



2018 Global aerospace and defense industry financial performance study

Commercial aerospace sector performance decelerates, while defense sector continues to expand

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Executive summary

Global aerospace and defense industry recuperated as revenue growth increased in 2017; however, the industry lagged compared to global gross domestic product (GDP).

Global aerospace and defense (A&D) industry revenues grew 2.7 percent or US\$18.3 billion in 2017 to reach US\$685.6 billion. The overall industry growth rate increased from 2.4 percent in 2016, yet was slower than the 2017 estimated GDP growth of 3.1 percent¹ as the commercial aerospace sector growth slowed to 1.2 percent in 2017.

Global commercial aerospace revenue growth further decelerated to 1.2 percent in 2017 from a growth of 2.7 percent in 2016. The sector added US\$4.0 billion in revenues to reach US\$323.1 billion in 2017. The decline in growth was largely due to a slowdown in twin-aisle aircraft deliveries in the US. The commercial aerospace sector growth in the US remained soft, up marginally by 1.3 percent in 2017, whereas the European commercial aerospace sector experienced strong growth of 3.7 percent as the region experienced higher aircraft deliveries during the year.

Global defense sector revenues recorded a 3.9 percent increase as defense spending continues to rise across the globe. After posting moderate growth in 2016, global defense revenue experienced robust growth of 3.9 percent in 2017 to reach US\$361.5 billion. This was largely driven by the US, where the defense sector revenues were up 4.5 percent, owing to higher funding from the US Department of Defense (DoD), the sector's major customer. The European defense sector revenues grew 2.6 percent in 2017, compared to a mere 0.6 percent in 2016. One of the factors driving growth in the defense sector in Europe is the increasing pressure from the US administration on NATO members to increase military expenditure to 2 percent of GDP.²

US A&D industry revenue growth outperformed its European counterparts, led by robust performance of the US defense sector. In 2017, the US A&D industry experienced a 3.4 percent year-on-year (YoY) growth, marginally outpacing the 3.2 percent growth recorded by the European A&D industry. This trend reversed after two straight years of European companies outperforming the US companies (in 2015 and 2016).

Original equipment manufacturers (OEMs) and companies in the electronics segment drove overall revenue growth.

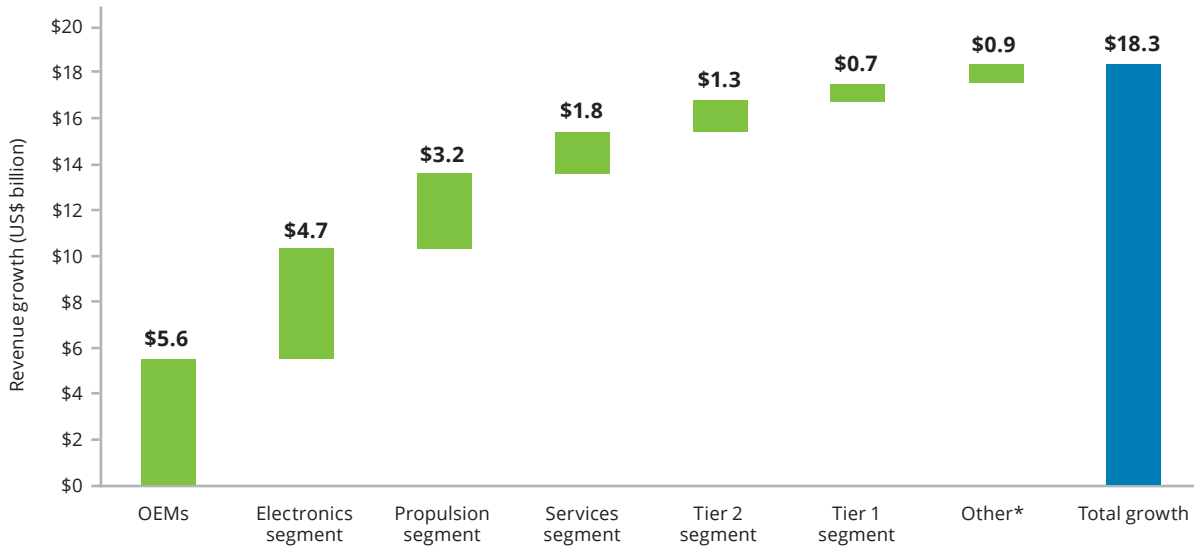
OEMs and companies in the electronics segment added US\$5.6 billion and US\$4.7 billion in revenues, respectively. While growth for OEMs was primarily led by a revenue increase at Lockheed Martin, which contributed US\$3.8 billion in revenues in 2017, Rockwell Collins and Raytheon were the leading contributors to the electronics segment revenue.

Global A&D industry core operating margins improved in 2017, primarily led by the US, with stable margins for the European A&D industry. Operating margins for the industry expanded to 10.8 percent, up from 10.2 percent in 2016. The margin improvement was mainly led by the US A&D industry, which recorded healthy margins of 12.7 percent in 2017, increasing from 11.6 percent in the previous year. Higher industry margins can be attributed primarily to strong core operating earnings growth (up 64.2 percent) at The Boeing Company (Boeing). In contrast, the European A&D industry recorded an operating margin of 8.5 percent, largely flat as compared to 8.6 percent in 2016.

Propulsion segment recorded the highest operating margins, followed by tier 2 suppliers. Although operating margins for the propulsion segment were mostly flat in 2017 at 17.4 percent, they were the highest amongst all segments. This was followed by tier 2 suppliers, which continue to earn margins higher than tier 1 suppliers, recording an operating margin of 16.5 percent in 2017, up from 16.0 percent in 2016. Tier 1 suppliers' margins remained stable at about 10.0 percent in 2017.

Productivity improvement in the industry accelerates as overall profitability rises, primarily in the US. The A&D industry productivity continued to improve, up by a solid 8.6 percent in 2017. Productivity per employee among global A&D companies increased to US\$38,543, as the employee base remained flat, whereas operating profit experienced healthy growth in 2017. While the European A&D industry recorded moderate productivity growth of 1.9 percent, productivity per employee for the US companies rose 12.3 percent in 2017. There continues to remain a gap between productivity levels per employee for the US and European companies, which stood at US\$48,658 and US\$29,477, respectively.

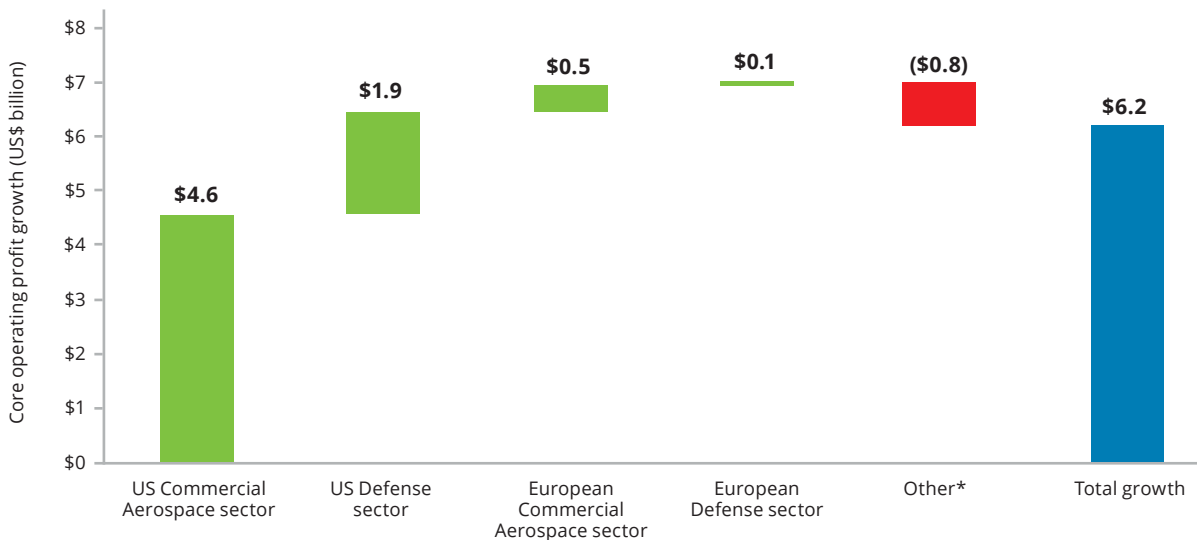
Figure 1. Key drivers of 2017 global aerospace and defense industry revenue



*For revenue, 'other' includes revenue growth from aerostructure and the tier 3 segment.

Source: Deloitte Global analysis of the 100 major global aerospace and defense companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates. Note that all figures are in US\$.

Figure 2. Key drivers of 2017 global aerospace and defense industry core operating profit



*For core operating earnings, 'other' includes some companies from outside the US and Europe, such as Brazil, Canada, Israel, Japan, Singapore, China, South Korea, Australia, Taiwan, India, and Turkey. Companies from these regions are not included in the "US" and the "European" region totals, but have been included in "other".

Source: Deloitte Global analysis of the 100 major global aerospace and defense companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates. Note that all figures are in US\$.

Scope of the study

The 2018 Global aerospace and defense industry financial performance study analyzes the top 100 global A&D companies or those units of industrial conglomerates with A&D businesses that reported revenues of more than US\$500 million in 2017. Figure 3 lists the 100 companies and divisions included in the analysis. The study does not include A&D organizations such as government-controlled entities, private companies that do not release public filings, or public companies that do not report A&D business segment information. In addition, certain companies from the last year's study were excluded if they did not fulfill the inclusion criteria, that is, companies with 2017 revenues of less than US\$500 million, companies that have been subsequently bought by others, and companies that have become (or will become) private, were not included in the 2017 analysis. Please refer to the methodology section for more details.

The study was conducted by assessing performance based on calculating 19 key financial metrics. These include metrics such as revenue, operating earnings, operating margin, return on assets (ROA), free cash flow (FCF), free cash margin (FCM), book-to-bill (BTB) ratio, and employee productivity. All financial metrics in the study are based on a constant currency conversion (using US\$) method to eliminate the impact of foreign exchange fluctuations on company or industry performance. However, please note that we have not restated the effects of currency hedging policies. Where metrics were compared to previous years, we restated the previous year's numbers to be consistent.

Financial performance metrics at the company level are cited throughout this study, especially for the top performing companies and, selectively, for the lower performers. However, metrics for a given company should not be viewed in isolation, as there are typically unique transactions for individual metrics by company, e.g., prior year acquisitions, special circumstances, etc. The combined metrics for a given company are more likely to form the basis for an overall assessment of the financial performance of both the global A&D industry and individual companies.

