



AIT Positioning Systems



AIT has been building precision turnkey automated positioning systems for large aircraft assembly for over 16 years, with more systems operational worldwide than any other company. In fact, the engineering staff at AIT has been involved with almost every large airframe automated control system in the Aerospace industry.

PRECISION CONTROL ✂ The positioners support airplane subassemblies and smoothly move them in a linear fashion as well as rotationally. Each positioner is effectively a three-axis machine whose precision motion is accomplished via servo motor control with resolver feedback.

Because of our experience manufacturing hundreds of positioning machines, AIT has been able to develop a standard design for many system elements. AIT can easily modify these designs to

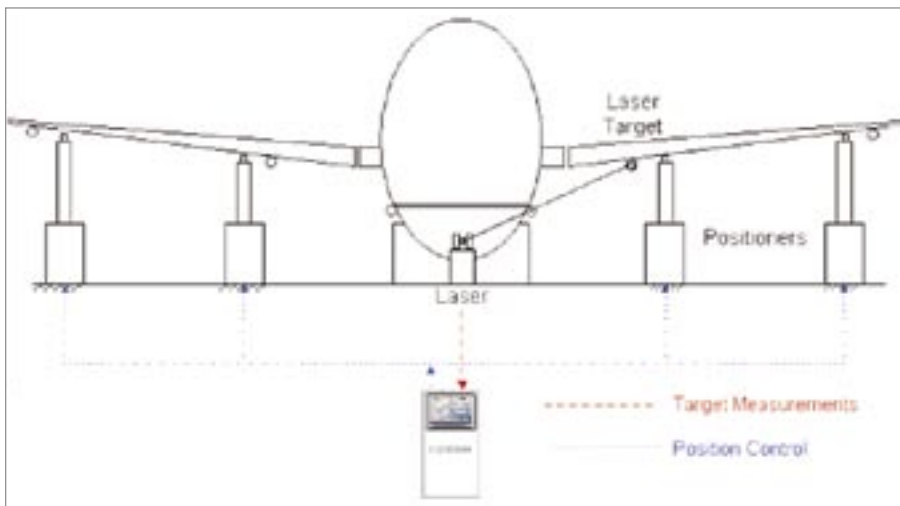
747 POSITIONERS ✂ AIT positioners – like those used for the 747 – are fabricated in our Aldergrove, B.C., facility, creating shorter lead times and more affordable equipment.

exactly match the unique requirements for each project. By using a standard design, AIT provides the shortest lead time and most reliable systems in the industry.

System Elements

With automated positioning systems, AIT has enhanced the Aerospace industry's ability to manufacture aircraft in less time and with greater exactness and flexibility. In reality, our positioning precision boasts a 0.005" accuracy or better. What gives AIT Positioning Systems their superior performance are the combination of mechanical actuators (or positioners), control system, and laser measurement system.

The automated tool's control system consists of a high-speed multiple-axis motion controller and user interface computer. Together, these components synchronize and coordinate the multiple axis moves. An intuitive graphical user interface (GUI) is used to control the system and simplifies the process. AIT's systems require minimal training while also reducing errors.





F-35 LASERS AIT has integrated many different types and makes of lasers, such as those used with the F-35 JSF.

Pioneers of Laser Indexing Systems

AIT leaders revolutionized the Aerospace industry in the late 1980s when they developed the laser alignment technology that would first be used for the McDonnell Douglas C-15 fuselage and wing alignment.

AIT's automated positioning systems incorporate laser measurement technology to facilitate aircraft structure alignment and join. The real-time laser measurement replaces jigs for locating parts and identifies out-of tolerance conditions before errors occur. Real-time part-to-part indexing offers higher tolerance, more flexibility, superior access, and improved ergonomics over traditional hard tooling. This improved method of assembly is controlled through the use of the GUI or joystick, making the system exceeding user friendly.



GUI TOUCHSCREEN Portable actuating devices, such as mobile pendants, have resulted in precision subassembly manipulation anywhere in the assembly process.

Benefits of AIT Positioning Systems

Each benefit of AIT's positioning systems results in heightened cost containment for our customers.

Speed: Faster tool setup, faster positioning of assemblies, and fewer move iterations to locate the assemblies result in faster flow of assemblies through the factory floor, shorter cycle time, and reduced work in process.

Quality: Unrivalled number of automated positioning machines in the aircraft industry ensures utmost accuracy and precision. Automated positioning produces superior quality final assemblies through tactile subassembly handling and by providing a means to analyze as-built data.

