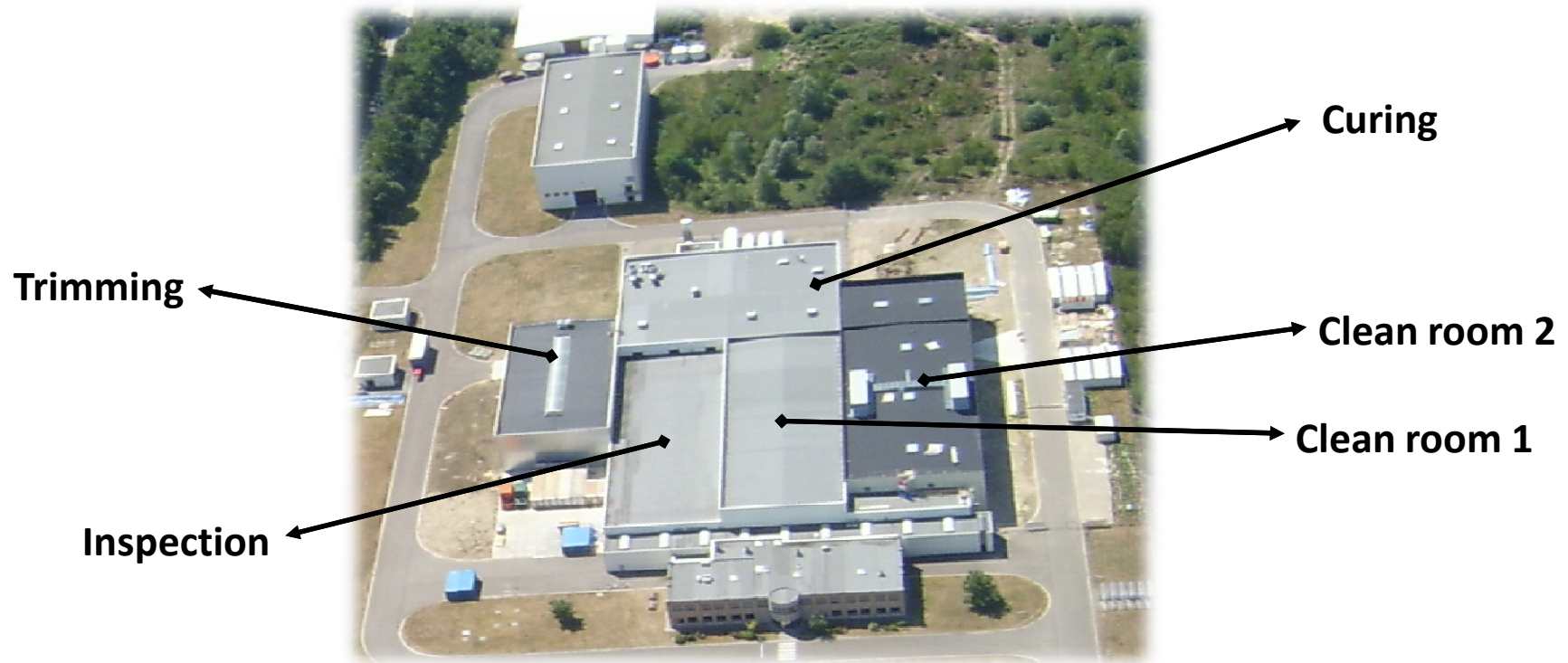


New inspection methods at SABCA Limburg

(29/10/2012)

Sabca Limburg NV

- SABCA LIMBURG has a 12.000 sqm purpose built facility for the manufacturing of high performance aerospace components from composite materials.

