Global aerospace and defense

Annual industry performance and outlook

2024 edition

How are aerospace and defense companies worldwide performing today?

What challenges and opportunities do they face?

PwC takes a close look.

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Contents

Executive summary

The 2024 edition of PwC's *Global Aerospace and Defense: Annual Industry Performance and Outlook* shares key performance metrics of the global commercial aerospace and defense (A&D) industry. Our data are drawn from financial reports for fiscal year (FY) 2023 and include financial results for the largest 100 A&D companies by revenue (please see the complete list in the Appendix).

We also highlight notable industry developments and express PwC's point of view on topics affecting the industry, developed through interactions with our clients and other industry leaders and analysts.

Aerospace and defense performance overview 2023

2023 set a record for industry revenue of $829 billion, 11% above 2022 and 4% above the previous record set in 2019, marking a significant milestone of full recovery from the pandemic, at least as measured by overall revenue. Civil aviation companies led the way, as they also did in 2022, with double-digit revenue increases. Boeing Commercial Airplanes revenue was higher by 30%, while revenues for the tier 1 suppliers GE Aerospace, Rolls-Royce and Safran were higher by more than 20%. Airbus, Honeywell and the Collins segment of RTX were up by figures in the mid-teens. Remarkably, out of 100 companies, only eight reported a revenue decline.

2023 was a year of continuing surge in demand for passenger (PAX) aviation despite constrained capacity and higher ticket prices. Revenue passenger kilometers (PRKs) and available seat kilometers (ASKs) both improved to 94% of pre-pandemic levels, with domestic travel exceeding pre-pandemic levels by 4% and international travel recovering to 89%. Full-year 2023 passenger load was 82.3%, nearly equal to 2019's 82.6%.

Operating profit improved to $73 billion, 10% higher than 2022, though still 9% below the pre-pandemic record of $82 billion set in 2018. Civil aviation companies led the way with many companies expanding operating margins.

Despite the strong profit improvement, performance continues to be hampered by production constraints, the lingering effects of supply chain and work force disruptions, and higher inflation, although all these issues seem to be abating. Boeing continues to report an overall loss in its Commercial Airplanes as well as its Defense, Space and Security businesses. Airbus reported a decline in operating margin, partly attributable to production increase challenges. RTX reported a decline in operating margin primarily related to production quality. And all of the big five US defense prime contractors reported operating margin declines or losses. Deliveries for 2024-Q1 were broadly in line with recent expectations: 83 commercial craft for Boeing and 142 for Airbus.[1]

Even as the supply chain performance improves, it's chasing accelerated demand. Airlines continued to post a flood of new aircraft orders — at 3,670, that's nearly three times 2023 deliveries — pushing backlog above 14,000 units as the industry struggles to ramp up production. This dynamic is likely to persist for years to come. Many airlines may need to revise or postpone existing plans for enlarging, renewing or greening their fleets.

Meanwhile, the defense sector is experiencing significant increases in demand amid increased global tensions and partly due to the wars in Ukraine and the Middle East. Global defense spending set a record as many countries moved to increase their deterrence capabilities, and the defense industry is struggling to meet the increased production requirements, particularly in munitions.

The space sector is also experiencing surging demand. Small satellite networks are proliferating as the world moves to a space-based economy. A decade or so ago, there were a handful of launches per year. Now we are seeing multiple launches weekly, and the pace is only accelerating. Projections for the space industry forecast an approximate tripling in value over the next decade to $1.5 trillion in annual value.

Figure 1: Key industry metrics

	2023	2022	Change
Revenue	$829 billion	$745 billion	11%
Operating profit	$73 billion	$67 billion	9%
Operating margin	8.8%	8.9%	-10 bps*

*bps = basis point; 1 basis point = 0.01 percent

Source: PwC analysis

Continuing industry recovery is led by civil aviation. The best-performing companies in 2023 were generally those in civil aviation. Boeing Commercial Airplane revenues increased by $7.9 billion, or 30%, the most of any company. Airbus civil revenues increased by $6.3 billion, 15%; and GE Aerospace revenues increased by $5.7 billion, 22%. RTX Collins Aerospace revenues were higher by $3.2 billion, 14%, Rolls-Royce Civil Aerospace revenues increased $2.1 billion, 29%; and Safran's Aerospace Propulsion segment was higher by $2.6 billion, 29%. Other companies with significant civil business are Honeywell Aerospace, up 15%, Howmet Aerospace, up 17%, and TransDigm Group, up 21%.

Boeing regained the distinction of being the largest company in the sector, with $78 billion in revenue. RTX won that honor last year. Lockheed Martin remained the most profitable company for the fifth consecutive year, reporting $8.5 billion in profit, up 1.9%. GE Aerospace was the second most profitable at $6.1 billion. Rolls-Royce reported the highest profit improvement of $1.39 billion, more than double the prior year. GE Aerospace operating profit improved by $1.34 billion, or 28%. Safran profit improved by $880 million, 41%.

Overall, US defense profits were up 4% on revenue growth of 6%. Boeing Defense, Space and Security accounted for most of the improvement, narrowing its operating loss to $1.8 billion from $3.5 billion the previous year. Boeing's losses relate to performance in certain fixed-price development programs, including VC-25B, KC-46A, MQ-25, T-7A Red Hawk and Commercial Crew. Northrop Grumman reported a $1.5 billion decline in profit primarily related to a charge on the B-21 program. Profits at Raytheon's Missiles and Defense and Intelligence and Space segments were down 3%. Lockheed Martin reported a 2% profit improvement but a slight decline in operating margin. Only L3Harris reported an overall profit and operating margin improvement.

European defense companies performed much better, reporting an overall 22% profit improvement on an 8% revenue increase.[2] Airbus Defence and Space reported a profit of $466 million, up 85%. Leonardo's profits were up 38%, Rolls-Royce's defense business was up 31%, and BAE Systems was up 9%. As a result, the European defense operating margin improved to 9.5%, beating its US peers, which reported a decline in margin to 7.8%.

Operating margin was down 10 bps. Despite an 11% increase in revenue, the higher volumes did not manifest in higher margin as a result of the operating challenges described above.

