies Ltd., which gained success by providing low-cost, rapid-deployment IFE hand-helds for boutique, charter, and low-cost airlines.

William Davidson, CTO and VP, Asia-Pacific

Davidson served as CTO and head of development for the trio of AURA solutions and led AURA sales activity in Asia and the Pacific. Previously, he was president of Boeing Australia and managing director of Smiths Group plc, a U.K. company with customers in aerospace and other sectors. Davidson was a fellow of the Royal Aeronautical Society.

Rob Britton, VP, Americas

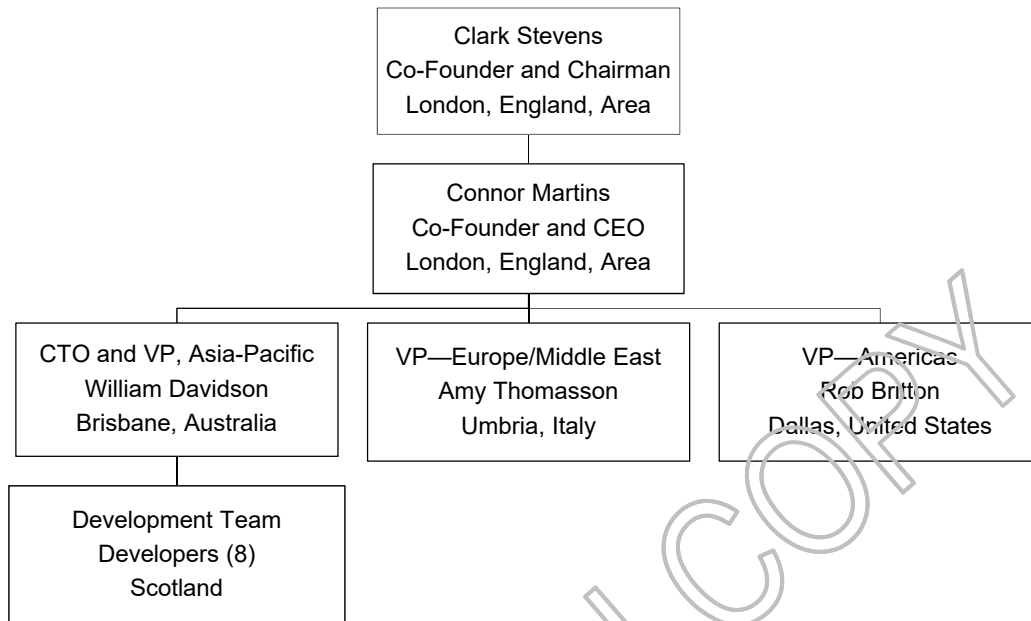
In his over 20 years of experience with American Airlines, Inc., Britton rose to head of advertising and marketing planning after serving in other leadership roles, including food and beverage services, corporate communications, and international affairs.

Amy Thomasson, VP, EMEA

Thomasson joined the AURA team after a successful run at a major equipment supplier for aircraft cabins. Thomasson had extensive experience in inflight service and provision, having begun her career in inflight service for Scandinavian Airlines (commonly known as SAS).

Note: CEO = chief executive officer; CTO = chief technology officer; VP = vice-president; EMEA = Europe, the Middle East, and Africa.

Source: Company files.

EXHIBIT 2: INTELLIGENT AVIONICS ORGANIZATIONAL CHART, 2012

Note: CEO = chief executive officer; CTO = chief technology officer; VP = vice-president.
Source: Company files.

**EXHIBIT 3: THE WORLD'S TOP 50 AIRLINES BY CAPACITY
(WEEKLY AVAILABLE SEAT KILOMETRES IN MILLIONS)**

Global Rank	Airline	December 2012
1	United Airlines, Inc.	6,149.39
2	Delta Air Lines, Inc.	5,643.67
3	Emirates	4,992.91
4	American Airlines, Inc.	4,800.88
5	Southwest Airlines Co.	3,276.52
6	Deutsche Lufthansa SE	3,158.82
7	British Airways	3,049.52
8	Air France	2,825.52
9	China Southern Airline Company Limited	2,596.67
10	Singapore Airlines Limited	2,375.71
11	Cathay Pacific Airways Limited	2,311.92
12	Air China Limited	2,193.52
13	US Airways	2,016.79
14	China Eastern Airlines Corporation Limited	1,987.44
15	Turkish Airlines	1,918.11
16	Qantas Airways	1,863.46
17	Qatar Airways Q.C.S.C.	1,798.31
18	Koninklijke Luchtvaart Maatschappij N.V.	1,785.62
19	Korean Air Lines Co., Ltd.	1,734.52
20	Thai Airways International Public Company Limited	1,702.80
21	Air Canada	1,671.16
22	All Nippon Airways Co., Ltd.	1,549.77
23	LATAM Airways Brasil	1,494.02
24	Ryanair DAC	1,476.21
25	Japan Airlines Co. Ltd.	1,375.61
26	JetBlue Airways Corporation	1,214.78
27	PJSC Aeroflot–Russian Airlines	1,197.67
28	Etihad Airways	1,135.83
29	EasyJet Airlines Company Limited	1,124.06
30	Iberia, Líneas Aéreas de España, S.A. Operadora, Sociedad Unipersonal	1,046.12
31	Malaysia Airlines Berhad	1,039.17
32	Virgin Atlantic Airways Limited	1,005.24
33	Gol Linhas Aéreas Inteligentes S.A.	913.46
34	Asiana Airlines Inc.	876.32
35	Air India	869.25
36	Alaska Airlines	866.81
37	Saudi Arabian	859.67
38	China Airlines	824.52
39	PT Lion Mentari Airlines	810.54
40	Hainan Airlines Co., Ltd.	789.65
41	Swiss International Air Lines AG	768.20
42	Jetstar Airways Pty Ltd	732.12
43	Air New Zealand Limited	710.17
44	WestJet Airlines Ltd.	703.52
45	Società Aerea Italiana	702.77
46	Jet Airways	682.16
47	OJSC Transaero Airlines	681.90
48	Air Berlin PLC & Co. Luftverkehrs KG	678.11
49	Virgin Australia Airlines	667.35
50	EVA Air Corporation	661.81

