

Commercial Air Wars: Strategies That Changed Commercial Aviation

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Introduction

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Introduction

- Airbus and Boeing – Large Commercial Aircraft Duopoly
- Their founding/founders
- Current products
- Current market shares
- Average prices
- Aircraft development times
- Aircraft programs cumulative cash flows
- Aircraft development costs estimates
- Some subjects to be considered

Large Commercial Aircraft Manufacturers 2022

- **Airbus** is a leader in designing, manufacturing and delivering aerospace products, services and solutions to customers on a worldwide scale

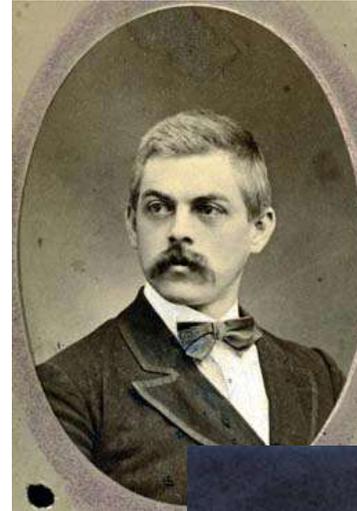


- **Boeing** develops, manufactures and services commercial airplanes, defense products and space systems for customers in more than 150 countries



The Boeing Company: The First 100 Years

- **William E. Boeing** was born in Detroit to **Wilhelm** and **Marie Ortmann Boeing (Böing)** in 1881
- His father, who arrived in the United States in 1868, had come from an old and well-to-do family in Hohenlimburg Germany
- He emigrated to the U.S. when he was 20 years old
- Wilhelm started work as a farm laborer but soon joined forces with Karl Ortmann, a lumberman and, ultimately, his father-in-law.
- Young Wilhelm Boeing bought timberland, with its mineral rights, in the Mesabi Range
- He also bought land in Washington State and timberland in the redwood forest in California
- Wilhelm did not live to see the development of those mining rights



William E. Boeing

The Boeing Company Founders

1910

- Boeing bought the Heath Shipyard on the Duwamish River to build a yacht, named the Taconite
- He attended an aviation meet in 1910 in Los Angeles, where he tried to get a ride on one of the boxy biplanes but had no success

1915

Thomas Hamilton, later founder of Hamilton Metalplane Co. (acquired by Boeing in 1929), introduced Boeing to U.S. Navy Lieutenant **George Conrad Westervelt**

- Westervelt was a graduate of the United States Naval Academy and Massachusetts Institute of Technology in naval engineering



William E. Boeing



George Conrad Westervelt

The Boeing Company Founders



- **June 15, 1916** William Boeing takes **Bluebill**, the first **B & W Model 1**, on its maiden 900 foot flight
 - B&W –Boeing and Westerveldt
- **This was the beginning of the Boeing Company**
- Pilot **Herb Munter** takes **Mallard**, the second plane on its first flight
- The B & W was made of wood, with wire bracing, and was linen-covered

The Boeing Company Founders



- **First flight** June 15, 1916
 - **Model number** 1 (B&W)
 - **Span** 52 feet
 - **Length** 27 feet 6 inches
 - **Gross weight** 2,800 pounds
 - **Top speed** 75 mph
 - **Cruising speed** 67 mph
 - **Range** 320 miles
 - **Power** 125-horsepower Hall-Scott A-5 engine
 - **Accommodation** Two crew
- **June 15, 1916** William Boeing takes **Bluebill**, the first **B & W Model 1**, on its maiden 900 foot flight
 - B&W –Boeing and Westerveldt
 - **This was the beginning of the Boeing Company**
 - Pilot **Herb Munter** takes **Mallard**, the second plane on its first flight
 - The B & W was made of wood, with wire bracing, and was linen-covered
 - It was similar to the Martin trainer aircraft that Boeing owned, but had better pontoons and a more powerful engine
 - The two B & Ws were offered to the United States Navy. When the Navy did not buy them, they were sold to the New Zealand Flying School and became the company's first international sale
 - Boeing paid for a wind tunnel at the **University of Washington** in exchange for establishment of a curriculum in the new science of aeronautics