Figure 2: Top 100 additions and deletions

Added to the list	
Jacobs Critical Missions Solutions	#40
Parsons Federal Solutions	#49
Palantir Government	#53
Leonardo DRS	#76
Deleted from the list	
OHB Technology	Delisting, minority stake by KKR
Aerojet Rocketdyne	Acquired by L3Harris
Maxar Technologies	Private
Esco Aerospace & Defense	Performance

Source: PwC analysis

Figure 3: Analysis highlights

Largest increase in revenue (dollars)	Boeing	+$11,186 million
Largest increase in revenue (percentage)	Parker Hannifin Aerospace	+73%
Largest increase in profit (dollars)	Boeing	+$2,746 million
Largest increase in profit (percentage)	Embraer	+147%
Highest operating margin	Palantir Government	59%
Largest increase in top 100 list	Parker Hannifin Aerospace	+7
Largest decrease in revenue (dollars)	Dassault Aviation	–$2,108 million
Largest decrease in revenue (percentage)	RUAG	–30%
Largest decrease in profit (dollars)	RTX	–$1,943 million
Largest decrease in profit (percentage)	SES	–604%
Largest decrease in top 100 list	Dassault Aviation	–16

Source: PwC analysis

Figure 4: Companies with operating margins exceeding 20% increased from 12 to 14:

Top 100 rank	Company	Operating margin
15	Honeywell Aerospace	27.50%
25	TransDigm	44.40%
45	Eaton Aerospace	22.90%
47	Hindustan	21.40%
49	Aselsan	33.90%
51	Heico	21.10%
61	Bharat Electronics	22.60%
62	ATI High Performance	20.30%
76	Palantir	59.30%
77	Teledyne	21.00%
78	Exchange Income Corporation	27.60%
84	Garmin	26.70%
87	Crane Aerospace & Electronics	20.20%

Source: PwC analysis

A&D deals

Some rebound in 2023

Mergers and acquisitions in A&D rebounded somewhat in 2023, with $42 billion in value. That figure is relatively encouraging for the sector, given that M&A deals across the global economy were down 17% year over year in 2023 and fell to a ten-year low.[3] The A&D rebound came on the heels of a low point in 2022 of just $23 billion in deal value. Deal value had set a record in 2021, with just over $100 billion in value, stemming from a flurry of activity among SPACs (special purpose acquisition corporations) and IPOs, particularly focused in the space and green aviation sectors.

In the US overall, PwC sees signs of a potential M&A rebound in 2024. We forecast this further uptick on the basis of a fair amount of pent-up demand and a widespread desire to allocate some capital toward inorganic growth after two slow years of deals. Companies have a lot of “dry powder” — strong balance sheets combined with the expectation of reduced interest rates and lowered cost of capital. In addition, the sector is affected by some motivated private equity sellers that have extended holding periods resulting from a combination of pandemic effects followed by a slow deals market.

Given the highly consolidated state of the A&D industry, as well as the US regulatory climate, we think mega deals are unlikely. PwC expects that small and midsize transactions are likely to continue driving the A&D M&A activity that emerges in 2024, probably focused on the space sector, green aviation and niche technologies such as artificial intelligence and autonomy, as well as cybersecurity.

Notable 2023 and early 2024 deals

- BAE Systems acquired Ball Aerospace for $5.5 billion, with the deal closing on February 16, 2024.
- In November 2023, Amentum announced a merger with Jacobs' Critical Mission Solutions and Cyber & Intelligence businesses, creating a $13 billion revenue entity that will be publicly traded after completion.
- In August 2023, OHB Technology announced that it would sell a minority stake to KKR and delist as a public company in a deal valued at 768 million euros.
- L3Harris completed the acquisitions of previously announced deals for Aerojet Rocketdyne and Viasat's Technical Data Link.
- In late 2023, Jeff Bezos's Blue Origin and a private equity firm proposed to buy the rocket company United Launch Alliance (ULA). Lockheed Martin and Boeing share equal ownership of ULA, which builds one of the launch vehicles for Amazon's satellite internet network Kuiper.

Some of the biggest 2023 M&A news in PAX aviation involved failed deals.

On January 16, 2024, a federal judge blocked JetBlue's bid to acquire Spirit Airlines in response to a 2023 Justice Department antitrust suit.[4] The deal's failure follows the collapse of a JetBlue ticketing-and-revenue-sharing alliance with American Airlines, likewise blocked over antitrust concerns,[5] as well as JetBlue's losing out to Alaska Airlines in an attempt to buy Virgin America,[6] both also in 2023. JetBlue's longstanding ambitions for expansion would appear to have nowhere else to go. In March 2024, JetBlue and Spirit announced that they were abandoning the deal and their appeals of the decision. JetBlue agreed to abide by the agreement's costly stipulated breakup fee — $69 million to Spirit and $400 million to Spirit's shareholders.[7] JetBlue also cut 20 routes as part of a cost-saving campaign.[8]

Spirit's stock fell by more than half after the January decision, while JetBlue's rose,[9] buoyed further by activist investor Carl Icahn taking a nearly 10% stake in the carrier.[10] Spirit has not turned a profit since before the pandemic, has cut several routes and faces repayment of significant debt in 2025. While rumors of Chapter 11 are probably premature, we suspect that a deal less likely to arouse regulatory scrutiny could be in Spirit's future.[11]

The JetBlue-Spirit merger would have created the nation's fifth largest airline. Alaska Airlines' proposed $1.9 billion deal, announced in December, to acquire Hawaiian could also face intense scrutiny from Justice.[12] Only a few years ago a wave of PAX industry consolidation appeared unstoppable. Now the industry may have no choice but to shift away from consolidation.

Commercial aviation and aerospace

Key takeaways

- Record aircraft orders of **3,670**
- Record backlog of **>14,000** aircraft
- Revenue passenger kilometers recover to **94%** of pre-pandemic levels

Overview

Commercial aviation and aerospace performance 2023

Airbus delivered 735 aircraft in 2023, an 11% increase from 2022 but 15% below its peak production of 863 in 2019. Boeing delivered 528 aircraft, a 10% increase from 2022 but still 34% below 2018's record production of 806.

Airbus reported 2,094 net orders in 2023, compared to 820 in the prior year, a 255% increase. Boeing reported 1,576 net orders, more than double the previous year's 774. Industry backlog of $972 billion and greater than 14,000 units — exceeding the previous record of 12,888 set at the end of 2019 — is more than 11 years' worth of production at current production levels.

