

# Defense: Aircraft Inspection

Conduct faster, more complete inspections wherever your assets are.



## Time it takes to inspect large aircraft:

- 8+ hours
- Personnel required: ~3
- Additional equipment needed: harnesses, lifts, safety gear
- Conducted multiple times each year for every aircraft



## Conduct faster, safer inspections with fewer personnel

Traditional exterior inspection of a C-17 Globemaster III aircraft by three Airmen can take approximately eight hours. [An autonomous drone inspection takes one Airman 40 minutes.](#)<sup>7</sup>

## Drones reduce inspection time by 90%

	Inspector	Time
Traditional inspection	3	8h
Autonomous aircraft drone inspection	1	40 min

**90% faster**

## Addressing mission capable readiness with an autonomous drone aircraft inspection process

As the U.S. Defense Department prepares for potential fights in the INDOPACOM region and Europe, the Air Force is pursuing the Agile Combat Employment concept. ACE envisions a hub-and-spoke layout of bases: some larger and fixed, some smaller and mobile. To be effective, this approach will need a smaller force of multi-capable Airman, [doing more with less.](#)<sup>1</sup>

When it comes to resource readiness, the most prevalent issue at hand for the Air Force is the [mission capability of aircraft.](#)<sup>2</sup> In 2023, the Air Force target for a mission capable rate averaged 75-80 percent. The unweighted average of all fleets in 2023 was 69.92 percent, [down from 71.24 percent in fiscal 2022.](#)<sup>3</sup>

## Maintaining a mission-ready fleet

- Age: The age of the fleet, with some aircraft more than 50 years old, is a contributing factor to [the need for lengthy inspections](#)<sup>4</sup>
- Schedules: Based on service periods and flight hours, physical inspections take some [aircraft out of service for days](#)<sup>5</sup>
- Safety: The size, height, and aircraft dimensions make inspections hazardous and time-consuming. This issue is compounded by time of year and even time of day
- Time: Exterior inspections of large aircraft currently take multiple personnel more than 8 hours, not including the time required for personnel to harness up and bring in lifts

## Unit leaders are working on the issue

Air Mobility Command [directed AMC bases to develop drone programs.](#)<sup>6</sup> Some of the locations leaning forward on innovation include Scott Air Force Base, MacDill AFB, Joint Base McGuire-Dix-Lakehurst, Dover AFB, and Travis AFB.

There is a concerted effort to address the maintenance and inspection challenge head on. ***Unit leaders are moving the needle, but need help making this an Air Force wide program that can significantly help unify a standard approach to mission readiness.***

## Units working on solutions

- 60th Air Mobility Wing, 60th Maintenance Group
- 436th Mission Generation Group
- 307th Bomb Wing, 307th Aircraft Maintenance Squadron, Air Force Global Strike Command, Air Mobility Command
- 8th Air Force
- 22nd Air Refueling Wing, McConnell innovation Lab

## Autonomous aircraft scans

- C-17 Globemaster III
- C-5 M Super Galaxy
- B-52 Stratofortress
- C-17 Globemaster
- KC-46A Pegasus

<sup>\*</sup> List only includes USAF aircraft scanned to date.

<sup>\*</sup> Autonomous scans are airframe agnostic and can be performed on any aircraft, or equipment

## Benefits of autonomous aircraft inspection

### Maintain a ready force:

Improve speed and accuracy of the inspection process. Process more inspections in less time with a smaller, more cost-effective footprint of equipment.

### Maximize program efficiency:

Shorten the life-cycle requirements for maintenance in both garrison equipment and forward deployed / assets in a contested environment. Require less people to perform legacy tasks, reduce fatigue, better allocate personnel task load.

### Keep assets and people safe:

Decreased risks for asset damage by removing large equipment setup for inspections. Shift personnel to a ground-based role as an operator and analysts versus being in dangerous locations and/or requiring extensive safety procedures to collect data, models, and inspection records.

## Capabilities required by the U.S. Air Force for the most effective group 1 sUAS program

- Small, lightweight, mission-ready, out of the box
- Capable of autonomous flight with active obstacle avoidance
- Simple to operate, with minimal levels of proficiency or training time
- Safely employed by Airmen for maintaining and inspecting high value assets
- Robust GPU and processing power; engineered to meet current / future requirements
- Versatile form factor, capable of incorporating into combat equipment jump, small compartment, or man-packable unit
- 3D scan and mapping technology equal to or greater than commercial capabilities for complex asset inspections and maintenance programs

## There is an Air Force wide need for autonomous aircraft inspections

An autonomous drone asset inspection capability helps to achieve improved Mission Capable aircraft by:

