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Global Industry SnapShot

The Global Unmanned Aerial Vehicles (UAV)

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Contents

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This Week's News

Industry News

PRNewswire – Datumate and Birds Eye Aerial Drones Form Strategic Partnership to Revolutionize Aerial Surveying - 28/06/24

Datumate, a leader in construction data analytics, is thrilled to announce its strategic partnership with Birds Eye Aerial Drones, LLC (BEAD), a pioneering force in aerial surveying led by industry veteran Scott Painter. This alliance is set to transform surveying practices for engineering and construction firms worldwide. This partnership combines Datumate's innovative analytical technology with BEAD's operational prowess, promising unmatched surveying solutions. (https://www.prnewswire.com/news-releases/datumate-and-birds-eye-aerial-drones-form-strategic-partnership-to-revolutionize-aerial-surveying-302185175.html)

The New York Times – Boeing Agrees to Buy Spirit AeroSystems - 01/07/24

Boeing [NYSE: BA] announced it has entered into a definitive agreement to acquire Spirit AeroSystems [NYSE: SPR]. The merger is an all-stock transaction at an equity value of approximately $4.7 billion, or $37.25 per share. The total transaction value is approximately $8.3 billion, including Spirit's last reported net debt. Boeing's acquisition of Spirit will include substantially all Boeing-related commercial operations, as well as additional commercial, defense and aftermarket operations. (https://www.nytimes.com/2024/07/01/business/boeing-spirit-aerosystems-acquisition.html)

OpenPR – With 9.9% CAGR, UAV (Drone) Market Growth to Surpass USD 48.5 billion - 02/07/24

The UAV (Drone) Market (OEM+ aftermarket) is estimated to grow to USD 48.5 billion by 2029, from USD 30.2 billion in 2024, at a CAGR of 9.9% from 2024 to 2029. North America is estimated to account for the largest share of the UAV (Drone) Market in 2024. Technological advancements enable UAVs to operate independently of human control, enhancing efficiency and expanding their application scope across various sectors. (https://www.openpr.com/news/3561004/with-9-9-cagr-uav-drone-market-growth-to-surpass-usd-48-5)

Company News

Safran SA – Aerospace and Defense Company Safran in Talks to Buy French AI Startup for €220 million – 24/06/24

Safran announced that it has entered into exclusive discussions to acquire 100% of Preligens, a leader in artificial intelligence (AI) for aerospace and defense, for an enterprise value of 220 million euros. This potential acquisition represents a unique opportunity for Safran to add state-of-the-art AI capabilities to its product offering and to accelerate its digital transformation roadmap. (https://www.safran-group.com/pressroom/safran-enters-exclusive-discussions-acquire-preligens-leader-artificial-intelligence-aerospace-and-2024-06-24)

AeroVironment – AeroVironment Announces Fiscal 2024 Fourth Quarter and Fiscal Year Results - 26/06/24

AeroVironment reported record revenue for Q424 (three months ended 30 April 2024), with revenue of $197.0 million, up 6% YOY, due to strong demand. For the year 2024, the company reported revenue of $716.7 million, up 33% YOY. AeroVironment reported funded backlog of $400.2 million as of 30 April 2024, as compared to $424.1 million as of 30 April 2023. For FY25, the company provided revenue guidance to be between $790 to $820 million. The company expects earnings per diluted share from continuing operations of between $2.61 and $2.92. (https://investor.avinc.com/news-releases/news-release-details/aerovironment-announces-fiscal-2024-fourth-quarter-and-fiscal)

Aurora Flight Science – Fuel Cell Powers SKIRON-XLE sUAS for Long Range Reconnaissance - 27/06/24

Aurora Flight Sciences designated SKIRON-XLE, the long-endurance variant which is expected to extend flight times to well over five hours. The SKIRON product line combines the convenience of vertical take-off and landing (VTOL) with the longer endurance of a fixed-wing design. (https://www.aurora.aero/2024/06/27/fuel-cell-powers-skiron-xle-suas-for-long-range-reconnaissance/)

1 Industry Snapshot

1.1 Introduction

Unmanned Aerial Vehicles (UAVs), Unmanned Aerial Systems (UAS) or Remotely Piloted Aircraft (RPA) — the official International Civil Aviation Organization (ICAO) term for such aircraft — are multi-rotor helicopters or planes with no human pilots that are controlled by onboard computers by the remote control of a pilot on the ground. Most commonly known as drones, they have been used since the 1900s, initially by the US military for target practice.

Military applications still dominate the global UAV market, but the achievements of UAVs in military operations have boosted demand for drones in North America, Middle East and the Asia-Pacific. UAVs are becoming a key element in the intelligence and surveillance operations of military and fast expanding in other combative areas as well.

The fast development of the UAV global market is having a big impact on a range of mainstream industries. Apart from defense, applications also include environmental management, crisis management, agriculture, policing and crowd monitoring, civil engineering, fisheries protection, disaster management, telecommunications maintenance, oil and gas exploration, mineral exploration, mine safety, geophysical surveys and mapping.

The UAV market has traditionally been narrowly focused, but it is rapidly diversifying. Given the pace at which technology and the effectiveness of aircraft are improving, and as sensor and automation technologies mature, commercial applications will rapidly grow over the next ten years.

1.2 Market Scope

The UAV sector is set to be the sector with the most dynamic growth in the aerospace industry globally in this decade. According to the Teal Group, global spending on unmanned aerial vehicle (UAV) programs is expected to more than triple over the next decade in military, commercial, and consumer markets.

In light of solid growth rates, the Teal Group forecasts global spending is expected to touch $20.3 billion by 2025. The civil UAS market is expected to grow faster than the military market over the next decade. The worldwide military UAS spending over the next decade is estimated to be US$216.5 billion. Of which, procurement spending will amount to US$162.2 billion and research spending will amount to US$72.5 billion. The US is expected to account for about 81% of the total military R&D spending and about 48% of military procurement through to 2030.

The high level of military R&D spending is forecast to be due to the bigger and higher-value systems procured by the US. The military UAS market growth will be led by unmanned combat aerial vehicles and high-altitude long endurance UAVs. The largest market segment over the next decade will be High Altitude Long Endurance UAVs, which will account for a third of the period’s sales.

The civil UAS will be the most attractive market this decade as commercial applications take off and governments adopt UAVs for new roles in border security and public safety. The worldwide civil UAS market is expected to reach US$19.8 billion by 2031, from US$7.2 billion in 2022, according to the Teal Group. Over the coming decade, the civil market will grow at a CAGR of 9.1% and will generate US$139 billion in revenues. Civil UAS promises to be the most dynamic growth sector with the commercial segment expected to lead the growth.

The worldwide commercial UAS market is projected to reach $9.5 billion by 2028. Delivery is likely to emerge as the leading sector for commercial UAS market in the US by 2030. Teal Group predicts that Teal growth opportunities will be in middle-mile (e.g., factory to warehouse) transportation, rather than in the last-mile deliveries. This is primarily due to the complexities involved in regulating the last-mile deliveries, while the regulatory framework for middle-mile transportation is already in place. Globally, Agriculture will be the largest sector by 2030 led by more affordable UAS and heavy Chinese

investments. This is also supported by UN projections which suggest the world's population to reach 9.7 billion by 2050, causing significant growth in agricultural consumption. Another key sector that will drive growth of the commercial UAS market is Industrial Inspection. Construction will be the largest portion of the Industrial Inspection market. All ten of the largest worldwide construction firms are deploying or experimenting with UAS fleets.

China has a clear leadership in the consumer UAS manufacturing and is now seeking to expand its capabilities to commercial UAS manufacturing. The aggressive growth of the UAV industry in China is attributable to the policy and regulatory support as well as significant investments from the Chinese government.

Currently, Sichuan, Hunan, Hainan and Jiangxi provinces in China are pushing forward the reform of low-altitude airspace management, giving support to the commercialization of drone application. China's civil drone market is estimated at $6.6 billion in 2022, according to Shenzhen-based research firm AskCI Consulting. The industrial drone market is also witnessing rapid growth. According to data from Shenzhen-based Qianzhan Industry Research Institute, the industrial drone sales is projected to increase from 27.3 billion yuan in 2020 to 265.8 billion yuan in 2026. Shenzhen has more than 1,500 drone companies with civilian UAV business licenses.

Data from the China UAV Industry Alliance shows that there are 1,200 companies registered within the UAV and drone market in China. Of which, only 10% have established international links, with the Asia-Pacific, Oceania and US the predominant focus. The Civil Aviation Administration of China released a plan that outlined several targets for the unmanned aerial vehicle (UAV) business in China by the years 2025, 2030, and 2035. These goals included the enhancement of rules and the expansion of airspace capacity for civilian UAVs.

As regulations governing the commercial use of drones become clearer both in China and internationally, sectors such as infrastructure, agriculture, and transportation emerge as the primary areas with significant growth potential. The expansion of drone utilization in agriculture aligns with its prioritization in Made in China 2025 vision.

Europe has fallen behind in the civil UAS market. It is now trying to catch up by enacting standardized airspace rules that will create a single market. The European Aviation Safety Agency (EASA) has established rules for small UAS across the European Union.

The European Union Aviation Safety Agency (EASA) has become the first air transport safety regulator in the world to offer technical design guidance to urban planners and eVTOL manufacturers looking to build drone taxi vertiports across Europe. Europe also adopted 'European Drone Strategy 2.0' late last year aimed for the further development of the European drone market. Further, the implementation of the 'U-space' in January 2023, a European system to manage drone traffic safely, will lay the ground for increased operations. According to the European Commission, the drone services market in Europe could be worth €14.5 billion, and create 145,000 jobs, by 2030.

The increase in defense spending by various countries to strengthen their defense forces is leading to growth in the number of military UAV systems. These UAV systems are being used for applications such as surveying, mapping, transportation, combat operations and monitoring. The US and European governments have already begun new programs using UAVs for protecting land and sea borders. Many other international agencies including the UN and other peacekeeping agencies are also deploying unmanned aerial protection systems.

According to the US Presidential budget for fiscal 2025, the US Department of Defense aims to hasten the deployment of advanced combat drones as part of a broader push to modernize the force and pursue cutting-edge technology. The US Air Force wants an additional $150 million on top of the $392 million previously appropriated for its drone wingmen effort. Autonomous aircraft are ideal for completing suicide missions and protecting pilots. The United States is not the only nation that is increasing defense spending on unmanned aerial vehicles. In 2023, Germany approved major uptick in defense spending on armed drones. German military will purchase ammunitions worth EUR152 million to arm German drones. This will be the first deployment of weaponized UAVs in German military.

UK has unveiled its Future of Flight action plan aimed at introducing electric vertical takeoff and landing (eVTOL) aircraft in the skies by 2026. This plan outlines the integration of eVTOL services, projecting a significant boost of £45 billion ($57.1 billion) to the national economy by 2030. The UK's The National Health Service has teamed up with private companies like Skyports Drone Services to prepare medical transport networks and other critical public operations.

UK's Defense Ministry announced the 'UK Defence Drone Strategy' and committed $5.7 billion towards the development of UAV technology in the country.

Ukraine has announced plans to double down on its deployment of drones in its efforts to counter Russian forces, pledging nearly $540 million of spending in 2023 for the production and procurement of UAVs.

France is investing €5 billion ($5.4 billion) in drones through 2030 as part of its military programming law. The goal is to develop a French loitering-munitions industry by the end of the decade and achieve swarm-flight capability. France has a target for the army to have 3,000 tactical drones by 2025. The French government is mainly looking to induct defense drones below 150 kg. Thales estimates the global market for drones of less than 150kg to be worth more than €2.5 billion, with growth rates of 14% per year.

Japan has announced a record $55.9 billion defense budget for fiscal 2024, which will include significant spending on armed drones. It intends to raise defense spending to 2 percent of GDP by 2027. The Japanese defense ministry aims to introduce unmanned vehicles that can be used directly in combat, rather than just for surveillance and intelligence gathering.

South Korea has announced plan to double its military drone fleet by 2026 in the face of growing threats from North Korean unmanned aerial vehicles. Korea plans to increase the funding for weapon modernization programs to 5% of the total state budget, up from the current level of 1%.

According to the Stockholm International Peace Research Institute (SIPRI), military expenditures are on the rise around the globe. The ongoing Russia-Ukraine war has led to increase in defense funding especially for drones. Over the next decade, growth in the military market will increasingly shift towards international markets as more militaries incorporate UAVs into their forces.

Major drone providers from China and Israel have increased the manufacture and export of defense drones for foreign militaries. Many counties from Saudi Arabia to Myanmar and Iraq to Ethiopia, are stockpiling Chinese combat drones and deploying them on the battlefield. Recently in August 2023, Indonesia announced plans to buy 12 Turkish military drones for $300 million.

The introduction of specially built unmanned combat air vehicles (UCAVs) also promises to drive growth over the next decade. The emergence of the commercial UAS market, growing demand from governments to better patrol borders, and continued consumer drone growth all promise to drive more than a quadrupling of the non-military market over the next decade.

With increasing UAV installations across the globe, there is rising need to defend against such systems as well. In May 2022, South Korea approved a project to install uncrewed aerial vehicle (UAV) defense systems at 45 bases across the nation to neutralize hostile drones. South Korean government will spend NT$4.3 billion (US$144.45 million) to purchase the UAV defense systems.

Market Share

The world UAV sector is highly concentrated with a small number of companies holding most of the market share compared to other industries. Our estimates show there are more than 500 companies globally, with more than 200 commercial UAV companies, while the other 300 develop UAV for the military industry. AeroVironment, BAE Systems, Elbit Systems, Finmeccanica, General Dynamics, Lockheed Martin, Navmar Applied Sciences, Northrop Grumman, Safran, Textron, Thales, Boeing, Tital Aerospace, TAI, AIA and Aviation Industry Corporation of China are among the biggest players in the UAV market.

A number of start-ups have made their mark on the market in recent years, however, and are challenging the dominance of the incumbent players. Technology companies like Intel, Qualcomm, Microsoft, Apple as well as venture capitalists have poured more millions of dollars into startup investments.

Impact of COVID-19 on the UAV Sector

The COVID-19 pandemic has impacted every industry, although not in an equal way. Some industries have felt the impact very differently to others. The effect on the UAV market especially commercial drones have been on the positive side. According to Drone Industry Insights, drone companies are on a path towards steady growth over the next many years. Global drone market size is forecast to reach US$55.8 billion by 2030, from US$30.6 billion in 2022, implying a CAGR of 7.8%. The services sector will remain the biggest segment, while the hardware segment will be the fastest growing.

As the global economies were forced to shut down and implement strict shelter-in-place restrictions, the demand for unmanned aerial systems became higher. Further, the use of drones for transporting medical supplies proved a boon for the sector. Cargo, courier and warehousing are the sectors with the fastest adoption of drones. Many drone companies including Wingcopter, Zipline and Wing have been able to deliver and scale their solutions quicker than previously expected.

