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GLOBAL AEROSPACE INDUSTRY RISKS

Summary. The global Aerospace industry is expected to improve in 2018 as its revenue is predicted to rise by 4.1% , doubling last year's 2.1% growth. The recovery of global gross domestic product (GDP), stable commodity prices, and increased passenger travel demand are likely to ramp up growth in the commercial aircraft sector in 2018. This article reviews the performance of the aerospace industry in 2017 and 2018 and speculates its growth in the incoming years. It also outlines the performance across the major aerospace markets and discusses trends that will impact the industry. The article forecasts the mergers and acquisitions activity in 2018 that lays the foundation for further growth in this space. Key findings are:

- Commercial aircraft sector revenues are expected to grow by 4.8% as production levels are likely to be robust while the defence sector revenues are likely to record 3.6% growth as the US defence budget recovers after experiencing multi-year declines.
- The spiralling demand for passenger travel is driving commercial aircraft production and is responsible for the record high backlog of 14,215 units at the end of 2017.
- In 2018, global Mergers and Acquisitions (M&A) activity is expected to remain strong in the aerospace sector, being driven by pricing pressures from aircraft OEMs and their expansion of high-margin aftermarket services. This has pushed suppliers to consolidate for scale and cost-effectiveness.

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1. INTRODUCTION

After a year of subdued growth in 2017, the global Aerospace and Defense (A&D) industry is expected to improve in 2018 with Deloitte² forecasting industry revenues to grow by about 4.1% . The industry closed the 2017 year with 2.1% revenue growth, in line with Deloitte's forecast of 2.0% (refer to Deloitte's 2017 Global aerospace and defense industry outlook).

Recovery in global gross domestic product (GDP) growth, stable commodity prices including crude oil and growth in passenger travel demand, especially in the Asia-Pacific, the Middle East, and the Latin America regions, is likely to drive the commercial aircraft sector growth in 2018. At the end of 2017, commercial aircraft backlog remained at an all-time high at about 14,000 units, representing nine and a half years of current annual production rate. Almost a 100 additional aircraft are expected to be produced in 2018, compared to 2017, aircraft manufacturers ramp up production in response to growing aircraft demands.

Mergers and Acquisitions (M&A) activity has accelerated over the past year, with more than a two-fold increase in deal value. In 2018, the A&D industry is likely to continue to experience increased M&A globally, driven by original equipment manufacturers' (OEMs) continued pressure on suppliers to reduce costs and boost production rates. M&A activity in the US defence sector could accelerate in 2018 as increased defence budgets are likely to provide certainty to military planners. Large prime contractors are anticipated to consider acquiring small to mid-sized companies to gain access to new technologies and markets. The defence sector in Europe is unlikely to see large M&A deals, however, companies may pursue Joint-Ventures (JVs) to strengthen their market positions.

With higher production requirements for both aircraft and defence equipment in the future, it is critical for A&D companies to invest in new and advanced technologies. This will help the industry to be at the forefront of manufacturing, hence, enhancing productivity and efficiency.

² Deloitte Touche Tohmatsu Limited, commonly referred to as Deloitte, is a multinational professional services network. Deloitte is one of the "Big Four" accounting organizations and the largest professional services network in the world by revenue and number of professionals. Deloitte provides audit, tax, consulting, enterprise risk and financial advisory services with more than 286,200 professionals globally. In FY 2018, the network earned a record \$43.2 billion USD in aggregate revenues. As of 2017, Deloitte is the 4th largest privately owned company in the United States.



Fig. 1. Global Aerospace and Defence 2018 forecast. Source: Deloitte’s 2017 Global aerospace and defense industry outlook

2. COMMERCIAL AIRCRAFT SECTOR OUTLOOK

The global commercial aircraft sector is projected to record a 4.8% growth in revenue in 2018. The sector is likely to experience a stronger growth rate in 2018 after its low performance in 2017, primarily driven by an increase in production levels as aircraft manufacturers set to boost production in response to the growing aircraft demand. An estimate of about a 100 additional commercial aircraft are to be produced in 2018, primarily led by the narrow body aircraft. Major aircraft manufacturers, Airbus and Boeing, have indicated that production rates increased in 2018 and 2019, with the Airbus likely to ramp up production of its A320neo in 2018. Boeing is expected to increase the production rate of its 737 from 47 per month in 2017 to 52 per month in 2018 and 57 per month in 2019.

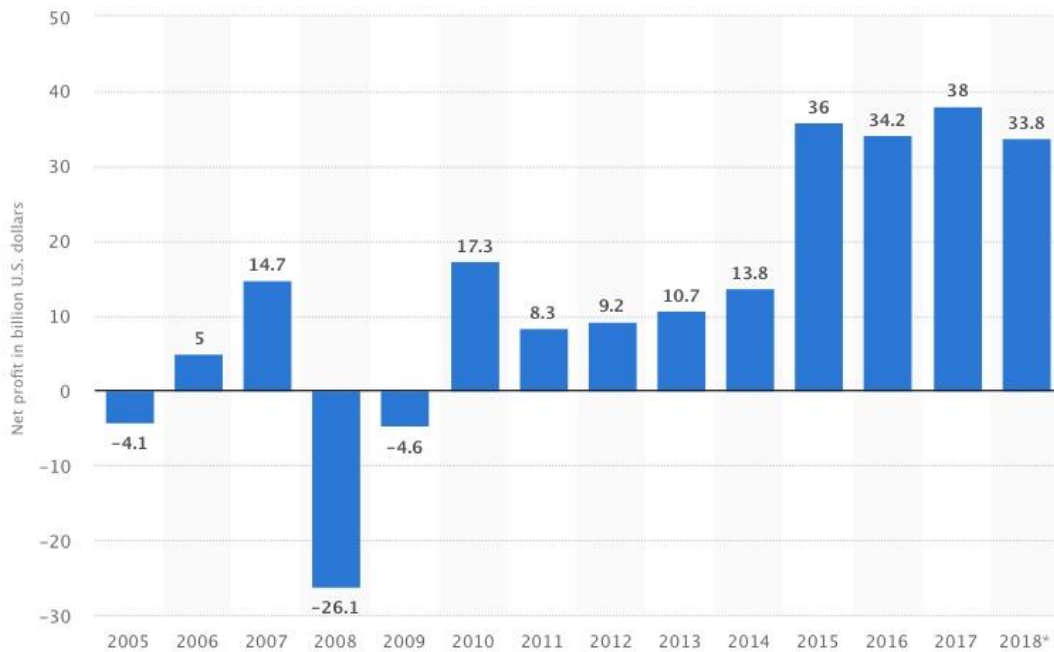


Fig. 2. Net profit of commercial airlines worldwide from 2005 to 2018 (in billion U.S. dollars)

Source: The Statistics Portal <https://www.statista.com/register/corporate>

Travel demand (Revenue Passenger Kilometers or RPKs)³ increased at a CAGR⁴ of 5.1 percent over the last 10 years. Annual passenger enplanements rose from about 2.5 billion in 2008 to more than 4.0 billion in 2017 (Figure 2). The year-on-year increase in 2017 was led by the Asia-Pacific region and is likely to continue to drive the passenger growth in the long-term due to the increasing share of the middle class population in the region, forecasted to grow to 65% by 2030 as compared to 46% in 2015.

Over the next 20 years, passenger traffic is expected to grow at an Average Annual Growth Rate (AAGR) of 4.7%, contributing to increased aircraft production (Figure 3). Strong order intake in the past several years resulted in a record high commercial aircraft backlog of 14,215 units at the end of 2017, representing nine and a half years of current annual production.

³ Revenue Passenger Kilometers (RPK) or Revenue Passenger Miles (RPM) is an airline industry metric that shows the number of kilometers travelled by paying passengers. It is calculated as the number of revenue passengers multiplied by the total distance travelled. Since it measures the actual demand for air transport, it is often referred to as airline “traffic.” They are often compared to the available seat kilometers (ASK), which show the total number of passenger kilometers that could be generated in order to determine the amount of revenue that comes in compared to the maximum amount.

⁴ The compound annual growth rate (CAGR) is the mean annual growth rate of an investment over a specified period of time longer than one year. To calculate compound annual growth rate, divide the value of an investment at the end of the period in question by its value at the beginning of that period, raise the result to the power of one divided by the period length, and subtract one from the subsequent result.