Airbus Beginnings and Founders

- Today's **Airbus SE** is the product of international consolidation in the **European** aerospace industry tracing back to the formation of the **Airbus Industrie GIE** consortium in 1970
- In 2000, the **European Aeronautic Defence and Space Company (EADS)** NV was established
- In addition to other subsidiaries pertaining to security and space activities, **EADS** owned 100% of the pre-existing **Eurocopter SA**, established in 1992, as well as 80% of **Airbus Industrie GIE**
- In 2001, **Airbus Industrie GIE** was reorganized as **Airbus SAS**, a simplified joint-stock company
- In 2006, **EADS** acquired **BAE Systems'** remaining 20% of **Airbus**
- **EADS NV** was renamed **Airbus Group NV** and **SE** in 2014, and 2015, respectively
- Due to the dominance of the **Airbus SAS** division within **Airbus Group SE**, these parent and subsidiary companies were merged in January 2017, keeping the name of the parent company
- The company was given its present name in April 2017

- **The founders of Airbus SE are:**

- Franz Josef Strauss



- Henri Ziegler



- Felix Kracht



- Roger Béteille



Airbus Beginnings and Founders



- **Franz Josef Strauss** was a German politician. He was the long-time chairman of the Christian Social Union in Bavaria (CSU)
- aerospace conglomerate Airbus
- As an aerospace enthusiast, Strauss was a key player in the creation of **Airbus** conglomerate in the 1970s
- He served as chairman of **Airbus** in the late 1980s, until his death in 1988



- **Henri Ziegler** was an engineer, as well as a French air force officer and test pilot
- He was a founding father of **Airbus Industrie** and became its first CEO
- He was the driving force behind the development of the **Airbus A300B**, the original **Airbus** aircraft

Airbus Beginnings and Founders



- **Felix Kracht** was a German engineer
- After the World War II, he went on to work in France with **Nord Aviation** before moving back to Germany to head **Deutsche Airbus GmbH**
- He was **Airbus'** first production director on the **A300** program
- He became the Senior Vice President and was responsible for production at the **Toulouse** site until his retirement in 1981



- **Roger Béteille** was a French aeronautical engineer and businessman
- He was one of the founding fathers of **Airbus**
- He is known for his contributions to **Airbus**
- His contributions include the "**Airbus fuselage**" – the 222-in fuselage cross section with the ability to carry two **LD-3** freight containers and the basic work-share agreement of the various partners in **Airbus**

Airbus Commercial Aircraft



Airbus

- Airbus is a leader in **designing, manufacturing and delivering aerospace products, services and solutions** to customers on a worldwide scale.
- With **over 130,000 employees** and as the **largest aeronautics and space company** in Europe and a worldwide leader, Airbus is at the forefront of the aviation industry
- We build the most innovative commercial aircraft and consistently capture about half of all commercial airliner orders
- Thanks to our deep understanding of changing market needs, customer focus and technological innovation, we offer products that connect people and places via air and space

Boeing Commercial Aircraft



Boeing

- As a leading global aerospace company, Boeing develops, manufactures and services commercial airplanes, defense products and space systems for customers in more than 150 countries
- As a top U.S. exporter, the company leverages the talents of a global supplier base to advance economic opportunity, sustainability and community impact
- Boeing's diverse team is committed to innovating for the future, leading with sustainability, and cultivating a culture based on the company's core values of safety, quality and integrity

Market Share 2nd Quarter 2021

BOEING Orders and Deliveries
ENCOMENDAS E ENTREGAS 2Q2021

DELIVERIES / ENTREGAS:



79 TOTAL DELIVERIES TOTAL DE ENTREGAS	317 ORDERS ENCOMENDAS	143 CANCELLATIONS CANCELAMENTOS	4.166 BACKLOG PEDIDOS
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AIRBUS Orders and Deliveries | Commercial Aircraft
DELIVERIES / ENTREGAS | 2Q2021



