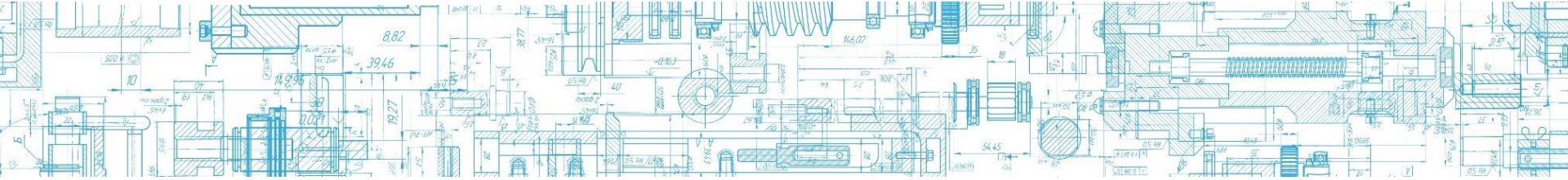


December 17, 2025 10:00 PM GMT



# The Robot Almanac

## Vol. 4: Drones & Air Mobility

Morgan Stanley Global Embodied AI Team

December 2025

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# THE MORGAN STANLEY ROBOT ALMANAC

CLICK TO JUMP TO ANY SECTION

- Vol 4: Drones & Air Mobility**
- Vol 3: Humanoids & Industrial Robots**
- Vol 5: Space & Defense**
- Vol 6: Autonomous Vehicles**
- Vol 7: BCI & Other Form Factors**
- Vol 1: AI gets Physical**
  - Cambrian Explosion of Bots**
- Vol 2: How to Train Your Robot**
  - Geopolitics**
  - Rare Earths Bottleneck**
  - Sagan's Prophecy**
- Vol 8: Big Tech's Physical AI Journey**
  - TESLA, amazon, Google, Meta, OpenAI, Apple, x1

Source: Microsoft Copilot, Company Websites, Morgan Stanley Research



# Drones



# Drones Have Existed for Decades








**Winston Churchill Awaiting Launch of a  
“Queen Bee” Target Drone (1941)**



**QH-50 Antisubmarine Drone Testing off  
USS Nicholas (1967)**



# Drones Are Becoming Smaller, Cheaper, Attritable

UAS Groups	Maximum Weight (lbs) (MGTOW)	Normal Operating Altitude (ft)	Speed (kts)	Representative UAS
Group 1	0 – 20	<1200 AGL	100	Raven (RQ-11), WASP 
Group 2	21 – 55	<3500 AGL	< 250	ScanEagle 
Group 3	< 1320	< FL 180		Shadow (RQ-7B), Tier II / STUAS 
Group 4	>1320	> FL 180	Any Airspeed	Fire Scout (MQ-8B, RQ-8B), Predator (MQ-1A/B), Sky Warrior ERMP (MQ-1C) 
Group 5				Reaper (MQ-9A), Global Hawk (RQ-4), BAMS (RQ-4N) 

## Factors Driving Growth of Small Drones

- Portability
- Expendability
- Ease of Use
- Ease of Production
- AI Unlock:
  - Navigation
  - Targeting & Tracking

## US DoD UAS Groupings

The remainder of this section will focus mainly on Group 1 & 2 UAS/Drones



# FPV (First Person View) Drones

Used in Various Consumer, Military, Commercial Applications Today



Source: Shutterstock, DJI, Morgan Stanley Research



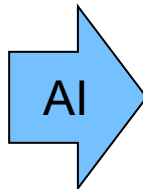
# The AI Unlock

Past / Present

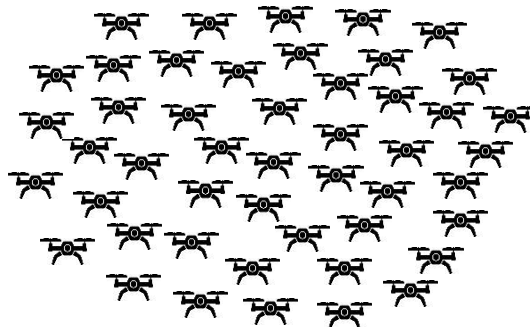
1  
\$30mn Drone



5 People



Future



100  
\$500 Drones



1 Person



Source: Shutterstock, Morgan Stanley Research



# The AI Unlock

## Toys



**RC Planes/Helicopters  
1980-2000's**

Evolved  
→

## Tools



**Initial Camera Drones  
2010's**

Evolved  
→

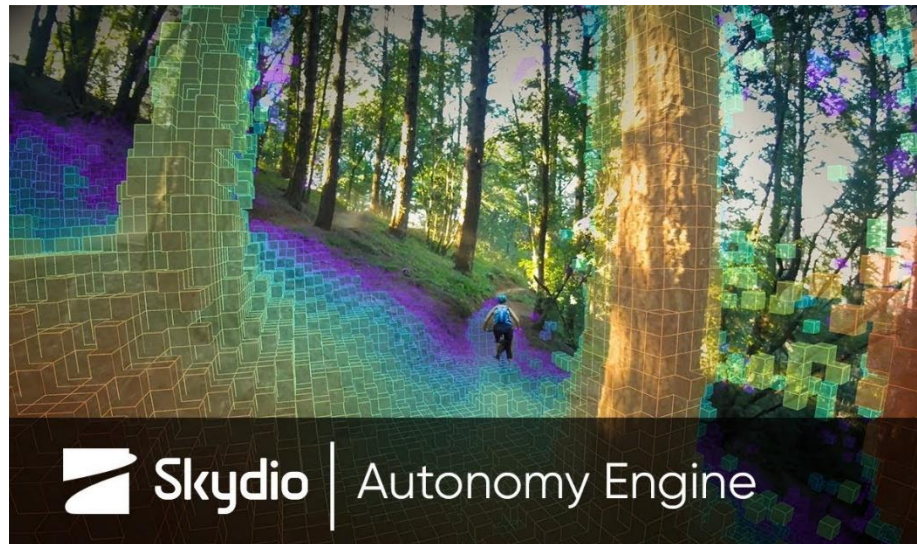
## Critical Infrastructure



**AI-Enabled FPV Drones  
2020's (Present)**



# Drones & Autonomy



Navigating open 3-dimensional space is arguably easier than city streets, factories, homes, etc.

Source: DJI, Skydio, Morgan Stanley Research



# Basic Autopilot & Object Avoidance Does Not Require Advanced AI



## Pixhawk 6X Autopilot Computer

~\$400

Based on STMicro Arm Cortex Microcontroller

Available On Various Hobby Sites



## ArduPilot Autopilot Software

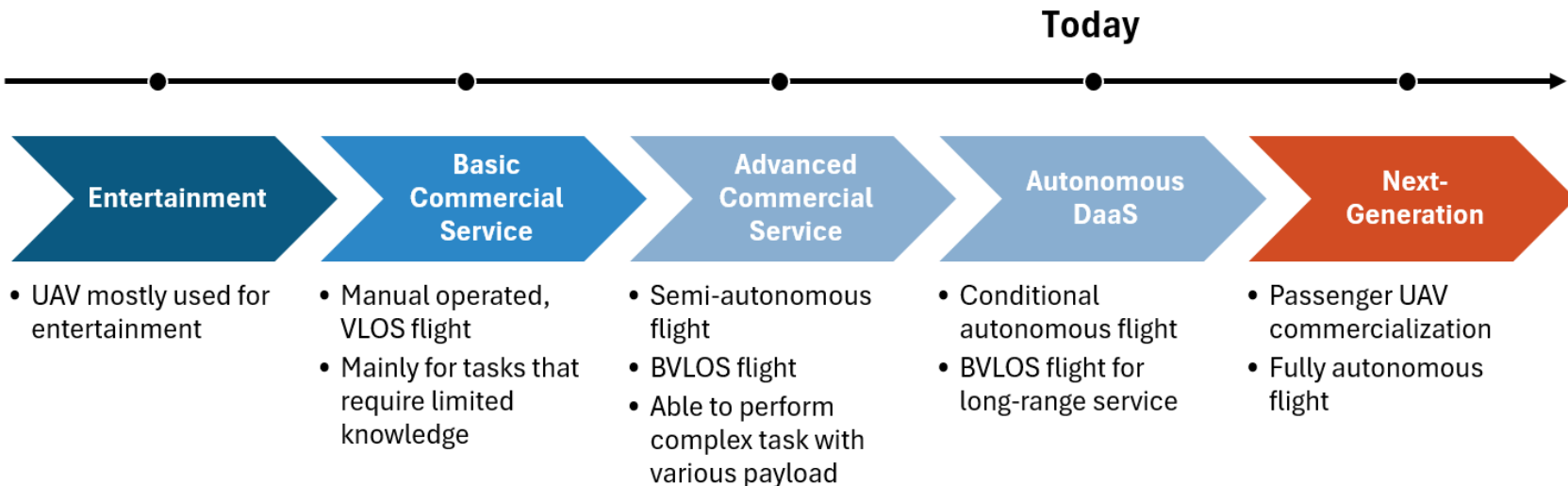
Open Source

First Released in 2009

Used During Ukraine's "Operation Spiderweb"



# Drones Today Have Achieved 'Conditional Autonomy', Progressing to Full Autonomy





# Multiple Companies Are Working on More Advanced ‘Swarm’ Autonomy

## Various autonomous systems

Control multicopter, fixed-wing, VTOL drones as well as ground rovers or unmanned boats

## GPS, ESC & more

Directly connect ESC, GPS, sensors, depth camera or FPV camera

## Flexible payloads

Supports best-in-class, fully integrated cameras and payloads

## LTE

Bring your robots online and enable automatic flight log analysis and cloud data sync



## Auterion Mission Control

Control vehicle and payload, view live video stream and plan missions from a single powerful but easy-to-use app.

## Auterion Suite

Analyze your flights, manage your fleet and operate over-the-air firmware updates

## Remote ID

Comply with the final Remote ID rule.

## Simulations

Run simulations with Skynode™ X hardware in the loop



## Auterion (Private)

### Skynode + AuterionOS for Drone Autonomy

33k Kits to Be Delivered to Ukraine (US DoD Contract)

## Shield AI (Private)

### Hivemind Pilot

Autonomous Mission Control & Autopilot

# Drones are ‘Dual Purpose’



## In Consumer Settings

Racing, photography, and recreation



## In Commercial Settings

Inspection, search & rescue, law enforcement, and agriculture

# Drones are ‘Dual Purpose’



**In Military Settings**  
Reconnaissance and munition-delivery missions

Source: Shutterstock, Morgan Stanley Research



## Notable Drone Manufacturers- China Dominates



## DJI (China) Controls 70% of the Global Market



“ *Any country that cannot manufacture its own drones is doomed to be the vassal state of any country that can.* ”

TSLA CEO Elon Musk - 1Q25 Earnings Call



# Ukraine's 'Operation Spider's Web'



## 'Operation Spider's Web' captured public attention around:

1. The potential lethality of small drones on the modern battlefield
2. The vulnerability of legacy military equipment and infrastructure



# Cost Comparison of Various Drones Used in Ukraine



**Custom FPV Drone**  
~\$300 - \$1k



**DJI Mavic**  
~\$2,000



**ZALA Lancet**  
~\$20,000



**Shahed 136**  
~\$35,000



**Switchblade 300**  
~\$100,000



**Orlan 10**  
~\$100,000



**Bayraktar TB2**  
~\$5,000,000



**Forpost**  
~\$7,000,000

Source: Wall Street Journal, Rasmussen Global, Baykar, 19fortyfive, Royal United Services Institute for Defence and Security Studies, Shutterstock, Wikipedia, Morgan Stanley Research



# Jiu Tian Drone Mothership



**High Altitude, Long Endurance Drone Designed to Deploy 100+ Microdrones or Loitering Munitions**

Source: China Central Television



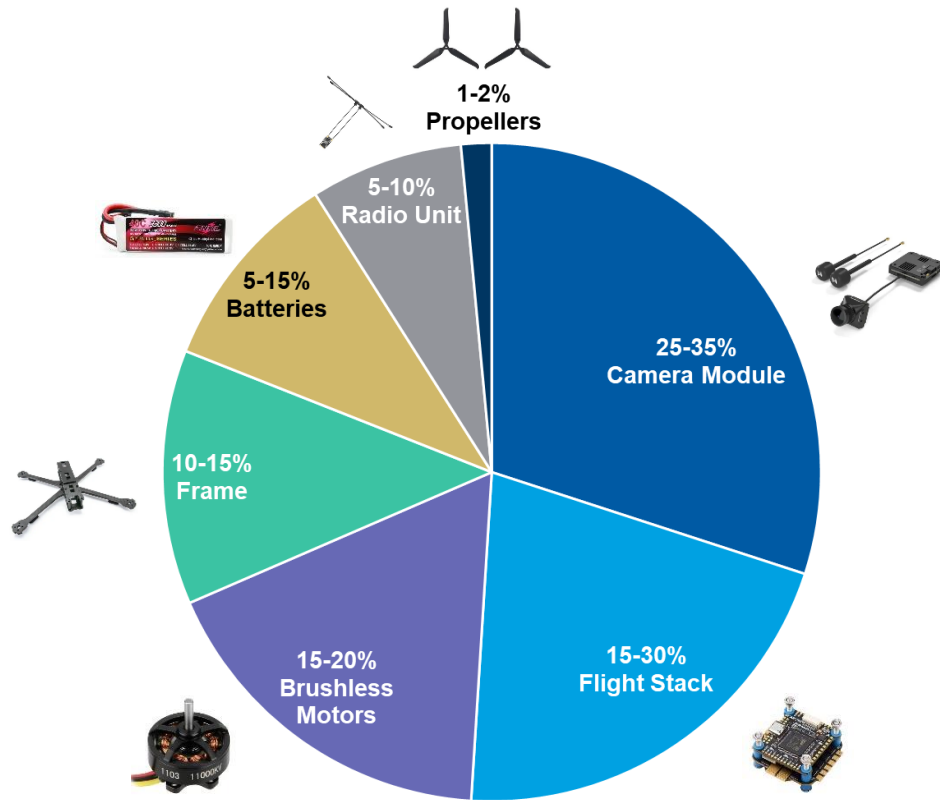
# A Nice Drone for \$300 Bucks?



Note: Background picture is of a DJI Mavic 2 drone. However, labels and prices are meant to be generalized to an average 6 to 10-inch FPV drone  
Source: DJI, RotorBuilds, GetFPV, RobotShop, MyFPVStore, Morgan Stanley Research estimates





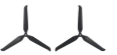





# Major Cost by Drone Component










Source: Morgan Stanley Research estimates



# Exploded Drone Bill-of-Materials

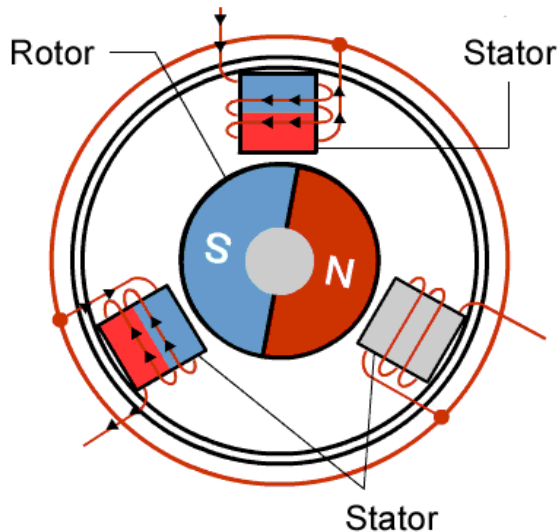
6-10 Inch FPV Drone BOM Cost				
Component	Picture	Description	Cost	% of Cost
<b>Frame</b>		Structure of the drone. Generally carbon fiber, aluminum, or 3D printed.	<b>\$50-100</b>	<b>10-15%</b>
<b>Brushless Motors</b>		Use permanent magnets to convert electricity into rotational motion	<b>\$75-150</b>	<b>15-20%</b>
<b>Propellers</b>		Converts rotational motion from electric motor into thrust	<b>\$5-15</b>	<b>1-2%</b>
<b>Batteries</b>		Generally lithium polymer (LiPo) batteries due to light weight and extremely high discharge rate.	<b>\$25-150</b>	<b>5-15%</b>
<b>Flight Stack</b>		The 'Brain' of the drone. These devices monitor and control the movements of the drone.	<b>\$75-250</b>	<b>15-30%</b>
Flight Controller		Central processing unit of the drone, integrating sensors and software to control flight.	\$50-150	10-20%
Autonomous Flight Computer (Optional)		Enable autonomous navigation, control, and stability. Consists of flight controller, GPS, and other sensors. Generally use Pixhawk open-source autopilot standards.	\$400-1,000	
Electronic Speed Controller		Manages speed, direction, and power of a drone's motors.	\$25-100	5-15%

6-10 Inch FPV Drone BOM Cost (Continued)				
Component	Picture	Description	Cost	% of Cost
<b>Camera Module</b>		The 'Eyes' of the drone. Captures video and transmits it to the operator.	<b>\$100-250</b>	<b>25-35%</b>
Camera		Captures video data which is sent to the transmitter.	\$50-100	10-15%
Video Transmitter		Converts video data into a wireless signal that is transmitted to the operator via an antenna.	\$50-125	10-20%
Video Antenna		Structure that actually sends the video data to the operator.	\$5-25	1-3%
<b>Radio Unit</b>		The 'Ears' of the drone. Transmits and receives radio signals between the drone and the operator.	<b>\$30-75</b>	<b>5-10%</b>
Radio Receivers		Captures and interprets radio signals received by the operator to pilot the drone.	\$25-50	5-10%
Radio Antennas		Structure that actually captures radio signals from the operator.	\$5-25	1-3%

Source: Company Websites, GetFPV, RobotShop, MyFPVStore, Morgan Stanley Research



# Closer Look at Drone Components: Brushless DC Motors



## What is a Brushless DC Motor (BLDC)?

- Rotor = permanent rare earth magnet
- Surrounded by stationary coil electromagnets (stators).
- Electricity alternated through stators to adjust direction and speed of motor
- **Advantages:**
  - High speeds and power-to-weight ratios
  - Near instantaneous control of speed and torque
  - Low maintenance
  - Cheap (~\$20-30)

# Closer Look at Drone Components: Brushless DC Motors

Market is *Extremely* Fragmented with Low Barriers to Entry

Small Hobby Companies in China Each Produce Tens of Thousands of Motors a Day



Worker on a T-Motor Assembly Line in Nanchang

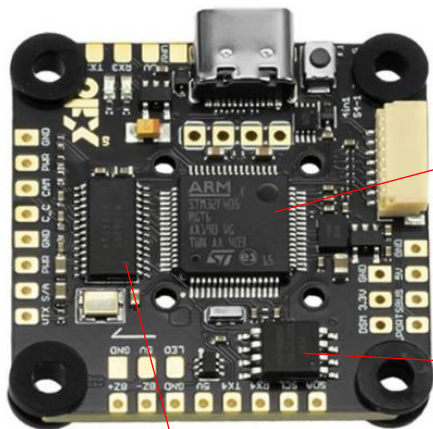


Worker on an EMAX Assembly Line in Dongguan



# Closer Look at Drone Components: Electronics & Semis

## XILO Stax V3 Flight Controller (\$52)

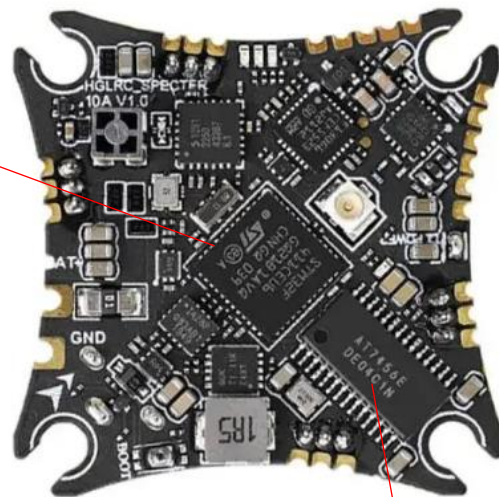


**Analog Devices (US)**  
AB7456  
Onboard Display Controller  
(\$1-2)

**STMicro (Switzerland)**  
ARM Cortex M4 STM32F4  
Microcontroller  
(\$12)

**Winbond (Taiwan)**  
25Q128JVSQ  
Flash Memory  
(<\$1)

## HGLRC Specter AIO Flight Controller (\$97)



**ZHONGKEWEI (China)**  
AT7456E  
Microcontroller  
(\$1-2)

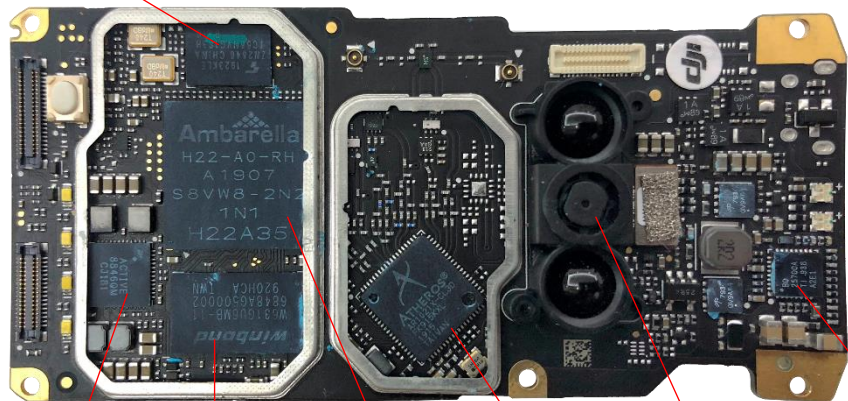
Source: Mouser Electronics, GetFPV, Morgan Stanley Research