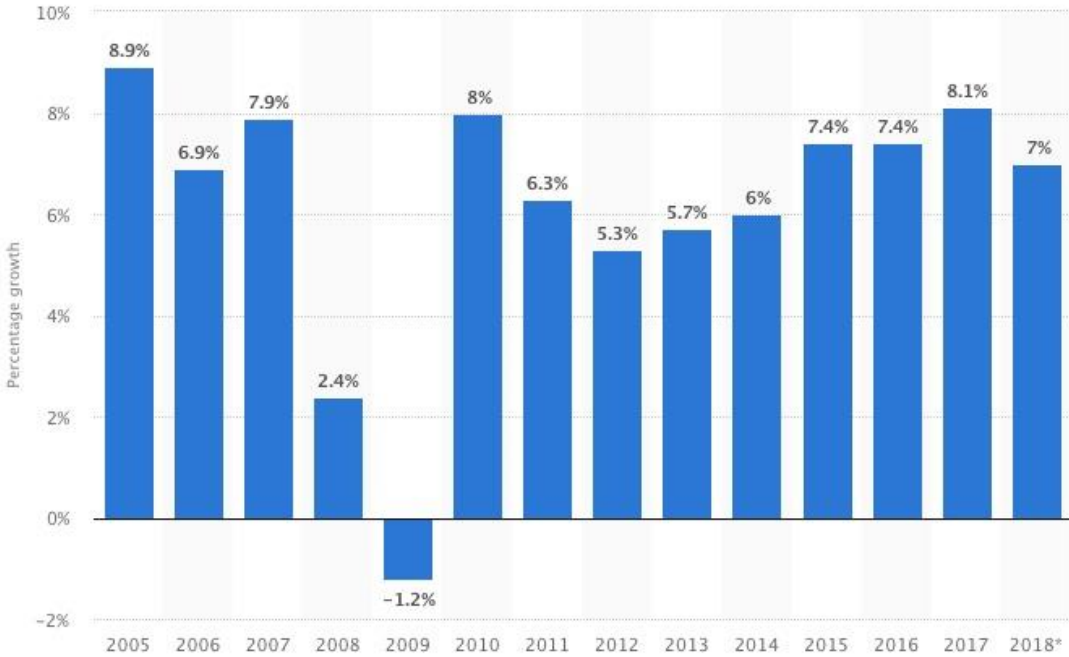
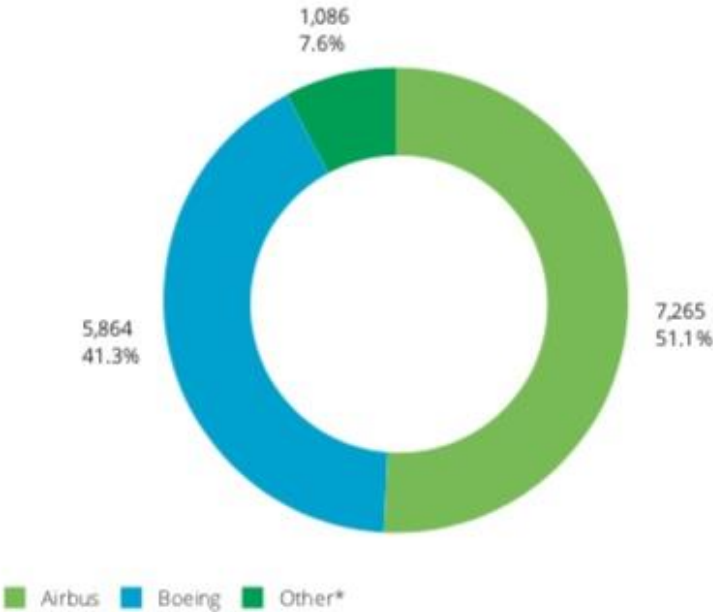


Fig. 3. Annual growth in global air traffic passenger demand from 2005 to 2018
Source: The Statistics Portal <https://www.statista.com/register/corporate>



Source: Deloitte analysis based on data from The Boeing Company, 2017 Annual report.

Fig. 4. Commercial aircraft unit backlog (as of December 2017)
Source: Deloitte’s 2017 Global aerospace and defence industry outlook

The large commercial aircraft market is a duopoly market with Boeing and Airbus collectively holding approximately 80% of the entire market share. Both have aggressively pursued orders with emerging market airlines and the growing low-cost carrier segments, often with favourable financing terms. Boeing and Airbus are the only players in the wide-body segment, while also dominating the narrow-body segment. Other players, such as the Bombardier and the Embraer, are present in the regional aircraft segment. The narrow-body aircraft manufacturers also face some competition from Bombardier's C-Series and will also have new entrants such as COMAC and Mitsubishi to contend with. COMAC, in particular, is likely to succeed given its ability to support a captive domestic market and the Bombardier has secured investment in C-Series by the province of Quebec in return for equity. However, in the medium term, opportunities for the new players are likely to be limited given the dominance and long order books of the Airbus-Boeing duopoly, which has effectively locked out new entrants.

Consolidation has continued within the fragmented commercial aerospace supply chain, this is due in part to the support of the OEMs seeking stronger suppliers with access to capital as partners who can support and partly fund new programme developments. Larger tier one and tier two suppliers have increased bargaining power with the OEMs given constrained production capacity. This has led to expanded margins at these levels at the expense of the OEMs. It has also driven increased M&A activity and increased pricing as strategic and private equity groups compete for scarce assets.

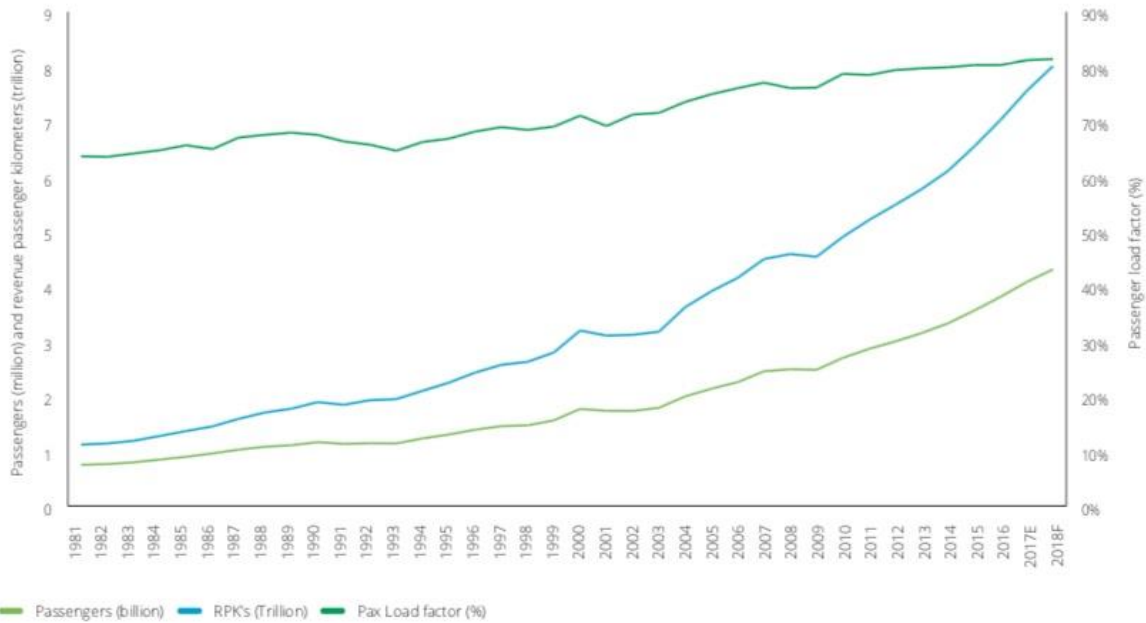
In Maintenance, Repair and Overhaul (MRO)⁵ and broader aftermarket, structural headwinds have created challenges. New sensor technology allows engine OEMs to control timing the of maintenance and the OEMs have changed their business models toward “through life total care”, reducing MROs share of spend. Airlines have been more rigorous on MRO costs. Aftermarket-focused businesses with long-life programmes have seen traditional high-margin pricing affected by the growth in the surplus parts market, being aided by the increased supply of parts as older aircraft are on verge of retirement.

As shown in Figure 5 above, passenger travel demand increased almost sevenfold from 1981 to 2017, with the passenger load factor (aircraft utilisation) rising 27.5% (nominally growing from 63.7 to 81.2%) during the same period. Likewise, the number of people flying per year also continued to grow, with a greater than five times increase from 1981 to 2017. This was mainly led by increased affordability of tickets as the average return fare (adjusted for inflation) of US\$355/per passenger in 2017 was 64% lower than that of 1996 (Figure 6).

Global demand for new aircraft production over the next 20 years is estimated to be 36,780 aircraft (excluding regional jets). Figure 4 depicts the sales order and production history of commercial aircraft from 1981 through 2017, showing a 248.5% increase in production during the period. On the basis of a seven-year moving average, production levels over the past 20 years have increased by 138.3% and over the next decade, commercial aircraft annual production is likely to increase by 25.0% .

As aircraft production continues to grow, there are key challenges the industry needs to consider among other factors; strengthening the supply chain, effective programme management, and use of new and advanced technologies to become more efficient (Figures 7 and 8).

⁵ MRO in an acronym for Maintenance, Repair, and Overhaul (or administratively – Maintenance, Repair, and Operations). Simply put, MRO is any action that helps keep or restore an item to its working condition. A wide variety of NDT, RVI, and Visual Inspection techniques can be used. Planned, Predictive, Preventative, Non-routine, and Shutdown maintenance are the main forms of overhaul. See related terms for the differences in these maintenance types.