Airbus plans to increase 2024 deliveries by 10%, to about 800. The company plans to boost A320 family production from 48 per month in 2023 to 75 per month by 2026, about a 50% increase, and then hold steady for the foreseeable future. This will pose a challenge for the supply chain to keep pace. The FAA has suspended Boeing's production ramp-up plans, pending a production quality assessment (see below). As a result, production can't keep pace with demand and airlines will have to keep older planes flying longer into the future. This dynamic has a silver lining for aftermarket companies, as the lucrative aftermarket stream is extended.

Figure 5: Aircraft backlog (US$ billions)

	12/31/23	12/31/22	12/31/21	12/31/20
Boeing	$441	$330	$297	$282
Airbus*	$531	$410	$345	$325

Source: The Boeing Co. 2023 annual report; Airbus Group 2023 annual report

Figure 6: Aircraft backlog (units)

	Boeing	Airbus	Total
Net orders	1,576	2,094	3,670
Deliveries	528	735	1,263
Backlog as of Dec. 31, 2023	5,600+	8,528	14,000+

RPKs recover to 94%

For 2023, the International Air Transport Association (IATA) reported total RPKs at 94% of pre-pandemic levels, while domestic routes had exceeded pre-pandemic levels. Total RPKs for 2024 are expected to exceed pre-pandemic levels.[13]

The cargo market contracted slightly for the year but added significant capacity, pushing load factor down to 44%.[14] Overcapacity (from expansion during the pandemic supply-chain crisis), falling freight rates and restored competition from PAX bellyhold have converged to create stiff headwinds for the air cargo industry in the short term, but the sector's long-term prospects remain bright. Neither Boeing nor Airbus has reduced its 20-year forecasts for freighter production and conversion.[15]

Figure 7: Key commercial aerospace metrics (year-over-year % change)

	2023	2022	2021	2020
RPKs	–6%*	–31%*	–58%*	–66%*
Load factor	82.3%	65.1%	74.3%	64.8%
Cargo ton-kilometers	–2.2%	-8.2%	18.7%	–10.6%
Load	44%	53.8%	54.5%	43.4%

*Compared to 2019

Source: IATA

Passenger aviation: Notable developments and outlook

The IATA forecasts a 9.8% improvement in revenue passenger kilometers for 2024, which would exceed pre-pandemic levels by about 4%. January 2024 got off to a great start, with 16.6% growth in RPKs. Airbus is forecasting 800 aircraft deliveries in 2024, a 10% increase. Boeing has suspended financial guidance while it focuses on safety. Given the regulatory restrictions on Boeing's production ramp, we would expect Boeing deliveries in 2024 to be about the same as the 528 delivered in 2023. Accordingly, we forecast that 2024 will be a year of modest growth for OEM products — in the mid-single digits. The more profitable aftermarket segment, however, should grow proportionately to RPKs — about 10% — and commercial aviation overall should therefore report revenue growth in the high single digits, with operating profit reaching double digit growth based on the mix of OEM to aftermarket.

In the long term, the outlook for global commercial aviation remains bullish. The current projections are for 4% CAGR, or 60% above forecast GDP growth. Over the next several decades, the industry will be focused on innovation and developing new products that contribute to net zero carbon-emissions goals. The forecast demand over the next two decades supports an estimated 43,000 new aircraft deliveries and a services market value greater than $9 trillion.

US air traffic control may be in crisis. Evidence suggests that the US air traffic control system is being pushed to the brink of failure, a danger driven mainly by persistent overwork of the controller workforce. Fully 99% of US air traffic control sites are understaffed today according to FAA targets. Facilities and equipment are also dangerously antiquated, if not obsolete.[16] Meanwhile, as of April 2024, legislation to reauthorize and fund the FAA through 2028 remained stalled in the Senate.[17] Still, although close calls in commercial US aviation occur much more often than passengers realize, the US PAX industry has not counted a single death from a crash in 15 years.[18] The problem is not confined to the United States. The key prediction to emerge from the 2023 US Chamber of Commerce Global Aerospace Summit was that we should expect at least five more years of air travel disruptions worldwide owing to an industry-wide shortage of air traffic controllers.[19]

Boeing confronts safety challenges. On January 5, 2024, a door-plug panel blew off midair.[20] The consequences continue to unfold. Boeing's stock price took an early hit[21] and has fluctuated since.[22] United and Boeing both discovered manufacturing issues in the 737-9 Max.[23] An FAA audit found problems at Boeing production facilities.[24] However, evidence emerged that the Alaska Airlines maintenance system might have been implicated in the accident as well.[25] A Boeing whistleblower employee accused the FAA of inadequate oversight regarding the manufacturer,[26] while the FAA released a report in February identifying problems in Boeing's safety systems.[27] Other employees attributed these issues to pressure to speed production and an unanticipated loss of workforce knowledge and experience stemming from the company's job cuts in response to the pandemic.[28] The NTSB expressed concern about the progress of its inquiry.[29] The Justice Department announced a criminal investigation into the Alaska Airlines incident,[30] which expanded with subpoenas and a grand jury in March.[31] Congressional hearings were also announced.[32] The FBI notified passengers on the Alaska Airlines flight that they had been identified as possible victims of a crime.[33] Boeing announced an extensive change in leadership across the firm in March (with possibly more to come).[34] Ultimately, Boeing, the US government and the industry as a whole share profound interests in successful resolution of the situation.

While the 737 Max aircraft returned to the skies within weeks, the FAA temporarily forbade expanded 737 Max production and implemented enhanced oversight measures,[35] including a requirement that airlines should inspect the door plugs on Boeing 737-900ER planes as well.[36] CEOs of European and US airlines (most notably United[37]) have publicly expressed concern regarding Boeing's quality control.

The 737 Max production slowdown is already causing an aircraft shortage for US carriers, many of which have substantial commitments to multiple models of the aircraft. In April, United asked its pilots to take unpaid leave, possibly through the summer, citing delayed Boeing deliveries as the reason.[38] Some airlines are seeking replacements for Boeing planes they had planned to purchase. United approached Airbus about a possible order for A321neo aircraft to replace undelivered Max 9s and Max 10s.[39] Ryanair, by contrast, offered to buy any Max 10s dropped by US airlines, expressing confidence in the aircraft.[40]

Boeing also received important good news: Its Chinese market is reopening. Thawing US-China trade relations have made Boeing confident that the Chinese government will permit deliveries of hundreds of jets that it has been blocking for several years, and perhaps before the end of 2024.[41] Boeing has delivered a 737 Max to a Chinese airline for the first time in five years.[42] China remains a critically essential market for Boeing's growth ambitions.