# Closer Look at Drone Components: Electronics & Semis

**Toshiba (Japan)**  
Kioxia TC58NVG1S3H  
Flash Memory  
(\$1)

## DJI Mavic Mini Motherboard



**Qorvo (USA)**  
ACTIVE-SEMI ACT8846  
PMU  
(<\$1)

**Winbond (Taiwan)**  
W631GU6MB-11  
DRAM  
(\$1)

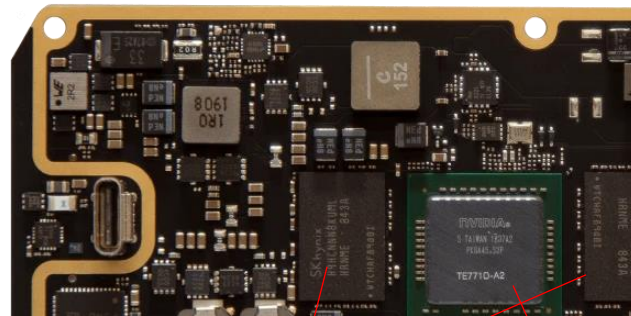
**Ambarella (USA)**  
H22-AH-RH  
4K Video Processor  
(\$15)

**Qualcomm (USA)**  
Atheros AR1021X-CL3D  
Long-Range WiFi Transceiver  
(\$12)

**NXP (Netherlands)**  
RT1060 ARM Cortex M7  
Microcontroller  
(\$5)

**Texas Instruments (USA)**  
BQ25700A  
Battery Management  
(\$1-2)

## Snapshot of Skydio2 Circuit Board



**SKhynix (South Korea)**  
H9HCNNN8KUMLHR  
DRAM  
(2 x \$5)

**NVIDIA (USA)**  
Jetson Tx2  
256-Core CUDA GPU  
(\$200)

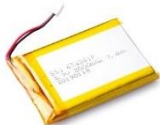
Source: DJI, Skydio, Mouser Electronics, DigiKey, Morgan Stanley Research



# Closer Look at Drone Components: Batteries

## Most Drones Use Lithium Polymer (LiPo) Batteries

### Lithium Polymer (LiPo)



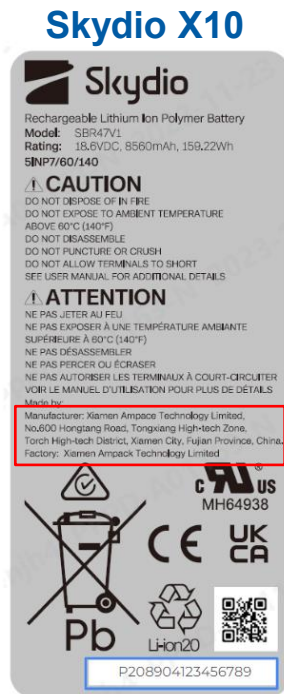
Pros	Cons
Shorter Charge Time	Less Energy Dense
Fast Discharge Rate	Expensive
Lighter	Niche Applications

### Lithium Ion (Li-ion)



Pros	Cons
More Energy Dense	Longer Charge Time
Cheaper	Slower Discharge Rate
Diverse Applications	Heavier

# Closer Look at Drone Components: Batteries (Continued)



**Ampace  
(China)**



**ATL  
(China)**



**DJI- In House  
(China)**



## Drone Component Players: China Dominated

	Brushless Motors	Electronics (Flight Contr./ESC's)	Camera Modules
Small Hobby Companies	BETA FPV	BETA FPV  SpeedyBee	BETA FPV
	BrotherHobby	BrainFPV  TBS	DJI
	EMAX	CUAV  T-Motor	EMAX
	Flywoo	CubePilot	Flywoo
	HappyModel	EMAX	HDZero
	iFlight	HappyModel	HGLRC
	Lumenier	Holybro	Lumenier
	Rotor Riot	iFlight	RunCam
	T-Motor	Lumenier	TBS
	XILO	MatekSys	Walksnail
Large Corporates Involved	Ametek  Nidec	Ambarella  Qualcomm	GoPro
	Allied Motion  Maxon	Foxconn  STMicro	Intel
	Johnson Electric  Regal Rexnord	NVIDIA  Texas Inst.	Sony
	Zhaowei	NXP Semi	Teledyne

*Note: Many large drone companies (DJI, Skydio, etc.) manufacture many of their components in-house*

Note: Meant to provide a realistic snapshot. Does not include 100% of players involved.

Source: Morgan Stanley Research



## LiPo Batteries Have More Niche (Also China Dominated) Suppliers



A&S Power



Ampace



ATL



CNHL



DNK Power



Grepow



MaxAmps



Panasonic



Padre Electronics



Sony



Tenergy



Turnigy

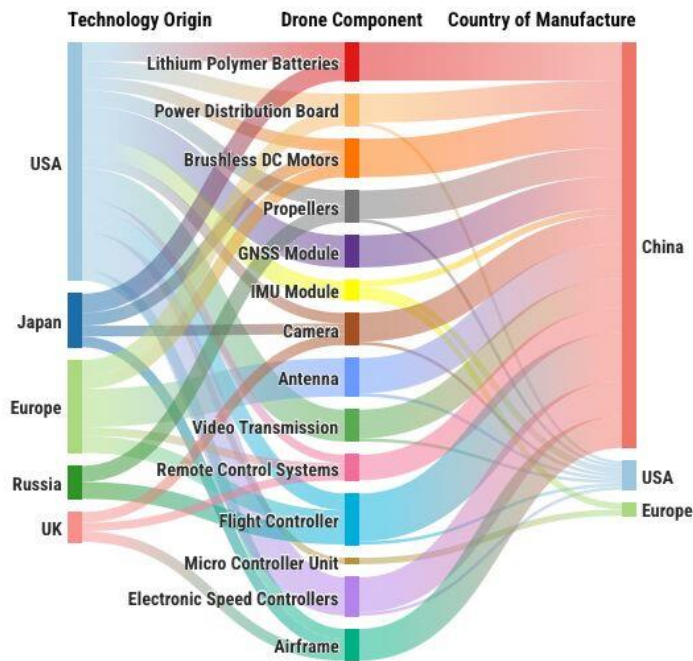


Ufine



# China Dominates Drone Components

## MIT Analysis of Drone Component Sourcing



Source: [Edlyn Levine & Fiona Murray](#)



# China Dominates The Hobby Drone Supply Chain

China



**USA/CA**

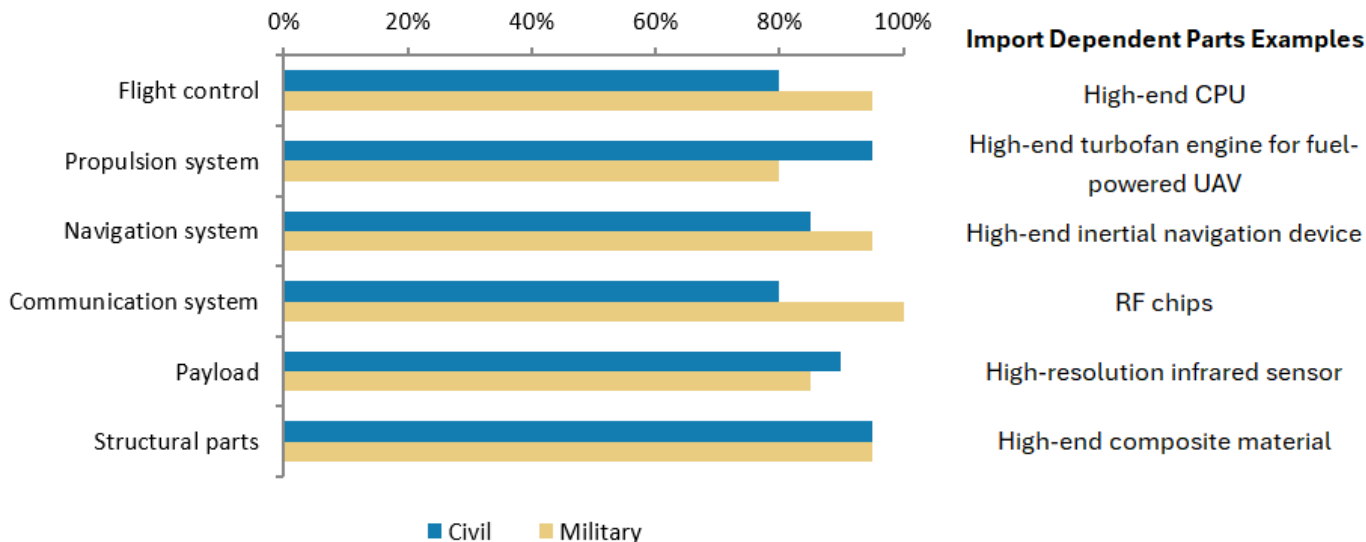


Note: Does not represent 100% of companies.  
Source: Company Websites, Morgan Stanley Research



# China's Drone Industry Is Heavily Localized

Localization Rate of UAV Components in China



**Import Dependent Parts Examples**

High-end CPU

High-end turbofan engine for fuel-powered UAV

High-end inertial navigation device

RF chips

High-resolution infrared sensor

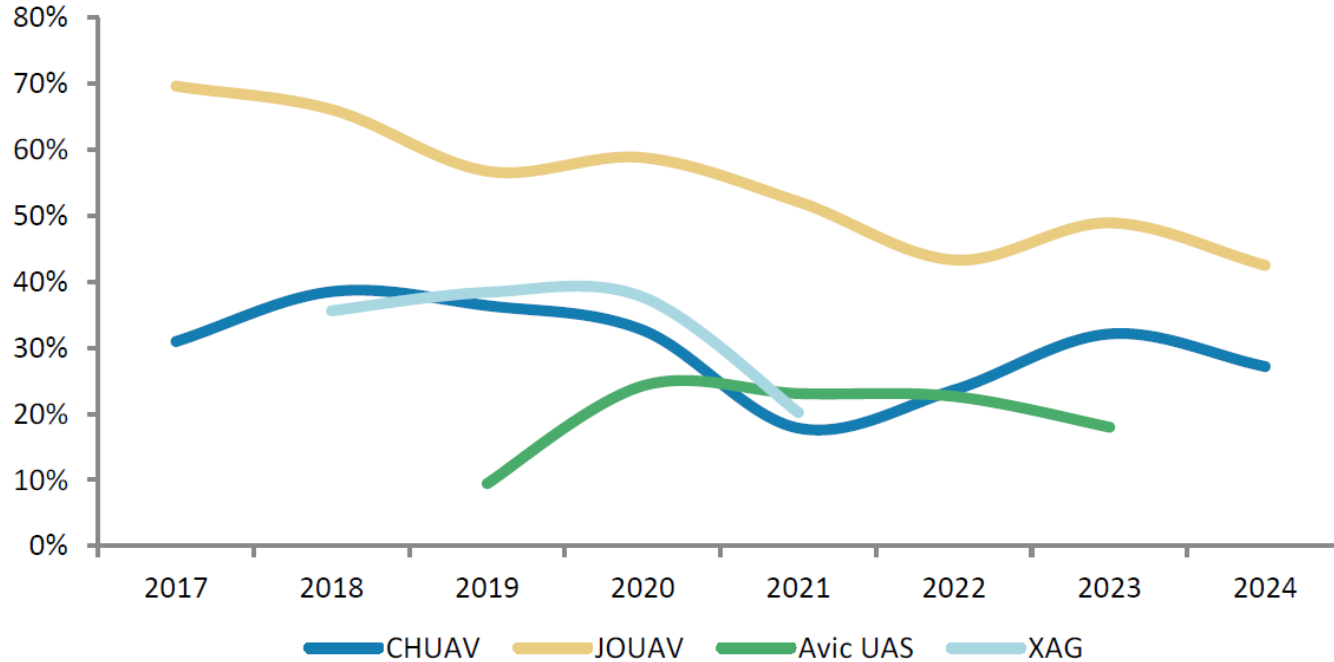
High-end composite material

Source: Morgan Stanley Research



# China Drone OEMs Under Margin Pressure Given Intense Competition

UAV OEM GPM



Source: Company Data, Morgan Stanley Research



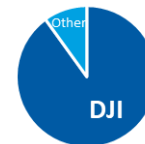
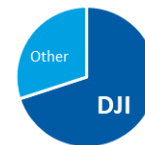
# DJI's Dominance



In 2023, DJI controlled **70%** of the global drone market.

In 2021, DJI controlled **80%** of the US commercial drone market.

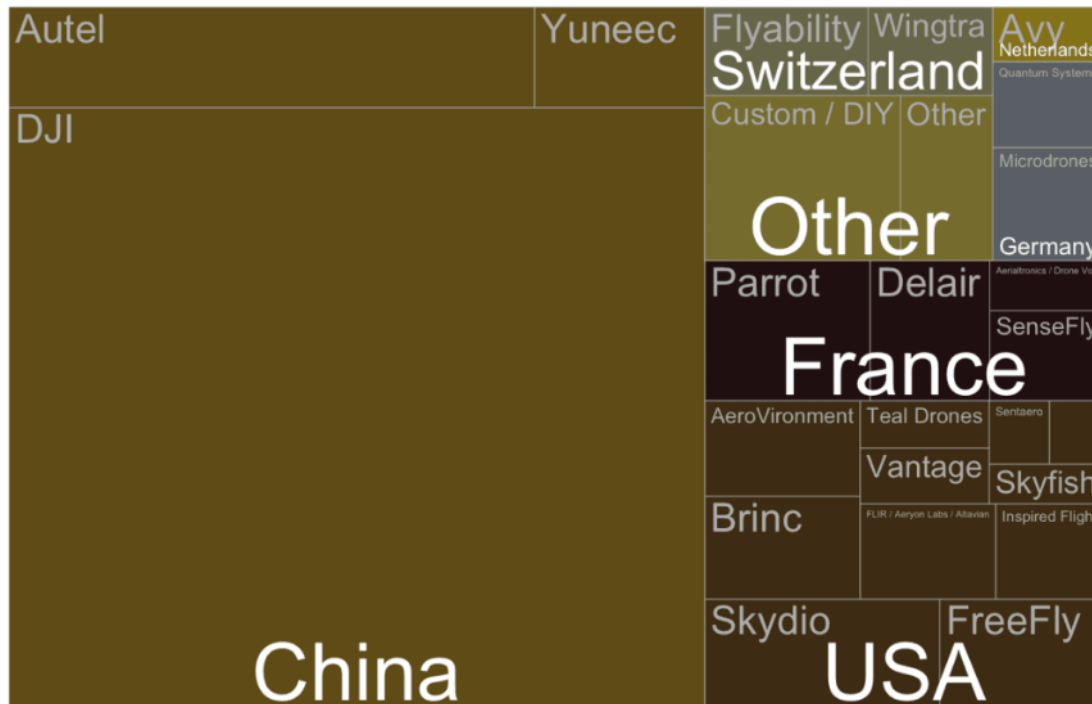
In 2020, **90%** of drones operated by US public safety agencies were DJI.





# DJI's Share vs. Rivals

## DroneAnalyst 2021 Drone Market Share Analysis



n = 1408 | DroneAnalyst 2021 Market Sector Report

Source: DroneAnalyst, Atlantic Council, Morgan Stanley Research



## DJI Imports May Soon be Blocked in the US. *There is No Clear Replacement.*



**70% of Global Drone  
Market**

**December 23, 2025**

**DJI Auto-Added to FCC Covered List  
(Restricted from Import)**

Unless a National Security Agency audits DJI and declares that its products do not pose a national security risk

No agency has currently begun any audit per DJI

# National Support Enabling China's Dominance

## Made In China 2025

**Goal:** Transform China from the 'world's factory' of low-value goods to high-tech manufacturing.

### Policies Include:

- Reduced tax rates in critical industries
- Direct and indirect funding of R&D
- Investment in startups

The "Made in China 2025" plan highlights 10 sectors:

 New generation information technology	 New energy and energy-saving vehicles
 High-end computerized machines and robots	 Energy equipment
 Aerospace	 Agricultural machines
 Maritime equipment and high-tech ships	 New materials
 Advanced railway transportation equipment	 Biopharma and high-tech medical devices



# National Support Enabling China's Dominance

## Military-Civil Fusion

**Goal:** Develop the PLA into a “world-class” military by 2049 by establishing linkages between the state and privately-owned companies that can contribute to military projects.