Reduced Direct Labor: User-friendly technology facilitates greater production rates, less overall labor costs, and fewer human errors.

Flexibility: Flexible automation equipment means a lower investment of fixed tooling, shorter lead times if a variation is introduced, and flexibility with production and the facility.



Positioning System Experience

AIT's engineering expertise has benefitted major Aerospace companies, including their following projects.

Boeing 787 Dreamliner Final Assembly

- Join Section 41 (FWD fuselage), Section 12 L&R (wings), and Section 47/48 (AFT fuselage) to the mid-fuselage
- 14 positioners mounted to transportation structures that move independently or interlocked and indexed to factory floor for stability
 - Real-time positional measurement data with an integrated indoor GPS
 - Alignment and positioning systems rolled under aircraft dollies after aircraft brought into factory, reducing equipment needs and positioning steps

Boeing 747 FAIT Automated Alignment

- Automate measurement and positioning of major structural subassemblies in the 42 and 46 Section Lower Lobes and 41/42, 44, 46 Section Majors assembly areas
- 13 automated fixtures
 - 200 positioning machines
 - 700 axes of servo motion
- Over 50 end-effectors in a 15ft x 15ft x 75ft volume
- Controlled by RTCs, AIT's graphical user interface, mobile joystick, and mobile GUI touchscreens

Lockheed Martin F-35 Joint Strike Fighter Final Assembly

- Perform final mating of the JSF forward, center, and aft fuselage assemblies as well as the wing assembly with automated Electronic Mate and Assembly System
- 16 positioners
 - Included 3 integrated Laser Trackers each to guide positioners into precise mating configuration for each aircraft component
 - Automatically measured key features to ensure precise alignment
 - Confirmed tolerances before errors occurred
- 4 major subassemblies (forward, center, aft, wings)
- Specialized control and GUI software
 - Software allowed operator to assign weights or alignment priorities to measured points
 - User friendly GUI touchscreen

737 FACILITY AIT provides a clean, aesthetically pleasing system with minimal floor obstruction.





AIRBUS A380 Positioners from the AIT upper shell tool for the A380.

Bombardier Challenger 300 Final Assembly

- Automate positioning of fuselage sections and wing assembly to fuselage for join
- Use of automatic laser tracker to measure sub-assemblies in process and ensure geometric integrity

Airbus A380 Section 19 Assembly

- Provide automated turnkey tooling to assemble the composite Airbus A380 rear fuselage section (Section 19)
- 6 conventional Panel Assembly Systems
- 2 automated Shell Assembly Systems
- 1 automated Final Assembly System
 - 50 positioning machines
 - 100 axes of servo motion

Boeing Next Generation (NG) 737 Final Body and Wing-to-Body Join

- Measure and automatically position 5 major fuselage components during the final assembly and wing-to-body join processes with turnkey laser alignment systems
 - Articulating lasers and airplane-mounted passive targets measure positions and orientations of four fuselage sections relative to the wing stub section.
 - Operators at the console observe the position data and actuate section moves via the touchscreen.
 - The control system performs coordinated linear and rotational moves in and about all three airplane axes utilizing servo positioning.
- Flexible equipment capable of building five models
- 7 final assembly tools
 - 140 positioners
 - 200 axes of servo motion
- Technology that sped production and improved fuselage quality with embedded Laser Tracker to inspect quality in-process

Additional Positioning Systems Experience

- Boeing 777 Automated Alignment and Empennage Positioning
- Bombardier Global Express and G5000 Final Assembly
- CASA DO728 Automated Wing Assembly
- Fairchild Dornier 528, 728, 928 Jet Final Assembly



About AIT

Advanced Integration Technology (AIT) is a leading industrial automation company delivering turnkey factory integration solutions to the Aerospace industry. Accustomed to managing multiple large, simultaneous, international projects, AIT has served as the full-scale integrator to some of the most prominent Aerospace companies' cutting edge projects. Relying on the strength of our diverse team of engineering pros, AIT has earned a leading position as the predominant turnkey integrator and prime contractor to the world's foremost Aerospace companies – including Airbus, The Boeing Company, Bombardier, Spirit AeroSystems, and Vought Aircraft Industries. Our precision-engineered technology and automation have enhanced the industry's ability to manufacture aircraft in less time and with greater exactness and flexibility. Learn more at www.aint.com

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