Comac's C919 made its first revenue flight: China Eastern Airlines operated the C919 from Shanghai to Beijing in May 2023,[43] and the C919 made its international debut at the Singapore Air Show in February 2024.[44]

Surpassing China, India now leads the world in commercial aircraft purchases in 2023. India's largest airlines ordered nearly a thousand jets last year, including 250 from Airbus and 220 from Boeing. The main demand driver is middle-class travel, and the main purchasers are India's own homegrown airlines. Airports are being expanded or built from scratch all over the country. The Indian travel boom has already seen tens of billions of dollars committed, with no end in sight.[45] Whatever challenges such companies as Boeing and Airbus face right now, their probable future can be summed up in one word — growth.

The DoT moves to protect passengers. The rise of online flight search engines prompted airlines to prioritize lowering ticket prices while cutting costs everywhere else. The result has been drastic reductions in convenience and comfort for budget fare buyers.[46] In December 2023, the DoT announced a $140 million civil penalty against Southwest Airlines for violations of consumer protection laws related to its cancellation of 16,900 flights that stranded some 2 million passengers over the 2022 Christmas travel season — by far the largest such fine ever assessed.[47] The Biden administration also announced a plan to require airlines to compensate passengers for delayed or canceled flights, but the DoT has yet to promulgate the new rule.[48]

Flights today are more susceptible to multiple types of turbulence. The warming climate is impacting turbulence rates in every one of the planet's four main jet streams. Incidents of passenger injury caused by turbulence are on the rise, and turbulence is likely to increase in coming decades.[49] However, multiple advances in "weather tech" are converging to help mitigate the risks.[50] We think this may be a promising area for innovation and investment in the near term.

New concepts in airplane seating continue to emerge. The goal is to enhance passenger safety, comfort and/or luxury. All the major US airlines are currently expanding their premium seating — by 25 to 75% — confident in sustained demand for high-end leisure travel.[51] Some new ideas, like allowing economy passengers to lie down if they purchase an entire three-seat row for long-haul flights, are available now.[52] Air New Zealand will even add economy bunkbeds in some 787s in September 2024.[53] Qantas will offer the industry's first economy-class communal lounges on ultra-long-haul flights beginning in 2025.[54] Lufthansa is developing arrays of 14 different seating options for its 787-9 Dreamliners and Airbus 350s to debut in 2024, creating the most diversely configured jets now flying.[55] Other ideas, like an imaginative way to eliminate all middle seats, for now remain conjectural.[56] New efforts to improve the economy passenger experience could soon emerge as a key differentiator among carriers in both the US domestic and international PAX markets.

Space: Notable developments and outlook

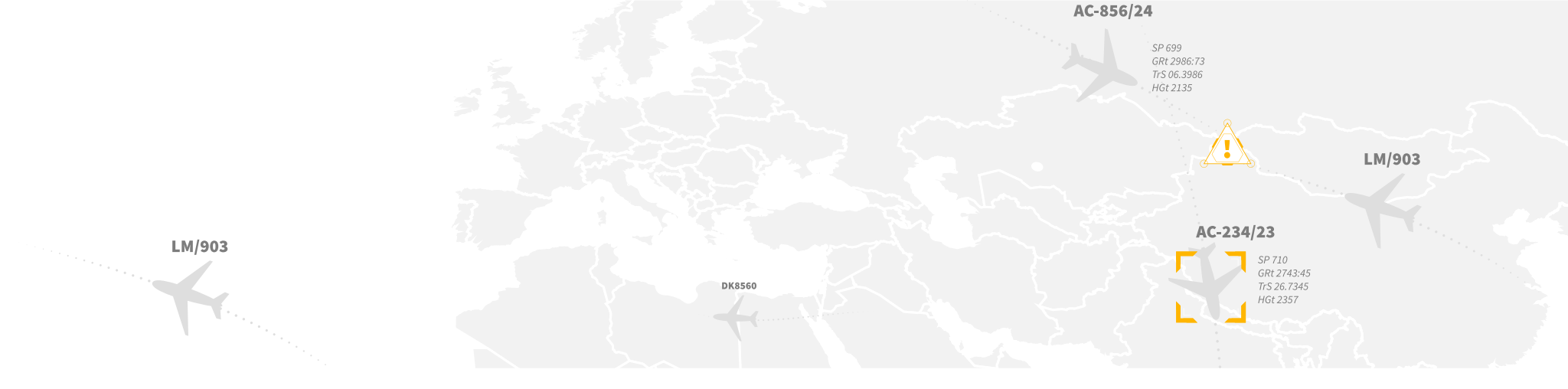
The most concerning news in the space sector was the revelation in February 2024 that US intelligence experts fear Russia is planning imminent deployment of an antisatellite nuclear weapon in space. Such a move would violate both the 1967 Outer Space Treaty and the 1968 Limited Nuclear Test Ban Treaty, which are among the last significant arms control treaties remaining in effect.[57] The detonation of a nuclear weapon in space could devastate global communications systems and could instantly crash the global economy.

2023 set a record for orbital launches. Global launches reached 223 (211 successful). SpaceX conducted 98 launches (44%). The US was the leader with 116 launches, up from 78 in 2022, with China second with 67 launches.

2023 also witnessed the advent of space warfare. In November 2023, a medium-range ballistic missile fired by Houthi forces from Yemen was intercepted by an Israeli Arrow-3 antiballistic missile more than 100 miles above the Earth's surface. Since the Houthi warhead was in space when it was blown up, this event marks the first instance of space warfare in our planet's history.

