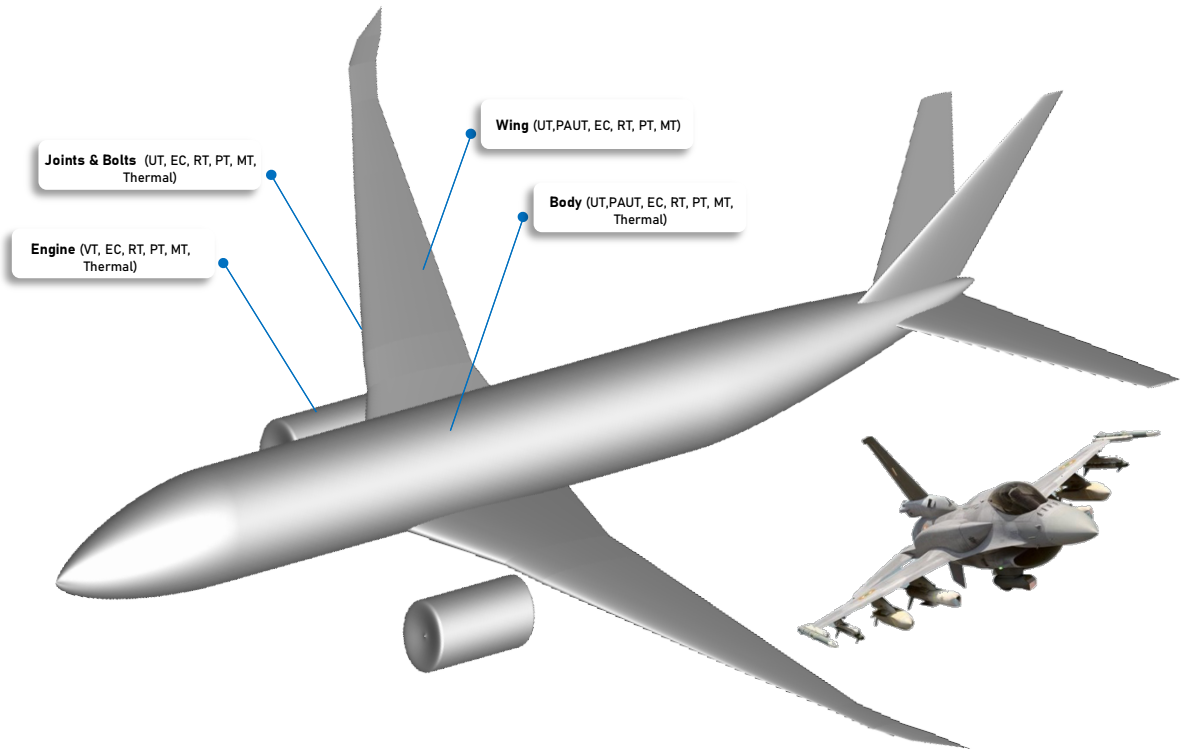
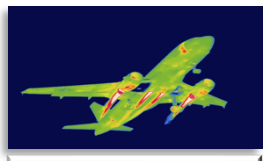
# HOW TO INSPECT AIRCRAFT?

## AIRCRAFT INTEGRITY



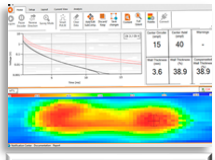



Thermal Imaging

Visual Test

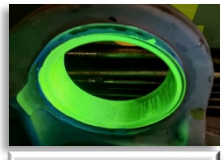
RT Scan

UT Test

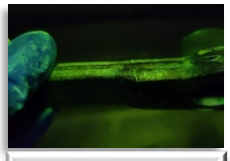


ECT Test

PAUT Test



Fluorescent PT



Fluorescent MT

# NDT and Aircraft Maintenance

A 50mm crack may not raise concerns on a ship's deck, but a 1mm crack on an aircraft can quickly disrupt weekend plans. To detect such defects, several common methods are employed, each with its unique strengths and applications.