### Policies Include:

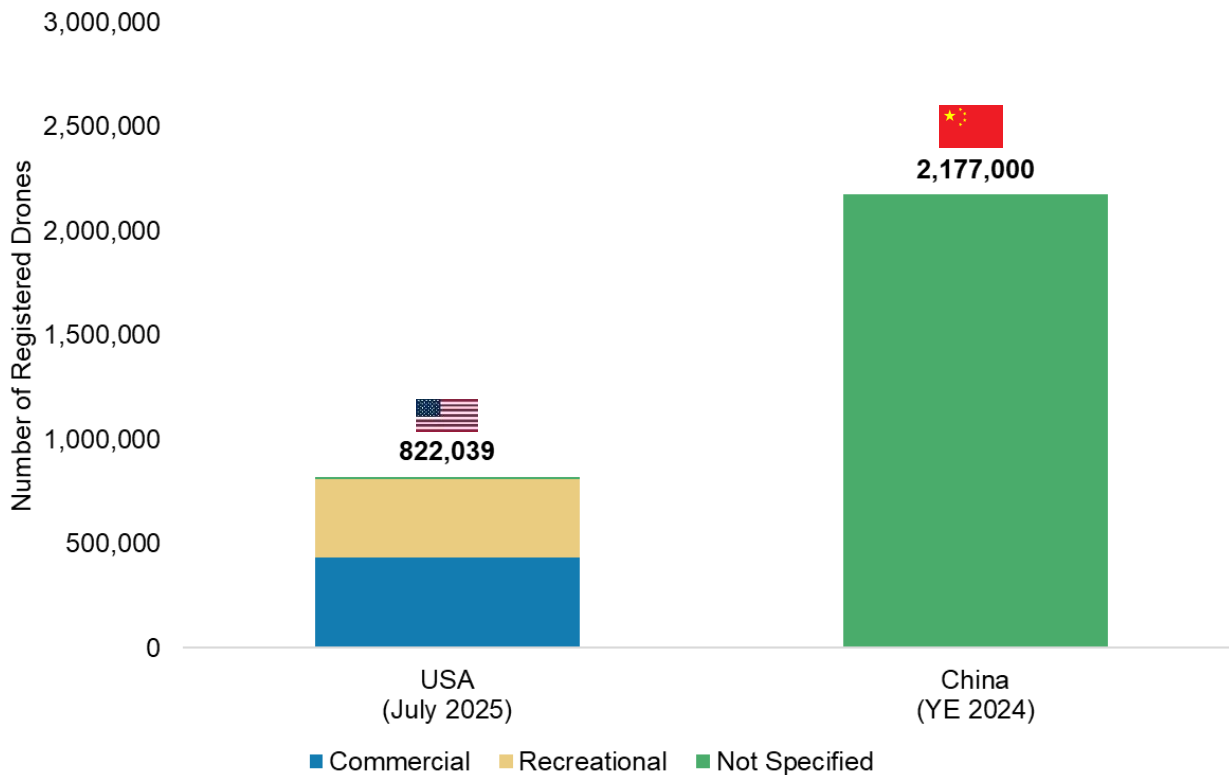
- Promotion of dual-purpose technology
- Collaboration between military and private sector
- Direct investment in private industry



*Jiu Tian “Drone Mothership”*



# Officially Registered Small Drones in US & China

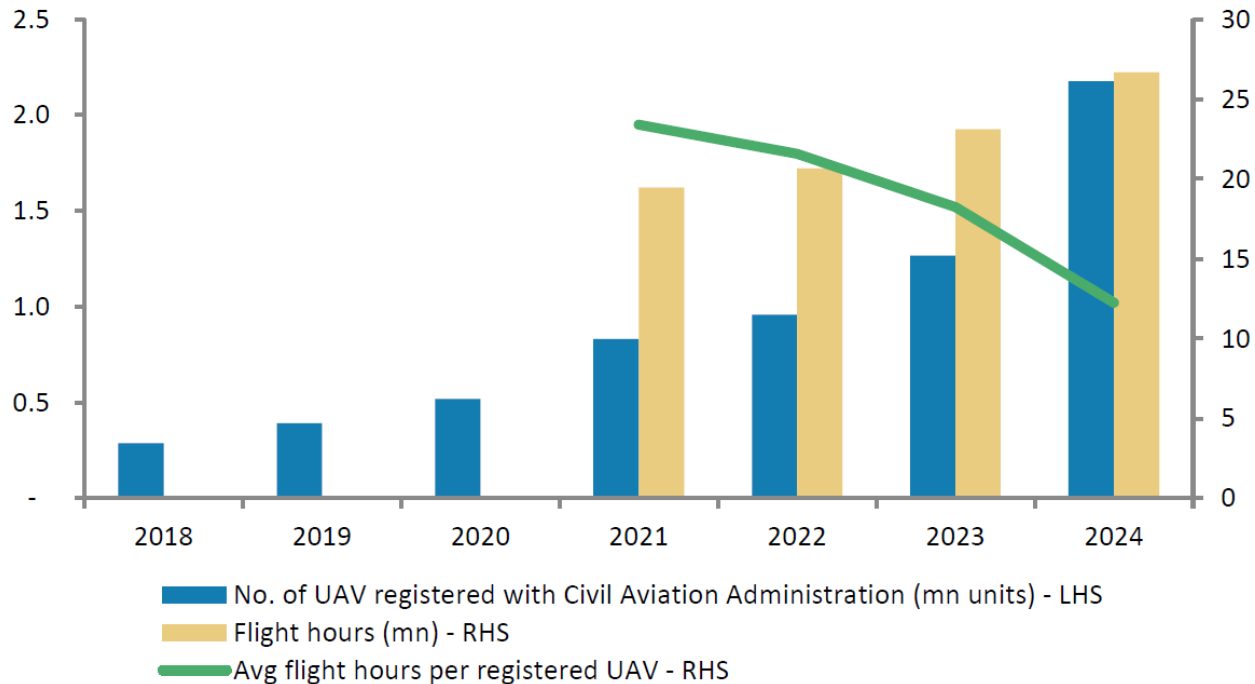


Source: FAA, China Civil Aviation Administration, Morgan Stanley Research



# Growth in Registered Drones in China Since 2018

## Operation of UAV registered with Civil Aviation Administration



Source: China Civil Aviation Administration, China Aerospace, Morgan Stanley Research



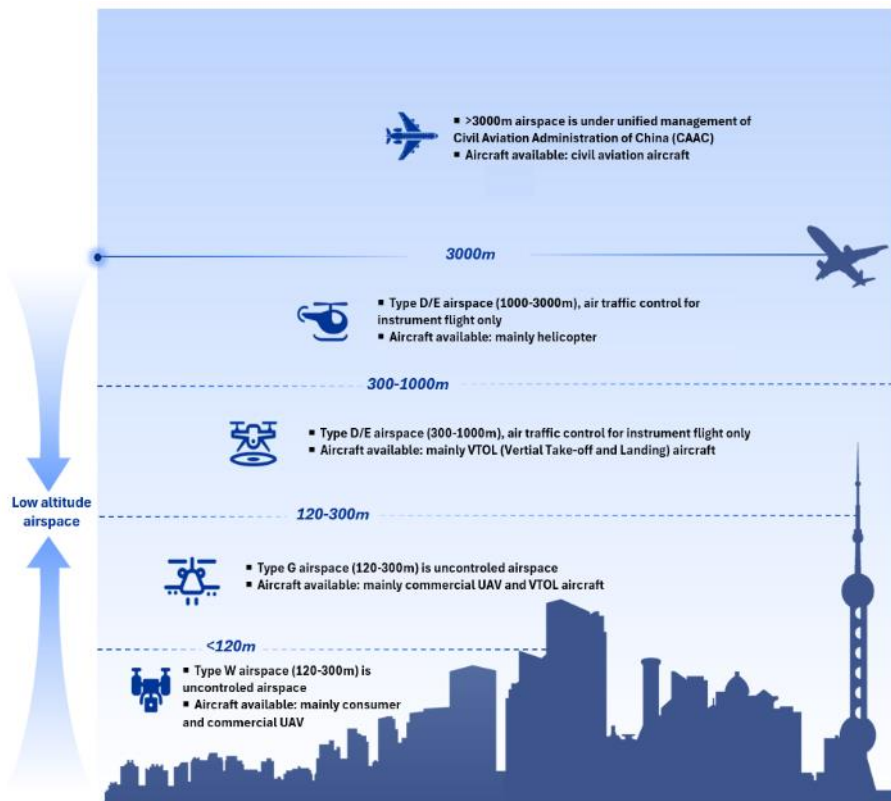
# Drone Display in Shenzhen For Beginning of Dragon Boat Festival



Source: China Central Television (CCTV) - 2023



# China Has Allowed Flexibility For Select Cities To Regulate Drone Airspace



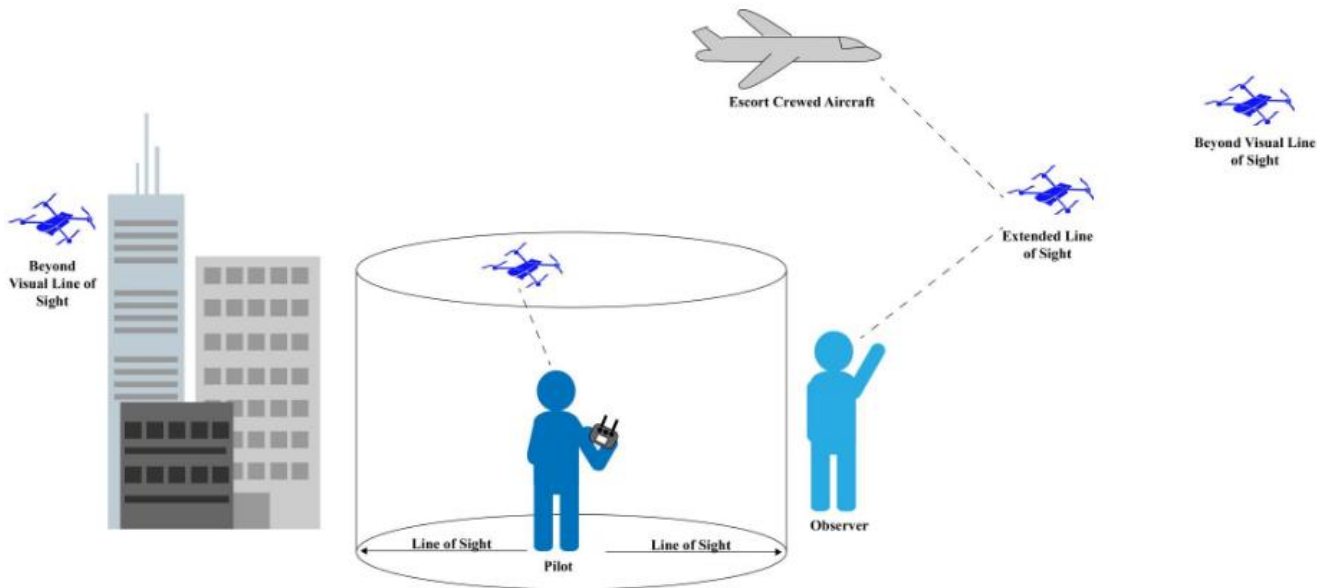
**China Currently Allows Drones <300m**

**Deregulated in Select Cities: Local Govts Regulate Airspace <600m For The Low-Altitude Economy, Enabling Greater Drone Penetration.**

Source: Civil Aviation Administration of China, Morgan Stanley Research



# In the US, Drones Require a Waiver to Be Flown Autonomously



**Per FAA, all drones in the US must be flown within visual line of sight of the operator unless the operator is granted a waiver**



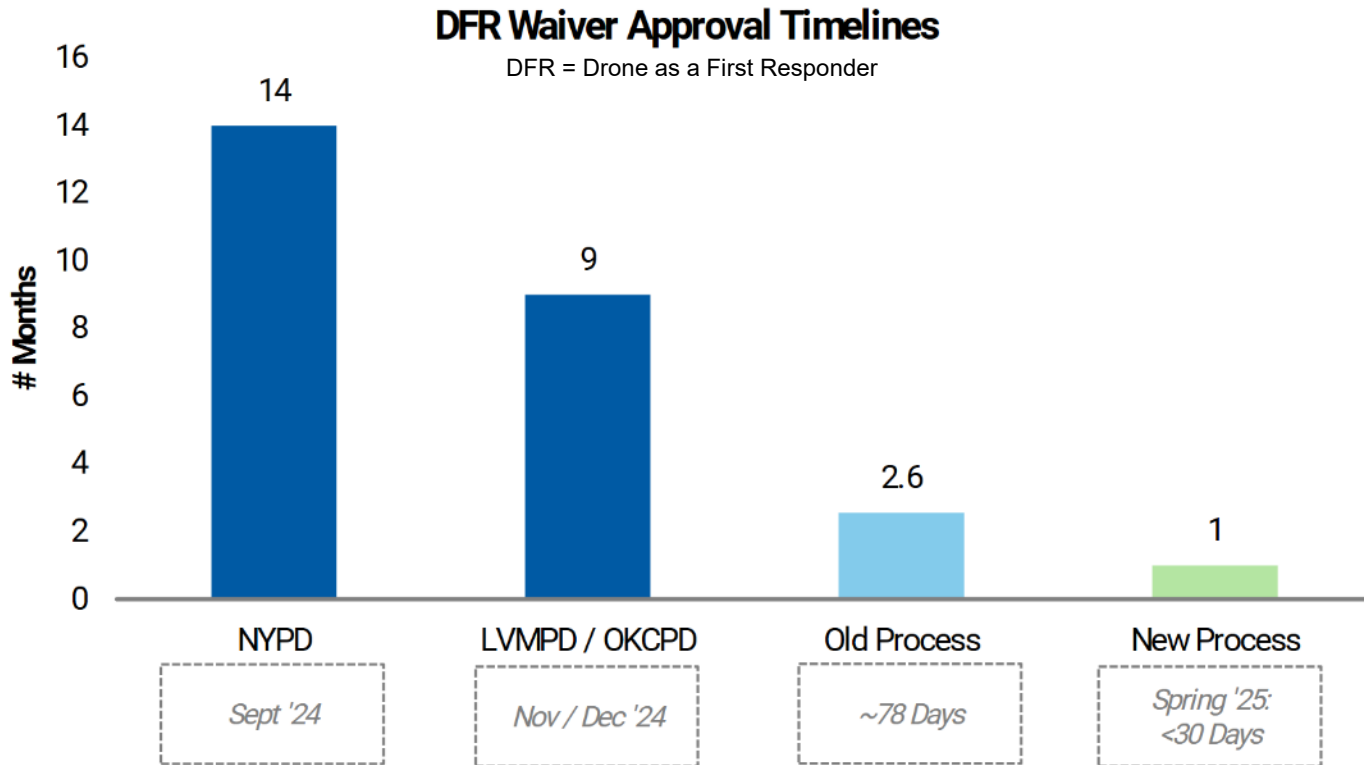
# Current Administration Aiming to Streamline These Waivers



**June 6<sup>th</sup> Exec Order: Aimed at streamlining BVLOS regulations & approval process**



# Drone Waiver Approval Times Are Now Falling

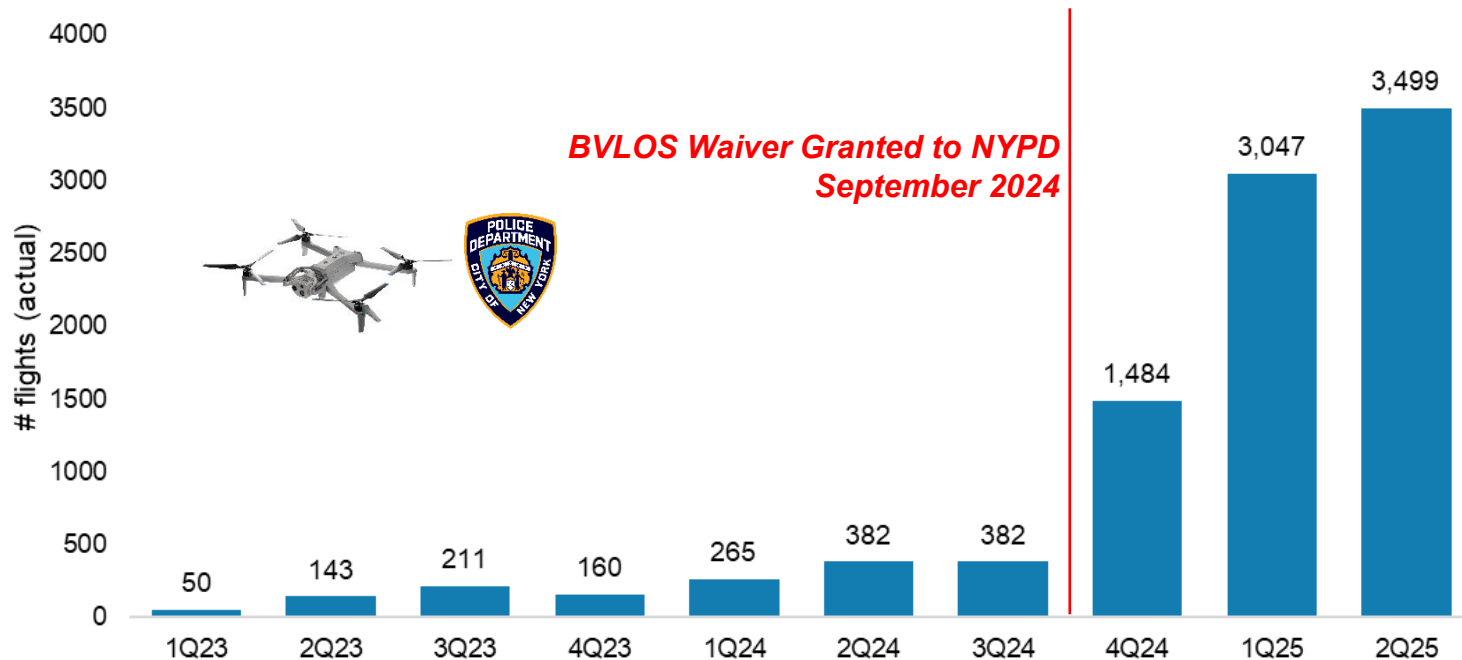


Source: Skydio, Morgan Stanley Research



# Ex: Rapid Growth in NYPD Drone Missions Post BVLOS Approval

## NYPD Drone Missions



Source: NYC.gov, Skydio, Morgan Stanley Research



# July DoD Memo: Unleashing US Military Drone Dominance



Source: US Department of Defense



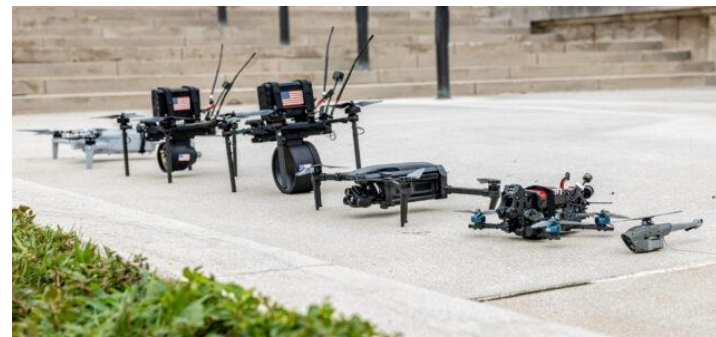
# July DoD Memo: “Unleashing US Military Drone Dominance”

## Goals for ‘UAS Dominance’ by 2027

### 1 Bolster US Drone Manufacturing Base

### 2 Deliver Thousands of Low-Cost Systems to Military Units

### 3 Integrate Drone Operations Into Training Programs



## Deadlines Established

- **Various Deadlines for:**
  - Adding UAS formations across armed forces
  - Establish program offices solely for UAS
  - Improvements to List of DoD-approved UAS
  - Identifying Programs To be Replaced by Drones
  - Designate National Ranges for UAS Training