Top commercial space companies made key advances in 2023-24. One top takeaway: The pace of integration of commercial and government-led space ventures is rapidly increasing. We've seen a number of important developments as well:

- Virgin Galactic racked up its first successful space tourism launch in August 2023. This has been a long time coming: One of the passengers had bought her ticket 18 years ago. While tourism remains a small slice of the commercial space industry pie, it continues to play a key role in driving technical innovation.[58] Blue Origin's New Shepard suborbital rocket finally notched a successful flight in late 2023,[59] and the company's enormous New Glenn rocket looks to be on track for a late 2024 debut launch.[60]
- On February 22, 2024, a SpaceX Falcon 9 rocket carrying Intuitive Machines' Nova-C Odysseus lunar lander, primarily loaded with NASA cargo, became the first American spacecraft to land on the moon since Apollo 17 in 1972 and the first private company ever to succeed in such a mission — at a much lower cost than NASA's efforts. This milestone likely heralds further NASA moon missions in collaboration with commercial partners as part of NASA's Commercial Lunar Payload Services program, or CLPS.[61] While NASA hopes to land astronauts on the moon in December 2025, the agency appears likely to miss that target, according to the Government Accountability Office, owing to delays in developing the mission's lunar lander (based on SpaceX's Starship and spacesuits).[62] NASA's Peregrine 1 failed to complete its lunar landing mission in January.[63]
- SpaceX passed another milestone on March 14, 2024, when its Starship, the largest and most powerful rocket ever built, reached orbital speed for the first time during a test flight. However, neither the ship nor its booster, both intended to be reusable, survived the test. The Starship is essential to NASA's planned lunar missions.[64]
- In December 2023, the Federal Communications Commission affirmed its 2022 decision to deny SpaceX satellite internet service provider Starlink $885.5 million in rural broadband subsidies. The FCC reiterated that Starlink had failed to meet program requirements and to demonstrate that it could.[65] Nonetheless, SpaceX announced in late 2023 that its Starlink satellite business had achieved breakeven cash flow.[66]



Green aviation and aerospace: Notable developments and outlook

The aerospace industry made advances toward sustainable aircraft and fuels last year. One of the most important developments is a Department of Defense (DoD) award of a $235 million contract to the aerospace startup JetZero and Northrop Grumman to devise a working prototype of a blended-wing-body jet called the Z-5, expected to fly by 2027. The design promises a 50% cut in fuel use vis-à-vis comparable models. JetZero intends to develop passenger, cargo and fuel tankers versions by 2030. The FAA cleared test flights of a prototype model in March 2024.[67]

Two alternative fuels pass important tests. The successful test flight of L.A.-based startup Universal Hydrogen's hydrogen-powered regional jet was also hailed as a hopeful sign for sustainable civil aviation.[68] China launched a methane-fueled rocket into orbit, a first in global spaceflight,[69] and an encouraging sign for methane-based commercial flight too.

The long-awaited era of the electric flying taxi may be upon us. United ordered $1 billion worth of Archer Aviation's Midnight electric vertical take-off and landing (eVTOL), which are designed for short-haul missions between city centers and airports. That's on track to debut in 2025.[70] The FAA is working to ease the way for this new industry in regulatory terms, and Archer has plenty of potential competitors.[71]

Airports join the effort to reduce carbon emissions. Amsterdam's Schiphol Airport announced that it would reduce international flights by 8% by the end of 2023 and by another 4% by the end of 2024. While many European countries have restricted regional/short-haul flights for environmental reasons, this is the first such measure targeting international aviation. Several airlines, including Delta, announced plans to sue in response.[72] The decision was put on hold in November as the plan made its way through the Dutch court system. A final decision from the Dutch supreme court is expected in 2024-Q2.[73] If other major airports follow suit, international PAX route planning could confront a whole new kind of complication.

Government-led space agencies also notched wins for sustainability. NASA released a report in 2023 showing the impressive success of its Global Ecosystem Dynamics Investigation (GEDI) initiative, launched in 2018. GEDI, which deployed a space-based sensor capable of precise 3D measurements of ground-level vegetation, reveals more accurately than ever before how much planet-warming carbon protected ecosystems are storing globally. The fight to bend the curve on climate warming may depend on such data.[74] China claimed that its Tiangong space station had achieved 100% oxygen regeneration and 95% water recycling, a major advance in environmental control and life-support technologies that has attracted wide attention.[75]

Defense

Key takeaways

- US margins slump, European margins improve
- Demand surges, with high-single-digit revenue growth
- Prime contractors confront a record backlog of **$747 billion**, up 11%

Overview

Defense performance 2023

Overall revenue for the top 11 defense companies was higher by 7% year over year in 2023. The top six US defense companies reported an aggregate 6% increase, while European defense companies reported revenue increases of 8%. L3Harris and Rolls-Royce reported double digit defense-related revenue increases of 13.8% and 12.4% respectively. The European revenue performance is consistent with increasing defense budgets across the continent, partly attributable to the war in Ukraine.[76] Given the strong demand, revenues might have been even higher but for continuing production constraints associated with supply chain disruptions and labor challenges.

Operating profit for the largest 11 defense companies was higher by 10% but heavily weighted toward European companies, which reported a 22% jump. The top five US defense companies all reported operating margin declines or, in the case of Boeing, an overall loss. Only L3Harris reported an operating margin improvement, although on an adjusted basis, after nonrecurring charges, this indicator was also down.

Boeing's overall loss of $1.8 billion relates primarily to performance challenges on multiple fixed-price development programs, including VC-25B, KC-46A, MQ-25, T-7A Red Hawk and Commercial Crew. Northrop Grumman incurred a $1.2-billion charge related to the B-21 program. And all companies continue to experience challenges associated with inflation, supply chain performance and labor-force issues, including the need for upskilling and high turnover.

Rolls-Royce's defense business reclaimed the best operating margin of 13.8%. Lockheed Martin and BAE Systems also reported double-digit operating margins. US operating margin decreased 10 bps, to 7.8%. European operating margin improved 110 bp, to 9.5%.

Figure 8: Backlog of defense orders (US$ billions)

	Dec. 31 2023	Dec. 31 2022
Lockheed Martin	$161	$150
Northrop Grumman	$84	$79
General Dynamics (excl. Gulfstream)	$73	$72
Raytheon	$78	$69
Boeing Defense, Space & Security	$59	$54
BAE Systems	$87	$73
Airbus Defence and Space and Helicopters	$69	$62
Leonardo	$43	$39
Thales	$49	$43
L3Harris	$33	$21
Rolls-Royce	$11	$10
TOTAL	**$747**	**$672**

Source: Company reports

Defense:

Notable developments and outlook

The Biden administration's FY25 budget request is for $895 billion for national security, of which $850 billion is for DoD. This is only about a 1% increase over the current budget and is expected to be significantly debated in Congress given enhanced security needs, including the wars in Ukraine and the Middle East[77] as well as deterrence in the Pacific. In Europe, defense budgets are rising faster because of the Russian threat. NATO expects European allied defense spending to reach a combined total of $380 billion this year, backed by 18 member states reaching the stipulated 2% of GDP spending target.[78]

Foreign military sales set a record in 2023 of $80.9 billion.[79] The Defense Security and Cooperation Agency stated that leading countries were Sweden, Poland and the Netherlands.[80]

The US Army canceled the Future Attack Reconnaissance Aircraft (FARA) as part of its evolving aviation strategy, including freeing up funding for future tactical unmanned aerial systems. At the end of 2022, **the Army awarded its Future Long-range Assault Aircraft (FLRAA) program to Bell's** V-280 Valor. The aircraft is powered by Rolls-Royce AE-1107F engines. The program is expected to replace about 2,000 Blackhawk helicopters and has an estimated value of $70 billion.