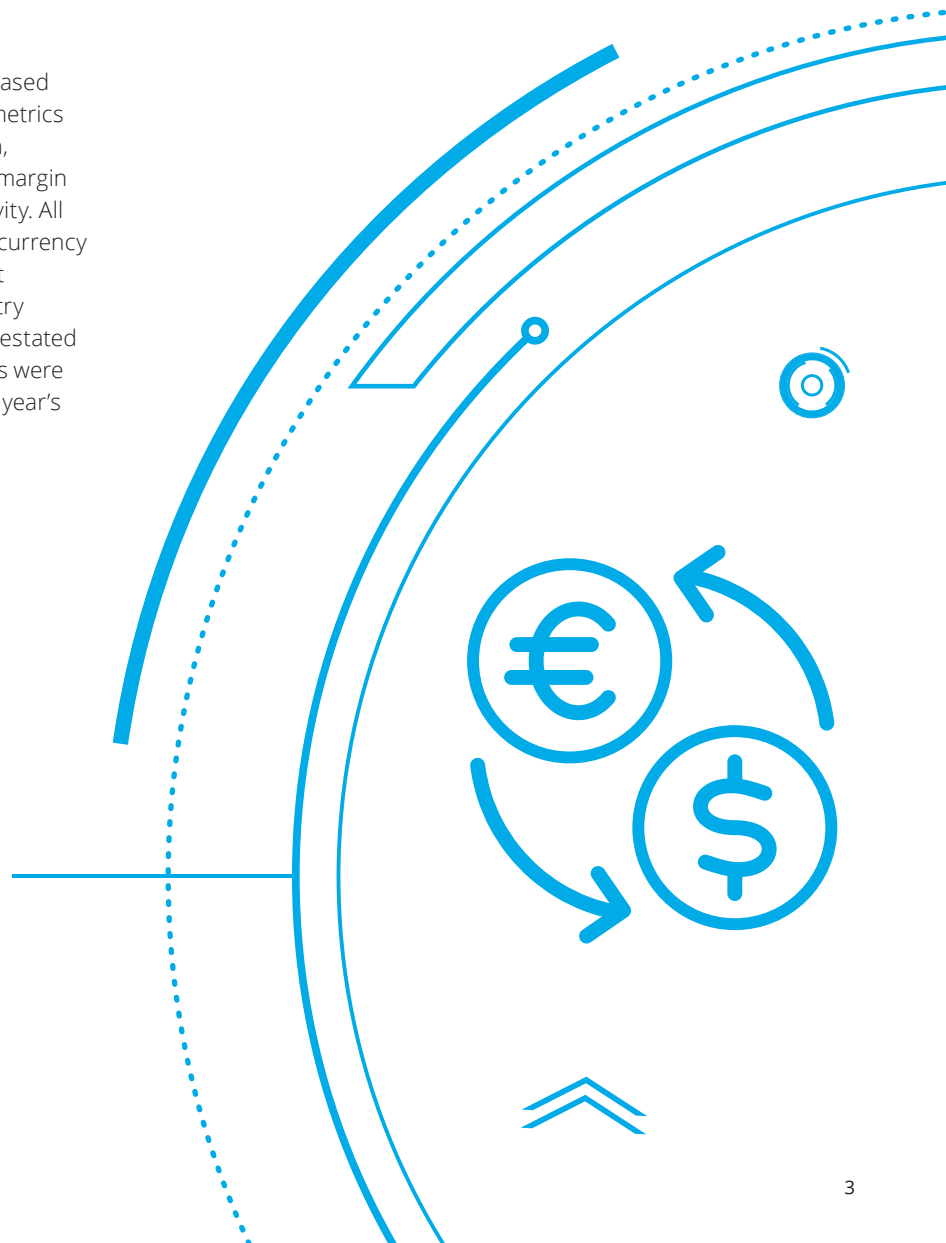


Figure 3: Global aerospace and defense companies included in the analysis**Global aerospace and defense companies or divisions included in this study ranked by 2017 revenue**

1. Boeing	35. SAIC	69. HEICO Corporation*
2. Airbus Group	36. IHI Aero Engine & Space*	70. Curtiss-Wright*
3. Lockheed Martin	37. Saab	71. BWX Technologies*
4. General Dynamics	38. Rheinmetall Defence*	72. Subaru Aerospace*
5. United Technologies Corporation*	39. Transdigm Group*	73. Serco Defence*
6. GE Aviation*	40. Elbit Systems	74. Fluor Corp*
7. Northrop Grumman	41. Triumph Group	75. LSI Aerospace*
8. Raytheon	42. Hindustan Aeronautics Ltd	76. Vectrus Inc.
9. BAE Systems	43. CACI*	77. Austal Ltd.
10. Safran	44. Cobham	78. Ball Aerospace*
11. THALES*	45. Hanwha Techwin*	79. Amphenol*
12. Rolls-Royce*	46. Jacobs Engineering Group*	80. Senior Aerospace*
13. Leonardo	47. Meggitt*	81. OHB Technology
14. Honeywell Aerospace*	48. Parker Hannifin Aerospace	82. QinetiQ*
15. Textron	49. CAE Inc.	83. Cubic Corp.*
16. L3 Technologies	50. thyssenkrupp Marine Systems GmbH*	84. Aerospace Industrial Development Corp. (AIDC)
17. Bombardier Aerospace*	51. Engility	85. Smiths Detection*
18. Huntington Ingalls Industries	52. Aerojet Rocketdyne Holdings*	86. Constellium*
19. Spirit Aerosystems	53. Korea Aerospace Industries	87. FACC
20. Rockwell Collins	54. Oshkosh Defense*	88. Ultra Electronics*
21. Mitsubishi Heavy Industries Aerospace*	55. Avicopter	89. Kongsberg Defence Systems
22. Harris Corp	56. AAR Corp.	90. Kratos Defense & Security Solutions
23. Embraer	57. Hexcel Corp.*	91. Magellan Aerospace
24. Zodiac	58. Eaton Aerospace*	92. Latécoère SA
25. MTU Aero Engines	59. MOOG*	93. SKF*
26. Arconic*	60. Allegheny Technologies*	94. Kaman Aerospace*
27. Dassault Aviation	61. ManTech Int'l Corp.	95. Chemring
28. Kawasaki Aerospace and Gas*	62. Maxar Technologies	96. JAMCO Corp.
29. Leidos Holdings	63. Aselsan A.S.	97. Indra Sistemas*
30. AviChina Industry & Tech.	64. Wesco Aircraft	98. Teledyne Tech*
31. Singapore Technologies Engineering Ltd.	65. KLX Inc.*	99. Astronics Corp*
32. Orbital ATK	66. Solvay Group*	100. Ducommun*
33. GKN Aerospace*	67. Esterline Technologies*	
34. Babcock International*	68. Woodward Aerospace*	

*Partial company results based on aerospace and defense (A&D) activity, identified by A&D specific business segment where possible. Ranking is based on A&D-industry-related revenues of the company.

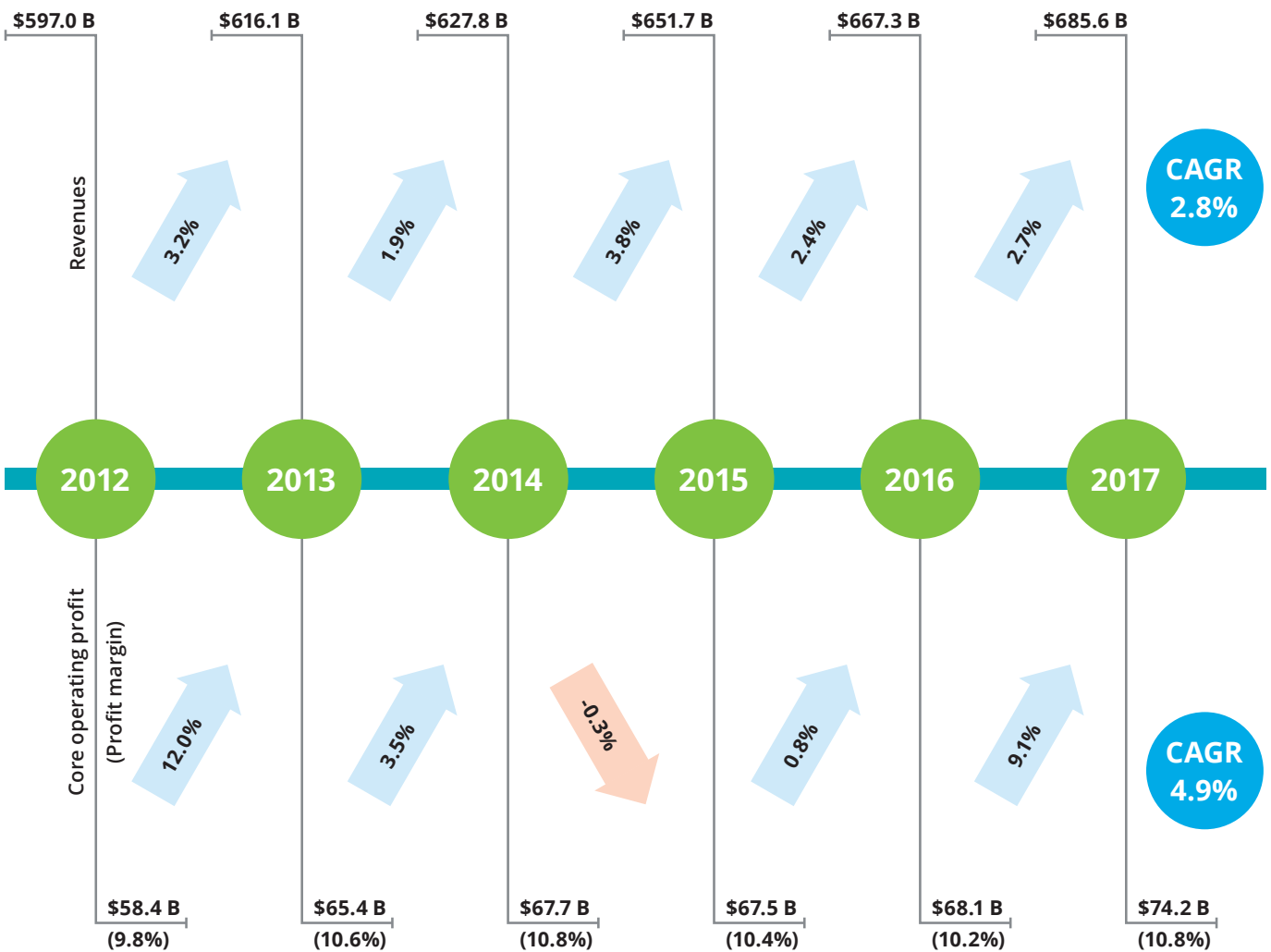
Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

Global A&D industry: Performance overview

The revenues of the top 20 global A&D companies accounted for nearly 73.6 percent or US\$504.6 billion of the overall A&D industry revenues in 2017, in line with the 73.8 percent in 2016, which indicates that the industry continues to be concentrated.

Figure 4 illustrates revenue, operating profit, and margin performance of the global A&D industry from 2012 to 2017.