# US Army Sec Driscoll: US Army to Acquire Millions of Drones

*(Per 11/7/25 Interview with Reuters)*



**Daniel Driscoll**

Secretary of Army

## Annual Army Drone Acquisition

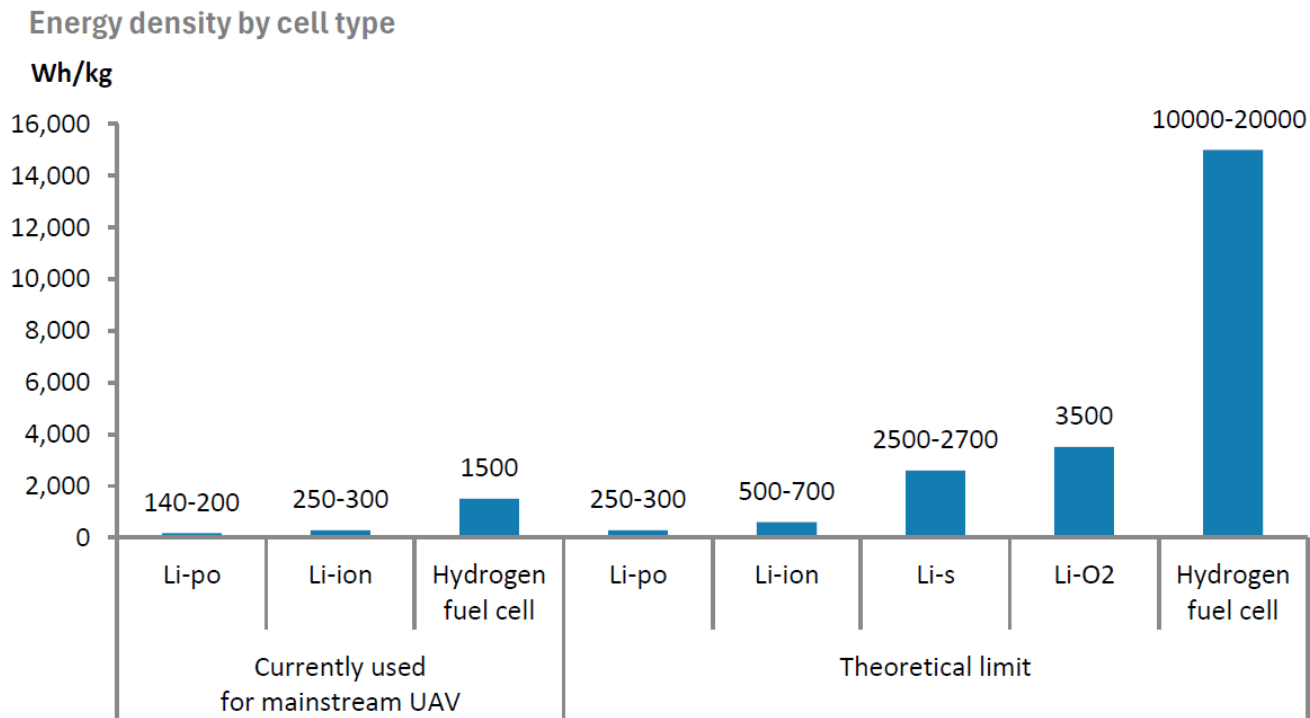
**50,000**



**500,000-  
1,000,000+**



## Other Bottlenecks: Energy Density

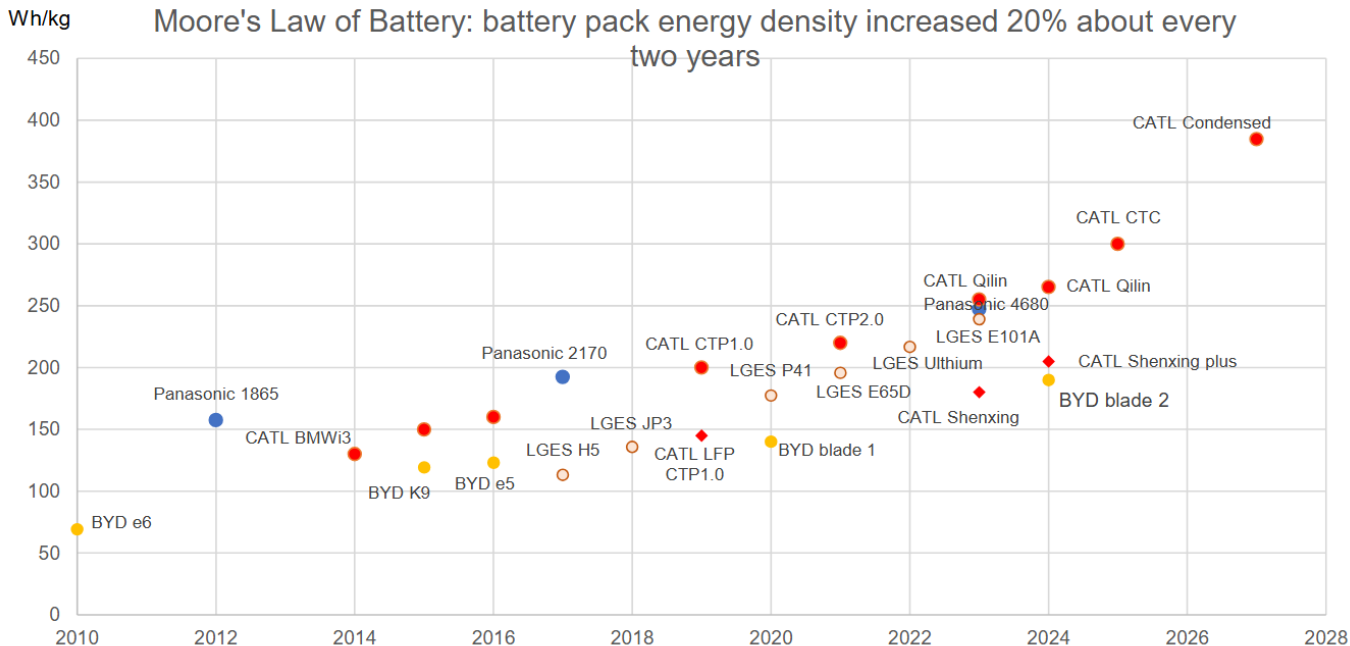


Source: Aero Engine Corporation of China, Morgan Stanley Research.



# Our Battery Team Assesses That Density Increases by 20% Every 2 Years

Analysis based on EV batteries.



Source: Company Data, Morgan Stanley Research.



# Current Commercial Applications for Drones



Mapping/Inspection



Agriculture



Delivery

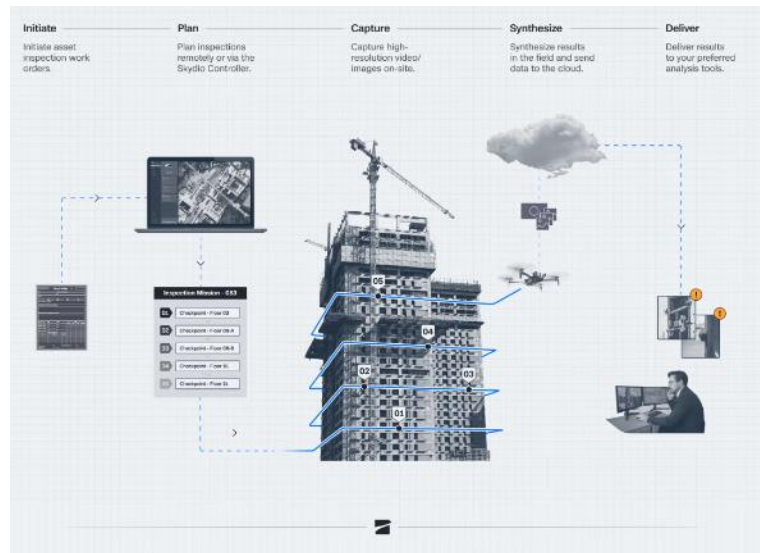


First Response



# Commercial Applications for Drones: Mapping/Inspection

## Notable Drone Developers



### Skydio Inspection Platform



## Notable Software Developers

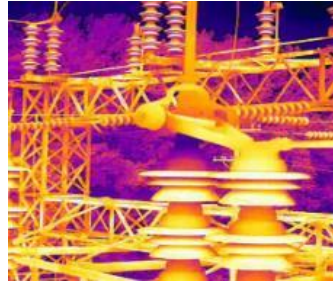




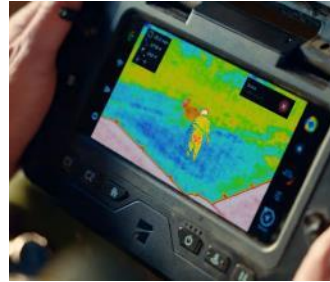
# Industries Using Drones for Mapping/Inspection



**Logistics**



**Energy & Utilities**



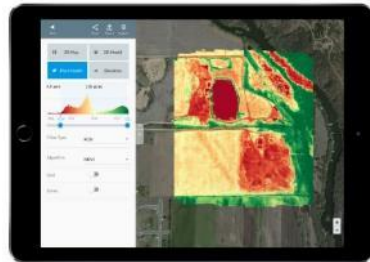
**Search & Rescue**



**Security & Patrol**



**Emergency Response**



**Agriculture**



**Mining**



**Construction**

Source: Skydio, DroneDeploy, DJI, Wingtra, Morgan Stanley Research



# Commercial Applications for Drones: Agriculture

## Notable Drone Developers



**DJI Agras T50**  
(~\$20k)



## Notable Software Developers



**DroneDeploy**



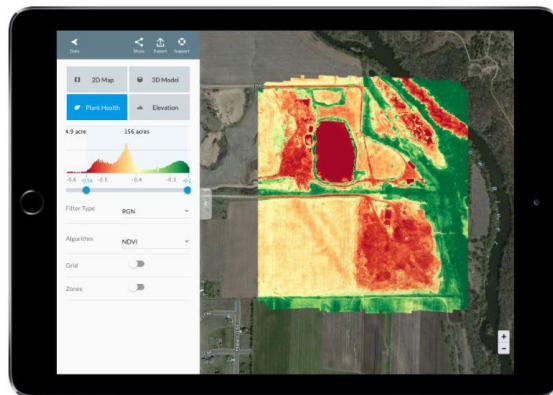
**PIX4D**



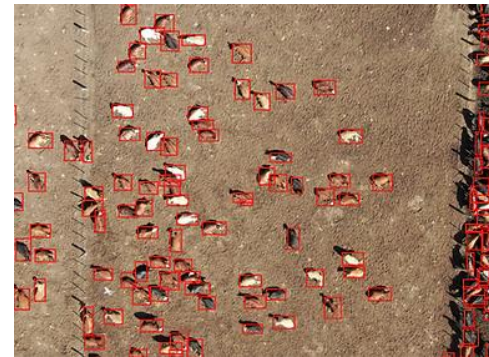
# Notable Applications for Drones in Agriculture



**Spraying**



**Crop Monitoring**



**Livestock Management**

Source: XAG, DroneDeploy, BeeFree Agro, Morgan Stanley Research



## Drones in Agriculture: Key Stats

**1/3**

of China's Farmland is  
Serviced by Drones

**500,000,000**

Hectares of Farmland are  
Serviced by Drones Globally

**30%**

Reduction in Chemical  
Use from Drone-Enabled  
Analytics (Up to)

**400,000**

DJI Agricultural Drones  
Operated Globally

Note: Stats as of 2024

Source: DJI Agricultural Drone Industry Insight Report, JoUAV, Morgan Stanley Research



# Commercial Applications for Drones: Delivery

## Major Players



Google's Project Wing



Source: Google Project Wing, Company Websites, Morgan Stanley Research



## Notable Companies Testing Drone Delivery





## Drone Delivery: Key Stats

**>1,500,000**

Deliveries Completed by  
Drone Delivery Startup  
Zipline Since 2016

**~2,700,000**

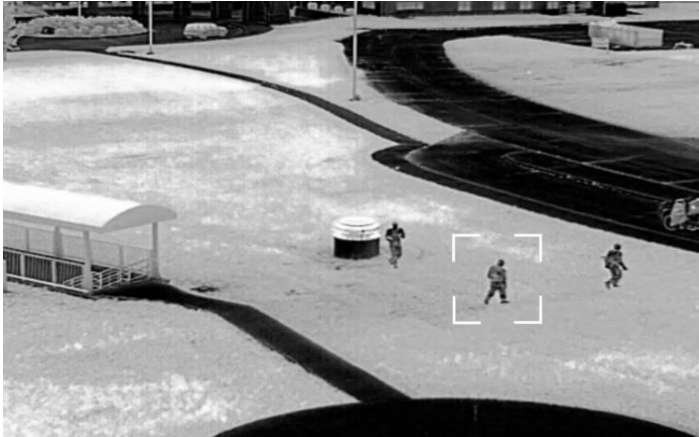
# of Parcels Delivered by  
Drones in China in 2024

**86%**

Of Amazon Packages  
are <5 Pounds



# Notable Military Applications for Drones



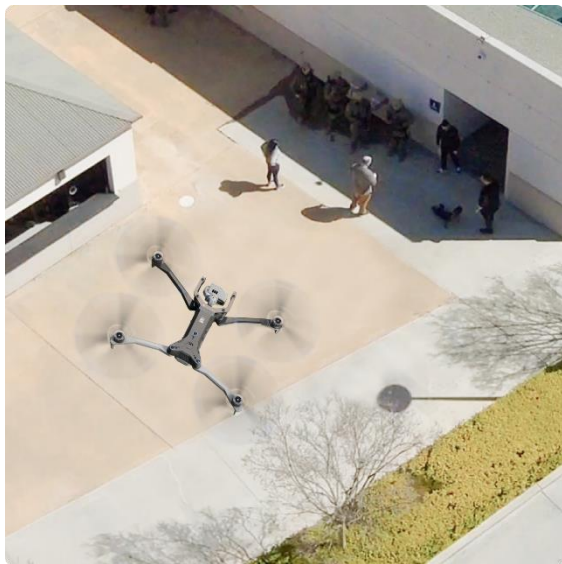
**Intelligence, Surveillance,  
and Reconnaissance (ISR)**



**Munition Delivery**



# Drone as a First Responder (DFR)



Skydio X10 Drone

## Major Players



## Key Stats

1,700

US Police Departments using Drones Today

133,000

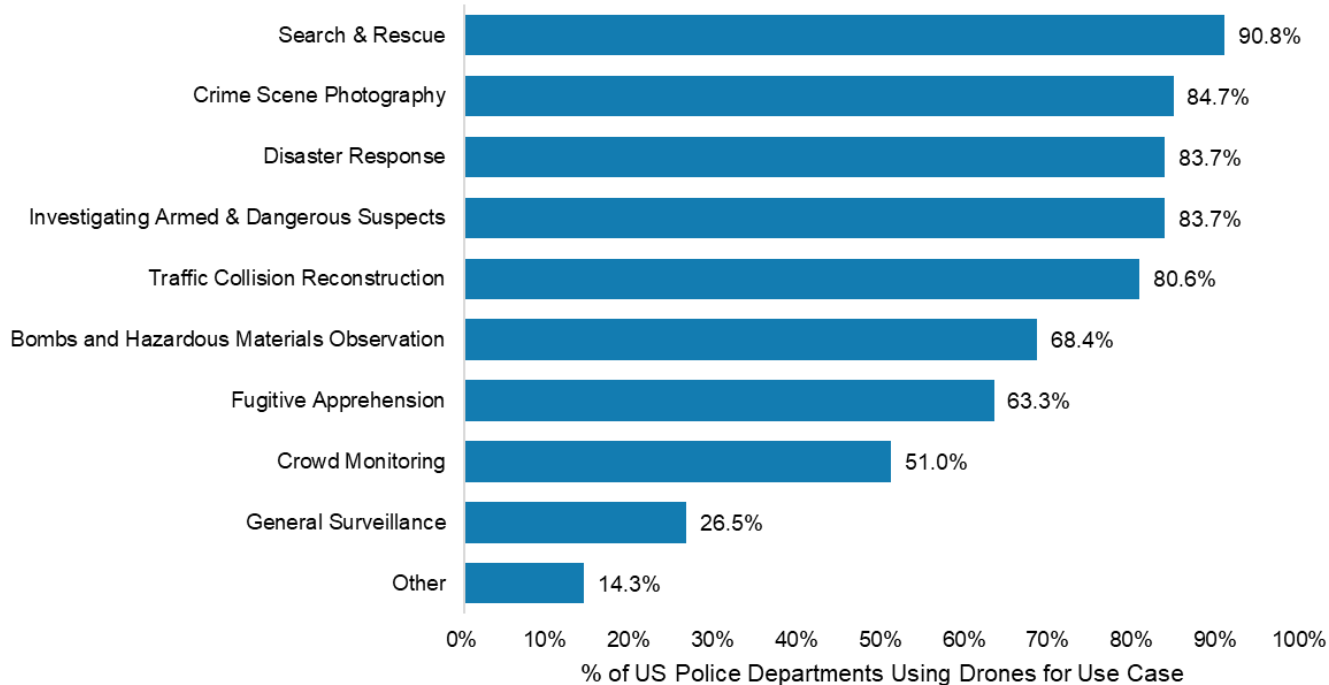
MSe Number of US First Responder Drones in 2030

Source: Skydio, Atlas of Surveillance, Company Websites, Morgan Stanley Research



# Drone as a First Responder (DFR) Use Cases

## Incidents Where Drones Used (PERF Survey of Police Departments)



Source: Police Executive Research Forum (2020), Morgan Stanley Research



# Military Applications for Drones



**AeroVironment Switchblade**



**Anduril Bolt-M**

## Major Players



## Key Stats

**70%**

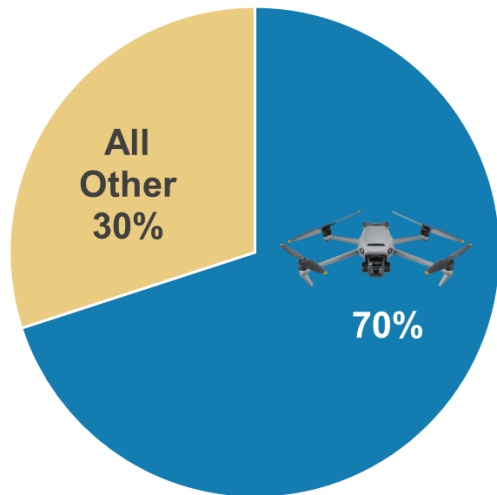
% Of Casualties in the Russia-Ukraine War Inflicted by Drones (Ukrainian Military)

**200,000**

Monthly Ukrainian Drone Production in Early 2025 (Atlantic Council)



## Per Ukrainian Leadership, 70% of Battlefield Casualties Caused By Drones



Drones, not the big, heavy artillery [that the war was once known](#) for, [inflict about 70 percent of all Russian and Ukrainian casualties](#), said Roman Kostenko, the chairman of the defense and intelligence committee in Ukraine's Parliament. [In some battles, they cause even more — up to 80 percent of deaths and injuries](#), commanders say.

*New York Times (March 3, 2025)*



### Roman Kostenko

Chair of Defense & Intelligence Committee  
of Ukrainian Parliament

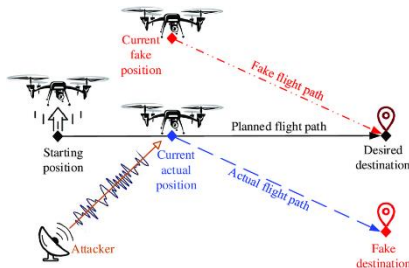


# Major Counter-Drone Methods

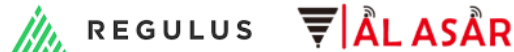
## RF Jamming



## GPS Spoofing



## Directed Energy



- **Disrupts control and video links, forcing drones to lose connection or land.**
- **Pros:** Non-destructive; Can eliminate multiple simultaneously.
- **Cons:** Less effective against autonomous/pre-programmed drones; Collateral risk to other aircraft.

- **Feeds false navigation data to misdirect or crash autonomous drones.**
- **Pros:** Non-destructive; Effective against drones using satellite navigation.
- **Cons:** Useless against drones using visual or inertial navigation; Collateral risk to other aircraft.

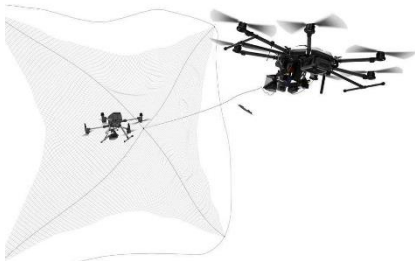
- **Physically disable drones by burning or frying electronics.**
- **Pros:** Low marginal cost-to-kill, Literal speed-of-light engagement.
- **Cons:** Sensitive to atmospheric conditions (weather); Large and expensive systems; Requires sustained line of sight.

Source: Anduril, National Library of Medicine, Lockheed Martin, Morgan Stanley Research



# Major Counter-Drone Methods (continued)

## Net Capture



- **Ensnare drone through fixed nets or nets launched by cannons or friendly drones.**
- **Pros:** Low collateral risk; Leaves drones intact for forensic analysis.
- **Cons:** Less effective against swarms; Often imprecise and evadable.

## Interceptor Drones



- **Fast, autonomous drones that track, chase and collide with hostile drones.**
- **Pros:** Agile & adaptable; Cheaper alternative to air defense missiles.
- **Cons:** Vulnerable to countermeasures; Short ranges and limited by battery life.