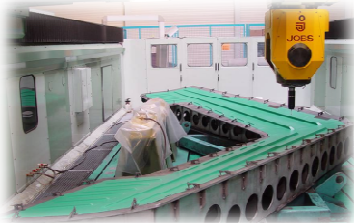


... based on prereg with thermoset resins

Equipments

Trimming area

- CNC 5-axis machine center
- Paint shop
- Pogo flexible tooling system



Curing area

- Autoclaves (#3)



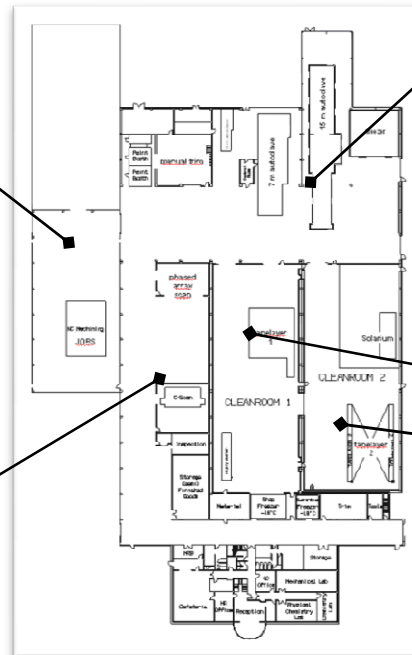
Inspection area

- Automatic US Phased array (C-scan)
- Automatic US squirter (C-scan)
- Handheld equipments (A-scan)

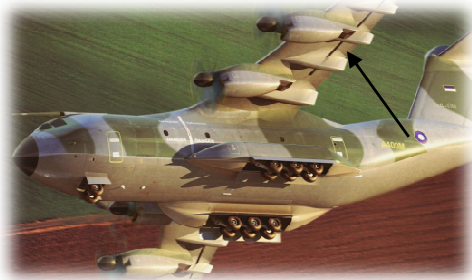


Clean rooms (#2)

- CNC contour automatic tape layers (#2)
- CNC ply cutter
- Hot forming equipment



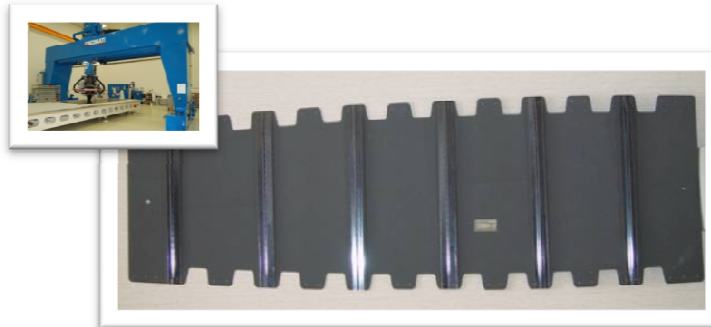
Programs



Main products overview and technology used



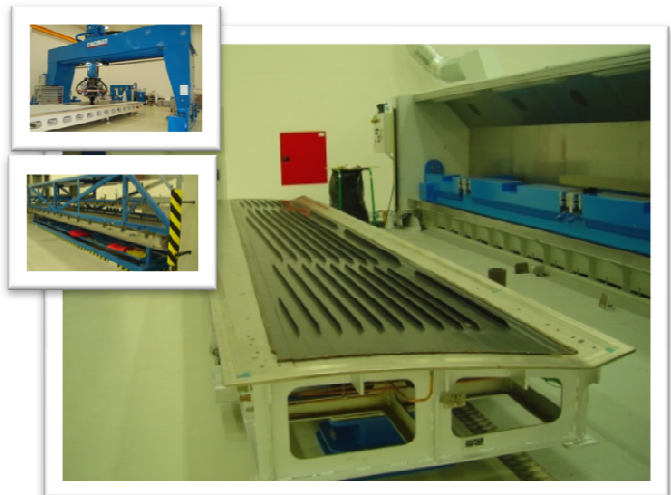
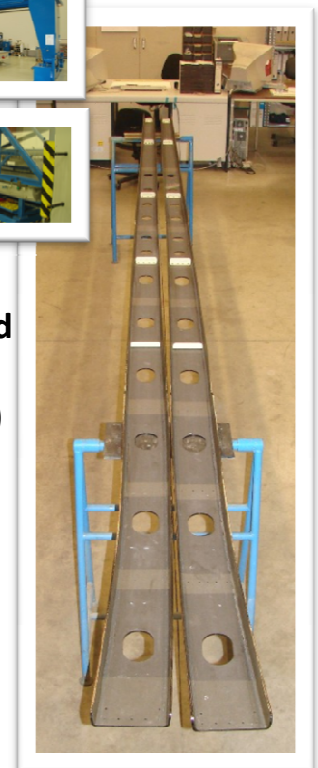
Honeycomb (Flap track fairings A340, A350)