Military strategists worldwide are intently studying the war in Ukraine, which now looks like three wars layered together. The no-man's-lands and trench networks under constant artillery fire recall World War I. The tank battles and the air war waged by Russia against Ukrainian civilians and civilian infrastructure evoke World War II. And the much-reported-on drone- and satellite-based reconnaissance and targeting — together with the conflict's much-less-visible cyber battles — reveal a mode of warfare inconceivable prior to the 21st century. Many of the 50-plus member countries of the Ukraine Defense Contact Group, including the US and NATO leaders, have made clear that they're already altering their modernization plans as a result. Among changes revealed in American planning are a thorough upgrade of the M1 Abrams tank[81] and the cancellation of the Future Attack Reconnaissance Aircraft (FARA) program in favor of new UAVs.[82]

Key lessons strategists are drawing for the future of defense manufacturing:

- The critical, not-to-be-taken-for-granted importance to the world economy of trade by sea
- The asymmetric advantage of naval drones in a confined (coastal) arena, like the Black Sea —or the Taiwan Strait
- The game-changing effects of loitering munitions, including attack drones, which have emerged as defining weapons of the Ukraine war
- The effectiveness of commercial space-based satellite systems and the higher resilience of networks comprising small, cheap satellites over those that rely on fewer, more capable ones
- The rapid evolution of electronic warfare and the critical importance of counter-drone technologies[83]

Aerial drone warfare innovations continue to make news. Russia has reduced the advantage Ukraine achieved in drone tactics early in the war through electronic warfare systems.[84] The recent emergence in the war of

tiny Ukrainian drones mounted with extremely lethal anti-infantry directional airburst warheads is sure to be closely studied.[85] Likewise, consider Ukraine's development of armed drones with a range of a thousand kilometers or more[86] and its successful deployment of cheap, ultralightweight Australian cardboard drones.[87]

Ukraine's seaborne drones have achieved impressive results too. Ukraine has adopted an innovative approach to asymmetric warfare, relying on several kinds of missiles and, notably, on homegrown maritime drones. This development has significant global implications, particularly for future defense planning regarding Taiwan, and is being studied worldwide.[88] In addition to protecting its southern coastal cities, Ukraine's success at sea has thwarted Russia's economic blockade and, most importantly, Ukraine is now on track to substantially outperform all prior estimates for its Black Sea exports of grain and other agricultural commodities for 2023-24.[89]

Ukraine's arms industry has achieved considerable resilience, dispersing production across the country and even abroad to protect factories from Russian attack and ramping up production especially of ammunition and drones.[90] While the war's outcome remains unpredictable, Ukraine could eventually emerge with a robust arms productions industry supported by direct investment and joint ventures with non-Ukrainian companies. In these terms, the German defense leader Rheinmetall's development agreement with Ukraine's Ukroboronprom, announced in early 2024, could prove prescient.[91] Several French firms and the UK's BAE Systems are poised to jump in too, though no major US manufacturers have plans yet to open production lines in Ukraine.[92]

Meanwhile Russia, the world's second-largest weapons exporter for 30 years, is seeing its arms exports nosedive — with long-term consequences for its customers and competitors worldwide.[93] However, recent data shows that, despite comprehensive sanctions, millions of dollars' worth of aircraft parts are being imported illegally to Russia, including many built by major suppliers such as Boeing and Airbus.[94] A key question going forward for manufacturers and MRO facilities — the two ultimate sources of this illegal trade — is to what extent trade compliance enforcement entities may hold them responsible for such violations.

US weapons procurement is heading into a new era of AI-driven change. With the US Airforce struggling with the smallest and oldest fleet since it became an independent service in 1947, the Pentagon is thinking well outside the familiar fighter-bomber box. Boeing, Lockheed Martin, Northrop Grumman, General Atomics and Anduril Industries are currently bidding on a $6 billion contract to produce 1,000 new expendable, low-cost AI-piloted fighter jets, named Collaborative Combat Aircraft (CCA), within five years. The plan calls for UAVs that can fly just 30 feet above the ground at 600 mph, execute maneuvers too dangerous for pilots to undertake and cover vast distances over the western Pacific. Marking a major increase in scale over the small drones that have had such an impact in the Ukrainian theater, the CCA program is likely a harbinger of UAVs to come. Of the five companies, the Pentagon will choose two by summer 2024.[95]

CCA is just one component of the ambitious Replicator initiative, an accelerating effort to revolutionize American warfare through thousands of autonomous, AI/ML-assisted systems. The Air Force is also accelerating its efforts to develop AI-based “robot wingmen” for its pilots.[96] The concept is to augment, not to phase out, legacy aircraft, ships, artillery and other vehicles. The boost for defense manufacturing within the next two years alone could be enormous, and small, nimble, innovative new defense tech companies may find themselves highly competitive.[97]

The most significant result of the Pentagon’s program to integrate AI widely is unlikely to be any specific new weapons system but rather a shakeup of the traditionally slow, risk-averse and sometimes inefficient weapons procurement system. Major defense contractors may find themselves competing with new software companies in a market where speed and creativity command a higher premium than ever before.[98]

Other developments in US weapons programs with important implications for the future include:

- The DoD awarding a $215 million contract to Aerojet Rocketdyne to upgrade and increase production of FGM-148 Javelin MANPADS, FIM-92 Stinger MANPADS and guided missiles for multiple launch rocket systems. The contract falls under the Additional Ukraine Supplemental Appropriations Act provisions for arms and ammunition stockpile replenishment.[99]
- Data analytics software company Palantir Technologies' March announcement that it had won a $178 million US Army contract as part of the TITAN (Tactical Intelligence Targeting Access Node) AI-defined battlefield system. TITAN will merge data from both space and terrestrial sensors to support long-range precision targeting and other tactical planning. The system will integrate technological contributions from several other contractors, including Northrop Grumman and L3Harris.[100]
- In March 2024, the US Air Force's successful hypersonic weapon test of the Air-launched Rapid Response Weapon (ARRW) system over the Pacific.[101] This weapons category appears likely to receive sustained attention from the Pentagon in its effort to keep pace with Russia and China.