## Kinetic Projectiles



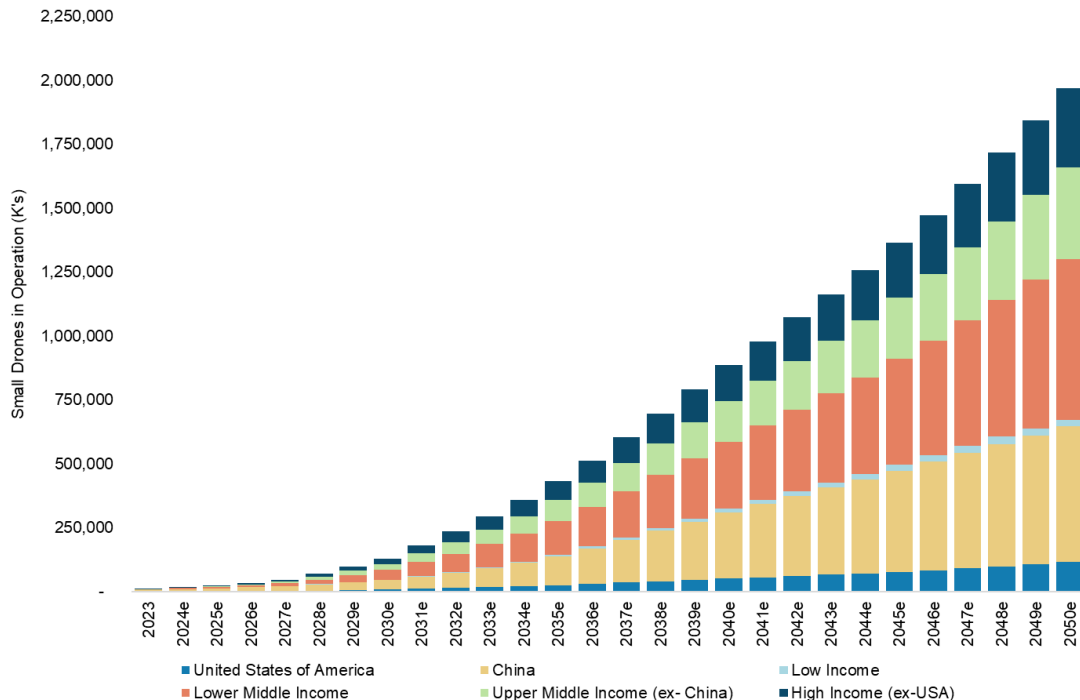
- **Guns, missiles, or specialized munitions ('The old-fashioned way').**
- **Pros:** Proven and reliable; Long range; Generally precise.
- **Cons:** Collateral risk; High cost-to-kill; Less effective vs. swarms.

Source: Fortem Technologies, MARSS, L3Harris, Morgan Stanley Research



# We See A Path For 2 Billion Drones Globally, Driven by China

*Represents Group 1 & 2 Unmanned Aerial Systems (UAS)*



## We Project....

**2030: ~130mn Drones**

**2040: ~900mn Drones**

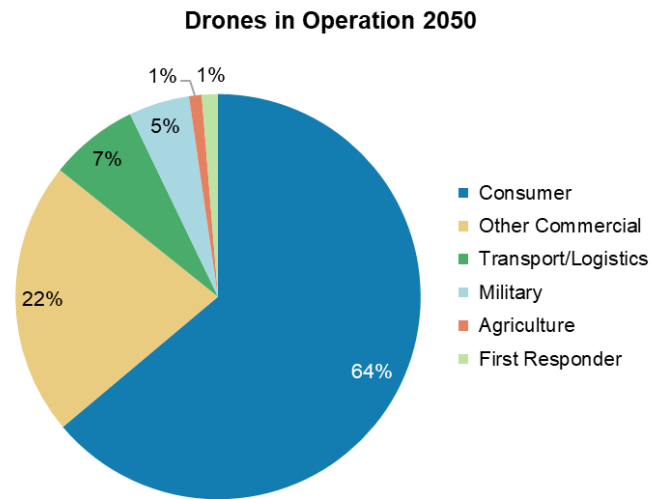
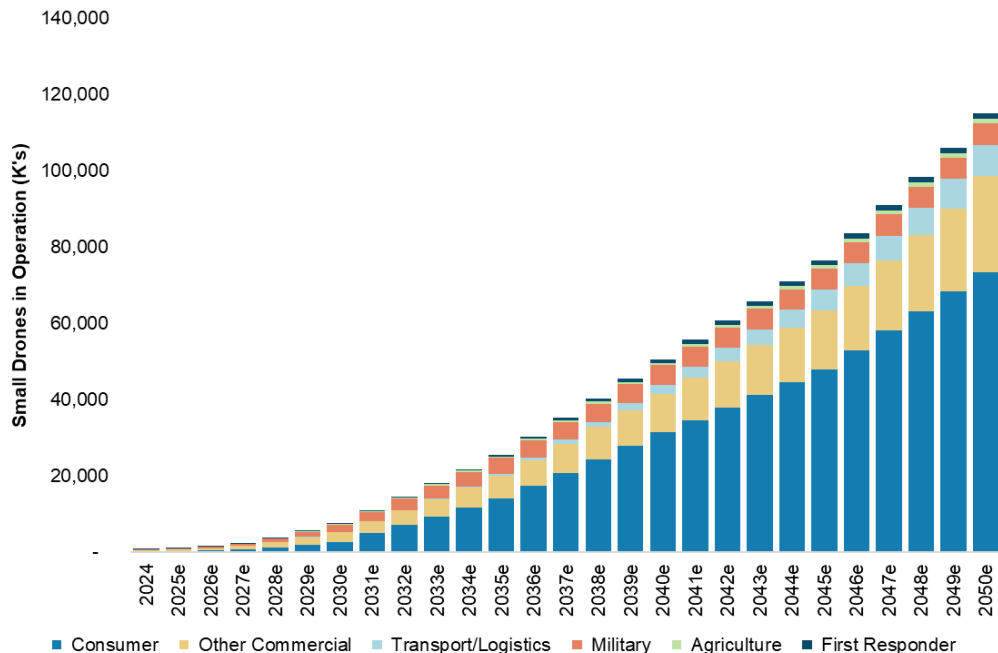
**2050: ~2 Billion Drones**

*(Reach out to your MS Rep for access to our Global Robot Model)*

Source: Morgan Stanley Research estimates



# In US: Driven by Consumer, Commercial, Logistics



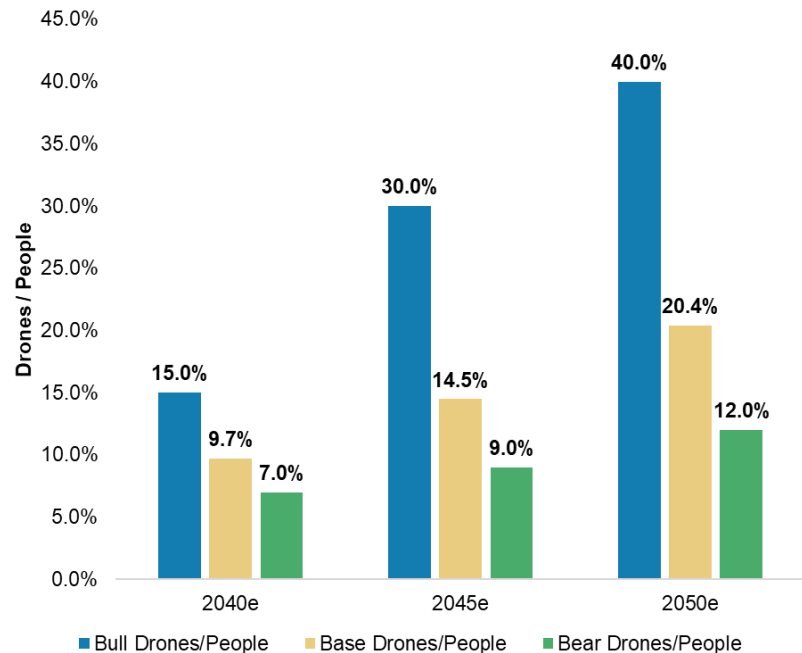
Source: Morgan Stanley Research estimates



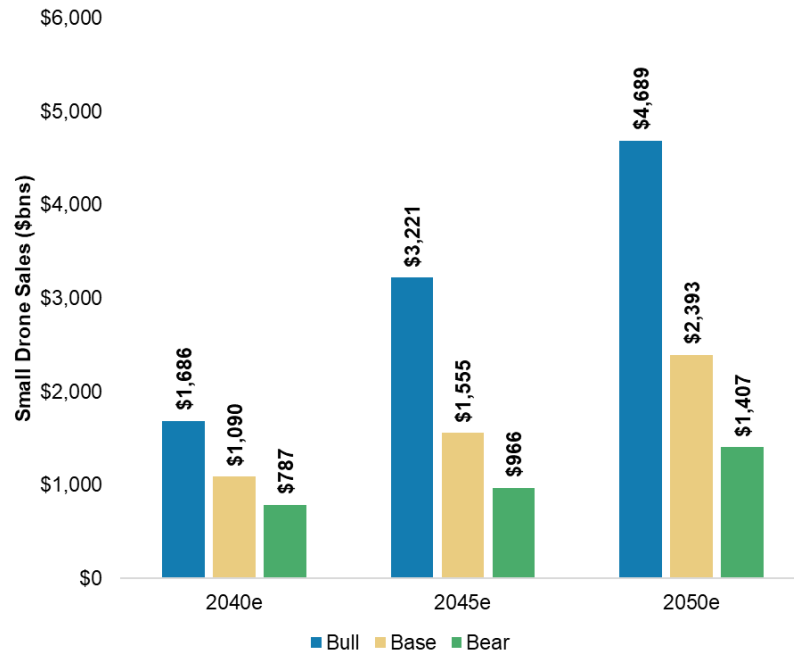
# Bull/Bear/Base Small Drone Revenue Estimates

Hardware Sales Only. Reach out for a copy of our Global Robot Model

Drones / Global Population



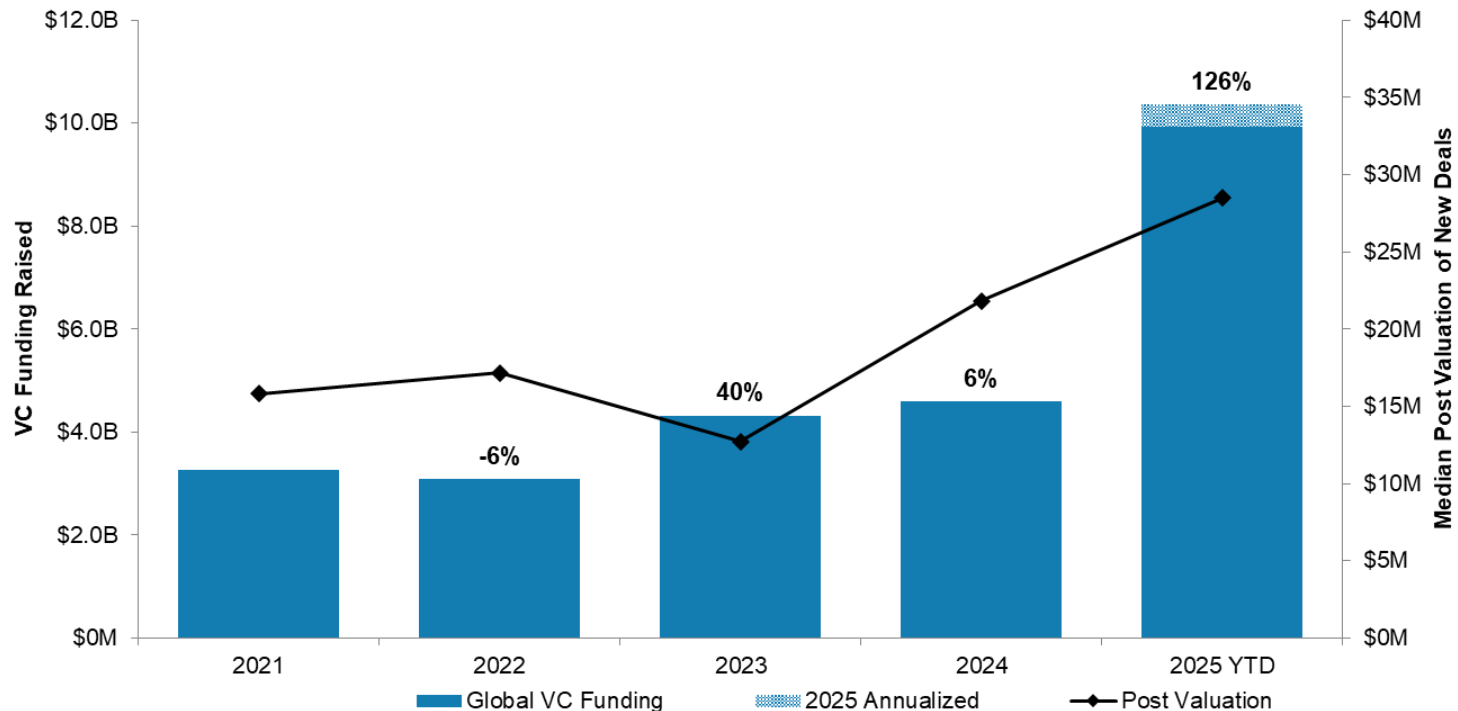
Global Small Drone Sales (\$bns)



Source: Morgan Stanley Research estimates



# Global Venture Funding for Drones



Note: May not capture all funding. Does not account for valuations not captured by PitchBook. Captures companies with keyword 'Drone' in bios on PitchBook- including drone manufacturing, components, software, autonomy, etc. As of 12/16/2025. Source: PitchBook data, Morgan Stanley Research



# Global Small Drone Enablers

Drone Manufacturing			Control/Autonomy			Delivery/Logistics			Components		
Public			Private			Public			Public		
Private			Private			Private			Private		

Note: Meant to provide a snapshot. Not all-inclusive.

Source: Morgan Stanley Research



## Notable Products



FPV Drones



Cinematography Drones



Agriculture Drones



Delivery Drones



Autonomous Docks



Cameras &amp; Equipment



Power Stations

## Key Info

- Largest drone maker in the world by a wide margin
- Founded by Frank Wang in 2006 in Shenzhen, China
- Last raised external funding in 2018 at a \$16bn val.
- 14,000 Employees (Feb 2025)

## Customers

70%

of the Global Drone Market

90%

of the Global Consumer Drone Market

## Investors

HONGSHAN  
红杉中国

Accel

NEW HORIZON  
新天域资本Lighthouse  
CAPITAL MANAGEMENT  
遠瞻资本

Boman 博满

丰誉资本  
FONG CAPITAL PARTNERS卓源资本  
Z&Y CapitalMIRAE ASSET  
Global Investments



(Private)

### Notable Products



Skydio X10



Skydio Dock



Autonomy Platform

### Key Info

- Major US small drone manufacturer. 50% revenues with military customers.
- Founded by Adam Bry, Abe Bachrach, and Matt Donahoe in 2014 in San Mateo, CA.
- Last raised external funding in Nov 2024 at a \$2.5bn val.
- Estimated 2024 revenue of \$180mn (*TechCrunch*)

### Customers

360+ Public  
Safety Agencies

150+ Energy  
Utilities

Every Branch of  
the US DoD

Militaries of the US,  
UK, Israel, New  
Zealand, India,  
Canada, and Ukraine

½ of US State  
Depts. Of  
Transportation

### Investors



Accel

Next47



andreesen.  
horowitz

LOCKHEED MARTIN 

ivp



Source: Skydio, PitchBook, TechCrunch, Morgan Stanley Research



(Private)

### Notable Products



**Platform 1**  
Long-Range  
Delivery Platform



**Platform 2**  
Short-Range  
Delivery Platform

### Key Info

- Largest drone delivery operator globally, having made 1.5mn deliveries to date.
- Founded by Keller Clifton and Keenan Wyrobek in 2012 in Half Moon Bay, CA.
- Last reported valuation in 2023 at \$4.2bn.
- Recently launched in Dallas in partnership with Walmart

### Customers



### Investors



Source: Zipline, PitchBook, Morgan Stanley Research



## Notable Products



Group 1-3 UAS



Loitering Munitions

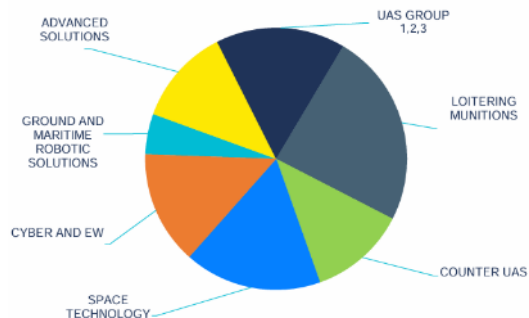


Counter UAS & Electronic Warfare

## Key Info

- Defense contractor specializing in unmanned systems. One of the US Military's primary suppliers of small drones.
- Founded in 1971 in Arlington, VA
- 55+ customers in the US and allied nations
- 42,000+ AV platforms fielded

## Revenue Split



## Financials

### AeroVironment (NASDAQ: AVAV)

<b>2024 Revenue (\$mn)</b>	821
<b>3 Year Rev CAGR</b>	22.6%
<b>2024 EBITDA Margin</b>	12.2%
<b>Market Capitalization (\$mn)</b>	11,749
<b>1 Year Stock Perf.</b>	170.3%

Note: Market data as of 12/15/2025

Source: AeroVironment, FactSet, Morgan Stanley Research

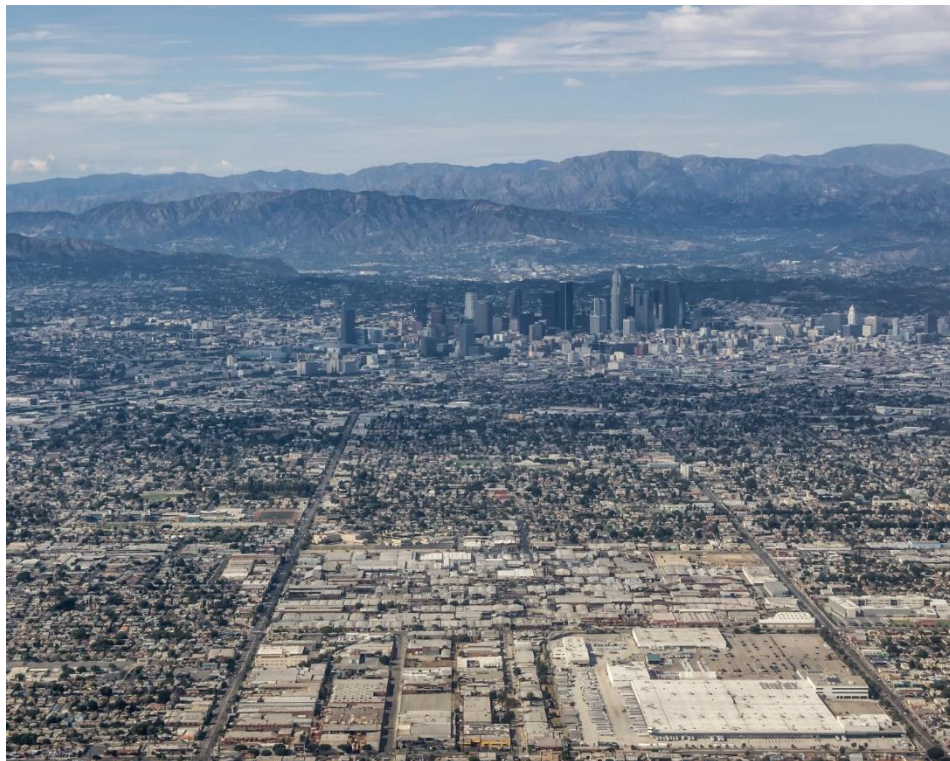


# Urban Air Mobility & Super/Hypersonics





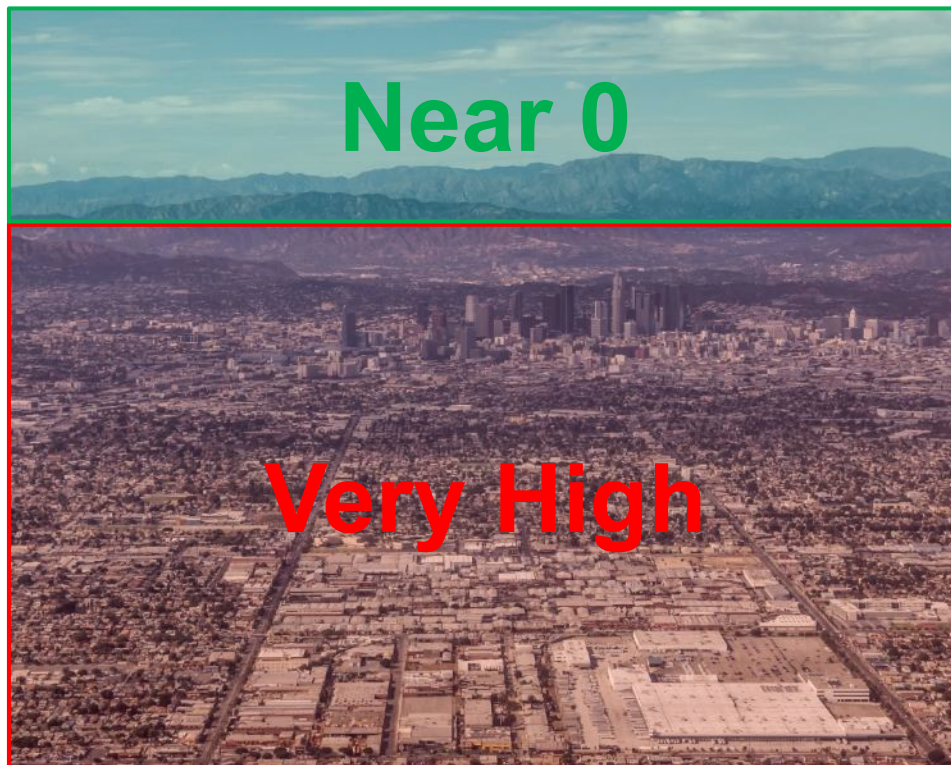
# The Next Time You're On A Plane, Take A Look Outside....