## NDT AND AIRCRAFT MAINTENANCE

Consistently Planed maintenance is an integral part of guaranteeing the aircraft safety.

**A wide scope of NDT methodology guarantees that not a solitary fabricated part achieves service without first finishing a progression of stringent tests.**

Today, NDT is trusted as an assurance for safety in the aviation field," airplane endures numerous sorts of basic breakdown including erosion, corrosion, fatigue, imperfections, fabrication defects, operation and maintenance, and unforeseen loading.

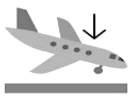
In airplane support, it is basic to assess surfaces for any harm that may exist to decide the degree of fix work required, regardless of whether that happens as the consequence of manufacturing or while the aircraft is in service. During Planed maintenance, non-destructive testing (NDT) is one of the fastest, most affordable approaches to perform assessments, and the best way to find a defect that is not noticeable to the unaided eye.

NDT is utilized to discover flaws on and under the surface, just as to identify leaks, decide the area of basic structural insufficiencies, and decide dimensional measurements.

# AIRPLANE PARTS TO INSPECT

1. **Surface and subsurface defects,**
2. **Main structural fittings of landing gear legs,**
3. **Engine attachments,**
4. **Aircraft structure joints and pylons,**
5. **Bolts located in critical areas,**
6. **Adhesive bond quality of lap joints and composite structure.**

## 5 Main Components of an Aircraft



### Fuselage

The long hollow tube that holds passengers and cargo, also known as the body of the airplane.

### Wings

Also known as foils, the wings generate the lifting force needed for flight. The wings are in the middle and back of aircraft.

### Empennage

The tail end of the aircraft is the empennage, which helps with stability using assistance from the rudder and elevator.

### Power Plant

The engine and propeller make up the power plant.

### Landing Gear

A plane can't function without landing gear. Shock absorbers and wheels are part of the landing gear.

# Conventional NDT used for Aircraft Inspection!

Most common methods are Visual Testing, Magnetic Particle Testing, Penetrant Testing, Ultrasonic Testing, Radiographic Testing and Eddy Current. In these tests, defects such as corrosion, cracks, decrease in wall thickness or gaps in internal structures are identified in ferritic, aluminum alloys, nickel, copper and titanium alloys during production or usage. Non-destructive testing methods can change depending on the procedure, size, thickness, and structure of the material.

## VISUAL INSPECTION

VT is the fastest and cheapest method of Non-destructive testing. It's the first step of every inspection before any other Non-destructive test starts. When performing visual test with naked eye, equipment such as magnifying glass, light source, borescope, and mirror can also be used.

The condition of the surface is important to detect discontinuities such as cracks, porosities, and undercuts. Required cleanings must be finished before visual testing starts. surface cleaning is very important.

Visual Testing is perhaps the oldest and most widely used inspection technique. Often the eyes of the inspector are the only "equipment" used for the inspection. Visual İnspection is applicable to virtually any material, at any stage of manufacture, at any point in its service life. To perform a successful direct visual examination, adequate lighting and good inspector eyesight is required.

VT seems like an easy method, but it has its own inspection terms, and the experience of the staff is important. Test should be performed under enough light, minimum 500 lux, with an angle not lower than 30° and the distance between eye and the surface shouldn't be less than 300 mm.

### Ultrasonic Testing

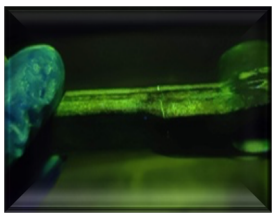
Wall Thickness & Metal Loses measurements using UT Thickness Gauges includes A-scan feature to able to detect corrosion failure and display reading in Digital & A-scan view.

**UT uses in the aerospace industry detection of**: Surface & subsurface defects, Main structural fittings of landing gear legs, engine attachments, Aircraft structure joints and pylons, Bolts located in critical areas, Adhesive bond quality of lap joints and composite structure, Thickness measurement after damage or corrosion removal.

