



## Improving the Inspectability of Aerospace Composite Materials IntACom 2



**PUBLISHABLE  
SUMMARY**

**JIP 25692**

### **Background**

IntACom is a development programme with the aim of reducing the time taken for inspection of complex geometry composite components. The project was originally dedicated to aerospace structures, but IntACom 2 extends this to other applications. It has achieved this by addressing three areas: (1) Automation of current manual inspection; (2) Enhancement of existing semi-automated systems through the use of multiple transducers and ultrasonic phased array technology (PAUT); (3) Software enhancement through the use of techniques such as assisted defect recognition and scan display management.

The programme has made great strides forward in its early phases and exceeded many of the original objectives. A system has been developed that incorporates two robotic arms, an advanced pulser receiver system and bespoke software. Phase 1 was completed in late 2014 and phase 1A in 2016. A further phase, IntACom 2, is now underway and will address the inspection of larger components through the addition of axes to the inspection system such as tracks and turntables, and the addition of metrology systems to cope with positioning and part shape variability. It will also develop enhanced radiographic CT and laminography systems, and large area scanning systems for use on site and in service.

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## IntACom 2

### Objectives

The objectives of the IntACom 2 project are to build upon the success of the preceding IntACom work to:

- Increase the size of the parts that can be scanned by the system through the addition of tracks and turntable axes
- Integrate metrology systems to cope with part positioning and shape variability
- Develop advanced end effectors to enable faster, more reliable scanning through improved water flow and cable management.
- Development of a detector translation system to enable Microfocus X-Ray CT of large components
- Development of a X-Ray laminography system to enable 3D imaging of parts with high aspect ratios not suitable for conventional CT
- Development of site Deployable Area Scanning System
- Development of site Deployable Low Energy Radiography System

### Programme Outcome

Principle outcomes of the previous phases of the IntACom programme were:

- Literature review that informed partners of the state of the art, and influenced the system requirements' specification.
- 'Library' of partner supplied samples containing artificial and real flaws representative of typical aerospace structures.
- Modelling techniques to support the design of probes and end effectors, and to aid inspection technique development.
- Ultrasonic techniques appropriate to inspection of the supplied components and detection of the implanted flaws.
- Two pulser receiver units with associated probes, end effectors and coupling devices.
- Robotic cell containing two Kuka KR16 robotic manipulators, complete with a safety interlocked cage and a water recirculation system.
- Custom software which, used in conjunction with a commercially available offline path planning application, has been used to develop robotic scanning programming for all samples.
- Custom software to enable acquisition and analysis of data, incorporating many advanced features not available on commercial software.
- Software tools that increase the reliability of the inspections.
- Integrated robotic and acoustic systems, accessed through an easy to use graphical user interface (GUI).
- Training of system operators.

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### Benefits

Partners provided with an inspection solution to aid development of new products where none would have existed.

### Participants

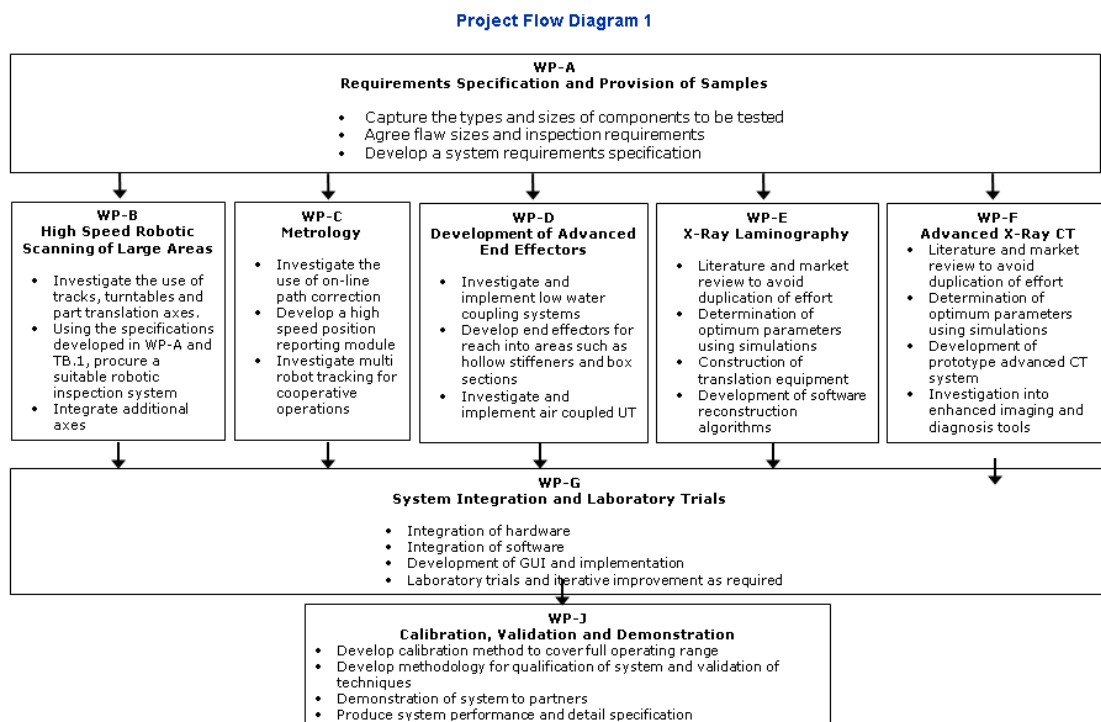
The Sponsor Group currently comprises:

- GKN Aerospace Services Ltd;
- Rolls-Royce plc.
- RNLI

Additional financial support is provided by the Welsh Government. Earlier phases of the work were also supported by Bombardier Aerospace.