Source: "United Ends 2012 as World's Biggest Airline, Emirates Third. Turkish and Lion Air the Biggest Movers," CAPA Centre for Aviation, December 31, 2012, accessed April 21, 2018, <https://centreforaviation.com/insights/analysis/united-ends-2012-as-worlds-biggest-airline-emirates-third-turkish-and-lion-air-the-biggest-movers-93047>.

EXHIBIT 4: SELECTED AIRLINES BY FLEET SIZE

Airline	Estimated Fleet Size	Headquarters
Air Berlin PLC & Co. Luftverkehrs KG	140	Berlin, Germany
Air Canada	364	Montreal, Canada
Air France	381	Tremblay-en-France, France
Air Transat	32	Montreal, Canada
American Airlines, Inc.	873	Fort-Worth, Texas, United States
Austrian Airlines AG	77	Schwechat, Austria
Azul Linhas Aéreas Brasileiras S/A	65	Barueri, Brazil
China Eastern Airlines Corporation Limited	349	Shanghai, China
China Southern Airlines Company Limited	423	Guangzhou, China
Delta Air Lines, Inc.	1,280	Atlanta, Georgia
EasyJet Airline Company Limited	217	Luton, United Kingdom
Etihad Airways	89	Abu Dhabi, United Arab Emirates
Garuda Indonesia	110	West Jakarta, Indonesia
Icelandair Group hf	37	Iceland
IndiGo	50	Gurgaon, India
PT Indonesia AirAsia	29	West Jakarta, Indonesia
PT Lion Mentari Airlines	100	Central Jakarta, Indonesia
Deutsche Lufthansa AG	401	Cologne, Germany
Malaysia Airlines Berhad	98	Selangor, Malaysia
Pegasus Airlines	49	Istanbul, Turkey
Scandinavian Airlines (SAS)	151	Stockholm, Sweden
Singapore Airlines Limited	102	Singapore
SkyWest, Inc.	755	St. George, Utah, United States
Southwest Airlines Co.	683	Dallas, Texas, United States
Swiss International Air Lines AG	94	Basel, Switzerland
United Airlines, Inc.	1,264	Chicago, Illinois, United States
US Airways	621	Tempe, Arizona, United States

Source: Company documents.

EXHIBIT 5: AIRCRAFT OFFERING AND PASSENGER CAPACITY OF BOEING AND AIRBUS (2012)**Boeing Aircraft by Passenger Capacity**

	737	747	767	777	787
Passenger Capacity	126–220	400–500	181–375	301–386	210–290

Airbus Aircraft by Passenger Capacity

	A318	319	320	321	340	330	380
Passenger Capacity	107	124	150	185	239–380	246–300	555

Source: The Boeing Company, 2012 Annual Report, February 11, 2013, accessed April 19, 2018, www.annualreports.com/HostedData/AnnualReportArchive/b/NYSE_BA_2012.pdf.

EXHIBIT 6: NUMBER OF AIRCRAFT ORDERED FROM AIRBUS AND BOEING, 2009–2012

	2009	2010	2011	2012
Airbus	310	644	1,608	914
Boeing	263	625	921	1,339

Source: "Aircraft Orders—Airbus and Boeing 2003–2017," Statista, 2018, accessed April 19, 2018, <https://www.statista.com/statistics/264492/aircraft-orders-from-airbus-and-boeing>.

EXHIBIT 7: COMMERCIAL REGIONAL JET OFFERINGS (2012)

Embraer	ERJ 145	170	175	190	195
Passenger Capacity	37–50	70–80	78–88	98–114	108–122
Bombardier	CRJ700	900	1000	190	195
Passenger Capacity	75	76	100	98–114	108–122

Source: Company documents.

EXHIBIT 8: COMMERCIAL REGIONAL JET DELIVERIES (2012)

Manufacturer	Units
Bombardier	50
Embraer	283

Source: "Bombardier's Commercial Aircraft Deliveries Worldwide 2012," Statista, 2018, accessed April 19, 2018, www.statista.com/statistics/263823/bombardiers-commercial-aircraft-deliveries-worldwide-since-2005; "Embraer—Aircraft Deliveries 2016," Statista, 2018, accessed April 19, 2018, www.statista.com/statistics/269938/deliveries-of-aircraft-from-embraer.

EXHIBIT 9: NEW BUSINESS JET / PRIVATE JET SALES BY MANUFACTURER, 2012

Manufacturer	Unit Sales	Head Office
Airbus	8	Toulouse, France
Beechcraft	32	Wichita, United States
Boeing	12	Chicago, United States
Bombardier	179	Montreal, Canada
Cessna	181	Wichita, United States
Dassault	66	Paris, France
Embraer	99	Sao Paulo, Brazil
Gulfstream	95	Savannah, United States

Source: "New Business Jet Sales up Slightly in 2013," SherpaReport, April 8, 2014, accessed April 19, 2018, www.sherpareport.com/aircraft/business-jet-sales-2013.html; and company files.