In April 2024, Zipline completed its one millionth commercial drone delivery. Zipline's autonomous drones have collectively flown over 70 million miles and delivered more than 10 million products across four continents. The company noted a notable surge in demand, prompting the recent enlargement of its Platform 2 (P2) system across the United States. This upgraded system will cater to additional partners, including Panera Bread, Memorial Hermann Health System, and Jet's Pizza, across various metropolitan regions like Seattle, Houston, and Detroit.

In January 2024, German UAV manufacturer and transport company Wingcopter announced the extension and expansion of its delivery project providing groceries to small, remote villages using drones.

England's National Health Service (NHS) is among those trailing the vehicles to deliver fragile medicines to cancer patients living on the Isle of Wight. Chemotherapy drugs can have short shelf lives and thus quick delivery by drones is a boon for patients.

Walmart said that it completed 6,000 drone deliveries in 2022 from 36 US stores in seven states. These deliveries were done from drone delivery hubs operated by DroneUp, Flytrex and Zipline. Walmart has 4,700 stores located within 90% of the US population making it uniquely positioned to offer drone delivery at scale.

In October 2023, Zipline announced a new partnership with healthcare giant Cleveland Clinic involving an evolving operation that will begin with drone delivery of medication directly to patients' homes. The aerial delivery of specialized medicines and prescriptions will be among the first uses of the partnership.

US-based Walgreens in partnership with Alphabet's Wing is targeting the drone delivery market. In April 2022, Walgreens announced that it will begin flying packages by drone to residents of Texas cities in partnership with Google's drone subsidiary, Wing.

US-based Matternet is another player targeting the medical delivery market. In September 2021, it launched the world's first city-wide drone delivery network for the rapid transport of medical goods in Abu Dhabi. The company will use drones to transport urgent, high-value goods such as COVID-19 vaccines, blood, and lab samples across the Abu Dhabi's health system.

In March 2024, Aerodyne Group announced that a cross-border drone delivery services between Malaysia and Singapore is being considered. The focus will be on critical deliveries such as urgent documents, high-value electronics, medical supplies, and perishable foods.

LEK Consulting notes that drones could account for a large portion of package delivery market by 2040. In December 2023, the Texas city of Arlington announced plans to launch a trial using drones

and robotic ground vehicles to deliver packages from a local food bank to recipient homes in a bid to reduce the number of vans and emissions.

Scotland has launched world's first nation-wide medical drone delivery network with the completion of its first live trial flight near Glasgow. The ultimate goal is to create a fast, clean, and relatively inexpensive aerial transportation network to spirit medicines, lab samples, and other supplies to facilities across the nation.

According to research published in journal Patterns, drone deliveries could help reduce greenhouse emissions significantly. The paper states that greenhouse-gas emissions per parcel were 84% lower for drones than for diesel trucks. Companies such as Amazon have been testing the use of drones to deliver packages with an eye to reducing their environmental impact.

1.3 Market Trends

Start-ups Threaten Larger Incumbents

Over the past 20 years, the UAV sector has expanded and opened up to a whole new level of competition and innovation that had not been seen in the market. While large incumbents, especially the Big Three - Boeing, Lockheed Martin and Northrop Grumman - have won a big slice of the available UAV deals, new and smaller entrants are increasingly winning against the big companies for UAV contracts, thus challenging their respective market positions.

A number of smaller start-up companies have burst onto the scene in recent years, threatening the market positions of the larger incumbents. Non-defense companies eager to diversify and get a slice of the fast-growing market have funded some start-ups.

The funding from Drone startups have started on a strong footing in 2023 after a robust 2022. In October 2023, Japan's SkyDrive received 12.4 billion yen ($82.7 million) from the government of Japan to support the development of the startup's electric vertical takeoff and landing craft (eVTOL). In June 2023, defense and security UAV specialist group Red Cat Holdings raised $1.2 million in new funding to develop a new, portable UAV as standard issue equipment for soldiers. In April 2023, San Francisco-based Zipline raised $330 million at about $4.2 billion, a 55% increase from its $2.7 billion valuation reached two years ago. The funding will help the company to carry out its expansion activities. In March 2023, French advanced air mobility (AAM) startup Ascendance Flight Technology says it is aggressively pushing to finalize the prototype of its ATEA hybrid vertical takeoff and landing (VTOL) plane and has raised new investment of €21 million ($22.6 million). In February 2023, US-based drone manufacturer, Skydio raised $230 million in Series E funding at a valuation of $2.2 billion. The funding will be used to set up a new manufacturing facility in America. In January 2023, Japan-based Terra Drone raised $14 million from oil giant Saudi Aramco. The company says it will utilize the funding to set up a new subsidiary for inspection services in Saudi Arabia.

In November 2022, India-based drone delivery platform Skye Air Mobility raised $1.7 million. Skye Air Mobility is currently operating in eight cities across India and plans to expand to 16 cities in the next 24 months. In October 2022, Australian drone logistics service provider Swoop Aero landed a new investment round for its first and last mile airborne delivery network, bringing its total backing to $26 million to date. Swoop Aero plans to use the funds to enter new markets, scale its integrated logistics networks, and expand its manufacturing capabilities.

Regulatory Uncertainties Overshadow the Segment

UAV vehicles have evolved swiftly in recent years, particularly since making the leap from military technology to consumer gadgetry. The technology they use could be useful for myriad business opportunities. For example, UAVs are being used in many sectors, like the agriculture, construction, energy, mining and entertainment, as well as geological surveys and, utility safety and maintenance, thanks to their ability to shoot aerial photos and video, as well as collect other data cheaply.

The growth of the UAV market, however, has drawn considerable attention from regulators and legislators eager to mitigate the complexities involved in the growth of the number of aeronautical vehicles in the skies. For instance, in the US there have been delays and confusion regarding the rules set by FAA. With the courts and Congress getting involved in regulation, clarity around the regulatory landscape is yet to emerge.

The Federal Aviation Administration (FAA) issued new rules for the commercial drone industry. Under the new rules, the FAA will allow small drones to operate at night and over people and will require remote identification of the drones. The new rules went into effect on 21 April 2021. Remote ID will be required for all drones weighing 0.55 lb (0.25 kg) or more. Remote ID requires identification of drones in flight as well as the location of their control stations or takeoff point.

Further, in 2022, the FAA will require every newly produced drone weighing over 0.55 pounds to broadcast its location. In 2023, it will be illegal to fly drone without this broadcasting capability.

For fiscal FY 2022, FAA is requesting a total of over $100 million in funding for unmanned aircraft system (UAS) research, development, and integration. This includes $31.3 million for UAS implementation which incorporates FAA Drone Zone. The FAA Drone Zone is a cloud-based information technology platform that includes a UAS registration system, Part 107 authorizations and optional waivers, and UAS accident reporting.

FAA budget request also includes $24 million for UAS concept validation and requirements development, UAS flight information management, and urban air mobility.

The FAA plans to launch field tests of unmanned aircraft traffic management capabilities. The Unmanned Aircraft System Traffic Management (UTM) field test, which is set to launch in the spring 2022 and continue into 2023, is expected to lead to new policies and the development of updated industry standards for drones operating beyond visual line-of-sight (BVLOS).

The commercial potential of UAV continues to attract big investors and venture capital. For example, Amazon’s is investing in its Amazon Prime Air program to create a delivery system utilizing UAVs.

Alphabet’s drone-delivery subsidiary Wing launched a new mobile and web app, OpenSky, which is free to use and informs drone pilots about airspace restrictions, pre-plan flights, and get airspace approvals. Drone flyers can also use the app to check information on areas where they can and cannot fly.

This is just one of the many proposed uses for UAVs, however. Within the next ten years, it is expected that more than 32,000 drones will be flying for commercial operations worldwide. FAA projects that remote pilot certificates could grow almost 3x to 350,000 over the next five years.

For the US, the potential economic impact of UAVs, according to the Association of Unmanned Vehicle Systems International, could reach approximately US$13.7 billion within the next three years and create more than 100,000 employment opportunities once the FAA drafts comprehensive drone regulations.

Despite some progress by FAA on establishing rules, it remains unclear. The US Government Accountability Office (GAO) delivered a report in January 2023 stating the need for FAA to more clearly communicate a strategy to integrate drones into the airspace. GAO notes that commercial drone use is likely to expand to 858,000 in 2026 from 622,000 in 2021.

The main conclusions of the report are that FAA needs to do better in both establishing and communicating a comprehensive strategy for broader UAV use, and in defining a uniform procedure for issuing waiver.

Wing’s CEO Adam Woodwort in March 2023 reiterated the need to make drone regulations more pragmatic and predictable. He emphasized the need for drone regulations that support commercial operations. He noted that many of the current regulations make sense for passenger-carrying airplanes, but not for small aircraft with no people onboard.

In June 2023, China unveiled a list of new rules applying to drone flight by civilian users and these rules are set to come into force next year. The regulations ban people from using the devices to take

pictures or video of military or defence industrial installations or secretive facilities. Drones cannot be used to gather and publish state secrets or unlawfully transfer information outside mainland China. It also bans non-Chinese drones and pilots who are not Chinese nationals from using the vehicles for surveying land. The country currently has a million registered civilian drones that fly around 20 million hours each year, according to data from China Daily.

The Buzz from Parcel-Toting Drones

In a few decades from now, we may look back and remember a time before flying robots delivered consumer orders. At least this might be the case if delivery drones turn out the way most retailers — as well as service providers - envision them. A delivery drone, or also known as a parcelcopter, is an UAV utilized to transport goods, packages, and foodstuffs, and recently, the delivery systems have been a hot future state plans among vendors.

By 2023, Statista projects global drone delivery market to touch $1.6 billion. Asia-Pacific will be the largest market accounting for nearly 39% of the total, followed by North America (31%) and Europe (22%).

The enthusiasm for drone delivery space is visible in the funding so far in 2023. In the first half of 2023, drone delivery startups have raised nearly $1.5 billion, almost equal to the figure for the full year 2022, according to data from Crunchbase. Zipline topped the list of drone delivery related companies with a total funding of $813 million in the first half of 2023.

Drone Industry Insights noted that services such as cargo, courier, intralogistics and warehousing were the fastest-growing drone market in 2021 and are likely to continue to remain so till 2026 with a CAGR of 24.3%. This is due to the increased popularity and demand of drone deliveries for both internal (intralogistics and warehousing) as well as external services.

Drone deliveries can cut emissions and reduce congestion on roads. According to Virginia Tech University, drone delivery could save the average consumer up to 56 hours per year, reduce vehicle traffic by 294 million miles per year and displace up to 113,900 tons of CO2 per year.

China-based ecommerce platform Meituan announced that it has completed more than 100,000 drone deliveries by 2022, an increase of more than 400% year-on-year. The company expects a greater number of drone deliveries going forward.

Alphabet’s drone delivery service Wing is adding complex route management and self-loading capability for its drone delivery fleet that will make it capable of handling tens of millions of deliveries for millions of consumers by mid 2024.

Amazon is set to launch its drone delivery service in UK and Italy by the end of 2024. The expansion follows successful operations in the US, where the service has already delivered thousands of packages.

Given the large opportunity in the drone delivery market, the space is witnessing new entrants. In 2023, Japan Post announced its plans to expand and accelerate its mail drone delivery services in the country. It is now undertaking trials in populated zones in the country.

Singapore’s civil aviation authority and transport ministry has chosen a private consortium of 13 members to develop the drone program. Under this program, the aim is to use drones for tasks that include delivering parcels, inspecting buildings and providing security. The companies involved in the project have carried our various pilots. These include drone parcel delivery as well as using drones to transport blood samples and specimens between hospitals and central laboratories. Drones are being tested for delivering parts and other materials to factories as well.

China is not too far behind in this race. DHL in partnership with China-based drone company EHang has launched drone delivery service in China. JD.com and Alibaba have tested the drone delivery system as well.

Putting the parcelcopter concept into service will take some time because of the many setbacks. The major setback for this concept in the US is that there is no specific flight system where there needs to be a specific path for the drone to travel and deliver in a populated area - and this needs to be solved. Once resolved, the big benefit should be that these delivery-by-drone systems could be commonplace within the next decade. Open season on the open skies could arrive sooner than expected.

The Obsession with Armed Flying Robots

The use of a UAV as a weapon first became known in World War II. After the war, little development occurred in drone technology and most remotely piloted vehicles were used for target practice. The US military's first major spending on UAVs began after the Vietnam War, and over the past two decades, the country has become the world's pre-eminent user and supplier.

Military UAVs in the US have gone through meteoric growth over the past decade. Development has taken a quantum leap — from lab concept to battle-tested proven technology. Today, America's comparative advantage in UAVs, however, is being battered as technological know-how disseminates throughout the international system. While existing technology has started to lag, global competitors are playing catch up in research and development for drone technology.

As such, the Pentagon is expected to ramp up its investment in unmanned aerial vehicles in the coming years. The US Defense Department budget request for fiscal year 2023 mentions that unmanned weapons systems, such as drone ships, planes, and ground vehicles, will play an increasing role in future US military planning. The president's fiscal year 2023 defense budget requests new spending on unmanned/autonomous systems technology.

The Air Force request includes $187 million for enhancements to the MQ-9 Reaper combat drone and $111 million for work on the MQ-4C Triton high-altitude surveillance drone. The Navy and Marine Corps have also requested additional funding for UAVs. The Navy requested $1.2 billion for the MQ-25 Stingray drone, which is to be deployed on carriers and perform aerial refueling and surveillance functions.

No country has ramped up its UAV research in recent years faster than China, where every major company for the Chinese military has a research and development center and funding allocations dedicated to drones. In recent years, the country has pumped considerable amounts of funds and engineering brainpower into the technology, a field previously dominated by the US and Israel.

Much of the work done, however, remains secret, but the large number of drones created underlines not only the country's willpower to catch up in the sector by building comparable combat and surveillance models like the Predator and the Global Hawk but also the desire to trade the technologies globally. Its armed UAV CH-4, Wing Loong I and Wing Loong II have been rapidly gaining market share especially in developing countries such as Nigeria, Jordan, Algeria and Middle Eastern countries.

Israel, second after the US in drone technology, has flown armed UAV models but few details are available. India has also revealed its intention to develop drones that will fire missiles and fly at 30,000 feet, followed by Russia, which has revealed models of UAVs with weapons (although there is little evidence that they are currently operational).

The Lucrative UAV Micro Segment

The new generation of UAVs is being developed to improve monitoring of many kinds of systems. From tracking bush fires in Australia to observing traffic in the US, infrared cameras to track missing people at night, and laser spectroscopy used to monitor air pollutions, UAVs are using a lot of the new up-to-date miniature sensor technology.

All of this requires more focus on the integration of sensor systems in an airborne device that is severely constrained in power and weight. Changing the sensor architecture or even take the control

sensors out entirely, allowing the size of the UAV to reduce dramatically. This has created a new class of ultra-small UAV sensors.