Source: Deloitte analysis of the data from International Air Transport Association (IATA), "Fact Sheet," December 2017
https://www.iata.org/pressroom/facts_figures/fact_sheets/Documents/fact-sheet-industry-facts.pdf

Fig. 5. Global airline traffic (1981 to 2018F)
 Source: Deloitte’s 2017 Global aerospace and defense industry outlook

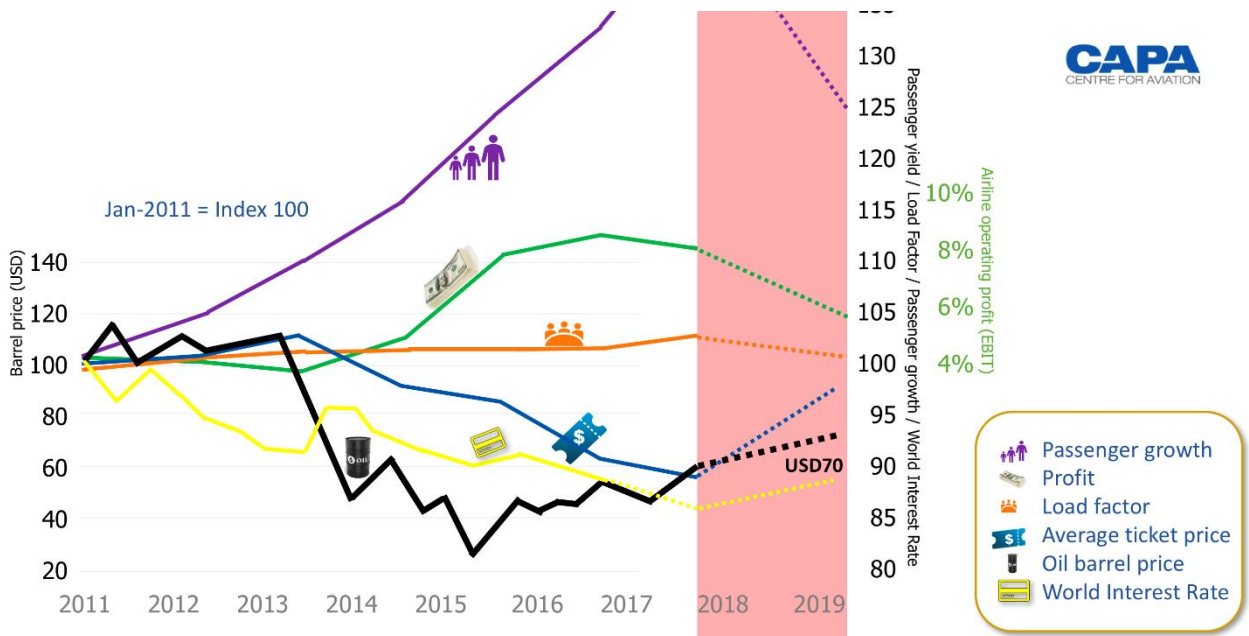


Fig. 6. The lines converge. As oil prices rise, the fundamentals begin to converge in 2018
 Sources: CAPA – Centre for Aviation, IATA, oilprice.net, The Economist

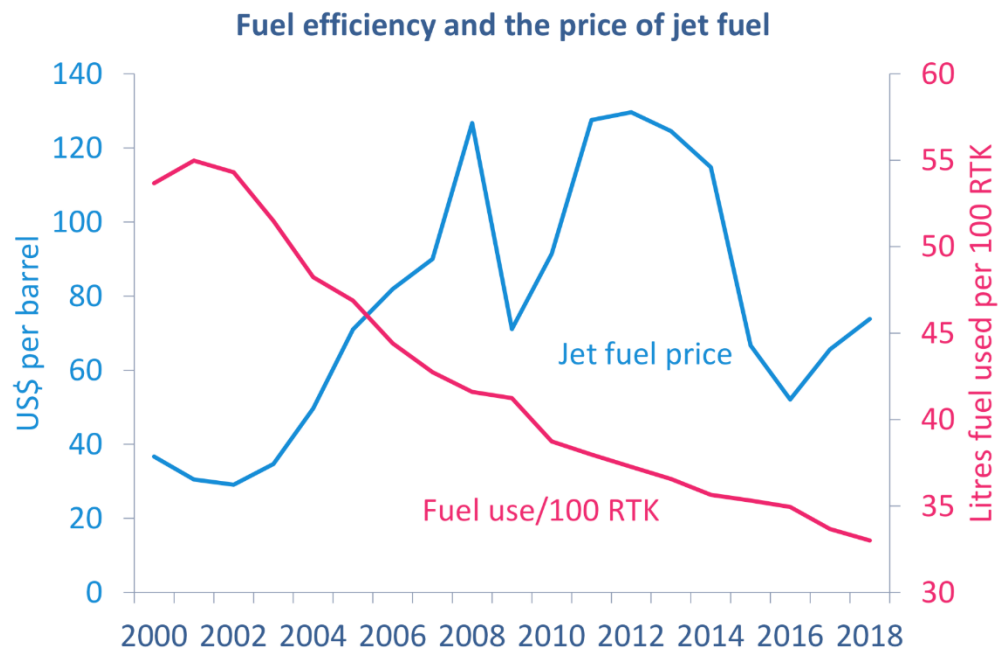
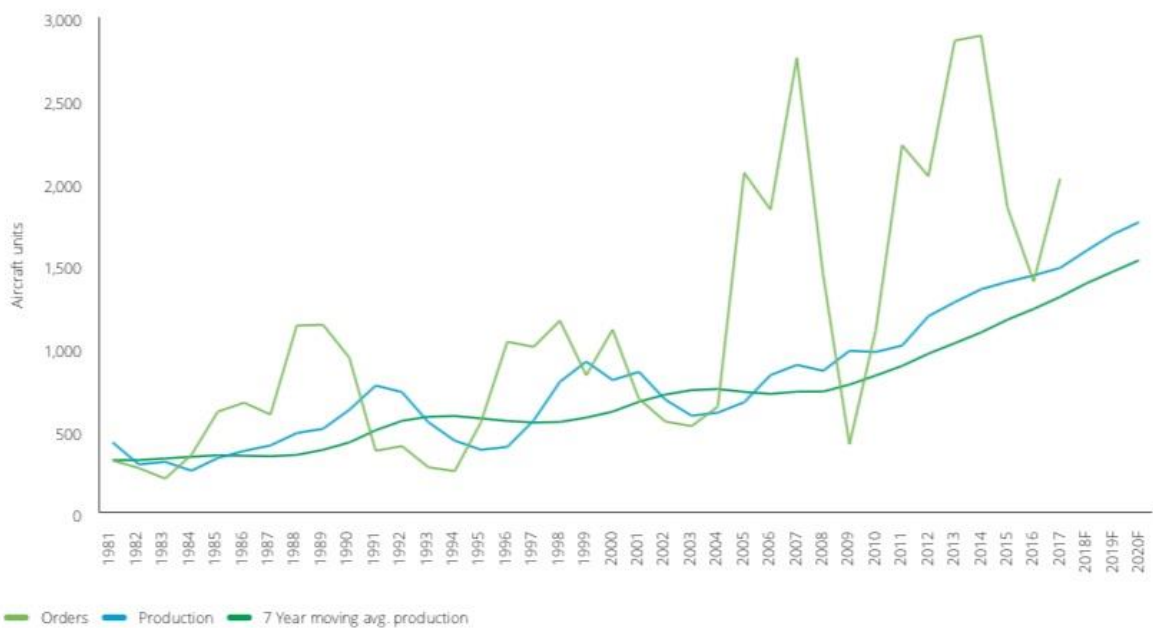


Fig. 7. Aircraft innovations and airline practices have improved fuel efficiency
 Source: IATA: <http://www.iata.org>

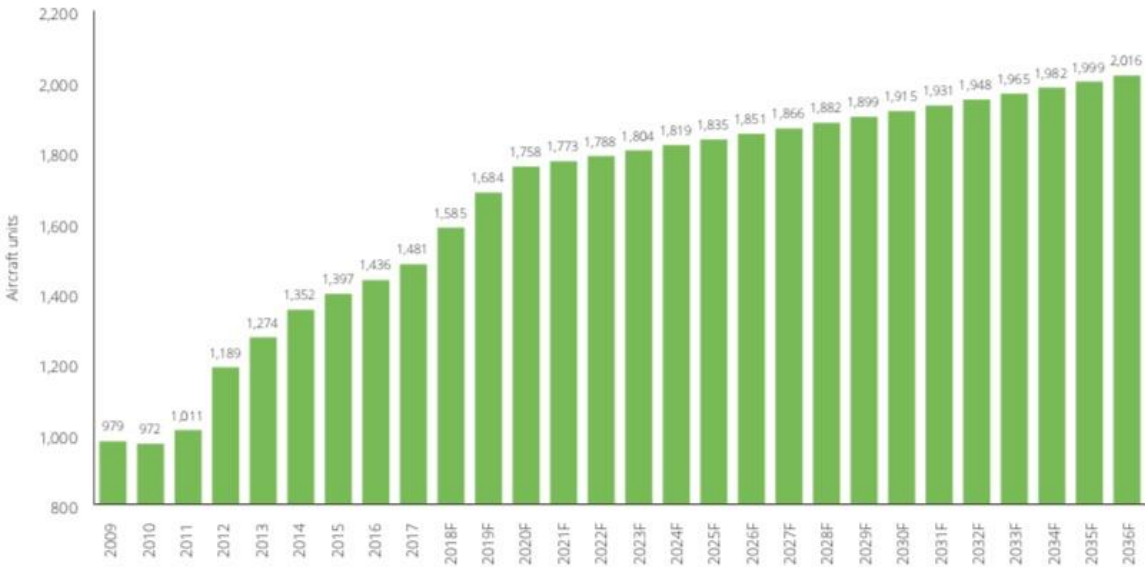


Source: Deloitte analysis of the following data: The Boeing Company, "Order and deliveries," accessed in February, 2018
<http://active.boeing.com/commercial/orders/index.cfm>; Airbus Group, "Orders and deliveries," accessed in February, 2018,
<http://www.airbus.com/company/market/orders-deliveries/>; UBS, US Aerospace and Defense Playbook, 27 November 2017; and Deutsche Bank, Global Aerospace and Defense - Industry Update, 15 December 2017.