Source: Wikipedia, Morgan Stanley Research



# How Much of Earth's Surface Area is Devoted to Vehicle Transport?



Source: Wikipedia, Morgan Stanley Research



# If AI Can Navigate This 2-Dimensional Urban Nightmare...



Source: Wikipedia



## ... Then Navigating in 3 Dimensions is a Walk in the Park



Note: Joby Aviation is covered by Kristine Liwag.  
Source: Joby Aviation



# Empty Skies...

**14,000 Aircraft in the Air Globally**

**X**

**200 People/Aircraft**

**=**

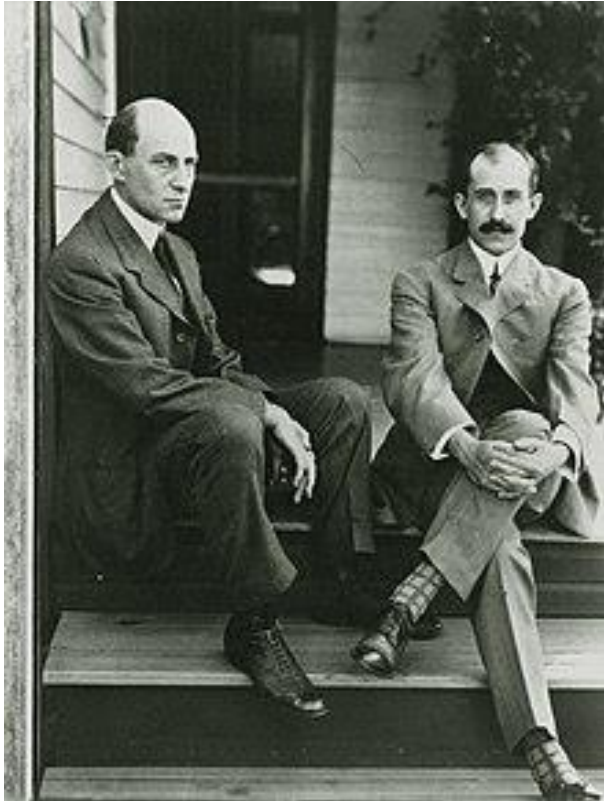
**2.8 Million People in Air**

**=**

**1 St. Louis of People Flying All Over Earth**



## 1903: 2 Brothers in Dayton, OH Achieved The First Flight



Source: Wikipedia



## 1967: Boeing 737 is Introduced into Service



Source: Boeing



## 60 Years Later: Design so Similar, They Didn't Even Change The Name....



Source: Boeing



# June 6: FAA Limits Newark Departures & Arrivals Through 2025

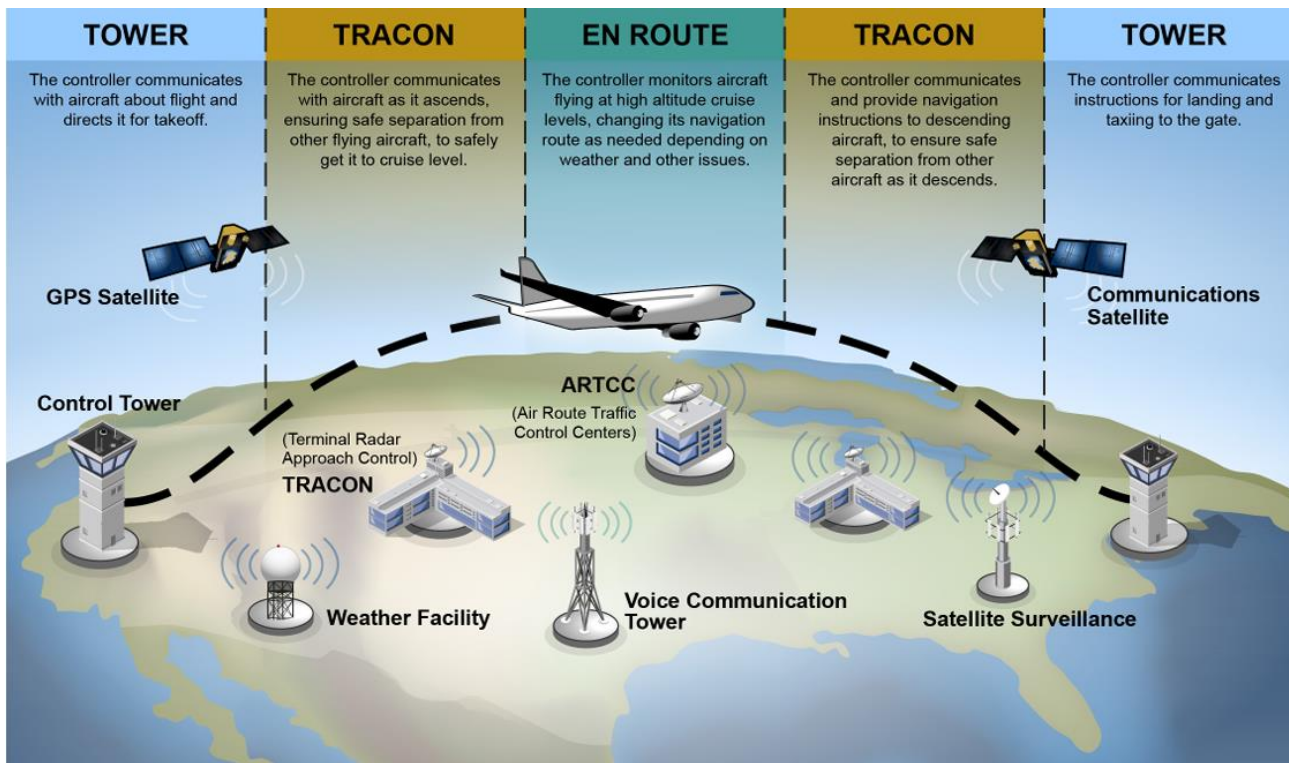
## FAA Final Order:

Arrivals & Departures Limited to 28-34 Each per Hour Through Dec 31, 2025, Due To “Staffing & Equipment Challenges”





# Understanding Air Traffic Control (ATC)

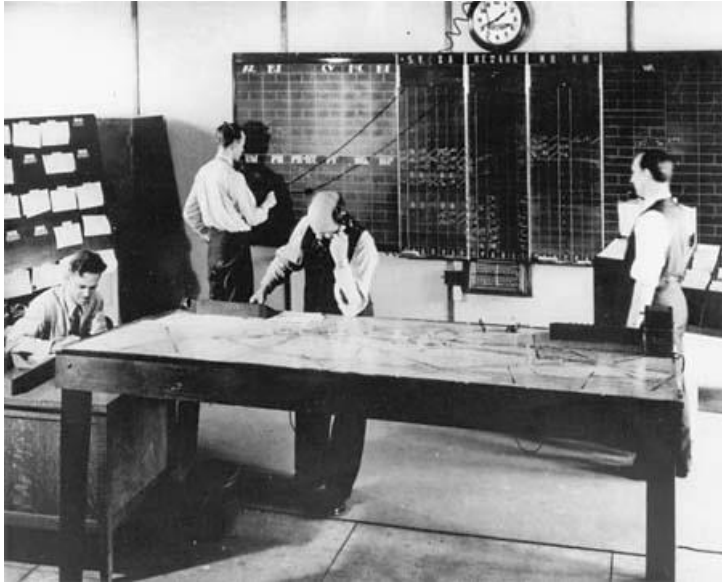


Source: GAO, Morgan Stanley Research





# In the 1940's, US ATC Began Using Paper Flight Progress Strips



**1936 New York-Area Air Traffic Control**  
Flights tracked on chalk boards



**1942 New York-Area Air Traffic Control**  
Flights now tracked on paper strips

Source: FAA, Morgan Stanley Research



# ... That Are Still in Use Today



ATC towers still use these to track flights.

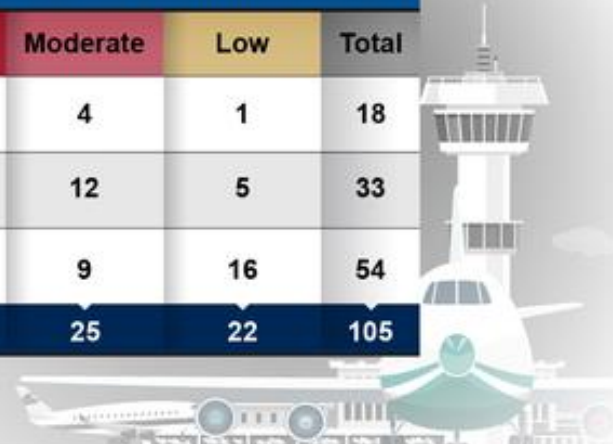
*Paper flight strips currently in use*

Source: FAA



## 2023: The FAA Found That 76% of ATC Systems Could Prove “Unsustainable”

Sustainability rating		Number of FAA systems by operational impact			
		Critical	Moderate	Low	Total
A	Unsustainable due to shortages in spares and shortfalls in funding.	13	4	1	18
B	Unsustainable due to shortfalls in funding or capability.	16	12	5	33
C	Potentially unsustainable due to possible shortfalls in funding or capability.	29	9	16	54
<b>Total</b>		<b>58</b>	<b>25</b>	<b>22</b>	<b>105</b>



Of 138 Total ATC Systems

*Imagine What AI Could Do To Our Antiquated ATC Systems*

Note: 105 of 138 ATC systems rated “Unsustainable” or “Potentially Unsustainable” by FAA.  
Source: FAA 2023 Operational Risk Assessment, Government Accountability Office



## Revenue from 1 eVTOL = 10-15 Ubers

# Annual Revenue



=



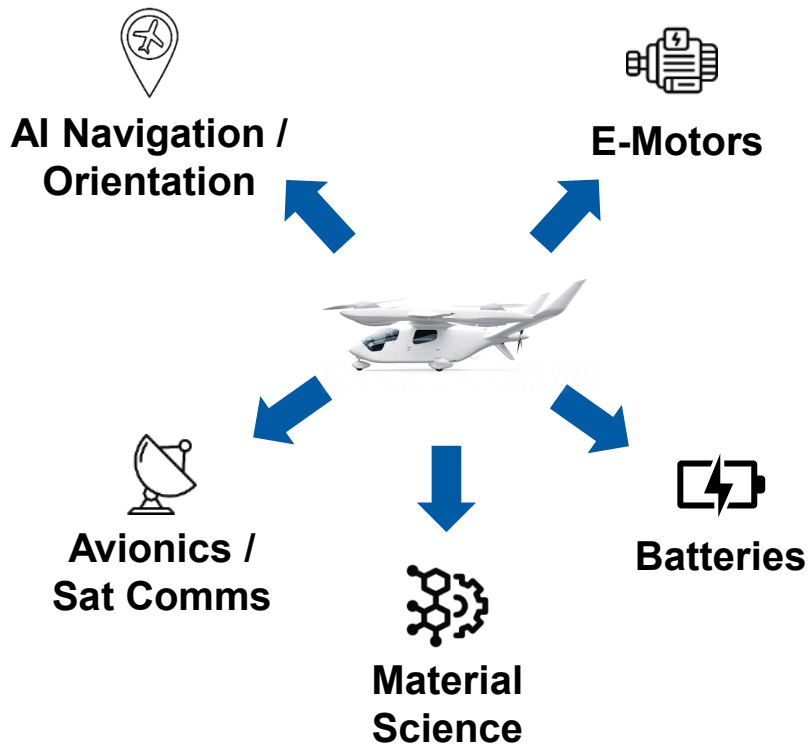
**\$1,460,000 / Flying Car**

**\$109,500 / Ride Share Car**

Note: Analysis originally published in Morgan Stanley Bluepaper: Urban Air Mobility: Flying Cars: Investment Implications of Autonomous Urban Air Mobility  
Source: Company Websites, Morgan Stanley Research estimates



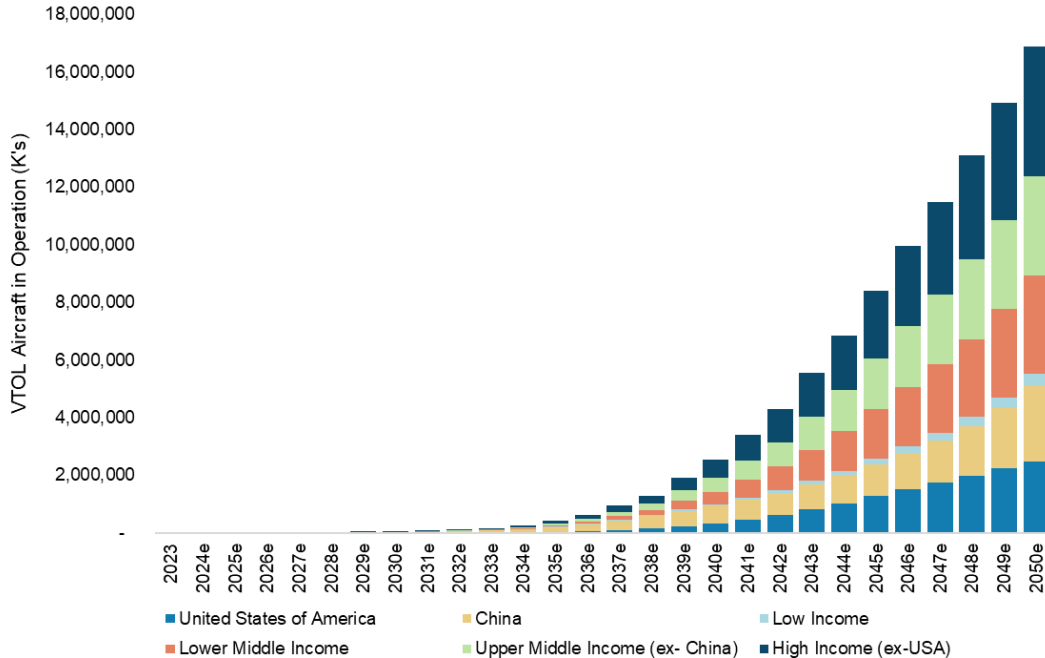
# 5 Major Technologies Will Make eVTOL's Ubiquitous





# Estimated Large VTOL Aircraft Globally (Ex-Small Drones)

*Includes Urban Air Mobility & Other VTOL Aircraft Expected to be Autonomous*



## We Project....

**2030: ~36k Aircraft**

**2040: ~2.5mn Aircraft**

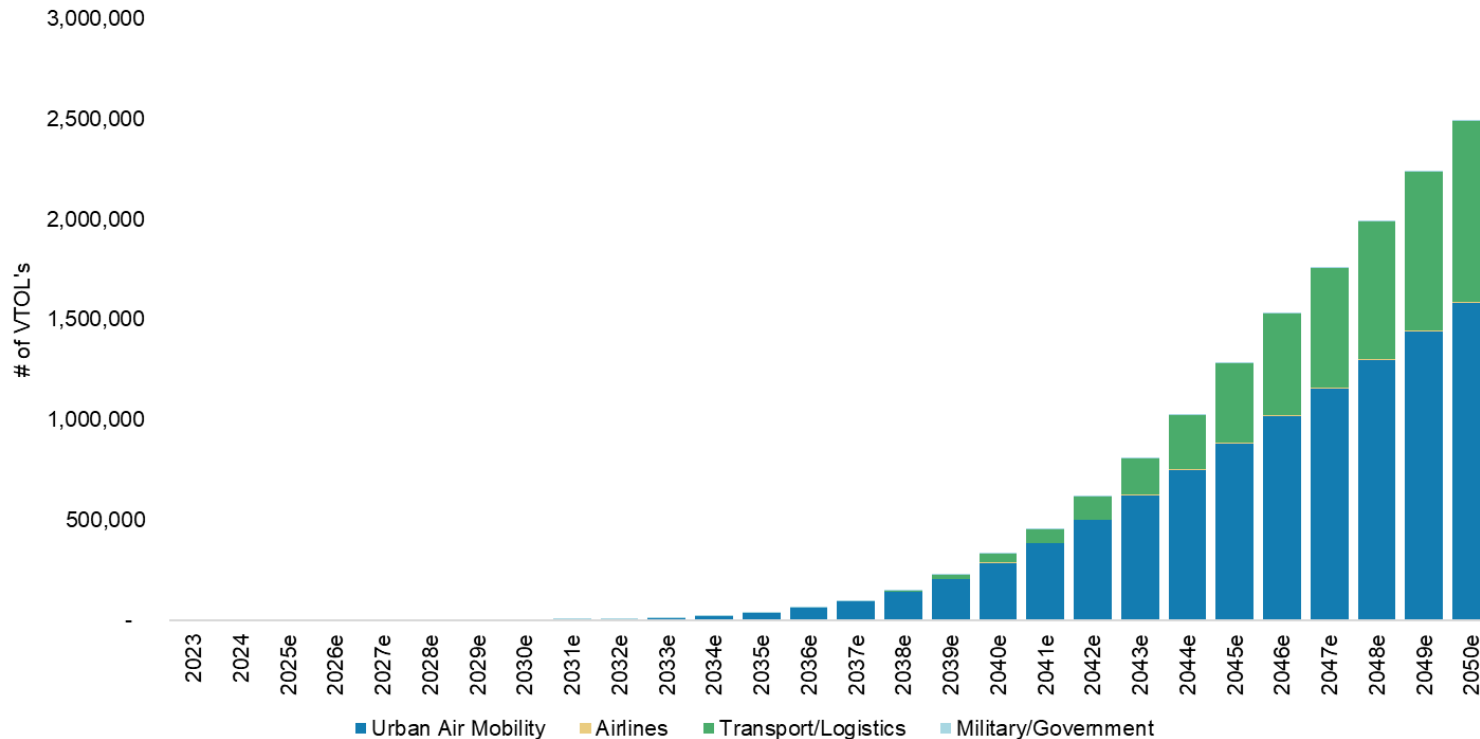
**2050: ~17mn Aircraft**

*(Reach out to your MS Rep for access to our Global Robot Model)*

Source: Morgan Stanley Research estimates



# Biggest Drivers In US: Urban Air Mobility, Transport/Logistics



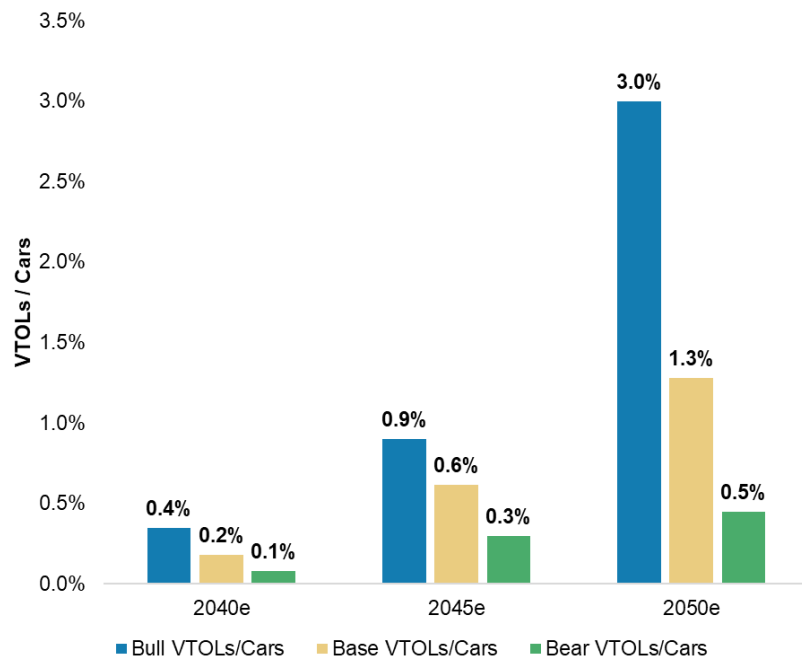
Source: Morgan Stanley Research estimates



