

Airframe Assembly—Major Join

The assembly process for airframes incorporates a series of Join tools. One is the Major Join tool which positions the center fuselage, forward fuselage (nose), assembled wings and aft fuselage (tail) sections. These sub-assemblies must be positioned for a seamless fit and then locked in place so that a mechanical join can be completed. Laser target alignment is used to control the positioning.

For the airframe components to be properly joined, the use of high-precision and highly reliable servo systems and software is essential. An intuitive graphical interface improves assembly operations time by providing operators the visualization of information required to control the automatic positioning. Individual adjustments to jack positions can be made via operator touch screens.



C-17 aircraft assembly uses advanced, precise motion control for the Major Join tool automation.

Application Highlights

The system executes fully automated joining of the aircraft fuselage, nose, assembled wing and tail sections. Predefined sequencing is performed to home and move the positioning jacks supporting the individual sections. They are precisely positioned and aligned for mechanical joining.

Adjustments from an operator touch screen can be made to fine tune each alignment. Positioning precision is up to .001 inches.

Motions between multiple jacks are synchronized to avoid stresses on the aircraft components. Specialized software and hardware interlocks insure this coordination.

Productivity in Motion

- Improved airframe assembly operations with easy-to-use operator interface.
- Safety override features including software halts, and hard-wired e-stops.
- Decreased down time with reliable and rugged system hardware.

Backup and Recovery Strategies

- Battery backup system supports fully automatic restart and recovery routines.
- Motion cabinets and controllers operate if SCADA system is off-line with directly connected PC.



High speed drive based I/O with micro-second position capture are used for precise alignment of positioning jacks.



An intuitive operator interface provides the information and command for efficient operation..

Operator Interface

- Single or dual touch screen operator monitors.
- Easy to use displays and commands.
- Security badge reader for controlled system access.
- Remote access via wired or wireless operator pendants.

SCADA Computer

- Data collection for trending and archiving.
- RAID—redundant arrays of independent disks for secure data storage.

ORMEC Equipment

Multi-axis ORMEC Controllers

- Motion control and PLC functions with high performance computing capability.
- High speed drive based I/O with microsecond position capture servo updates.
- Sub millisecond programmable limit switch outputs.
- Drive fault protection circuits, watchdog timers and integrated diagnostics for fail-safe operation.

ORMEC Servo Drives

- High bandwidth control with high resolution motor feedback, for quick and accurate torque, velocity and position control.
- Programmable drive real-time software configuration tools.

ORMEC AC Servo Motors

- High performance, reliable with low maintenance.
- Large library of standard motors and a custom motor wizard for non-standard motor configuration.

Certified UL508A panels

- Integrated panels are built to your design specifications and are UL certified by ORMEC.



Custom integrated panels are provided with UL certification.

Operator consoles

Touch screen monitors

- Easy-to-use.
- Efficient commands.
- Secured access via card reader.

Pendant stations

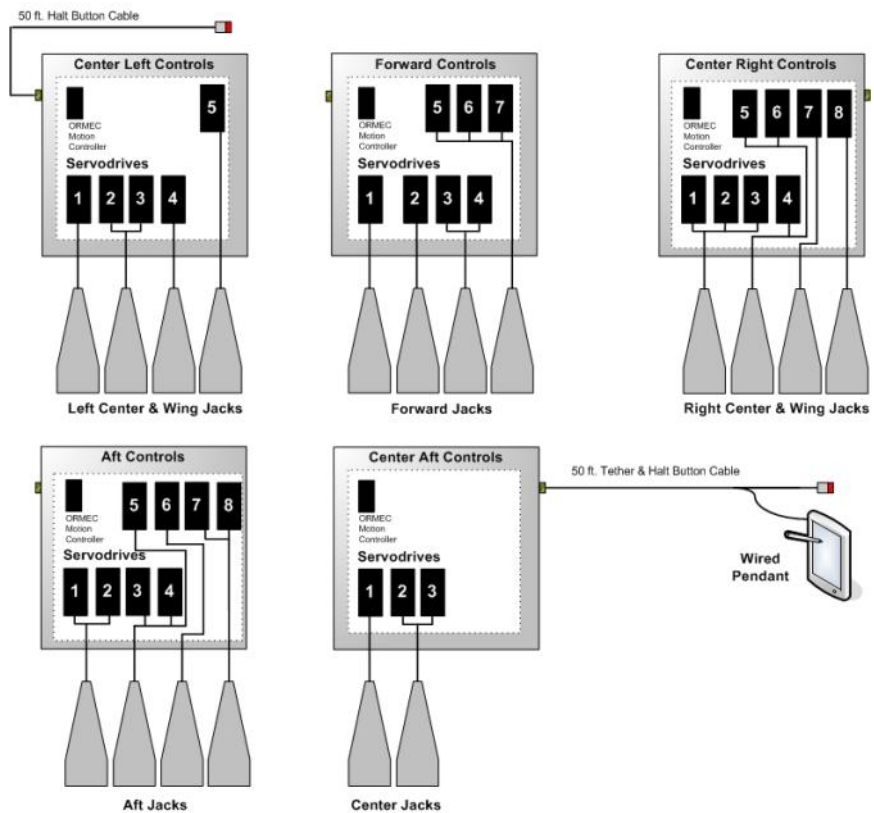
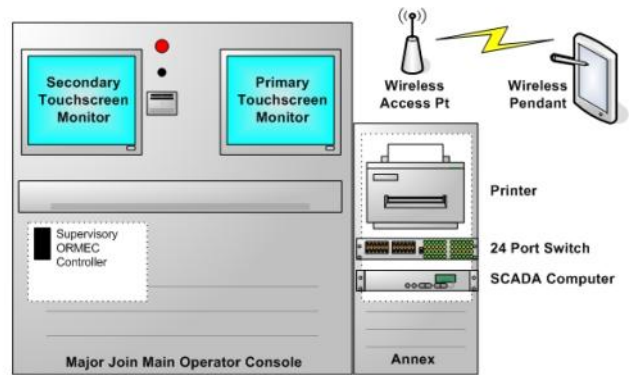
- Operator flexibility for remote access— wired and wireless.

SCADA Computer

- Historical data collection and archiving.

Backup Operation

- In backup mode, the motion controls can be independently operated with a directly connected PC.



ORMEC configuration for a typical Major Join system.

The motion control experts at ORMEC have a wealth of experience providing motion control solutions for the aerospace industry. As your automation partner, we offer a comprehensive range of

automation integration and project management services.

For more information please contact us by phone (585) 385-3520 or email us at sales@ormec.com