Fig. 8. History and forecast for large commercial aircraft orders and production (1981 to 2020F)
 Source: Deloitte’s 2017 Global aerospace and defence industry outlook

After experiencing the delivery of 1,481 units, which indicates moderate growth in 2017, it is estimated that 1,585 commercial aircraft will be produced in 2018, which is a 7.0% increase over 2017, and a 24.4% increase compared to five years ago. In five years, the sector is expected to produce 1,788 aircraft, a 20.8% increase from 2017. Figure 9 illustrates aircraft production, indicating the solid growth experienced by the commercial aircraft sector since 2009.

However, demand for widebody aircraft is expected to soften due to overcapacity in the industry, airlines deferring upgrades as they wait for the super-efficient next-generation widebodies, as well as the robust order backlog of widebodies. Moreover, with oil prices stabilising at low-to-mid levels, older aircraft have become more economical, potentially making new widebodies less attractive.



Source: Deloitte analysis of the following data: The Boeing Company, "Order and deliveries," accessed in February, 2018 <http://active.boeing.com/commercial/orders/index.cfm>; Airbus Group, "Orders and deliveries," accessed in February, 2018, <http://www.airbus.com/company/market/orders-deliveries/>; UBS, US Aerospace and Defense Playbook, 27 November 2017; and Deutsche Bank, Global Aerospace and Defense – Industry Update, 15 December 2017.

Fig. 9. Aircraft deliveries (2009 to 2036F)
 Source: Deloitte’s 2017 Global aerospace and defence industry outlook

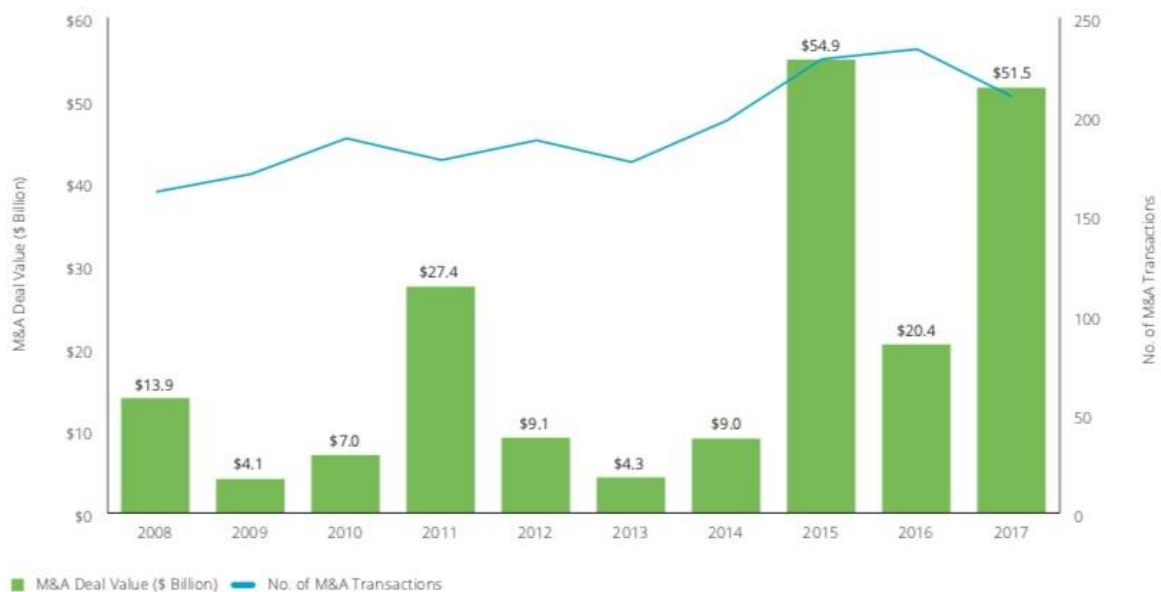
As the demand for commercial aircraft continues to increase, new production programmes are emerging from other regions, particularly China and Russia. With 815 orders from 28 customers for Commercial Aircraft Corporation of China’s (COMACs) C919 aircraft programme, China is observing some success with respect to its domestically manufactured commercial aircraft, whose deliveries are likely to commence in 2021. Given the fact that majority of its customers are Chinese airlines and leasing companies, COMAC also plans to increase its focus on potential buyers in Africa, Middle Asia, and West Asia.

Nevertheless, to compete with the existing duopoly, these new entrants will face several challenges, ranging from procurement of orders from established global carriers, risk of cost and schedule over-runs, certifications from European and US regulators, to establishing a track record of safe and reliable operations.

3. OUTLOOK FOR AEROSPACE ACTIVITY IN 2018.

M&A deal value in the global A&D industry reached US\$51.5 billion in 2017, with the number of transactions down to 210, compared to 234 transactions in 2016. Value of M&A transactions in 2017 was close to the record high levels of 2015, primarily led by the mega-deal of Rockwell Collins's US\$30.2 billion acquisition by United Technologies Corp. In 2015, M&A deal value peaked, however, this was heavily weighted by one transaction, the Berkshire Hathaway Inc.'s US\$35.8 billion acquisition of Precision Castparts Corp.

Pricing pressures from aircraft OEMs and their expansion of high-margin aftermarket services have pushed suppliers to consolidate for scale and cost-effectiveness. For example, aerospace supplier United Technologies Corp. agreed to acquire avionics and interiors maker Rockwell Collins, Inc. for US\$30.2 billion to increase its negotiating power with aircraft manufacturers. Efforts to rebuild missile defence systems, geopolitical tensions and the US administration's rising defence budget drove deal-making in the defence sector in the US. Notable deals include Northrop Grumman Corp.'s US\$7.8 billion deal to acquire fellow defence contractor Orbital ATK, Inc. The deal is expected to provide Northrop Grumman with greater access to government contracts and expand its arsenal of missile defence systems and space launch systems (Figure 10).



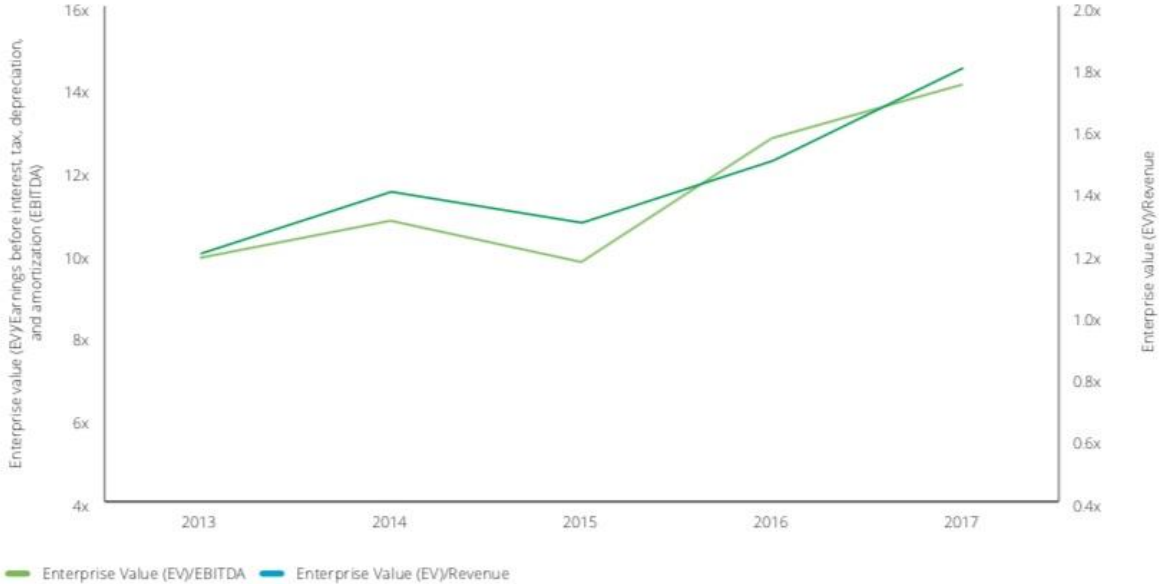
Source: Deloitte analysis of data from Thomson Reuters, accessed in February 2018. The Thomson Reuters Mergers & Acquisitions (M&A) database tracks changes in economic ownership at ultimate parent level in going business concerns. All deals involving a purchase of at least a 5.0% stake, or 3.0% with a value of at least US\$1 million are tracked, subject to criteria. Thomson Reuters gets access to M&A data from publicly available sources such as Reuters Edgar, SEC filings, Dow Jones etc.