The defense sector is stable, and companies are generally forecasting moderate growth for 2024. We expect to see mid-single-digit revenue growth. Margin pressures should subside as inflation, supply chain performance and workforce stability improve. Accordingly, we expect operating margins to improve and move back toward historical benchmarks.

The global security environment continues to be dynamic, with tensions rising among the West and Russia, China, Iran and North Korea. The coming year is likely to usher in additional repercussions on defense policies, given the continuing crises around the world.

In closing

The performance of the top 100 A&D companies is a barometer for the health of the industry. 2023 was a milestone year, marking a full recovery from the pandemic in terms of revenue. However, industry profit continues to be impacted by the lingering effects related to inflation, supply chain disruption and worker transition.

Commercial aviation has become a critical part of our global infrastructure. The demand for commercial aircraft has been outpacing production capacity for two decades and the gap is widening, resulting in a backlog equal to 11 years of current production. Production is challenged by the most complex supply chain of any industry, requiring high engineering, technology and skilled workforce. Capacity is further constrained by critical safety requirements, and the industry must diligently restore the trust and confidence that has been recently tarnished. The long-term forecast for commercial aerospace is extremely positive. Just consider, for example, that more than 80% of the global population has yet to set foot in an airplane.[102] With a global middle class projected to grow to 60% by 2030, that's an enormous untapped segment of new customers. The industry is expected to grow about 60% above GDP for the long term.[103]

The defense industry is critical for preserving security, and the current global situation gives new urgency to defense prioritization. Conflict no longer seems theoretical but imminent, resulting in increased defense spending, innovation and modernization.

As for space, the sector is in high-growth mode, potentially providing $1 trillion of growth over the next decade. It's an exciting time for A&D — long considered a mature industry — as the space sector provides an emerging industry full of innovation, startups and M&A for the foreseeable future.

Accordingly, the health of the A&D industry is quite strong, as is the forecast in both the near and long term. Profitability, however, remains challenged by the current dynamics and has, historically, been considerably lower than broader industrial measures such as the S&P 500. It will be important for the industry to continue its pursuit of safety and operating performance to ensure returns that are commensurate with the critical requirements for innovation, a talented workforce, safety and scalability to support the global economy.

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Appendices

Methodology

Our data are drawn from financial reports on FY2023 results for the largest 100 A&D companies by revenue (see below) and other publicly available information, such as company websites and press releases. Our cutoff date for publication was April 1, 2024.

A&D companies include those that generate most of their revenue from aerospace or defense activities or, for diversified companies, those reportable segments that derive most of their revenue from A&D activities. The results are reported in US dollars. Foreign currencies were translated for the top 100 list at average exchange rates for years ended December 31, 2023, and December 31, 2022.

Our report also expresses PwC's point of view on topics affecting the industry, developed through interactions with our clients and other industry leaders and analysts.

A&D top 100 companies (ranked by 2023 revenue)

		Revenue (US$ millions)			Operating profit (US$ millions)		
Rank	Company	2023	2022	change	2023	2022	change
1	Boeing	77,794	66,608	16.8%	(773)	(3,519)	78.0%
2	Airbus	70,829	61,791	14.6%	4,982	5,599	-11.0%
3	RTX	68,920	67,074	2.8%	3,561	5,504	-35.3%
4	Lockheed Martin	67,571	65,984	2.4%	8,507	8,348	1.9%
5	General Dynamics	42,272	39,407	7.3%	4,245	4,211	0.8%
6	Northrop Grumman	39,290	36,602	7.3%	2,760	4,253	-35.1%
7	GE Aerospace	31,770	26,050	22.0%	6,115	4,775	28.1%
8	BAE Systems	28,704	26,212	9.5%	3,200	2,940	8.9%
9	Safran	25,596	20,529	24.7%	3,028	2,148	41.0%
10	Rolls Royce	20,505	16,671	23.0%	2,418	1,032	134.3%
11	Thales	19,944	18,474	8.0%	2,307	2,035	13.4%
12	L3Harris	19,419	17,062	13.8%	1,426	1,127	26.5%
13	Leonardo	16,558	15,471	7.0%	1,396	1,011	38.2%
14	Leidos	15,438	14,396	7.2%	621	1,088	-42.9%
15	Honeywell Aerospace	13,624	11,827	15.2%	3,741	3,228	15.9%
16	Huntington Ingalls	11,454	10,676	7.3%	781	565	38.2%
17	Textron	9,787	9,352	4.7%	1,053	1,027	2.5%
18	Booz Allen Hamilton	9,268	8,364	10.8%	447	685	-34.7%
19	Bombardier	8,046	6,913	16.4%	793	538	47.4%
20	SAIC	7,704	7,394	4.2%	501	462	8.4%
21	Singapore Technologies	7,521	6,552	14.8%	681	533	27.8%
22	Hanwha Aerospace	7,166	5,062	41.6%	537	290	85.1%
23	CACI	6,703	6,203	8.1%	568	496	14.5%
24	Howmet Aerospace	6,640	5,663	17.3%	1,203	919	30.9%
25	TransDigm Group	6,585	5,429	21.3%	2,923	2,215	32.0%
26	Rheinmetall Defence	6,150	5,050	21.8%	949	717	32.3%
27	Serco	6,062	5,591	8.4%	310	268	15.7%
28	Spirit AeroSystems	6,048	5,030	20.2%	(151)	(281)	46.3%
29	Elbit Systems	5,975	5,512	8.4%	369	367	0.5%
30	MTU Aero Engines	5,804	5,605	3.6%	(174)	534	-132.6%
31	AVIC Aircraft Company	5,768	5,596	3.1%	144	76	88.5%
32	Babcock International Group	5,521	5,058	9.1%	57	280	-79.8%
33	KBR Government Solutions	5,353	5,320	0.6%	285	441	-35.4%
34	Israel Aerospace Industries	5,327	4,973	7.1%	376	316	19.0%
35	Embraer	5,269	4,540	16.1%	350	142	146.5%
36	Dassault Aviation	5,200	7,308	-28.8%	378	621	-39.2%
37	Maximus	4,905	4,631	5.9%	295	326	-9.5%