Figure 4: Global aerospace and defense industry revenue and operating margin: 2012 to 2017



Note: A&D industry revenue and operating earnings calculations will differ from previous years' Deloitte Global A&D industry financial performance studies, as the set of companies included in this study is not directly comparable across the years. Also, 2016 and 2017 numbers are based on constant currency basis and 2012 to 2015 numbers have been re-calculated using the growth rates for the respective period with 2016 revenues as the base.

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

Figure 5 summarizes the key performance metrics of the global A&D industry. Each performance metric is discussed in detail in the subsequent sections of this study.

Figure 5: Global aerospace and defense industry performance in 2017, as compared to 2016

Metric	2016	2017	Change (2017 versus 2016)
Revenues (US\$ billion)	US\$667.3	US\$685.6	2.7%
Core operating earnings (US\$ billion)	US\$68.1	US\$74.2	9.1%
Core operating margin (percent)	10.2%	10.8%	6.2%
Return on assets (percent)	4.5%	5.2%	15.9%
Free cash flow (FCF) (US\$ billion)	US\$40.7	US\$51.3	26.2%
FCF margin (percent)	6.1%	7.5%	22.8%
Book-to-bill ratio	1.19	0.95	(20.0%)
Aerospace and defense (A&D) revenue/employee (US\$)	US\$347,817	US\$355,997	2.4%
A&D core operating earnings/employee (US\$)	US\$35,475	US\$38,543	8.6%
Number of A&D employees	1,918,510	1,925,910	0.4%

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

Figure 6 lists the companies ranked as the top performers in the 19 metrics among the top 100 global A&D companies in this study, according to the methodology used for this report (see the methodology section for more information).

Figure 6: Top ranked company for each of the 19 key 2017 financial performance metrics

Metric	Top ranked company	2017 result
Revenue	Boeing	US\$93,392 million ³
Revenue growth	Aselsan A.S.	42.3%
Core operating earnings	Boeing	US\$8,970 million ⁴
Core operating earnings growth	FACC AG	155.2%
Core operating margin	Transdigm Group	42.2%
Return on assets (ROA)	Parker Hannifin	23.7%
Free cash flow (FCF)	Boeing	US\$11,605 million ⁵
Free cash margin	Dassault Aviation	29.8%
Cash and cash equivalents	GE Aviation	US\$43,299 million
Book-to-bill	Mantech International Corp.	2.28 times
Backlog	Airbus Group	US\$1,123,813 million
Backlog change	Maxar Technologies	83.3%
Number of aerospace and defense employees	Boeing	140,800 ⁶
Employee additions growth	Rockwell Collins	52.6%
Revenue per employee	Subaru Aerospace	US\$931,423
Revenue per employee growth	Aselsan	42.3%
Core operating earnings per employee	Transdigm Group	US\$160,851
Core operating earnings per employee growth	FACC AG	154.5%
Share price change	FACC AG	231.6%

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

The following sections discuss the 2017 financial performance of the global A&D industry based on company type and geography, as well as on a consolidated basis:

- Global A&D industry performance: A detailed analysis
- Global commercial aerospace sector compared with defense sector
- Comparison of US and European A&D industry performance
- Comparison of US and European defense sector performance
- Segment performance



2017 global A&D industry performance: A detailed analysis

Revenue: Global A&D industry revenues grew 2.7 percent in 2017 to reach US\$685.6 billion, from US\$667.3 billion in 2016 (see Figure 7), largely driven by robust growth in the defense sector. Increase in global defense spending, as well as US defense budgets returning to growth, contributed to the solid performance of the defense sector in 2017. In contrast, the commercial aerospace sector growth remained subdued as the year witnessed fewer twin-aisle aircraft deliveries in the US, which was partially offset by strong deliveries in Europe. Despite a dip in twin-aisle deliveries in the US, overall deliveries were up 3.1 percent to a record-high of 1,481 aircraft in 2017.

Boeing, which continues to be the largest global A&D company, recorded a 1.2 percent decline in revenue in 2017 to US\$93.4 billion, compared to US\$94.6 billion in 2016. Both commercial aerospace and defense sectors contributed to a decline in revenues at Boeing in 2017. Commercial Airplanes segment reported a 2.2 percent decrease in revenues primarily due to delivery mix, with fewer twin aisle deliveries more than offsetting the impact of higher single aisle deliveries.⁷ Boeing's Defense, Space and Security division also reported lower revenues, down 6.7 percent, primarily due to fewer C-17 deliveries, lower milestone revenue on satellite programs, and the Apache and F-15 program delivery mix, partially offset by higher volume on various weapons programs.⁸

Airbus' revenue increased slightly (up 0.3 percent) to US\$75.3 billion in 2017, from US\$75.1 billion in 2016. The Commercial Aircraft segment grew 3.5 percent YoY as the company recorded

a 4.4 percent increase in deliveries to 718 aircraft. However, this was offset by an 8.9 percent decline in the Defence and Space segment, which was mainly due to the perimeter changes from portfolio reshaping, primarily reflecting the sale of Defence Electronics business, negatively impacting US\$1.9 (€1.7) billion in revenue.⁹

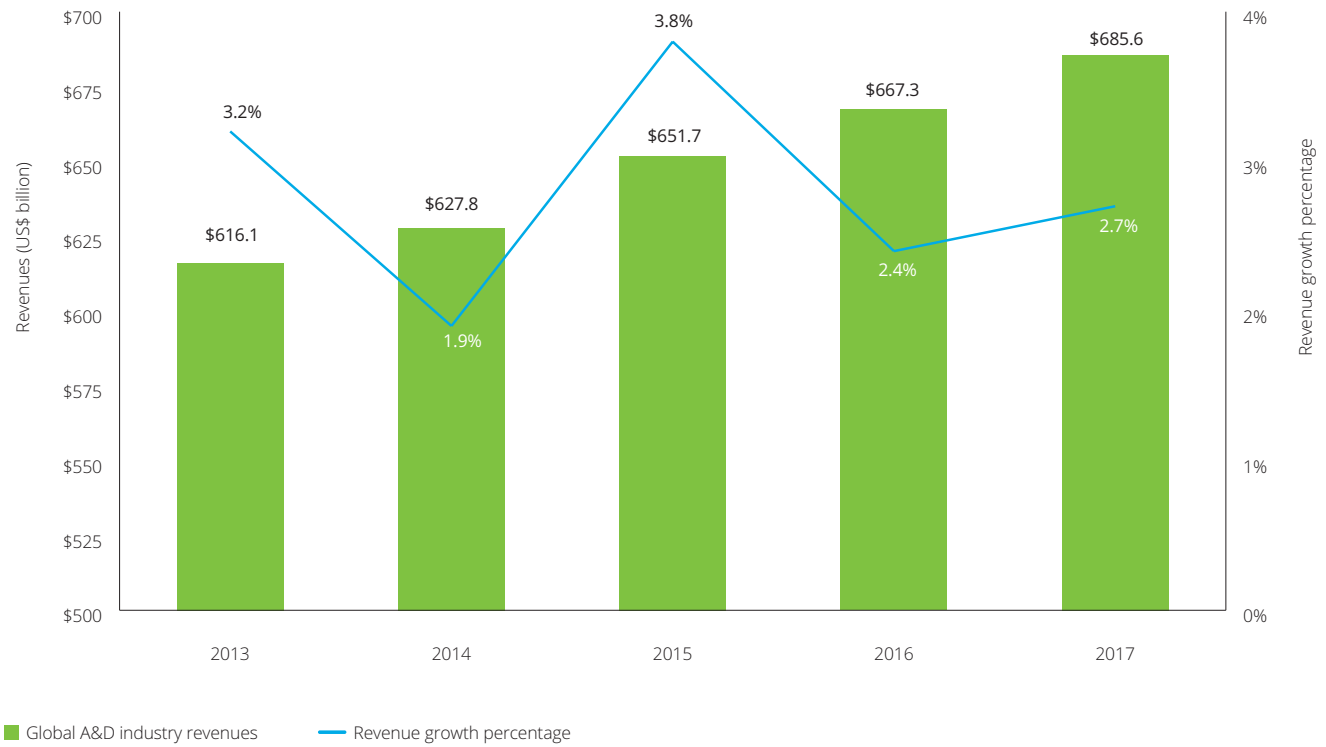
Lockheed Martin, the third-largest A&D company, reported a solid revenue growth of 8.0 percent in 2017, its revenues increasing to US\$51.1 billion, compared to US\$47.2 billion in 2016. This was mainly driven by F-35 program sales, increase in C-130 deliveries, as well as higher volume on the F-16 aircraft modernization program.¹⁰

In terms of rank order of revenues, there was no change in the rankings of the top 10 A&D companies, which accounted for 59 percent of the total revenue, reflecting concentration in the A&D industry.

Of the 100 companies in this study, 32 reported a decline in revenues in 2017 versus 29 that experienced negative growth in revenues in 2016. Korea Aerospace Industries recorded the largest decline in revenues, down 29.7 percent or US\$774 million.

The following chart illustrates a five-year performance of the global A&D industry, showing a recovery in revenue growth in the last three years.

Figure 7: Five-year history of global aerospace and defense industry revenue and growth performance



Note: A&D industry revenue calculations will differ from previous years' Deloitte Global A&D industry financial performance studies, as the set of companies included in this study is not directly comparable across the years. Also, 2016 and 2017 numbers are based on constant currency basis and 2013 to 2015 numbers have been re-calculated using the growth rates for the respective period with 2016 revenues as the base.

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

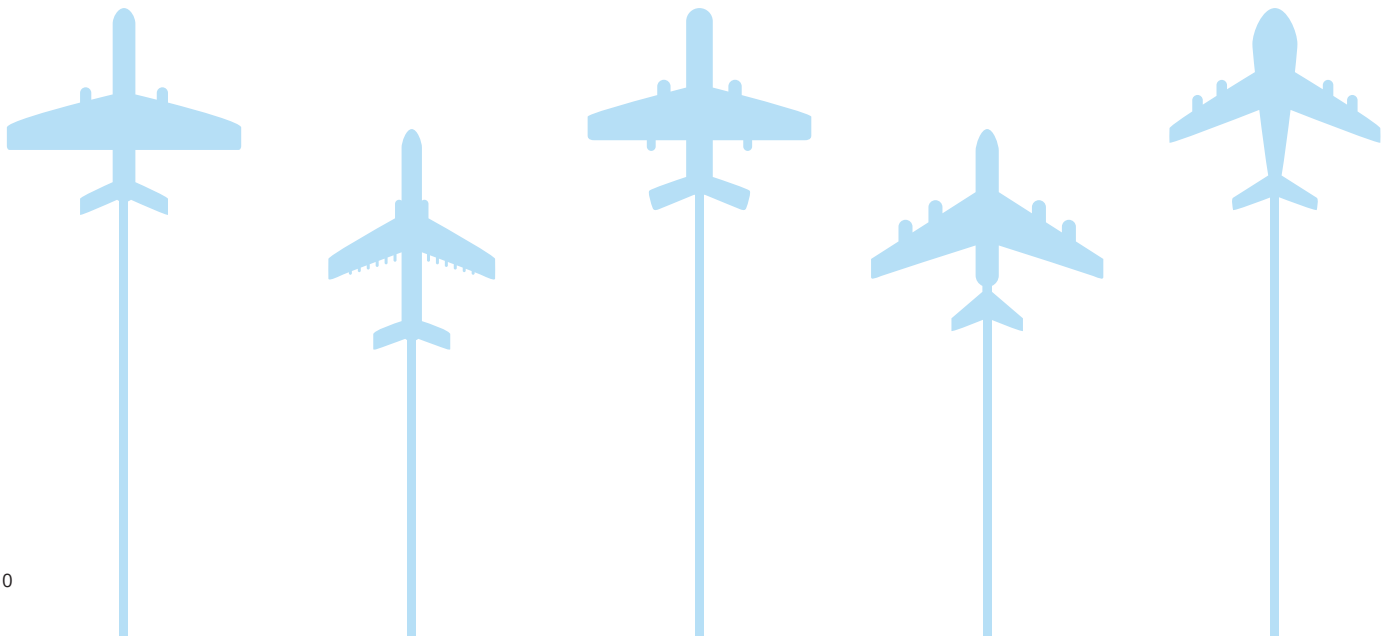


Figure 8. Top 10 aerospace and defense companies by 2017 revenue (US\$ million)