Fig. 10. Global aerospace and defence industry mergers and acquisition activity (2008 to 2017)

Source: Deloitte's 2017 Global aerospace and defence industry outlook

In 2018, the global M&A activity is expected to remain strong in the aerospace sector, driven by OEMs’ continued pressure on suppliers to reduce costs and boost production rates. In addition, the Northrop Grumman and Orbital ATK deal could prompt other defence contractors to broaden their offerings and increase negotiating leverage through acquisitions. Deal activity in the US defence sector could accelerate in 2018, as the DoD’s⁶ spending bill will likely provide certainty to military planners. Large prime contractors are expected to buy small to mid-sized companies to gain access to new technologies or certain markets. In Europe, the defence sector is not likely to observe large deals, however, companies may choose to pursue JVs to bolster their market positions. The focus is probably on acquisitions related to space, data analytics, cybersecurity, and advanced technologies.

Valuations of A&D companies have been on the rise, led by continued improvements in financial performance and growth expectations. Specifically, the price earnings (P/E) ratio⁷ of the A&D industry is now 30.0% higher than it was five years ago. Figure 11 shows the increase in enterprise value on both earnings before interest, tax, depreciation, and amortization (EBITDA)⁸ and revenue basis.



Source: Deloitte analysis of data from Capital IQ, accessed in February 2018

Fig. 11. Global A&D industry valuations (2013 to 2017)
 Source: Deloitte’s 2017 Global aerospace and defense industry outlook

⁶ Department of Defense (US government).
⁷ The price-earnings ratio (P/E ratio) is the ratio for valuing a company that measures its current share price relative to its per-share earnings. The price-earnings ratio is also sometimes known as the price multiple or the earnings multiple. The P/E ratio can be calculated as: Market Value per Share / Earnings per Share.
⁸ EBITDA stands for earnings before interest, taxes, depreciation and amortization. EBITDA is one indicator of a company’s financial performance and is used as a proxy for the earning potential of a business, although doing so can have drawbacks. EBITDA strips out the cost of debt capital and its tax effects by adding back interest and taxes to earnings.

A&D companies are also entering into cross-border JVs, which remains an important determinant in expanding international access to new markets and technology. Cross-border JVs create a new third entity that combines certain assets of the two partners while maintaining the ownership profile of the original entities. As compared to M&A, JVs are easily achievable because the risk is shared between both JV partners and the outlay of investment is less than an outright acquisition. Changes in regulations, access to new technologies, the need for local partners, and a fast-growing A&D industrial base are likely to make India and the Middle East “hot spots” for cross-border JVs in the near-term for both commercial aircraft and defence sectors. China is also expected to be an important destination for JVs in the commercial aircraft and equipment space.

4. GLOBAL AEROSPACE INDUSTRY SHAREHOLDER RETURNS PERFORMANCE.

The key A&D industry indices (including the US-based S&P9 A&D10 Select Index and the European STOXX11 Europe Total Market A&D Index) continued to outperform the broader market indices. Driven primarily by higher profitability, free cash flow, return on invested capital, and future growth expectations, the S&P A&D select index experienced a 402% improvement over the past 12 years, compared to a 115% improvement for the S&P 500 Index. Additionally, share buyback programmes by A&D companies have also contributed to the solid growth in their stock prices in the recent past. Figure 12 portrays the performance of the industry indices in comparison with the broader market indices.

Main global aerospace and defence risks area are (Figure 13):

- Compliance threats originating in politics, law, regulation or corporate governance.
- Operational threats impacting the processes, systems, people and overall value chain of a business.
- Strategic threats related to customers, competitors and investors.
- Financial threats stemming from volatility in the markets and in the real economy.

⁹ The S&P 500 Index (formerly Standard & Poor's 500 Index) is a market-capitalization-weighted index of the 500 largest U.S. publicly traded companies by market value. The index is widely regarded as the best single gauge of large-cap U.S. equities. Other common U.S. stock market benchmarks include the Dow Jones Industrial Average or Dow 30 and the Russell 2000 Index, which represents the small-cap index.

¹⁰ S&P Aerospace & Defense Select Industry Index

¹¹ The STOXX Europe 600, also called STOXX 600, SXXP, is a stock index of European stocks designed by STOXX Ltd.. This index has a fixed number of 600 components representing large, mid and small capitalization companies among 17 European countries, covering approximately 90% of the free-float market capitalization of the European stock market (not limited to the Eurozone). The countries that make up the index are the United Kingdom (comprising around 27% of the index) France, Germany and Switzerland (accounting for around 15% of the index each), as well as Austria, Belgium, Czech Republic, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, and Sweden.

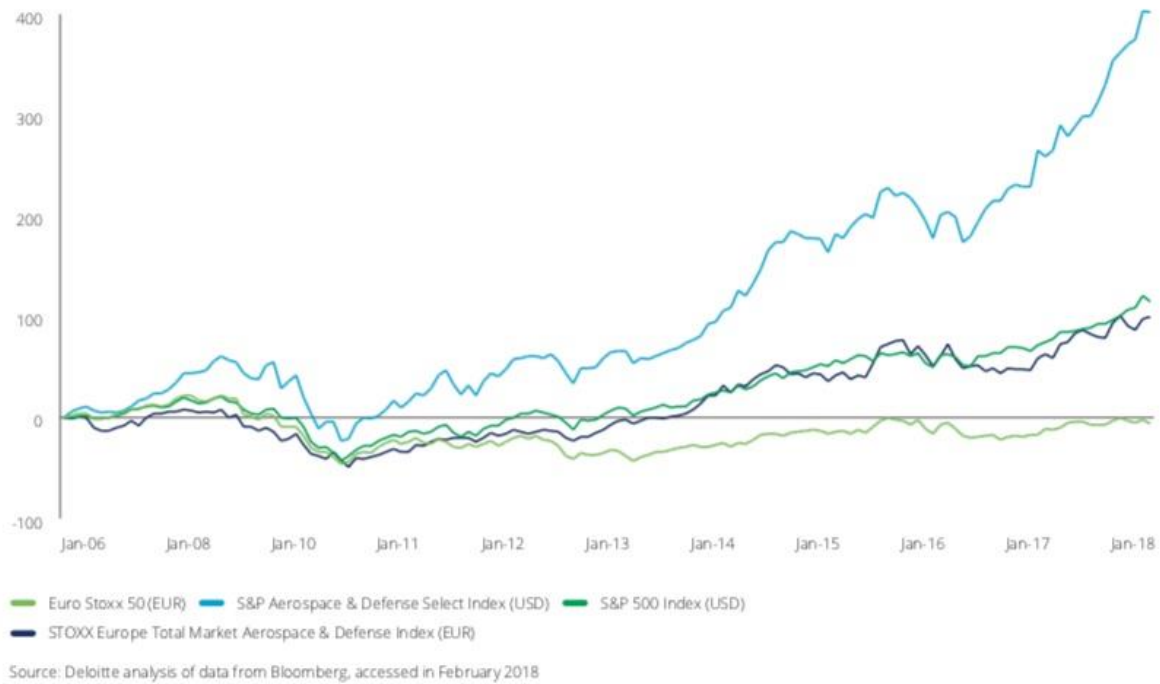


Fig. 12. Global A&D industry indices’ performance (2006 to 2018YTD)
 Source: Deloitte’s 2017 Global aerospace and defense industry outlook



Fig. 13. Global A&D industry risks. Top 10 risks in aerospace and defense (A&D) - Ernst & Young-EY¹², Report 2017

¹² EY is a global leader in assurance, tax, transaction and advisory services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. We develop

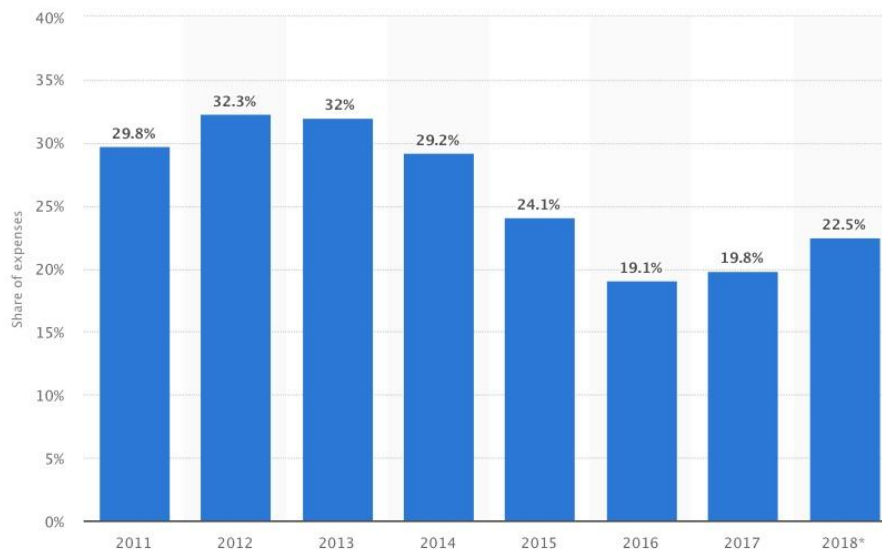


Fig. 14. Fuel costs of airlines worldwide from 2011 to 2018, as percentage of expenditure
Source: The Statistics Portal <https://www.statista.com/register/corporate>

Top aerospace and defence risks are:

1. Volatility in geopolitical and economic environments (Figure 14).
2. Managing the supply chain.
3. Competition in domestic and international markets.
4. Managing and retaining talent.
5. Ability to perform on key contracts.
6. Compliance to a wide range of regulations and restrictions.
7. Capacity to innovate.
8. Failure to realise the benefits of M&As and partnerships.
9. Exposure to cybersecurity events.
10. Foreign currency and commodity price fluctuations.

