Over the last few years, the aeronautical industry is using – at an increasing pace – automation solutions for aircraft structure assembly. This scenario has motivated two Brazilian institutions — the Aeronautical Institute of Technology (ITA) and Embraer — to develop a joint project. This encompasses designing and commissioning a low-cost, flexible automation system for aircraft structure assembly suitable for the Brazilian aeronautical requirements. A number of industrial partners have joined the ITA – Embraer project, among them Nikon Metrology, for supplying the equipment for setting up the large volume measurement cell.

A flexible low-cost automation system for aircraft structure assembly

Last June, the laboratory of Aircraft Structure Assembly Automation opened its doors after eleven months of work. 300 square meter (3,230 square foot) and 10 meter high (33 feet), the laboratory houses equipment, devices and systems that are considered innovative within their respective technical areas, namely:

- Robotic cell equipped with two industrial anthropomorphic robots that yield high load capability and large work space volume
- Large-volume measurement cell that consists of iGPS, photogrammetric station and a Laser Radar (in process of purchase)
- Automatic alignment and levering process for aircraft fuselage using anthropomorphic robots assisted by external measurement systems, such as iGPS, Laser Radar, laser tracker, optical systems and theodolites.
- In this process, one anthropomorphic robot positions a fuselage ring relative to the other fuselage rings in order to assemble the complete aircraft structure. An alternative solution for the alignment and levering process is being derived based on a dedicatedly designed, non-conventional robot, to meet the requirements.
- Multitask end effector for drilling, inserting and inspecting rivets into the aircraft fuselage.

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Joint project developed by Brazilian institutions ITA and Embraer

Besides the technology involved, the project aims at capacitating human resources in the technical area of the laboratory. The project is named Aircraft Structure Assembly Automation, and it is financially supported by Brazilian research agency FINEP and Embraer.

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