### Magnetic Testing

MT is essentially a surface-type examination, although some imperfections just below the surface are detectable. This type of examination is limited to materials which can be magnetized (hence it is not appropriate for austenitic stainless steels). An area to be examined by MT can be completely examined or examined on a random sampling basis, as specified.

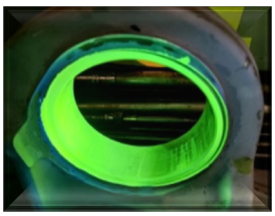
**Fluorescent MT**: This method is suitable for materials that can be magnetized, primarily detecting surface and slightly sub-surface defects.



### Penetrant Testing

Liquid penetrant testing is another simple and speedy strategy broadly utilized in the aerospace to recognize surface deformities and basic harm in non-porous materials.

PT is a method to detect surface-connected defects. It is important to have a clean and smooth surface. After mechanical, chemical precleaning the surface must be dry and any dirt such as rust, oil, or paint should be cleaned from the surface as it will affect the process. The biggest advantage of this method is it has no restrictions about the material.



### Radiography Testing

RT in aerospace can utilize both x- Ray beams for thin materials and gamma beams for thicker materials. Generally, film has been utilized to capture the picture yet is being supplanted by computerized strategies.

A further ongoing development is 3D Computer Tomography (CT) checking, which capture multiple x-Ray of a test article to develop a cross-area perspective on the specimen on a computer monitor.

# Advanced NDT used for Aircraft Inspection!

Most common methods are Phased Array UT, UT Corrosion Mapping, Eddy Current, Thermal Imaging. In these tests, you will have a permanent record and digital report for corrosion assessment. Defects such as corrosion, cracks, decrease in wall thickness or gaps in internal structures are identified in ferritic, aluminum, nickel, copper and titanium during production or usage. The NDT methods can change depending on the procedure, size, thickness, and structure of the object need to inspect.

## NDT METHODS

NDT applications not only in aviation but also in general engineering.

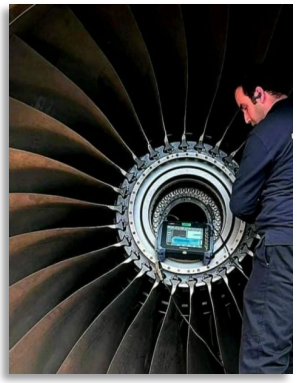
The disparity lies in what is deemed acceptable.

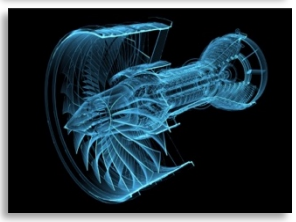
A **50mm** crack may not raise concerns on a ship's deck, but a **1mm** crack on an aircraft can quickly disrupt plans.

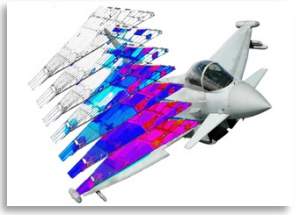
To detect defects, several methods are employed, each with its unique strengths and applications.

### PHASED ARRAY UT

Phased array inspection for full aluminum aircraft skin for scribe marks and for cracks originating at fastener holes in lap-splice joints.

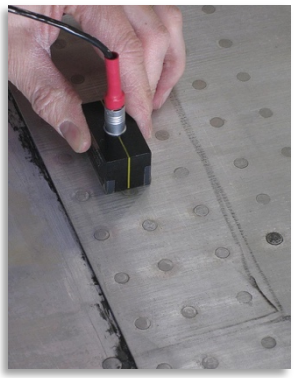


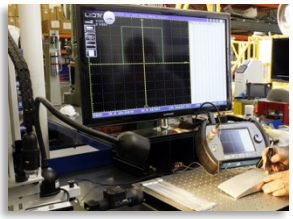




### EDDY CURRENT

Eddy Current is extensively used on electrically conductive materials, offering limited penetration. It necessitates the analysis and interpretation of flaw detector signals for surface and subsurface.





### THERMOGRAPHY

A relatively modern method, thermography employs infrared cameras to scrutinize thermal patterns on surfaces, primarily for detecting water ingress in composites.