5. MANAGING AND RETAINING TALENT

A highly engaged talented workforce can give companies the edge in the marketplace (Figure 15, Figure 16, and Figure 17).

Because of the specialised nature of the business, companies are highly dependent on the continued services of key engineering personnel and executive officers. They are also dependent on the development of additional management personnel and the hiring of newly qualified engineering, manufacturing, marketing, sales and management personnel for operations.

outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities.

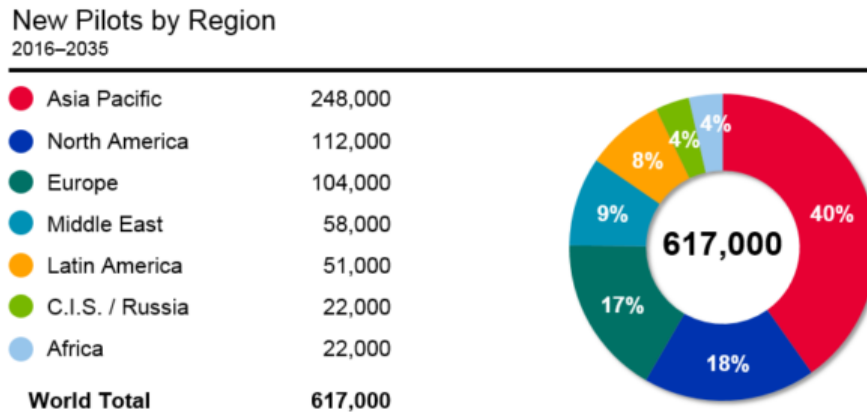


Fig. 15. Boeing foresees a big need for new pilots in the next 20 years
Source: <https://www.boeing.com>

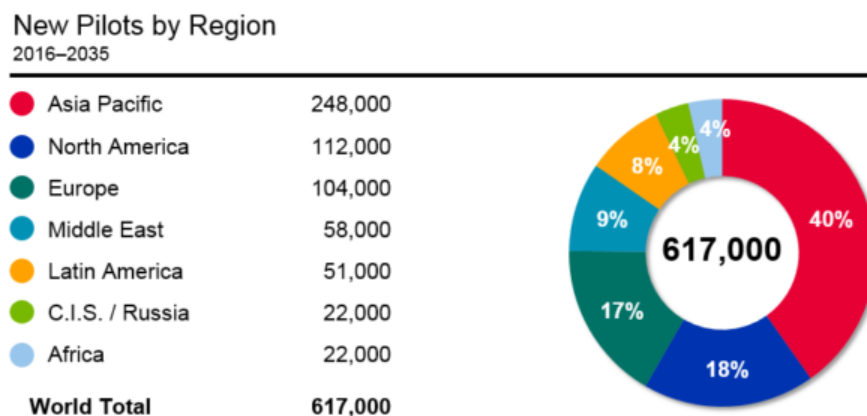


Fig. 16. Boeing Cabin Crew forecast
Source: <https://www.boeing.com>

EY conducted a survey to identify the major challenges faced by A&D companies around talent management. Respondents identified ineffective succession planning, and lack of diversity as key areas of opportunity for improvement. A list of the top talent management challenges faced by A&D companies is given below (Figure 18).

The products and services provided by A&D players involve sophisticated technologies and engineering, alongside complex manufacturing and system integration processes (Figure 19).



Fig. 17. Major airlines with the most female pilots
Source: <http://www.iswap.org>

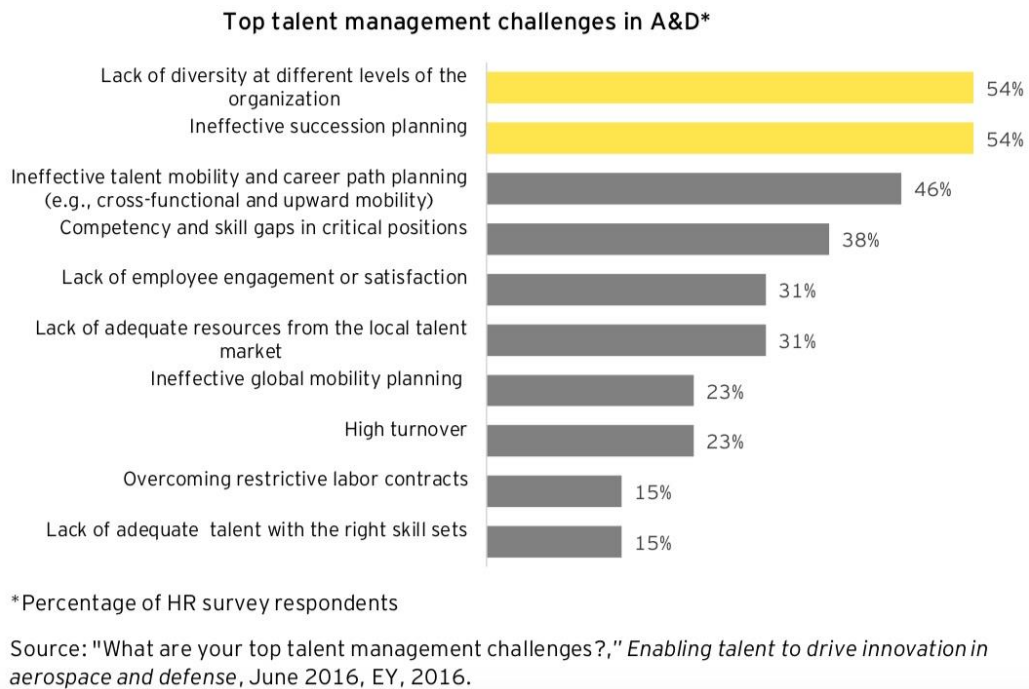
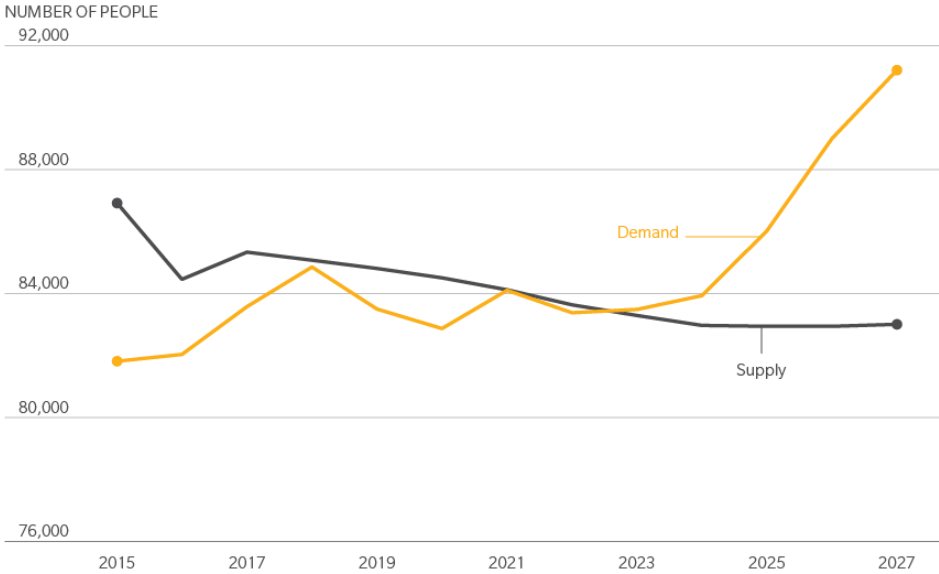


Fig. 18. Top talent management challenges in Aerospace and Defence
Source: Ernst & Young-EY, Report 2016