### Scope of Work

The project structure and overview of content of each work package for IntACom 2 is shown in Figure 1 and Figure 2.



**Figure 1** Project Flow Diagram

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## IntACom 2

Project Flow Diagram 2

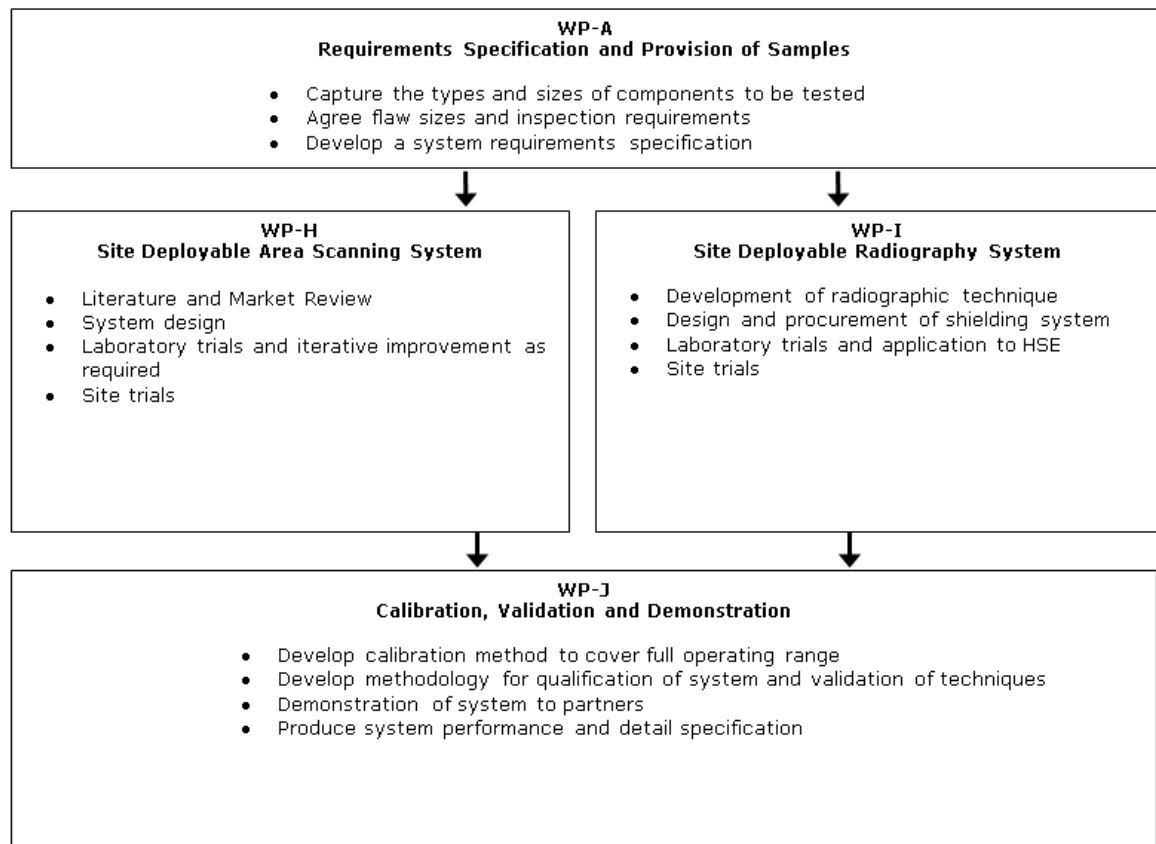


Figure 2 Project Flow Diagram

## Price and Duration

IntACom 1 and 1A had a total duration of four years and a combined budget of £2.01M.

IntACom 2 has a duration of three years and a budget of £1.8M. Currently there are three Sponsors each making a contribution of £180,000. TWI is contributing £360,000, and Welsh Government is providing the balance.

## Further Information

For further information on how a Joint Industry Project (JIP) runs please visit:

<http://www.twi-global.com/services/research-and-consultancy/joint-industry-projects/>

**Programme Manager:** Ian Cooper

**Email:** [ian.cooper@twi.co.uk](mailto:ian.cooper@twi.co.uk)

**JIP Co-ordinator:** Tracey Stocks

**Ref:** 25692/2/17

**Email:** [JIP@twi.co.uk](mailto:JIP@twi.co.uk)