Co bonded stringers (Ribs A320)



Hot formed spars (G650)



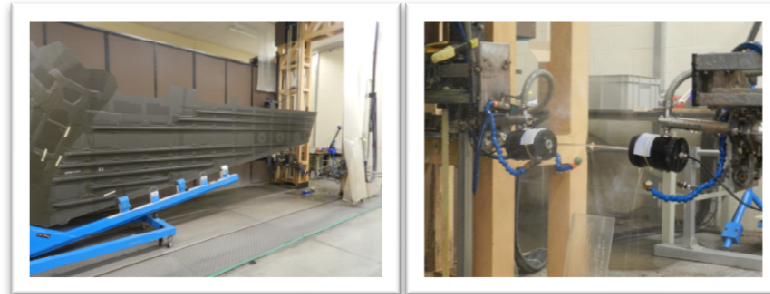
Integrated stringers (Flap covers A400M)



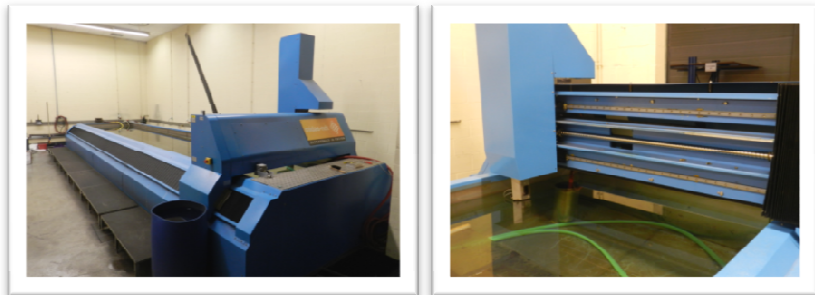
Co cured stringers (HTP Flacon 900/200, SMS, G650)

Ultrasonic inspection equipments (today)

- Automatic ultrasonic C-scan squirter equipment on towers (2 axes)



- Automatic ultrasonic C-scan phased array equipment – immersion system (3 axes).



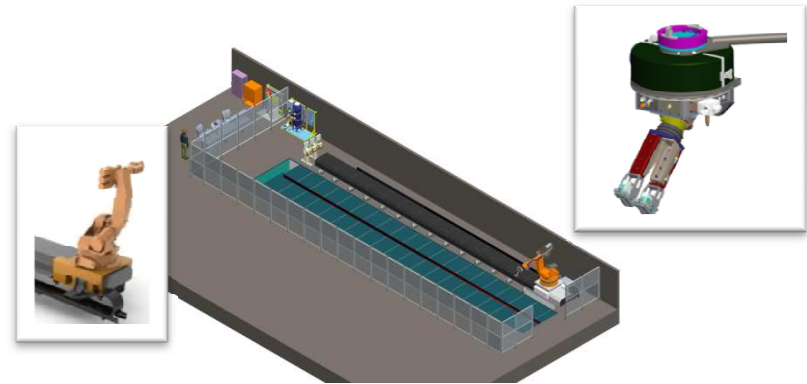
- Handheld equipments

- Ultrasonic A-scan equipments (GE USM 35X)
- Ultrasonic phased array equipment (Olympus Omniscan)
- Ultrasonic thickness measurement equipment (GE CL5)

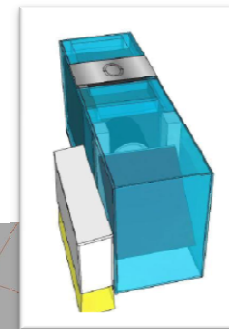


New technologies investigated (tomorrow)