Source: Oliver Wyman Commercial MRO Maintenance Technician Labor Model

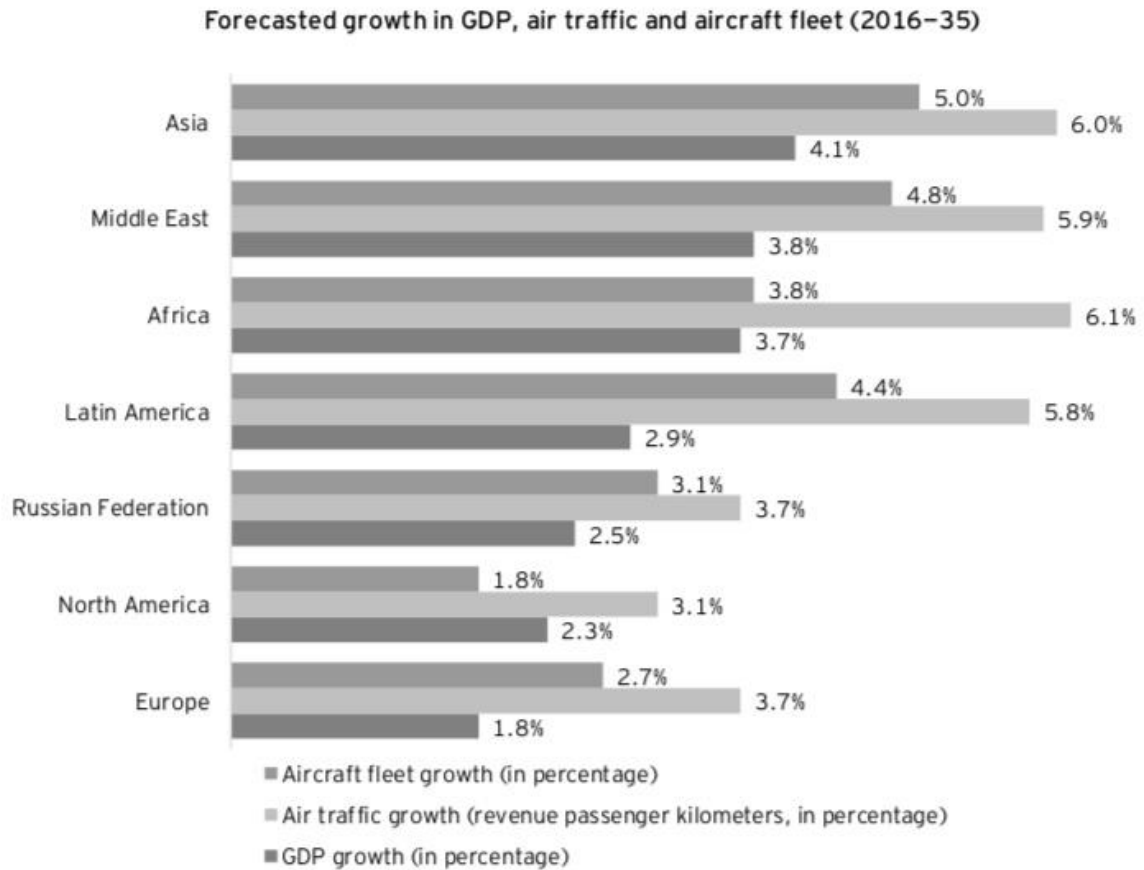
Fig. 19. Forecast for US commercial MRO maintenance technician demand and supply by year
Source: Frost and Sullivan Report 2018

Because of the highly specialised nature of the business, companies must hire and retain skilled and qualified personnel necessary to perform the business-critical processes. In addition, certain personnel may be required to receive security clearance and substantial training in order to work on certain programmes or perform certain tasks.

Companies need to manage leadership development and succession planning in their business. While most of the companies have processes in place for management transition and transfer of knowledge, the loss of key personnel, coupled with an inability to adequately train other personnel, hire new personnel or transfer knowledge, could significantly impact negatively on their ability to perform under their contracts. On the other hand, as A&D players expand their operations internationally, it becomes increasingly important to hire and retain personnel with relevant experience in local laws, regulations, traditions and business practices. Inability to attract and retain qualified personnel, and maintain a diversified workforce at different levels of the organisation might lead to materially adverse effect on revenue and earnings. Additionally, the average workforce demographic continues to shift toward a higher proportion of employees nearing retirement. Considering the fact that companies lose experienced personnel, it becomes imperative that they develop other employees, hire new qualified personnel, and successfully manage the transfer of critical knowledge.

Competition for skilled personnel is intense, and companies are subject to the risk of not being able to hire or retain personnel with the requisite skills or clearances. A&D companies have to increasingly compete with commercial technology companies outside the industry for qualified technical, cyber and scientific positions as the number of qualified engineers is decreasing and the number of cyber professionals is not meeting demand. As commercial technology companies grow at a faster rate or face fewer cost and product pricing constraints,

they may be able to offer more attractive compensation and other benefits to the candidates. At the point where demand for skilled personnel exceeds supply, A&D companies could experience higher labour, recruiting or training costs in order to attract and retain skilled employees. However, would they be unable to hire or retain talent, then they may experience difficulty in performing key contracts. Furthermore, at difficult times, endeavours to increase operational efficiency through workforce reductions, and consolidating and relocating certain operations may challenge the companies' ability to retain talent.



Source: "Current Market Outlook 2016-2035," Boeing, 2016.

Fig. 20. Volatility in the geopolitical and economic environment. Forecasted growth in GDP air traffic and aircraft fleet (2016-2035). Top 10 risks in aerospace and defense (A&D)- Ernst & Young-EY, Report 2017

Most A&D companies have global footprints, so their operational, as well as financial performance, depend significantly on the geopolitical and economic conditions in their key markets. On the side of the commercial aerospace, sustained economic growth and political stability are major underlying factors that drive long-term growth in the air traffic. On the defence side, political and economic conditions of the developed, as well as emerging countries, play an instrumental role in dictating the governments' allocation of funds for the military.

In recent years, the European financial markets have undergone significant disruptions due to concerns regarding the ability of certain countries in the eurozone to reduce their budget deficits and refinance or repay their sovereign debt obligations. On the other side of the globe, China has reduced its GDP growth target, indicating apprehensions of a slowdown of the world's largest growing economy.

History has over time shown a great correlation between economic growth and growth in demand for commercial aircraft. The chart below highlights the expected growth in GDP, air traffic and aircraft fleet size across different geographic regions.

The chart (Figure 20), clearly shows that Asia and the Middle East are expected to witness the highest economic growth in the next two decades. In line with the GDP growth in these regions, air traffic and aircraft fleet size are also expected to grow significantly during the same period. On the other hand, aircraft fleet growth as well growth in air travel would develop at a slow rate in North America and Europe, as the economic growth in both of these regions is expected to be low at close to 2% per annum.

In the last five years, there has been much volatility in the GDP growth of the top five defence markets. Over the next five years, while the GDP of seven of the top 10 defence markets (the US, France, Japan, the UK, Korea, Russia and Germany) are expected to remain near-stagnant, China's GDP growth rate is expected to decline and India and Saudi Arabia's GDPs are expected to increase.

6. COMPLIANCE TO A WIDE RANGE OF REGULATIONS AND RESTRICTIONS

Companies have to comply with the laws and regulations related to the award, administration and performance of contracts, especially for government contracts. They face various laws and regulations relating to the export of products and services as well as the use of technology. Failure to comply with any of the regulations could result to severe consequences, such as the imposition of fines and penalties, termination of contracts, suspension or debarment from bidding on or being awarded government contracts, and civil or criminal investigations or proceedings.

With the inclusion of government customers and defence agencies in the customer base of A&D companies, it becomes obvious that they have to operate in a highly regulated environment. This subjects A&D companies to added scrutiny on bribery and corruption. Furthermore, A&D companies often work in partnerships in a number of small and non-consolidated entities. These entities have a lower level of control and oversight from their parent groups and presents a higher risk of fraud and corruption. Operating in countries with high level of corruption often multiplies the level of exposure to bribery and corruption litigations. Involvement in bribery or corrupt practices may lead to severe consequences, such as order cancellations or even blacklisting. For instance, a leading European defence company was blacklisted by the Government of India on the instance of alleged corruption charges related to a helicopter acquisition programme.

7. CAPACITY TO INNOVATE

Offerings in the A&D industry involve high-end technologies and engineering, as well as complex manufacturing and system integration processes. The demand from the end users is evolving and changing regularly. To thrive in the current era of rapidly evolving technologies

across industries, A&D companies need to constantly focus on innovations in their product and services offerings. It is also very important for A&D players to create the right infrastructure for fostering innovation through funding in-house R&D, collaborating with industry partners and teaming up with the academia.

Some of the technologies that A&D players use in their manufacturing and other business processes are decades old. They need to upgrade these technologies on a regular basis as well as adopt new and advanced technologies to stay competitive. The advancements in the internet of things and digital technologies make it even more important for aircraft manufacturers and their suppliers to look for opportunities to offer new products and services in both the original equipment (OE) and aftermarket spheres of their businesses. While OEMs are using digital technologies to improve the performance and efficiency of their aircraft and parts, aftermarket service providers are extensively using sensors to capture in-flight data to facilitate predictive maintenance and associated services.

8. EXPOSURE TO CYBERSECURITY EVENTS.

A&D players transfer large volume of data including flight data monitoring, flight operations quality assurance and load management between end users, manufacturer and service provider. Companies involved in the A&D value chain routinely exchange confidential data on specifications, technology and performance of equipment or services with the objective of enhancing collaboration on design, development and support. All of such data is valuable for cyber terrorists with unethical clients in the industry, who use this stolen data to copy products and undercut prices to outperform the competition.

In commercial aerospace, key aircraft functions, such as flight navigation and control, propulsion, landing and braking, and information systems, are managed by embedded electronic systems and safety-critical software. The critical data generated during the time of the flight is analysed for better flight safety and optimisation. On the defence side of the business, upgrading of existing weapons, as well as increased focus on intelligence, surveillance, and reconnaissance (ISR) systems, have increased the information flow within the supply chain. Furthermore, the confidential and sensitive nature of the information around programme specifications and technologies involved necessitates the use of reliable and enhanced cybersecurity solutions.