Lockheed Martin's Lockheed Sanders MicroSTAR series of prototypes is one of the many examples of a mini-UAV. The battery-operated MicroSTAR designs resembled kid's toys. The device has winglets instead of the single vertical plane tail, and a nose mounted propeller. MicroSTAR featured a five-gram navigation system that could give directions by the ground station but could also automatically keep on a heading or orbit a target.

The US army has been using mini UAVs for mission in Afghanistan and other areas. These mini-UAVs provide near-real time video that allows soldiers to better survey their surroundings and detect enemies in combat. FLIR System's Black Hornet is one such mini-UAV which weighs less than two ounces, can be deployed in less than one minute and has a range of over a mile. It is intended to eliminate battlefield blind spots thereby saving lives.

French drone maker Parrot is also an established player in micro-UAV space. It has been selected by Swiss army to develop and supply micro-drones as part of the Swiss Mini UAV Program.

Despite the advancements, the current micro-UAV market remains constrained, largely due to regulatory frameworks on unmanned operations in airspace. But once regulatory restraints are loosened and clarified, the potential of this technology will be unlocked. Mini UAVs are set to become one of the major contributors to both the economy and technology. Market growth, however, still very much depends on the pace of UAV development in different countries, thanks to the wide range of applications and the added value related to these unmanned machines.

1.4 Applications

Defense

Defense will continue to the largest market for UAVs for the foreseeable future. UAVs can play an important role in counter terrorism and counter insurgency activities. They can be deployed in highly dangerous missions thereby saving personnel lives. The UAVs are also being used in difficult terrains for intelligence gathering and surveillance. They provide high resolution images and videos which can significantly help ground troops. Drones have been used by militaries of many countries to conduct strikes against terrorists.

Transport

UAVs are increasingly used in transport activities such as e-commerce parcel delivery, food delivery and medicine delivery. Of these, e-commerce delivery is getting the maximum attention with large companies such as Amazon already doing pilot tests.

Another promising area for UAVs is the delivery of food. It could be used in heavily populated urban areas for food delivery by restaurants and also could be used to deliver foods to difficult terrains including oil rigs and remote islands. Medical logistics is another area where UAVs can be used to transport medicines and can also be used as flying defibrillators.

Infrastructure

UAVs can assist in the management of various kinds of infrastructure, specifically construction sites. In the pre- construction phase, drones can survey the land and provide accurate field data and images. They are able to capture high-resolution videos and images, which can significantly improve the speed and quality of the design process. In the construction phase, drones can inspect the sites and provide accurate information regarding the progress of the construction.

The data received could be used by investors and property owners to monitor if the project is progressing as per original schedule or not. Abu Dhabi has launched the trial stage of implementing drones as aerial monitoring and inspection tools for the city's engineering projects and construction sites.

US state of Arizona is mulling the use drones to inspect roads, bridges and other infrastructure. The state has introduced Drone Infrastructure Inspection Grant Act, that would dispense about $200 million to purchase drones and the other half to train pilots to fly them.

The FAA's rollout of the Low Altitude Authorization and Notification Capability (LAANC) has helped standardize and expand the use of drones in construction. LAANC automates the application and approval process for airspace authorizations and is currently available near 500 airports across the country. LAANC is currently in beta and will be tested further before nationwide rollout.

An increasing number of construction firms and real estate developers in the Middle East are turning to drones amid the COVID-19 crisis. Drones are being used for progress monitoring and site mapping as companies try to speed up delivery of projects. In November 2020, New York's Department of Finance's property division said that it is looking into the use of Unmanned Aircraft Systems for tasks such as surveying tax lots, geographic information system (GIS) mapping and aerial photography.

Agriculture

One of the largest projected applications of UAVs in in agriculture. Drones can be used by farmers to monitor their crops. UAVs can survey farmland faster and at a lower cost than airplanes/satellites and also provide better data and images to farmers. The current altitude restrictions for UAVs limit the area that it can survey, but if the altitude restrictions ease a little, the area could expand and provide greater benefits to farmers.

Japan has been using UAVs for crop dusting for more than 20 years now and drones account for more than 90% of crop dusters. In the US as well, the adoption of drones in agriculture is increasing due to exemption from the Federal Aviation Administration (FAA) under the part 107 rule.

China's largest agriculture drone maker XAG is trying to automate rice farming in China with the launch of its drone-based direct seeding system called JetSeed. It could replace manual seed planting and raise efficiency amid a labor shortage due to COVID-19.

In January 2023, the United Kingdom's Civil Aviation Authority (CAA) has given operational authorization to China-based XAG's agricultural spraying aircraft P40 and V40. This is the first-time drone spraying and spreading has been legalized for use on UK farms.

Public Safety

This area again presents huge opportunities for UAVs. Drones can be used for law enforcement, search and rescue missions, firefighting and medical services. Civil governments are deploying an increasing number of unmanned systems.

The US and European governments have launched many new pilot programs to deploy UAV systems to protect borders. The United Nations and other peacekeepers are also deploying unmanned aerial systems to provide protection.

In the US, many agencies have acquired drones. Most of these agencies are police/sheriff departments followed by fire departments. In October 2022, the sheriff department of Las Vegas announced plans to deploy 400 drones as responders to rising gun violence. In Indiana and Maryland, police have successfully used drones to catch suspects and thieves. In Oakland, the fire department used drones to hot spots, which were not extinguished during a firefighting mission. The Los Angeles Fire Department has been using drones to make hot-spot identification and aerial mapping for wildfire response, as well as incident response for other search and rescue missions.

Further, drones can collect information, data and images on natural disasters such as floods, hurricanes and wildfires. UAVs have great potential for surveying storm damage and locating people after natural disasters. The US National Guard is using AI-powered drones to track wildfires in real time. The AI-backed drones can predict the area where fire is most likely to spread based on previous fires.

The US is using drones for border security as well. The drones support the border patrol team by providing enhanced intelligence, surveillance capabilities and reducing the risk to human operators on the ground.

Inspections

UAVs can be used for inspections in areas such as wind turbines, oil pipelines, power lines, railroads and more. Oil and gas companies can use a drone to conduct the required monthly inspection of their pipelines. Instead of hiring a helicopter, which is costly, companies can use drones to do the same at lower cost. Drone inspections can survey hundreds of miles of pipeline and pinpoint the location of the leaks, thereby reducing traditional surveilling costs by nearly 90%.

In November 2021, KLM Royal Dutch Airlines announced plans to use of drones for passenger aircraft inspection. The drones can inspect the aircraft for minor damage inflicted by events like hailstorms and lightning strikes.

Similarly, UAVs can inspect wind turbines, several hundred feet in the air, removing the need for an individual to physically reach the place. Netherlands-based wind energy company Vestas is using drones to conduct inspection of its 1,250 wind turbines. Archaeologists can use UAVs to inspect the sites and also patrol for looters. The city of London is using drones for surveys which are used for repairing and maintaining assets across the underground rail network.

1.5 Regulatory Environment

Drones are taking off in a big way. Once the preserve of the military, UAVs are now widely popular in the commercial sector, thanks to consumer-grade UAVs that become increasingly sophisticated and cheaper. Though regulatory obstacles could hinder growth prospects.

Currently, there are different sets of rules governing the uses of commercial UAVs around the world. In December 2020, the US FAA approved a new set of regulations governing commercial UAVs. The FAA will allow small drones to operate at night and over people and will require remote identification of the drones. This new regulation will bring a step closer to commercial drone use for agriculture, infrastructure repair, and eventually, even deliveries from companies such as Amazon.

Canada has had safety regulations in place that govern the use of UAVs. A recreational pilot operating a drone weighing less than 35kgs does not currently require either a license or a special flying permit. It, however, must follow a list of Transport Canada safety guidelines, such as staying nine kilometers from an airport, flying under 90 meters and always keeping the craft within eyesight.

Australia requires no registration of recreational drones. Recreational drone operators must comply with Civil Aviation and Safety Authority (CASA) rules that allow drones to be flown only within a visual line of sight. There are other restrictions on the maximum altitude, vicinity near airports and flying overcrowded places.

The regulations allow commercial operators to fly drones weighing less than 2kg without a license. Operators must still adhere to all the existing rules for recreational drone use such as not to fly within 5.5km of an airport, above 400 feet or within 30m of buildings, railways or vehicles, and always to have line of sight of the drone.

Drones that weigh less than 20kgs in the UK can fly in normal airspace for private use as long as the operator is not planning to use data or images from the flight acquired by flying close to people or objects. The Civil Aviation Authority (CAA) requires all UAVs to remain 150 meters from crowded events or large assemblies, 50m from an individual or building, and stay within line of sight, which is 500m horizontally and 122m vertically. Drones that weigh more than 20kgs are currently banned from flying in civilian airspace.

The European Aviation Safety Agency (EASA) has established new rules on drones. Under the rules, drone operators will have to be registered with their national authority and the drones will need to

have a direct remote identification system in place. The regulatory framework will ensure the protection of citizens' privacy rights while addressing security issues as well.

China is moving rapidly to establish regulatory framework for drones. In October 2020, the Civil Aviation Administration of China (CAAC) announced the first Unmanned Civil Aviation Experimental Zones (UCAEZs) to help accelerate the drone industry in China. The new experimental zones are designed to not only offer the airspace for testing innovative drone applications, but to ease the process of developing drone businesses.

1.6 Challenges and Opportunities

Opportunities

UAV industry presents tremendous opportunities for investors, companies as well as government. UAV technology has reached a maturity point that has placed it at the forefront of aerospace manufacturing. As UAV companies around the world make drones more accessible, the UAV sector, despite the undeveloped regulatory framework, is set to develop into one of the most dynamic growth industries this decade. There are some 450 UAV companies worldwide behind this growing multibillion-dollar industry, with the number growing.

Both the military and commercial markets are set to grow rapidly in the next few years, as the US economy continues to recover, technology continues to diffuse around the world, as designs become more streamlined and efficient and as more industries adopt existing business processes for UAV use.

The non-military, especially the commercial drone segment, is set to grow the fastest with projections of mid to high teens growth over the next the next decade. The latest developments in computer vision, machine learning, cloud and data analytics are expected to push drone deployment in the mainstream commercial sector. In the US and many other places around the world, the regulations either remain too restrictive or are yet to be given a final shape, which has been a deterrent in the pace of UAV adoption.

With the explosion of interest in building and operating unmanned aircraft systems, the use of UAV technology is set to generate more high-tech jobs, with millions in tax revenues and tens of billions in economic impact.

UAV technology is moving ever faster forward as the market continues to flourish. Industry will need to consider how to best integrate UAVs into their businesses.

Challenges

Safety, privacy and regulatory barriers remain key challenges for the rapid adoption of UAVs. The most urgent challenge for the governments is to ensure that the drone operations remain safe.

Privacy is another key concern that needs to be addressed. UAVs collect massive amounts of data including video and images, which sometimes could result in the invasion of personal privacy. A livestream or a recording of individuals or buildings can easily be captured without consent. Also, even if the data collected is with consent, the transmission of data itself remains vulnerable to hacking. The growth and evolution of the UAV industry has outpaced the development of rules and systems to govern their use. This uncertainty weighs on innovation and commercial adoption unless there is more clarity on the rules.

Illegal use of UAVs for criminal activities is another big challenge. For instance, drug cartels have used drones to transfer illegal drugs in the US. These vehicles tend to fly for short periods at very low altitudes. This makes it very difficult to detect using conventional sensor systems. Also, UASs or drones could be a source of public nuisance. If a drone flying over a public place loses control and falls, it could cause substantial damage to the property as well as endanger lives.

In conclusion, the UAVs have raised a lot of concerns and it is up to policymakers to design and create laws that facilitate the good use of the technology while discouraging its harmful use.

2. Leading Companies

2.1 Aeronautics Ltd (acquired by Rafael Advanced Defense Systems Ltd.)

Aeronautics Ltd is an Israeli company that provides comprehensive Defense Solutions and has become known as one of the major global providers of security consulting services and defense applications. The company is also famous for the manufacture and supply of land, surface, and air UAS. Aeronautics, formerly known as NETS Integrated Avionics Systems, was founded in 1997. Its headquarters are in Yavne, Israel.

The company puts much of its resources into UAS products, including twin engine medium altitude long endurance UAVs, tactical UAS, compact and lightweight systems for military and homeland security missions, mini UAV systems for field level operations, and USVs for home-land security and naval applications. The company's ISR systems deals with systems such as aerial intelligence surveillance and reconnaissance systems onboard fixed wing and rotor aircraft, ground intelligence surveillance and reconnaissance solutions for military and homeland security missions, lightweight mini aerostat systems for military, homeland security and law enforcement applications and ISR solutions based on hi-end aerostats.

The company also provides C4I systems, including ground control stations, launch and recovery stations, RPCS, personal ground control stations, remote video terminal C4I systems and provides security arrays. These include law enforcement UAVs, security, homeland security, and emergency support system project and port security array.

Key Products

Unmanned Aerial Systems (UAS)

- *Aerostar Tactical UAS* — involved in civil missions including an oil rig protection program near the shores of Angola, as well as in military leasing programs in the Middle East and in Afghanistan. It is currently having 15 customers globally.

- *Dominator MALE UAS* — a twin-engine MALE UAS based on the Diamond DA-42 aircraft that is involved in a civil UAS program in Canada and operated in cooperation by Aeronautics and CAE.

- *Orbiter 3 STUAS* — an electrically powered, field deployed UAS designed for military and homeland security missions. Managed by three people, Orbiter 3 is initiated from a vehicle mounted launcher and lands using a parachute and an airbag.

- *Orbiter Mini UAS* — a compact and lightweight electrically powered system, operated by two personnel. It is carried and set out in backpacks or from a small vehicle.

Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR)

- *Skystar Surveillance Aerostat* — a system that provides its users with an "eye in the sky" at the altitude of 300 to 500 meters above the ground level.

- *AISR* — an aerial intelligence surveillance and reconnaissance system that operates onboard fixed wing and rotary wing aircraft.

- *GISR* — a solution that incorporates advanced electro optical sensors, flexible and robust elevation systems and intuitive operator interfaces.

2.2 AeroVironment Inc (NASDAQ: AVAV)

AeroVironment is an American technology company in Monrovia, California, and Simi Valley, California. Primarily involved aerospace and tech, the company designs, develops and produces a number of unmanned aircraft systems (UAS) and efficient energy systems (EES).

The company operates through two business segments: Unmanned Aircraft Systems — focuses mainly on the design, improvement, manufacturing, support and operation of UAS and tactical missile

systems that provide situational knowledge, multi-band communications, force protection and other mission effects to the operations of the customers — and Efficient Energy Systems (EES) — works on the design, development, production, marketing, support and operation of electric energy systems.