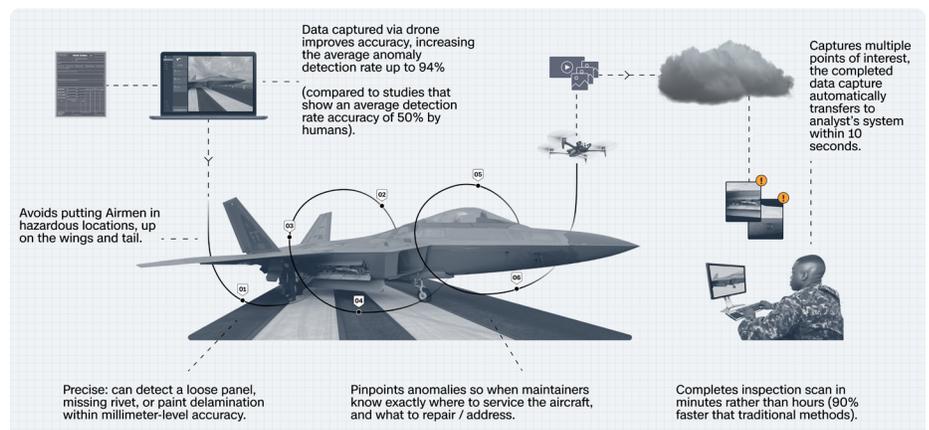
- Reducing the complexity of aircraft checkups while also improving the accuracy and reliability of information. In testing, drones have detected damage with [up to 94-97% accuracy](#),<sup>8</sup> surpassing the human-only metric of 50%
- Drastically decreasing the amount of time required to conduct fleet / aircraft inspections by up to 90%. Traditional exterior examinations can take several hours with potential safety risks to Airmen. The drone-centric approach, bolstered by pattern recognition and 3D scan technology, can reduce the inspection time per aircraft from [hours to minutes](#)<sup>9</sup>
- Improving inspection efficiency and [reducing aircraft downtime](#)<sup>10</sup>
- Reducing unscheduled maintenance, and allowing for progressive actions toward maintaining and [returning aircraft and equipment to safe operating condition](#)<sup>11</sup>
- Using AI-driven predictive maintenance, data analytics, and machine learning algorithms to predict potential failures before they occur. This can transform mission capability by enhancing safety, optimizing operational efficiency, and minimizing downtime

## Operational small UAS programs of record are needed across the enterprise, enabling wing commanders and subordinate leaders to:

- Fund this requirement
- Meet mission ready requirements and reduce the decline of Mission Capable assets
- Maintain a force postured for rapid global mobility
- Optimize readiness with limited personnel and resources

## How the Air Force can Improve equipment readiness with autonomous inspections

- Standardize autonomous inspections across the fleet: The Air Force should implement autonomous drone inspections as a standardized procedure for all relevant aircraft, ensuring consistency and maximizing efficiency across the total fleet
- Expand training programs for personnel: Establish comprehensive training programs focused on operating autonomous drones, reducing the need for extensive manual inspection labor, and empowering personnel with the skills to utilize advanced drone technology effectively
- Integrate AI-driven predictive maintenance: Leverage AI and machine learning algorithms within the drone inspection process to predict maintenance needs and potential failures, enabling preemptive actions that enhance aircraft readiness and reduce downtime
- Invest in research and development: Continue to innovate and refine drone technology to further reduce inspection times and enhance the accuracy of damage detection. This ongoing R&D investment will keep the Air Force ahead of technological advances and maintain its strategic edge
- Collaborate with industry partners: Strengthen partnerships with industry leaders like Skydio to ensure that the Air Force has access to the latest drone technologies and best practices, allowing for continuous improvement in inspection processes and operational efficiency



Contact [sales@skydio.com](mailto:sales@skydio.com) today to learn more.

For more info: <https://www.skydio.com/solutions/defense/asset-inspection>

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<sup>1</sup><https://www.airandspaceforces.com/browns-5-big-steps-to-transforming-his-air-force/> <sup>2</sup><https://www.airandspaceforces.com/air-force-mission-capable-rates-2023/> <sup>3</sup><https://www.airforcetimes.com/news/your-air-force/2022/02/14/us-air-force-fleets-mission-capable-rates-are-stagnating-heres-the-plan-to-change-that/> <sup>4</sup><https://www.heritage.org/military-strength/assessment-us-military-power-us-air-force> <sup>5</sup><https://www.fairchild.af.mil/News/Features/Display/Article/763069/behind-the-kc-135-periodic-inspection/> <sup>6</sup><https://www.mcconnell.af.mil/News/Article/3799320/new-drone-capabilities-evaluated-by-mcconnells-innovation-lab/> <sup>7</sup><https://www.travis.af.mil/News/Display/Article/3849976/60th-mxg-spearheads-new-drone-aircraft-inspection-program/> <sup>8</sup>[https://www.researchgate.net/publication/335785611\\_Visual\\_Inspection\\_of\\_the\\_Aircraft\\_Surface\\_Using\\_a\\_Teleoperated\\_Reconfigurable\\_Climbing\\_Robot\\_and\\_Enhanced\\_Deep\\_Learning\\_Technique](https://www.researchgate.net/publication/335785611_Visual_Inspection_of_the_Aircraft_Surface_Using_a_Teleoperated_Reconfigurable_Climbing_Robot_and_Enhanced_Deep_Learning_Technique) <sup>9</sup><https://www.travis.af.mil/News/Display/Article/3849976/60th-mxg-spearheads-new-drone-aircraft-inspection-program/> <sup>10</sup><https://www.ainonline.com/aviation-news/business-aviation/2024-05-27/drones-approved-jet-aviations-aircraft-inspection> <sup>11</sup>[https://static.e-publishing.af.mil/production/1/jbmcguire-dix-lakehurst/publication/afi21-101\\_amcsup\\_jbmdisup/afi21-101\\_amcsup\\_jbmdisup.pdf](https://static.e-publishing.af.mil/production/1/jbmcguire-dix-lakehurst/publication/afi21-101_amcsup_jbmdisup/afi21-101_amcsup_jbmdisup.pdf)