Rank	Company	US\$ million
1.	Boeing	US\$93,392
2.	Airbus Group	US\$75,275
3.	Lockheed Martin	US\$51,048
4.	General Dynamics	US\$30,973
5.	United Technologies	US\$30,261
6.	GE Aviation	US\$27,375
7.	Northrop Grumman	US\$25,803
8.	Raytheon	US\$25,348
9.	BAE Systems	US\$23,590
10.	Safran	US\$19,099

Figure 9. Top 10 aerospace and defense companies by 2017 revenue growth

Rank	Company	%
1.	Aselsan A.S.	42.3%
2.	Oshkosh Defense	34.7%
3.	Dassault Aviation	32.3%
4.	Smiths Detection	30.6%
5.	Rockwell Collins	29.7%
6.	Leidos Holdings, Inc.	29.0%
7.	Ball Aerospace	21.1%
8.	OHB Technology AG	18.1%
9.	Hanwha Techwin	17.2%
10.	CACI	16.0%

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

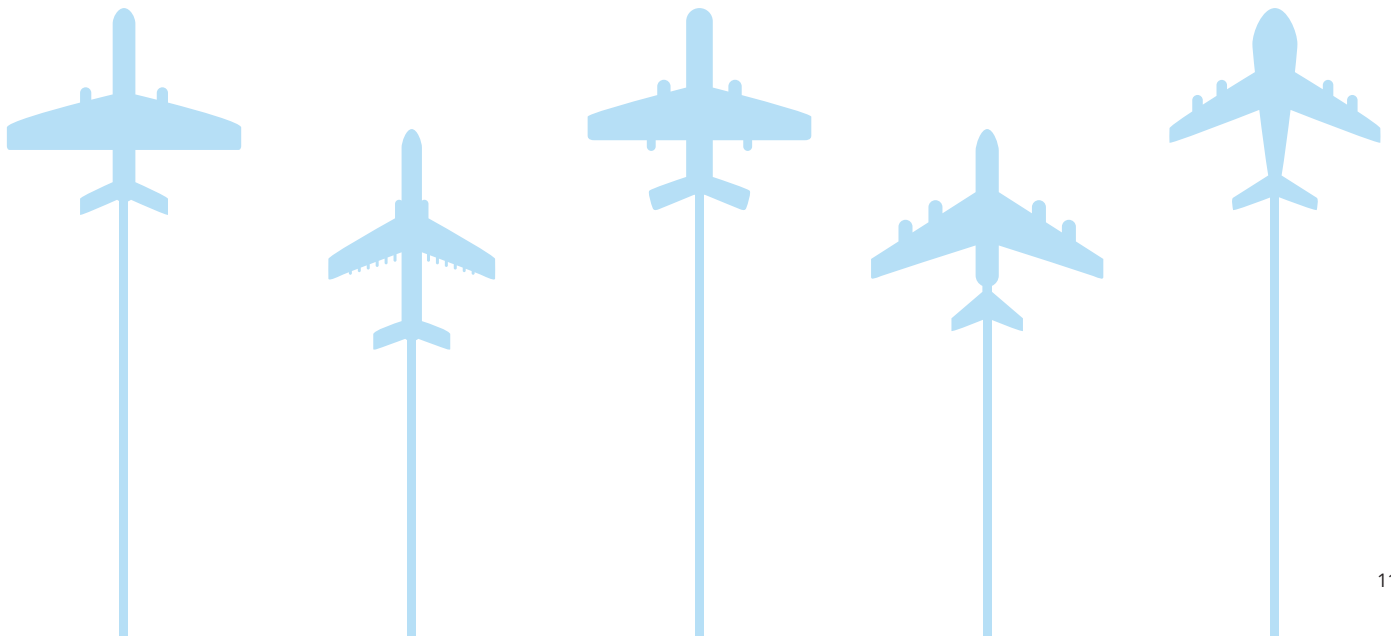
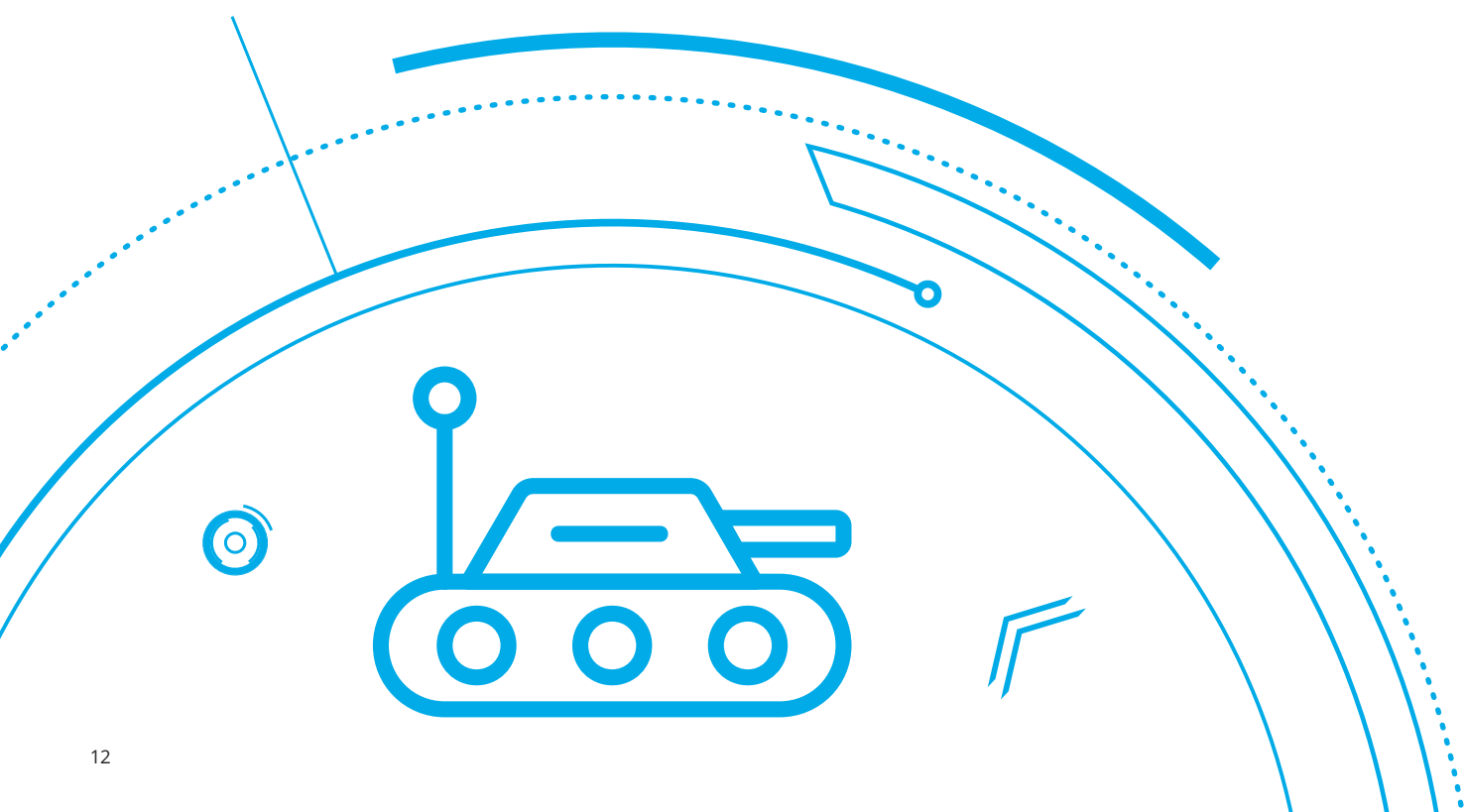


Figure 10. Top 10 aerospace and defense companies by revenues in 2017 and their movement in rank compared to 2016

Company	2016 Revenues (US\$ million)	Rank in 2016	Movement in rank	2017 Revenues (US\$ million)	Rank in 2017
Boeing	US\$94,571 ¹¹	1	↔	US\$93,392 ¹²	1
Airbus Group	US\$75,065	2	↔	US\$75,275	2
Lockheed Martin	US\$47,248	3	↔	US\$51,048	3
General Dynamics	US\$30,561	4	↔	US\$30,973	4
United Technologies	US\$28,925	5	↔	US\$30,261	5
GE Aviation	US\$26,261	6	↔	US\$27,375	6
Northrop Grumman	US\$24,508	7	↔	US\$25,803	7
Raytheon	US\$24,124	9	↔	US\$25,348	8
BAE Systems	US\$22,905	8	↔	US\$23,590	9
Safran	US\$18,582	10	↔	US\$19,099	10

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.



Operating earnings

In 2017, the global A&D industry's reported operating income grew 12.4 percent or US\$8.0 billion. On an adjusted basis, core operating earnings for the industry rose 9.1 percent to US\$74.2 billion, led by a solid operating performance of the commercial aerospace sector.

Boeing was the leader in terms of profitability, with core operating earnings of US\$8,970 million in 2017, up 64.2 percent over the last year. GE Aviation ranked second, with core operating earnings of US\$6,642 million (up 8.6 percent) in 2017, followed by Lockheed Martin, which reported US\$5,921 million in core operating earnings in 2017, up 5.2 percent.

Sixty-eight companies reported positive YoY growth in core operating earnings, with the top 20 companies accounting for 79.3 percent of the total industry core operating earnings, reflecting concentration of industry profits.