Additionally, AeroVironment also offers electric vehicle charging systems, services, and related solutions for plug-in passenger and fleet vehicles. It also supports PosiCharge industrial electric vehicle charging systems for electric material handling vehicles and airport ground support equipment; power cycling and test systems for developers and manufacturers of electric vehicles; as well as battery packs, electric motors, and fuel cells.

It serves US Department of Defense, including the US Army, Marine Corps, Special Operations Command, and Air Force, as well as commercial, consumer, and government customers. In May 2019, AeroVironment announced a strategic partnership with Kratos Defense & Security Systems, Inc.to further bolster its UAS offerings. The two companies will collaborate to develop highly effective unmanned system solutions.

Key Products

AeroVironment is probably most well-known for developing a series of lightweight droids and solar-powered vehicles. The company is the Pentagon's main supplier of small robotic planes — including the Raven, Wasp and Puma over the last decade. As such, AeroVironment and the Pentagon signed a strategic partnership with defense giant Lockheed Martin to pursue opportunities together in unmanned aircraft development. The deal announced in February 2014 has seen the two companies working together to develop their robotic Global Observer aircraft — an aircraft of about 175 feet and is built to stay aloft for a week at a time at 65,000 feet — which will greatly expand the reach of military spy planes.

As AeroVironment walks the line between aerospace and tech, it also produces:
-*The Switchblade* — an advanced direct fire missile system with high precision capabilities, minimizing collateral damage in hostile environments.
-*UAS Solutions for Public Safety and Commercial users* —where UAS devices help protect the public, monitor wildlife, manage resources, or advance research by providing immediate situational awareness, enabling better decision-making.
-*Digital Data Link (DDL) products* — provide secure communications and interoperability between small platforms and remote terminals.
-*Kestrel Moving Target Indication (MTI) software* — automatically detects moving objects, which are normally too small for human eyes to see; viewed through electro optical full motion video; and provide real-time and forensic operation support.
-*VAMPIRE (Visualization and Mission Planning Integrated Rehearsal Environment) flight simulator software* — provides critical training capabilities that are accessible regardless of weather, airspace, or tactical limitations.
-*AeroVironment's "Mantis" suite of gyro stabilized, gimbaled sensor payloads* — available for unmanned aircraft systems, manned aircraft, ground vehicles and watercraft. These gimbaled, micro multi-sensor payloads come with a high-resolution color and an infrared thermal video sensor, as well as a laser illuminator (pointer), all integrated into a multi-axis sphere.
-*Shrike VTOL* — a man-packable, Vertical Take-Off and Landing Micro Air Vehicle (VTOL MAV) system. It is a portable, reliable and quiet unmanned aerial platform designed for front-line day/night intelligence, surveillance and reconnaissance (ISR).
-*The Ground Control System (GCS)* — provides a common command and control solution for AeroVironment's family of small UAS. Small, lightweight, and combat proven, the GCS displays real-time video from the air vehicle's payload cameras to personnel on the ground.
-*Snipe Nano*- is a latest Tactical UAV providing defenders with critical information whenever and wherever it is needed.
-*Quantix* – combined with the advantage of vertical lift-off and horizontal flight for seamless operations and maximum coverage offering a robust and reliable solution for aerial inspections, mapping and actionable insights.

Apart from the abovementioned products, the company also produces Tactical Missile Systems, EV Charging Solutions, Power Cycling and Test Systems and product support services to its customers. The company sells its commercial UAS and EES products through sales force, through retailers, resellers, industrial battery and lift-truck dealers, distributors, and representatives.

Recent Developments

On 18 June 2024, AeroVironment (AV) successfully demonstrated its JUMP® 20 uncrewed aircraft system (UAS) with a heavy fuel engine. The heavy fuel engine provides JUMP 20 with greater performance, efficient fuel consumption and longer operational lifespan.

On 28 May 2024, AeroVironment announced it will develop its Wildcat – is a Group 3 vertical take-off and landing (VTOL) uncrewed aircraft system (UAS) developed specifically to execute ship-based operations in challenging maritime environments for the DARPA's AdvaNced airCraft Infrastructure-Less Launch and RecoverY program.

On 15 April 2024, AeroVironment (AV) announced agreement with Parry Labs, a leader in Modular Open Systems Approach (MOSA), to develop uncrewed aircraft system (UAS), purpose built for the U.S. Army's Long Range Reconnaissance (LRR) program.

On 9 January 2024, AeroVironment announced the first successful multidrop from the VAPOR® 55 MX, all-electric unmanned aircraft system integrating with Shryke, developed by Corvid Technologies and L3Harris Technologies.

On 22 August 2023, AeroVironment announced acquisition of Tomahawk Robotics, a leader in AI-enabled robotic control systems, for $120 million to be paid in a mix of cash and stock. Tomahawk Robotics will become part of the small UAS (SUAS) business unit within AeroVironment's Unmanned Systems segment.

On 27 July 2023, AeroVironment announced change to the Board of Directors. Catharine Merigold has decided to resign from AeroVironment's board of directors and not stand for re-election. The Company is yet to announce replacement for her.

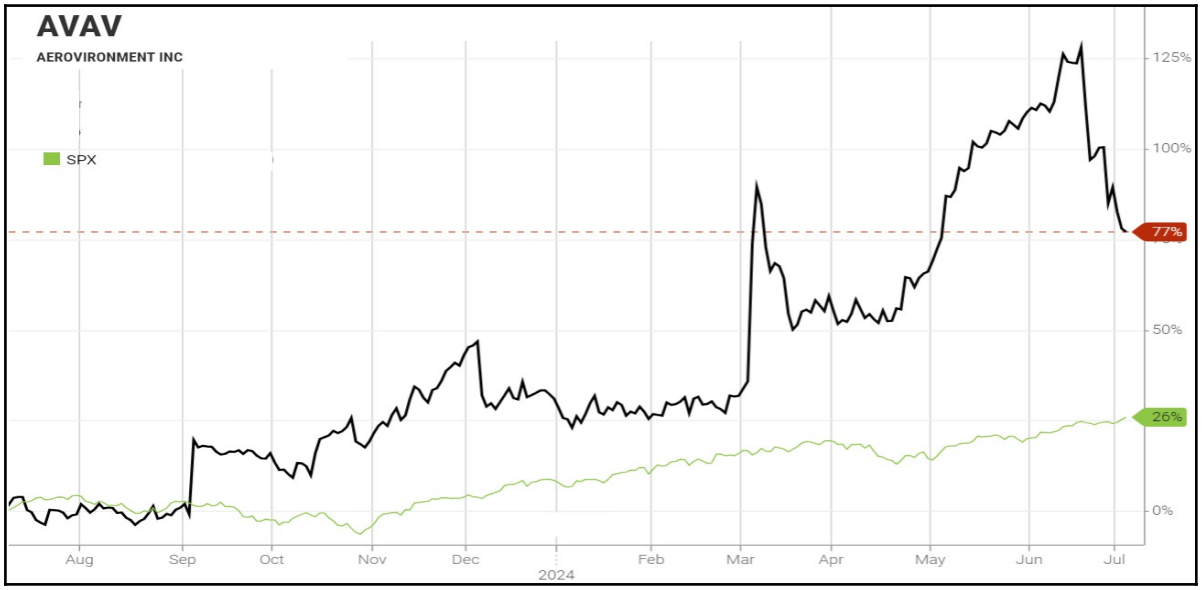
Latest Quarterly Results

The company reported record revenue for Q424 (three months ended 30 April 2024), with revenue of $197.0 million, up 6% YOY, due to strong demand. For the year 2024, the company reported revenue of $716.7 million, up 33% YOY. AeroVironment reported funded backlog of $400.2 million as of 30 April 2024, as compared to $424.1 million as of 30 April 2023. For FY25, the company provided revenue guidance to be between $790 to $820 million. The company expects earnings per diluted share from continuing operations of between $2.61 and $2.92.

Latest Key Financial Data

(In millions of US$)	Three Month Ending		Fiscal Year Ending	
	April 30, 2023	April 30, 2024	April 30, 2023	April 30, 2024
Revenue	US$186.0	US$196.9	US$540.5	US$716.7
Operating Income	(US$165.6)	US$5.9	(US$178.6)	US$71.8
Net Income	(US$160.4)	US$6.0	(US$176.2)	US$59.6
Total Assets	US$824.5	US$1,015.8	US$824.5	US$1,015.8
Total Equity	US$550.9	US$822.7	US$550.9	US$822.7

Figure 1: LTM Performance vs. SPX 500 Index



Source: Nasdaq[1]

2.3 Aurora Flight Sciences (acquired by Boeing)

Aurora Flight Sciences, a subsidiary of Boeing Inc. is a company that specializes in the design and construction and aerospace vehicles, and for most of its products, Aurora Flight Sciences does not need pilots. The company makes UAVs or drones and composite structures for aircraft with both military and scientific applications. It also provides flight operations and testing services for a variety of aircraft. Aurora's customers include aerospace contractors, like Raytheon, NASA, the US Air Force and other US government agencies. Currently, Aurora Flight Sciences, along with Georgia Institute of Technology, is developing next-generation distributed controllers for turbine engines for the Air Force Research Laboratory.

The company, founded in Alexandria, Virginia — in 1989 as a follow on to the MIT Daedalus Project — is headquartered in Manassas, Virginia with offices in West Virginia, Massachusetts, and Mississippi. It has production plants in Bridgeport, West Virginia and Columbus, Mississippi. The company also owns a research and development centre in Cambridge, Massachusetts.

Key Products

- *Small Unmanned Aircraft Systems (SUAS)* — a system tailored for use in urban or crowded environments. Aurora's SUAS are designed to be lightweight, easily portable, deliver long endurance on quiet electric power and provide autonomous operation.
- *Orion* — long-endurance UAS that are capable of providing extreme persistence for military applications, for instance ISR and communication relay.
- *Skate* — the technology merges the simplicity and endurance of a fixed wing platform with the maneuverability and mission flexibility of a VTOL asset.
- *Centraur* – is an optional piloted aircraft which can operate in three modes manned, unmanned and augmented. It is an excellent solution for operations over controlled airspace.
- *LightningStrike* – is the first aircraft in history designed to demonstrate distribution of hybrid electric propulsion ducted fans, innovation synchronous electric-drive systems, both tilt wing and canard for vertical take-off and landing and high efficiency in both hover and high-speed forward wings.
- *AACUS*- it is an autonomous aerial cargo which will help the marine on the ground to request for supply delivery0020via a helicopter.

Recent Developments

[1] https://www.nasdaq.com/market-activity/stocks/avav/advanced-charting

On 27 June 2024, Aurora Flight Science announced a new addition to its SKIRON Expeditionary small UAS product line with SKIRON-XLE. It is powered by a hydrogen fuel cell and purpose-designed for long range reconnaissance.

2.4 Aviation Industry Corporation of China (AVIC)

The Aviation Industry Corporation of China (AVIC) is a diversified state-owned aerospace and defence corporation, headquartered in Beijing, China. Originally established under Bureau of Aviation Industry in 1951, AVIC has grown over the years and today manufactures aircrafts, helicopters, avionics, and engine components, deals with aircraft leasing and manages the country's defence systems. It is also involved in non-aviation markets such as heavy machinery and construction. AVIC offers its products and services for customers in the Asia-Pacific, Europe, North America, and Africa.

Key Products

- *Electrically powered micro air vehicle (MAV)* — a hand-held Chinese UAV with T-tail and high-wing configuration. Propulsion is provided by a propeller driven by a pusher engine mounted behind the wing.

- *LIEOE* — almost identical to Northrop Grumman's RQ-4 Global Hawk, LIEOE is used for reconnaissance, surveillance, and attack missions.

- *AVIC Sky Eye* — an electrically unmanned helicopter designed to be deployed by artillery or rocket round, for reconnaissance and targeting.

- *TL-8 Sky Dragon* — used for simulating cruise missiles for Chinese military.

- *LT MAV* — micro air UAV which is powered by a two-blade propeller driven by an engine.

- *FKC-1* — unmanned blimp designed for various industrial, commercial and security applications.

- *Liu Feng 1 (LF-1)* — micro air vehicle (MAV) is a hand-held UAV.

- *Soft-Wing UAV* — an unmanned parameter deployed in China for fog disposal or dissipation applications.

- *Wing Loong 1 UAS* – an unmanned aircraft developed as an integrated multipurpose UAS for medium altitude flying.

- *Harrier* –is a middle unmanned aerial vehicle system at low speed.

- *SW1* – is a light, multipurpose unmanned vehicle with two ways of taking off in terms of inboard and ejection.

- *Nighthawk* – is a new generation of small short-range unmanned drones mainly used in the battlefield for reconnaissance, target accurate positioning and fighting against damage effect assessment tasks such as correction shots.

- *Yunying*: is an unmanned military attack drone.

Latest Quarter Results

For the first quarter of 2024, FACC AG reported an increase of 24.4% in revenue to €202.4 million. The latest market analyses forecast an annual market volume of $25 billion from 2040 onwards. Within the next three years, FACC expects to generate additional revenue of around $ 90 million for commissioned research and development services in this new sector.

2.5 BAE Systems Plc (LSE: BA)

BAE Systems operates as a defense, aerospace, and security company worldwide and is among the world's largest defense contractors. The company was formed on 30 November 1999 by a £7.7 billion merger of two British companies, Marconi Electronic Systems (MES) — the defense electronics and

naval shipbuilding subsidiary of the General Electric Company — and British Aerospace (BAe) — an aircraft, munitions and naval systems manufacturer.

BAE is currently engaged in delivering a range of products and services for air, land and naval forces, as well as advanced electronics, security, information technology solutions and support services. It operates through five principal business segments: Electronics Systems; Cyber & Intelligence; Platforms & Services (US); Platforms & Services (UK); and Platforms & Services (International). The company now operates in the UK, the US, Europe, Canada, Australia, the Asia-Pacific region, Middle East, Saudi Arabia, Africa, and Central and South America.

Key UAV Products

- *SPRINT* – designed to operate from a significant range for ground moving target indicators, dismount moving target indicators and coherent change direction performance demonstrated for group 3 unmanned aerial systems.
- *DEMON* — designed to fly without using conventional 'flaps' (elevators or ailerons), using jet propelled blasts of air blown over the trailing edges of its wings to maneuver.
- *Taranis* — an unmanned combat aircraft system, which is under the control of a human operator, is capable of undertaking sustained surveillance, marking targets, gathering intelligence, deterring adversaries and carrying out strikes in hostile territory.
- *Intelligent Landing System* — a technology which allows UAVs to autonomously locate a suitable landing strip and land safely without relying on GPS, remote piloting, special equipment on the ground, surveying of the landing site, and other external systems.
- *Mantis* — a twin-engine unmanned aircraft.
- *SIGINT* – gathers information with the help of adversary electronic signals. Analyses and evaluates the raw data from foreign communication systems, radars, and weapon systems and transforms it into actionable intelligence.