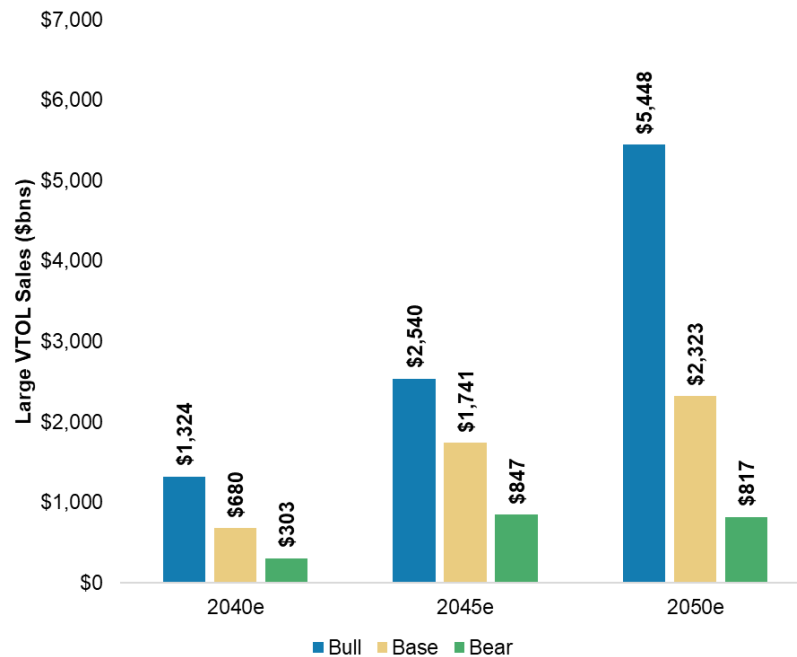
# Bull/Bear/Base Large VTOL Revenue Estimates

Hardware Sales Only. Reach out for a copy of our Global Robot Model

## VTOLS / Cars



## Global Large VTOL Sales (\$bns)



Source: Morgan Stanley Research estimates

## ... And Take Stress off the Surface of the Planet



Source: Shutterstock



# What about Supersonic?



**Boom Overture:** New York to London in 3.5 Hours

Source: Boom Supersonic



# The Technology Isn't Necessarily Novel

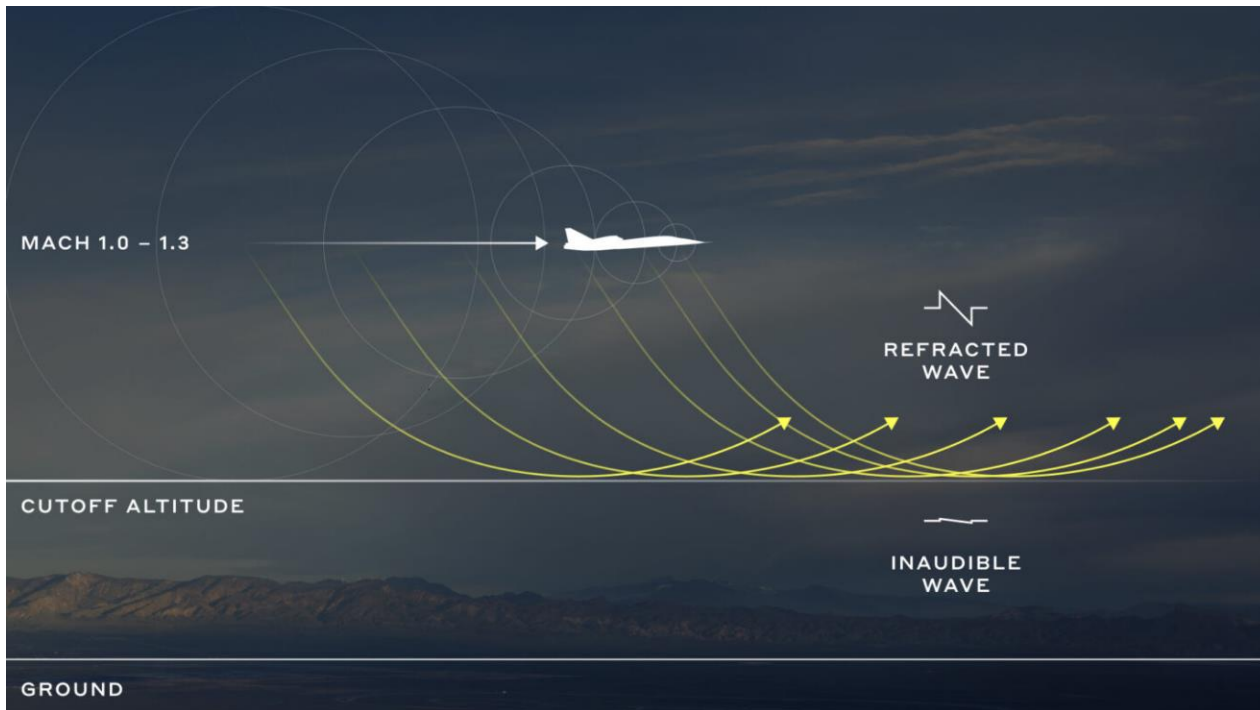


**Tupolev Tu 144 in 1969**

Source: Wikipedia



# And (Some of) Past Barriers Are Being Solved



## Boom Supersonic's "Boomless Cruise"

*Barriers Other Than Noise: High Fuel Use, Operating Costs, Emissions*

Source: Boom Supersonic, Morgan Stanley Research



# Regulatory Barriers Re-Assessed



## Instructs FAA to Repeal Ban on Supersonic Flight Over US Land



## But Why Not Hypersonic?



**Hermeus Halcyon (Concept): New York to London in 90 Minutes**



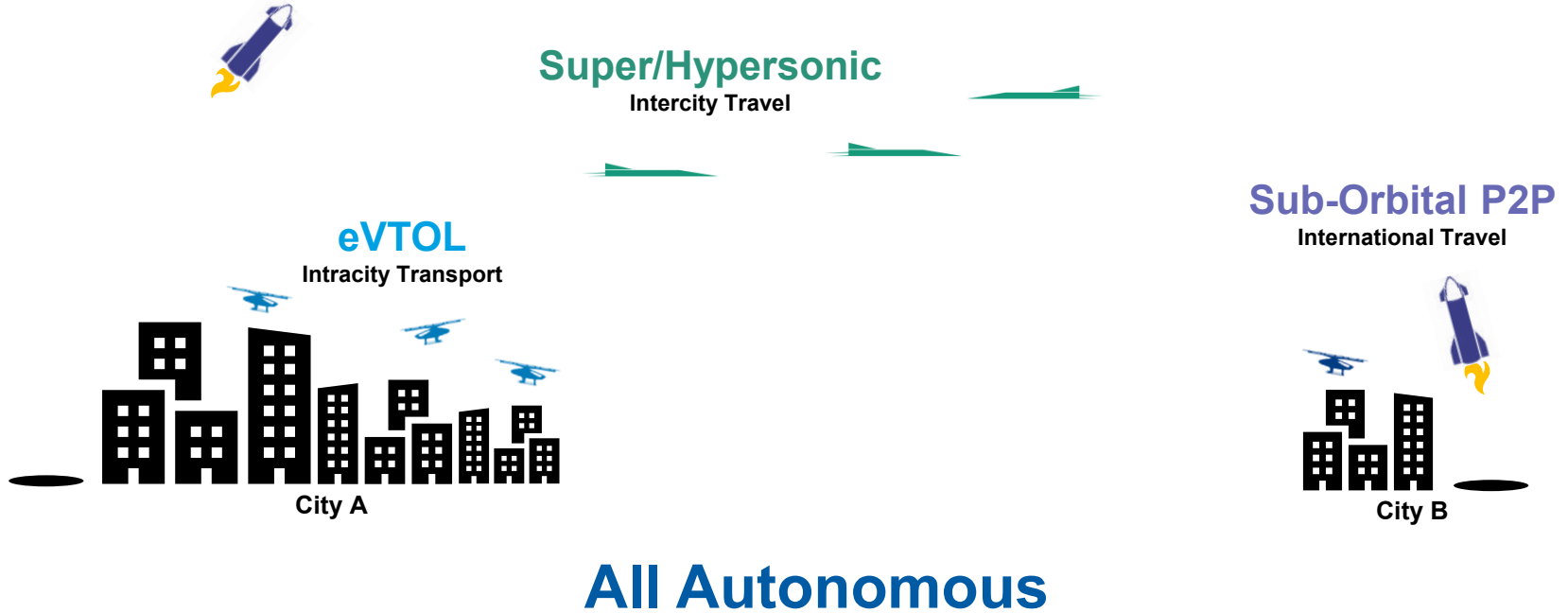
## Or Sub-Orbital Point-to-Point Transport?



**SpaceX Starship: New York to London in 29 Minutes**



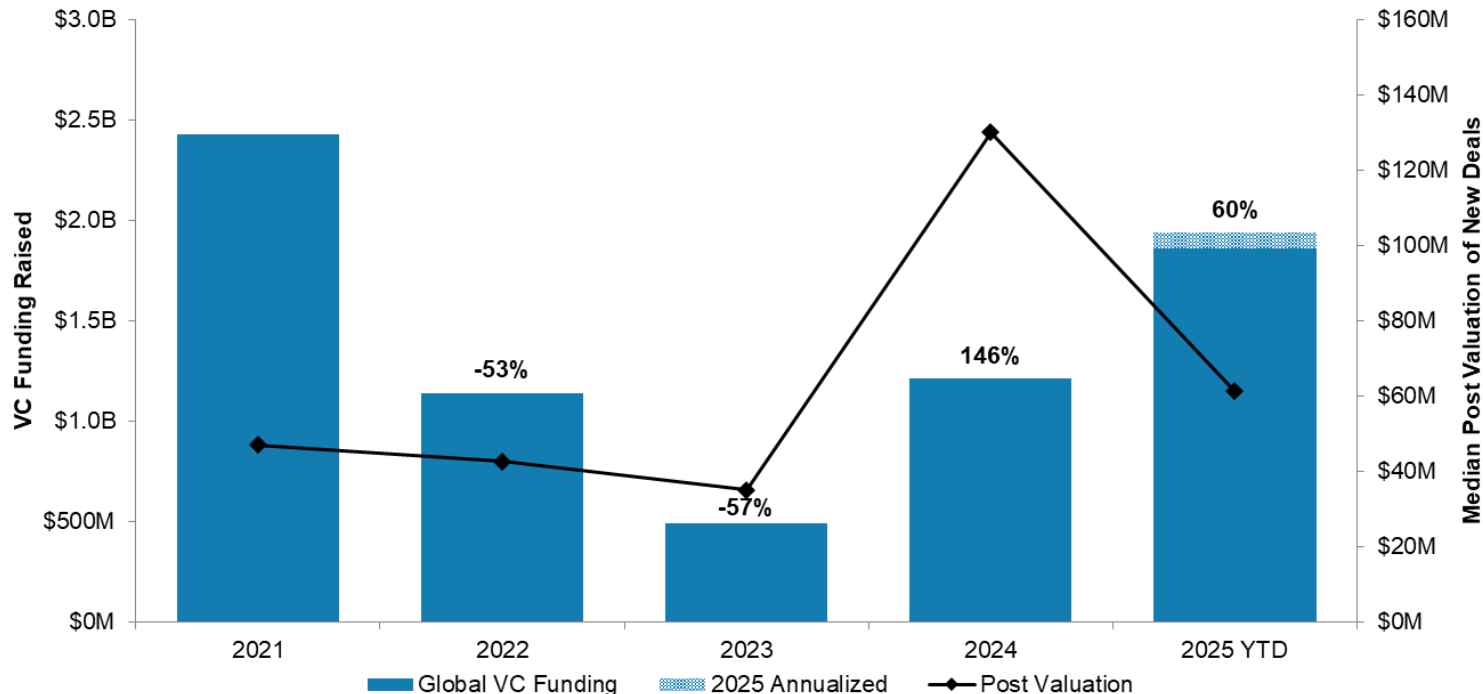
# Future of Air Travel?





# Global Venture Funding for Aerial Transport Disruption

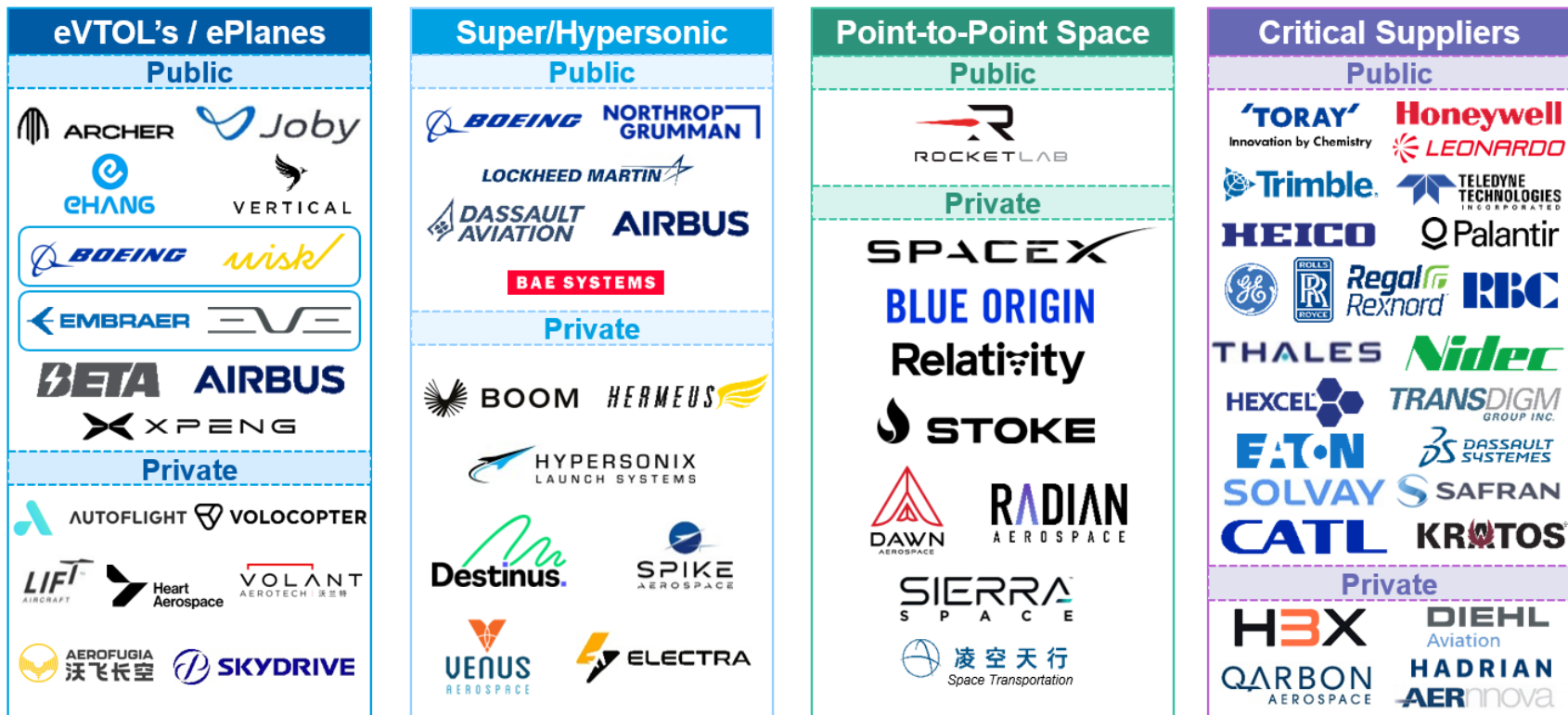
Includes eVTOL's, Supersonic Travel, Autonomous Flight, Electric Flight



Note: May not capture all funding. Does not account for valuations not captured by PitchBook. As of 12/16/2025.  
 Source: PitchBook data, Morgan Stanley Research



# Global Enablers of Aerial Transportation Disruption



Note: Meant to give a representative snapshot. May not capture 100% of exposed players. Point to Point Space largely includes players building spaceplanes or reusable rockets.

Source: Company Websites, Morgan Stanley Research



- San Jose-based eVTOL company founded in 2018 by Adam Goldstein and Brett Adcock.
- Developing 'Midnight' eVTOL, completing 400 flights in 2024.
- Partnered with United, Stellantis, Anduril, and others.
- **Traded as NYSE: ACHR**



Archer Midnight



- Santa Cruz-based eVTOL company founded in 2009 by JoeBen Bevirt.
- Partnerships with Toyota, ANA, Delta, Uber, L3Harris, and others.
- Completed over 40k miles of test flights as of May 2025.
- **Traded as NYSE: JOBY (Covered by Kristine Liwag)**



Joby S4 eVTOL

Note: Joby is covered by Kristine Liwag.  
Source: Archer Aviation, Joby Aviation, Morgan Stanley Research



Boom Overture

## Key Info

- Colorado-based supersonic startup developing the “Overture” supersonic airliner. Founded by Blake Scholl in 2014.
- Overture currently has 130 orders from United, American, and Japan Airlines.
- Developed “Boomless Cruise” technology- supersonic flight without audible sonic boom
- Raised \$300mn at \$2.0bn valuation in Dec. 2025 per PitchBook.

## Customers / Partners



## Notable Investors



Sam Altman



Source: Boom Supersonic, PitchBook, Morgan Stanley Research

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(as of November 30, 2025)

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STOCK RATING CATEGORY	COVERAGE UNIVERSE		INVESTMENT BANKING CLIENTS (IBC)			OTHER MATERIAL INVESTMENT SERVICES CLIENTS (MISC)	
	COUNT	% OF TOTAL	COUNT	% OF TOTAL IBC	% OF RATING CATEGORY	COUNT	% OF TOTAL OTHER MISC
Overweight/Buy	1501	41%	389	46%	26%	661	41%
Equal-weight/Hold	1608	44%	379	44%	24%	736	46%
Not-Rated/Hold	4	0%	1	0%	25%	1	0%
Underweight/Sell	567	15%	83	10%	15%	212	13%
TOTAL	3,680		852			1610	

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months. Due to rounding off of decimals, the percentages provided in the "% of total" column may not add up to exactly 100 percent.

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Overweight (O or Over) - The stock's total return is expected to exceed the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis over the next 12-18 months.

Equal-weight (E or Equal) - The stock's total return is expected to be in line with the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis over the next 12-18 months.

## Disclosure Section (cont.)

Not-Rated (NR) - Currently the analyst does not have adequate conviction about the stock's total return relative to the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

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Cautious (C): The analyst views the performance of his or her industry coverage universe over the next 12-18 months with caution vs. the relevant broad market benchmark, as indicated below.