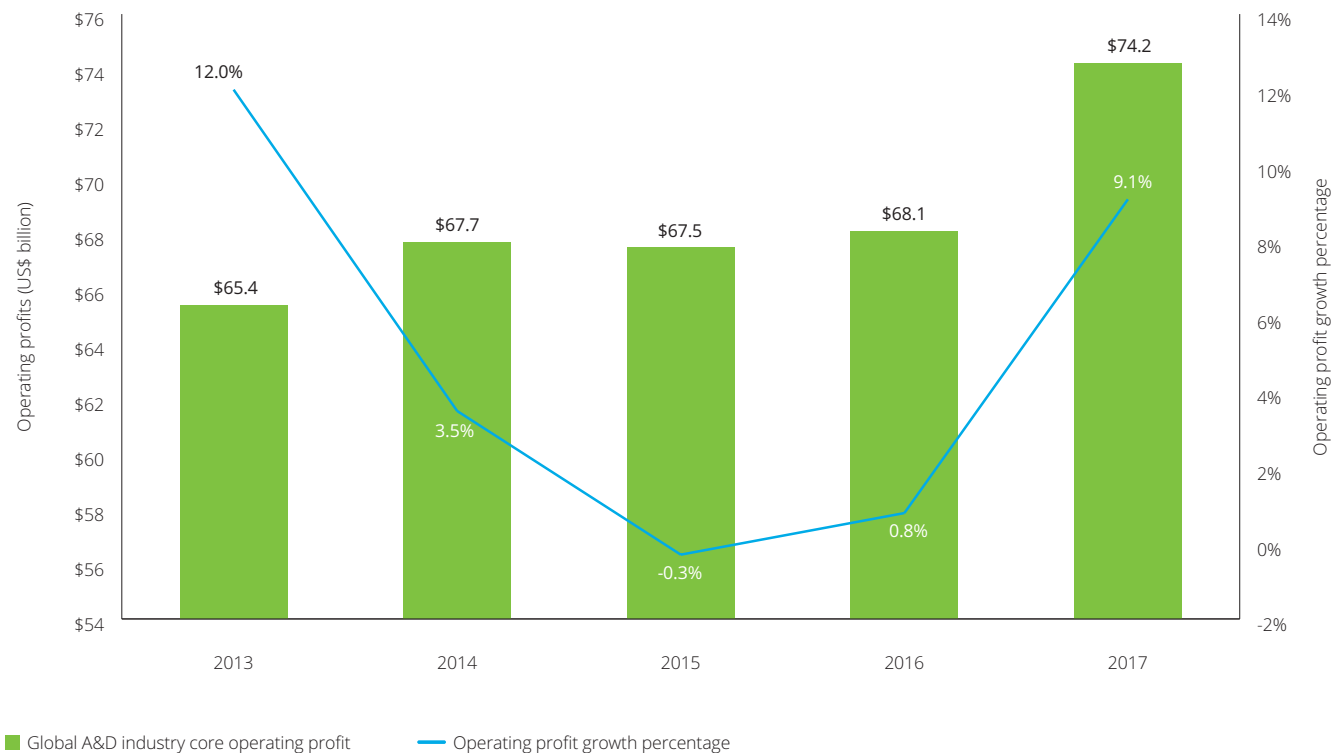
Figure 11 shows the industry's core operating profit and growth in core operating profit, with a significant improvement in profitability seen in 2017.

Figure 12: Top 10 aerospace and defense companies by 2017 core operating earnings (US\$ million)

Rank	Company	US\$ million
1.	Boeing	US\$8,970
2.	GE Aviation	US\$6,642
3.	Lockheed Martin	US\$5,921
4.	Airbus Group	US\$4,795
5.	General Dynamics	US\$4,177
6.	United Technologies	US\$3,630
7.	Raytheon	US\$3,318
8.	Northrop Grumman	US\$3,299
9.	Safran	US\$3,124
10.	Honeywell Aerospace	US\$2,588

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates. Note that all figures are in US\$.

Figure 11: Five-year history of aerospace and defense industry core earnings and growth performance metrics



Note: A&D industry operating income calculations will differ from previous years' Deloitte Global A&D industry financial performance studies, as the set of companies included in this study is not directly comparable across the years. Also, 2016 and 2017 numbers are based on constant currency basis and 2013 to 2015 numbers have been re-calculated using the growth rates for the respective period with 2016 revenues as the base.

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates. Note that all figures are in US\$.

Operating margin

A&D industry's core operating margin improved by 60 basis points (bps), from 10.2 percent in 2016 to 10.8 percent in 2017, as the industry continued to become more efficient. On a reported basis, operating margin was up 90 bps in 2017 to 10.4 percent. One-time write-offs/non-recurring charges declined from US\$4.3 billion to US\$2.6 billion in 2017, hence narrowing the gap between reported and core margins.

GE Aviation and BWX Technologies recorded one of the highest operating margins in the A&D industry—24.3 percent and 22.8 percent, respectively.

Out of the 100 companies analyzed, only three companies reported a negative operating margin—Mitsubishi Heavy Industries, Korea Aerospace Industries, and Bombardier.

Return on assets (ROA)

The global A&D industry's ROA rose to 5.2 percent in 2017, from 4.5 percent in 2016, as overall profitability for the industry experienced significant improvement and A&D companies continued to become more efficient in utilizing their asset base. Parker Hannifin recorded the highest return on assets of 23.7 percent, followed by Safran (15.0 percent) and Rolls-Royce (14.0 percent).

Of the 100 companies analyzed, only 11 reported a negative ROA, with Wesco Aircraft's ROA being the lowest, at minus 13.8 percent in 2017 as the company recorded net loss due to a US\$300 million goodwill impairment charge.

Figure 13: Top 10 aerospace and defense companies by 2017 core operating margin

Rank	Company	Percentage
1.	Transdigm Group	42.2%
2.	GE Aviation	24.3%
3.	BWX Technologies, Inc	22.8%
4.	Honeywell Aerospace	22.2%
5.	Aselsan A.S.	22.2%
6.	Amphenol	20.4%
7.	HEICO Corporation	20.1%
8.	Meggitt	19.2%
9.	Eaton Aerospace	19.0%
10.	Teledyne Tech	18.6%

Source: Deloitte Global analysis of the 100 major global A&D companies, using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

Figure 14: Top 10 aerospace and defense companies by 2017 return on assets

Rank	Company	Percentage
1.	Parker Hannifin Aerospace	23.7%
2.	Safran	15.0%
3.	Rolls-Royce	14.0%
4.	Aselsan A.S.	12.7%
5.	QinetiQ	12.7%
6.	Vectrus Inc.	12.0%
7.	Magellan Aerospace	11.3%
8.	Smiths Detection	10.9%
9.	Hexcel Corp.	10.2%
10.	Eaton Aerospace	9.1%

Source: Deloitte Global analysis of the 100 major global aerospace and defense companies using public company filings and press releases. See the methodology section for further information and definitions of financial metric, as well as company name, reports, and dates.

Free cash flow (FCF)

It represents the cash generated by a company through its operations after accounting for capital expenditure. Global A&D industry FCF improved significantly in 2017, up 26.2 percent to \$51.3 billion from US\$40.7 billion in 2016, largely due to a recent tax reform in the US and lower research and development (R&D) expenditure. The top 10 companies in terms of FCF contributed 70.1 percent to the total sector FCF, as compared to 68.4 percent the previous year.

The top three companies—Boeing, Lockheed Martin, and Airbus Group—accounted for 41.0 percent of the total FCF, continuing to show concentration of the industry. These three companies reported YoY increases in their FCFs—Boeing (47.2 percent), Lockheed Martin (28.4 percent), and Airbus Group (17.4 percent).

Of the 100 companies analyzed, 14 reported negative FCF in 2017—lowest by Bombardier Aerospace (minus US\$373 million) and Triumph Group (minus US\$331 million). Bombardier Aerospace reported a loss due to the impairment charges on its C-Series program, while Triumph Group posted a negative FCF due to a reduction in production rate on the 747-8, Gulfstream G450/G550, C-17 and A330 programs

Free cash margin

In 2017, the global A&D industry FCM rose to 7.5 percent from 6.1 percent in 2016. This was largely driven by a strong growth in global FCF, which was up 26.2 percent YoY in 2017, compared to a revenue growth of 2.7 percent in the same year, resulting in a higher FCM. Fifty-five of the 100 companies analyzed reported FCM of more than 5.0 percent, while 19 companies reported FCM of greater than 10.0 percent in 2017.

Dassault Aviation ranked first, with the highest FCM of 29.8 percent, as its FCF increased 63.5 percent in 2017. Kongsberg Defence Systems ranked in the top three, with a FCM of 17.6 percent, a significant jump from 1.1 percent in 2016 that was led by higher operational cash inflow.

Overall, only 14 of the 100 companies analyzed reported negative FCM in 2017 as these companies either reported negative operating cash flow or made significant capital investments.

Figure 15: Top 10 aerospace and defense companies by 2017 free cash flow (US\$ millions)

Rank	Company	US\$ million
1.	Boeing	\$11,605
2.	Lockheed Martin	\$5,299
3.	Airbus Group	\$4,211
4.	General Dynamics	\$3,451
5.	Safran	\$2,239
6.	Raytheon	\$2,202
7.	BAE Systems	\$1,942
8.	United Technologies	\$1,809
9.	Northrop Grumman	\$1,685
10.	Dassault Aviation	\$1,622

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates. Note that all figures are in US\$.

Figure 16: Top 10 aerospace and defense companies by 2017 free cash margin performance

Rank	Company	Percentage
1.	Dassault Aviation	29.8%
2.	Transdigm Group Inc.	20.5%
3.	Kongsberg Defence Systems	17.6%
4.	HEICO Corporation	16.3%
5.	Meggitt	15.6%
6.	Rockwell Collins	15.0%
7.	Curtiss Wright	14.8%
8.	Amphenol	13.1%
9.	Smiths Detection	12.7%
10.	Boeing	12.4%

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

Book-to-bill ratio (BTB)

An indicator of a company's future revenues, BTB ratio is determined by comparing sales order bookings to company revenues. Global A&D industry's BTB ratio declined 20.0 percent to 0.95 times in 2017 as overall backlog decreased, especially at Airbus (US\$71.7 billion), which was mainly due to a weaker US dollar spot rate used for the conversion of non-hedged portion of the backlog to local currency. With the commercial aircraft backlog at a record-high, new aircraft orders continued to slow down, resulting in a 1.1 percent decrease in total backlog to US\$2.78 trillion in 2017, hence a lower BTB ratio. However, BTB ratio (excluding that of Airbus) was down only 2.2 percent in 2017.

As illustrated in Figure 17, Mantech International Corp. ranked highest in terms of BTB ratio, at 2.28 times, up 52.1 percent over the last year. A surge in Mantech's BTB ratio was largely driven by new contract awards in 2017.¹³ OHB Technology ranked second, with a BTB ratio of 2.06 times that in 2017, as its backlog rose 44.9 percent, led by major contract awards in the Space Systems business unit. Maxar Technologies' BTB of 1.92 was the third highest, which grew from 0.76 times in 2016. This was led by the company's acquisition of DigitalGlobe, which was completed in October 2017.¹⁴

Forty of the 100 companies in this study reported a BTB ratio of 1.0 times or more, down from 51 in the previous year, indicating a weakened BTB ratio for the industry.