Recent Developments

On 16 February 2024, BAE announced acquisition of Ball Aerospace from Ball Corporation, at a purchase price of $5.5 billion (approximately £4.4 billion), which has been funded through existing cash and new external debt. The acquisition enhances BAE's space portfolio.

On 12 February 2024, BAE announced being selected by Boeing to upgrade and modernize the vehicle management system computer (VMSC) for the U.S. Navy's MQ-25 unmanned aerial refueling system.

On 2 February 2024, BAE Systems announced the acquisition of Malloy Aeronautics, a UK quadcopter manufacturer, for an undisclosed amount. Malloy Aeronautics designs and supplies all-electric uncrewed aerial systems (UAS) to both civil and military customers.

On 31 October 2023, BAE Systems announced acquisition of Eurostep, a secure data sharing company headquartered in Sweden, to deliver advanced digital asset management.

On 11 October 2023, BAE Systems announced appointment of Dan Sallet as its senior vice president for finance. He will be responsible for the financial operations of the company's U.S.-based businesses.

On 12 September 2023, BAE Systems and QinetiQ announced collaboration to develop a family of autonomous uncrewed air systems (UAS) and mission management systems.

Latest Quarter Results

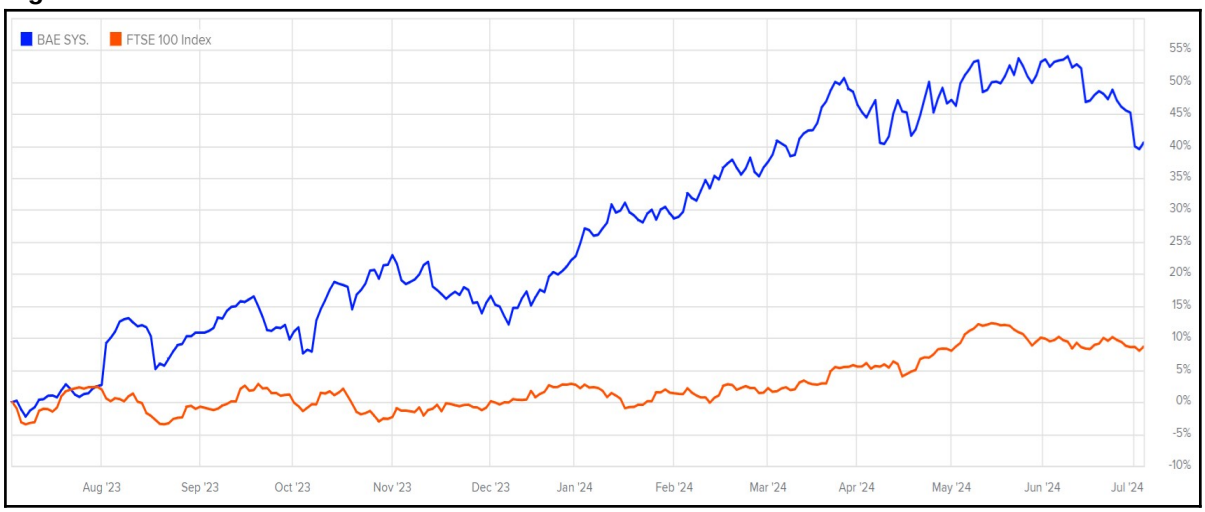
For the year 2023, the revenue increased 9% to £23.0 billion driven by strong performance across all sectors. The order backlog stood at a record £69.8 billion, driven by the order intake of £37.7billion and the free cash flow of £2.6 billion exceeded expectations. For FY 2024, the company expects its sales to increase by 10%-12% YOY and free cash flow by greater than £1.3 billion.

Latest Key Financial Data

(In millions of	Six Months Ending	Fiscal Year Ending

GBP)	June 30, 2022	June 30, 2023	December 31, 2022	December 31, 2023
Revenue	10,581	12,018	21,258	23,078
Operating Income	1,028	1,233	2,384	2,573
Net Income	647	1,005	1,674	1,940
Total Assets	29,935	30,963	31,462	32,064
Total Equity	11,550	10,821	11,400	10,723

Figure 2: LTM Performance vs. FTSE 100



Source: London Stock Exchange[2]

2.6 Da-Jiang Innovations (DJI) Science and Technology Co., Ltd

DJI is a Chinese technology company founded in 2006 by Frank Wangand headquartered in Shenzhen, Guangdong province, China. The company made its name in the global market by manufacturing commercial and recreational UAV for aerial photography and videography.

DJI pours much of its resources to manufacture a range of products like flying cameras — like its Inspire and Phantom series— flying platforms, flight controllers for multi rotors, accessories for helicopters, camera gimbals — aerial and handheld — and ground stations. These products are for industrial, professional and amateur use.

DJI was featured on Time Magazine's 100 most influential companies list in 2021. It is the only drone company in the world to have been featured on this list.

In October 2021, the Federal Communications Commission's commissioner Brendan Carr called on regulators to begin the process to blacklist DJI alleging that the company poses national security risk given the large amounts of data collected by its drones.

Key Products

- *Phantom Series* — a series of quadcopters called the Phantoms that have developed into an integrated flying system with aircraft, camera, Wi-Fi connectivity, a controller and the pilot's mobile device. These UAVs are mainly intended for aerial cinematography and photography applications. The air force in Australia been using a DJI Phantom 4 to carry out inspections of its aircraft.
- *Unmanned Helicopter* — a small unmanned helicopter jointly developed by Harbin Institute of Technology (HIT), Hong Kong University of Science and Technology (HKUST) together with DJI. The unmanned helicopter is intended for high elevation missions and is able operate with wind scale of 6.
- *Spreading Wings Series* — a series of hexacopters called Spreading Wings (Gen-Dou-Yun or Gendouyun) use to ferry heavy cameras in aerial photography, search and rescue, and surveillance purposes.

[2] https://www.londonstockexchange.com/stock/BA./bae-systems-plc/company-page

- *Flight Controllers* — professional and amateur flight controllers intended for multi-rotor stabilization control of various platforms or heavy payloads in aerial photography.
- *Ronin Platform* — the company's stand-alone ground-based camera stabilization platform developed for everyday cinematography and aerial film making in professional environments.
- *Flame Wheel Series* — a series of multirotors flying platforms called Flame Wheel (Feng-Huo-Lun or Fenghuolun) for aerial photography in entertainment. There are a total of four electrically powered Flame Wheels — the hexacopter Flame Wheel F550, quadcopters Flame Wheel F330, Flame Wheel F450 and Flame Wheel ARF KIT.
- *Inspire Series* – a professional series of camera quadcopters similar to the Phantom line.
- *Spark* – an affordable consumer drone designed for people to enter the camera drone ecosystem.

Recent Developments

On 5 June 2024, DJI announced it teamed up with Nepalese drone service company Airlift, video production company 8KRAW, and Nepalese certified mountain guide Mingma Gyalje Sherpa, and completed the world's first successful round trip delivery by DJI FlyCart 30 drone on Mount Everest in April.

On 11 April 2024, DJI introduced DJI Avata 2 with a safer, fully immersive enhanced FPV flight experience, an upgraded sensor to improve image quality and increased flight time.

On 26 March 2024, DJI launched DJI Dock 2, new "Drone in a Box" automated enterprise solution launched globally with DJI Matrice 3D/3TD, offering seamless automated aerial missions for surveys, inspections, asset management, and security.

On 10 January 2024, DJI introduced its first delivery drone DJI FlyCart 30 (FC30) to the global market.
DJI's industrial-grade drones offers industries improved safety for workers and productivity for businesses.

On 25 October 2023, DJI announced the Osmo Pocket 3, a versatile pocket-sized gimbal camera. It features a powerful 1-inch CMOS sensor, that delivers precision, efficiency every moving movement.

On 10 October 2023, DJI unveiled DJI Zenmuse L2, a highly-integrated LiDAR system, with enhanced efficiency, reliability and precision.

2.7 Denel SOC Ltd (Denel Dynamics division)

Denel SOC Ltd is a division of Denel Dynamics, a South African armaments development and manufacturing company wholly owned by the South African Government. It was created when the manufacturing subsidiaries of Armscor were split off in order for Armscor to become the procurement agency for South African Defence Force (SADF), now known as the South African National Defence Force (SANDF), and the manufacturing divisions were grouped together under Denel as divisions.

Located in Centurion, South Africa, the company is an innovative leader in advanced systems technology. Its main business consists of tactical missiles, precision guided weapons, UAV, integrated systems and space solutions. With most of the products designed, developed and manufactured in South Africa, Denel's products are also in service with other defence forces in Africa, the Middle East, Europe, Asia and South America. The company also collaborates and partners with several other national governments including Brazil and the United Arab Emirates.

Unmanned Aerial Systems (UAS)

- *Seeker*—is designed to perform tactical reconnaissance in real-time and can conduct day and night surveillance in all threat environments.

- *Hungwe*—a tactical reconnaissance UAS.

- *Skua*—a turbojet-engine target drone used to simulate fast-moving attack aircraft during surface-to-air and air- to-air training exercises and weapons tests.

- *Bateleur*— a MALE UAV, with its primary role being surveillance, with a secondary signals' intelligence capability.

Missiles

- *A-Darter*— a modern short-range heat seeking air-to-air missile.

- *R-Darter*—a beyond visual range (BVR) air-to-air missile guided by an active radar homing seeker.

- *MUPSOW* — multipurpose standoff weapon air-launched cruise missile.

- *Umkhonto*—multi-range infrared homing missile series.

- *Seekers* — Brazilian MAA-1 Piranha.

- *Raptor Precision* — a guided glide bomb series.

- *TORGOS*— an air-launched cruise missile.

- *R-Darter*— radar guided beyond visual range missile.

- *Mokopa*— long-range laser guided anti-tank guided missile.

- *ZT3 Ingwe*— multi-role laser guided anti-tank guided missile.

Recent Development

On 5 February 2024, Denel announced it will showcase several global-leading products in the fields of missile technology, air defense systems, precision guided munitions, artillery systems and unmanned aerial vehicle systems at the World Defense Show in Saudi Arabia this week.

2.8 Elbit Systems Ltd (TLV: ESLT and NASDAQ: ESLT)

Elbit Systems headquartered in Haifa, Israel, is an international high technology company engaged in a wide range of defense, homeland security and commercial programs globally.

Key UAV Products

- *Da Vinci* - Da-Vinci is a powerful vertical takeoff and landing (VTOL) small UAS (sUAS), suitable for a variety of missions, terrains and weather conditions.
- *Elbit Hermes 90* — an expeditionary, high performance, low cost tactical UAS.
- *Elbit Hermes 450* — an Israeli medium size multi-payload UAV designed for tactical long endurance missions. It has an endurance of over 20 hours, with a main mission of reconnaissance, surveillance and communications relay.
- *Elbit Hermes 900* — over-the-horizon, persistent multi-mission, multi-payload capabilities with class leading payload carrying capacity of 350 kg. It is capable of performing missions for area dominance, persistent intelligence, surveillance, target acquisition and reconnaissance (ISTAR).
- *Elbit Skylark I Le (mini UAS)* — man-portable high performance mini-UAS, Skylark ILE has been selected and deployed as the IDF's battalion level UAS and also has been delivered to over 20 users worldwide.
- *Silver Arrow Micro-V* — a device powered by twin 3 kW piston engines, one in a nacelle on each wing driving a pusher propeller. It has no landing gear. The Micro-V appears to be too small to carry a full sensor turret, carrying a miniaturized imager in a transparent section built into the middle of its fuselage.

- *Silver Arrow Sniper* — an aircraft that resembles that of a conventional private aircraft with fixed tricycle landing gear, driven by a nose-mounted propeller and a 28.5 kW (38 horsepower) piston engine. Its only unusual feature is an upright vee-tail.
- *Unmanned Surface Vehicle* - The Seagull Unmanned Surface Vessel (USV) facilitates end-to-end mine hunting operations including detection, classification, localization, identification and neutralization of bottom, moored and drifting sea mines while taking the sailor out of the mine field.

NGC, Honeywell, BAE Systems, Rockwell Collins, L-3 Communications Corporation, Thales S.A., Finmeccanica S.p.A., Harris Corporation, AAI Corporation, FLIR Systems, Inc., Rhode and Schwartz GmbH, ITT Defense Limited, Rheinmetall AG and Safran Group-Sagem Defense Securite S.A. are among Elbit's main competitors.

Recent Developments

On 21 February 2024, Elbit System unveiled its next generation Unmanned Aerial System (UAS), Hermes™ 650 Spark, with outstanding endurance, versatility, and cost-effective performance across land, air and sea operations.

On 12 September 2023, Elbit System announced receiving order from Israeli Defense Forces for SkylarkTM 1Transitional Vertical Take-Off and Landing Small Tactical Unmanned Aerial Systems along with life maintenance services for all systems.

On 21 August 2023, Elbit Systems – Elbit Systems announced receiving approximately $55 million contract to supply multi-layered ReDrone Counter Unmanned Aerial Systems (C-UAS) to the Netherlands, over a period of four years.

Latest Quarterly Result

Revenues in the first quarter of 2024 were $1,554.0 million, as compared to $1,393.5 million in the first quarter of 2023, up 11.5% YOY. Aerospace revenues were flat in the first quarter of 2024, as compared to the first quarter of 2023. Non-GAAP net income in the quarter was $80.7 million (5.2% of revenues), as compared to $79.0 million (or 5.7% of revenues), a year ago for the same period.

Elbit's board of directors declared a dividend of $0.50 per share for shares on 18 June 2024. The dividend will be paid on 1 July 2024.

Figure 3: LTM Performance vs. SPX 500 Index

Source: Nasdaq[3]

[3] https://www.nasdaq.com/market-activity/stocks/eslt/advanced-charting

2.9 FLIR Systems (Acquired by Teledyne Technologies)

FLIR Systems is a world-leading maker of sensor systems that enhance perception and heighten awareness, helping to save lives, improve productivity, and protect the environment. LIR's vision is to be "The World's Sixth Sense" by leveraging thermal imaging and adjacent technologies to provide innovative, intelligent solutions for security and surveillance, environmental and condition monitoring, outdoor recreation, machine vision, navigation, and advanced threat detection.

FLIR was acquired by Teledyne Technologies on 14 May 2021. FLIR is now be included in Teledyne's Digital Imaging segment and operates under the name Teledyne FLIR.

Key Products

- *Black Hornet Nano* — a military micro UAV used by the Norwegian and British Army. The UAV is outfitted with a camera, which gives the operator full-motion video and still images. Weighing 16 grams, the Black Hornet helicopter can fly for up to 25 minutes at line-of-sight distances of up to one mile. In February 2018, the company added a night vision capability to Black Hornet.