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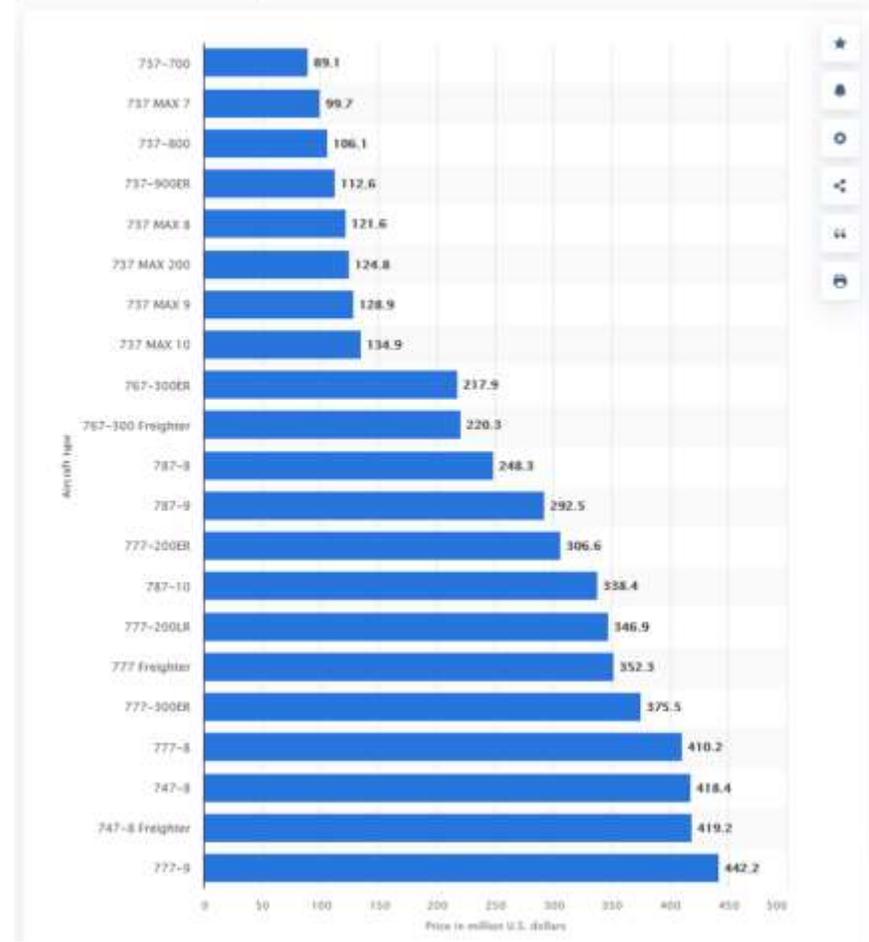