Figure 17: Top 10 aerospace and defense companies by 2017 book-to-bill performance

Rank	Company	Ratio
1.	Mantech Int'l Corp.	2.28
2.	OHB Technology AG	2.06
3.	Maxar Technologies	1.92
4.	GE Aviation	1.58
5.	Rockwell Collins	1.57
6.	Vectrus Inc.	1.52
7.	SAIC	1.50
8.	Jacobs Engineering Group	1.48
9.	Safran	1.37
10.	Ball Aerospace	1.35

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.



Aerospace and defense sector employment

Global A&D industry employment was 1.93 million in 2017, marginally up compared to the previous year. The number of companies increasing their headcounts in 2017 was down, with 49 companies adding people, compared to 58 the year before.

- Employment at the European and Rest of World (ROW) companies decreased 0.3 percent YoY in 2017. However, the US A&D companies reported 0.9 percent YoY increase in employment numbers, from 1.065 million in 2016 to 1.075 million in 2017.
- Accounting for 46.2 percent of the total global A&D employees, OEMs remained one of the largest employer in the industry. However, employment at this segment declined 0.4 percent YoY in 2017. Tier 1, tier 2, electronics, and propulsion segments reported YoY increases in employment numbers ranging from 0.1 percent to 1.6 percent.

In 2017, the top three companies increasing their headcount included Rockwell Collins, which reported an increase of 10,000 employees, or 52.6 percent, led by the acquisition of B/E Aerospace. Leidos Holdings added 7,286 employees after completing the bulk of the integration activities from its acquisition of Lockheed Martin's former Information Systems and Global Solutions business. Lockheed Martin added 3,000 to its workforce in 2017.

Companies that reported YoY reductions in the size of their global workforces include L3 Technologies (~7,000 or 18.4 percent)

Figure 18: Top 10 aerospace and defense companies by 2017 employee additions growth

Rank	Company	Percentage
1.	Rockwell Collins	52.6%
2.	Maxar Technologies	31.3%
3.	Leidos Holdings, Inc.	30.7%
4.	Oshkosh Defense	25.7%
5.	JAMCO Corporation	21.7%
6.	Vectrus Inc.	19.6%
7.	Smiths Detection	19.5%
8.	Amphenol	12.9%
9.	Orbital ATK	11.2%
10.	Astronics Corp.	10.1%

Figure 19. Top 10 aerospace and defense companies by 2017 employee reduction percentage

Rank	Company	Percentage
1.	Solvay Group	-25.5%
2.	L3 Technologies	-18.4%
3.	Esterline Technologies	-12.5%
4.	SKF	-10.5%
5.	Fluor Corp.	-7.9%
6.	CACI	-6.7%
7.	Ultra Electronics	-6.6%
8.	Boeing	-6.4%
9.	Triumph Group	-5.3%
10.	Dassault Aviation	-4.6%

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

Employee productivity

Overall employee productivity, defined as core operating earnings per employee, improved 8.6 percent YoY to reach US\$38,543 in 2017. The propulsion segment generated the highest operating earnings per employee, at US\$81,222, compared to US\$77,765 in 2016, a growth of 4.4 percent. Tier 3 segment's operating earnings per employee doubled in 2017 at US\$38,004 from US\$18,973 in 2016. The aerostructure segment's employee productivity was down 24.2 percent YoY to US\$20,787.

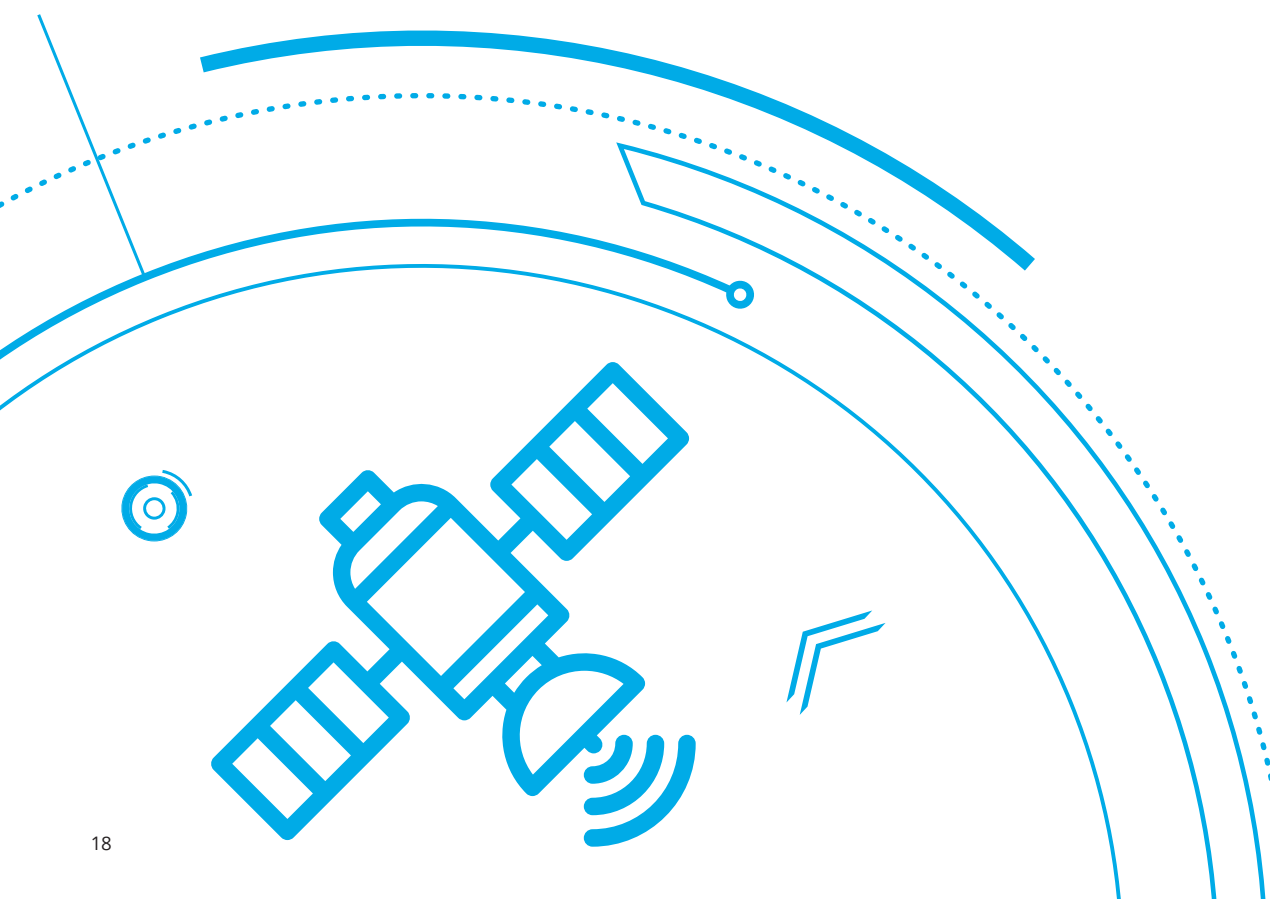
GE Aviation was one of the most productive companies on a per-employee basis, with operating earnings per employee improving 9.8 percent to reach US\$149,258 in 2017.

Figure 20: Top 10 aerospace and defense companies by 2017 core operating earnings per employee (US\$)

Rank	Company	US\$ million
1.	Transdigm Group Inc.	\$160,851
2.	GE Aviation	\$149,258
3.	BWX Technologies, Inc	\$88,549
4.	IHI Aero Engine & Space	\$84,420
5.	Subaru Aerospace	\$80,318
6.	MTU Aero Engines	\$70,773
7.	Honeywell Aerospace	\$68,839
8.	Aselsan A.S.	\$65,145
9.	Harris Corp.	\$63,235
10.	HEICO Corp.	\$60,129

Source: Deloitte Global analysis of the 100 major global aerospace and defense companies using public company filings and press releases. See the methodology section for further information and definitions of financial metric, as well as company name, reports, and dates. Note that all figures are in US\$.

Note: Companies analyzed based on partial results based on aerospace and defense (A&D) activity have an advantage over others as they do not have corporate overheads.



Global defense sector compared with commercial aerospace sector

The global defense sector led the overall industry growth, with revenues up 3.9 percent in 2017. Defense spending continued to increase due to heightened global security threats, increasing US defense budgets and higher defense spending by countries such as India, China, and Japan.

In contrast, the global commercial aerospace sector growth slowed to 1.2 percent in 2017, from a growth of 2.7 percent in 2016, partly due to a decline in twin-aisle deliveries in the US. However, backlogs of commercial aircraft continued to remain at an all-time high of 14,215 aircraft. Moreover, given the healthy

demand for new commercial aircraft, it is estimated that approximately 36,800 jets will be delivered globally over the 2017–2036 period.¹⁵

The commercial aerospace sector's operating margin reached 11.0 percent in 2017, nearing the defense sector margin of 11.2 percent. As profitability improved for the commercial aerospace sector in 2017, especially for the companies headquartered in the US, sector margins expanded 145 bps in 2017. On the other hand, operating margin for the defense sector remained flat at 11.2 percent in 2017.

Figure 21: Commercial aerospace, as compared to defense sector performance comparison (2016 to 2017)

	Commercial aerospace			Defense		
	2016	2017	Change (2017 versus 2016)	2016	2017	Change (2017 versus 2016)
Revenues (US\$ billion)	US\$319.1	US\$323.1	1.2%	US\$348.1	US\$361.5	3.9%
Core operating earnings (US\$ billion)	US\$30.4	US\$35.4	16.7%	US\$38.8	US\$40.5	4.3%
Core operating margin	9.5%	11.0%	145 bps	11.1%	11.2%	5 bps

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates. Note that all figures are in US\$.

Note: The total A&D industry revenues will not match when we add up commercial aerospace and defense revenues. The reason is certain large A&D companies have corporate eliminations/others as input in their total revenues which cannot be distributed among commercial and defense sectors.

Comparison of US and European A&D industry performance

US-based companies account for most of the revenues of the industry, representing 60.0 percent of global A&D revenue. Companies headquartered in Europe represent 31.4 percent of the global revenues, while companies domiciled in Canada, Brazil, Japan, China, India, Australia, and others account for the balance.

In 2017, revenue for the US companies grew 3.4 percent, slightly outperforming revenue growth for European companies, which came in at 3.2 percent. While the growth in the US A&D industry was driven by the defense sector, Europe's A&D industry growth was attributable to both the commercial aerospace and defense sectors.

In the US, higher defense budgets and US administrations' focus on increasing defense spending led to a robust revenue growth of 4.5 percent for the US defense sector in 2017. Likewise, European defense sector revenues increased 2.6 percent in 2017, as the region is increasing focus on military expenditure to counter potential threats and remain competitive. Moreover, increasing political pressure from the US administration on NATO member countries to increase military expenditure to 2.0

percent of GDP is also driving growth in the defense sector in Europe.¹⁶ Revenues for the top 20 US defense companies increased 4.3 percent in 2017, whereas the top 20 defense companies in Europe recorded a lower revenue growth of 2.8 percent.