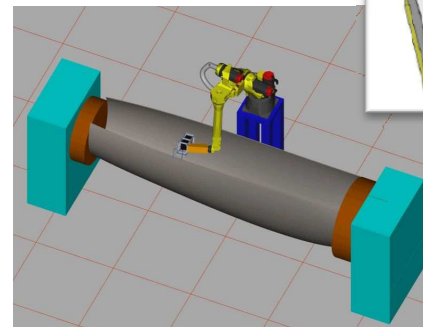
- Automatic ultrasonic C-scan phased array pulse echo equipment on robot(s)



- Automatic ultrasonic true transmission squirter system mounted on 2 robots.



- Thermography system mounted on robot.



Honeycomb structures

Today



Hammer tap



(FTF A350)




Manual thick. meas.



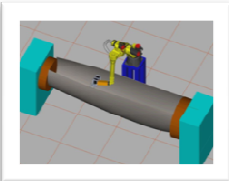
US Omniscan

Tomorrow




US Squirter


OR



Thermography




(FTF A350)



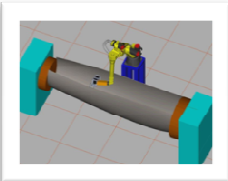
US Omniscan

OR




US Squirter

OR



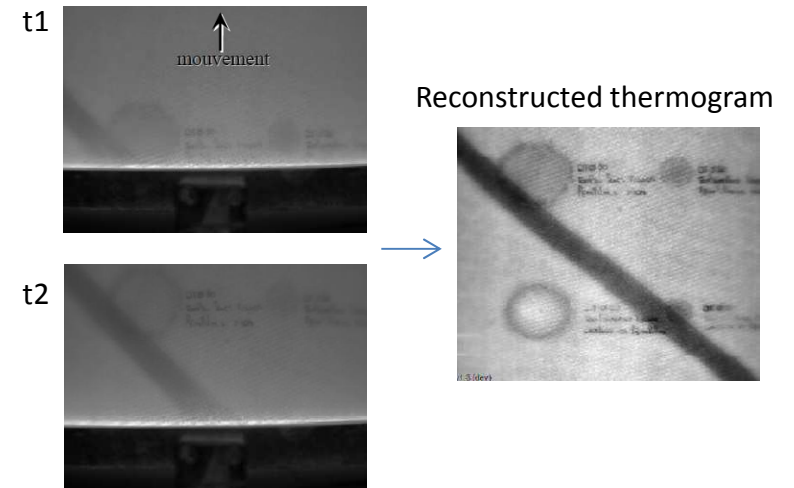
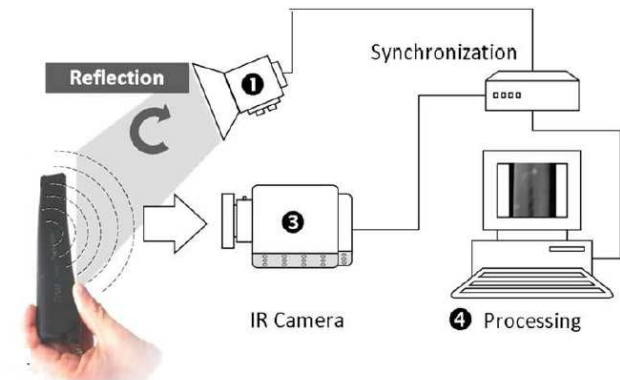
Thermography



Manual thick. meas.

Thermography system

- Non-destructive technique allowing the inspection of materials in a noncontact manner through the use of an infrared (IR) camera.
- The difference in thermal properties between the specimen material and the eventual surface or internal defects is large enough to be detected with an IR camera.
- In order to increase the contrast between defective and non-defective zones, an external thermal stimulation is used.
- The specimen is thermally stimulated in reflection mode (in this case).
- A dynamic inspection, where the heat source and the IR camera move along the specimen is considered.



