

Abstract

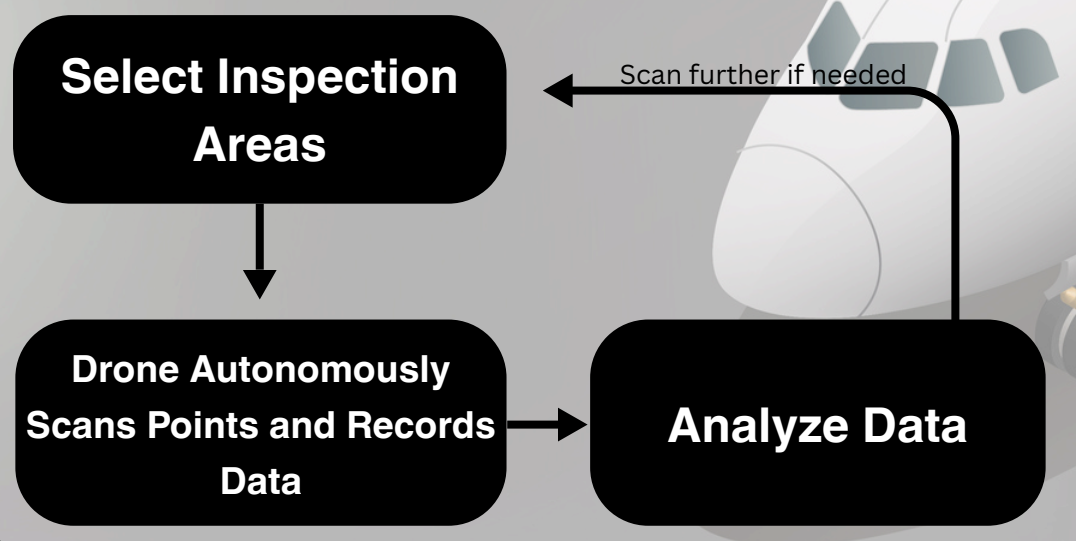
Aircraft maintenance is a complex task that demands proactive scanning for defects as opposed to retroactive fixes. Eddy Current Testing is a widely popular non-destructive testing method to find subsurface faults before they become critical safety issues. However, this inspection is labor intensive, and as the industry braces for a future with a lack of NDT talent, **since 30% of the workforce is over the age of 55**, our solution aims to alleviate this shortage by automating the manual scanning. Although robotic NDT platforms have been experimented with, such as crawlers and scanners, they fail to provide the mobility needed to adapt to any given airframe. We propose a drone based automated scanner to solve this problem. The Surface Evaluation Network for Tethered Inspection and Nondestructive Evaluation (SENTINEL) is a tethered UAV that uses a perching mechanism to anchor to a given spot of the drone and performs a scan using the eddy current sensor on board.

1.) Navigate to inspection zone
Drone and GCS coordinate to the target inspection zone

2.) Attach and perch
Docking arms extend and suction cups engage, securing the drone to the aircraft. Motors turn off to eliminate vibration

3.) Detach and relocate
Drone and GCS coordinate to relocate

Operations



Path to Deployment

- 2026: Kickoff**
 - Rapid prototype development
 - Drone platform, eddy current tester, attachment mechanism
 - Tether system & mobile GCS integration
- 2027: MVP complete**
 - Fully integrated system
 - Single-instance usability
 - Internal validation testing
- 2029-2030: Scale & Certify**
 - NAS 410 certification process
- 2031: Mass deployment**
 - Commercially available
 - Ready for airline adoption