

## Impact & Expected Results

The successful developments within ComBoNDT will enable:

- Reliable and reproducible detection of unknown and potentially multiple contaminations on adherend surfaces
- Reliable and reproducible detection of poor bond quality in bonded adhesive joints
- Robustness of methods and suitability for field measurements in aircraft manufacturing and repair environments, in terms of detection limits and measuring speed
- ENDT technique(s) which are validated in relevant environments (TRL 5 to 6)
- Certification of CFRP bonding for load-critical primary aircraft structures leading to reduced aircraft weight and fuel consumption, and the reduction of costs and times by the use of ENDT

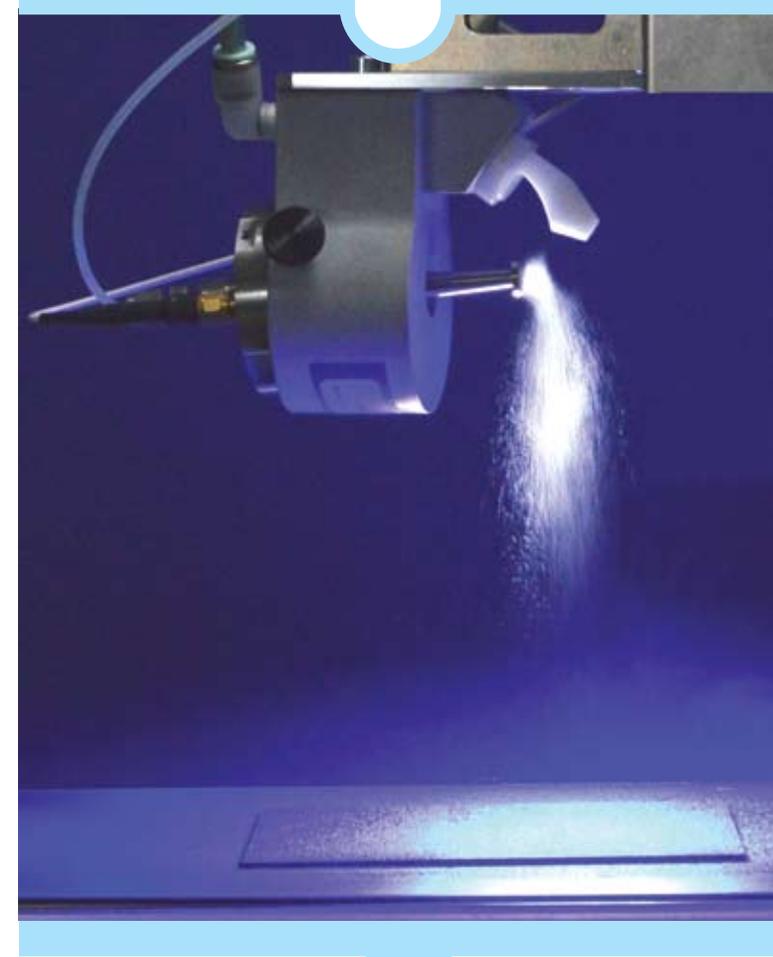


## Consortium Partners

 **Fraunhofer**



Coordinated by



**Quality Assurance Concepts for Adhesive Bonding of Aircraft Composite Structures by Extended NDT**

 [combondt.eu](http://combondt.eu)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 636494

Endorsed by:



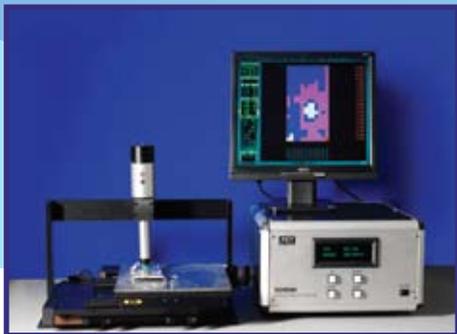
## About ComBoNDT

In order to exploit the full potential of CFRPs for the manufacturing of lightweight structures in aeronautic industry there is a need to apply **adhesive bonding** as a joining technology to **load-critical primary structures**.

**Quality assurance processes** for adhesively bonded CFRP primary structures that are not load-critical already exist. Up to now it is not possible to detect defects like kissing bonds or bondline weakening by in- and post-process NDT techniques.

The ComBoNDT project meets the **European Aviation Safety Agency** certification requirements for structural bonding. The **extended non-destructive techniques** used in ComBoNDT aim at establishing **reproducible and reliable** NDT tools to ensure the reliable strength of joint structures.

The overall objective of ComBoNDT is to **develop a quality assurance concept for adhesive bonding of load-critical CFRP primary aircraft structures**, which is applicable within the whole life cycle of the aircraft to overcome the current limitations regarding certification of composites.



## ComBoNDT Concept & Approach

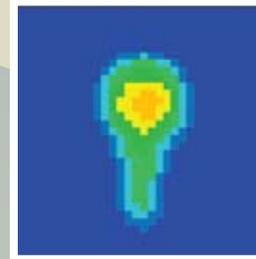
### State of the Art



**ENDT techniques can detect:**

- **Single surface contaminations** (prebond) on **simple** sample geometries
- *Weak bonds* due to single contaminations/ poorly cured adhesive (post-bond) on simple geometries

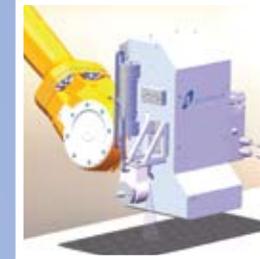
### 1<sup>st</sup> Step



**Maturation of ENDT techniques to detect:**

- Different **multiple** surface **contaminations** down to a certain threshold value (pre-bond) on **test coupons**
- *Weak bonds* due to multiple contaminations/ poorly cured adhesive (post-bond) on test coupons

### 2<sup>nd</sup> Step



**Adaptation and improvement of ENDT in terms of:**

- *Pre-bond/ post-bond* inspection on pilot samples with **realistic geometries**
- **Automation and industrialization** of ENDT techniques, including its use on a demonstrator and automated data evaluation
- Validation of measuring results/round robin test

### Final Results & Innovations of ComBoNDT



**Validated ENDT techniques for:**

- Surface quality assurance (pre-bond)
  - Adhesive bondline quality assurance (post-bond)
- ... for integration into future adhesive bonding processes