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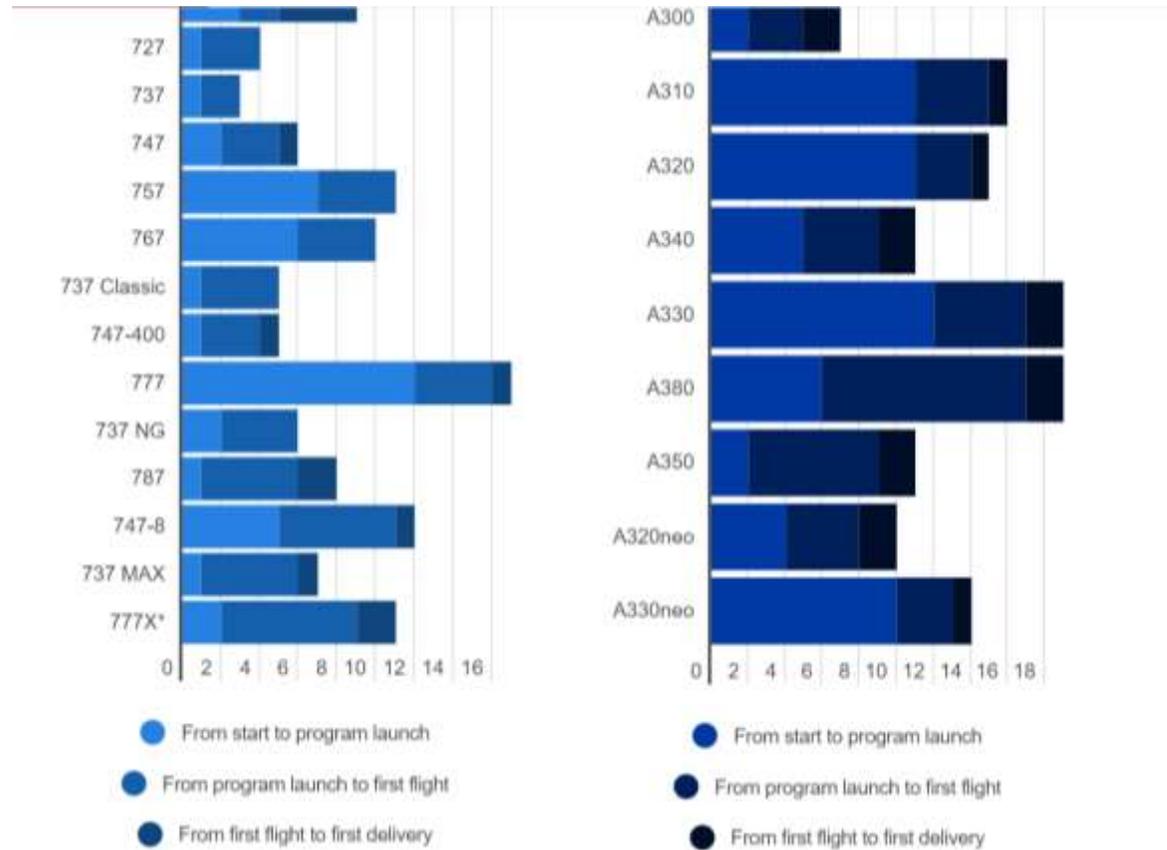
Commercial Aircraft Estimated Prices