The commercial aerospace sector growth slowed in the US, with revenues up only 1.3 percent in 2017, largely due to a decrease in twin-aisle deliveries. On the other hand, Europe's commercial aerospace sector recorded modest revenue growth of 3.7 percent in 2017. This was primarily driven by a 4.4 percent increase in aircraft deliveries in Europe during the year.¹⁷

Operating margin differences between the US and European companies continued to remain, both in the commercial aerospace and the defense sector. In 2017, the core operating margin for the US A&D industry rose to 12.7 percent as compared to 11.6 percent in 2016, whereas, for the European industry, the operating margin in 2017 remained flat at 8.5 percent. While the margins of the US A&D industry continue to increase, they have remained flat to down for the European companies over the past five years.

Figure 22: US defense sector performance as compared to the European defense sector (2016 to 2017)

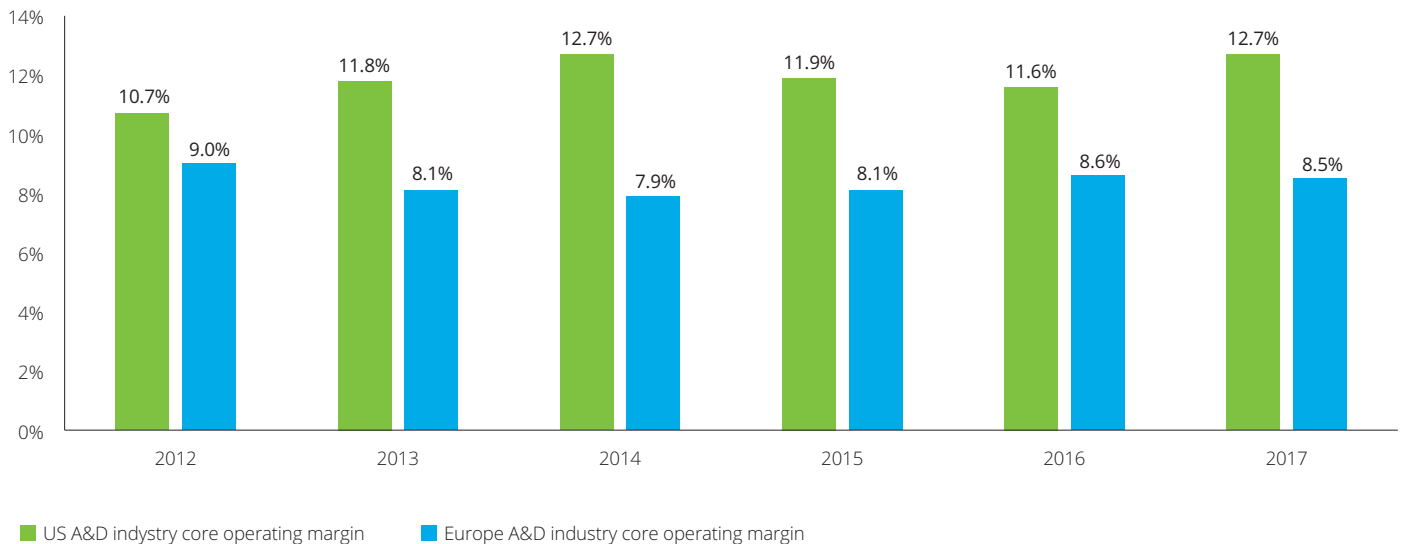
	US defense			Europe defense		
	2016	2017	Change (2017 versus 2016)	2016	2017	Change (2017 versus 2016)
Revenues (US\$ billion)	US\$229.3	US\$239.6	4.5%	US\$93.3	US\$95.8	2.6%
Core operating earnings (US\$ billion)	US\$27.5	US\$29.4	6.8%	US\$9.2	US\$9.3	0.7%
Core operating margin	12.0%	12.3%	22 bps	9.8%	9.7%	(18 bps)

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

Figure 23: US commercial aerospace sector performance as compared to the European commercial aerospace sector (2016 to 2017)

	US commercial aerospace			Europe commercial aerospace		
	2016	2017	Change (2017 versus 2016)	2016	2017	Change (2017 versus 2016)
Revenues (US\$ billion)	US\$168.8	US\$171.0	1.3%	US\$112.8	US\$117.0	3.7%
Core operating earnings (US\$ billion)	US\$19.3	US\$23.9	23.6%	US\$9.0	US\$9.5	5.7%
Core operating margin	11.4%	14.0%	220 bps	8.0%	8.1%	16 bps

Source: Deloitte Global analysis of the 100 major global A&D companies, using public company filings and press releases. See methodology section for further information and definitions of financial metrics, as well as company name, reports and dates.

Figure 24: US aerospace and defense industry margins compared to the European sector (2012 to 2017)

Note: A&D industry operating margin calculations will differ from previous years' Deloitte Global A&D industry financial performance studies, as the set of companies included in this study is not directly comparable across the years. Also, 2016 and 2017 numbers are based on constant currency basis and 2012 to 2015 numbers have been re-calculated using the growth rates for the respective period with 2016 margin as the base.

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

US companies continue to outperform their European counterparts in several key measures. In addition to core operating margins, US companies maintain a lead in free cash flow margin by 1.25 times and core operating earnings per employee by 1.65 times.

Figure 25: US aerospace and defense sector compared to European sector (2016 to 2017)

	US			Europe		
	2016	2017	Change (2017 versus 2016)	2016	2017	Change (2017 versus 2016)
Revenues (US\$ billion)	\$398.2	\$411.6	3.4%	\$206.2	\$212.8	3.2%
Core operating earnings (US\$ billion)	\$46.2	\$52.3	13.3%	\$17.7	\$18.0	1.5%
Core operating margin percentage	11.6%	12.7%	9.7%	8.6%	8.5%	(1.6%)
Return on assets	6.3%	5.5%	(12.6%)	1.3%	4.9%	275.4%
Free cash flow (US\$ billion)	\$28.9	\$35.3	21.9%	\$11.5	\$14.6	27.1%
Free cash flow margin percentage	7.3%	8.6%	18.0%	5.6%	6.9%	23.1%
Book-to-bill ratio	1.04 times	1.12 times	7.6%	1.54 times	0.61 times	(60.1%)
Aerospace and defense (A&D) revenue/employee (US\$)	\$373,870	\$382,786	2.4%	\$336,680	\$348,669	3.6%
A&D core operating earnings/employee (US\$)	\$43,338	\$48,658	12.3%	\$28,932	\$29,477	1.9%
Number of A&D employees	1,065,054	1,075,155	0.9%	612,461	610,368	(0.3%)

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

Segment performance

Original equipment manufacturers and supplier companies

All the segments reported YoY revenue growth in 2017, with tier 2 and electronics generating strong revenue growth of greater than 5.0 percent, while tier 3, propulsion, and services experienced revenue growth in the range of 4.0 to 5.0 percent, higher than the overall A&D industry revenue growth of 2.7 percent. Revenues for the original equipment manufacturers (OEM) increased 1.5 percent in 2017, the lowest revenue growth among all segments. Revenue growth of the OEMs were mixed.

Boeing experienced a revenue decline of 1.2 percent in 2017, while Airbus Group reported a growth of 0.3 percent. Tier 1 and aerostructures segments reported revenue growth of 1.6 percent and 1.8 percent, respectively, in 2017, the lowest amongst all segments.

The following chart summarizes the segment financial performance metrics as described above.

Figure 26: Segment performance in 2016 and 2017

Segment	Revenues (US\$ billion)			Core operating earnings (US\$ billion)			Core operating margin		
	2016	2017	Change (2017 versus 2016)	2016	2017	Change (2017 versus 2016)	2016	2017	Change (2017 versus 2016)
Original equipment manufacturers	\$370.9	\$376.5	1.5%	\$30.6	\$34.9	14.0%	8.2%	9.3%	12.4%
Tier 1	\$44.8	\$45.5	1.6%	\$4.5	\$4.6	2.3%	10.0%	10.1%	0.7%
Tier 2	\$25.1	\$26.5	5.3%	\$4.0	\$4.4	8.8%	16.0%	16.5%	3.3%
Tier 3	\$7.7	\$8.0	4.4%	\$0.5	\$1.0	96.2%	6.4%	12.1%	88.0%
Electronics	\$82.5	\$87.2	5.7%	\$11.4	\$12.3	7.4%	13.9%	14.1%	1.6%
Aerostructures	\$31.7	\$32.3	1.8%	\$2.5	\$1.9	-26.3%	8.0%	5.8%	-27.6%
Propulsion	\$66.3	\$69.5	4.8%	\$11.4	\$12.1	5.6%	17.2%	17.4%	0.7%
Services	\$38.3	\$40.1	4.8%	\$3.1	\$3.2	3.7%	8.0%	7.9%	-1.0%

Source: Deloitte Global analysis of the 100 major global A&D companies, using public company filings and press releases. See methodology section for further information and definitions of financial metrics, as well as company name, reports and dates.

Aerostructures was the only segment to report negative core operating earnings and core operating margin in 2017 compared to 2016. Tier 3 suppliers recorded core operating earnings of US\$0.97 billion in 2017, rising from US\$0.5 billion in 2016, with

margins increasing from 6.4 percent in 2016 to 12.2 percent in 2017. OEMs core operating earnings increased 14.0 percent YoY in 2017, outperforming the overall global A&D industry.