Modern-day increased dependency on internet network by military organisations has brought about the frequency and rise of sophisticated and organised cyber attacks. Furthermore, the traditional methods of defences against cyber threats have become ineffective against new types of cyber attacks and advanced malware. Companies need to invest in the next generation cybersecurity solutions to be able to prevent themselves against advanced cyber attacks.

9. FOREIGN CURRENCY AND COMMODITY PRICE FLUCTUATIONS.

Operating in a number of countries across continents, A&D companies are susceptible to fluctuations in foreign currency exchange rates. The following chart highlights the fluctuations in the yearly growth rate of the average value of major currencies against the US dollar in the last five years.

Given that most of the A&D companies have global footprints, they earn a significant portion of their revenues in currencies other than the currency of their home market. With foreign currency fluctuations, the value of the revenues earned in foreign currencies fluctuates. The impact of the currency rate fluctuations on the overall financials of a company is even more magnified when a significant portion of its revenue comes in foreign currencies.

In addition to its effect on the revenues earned, currency fluctuations also affect the receivables, payables and return on assets denominated in foreign currencies. Moreover, production in various countries adds to the risks associated with fluctuations in the foreign exchange rate as compared with the home currency.

10. CONCLUSIONS

Companies must prepare themselves to counter the threat of a tight credit environment and order cancellations. An economic slowdown in any of the key markets for A&D players could potentially result into tightening in the credit markets, low liquidity, and extreme volatility in credit, currency, commodity and equity markets (Figure 21).

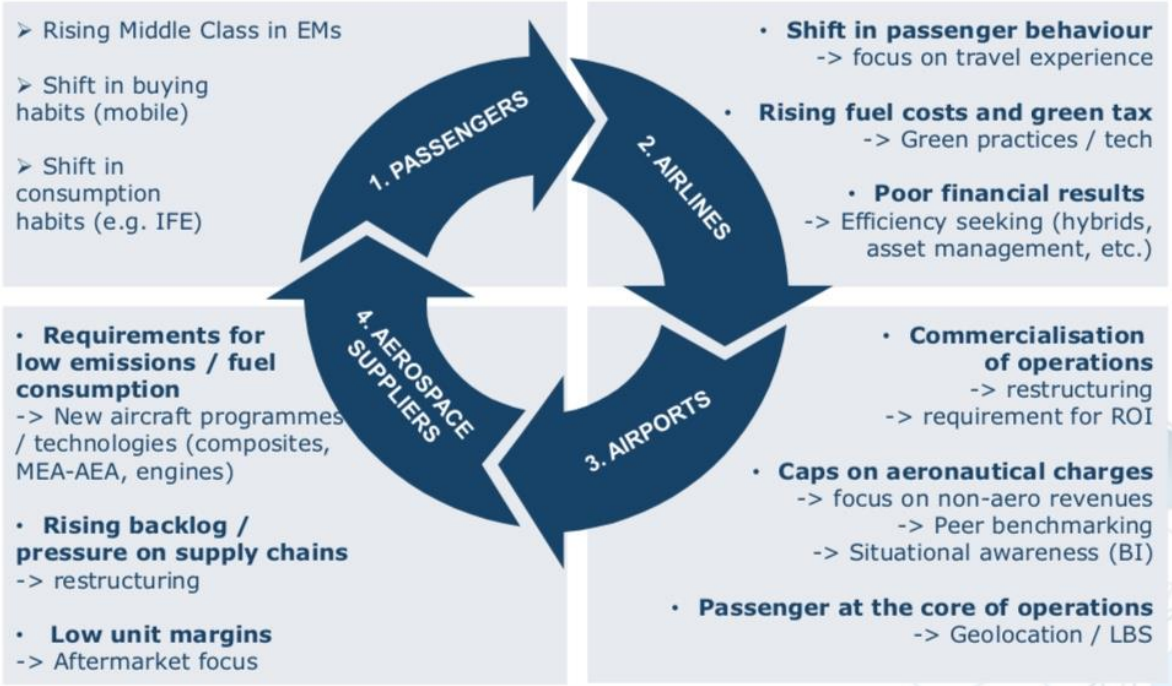


Fig. 21. Major Trends in Commercial Aviation Segments
Source: Frost and Sullivan Report 2018

Customers might review their order intake strategies and eventually postpone or cancel existing orders for aircraft. In face of the declining financial health of their customers, A&D companies would need to provide increased sales financing to the customers to support their purchases, therefore, increasing its exposure to the risk of customer defaults.

After reaching a peak in 2015, order intake for commercial aircraft is expected to gradually drop over the next few years. Airbus's net orders for new aircraft declined by 32% in 2016 (731 in 2016 compared to 1,080 in 2015), while Boeing's net orders declined by 13% (668 in 2016 as compared to 768 in 2015). Order intake in the first two months of the full year-FY17 has further slowed down. While this is not a problem given the order books, it suggests growth will flatten once production has ramped.

Furthermore, reductions in public spending for defence, homeland security and space activities could also result in loss of sales. In addition, changes in the economic environment and a reduction in defence budgets may adversely affect the financial stability of the key suppliers and their ability to meet their performance requirements, impacting the ability of the OEMs to meet their customer obligations.

References

1. Airbus 2016 annual report.
2. Airbus 2017 annual report.
3. Airbus achieves targets proving ramp-up readiness in 2016. Airbus website. Available at: <http://airbus.com/presscentre/pressreleases/pressrelease-detail/detail/airbus-achieves-targetsproving-ramp-up-readiness-in-2016/>.
4. Airbus approved supplier list. Airbus website. Available at: http://airbus.com/fileadmin/media_gallery/files/supply_world/Airbus-Approved-Suppliers-ListJul2016.pdf.
5. Boeing 2016 annual report.
6. Boeing 2017 annual report.
7. Bombardier 2015 financial report.
8. Bombardier 2016 financial report.
9. CAPA. "LCCs reach 10% market share in domestic Japan. Partnerships become likely - but complex". July 2017. Available at: <http://centreforaviation.com/insights/analysis/lccs-reach-10-market-share-in-domestic-japan-partnerships-become-likely---butcomplex-351499>.
10. Current Market Outlook 2016-2035. Boeing website. Available at: http://boeing.com/resources/boeingdotcom/commercial/about-ourmarket/assets/downloads/cmo_print_2016_fin al_updated.pdf.
11. Deloitte analysis based on data from Boeing – available at: <http://http://www.boeing.com/commercial>. Airbus – available at: <http://http://www.airbus.com/company/market/orders-deliveries/>. Bombardier – available at: <http://http://www.bombardier.com/en/media/commercial-aircraft-status-reports.html>. Flightglobal – available at: <http://https://www.flightglobal.com/>.
12. Deloitte analysis of data from Stockholm International Peace Research Institute (SIPRI) Military Expenditure Database. Available at: <http://https://www.sipri.org/databases/milex>.
13. Deloitte analysis of the following data: The Boeing Company. Current Market Outlook (2017–2036), July 2017. Available at: <http://www.boeing.com/commercial/market/current-market-outlook-2017/>.
14. Enabling talent to drive innovation in A&D. EY website. Available at: [http://ey.com/Publication/vwLUAssets/EYenabling-talent-in-aerospace-anddefense/\\$FILE/EY-enabling-talent-in-aerospaceand-defense.pdf](http://ey.com/Publication/vwLUAssets/EYenabling-talent-in-aerospace-anddefense/$FILE/EY-enabling-talent-in-aerospaceand-defense.pdf).

15. Global Market Forecast – Mapping demand 2016/2035. Airbus website. Available at: <http://airbus.com/company/market/globalmarket-forecast-2016-2035/>.
16. IATA. Industry Statistics. December 2017. Available at: http://www.iata.org/pressroom/facts_figures/fact_sheets/Documents/fact-sheet-industry-facts.pdf.
17. Jacyna-Golda I., M. Wasiak, M. Izdebski et al. 2016. “The Evaluation of the efficiency of supply chain configuration”. 20th International Scientific Conference on Transport Means. Juodkrante, Lithuania. October 05-07, 2016. *Proceedings of the 20th International Scientific Conference Transport Means 2016. Transport Means - Proceedings of the International Conference*. P. 953-957.
18. Kowalski M. 2012. “Phase mapping in the diagnosing of a turbojet engine”. *Journal of Theoretical and Applied Mechanics* 50(4): 913-921.
19. Kozakiewicz A., M. Kowalski. 2013. “Unstable operation of the turbine aircraft engine”. *Journal of Theoretical and Applied Mechanics* 51(3): 719-727.
20. Orders & Deliveries. Airbus website. Available at: <http://airbus.com/company/market/ordersdeliveries/>.
21. Orders and deliveries. Boeing website. Available at: <http://boeing.com/commercial/#/orders-deliveries>.
22. Zieja M., P. Golda, M. Zokowski et al. 2017. „Vibroacoustic technique for the fault diagnosis in a gear transmission of a military helicopter”. *Journal of Vibroengineering* 19(2): 1039-1049.

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