A&D top 100 companies (ranked by 2023 revenue)

		Revenue (US$ millions)			Operating profit (US$ millions)		
Rank	Company	2023	2022	change	2023	2022	change
38	Saab	4,863	4,150	17.2%	403	323	24.4%
39	Mitsubishi Aircraft, Defense and Space	4,712	4,604	2.4%	304	152	99.9%
40	Jacobs Critical Mission Solutions	4,693	4,377	7.2%	378	356	6.2%
41	Parker Hannifin Aerospace	4,360	2,520	73.0%	562	501	12.2%
42	Melrose / GKN Aerospace	4,167	3,646	14.3%	522	229	127.8%
43	V2X (Vectrus)	3,963	2,891	37.1%	124	56	121.4%
44	Trimble	3,799	3,676	3.3%	449	511	-12.1%
45	Eaton Aerospace	3,413	3,039	12.3%	780	705	10.6%
46	MOOG	3,319	3,036	9.3%	280	240	16.7%
47	Hindustan Aeronautics Limited (HAL)	3,197	3,104	3.0%	683	650	5.1%
48	CAE Aviation Defense and Security	3,113	2,475	25.8%	351	215	63.1%
49	Aselsan	3,089	4,035	-23.4%	1,048	1,084	-3.3%
50	Parsons Federal Solutions	3,021	2,213	36.5%	290	199	45.7%
51	Heico Corporation	2,968	2,208	34.4%	625	497	25.8%
52	Korea Aerospace Industries	2,922	2,157	35.5%	190	110	73.1%
53	Curtiss-Wright	2,845	2,557	11.3%	485	423	14.7%
54	Leonardo DRS	2,826	2,693	4.9%	231	561	-58.8%
55	IHI Aero Engines and Space Operations	2,770	2,017	37.3%	275	(71)	488.2%
56	Kawasaki Aerospace Systems	2,653	2,346	13.1%	113	(74)	252.5%
57	ViaSat	2,556	2,417	5.8%	(155)	(113)	-37.2%
58	BWXT	2,496	2,233	11.8%	383	349	9.7%
59	Swire Pacific / HAECO	2,272	1,766	28.7%	6	24	-75.7%
60	SES	2,197	2,044	7.5%	(742)	147	-604.3%
61	Bharat Electronics	2,137	1,948	9.7%	483	402	20.1%
62	ATI High Performance Materials & Components	2,120	1,641	29.2%	431	303	42.2%
63	Oshkosh Defense	2,098	2,141	-2.0%	92	46	100.0%
64	AAR	1,991	1,820	9.4%	134	107	25.2%
65	Ball Aerospace	1,967	1,977	-0.5%	219	170	28.8%
66	Qinetiq	1,966	1,628	20.8%	215	153	40.7%
67	Constellium Aerospace & Transport	1,870	1,788	4.6%	351	228	53.7%
68	Hexcel	1,789	1,578	13.4%	215	175	22.9%

A&D top 100 companies (ranked by 2023 revenue)

		Revenue (US$ millions)			Operating profit (US$ millions)		
Rank	Company	2023	2022	change	2023	2022	change
69	Woodward Aerospace	1,768	1,519	16.4%	290	231	25.5%
70	Indra Transport & Defense	1,706	1,404	21.5%	216	171	26.3%
71	Austal	1,585	1,429	10.9%	(5)	120	-104.2%
72	Axon Enterprise	1,563	1,190	31.3%	155	93	66.7%
73	Kongsberg Gruppen Defense and Aerospace	1,510	1,233	22.4%	227	200	13.8%
74	RBC Bearings	1,469	943	55.8%	293	121	142.1%
75	Triumph Group	1,379	1,460	-5.5%	238	104	128.8%
76	Palantir Government	1,222	1,072	14.0%	725	621	16.7%
77	Teledyne A&D Electronics and Engineered Systems	1,165	1,093	6.6%	245	223	9.9%
78	Exchange income Aerospace & Aviation	1,110	1,028	8.0%	307	258	18.7%
79	Kratos Defense & Security Solutions	1,037	898	15.5%	31	(3)	1133.3%
80	Smiths Detection	999	808	23.7%	68	44	54.1%
81	Mercury Systems	974	988	-1.4%	(22)	32	-168.8%
82	Larson & Toubro Hi-Tech Manufacturing	867	797	8.8%	121	128	-5.7%
83	VSE Corporation	861	669	28.7%	88	54	63.0%
84	Garmin Aviation	846	793	6.7%	226	213	6.1%
85	FACC	807	638	26.4%	19	6	227.5%
86	SIA Engineering	796	566	40.6%	(26)	(22)	-18.2%
87	Crane Aerospace & Electronics	789	667	18.3%	159	120	32.5%
88	Kaman	776	688	12.8%	49	(69)	171.0%
89	Senior Aerospace	767	683	12.3%	34	25	34.2%
90	Ducommun	757	713	6.2%	29	40	-27.5%
91	RUAG	690	990	-30.3%	31	186	-83.3%
92	Astronics	689	535	28.8%	(7)	(30)	76.7%
93	Latecoere	666	492	35.2%	(34)	(65)	47.5%
94	Magellan Aerospace Corp Aerospace & Aviation	652	588	10.9%	19	(12)	250.6%
95	Barnes Aerospace	608	429	41.7%	53	76	-30.3%
96	Subaru Aerospace	601	474	26.8%	(16)	(53)	70.3%
97	Chemring	588	546	7.7%	56	66	-14.1%
98	Aeroviroment	541	446	21.3%	(178)	(10)	-1680.0%
99	Albany Engineered Composites	477	425	12.2%	42	32	31.3%
100	Heroux Devtek	403	412	-2.2%	19	35	-44.3%

Additional resources

Aerospace and defense:
US Deals 2024 outlook

Our analysis of global merger and acquisition activity in the A&D industry provides an overview of the most recent M&A results and our expectations for future deal activity.

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2022 Aerospace manufacturing attractiveness ranking

Our analysis considers how various countries and American states compare in terms of their attractiveness as locations for all sectors of aerospace manufacturing.

Contact

To have a deeper conversation about how these trends may affect your business, contact:

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