Aircraft	List Price (\$m)	Market Value (\$m)	Discount
<u>A380</u>	432.6	236.5	45%
<u>B777-300ER</u>	339.6	154.8	54%
<u>A350-900</u>	308.1	150	51%
<u>B787-9</u>	264.6	142.8	46%
<u>B787-8</u>	224.6	117.1	48%
<u>A330-300</u>	256.4	109.5	57%
<u>A330-200</u>	231.5	86.6	63%
<u>A321</u>	114.9	52.5	54%
<u>A320neo</u>	107.3	48.5	55%
<u>B737-900ER</u>	101.9	48.1	53%
<u>B737-800</u>	96	46.5	52%
<u>A320</u>	98	44.4	55%
<u>A319</u>	89.6	37.3	58%
<u>B737-700</u>	80.6	35.3	56%

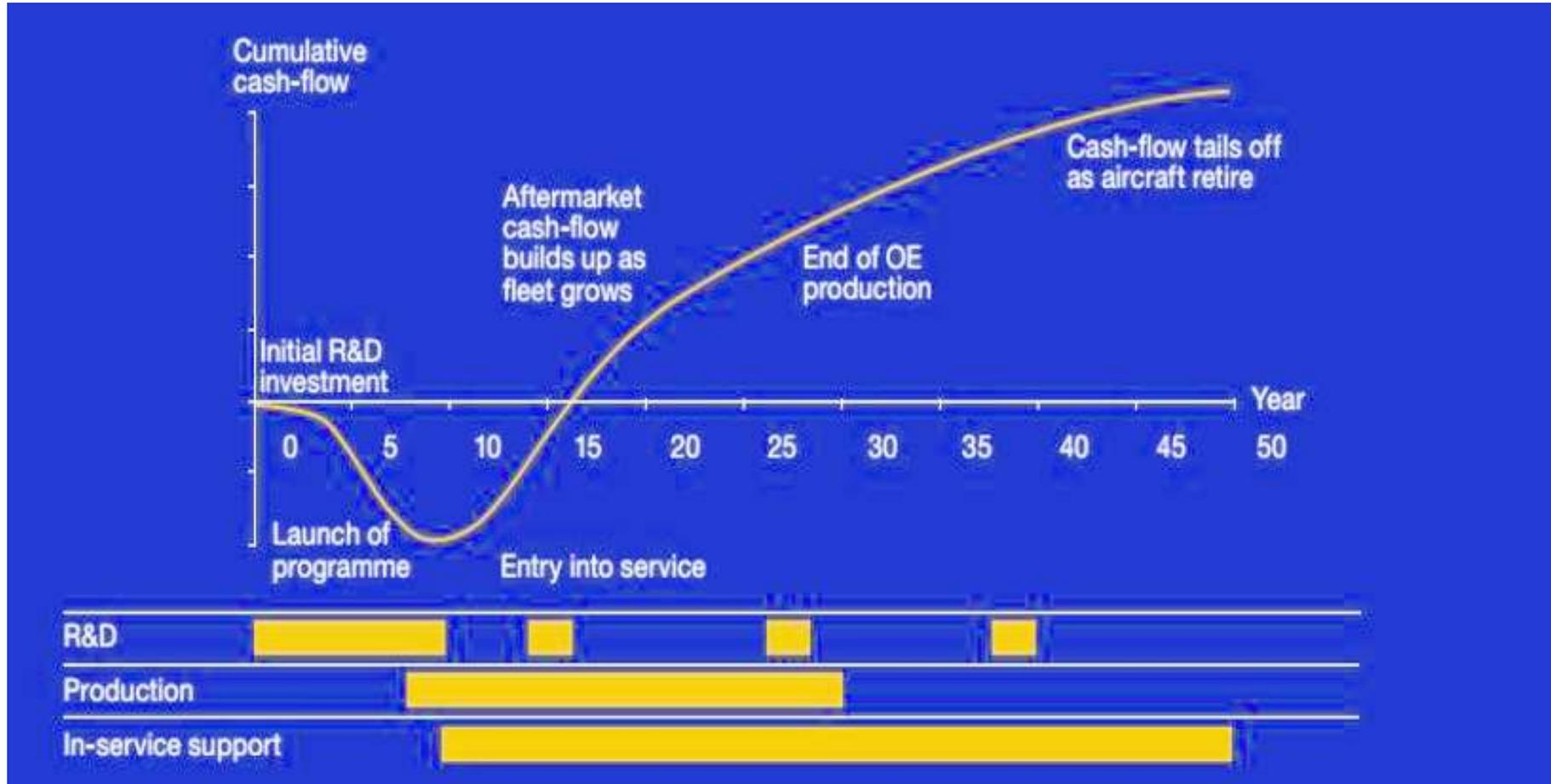
Average prices for Boeing aircraft as of March 2021, by type
(in million U.S. dollars)



Boeing and Airbus Development Times



Aircraft Programs Cumulative Cash Flows



Aircraft Development Cost Estimates

Aircraft	Year of First Service	Development Costs (USD) Constant 2004 Dollars
Douglas DC-3	1936	4.3 Million
Douglas DC-6	1946	144 Million
Boeing 707	1958	1.3 Billion
Boeing 747	1970	3.7 Billion
Boeing 777	1995	7.0 Billion
Airbus A380	2007	14.4 Billion
Boeing 787	2012	13.4 Billion