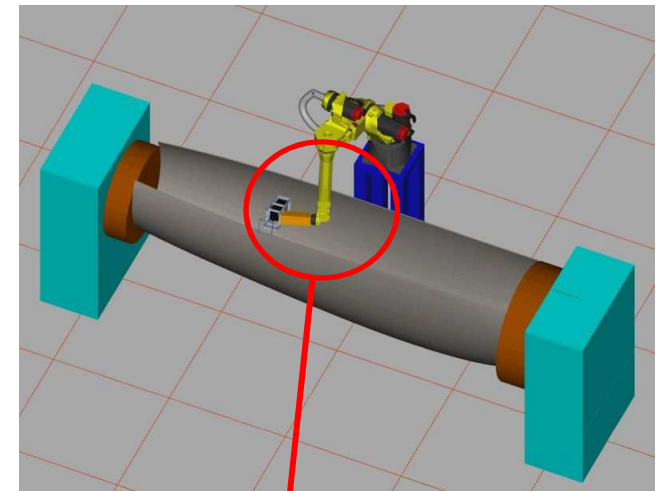
Thermography system mounted on robot



- Requirements:
 - Criteria defects: Class VI: 1500 mm²
 - Indication of 10 x 10 mm²

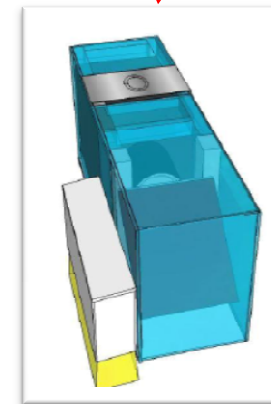
- Today

- Tap test:
 - ~2 ... 3 cm² /sec

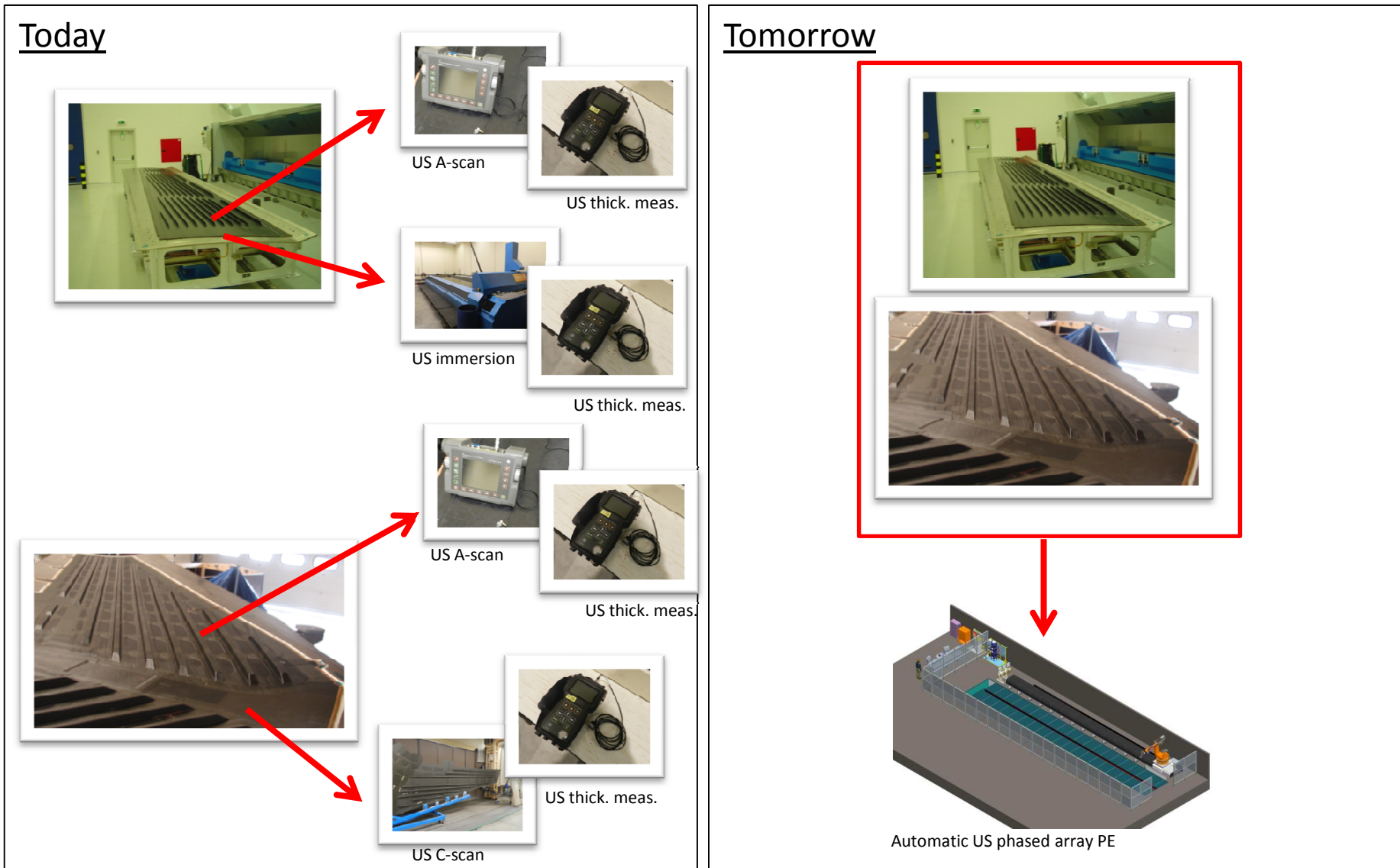


- Tomorrow

- Thermography system:
 - Linear IR lamp at 5 cm of the surface
 - IR camera with gold reflector
 - Assembled 3D or 2D image of the inspected part
 - ~15 ... 20 cm² /sec

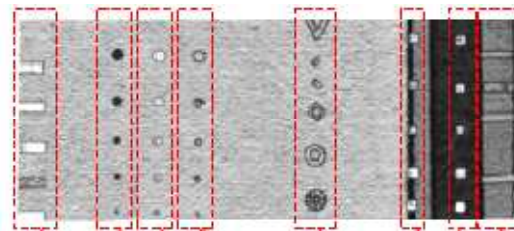
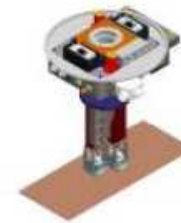
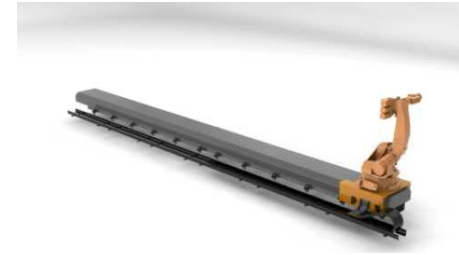


Integrated stringers and co-cured stringers



Phased array pulse echo ultrasonic inspection system mounted on robot

- Manipulator: robot moving along an X Axis.
- End Effectors
 - Skin module and probes, for local immersion pulse-echo inspections , including one or two phased array probes
 - Stiffeners module, for local immersion pulse-echo inspections including phased array probes specific to the shape of the stringers
- Ultrasonic Data Acquisition and Analysis system



Phased array pulse echo ultrasonic inspection system mounted on robot

- Requirements:
 - Criteria: 6 x 6 mm
 - Indication of 3 x 3 mm
- Today:
 - Skin:
 - Squirter US TT system: **~10 cm² /sec**
 - US thickness measurement
 - Stringers
 - US A-scan handheld equipment: **~5 ... 10 mm /se**
- Tomorrow
 - Thickness measurement during scan
 - Skin:
 - Phased array UD PE system: **~30 ... 120 cm² /sec**
 - Stringers:
 - Phased array UD PE system: **~50 ... 200 mm /sec**