Recent Development

On 20 February 2024, Teledyne FLIR Defense, received an order of over 800 SkyRanger R70 Unmanned Aerial Systems (UAS), for approximately US$70 million by Canada's Department of National Defense, which it will donate to the government of Ukraine.

On 12 September 2023, Teledyne FLIR Defense, is showcasing a new technology concept at DSEI conference in London which will allow crews to autonomously launch small drones operated from inside a military vehicle; perform reconnaissance, surveillance, and target acquisition (RSTA); and then recover the aircraft safely without going out.

Latest Quarterly Result

Teledyne Technologies delivered sales of $1,350.1 million for Q1 2024, down 2.4% YOY. Net income was $178.5 million (or $3.72 diluted earnings per share) for the first quarter of 2024, compared with $178.7 million (or $3.73 diluted earnings per share) for the first quarter of 2023. The company updated its full year non-GAAP EPS to be $ 19.25 to $19.45, compared with the prior outlook of $20.35 to $20.68.

Latest Key Financial Data

(In millions of US$)	Quarter Ending		Fiscal Year Ending	
	April 2, 2023	March 31, 2024	January 1, 2023	December 31, 2023
Revenue	1,383	1,350	5,458	5,635
Operating Income	242	234	972	1,034
Net Income	178	178	788	885
Total Assets	14,429	14,639	14,354	14,527
Total Equity	8,365	9,328	8,169	9,221

2.10 General Atomics Aeronautical Systems Inc (GA-ASI)

General Atomics Aeronautical Systems, Inc. (GA-ASI), an affiliate of General Atomics and designs and manufactures unmanned aircraft systems (UAS), tactical reconnaissance radars and electro optic surveillance systems for the US military and commercial applications globally. The company's Aircraft Systems business unit is a top designer and manufacturer of Predator A, Predator B/MQ-9 Reaper, Gray Eagle, Predator C Avenger and Predator XP.

It also produces a range of solid-state digital Ground Control Stations (GCS) and provides pilot training and support services for RPA field operations. The Mission Systems business unit on the

other hand, designs, manufactures and integrates the LynxMulti-mode Radar and the highly sophisticated Clawsensor payload control and image analysis software on to both manned and remotely piloted aircraft. It also integrates other sensor and communication equipment into manned ISR aircraft and develops emerging technologies in high energy lasers, electro-optical sensors, and meta-material antennas.

GA-ASI is headquartered in Poway, California and has a number of facilities in the San Diego and Mojave Deserts, as well as various customer locations around the US. The company received a Certificate of Waiver from FAA for Beyond Visual Line of Sight (BVLOS) operations at the North Dakota facility. This will further help the company to expand its UAS operations.

Key Products

- *MQ-1 Predator* — MQ-1 Predator is primarily used by the United States Air Force (USAF) and the Central Intelligence Agency (CIA).

- *MQ-1C Gray Eagle or Sky Warrior* — a MALE UAS developed for the US Army as an upgrade of MQ-1 Predator.

- *MQ-9 Reaper* — primarily developed for the US Air Force; MQ-9 is an UAS which is capable of remote controlled or autonomous flight operations. It is the first ground-controlled hunter-killer UAV designed for long- endurance, high-altitude surveillance.

- *Avenger* — a developmental unmanned combat air vehicle built by GA-ASI for the US military. The Avenger is powered by a turbofan engine and its design includes stealth features — like internal weapons storage, and an S-shaped exhaust for reduced heat and radar signature.

- *Predator XP* – is primarily used by the US Air Force and the US Government and Italian Air Force.

- *Powler* – is used as the GNAT 750 as the basis for a tactical UAV.

- *SkyGuardian* – It is a remotely piloted aircraft (RPA) that can be used for a variety of commercial and public services applications. This includes inspections of hundreds of miles of rail, power line, communication and canal infrastructure, agriculture monitoring and topological surveys, as well as wildfire and flood monitoring.

Recent Developments

On 31 May 2024, GA-ASI announced that the Army National Guard has ordered 12 Gray Eagle 25M (GE 25M) Unmanned Aircraft Systems (UAS).

On 26 March 2024, GA_ASI announced that Royal Netherlands Air Force (RNLAF) would upgrade their MQ-9A Remotely Piloted Aircraft (RPA) fleet including capabilities such as maritime radars, a communications relay, extended range fuel tanks, electronic support measures (ESM), and weapons, over the period of next three years.

On 25 January 2024, General Atomics Aeronautical Systems, Inc. (GA-ASI) announced conducting the first flight of the Gray Eagle 25M (GE-25M) Unmanned Aircraft System at its El Mirage, Calif. flight facility on Dec. 5, 2023, reaching a significant milestone in its progress.

On 15 November 2023, GA-ASI conducted a first-of-its-kind demonstration of its short takeoff and landing (STOL) capability on the HMS Prince of Wales, a Royal Navy aircraft carrier, using the Mojave Unmanned Aircraft System. Equipping UAS with STOL capability provides greater versatility and allows the aircraft to operate in areas previously deemed unsuitable for UAS operations.

On 13 November 2023, GA-ASI partnered with EDGE, a world-leading advanced technology group for defense and beyond, to integrate EDGE smart weapons onto GA-ASI’s MQ-9B SkyGuardian Remotely Piloted Aircraft (RPA).

On 16 October 2023, Republic of Korea-based ROKADI signed a purchase order to supply General Atomics Aeronautical Systems, Inc. (GA-ASI) with fuel interface rings for GA-ASI’s new MQ-9B SkyGuardian/SeaGuardian Unmanned Aircraft Systems.

On 10 October 2023, General Atomics Aeronautical Systems, Inc. announced advancement to its Aerial Recovery System for Small Unmanned Aircraft Systems/Air-Launched Effects (SUAS/ALE), by deploying and retracting a towline with a “smart end feature” from a GA-ASI MQ-20 Avenger Unmanned Aircraft System in flight. SUAS/ALE can be refueled, recharged, and/or rearmed and then redeployed.

On 9 August 2023, General Atomics Aeronautical Systems, Inc. announced advanced operational ability for the Unmanned Combat Air Vehicle (UCAV) ecosystem.

On 14 July 2023, General Atomics Aeronautical Systems announced that its family of Unmanned Aircraft Systems, which includes the Predator, Reaper, Gray Eagle, Avenger, and MQ-9B SkyGuardian lines, has surpassed eight million flight hours. GA-ASI aircraft have completed 566,000 total missions in nearly 40 countries around the world.

2.11 General Dynamics (NYSE: GD)

General Dynamics is a major aerospace and defense company - formed by mergers and divestitures - that offer a broad range of products and services in business aviation, combat vehicles, weapons systems and munitions, military and commercial shipbuilding, and communications and information technology. Formed in 1952, General Dynamics has grown organically and through acquisitions until the early 1990s, that currently the company has acquired and integrated more than 60 businesses to further strengthen and complement its business portfolio. The Company operates through four business groups:

Aerospace - which produces Gulfstream aircraft, provides aircraft services and performs aircraft completions for other original equipment manufacturers.
Combat Systems - which designs and manufactures combat vehicles, weapons systems and munitions.
Information Systems and Technology — which provides communications and information technology systems and solutions.
Marine Systems - which designs, constructs and repairs surface ships and submarines. Co.’s primary customer is the US government.

Key Unmanned Products

- *Tactical Integrated Sensor Information System (TISIS)* — a mission management system to a fully supported turnkey weapon system for fixed-wing, helicopter or UAV platforms. Designed to incorporate off-the-shelf sensors, the system provides a flexible vehicle for integration of a modern mission system.

Recent Developments

On 5 June 2024, the board of directors of General Dynamics declared a regular quarterly dividend of $1.42 per share, payable 9 August 2024, to shareholders of record on 5 July 2024.

On 6 December 2023, General Dynamics declared a regular quarterly dividend of $1.32 per share, payable 9 February 2024, to shareholders of record on 19 January 2024.

Latest Quarterly Result

The company reported solid Q124 revenue of $10.7 billion, up 8.6% YOY, due to strong demand and steady revenue growth across the business. General Dynamics reported first quarter 2024 operating earnings of $1 billion, up 10.4% YOY, diluted earnings per share (EPS) of $2.88, up 9.1% YOY. GD reported a record backlog of $93.7 billion, up 4.4% YOY. In the Aerospace segment, orders in the quarter totaled $2.4 billion, growing backlog to $20.5 billion, up 6.2% from the year-ago quarter. Aerospace book-to-bill was 1.2-to-1 for the quarter.

Latest Key Financial Data

(In millions of US$)	Quarter Ending		Fiscal Year Ending	
	April 2, 2023	March 31, 2024	December 31, 2022	December 31, 2023
Revenue	9,881	10,731	39,407	42,272
Operating Income	938	1,036	4,211	4,245
Net Income	730	799	3,390	3,315
Total Assets	52,096	55,246	51,585	54,810
Total Equity	19,087	21,410	18,568	21,299

Figure 4: LTM Performance vs. SPX 500

Source: Nasdaq[4]

2.12 Israel Aerospace Industries Ltd

Israel Aerospace Industries (IAI) is globally recognized leader and also the largest government owned defense and aerospace company in Israel. It offers space systems, which includes communication and observation, UAV, defense and naval systems, military and civil aircrafts, as well as helicopters maintenance and upgrade services, and cyber defense, maritime, border protection, defense surveillance systems, and crisis and emergency management systems.

As a national center of excellence for advanced technological fields, IAI maintains extensive R&D, engineering, manufacturing, and testing capabilities to develop, produce and support complete systems, from the component, sensor and sub-system to large scale integrated systems, support systems of expertise. This capability is also reflected by the company's manpower - IAI is the largest employer of engineers in Israel; R&D makes about a quarter of the company's annual budget.

IAI is wholly owned by the government of Israel and Since 1953 — or over the past 60 years — IAI delivered, supplied, and supported advanced systems to the Israeli Ministry of Defense as well as various customers globally.

Key Products : UAVs manufactured by IAI's MALAT division

- *RQ-2 Pioneer (with the USA)*— an UAV that had been utilized by the US Navy, Marine Corps, and Army, and deployed at sea and on land.

- *RQ-5 Hunter (with the USA)* — an UAV intended to serve as the US Army's Short-Range UAV system for division and corps commanders.

[4] https://www.nasdaq.com/market-activity/stocks/gd/advanced-charting

- *Heron family of long-endurance UAV* — a medium-altitude long-endurance UAV developed by the Malat (UAV) division of Israel Aerospace Industries, which is capable of MALE operations of up to 52 hours' duration at up to 10.5 km.

- *Harpy*—Harpy is designed to attack radar systems and is optimized for the SEAD role, and it carries a high explosive warhead.

- *I-View*—has fixed landing gear and an 18.6 kW (25 hp) piston engine and is being promoted in civilian markets for forest fire warning, and in this form is appropriately known as the FireBird.

- *Harop*— a SEAD-optimized UCAV is designed to loiter the battlefield and attack targets by self-destructing into them.

- *Ranger*— a tactical UAV system, and the only tactical UAV system certified to fly in civilian airspace as well as overpopulated areas.

- *IAI Scout*— a reconnaissance UAV.

- *IAI Searcher*— a reconnaissance UAV developed in Israel in the 1980s.

- *Bird-Eye*— family of mini-UAV.

- *Panther*— a tilt-rotor UAV.

- *Ghost* — tandem-rotor reconnaissance mini-UAV.

Recent Development

On 2 April 2024, IAI signed Memorandum of Understanding (MOU) with Aerotor Unmanned Systems to develop and promote their products. MOU includes development of advanced drone systems for a variety of tactical military missions for users on land, at sea and in the air.

Latest Quarter Results

IAI delivered the highest ever net income of $318 million, an increase of 49% YOY. The sales for the year 2023 were $5,327 million, compared with about USD 4,973 million in 2022, highest till date. The Company's order backlog leaped to about USD 18 billion, representing 3.3 years of operation compared to USD 15.6 billion at the end of 2022. The Company has free cash flow of USD 889 million at the end of the year 2023.

2.13 Leonardo SpA (BIT: LDO)

Leonardo SpA is the most important industrial group in the high-technology sector in Italy and one of the main global players in aerospace, defense and security. It operates in seven sectors: Aeronautics — through Alenia Aermacchi, ATR and SuperJet International; Helicopters — through AgustaWestland; Space — through Telespazio and Thales Alenia Space; Defense and Security Electronics — through Selex ES and DRS Technologies; Defense Systems — through OTOMelara, WASS and MBDA; and Transportation — through Ansaldo STS, AnsaldoBreda and BredaMenarinibus.

The company counts more than 360 sites in 22 countries globally, and have major presence in Italy, the UK, the US and Poland. The Group is partially owned by the Italian government, which holds more than 30% of Leonardo's shares.

Key Unmanned Products

- *nEUROn* — is a collaborative program between France, Italy, Sweden, Spain, Greece and Switzerland for future combat UAVs.

- *Sky-Y* - powered by a diesel engine and thrust propeller, was specifically developed as demonstrator of innovation technologies for a surveillance and reconnaissance Medium-Altitude, Long-Endurance (MALE) class remote piloted aircraft.

- *V-Fides* – is a wired guidable vehicle capable of performing various types of mission as autonomous vehicle or remote-controlled vehicle.

- *Helistark* - is a rotating wing UAV propelled by an internal combustion engine.

- *Horus* – is an aerial robotic platform equipped with optical sensors to carry out surveillance and tactical reconnaissance tasks and missions.

- *TRP2HD* - is a dual use UGV with outstanding mobility, speed, loan capacity, ease of remote control and effectiveness.

- *IBIS* – it is a small rotary wing UAV system able to carry out surveillance and tactical reconnaissance tasks and missions.

- *SW-4 'Solo'* –It is a light single engine helicopter and designed for both piloted and unmanned operations. It is able to carry out intelligence, surveillance and reconnaissance and cargo re-supply.

- *AWHERO* – It is a short range tactical rotary unmanned air vehicle whose design complies with international regulations for both civil as well as military operations.

Recent Development

On 28 February 2024, Leonardo announced being awarded a contract by Public Services and Procurement Canada (PSPC) to provide its Falcon Shield Counter-Uncrewed Aerial System (C-UAS), which will safeguard Canadian airspace, installations and people against the threat posed by rogue drones.