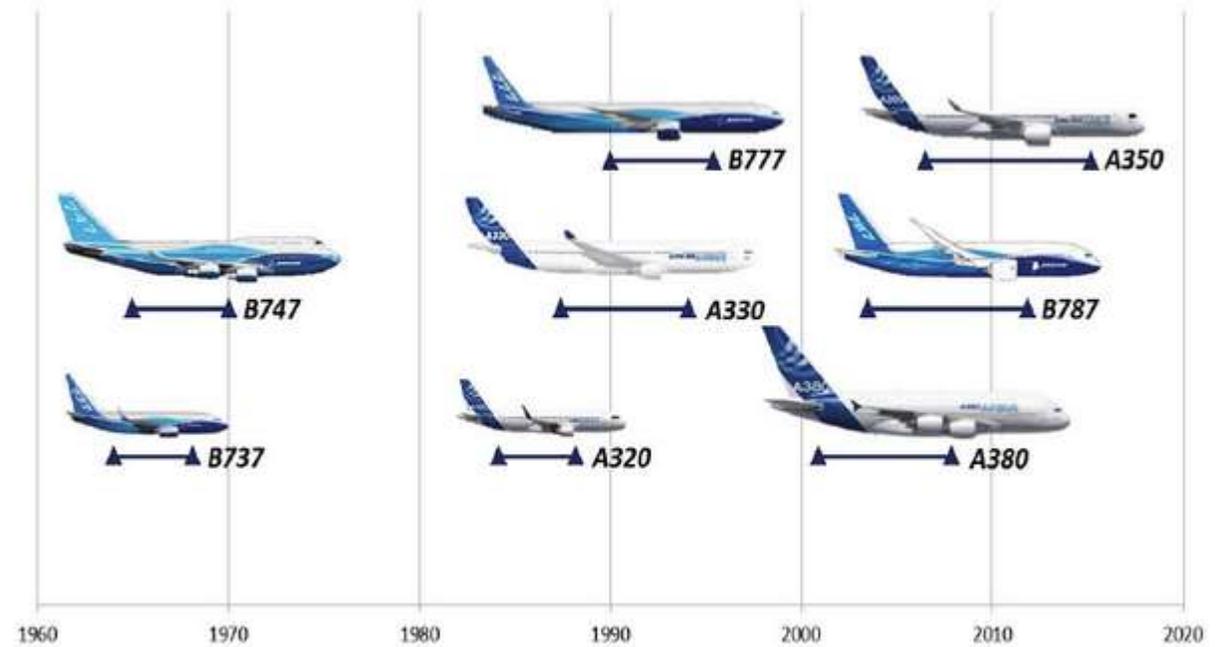


Fig. 2. Boeing and Airbus Group representative models and development cycle timeframe

Some Subjects To Be Considered

- Commercial aircraft duopoly
- Some commercial aviation history
- Commercial aircraft manufacturers
 - American and European
 - Some of their aircraft
- Growth of air travel with improved aircraft
- Bigger and faster aircraft
- Invention of the jet engine
- Post war aircraft
- Aircraft of the jet age
- American manufacturers dominate
- Boeing- history
- Douglas- history
- Lockheed-history
- Introduction of the wide bodies
 - Boeing 747
 - Douglas DC-10
 - Lockheed L-1011
- European manufacturers join to counter the Americans
- Beginning of Airbus
- Airbus organization issues
- The first Airbus aircraft the A300 wide body twin
- Breaking into the North American market
- Douglas merges with McDonnell
 - Problems with DC-9 production
- MDC fails to build a wide body twin
- Lockheed drops out of commercial market
- Airbus expands its offerings- A320 a new aircraft
- Challenging Boeing

Some Subjects To Be Considered

- The Airbus Boeing narrow body battles
- Boeing merges with McDonnell Douglas MDC
- MDC management changes Boeing
- The four engine wide bodies (747) sales decline
- ETOPS
- Two crew cockpits
- Big twins take over long haul routes
- Boeing 777
- Boeing 787- composite airframe
 - Production problems
- Airbus A330
- Airbus A350XWB – responds to 787 –goes composite
- Airbus A380 double decker
- Boeing 777X
- Boeing 737 –multiple derivative models
 - Why the 737MAX
- MDC and ex GE management at Boeing – no new narrow body aircraft
- Focus on profits and investors
- Airbus expands market share
- Boeing problems with 787
 - EIS three years late
 - Battery fires -787 grounded
- Boeing 737 MAX accidents
 - MAX grounded
- Airbus problems with A380
 - EIS delayed
- New aircraft from Airbus or Boeing?
 - Need new engines
- Who is winning the battle?