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### INDUSTRY COVERAGE: Autos & Shared Mobility

COMPANY (TICKER)	RATING (AS OF)	PRICE* (12/15/2025)
<b>Adam Jonas, CFA</b>		
PHINIA INC (PHIN.N)	E (09/25/2024)	\$57.78
<b>Andrew S Percoco</b>		
Adient PLC (ADNT.N)	E (12/07/2025)	\$18.76
American Axle & Manufacturing Holdings Inc (AXLN)	E (12/07/2025)	\$6.33
Aptiv Plc (APT.V.N)	E (12/07/2025)	\$77.35
Avis Budget Group Inc (CAR.O)	E (12/07/2025)	\$128.61
BorgWarner Inc. (BWA.N)	E (12/07/2025)	\$44.86
Ford Motor Company (F.N)	E (09/25/2024)	\$13.65
General Motors Company (GM.N)	O (12/07/2025)	\$81.98
Hertz Global Holdings Inc (HTZ.O)	E (02/08/2024)	\$5.04
Lear Corporation (LEA.N)	E (12/07/2025)	\$116.07
Lucid Group Inc (LCID.O)	U (12/07/2025)	\$11.81
Magna International Inc. (MGA.N)	E (09/25/2024)	\$52.36
Mobileye Global Inc (MBLY.O)	E (08/02/2024)	\$10.54
QuantumScape Corp (QS.N)	E (12/07/2025)	\$10.83
Rivian Automotive, Inc. (RIVN.O)	U (12/07/2025)	\$18.70
Tesla Inc (TSLA.O)	E (12/07/2025)	\$475.31
Visteon Corporation (VC.O)	E (06/01/2022)	\$102.65

### Daniela M Haigian

Asbury Automotive Group Inc (ABG.N)	E (09/25/2024)	\$242.43
AutoNation Inc. (AN.N)	O (09/25/2024)	\$207.61
Carmax Inc (KMX.N)	E (11/10/2025)	\$40.92
Carvana Co (CVNA.N)	O (08/07/2025)	\$447.92
Group 1 Automotive, Inc (GPI.N)	O (09/25/2024)	\$408.85
Lithia Motors Inc. (LAD.N)	E (09/25/2024)	\$346.68
Penske Automotive Group, Inc (PAG.N)	O (09/25/2024)	\$167.92
Sonic Automotive Inc (SAH.N)	E (09/25/2024)	\$65.67

### Javier Martinez de Olcoz Cerdan

Goodyear Tire & Rubber Company (GT.O)	U (09/28/2025)	\$9.01
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\* Historical prices are not split adjusted.

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## INDUSTRY COVERAGE: Aerospace

COMPANY (TICKER)	RATING (AS OF)	PRICE* (12/15/2025)
<b>Kristine T Liwag</b>		
AerCap Holdings NV (AER.N)	E (06/07/2024)	\$141.79
Beta Technologies Inc (BETA.N)	O (12/01/2025)	\$29.69
Boeing Co. (BA.N)	E (01/10/2023)	\$205.50
CAE Inc. (CAE.TO)	E (08/16/2024)	C\$40.25
FTAI Aviation Ltd (FTAI.O)	O (01/11/2024)	\$170.69
Heico Corp (HEI.N)	E (06/04/2024)	\$312.16
Hexcel Corp (HXL.N)	U (02/22/2024)	\$73.70
Howmet (HWM.N)	O (12/03/2021)	\$197.24
Joby Aviation Inc (JOBY.N)	E (04/11/2025)	\$14.19
Loar Holdings Inc (LOAR.N)	O (05/23/2025)	\$68.82
RBC Bearings Inc. (RBC.N)	O (12/03/2021)	\$462.59
Rocket Lab USA Inc (RKL.B.O)	E (07/15/2024)	\$55.41
RTX Corp (RTX.N)	O (04/23/2025)	\$182.11
StandardAero Inc. (SARO.N)	E (10/28/2024)	\$27.40
Teledyne Technologies Inc. (TDY.N)	E (12/12/2022)	\$514.29
Textron Inc. (TXT.N)	E (08/08/2024)	\$87.94
TransDigm Group Inc. (TDG.N)	O (09/10/2021)	\$1,292.08
Virgin Galactic Holdings Inc (SPCE.N)	U (11/22/2023)	\$3.02

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\* Historical prices are not split adjusted.

## INDUSTRY COVERAGE: China Internet and Other Services

COMPANY (TICKER)	RATING (AS OF)	PRICE* (12/15/2025)
<b>Eddy Wang, CFA</b>		
Autohome Inc (ATHM.N)	E (02/09/2023)	\$23.30
Full Truck Alliance Co. Ltd (YMM.N)	O (07/05/2023)	\$11.17
JD.com, Inc. (JD.O)	U (11/10/2025)	\$28.85
Kanzhun Ltd (BZ.O)	O (08/04/2021)	\$20.03
KE Holdings Inc (BEKE.N)	O (03/16/2022)	\$16.60
PDD Holdings Inc (PDD.O)	O (03/02/2023)	\$110.40
Vipshop Holdings Ltd (VIPS.N)	E (02/24/2022)	\$19.52
<b>Gary Yu</b>		
Alibaba Group Holding (BABA.N)	O (02/24/2025)	\$150.09
Baidu Inc (BIDU.O)	E (05/17/2024)	\$118.83
Meltuan (3690.HK)	O (08/29/2024)	HK\$99.50
Tencent Holdings Ltd. (0700.HK)	O (03/19/2020)	HK\$596.50
<b>Rebecca Xu</b>		
Hello Group Inc (MOMO.O)	U (05/16/2024)	\$6.63
HUYA Inc (HUYA.N)	E (05/16/2024)	\$3.12
IQIYI Inc (IQ.O)	E (01/19/2023)	\$1.95
JOYY Inc. (JOYY.O)	E (06/02/2022)	\$63.50
Weibo Corp (WB.O)	U (05/17/2024)	\$10.16
<b>Yang Liu</b>		
Bilibili Inc (BILLO)	E (01/07/2022)	\$24.52
Kuaishou Technology (1024.HK)	E (07/04/2024)	HK\$64.10
NetEase, Inc (NTES.O)	O (01/08/2025)	\$138.20
Tongcheng Travel Holdings (0780.HK)	O (01/04/2019)	HK\$21.86
Trip.com Group Ltd (TCOM.O)	O (05/17/2021)	\$71.39

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## INDUSTRY COVERAGE: China Industrials

COMPANY (TICKER)	RATING (AS OF)	PRICE* (12/16/2025)
<b>Chelsea Wang</b>		
China Railway Group (601390.SS)	E (05/12/2022)	Rmb5.39
China Railway Group (0390.HK)	E (08/11/2025)	HK\$3.78
China State Construction Engineering (601668.SS)	U (08/11/2025)	Rmb5.15
Han's Laser (002008.SZ)	O (10/02/2025)	Rmb36.10
Hefei Meyer Optoelectronic Technology (002690.SZ)	E (09/08/2025)	Rmb20.25
iRay Technology Company Limited (688301.SS)	E (01/16/2025)	Rmb97.00
Neway Valve (Suzhou) Co., Ltd (603699.SS)	O (09/12/2025)	Rmb48.54
Shanghai BOCHU Electronic Technology (688188.SS)	O (08/22/2024)	Rmb132.25
Shenzhen Envicool Technology Co Ltd (002837.SZ)	O (08/19/2024)	Rmb84.50
<b>Sheng Zhong</b>		
Beijing Geekplus Technology Co., Ltd. (2590.HK)	O (08/07/2025)	HK\$21.88
Centre Testing International Group (300012.SZ)	E (11/18/2024)	Rmb13.32
CRRC Corp Ltd (1766.HK)	E (08/25/2025)	HK\$6.02
CRRC Corp Ltd (601766.SS)	E (06/30/2022)	Rmb6.77
DR Laser (300776.SZ)	E (12/17/2021)	Rmb58.15
Estun Automation Co Ltd (002747.SZ)	U (06/30/2022)	Rmb20.91
Haitian International Holdings Limited (1882.HK)	E (09/08/2025)	HK\$21.40
Hongfa Technology Co Ltd (600885.SS)	O (05/23/2023)	Rmb30.28
Jiangsu Guomao Reducer Co Ltd (603915.SS)	U (01/08/2025)	Rmb16.37
Jiangsu Hengli Hydraulic Co.Ltd (601100.SS)	O (05/23/2023)	Rmb108.20
Jingsheng Mechanical & Electrical Co (300316.SZ)	U (01/08/2025)	Rmb33.55
Leader Harmonious Drive Systems (688017.SS)	E (05/19/2025)	Rmb150.68
Sany Heavy Industry Co., Ltd. (600031.SS)	O (01/08/2025)	Rmb20.76
Shenzhen Inovance Technology (300124.SZ)	O (05/19/2025)	Rmb70.55
Shenzhen SC New Energy Technology Corp (300724.SZ)	U (09/08/2025)	Rmb86.11

Sinotruk (Hong Kong) Limited (3808.HK)	E (05/19/2025)	HK\$29.22
Suzhou Maxwell Technologies Co Ltd (300751.SZ)	U (09/15/2023)	Rmb157.60
Times Electric (3898.HK)	O (08/30/2022)	HK\$37.78
WeiChai Power (2338.HK)	E (09/08/2025)	HK\$19.56
WeiChai Power (000338.SZ)	E (09/08/2025)	Rmb17.47
Wuxi Autowell Technology Co Ltd (688516.SS)	U (09/08/2025)	Rmb40.48
Wuxi Lead Intelligent (300450.SZ)	O (09/08/2025)	Rmb45.90
Zhejiang Dingli Machinery Co Ltd. (603338.SS)	O (11/05/2025)	Rmb59.94
Zhejiang Hangke Technology (688006.SS)	O (09/08/2025)	Rmb27.35
Zhejiang Shuanghuan Driveline Co. Ltd. (002472.SZ)	O (08/25/2023)	Rmb40.07
Zoomlion Heavy Industry (1157.HK)	O (09/08/2025)	HK\$7.56
Zoomlion Heavy Industry (000157.SZ)	O (09/08/2025)	Rmb8.37

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# Disclosure Section (cont.)

## INDUSTRY COVERAGE: Machinery & Construction

COMPANY (TICKER)	RATING (AS OF)	PRICE* (12/15/2025)
<b>Angel Castillo</b>		
AGCO Corp (AGCO.N)	U (04/16/2025)	\$108.33
Allison Transmission Holdings Inc (ALSN.N)	E (01/08/2024)	\$99.42
Caterpillar Inc (CAT.N)	U (08/07/2025)	\$589.76
CNH Industrial NV (CNH.N)	O (12/17/2024)	\$9.57
CRH (CRH.N)	O (07/09/2024)	\$127.26
Cummins Inc (CMI.N)	O (01/08/2024)	\$517.25
Deere & Co. (DE.N)	O (01/08/2024)	\$488.01
Donaldson Company Inc. (DCLN)	E (11/24/2025)	\$92.51
Kennametal Inc. (KMT.N)	E (01/08/2024)	\$29.13
Lincoln Electric Holdings Inc (LECO.O)	U (01/08/2024)	\$244.24
Martin Marietta Materials Inc (MLM.N)	O (01/08/2024)	\$633.88
Oshkosh Corp (OSK.N)	E (01/08/2024)	\$130.03
PACCAR Inc (PCAR.O)	E (04/16/2025)	\$112.96
REV Group Inc. (REVG.N)	E (06/18/2025)	\$59.20
Terex Corp. (TEX.N)	O (12/10/2025)	\$52.25
Timken Co (TKR.N)	O (12/17/2024)	\$87.01
United Rentals Inc. (URI.N)	O (04/16/2025)	\$810.44
Vulcan Materials Company (VMC.N)	E (01/08/2024)	\$296.68
Westinghouse Air Brake Technologies Corp (WAB.N)	O (01/08/2024)	\$215.38
WillScot Holdings Corporation (WSC.O)	E (11/12/2025)	\$19.89

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## INDUSTRY COVERAGE: Semiconductors

COMPANY (TICKER)	RATING (AS OF)	PRICE* (12/15/2025)
<b>Joseph Moore</b>		
Advanced Micro Devices (AMD.O)	E (06/09/2024)	\$207.58
Aeva Technologies Inc (AEVA.O)	E (07/19/2021)	\$14.37
Allegro Microsystems Inc (ALGM.O)	E (05/09/2025)	\$26.72
Ambarella Inc (AMBA.O)	O (03/29/2016)	\$73.80
Amkor Technology Inc (AMKR.O)	E (11/08/2023)	\$43.91
Analog Devices Inc. (ADLO)	O (11/16/2023)	\$280.44
Astera Labs Inc (ALAB.O)	O (05/11/2025)	\$143.66
Broadcom Inc. (AVGO.O)	O (06/09/2024)	\$339.81
GlobalFoundries Inc (GFS.O)	E (10/28/2024)	\$37.24
Intel Corporation (INTC.O)	E (02/22/2023)	\$37.51
IonQ Inc (IONQ.N)	E (04/25/2023)	\$46.07
Marvell Technology Group Ltd (MRVL.O)	E (09/14/2015)	\$84.26
Microchip Technology Inc. (MCHP.O)	E (07/10/2024)	\$67.18
Micron Technology Inc. (MU.O)	O (10/06/2025)	\$237.50
Navitas Semiconductor Corp (NVTS.O)	U (04/06/2025)	\$7.96
NVIDIA Corp. (NVDA.O)	O (03/16/2023)	\$176.29
NXP Semiconductor NV (NXPL.O)	O (02/11/2025)	\$231.83
ON Semiconductor Corp. (ON.O)	E (05/11/2025)	\$55.09
Qorvo Inc (QRVO.O)	E (10/28/2025)	\$87.70
Qualcomm Inc. (QCOM.O)	++	\$179.26
SanDisk Corporation. (SNDK.O)	O (03/03/2025)	\$201.87
Semtech Corp. (SMTC.O)	E (04/06/2025)	\$72.54
Silicon Laboratories Inc. (SLAB.O)	E (01/19/2021)	\$134.54
Skyworks Solutions Inc (SWKS.O)	E (11/28/2018)	\$66.37
Texas Instruments (TXN.O)	U (04/13/2020)	\$177.97
Wolfspeed, INC (WOLF.N)	NR (04/06/2025)	\$17.74

## Disclosure Section (cont.)

### Lee Simpson

Arm Holdings plc (ARM.O)	O (07/19/2024)	\$124.37
Cadence Design Systems Inc (CDNS.O)	O (02/14/2024)	\$318.43
Synopsys Inc. (SNPS.O)	O (11/10/2023)	\$454.67

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### INDUSTRY COVERAGE: Multi-Industry

COMPANY (TICKER)	RATING (AS OF)	PRICE* (12/15/2025)
<b>Christopher Snyder, CFA</b>		
3M Co. (MMM.N)	E (10/21/2025)	\$165.70
Acuity Inc. (AYI.N)	O (01/14/2025)	\$361.07
Allegion Public Limited Company (ALLE.N)	E (01/06/2025)	\$163.06
Alliance Laundry Holdings Inc (ALH.N)	E (11/03/2025)	\$21.52
Ametek Inc. (AME.N)	E (04/14/2025)	\$203.19
Carrier Global Corp. (CARR.N)	E (09/06/2024)	\$52.58
Dover Corp (DOV.N)	E (04/14/2025)	\$201.30
Eaton Corporation PLC (ETN.N)	O (09/06/2024)	\$333.21
Emerson Electric Co (EMR.N)	U (09/06/2024)	\$137.26
Fastenal Co. (FAST.O)	E (09/06/2024)	\$42.58

Fortive Corp (FTV.N)	E (09/02/2025)	\$55.35
Gates Industrial Corporation PLC (GTES.N)	E (09/06/2024)	\$21.80
Honeywell International Inc (HON.O)	E (09/06/2024)	\$197.45
Hubbell Inc. (HUBB.N)	E (09/06/2024)	\$444.84
Ingersoll Rand INC (IR.N)	E (09/06/2024)	\$81.63
Johnson Controls International Plc (JCL.N)	O (09/06/2024)	\$116.88
Lennox International Inc (LIL.N)	U (01/06/2025)	\$496.13
Otis Worldwide Corp (OTIS.N)	E (09/06/2024)	\$88.57
Parker-Hannifin Corp (PH.N)	E (06/05/2025)	\$883.47
QXO Inc (QXO.N)	O (09/02/2025)	\$21.31
Ralliant Corporation (RAL.N)	O (09/02/2025)	\$50.78
Rockwell Automation (ROK.N)	O (09/06/2024)	\$401.65
Stanley Black & Decker Inc (SWK.N)	E (09/06/2024)	\$74.15
Trane Technologies PLC (TT.N)	O (09/06/2024)	\$394.87
Vertiv Holdings Co. (VRT.N)	O (01/06/2025)	\$161.74
W.W. Grainger Inc. (GWW.N)	E (09/06/2024)	\$1,029.56
Watsco Inc (WSO.N)	E (04/14/2025)	\$344.59

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# Disclosure Section (cont.)

## INDUSTRY COVERAGE: Internet

COMPANY (TICKER)	RATING (AS OF)	PRICE* (12/15/2025)
<b>Brian Nowak, CFA</b>		
Airbnb Inc (ABNB.O)	U (12/06/2022)	\$131.81
Alphabet Inc. (GOOGL.O)	O (08/11/2015)	\$308.22
Amazon.com Inc (AMZN.O)	O (04/24/2015)	\$222.54
Booking Holdings Inc (BKNG.O)	E (01/09/2019)	\$5,457.70
DoorDash Inc (DASH.O)	O (02/21/2024)	\$226.98
Expedia Inc. (EXPE.O)	E (01/09/2019)	\$283.45
Instacart (CART.O)	E (01/29/2024)	\$45.40
Lyft Inc (LYFT.O)	E (10/24/2019)	\$19.12
Meta Platforms Inc (META.O)	O (03/20/2023)	\$647.51
Nextdoor Holdings Inc (NXDR.N)	U (05/12/2025)	\$2.16
Pinterest Inc (PINS.N)	O (07/20/2025)	\$25.76
Reddit Inc (RDDT.N)	O (12/08/2024)	\$218.50
Snap Inc. (SNAP.N)	E (07/22/2024)	\$7.26
Uber Technologies Inc (UBER.N)	O (06/04/2019)	\$81.86
<b>Matthew Cost</b>		
AppLovin Corp (APP.O)	O (04/10/2025)	\$675.17
Compass, Inc. (COMP.N)	++	\$10.34
Criteo SA (CRO.O)	E (01/26/2016)	\$20.30
DoubleVerify Holdings Inc (DV.N)	E (06/25/2024)	\$10.83
Electronic Arts Inc (EA.O)	E (08/04/2021)	\$204.20
Integral Ad Science Holding Corp. (IAS.O)	E (04/16/2024)	\$10.28

MNTN Inc (MNTN.N)	E (06/16/2025)	\$12.10
Opendoor Technologies Inc (OPEN.O)	E (07/24/2023)	\$6.47
Playtika Holding Corp (PLTK.O)	E (11/27/2022)	\$4.11
Roblox Corporation (RBLX.N)	O (11/04/2024)	\$86.96
Shutterstock Inc (SSTK.N)	E (07/28/2022)	\$18.82
Take-Two Interactive Software (TTWO.O)	O (02/01/2018)	\$244.56
Trade Desk Inc (TTD.O)	E (09/10/2025)	\$36.19
Unity Software Inc (U.N)	O (09/02/2024)	\$45.22
Webtoon Entertainment Inc (WBTO.N)	E (07/22/2024)	\$12.51
Yelp Inc (YELP.N)	U (01/10/2019)	\$30.64
Zillow Group Inc (Z.O)	E (04/18/2018)	\$68.38
<b>Nathan Feather</b>		
Bumble Inc. (BMBL.O)	E (03/09/2021)	\$3.46
Chewy Inc (CHWY.N)	O (10/31/2023)	\$33.14
Duolingo Inc (DUOL.O)	O (04/23/2025)	\$185.97
eBay Inc (EBAY.O)	O (04/18/2024)	\$82.59
Etsy Inc (ETSY.N)	E (07/20/2025)	\$53.13
FIGS, Inc. (FIGS.N)	E (02/29/2024)	\$11.78
Match Group Inc (MTCH.O)	E (04/18/2024)	\$32.62
Peloton Interactive, Inc. (PTON.O)	E (03/14/2022)	\$6.25
Revolve Group Inc (RVLV.N)	E (10/20/2024)	\$27.85
WW International Inc (WWO)	E (08/01/2025)	\$24.28

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