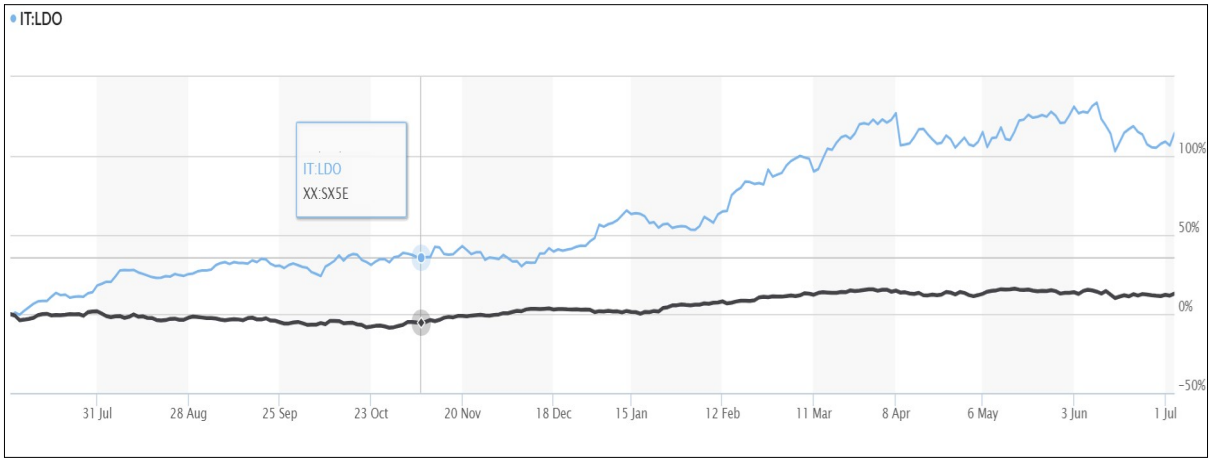
Latest Quarter Results

Leonardo SpA delivered a strong performance for the first quarter of 2024 with new orders of EUR5.8 billion (+14.9% YOY), revenues of EUR3.7 billion (+15.3% YOY) and EBITA of EUR182 million (+67% YOY). The company reconfirmed guidance for FY 2024 orders to be EUR19.5 billion and revenue to be EUR16.8 billion.

Latest Key Financial Data

(In millions of EURO)	Three Month Ending		Fiscal Year Ending	
	March 31, 2023	March 31, 2024	December 31, 2022	December 31, 2023
Revenue	3,034	3,664	14,713	15,291
Operating Income	93	168	961	1,085
Net Income	40	459	932	695
Total Assets	NA	NA	28,582	30,693
Total Equity	7,749	9,408	7,699	8,561

Figure 6: LTM Performance vs. EURO STOXX 50 Index



Source: Marketwatch[5]

2.14 Lockheed Martin Corporation (NYSE: LMT)

Lockheed Martin Corporation is a global aerospace and security company principally engaged in the research, design, development, manufacture, integration, and sustainment of advanced technology systems and products. The company also provides a broad range of management, engineering, technical, scientific, logistic, and information services. It serves both domestic and international customers with products and services that have defense, civil, and commercial applications, by operating through its five main segments:

Aeronautics — researches, designs, develops, manufactures, integrates, sustains, supports, and upgrades military aircraft.

Information Systems & Global Solutions —provides technology systems, information technology applications, and management services across a range of applications.

Missiles & Fire Control — provides air and missile defense systems, tactical missiles and air-to-ground precision strike weapon systems.

Mission Systems & Training — provides ship and submarine combat systems.

Space Systems — provides satellites, defensive missile systems, and space transportation systems.

Some of its Key Unmanned Products

- *K-Max* — a transformational technology for a fast-moving combat zone that allows Marines to deliver supplies either day or night to particular areas.

- *Indago VTOL* — provides military, civil and commercial customers with aerial exploration in crowded areas which are usually unreachable by fixed-wing unmanned aircraft systems.

- *Persistent Threat Detection System (PTDS)* — a system designed specifically to complete, transportable UAS computing and storage platform.

- *Ares* – a system designed specifically to make ground related transportation from difficult terrain and threats, such as ambushes and improvized Explosive Devices (IEDs).

- *Desert Hawk III* - a next generation UAS designed for portability, quick mission planning, hand launched and skid recovery, multi-mission versatility, enhanced day/night target detection, recognition, identification, greater operational range, endurance and covert operations.

- *Autonomous Mobility Applique System (AMAS)* – is a low cost, low risk autonomy kit for military logistics vehicles providing driver warnings and assist and leader-follower capabilities.

Recent Developments

[5] https://www.marketwatch.com/investing/stock/ldo/charts?countrycode=it&mod=mw_quote_tab

On 27 June 2024, Lockheed Martin authorized a third quarter 2024 dividend of $3.15 per share. The dividend is payable on 27 September 2024, to holders of record as of the close of business on 3 September 2024.

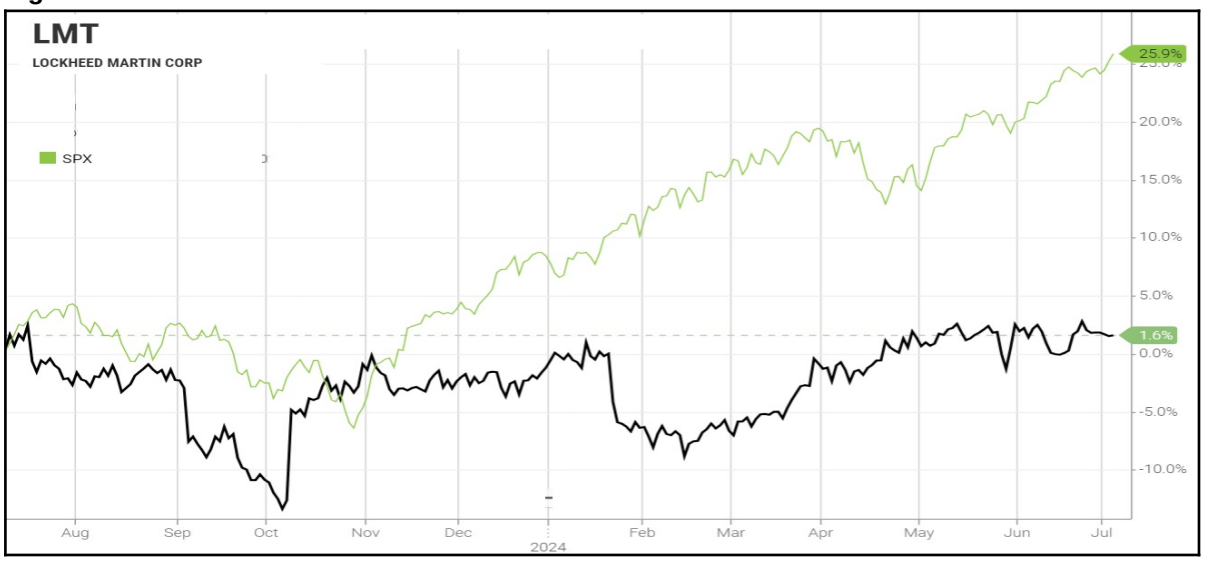
Latest Quarterly Result

Lockheed Martin reported robust backlog of $159 billion and net sales of $17.2 billion for the first quarter of fiscal 2024, compared to $15.1 billion in Q123. Net earnings in the first quarter of 2024 were $1.5 billion, or $6.39 per share. The company reconfirmed its net sales outlook of $68.5 - $70.0 billion for the year 2024.

Latest Key Financial Data

(In millions of US$)	Three Month Ending		Fiscal Year Ending	
	March 26, 2023	March 31, 2024	December 31, 2022	December 31, 2023
Revenue	15,126	17,195	65,984	67,571
Operating Income	2,037	2,029	8,348	8,507
Net Income	1,689	1,545	5,732	6,920
Total Assets	54,622	54,963	52,880	52,456
Total Equity	9,646	6,650	9,266	6,835

Figure 6: LTM Performance vs. SPX 500



Source: Nasdaq[6]

2.15 Northrop Grumman Corporation (NYSE: NOC)

Northrop Grumman Corporation is an American global security, aerospace and defense technology company formed by Northrop's 1994 purchase of Grumman. It provides systems, products and applications in unmanned systems, cyber security; command, control, communications and computers intelligence, surveillance, and reconnaissance (C4ISR); strike aircraft and logistics and modernization to government and commercial customers.

The company is made up of four business segments — Aerospace Systems, Electronic Systems, Information Systems and Technical Services. Northrop Grumman conducts most of its businesses with the US Government, principally the Department of Defense and intelligence community. The company also conducts business with foreign, state and local governments and domestic and international commercial customers.

Key Unmanned Products

[6] https://www.nasdaq.com/market-activity/stocks/lmt/advanced-charting

- *RQ-4 Global Hawk reconnaissance system* — a high-altitude long-endurance system providing close to real-time high resolution imagery of large geographical areas.

- *MQ-4C Triton* — an aircraft system that provides real-time ISR over vast ocean and coastal areas.

- *Trans-Atlantic North Atlantic Treaty Organization (NATO) Alliance Ground Surveillance (AGS)* — a system for multinational theatre operations, peacekeeping missions, and disaster relief efforts.

- *MQ-8 Fire Scout* — an aircraft system which provides exceptional situational awareness and precision targeting support.

- *Navy Unmanned Combat Air System (UCAS)* — an unmanned combat air vehicle for carrier-based operations.

- *Common Mission Management System* — provides high performance service based on ground control solutions which allow unmanned mission capabilities possible.

- *Bat Unmanned Aircraft System* – an affordable, medium altitude, multi-mission unmanned aircraft system suited for tactical missions, including intelligent, surveillance, target acquisition and communication relay.

Recent Developments

On 14 May 2024, the board of directors of Northrop Grumman declared an increased (10%) quarterly dividend of $2.06 per share, payable 12 June 2024, to shareholders of record as of the close of business 28 May 2024.

On 29 January 2024, NOC announced that it has priced a $2.5 billion underwritten public offering of senior unsecured notes, the net proceeds from the offering will be used for general corporate purposes, including debt repayment, share repurchases and working capital.

Latest Quarterly Result

NOC reported a strong start to the year with Q124 sales increase of 9% to $10.1 billion, reflecting continued strong demand across all sectors. Operating income increased 13% driven by strong performance and cost efficiencies. The backlog stood at $78.9 billion. NOC reconfirmed revenue guidance to be in the range of $40.8 - $41.2 billion for the year 2024.

Latest Key Financial Data

(In Millions of US$)	Three Month Ending		Fiscal Year Ending	
	March 31, 2023	March 31, 2024	December 31, 2022	December 31, 2023
Revenue	9,301	10,133	36,602	39,290
Operating Income	947	1,071	3,601	2,537
Net Income	842	944	4,896	2,056
Total Assets	44,244	47,818	43,755	46,544
Total Equity	15,136	14,223	15,312	14,795

Figure 7: LTM Performance vs. SPX 500

Source: Nasdaq[7]

2.16 Safran SA (EPA: SAF)

Safran SA is a France-based high-technology company which produces aircraft and rocket engines and propulsion systems. It divides its work into three segments: Aerospace, Aircraft, Defense and Security. The Aerospace includes Aerospace Propulsion (propulsion systems for commercial aircraft, military transport, training and combat aircraft, rocket engines, civil and military helicopters) and Aircraft Equipment (mechanical, hydro mechanical and electromechanical equipment).

The Defense division which includes the subsidiary, Sagem, makes optronic, avionic and electronic systems, while its Security segment deals with biometric technologies for fingerprint, iris and face recognition, identity management products, access management and transaction security, including tomographic systems for detection of dangerous or illicit substances in baggage.

Key Unmanned Products

Safran is the producer of tactical drone systems in France for over 15 years, building on its expertise in all the enabling technologies needed for development and production. At present, drones that are in service and integrated in the digital battlefield, are those which are able to perform a number of different missions. For instance, surveillance, intelligence, early warning, artillery and gunship guidance, protection, maneuver control, as well as threat detection.

The Patroller, a multi-sensor tactical drone, was designed for land forces, operational support and maritime surveillance. It Features a highly modular design, can be fitted with a wide range of sensors and is easily deployed in foreign theatres of operation. Using its own automatic launch system, it can be deployed from an airport without requiring any change to ground facilities and offers 24-hour endurance with a payload exceeding 250 kg.

The company released its new targets for the period 2021-2025. It expects organic revenue CAGR of 10% during 2021-2025 and operating income margin of 16% to 18% by 2025.

Recent Development

On 24 June 2024, Safran announced entering into exclusive discussions to acquire 100% of Preligens, a leader in artificial intelligence (AI) for aerospace and defense, for an enterprise value of 220 million euros. The acquisition will add AI capabilities to Safran's product offering and accelerate its digital transformation roadmap.

On 20 February 2024, Safran Electrical & Power announced a new facility in Singapore, dedicated to manufacturing, maintenance, repair, and overhaul (MRO) for aeronautical electrical equipment.

[7] https://www.nasdaq.com/market-activity/stocks/noc/advanced-charting

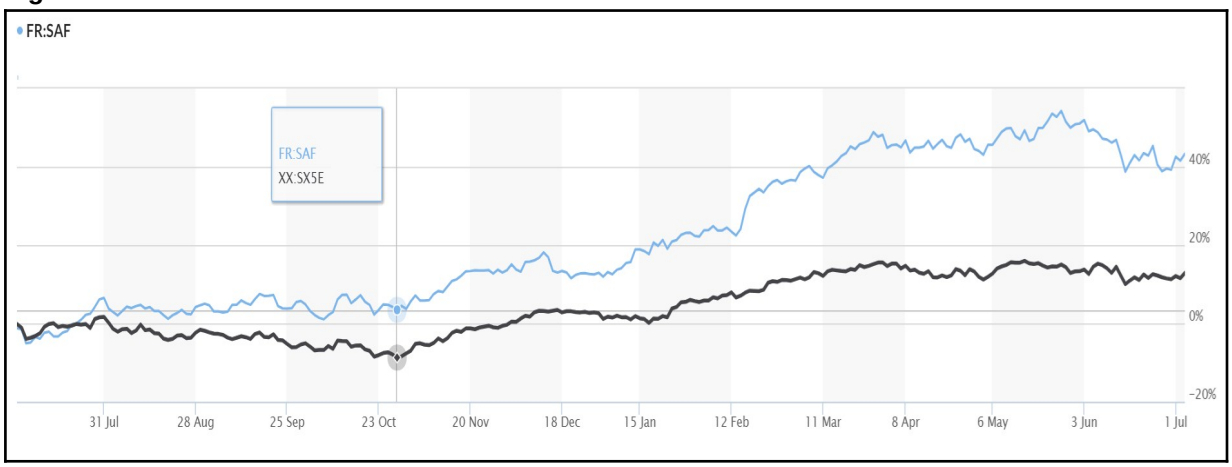
Latest Quarterly Result

Safran's reported continued solid moment for the first quarter of 2024. The company reported revenue of EUR6.22 billion for Q124, up 18.1% YOY. For FY 2024, Safran reaffirmed revenue to be around EUR27.4 billion and free cash flow of EUR3.0 billion.