Figure 27: Segment performance from 2011 to 2017

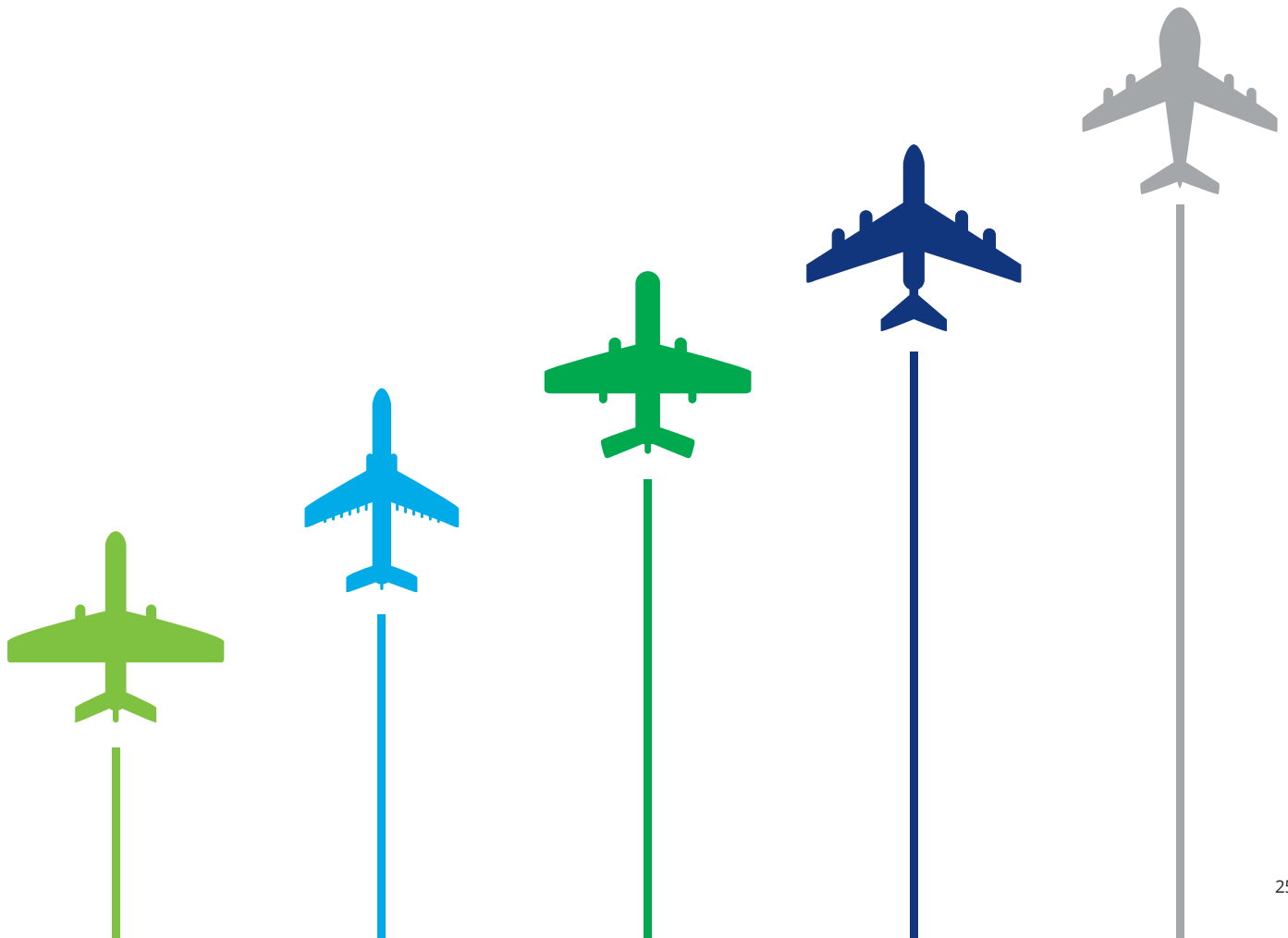


Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.

Figure 28: Segment performance key metrics in 2017

	Revenue (US\$ billion)	Core operating earnings (US\$ billion)	Operating margin	ROA	FCF (US\$ billion)	FCM	BTB ratio	Number of A&D employees (million)	A&D revenue/ employee (US\$ '000)	A&D operating earnings/ employee (US\$ '000)
OEMs	\$376.5	\$34.9	9.3%	5.2%	\$32.0	8.5%	0.84	0.89	\$422.88	\$39.19
Tier 1	\$45.5	\$4.6	10.1%	4.0%	\$2.5	5.5%	1.13	0.20	\$224.78	\$22.62
Tier 2	\$26.5	\$4.4	16.5%	7.6%	\$2.6	9.7%	1.07	0.10	\$258.69	\$42.64
Tier 3	\$8.0	\$1.0	12.1%	0.0%	\$0.1	0.4%	1.09	0.03	\$313.76	\$38.00
Electronics	\$87.2	\$12.3	14.1%	4.9%	\$7.7	8.9%	1.06	0.28	\$312.83	\$44.11
Aerostructures	\$32.3	\$1.9	5.8%	3.1%	\$0.5	1.5%	0.70	0.09	\$359.85	\$20.79
Propulsion	\$69.5	\$12.1	17.4%	7.3%	\$4.1	5.9%	1.28	0.15	\$467.63	\$81.22
Services	\$40.1	\$3.2	7.9%	4.0%	\$1.9	4.8%	1.13	0.19	\$213.17	\$16.92

Source: Deloitte Global analysis of the 100 major global A&D companies using public company filings and press releases. See the methodology section for further information and definitions of financial metrics, as well as company name, reports, and dates.



Study methodology

This study is based on the key financial performance metrics for 100 global A&D companies or segments of industrial conglomerates with A&D businesses which generated global A&D revenues greater than US\$500 million in 2017. Using the data from the companies' respective 10-Ks, annual reports, and other official financial releases, Deloitte Global analyzed the sector's 2017 performance. The study used audited results for all companies and highlights specific companies that had a positive or negative impact on the A&D industry's performance, while also analyzing category-by-category performance based on business types and geography.

The presentation of the companies' 2017 financial performance data is based on its respective 2017 fiscal year results. Similar treatment applies to the presentation of the companies' 2016 financial performance data.

Certain companies were excluded from the analysis, including government-controlled entities, private companies that do not release public filings, and public companies that do not report A&D segment information. Additionally, certain companies from the previous year's study were excluded, because they did not meet the study criteria, e.g., lower revenues than the threshold of US\$500 million, companies that were acquired, and companies going private.

All data in this study are presented in US dollars. Fifty of the 100 companies analyzed in this study are headquartered in countries other than the US. For such companies, the study applied a constant currency conversion rate to remove the impact of exchange-rate fluctuations in the analysis (2017 average exchange rate). The conversion rates used for Euro/US dollars include 2017 average conversion rate of 1.127.¹⁸ Embraer, Elbit Systems, and Bombardier Aerospace are four non-US companies that report financials in US dollars.

The study used the standard constant approach to eliminate the effect of significant currency fluctuations from year to year. For instance, Airbus Group's revenue in native currency increased from €66.6 billion in 2016 to €66.8 billion in 2017, up 0.3 percent.¹⁹ However, Airbus' foreign exchange hedging policy significantly affects the theoretical foreign exchange conversion performed in this study. As a result, the 2017 average exchange rate was used for converting both 2016 and 2017 data for non-US-denominated companies.

Many companies provided their commercial-versus-defense revenues. However, there were only a few companies that explicitly stated commercial-versus-defense operating earnings. In absence of explicit details, the study used the commercial and defense percentage of revenue as a proxy to estimate the respective operating earnings.

1. A&D industry revenue

- To calculate the A&D revenue for a company, we determined the percentage of revenue associated with A&D activities. In calculating this percentage, we first checked whether the company explicitly stated an A&D revenue figure. In such a case, the explicitly stated percentage was directly used. If the percentage was not explicitly stated, the company's various business segments or end-markets were analyzed. Only those that were related to A&D in estimating the revenue percentage were considered.
- In determining the A&D industry revenue, a calculated summation of the revenues of the constituent 100 companies was included.

2. Operating earnings/margin

- The study examined the operating earnings as stated, if these were reported by the company. If the operating earnings were not published by the company, they were calculated as follows: Operating earnings = Sales – Cost of goods sold – SG&A expenses – Research and development expenses – Restructuring/ acquisition costs – Impairments/amortizations.
- The companies' respective A&D operating margins were calculated by dividing their respective A&D operating earnings by their respective A&D revenues.
- Operating earnings for the A&D industry is a summation of operating earnings of the constituent companies.
- Operating margin for the A&D industry was calculated as the total sector operating earnings, as a percentage of total sector revenue.

3. Return on assets (ROA)

- ROA was calculated for the entire company, as the components to calculate ROA were reported at the company level and not at the segment level. ROA was calculated based on component values in home currencies to eliminate the impact of currency conversion.
- ROA value was calculated using the following formula: $ROA = \text{Net income} / \text{Total Assets}$.
- ROA for the A&D industry is a revenue-weighted average. It was calculated as the following: $\text{A\&D industry ROA} = \frac{\sum (\text{Company ROA} * \text{company A\&D revenue})}{\text{Total A\&D industry revenue}}$.

4. Free cash flow (FCF)/Free cash margin (FCM)

- FCF was calculated for the A&D business based on the A&D revenues of the company.
- If the company published the FCF value, it was used directly. If the company did not publish the FCF value, it was calculated as $FCF = \text{Operating cash flow} - \text{Capital expenditures}$.
 - A&D industry FCF was calculated as a summation of the FCFs of the constituent companies.
 - FCM was calculated for the A&D business based on the A&D revenues of the company. FCM for a company was calculated as $\text{A\&D FCM} = \text{A\&D FCF} / \text{A\&D revenue}$.
 - FCM for the A&D industry is a revenue-weighted average. It was calculated as $\text{A\&D industry FCM} = \frac{\sum (\text{Company FCM} * \text{Company A\&D revenue})}{\text{Total A\&D industry revenue}}$.

5. Book to bill ratio

- BTB ratio was taken as stated, if reported by the company. If the BTB ratio was not published by the company, it was calculated as $BTB = 1 + \frac{(\text{Current fiscal year total backlog} - \text{Previous fiscal year total backlog})}{(\text{Current fiscal year revenue})}$.

- The BTB ratio for the A&D industry is a revenue-weighted average. It was calculated as the following: $\text{A\&D industry BTB} = \frac{\sum (\text{Company BTB} * \text{Company A\&D revenue})}{\text{Total sector A\&D revenue}}$.
- BTB ratio was calculated based on component values as reported in home currencies to eliminate the impact of currency conversion.

6. Number of aerospace and defense employees

- Where reported by the companies, the average employee numbers for the respective fiscal years were used. If average employee numbers were not available, employee figures were factored in as of at the end of the respective fiscal years.

7. Employee productivity

- Employee productivity was measured for individual companies and the A&D industry, including A&D operating earnings per employee.
- The number of employees associated with the A&D business was used as reported by the company, when stated explicitly. However, if the number was not explicitly stated, the number of employees associated with the A&D business was estimated based on revenues.
- Operating earnings per employee for the sector were calculated as: $\text{Operating earnings per employee in the A\&D industry} = \frac{\text{Total operating earnings of the sector}}{\text{Total number of employees in the sector}}$.

Note: i) Likely due to rounding, numbers presented throughout this report may not add up precisely to the totals provided and percentages may not precisely reflect the absolute figures. Also, the total A&D industry revenues will not precisely match when commercial aerospace and defense sectors revenues are added together. This is because many large A&D companies have corporate eliminations/others as input in their total revenues, which cannot be distributed among commercial aerospace and defense sectors. For this study, below are the definitions of various segments mentioned:

For this study, below are the definitions of various segments mentioned:

- OEM – Prime integrator
- Tier one – System integrator
- Tier two – Sub-system integrator
- Tier three – Sub-component suppliers
- Electronics – Communication and electronic systems and products used on commercial and military platforms
- Aerostructures – Airframes including all or parts of the fuselage and wings
- Propulsion – Aircraft (commercial and military) and rocket engines
- Services – Mission and program support, command and control (C2) solutions, cyber security, information and intelligence solutions, analytics etc.



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