Latest Key Financial Data

(In millions of EUR)	Six Month Ending		Fiscal Year Ending	
	June 30, 2022	June 30, 2023	December 31, 2022	December 31, 2023
Revenue	8,560	10,945	19,523	23,651
Operating Income	955	1,340	2,715	2,798
Net Income	551	1,085	(2,459)	3,520
Total Assets	45,551	48,262	46,828	50,468
Total Equity	10,046	11,221	10,866	12,088

Figure 9: LTM Performance vs. EURO STOXX 50 Index



Source: Marketwatch[8]

2.17 Thales SA (EPA: HO)

Thales Group is a French multinational company that designs and builds electrical systems and provides services for the aerospace, defense, transportation and security markets. It operates in many countries through its divisions, including:

Aerospace — specialized in onboard equipment, electronics and systems for the military markets.

Ground Transportation (Ground Transport Systems) — offers a range of integrated transportation and railway systems.

Defense (Secure Communications & Information Systems Land and Air Systems, Defense Mission Systems) — the division which designs and delivers interoperable and protected information and telecommunications systems for military forces, security forces, and essential operators.

Security — which offers the emergence of new types of threats from terrorism to drug trafficking.

Key Unmanned Products

- *Hermes 450* — in support of operations, providing persistent ISTAR coverage and delivering very high visual and IR imagery, day and night.

[8] http://www.nasdaq.com/symbol/googl/stock-chart?andintraday=offandtimeframe=1yandsplits=offandmovingaverage=Noneandlowerstudy=volumeandcomparison=onandindex=sp500

- *Watchkeeper WK450* — world's most sophisticated tactical ISTAR system and Europe's largest UAS program. The Watchkeeper is designed to be part of a highly networked system that allows for greater dissemination and exploitation of intelligence and will be a key component of the network enabled capability.

- *MALE UAS* — used to identify the position of enemy forces, the mass movement of non-combatant populations, the state of in-theatre infrastructures, as well as to establish lists of targets.

- *Lightweight Multi-role Missile* — a low cost, lightweight, precision strike missile, which has been designed to be fired from a variety of light aircraft, UAVs or micro-lites

- *Spy Ranger*- is the world's only capable EO/IR imaging system for transmitting high-definition electro optical and infrared imagery in real time.

- *Spy Arrow*- is a user friendly lightweight portable UAV designed to perform fast and efficient short-range observation and provide stabilized georeferenced video imagery in real time.

Recent Developments

On 13 June 2024, Thales, Spire and ESSP are joining forces to develop a satellite constellation and offer new space-based surveillance services for Air Navigation Service Providers (ANSPs).

On 20 November 2023, Thales and StandardAero announced that the StableLight™ autopilot was granted a Supplemental Type Certificate (STC) from the US Federal Aviation Administration (FAA). StableLight is a robust, feature-packed autopilot which is now available for retrofit on Airbus Helicopters AS350 and H125 platforms.

On 12 September 2023, Thales and Schiebel, a renowned Rotary Wing Uncrewed Air System (RWUAS) manufacturer, signed a Memorandum of Understanding (MoU), focusing on unlocking new frontiers around the world in uncrewed aerial operations.

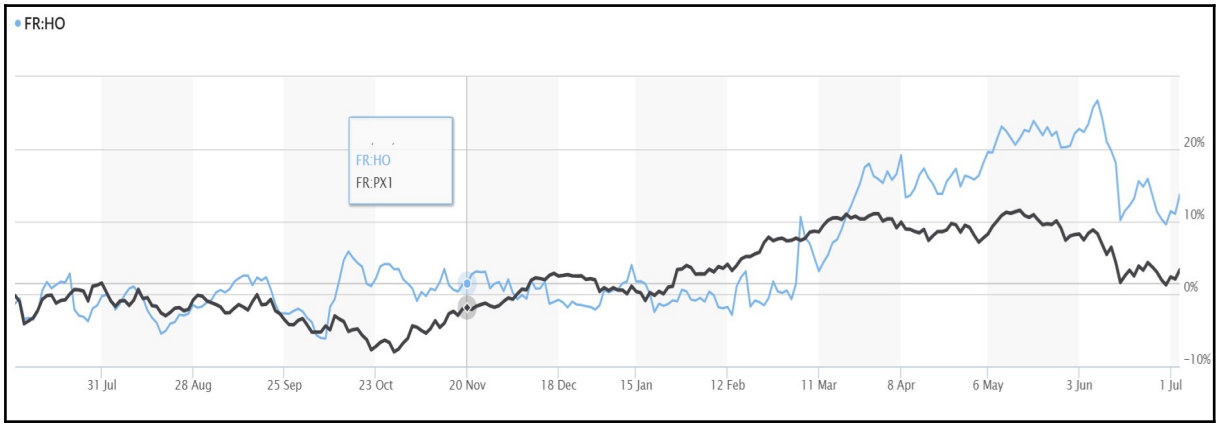
Latest Quarter Result

Thales reported strong sales moment in various markets in the first quarter of 2024. The company sales were €4.42 billion, up 9.8% YOY, driven by all the segments. The order intake was €5.03 billion, up 47% YOY. For 2024, the company reconfirmed its plans to achieve above 1% of book to bill ratio, organic sales growth of between +4% and +6%, sales between, €19.7 and €20.1 billion.

Latest Key Financial Data

(In millions of US$)	Six Month Ending		Fiscal Year Ending	
	June 2022	June 2023	December 31, 2022	December 31, 2023
Revenue	8,256	8,716	17,568	18,428
Operating Income	582	734	1,344	1,562
Net Income	560	642	1,131	1,002
Total Assets	33,311	35,193	34,420	38,785
Total Equity	7,772	7,271	7,381	6,969

Figure 10: LTM Performance vs. Euronext Paris Index



Source: Marketwatch[9]

2.18 The Boeing Company (NYSE:BA)

Boeing, together with its subsidiaries, is an aerospace firm engaged in the design, development, manufacture, sale, service and support of commercial jetliners, military aircraft, satellites, missile defense, human space flight and launch systems and services. Co. provides assistance and services to facilitate aircraft operation to the operators of its commercial airplane models. These activities and services include flight and maintenance training, field service support, engineering services, and technical data and documents. While its main operations are in the US, the company conducts operations in various countries and has a network of international partners, suppliers and subcontractors.

While its main operations are in the US, Boeing conducts operations in various countries and has a network of international partners, suppliers and subcontractors. Its main competitors are Lockheed Martin, Northrop Grumman, Raytheon, Embraer, Thales, Dassault Aviation, General Dynamics, Airbus, Bombardier and BAE Systems.

Recent Developments

On 1 July 2024, Boeing announced it has entered into a definitive agreement to acquire Spirit AeroSystems, for approximately $8.3 billion, including Spirit's last reported net debt. The acquisition demonstrates Boeing's commitment to aviation safety and improving quality for Boeing commercial airplanes.

Latest Quarterly Result

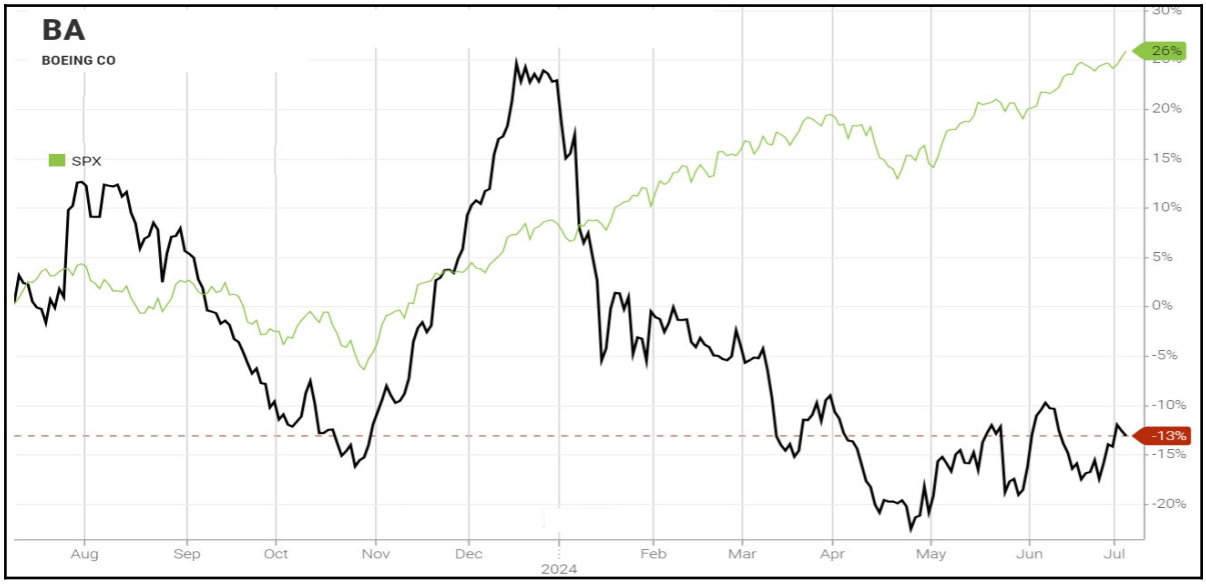
For the first quarter of fiscal 2024, the company reported results with revenue of $16.6 billion, down 8% YOY, reflecting lower commercial deliveries. It reported loss per share of $0.56 and recorded operating cash flow of ($3.4) billion. Total company backlog grew to $529 billion.

Latest Key Financial Data

(In millions of US$)	Three Month Ending		Fiscal Year Ending	
	March 31, 2023	March 31, 2024	December 31, 2022	December 31, 2023
Revenue	17,921	16,569	66,608	77,794
Operating Income	(149)	(86)	(3,519)	(773)
Net Income	(425)	(355)	(5,053)	(2,242)
Total Assets	136,347	134,484	137,100	137,012
Total Equity	(15,484)	(17,016)	(15,848)	(17,228)

Figure 11: LTM Performance vs. SPX 500

[9] http://www.nasdaq.com/symbol/googl/stock-chart?andintraday=offandtimeframe=1yandsplits=offandmovingaverage=Noneandlowerstudy=volumeandcomparison=onandindex=sp500



Source: Nasdaq[10]

2.19 Turkish Aerospace Industries Inc

Turkish Aerospace Industries, Inc. (TAI) is Turkey's centre of technology in design, development, modernization, manufacturing, integration and support of integrated aerospace systems — from fixed and rotary wing air platforms to UAV and space systems. Major products and activities of the company includes ANKA UAV System, HURKUS Trainer Aircraft, T129 ATAK Multirole Combat Helicopter, E/O Surveillance, Reconnaissance Satellites, modernization mission conversions and aero structure design-to-build programs.

In March 2020, the company won a contract from the government of Tunisia to supply six Anka-S drones. The deal is estimated to be worth $240 million.

Key Unmanned Aerial Vehicles Products

- *TAI Baykuş*— a tactical surveillance drone

- *TAI Gözcü*— a short-range tactical ISTAR drone

- *TAI Keklik*— a target drone for tracking and non-firing exercise

- *TAI Martı*— drone made for surveillance

- *TAI Öncü*— an experimental small-scale drone

- *TAI Şimşek*— a high-speed target drone

- *TAI Turna*— target drone made for tracking and live firing

2.20 Xi'an Aisheng (ASN) Technology Group

ASN Technology Group is a specialized UAV R&D company in China and is also the largest UAV production company, with over 90% of the Chinese UAV market held by ASN.

Key Products

- *ASN-12* — a fixed wing UAV in conventional layout with mid wing designs and propulsion is supplied by a two- blade fixed pitch wooden propeller driven engine.

- *ASN-106* — a fixed wing UAV in conventional layout with low wing configuration with V-tail.

- *ASN-211* — an unmanned ornithopter initially planned as an experimental aircraft for research purposes. Consequently, it was further developed into a scoute platform for conducting

[10] https://www.nasdaq.com/market-activity/stocks/ba/advanced-charting

reconnaissance mission at low altitude within short distance, equipped with imaging, data processing and transmission systems.

- *ASN-213* — a micro air vehicle (MAV) that resembles a scaled down version of ASN-106.

- *ASN-229* — afixed wing UAV in twin boom layout with a pair of skids as landing gear, which can be replaced by tricycle landing gear system.

Key References

Global

Association for Unmanned Vehicle Systems International (AUVSI)

A non-profit organization dedicated to advancing the unmanned systems community and committed to developing and promoting unmanned systems.

http://www.auvsi.org

Academy of Model Aeronautics (AMA)

The world's largest model aviation association and is a self-supporting, non-profit organization whose purpose is to promote development of model aviation as a recognized sport and worthwhile recreation activity.

http://www.modelaircraft.org/

European UAV Systems Centre (EuroUSC)

Europe's leading independent approvals specialist covering accreditation of organizations, airworthiness assessment and flight crew licensing for RPAS or UAS operating within civil airspace. http://eurousc.com/

AHS International

The world's only international technical society for engineers, scientists and others working on vertical flight technology.

http://www.vtol.org/

International Civil Aviation Organization (ICAO)

ICAO is a specialized agency of the United Nations. It codifies the international air navigation systems and fosters the planning and development of international air transport to ensure safe and orderly growth.

http://www.icao.int/

United States

Federal Aviation Administration (FAA) — Unmanned Aircraft Systems Department

The national aviation authority of the US.

https://www.faa.gov/uas/

National Aeronautics and Space Administration (NASA)

The US Government agency responsible for the civilian space program as well as aeronautics and aerospace research.

http://www.nasa.gov/

American Society for Testing and Materials (ASTM)

A global leader in the development and delivery of international UAV voluntary consensus standards. http://www.astm.org/

American Institute of Aeronautics and Astronautics (AIAA)

The world's largest technical society dedicated to the global aerospace profession.
http://www.aiaa.org

Unmanned Autonomous Vehicle System Association (UAVSA)

An association established to unify UAV-UAS-RPS pilot owners through local and national government activities.
http://www.uavsa.org/

Japan

Japan UAV Association (JUAV)

The Japan UAV Association (JUAV) an organization representing the industries which develop, manufacture and operate UAVs in Japan. It was organized for the purpose of promoting safety and contributing to the development of the UAV market in Japan.
http://www.juav.org/

Australia

Australian Association for Unmanned Systems

An association dedicated to promoting and supporting the unmanned systems and robotics industry.
http://aaus.org.au/

Civil Aviation Safety Authority of Australia (CASA)

Australian's national aviation authority (NAA) and also a government statutory authority responsible for the regulation of civil aviation.
https://www.casa.gov.au/

The Australian Certified UAV Operators Association (ACUO)

The only UAV industry body directly representing the commercial sector of unmanned aviation in Australia.
http://www.acuo.org.au/

China

Civil Aviation Administration of China (CAAC)

Formerly known as the General Administration of Civil Aviation of China (CAAC) is the aviation authority under the Ministry of Transport of the People's Republic of China, which oversees civil aviation activities across the nation.
http://www.caac.gov.cn/

United Kingdom

Unmanned Aerial Vehicle Systems Association (UAVS)

UAVS is a trade association for the UK UAV sector where its role is to interface with government and the regulators ensuring that industry's perspectives and objectives.
http://www.uavs.org/