



PROJECT BRIEF

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Paint Hangar System

Description: Aircraft manufacturers require extreme accuracy and repeatability when painting airplanes. Mistakes and slow performance can be very costly. When one of the world's largest aircraft manufacturers wanted to upgrade a paint hangar, they turned to Concept Systems. The project was one of the most complex and multi-faceted in Concept's history.

One key aspect of the paint hangar upgrade was the Collision Avoidance System. For greatest efficiency, painters must quickly get very close to the aircraft. Using 3D modeling, multiple PCs, a PLC interface, and theodolite surveying equipment, Concept engineers developed one of the most unique, sophisticated collision avoidance methods ever designed. The result was a system that allows for flexible aircraft parking but it is also highly accurate; the operator cranes can quickly reach within 4 inches or less of the aircraft without risk of contacting it. This Collision Avoidance System also offers extreme reliability and operator-friendly interaction.

The Process Air System was another critical piece of this project. The assigned Concept process control engineer used only one ControlLogix processor to manage the entire air-handling system with function block programming. Through the software, the engineer produced much more accurate control of dramatic temperature shifts, despite significant differences in the air handling system's mechanical components. Providing an easy-to-maintain system was important to all sub-systems in this complex project. Although several Concept engineers were on the team, they all programmed on the same RSLogix 5000 platform and used consistent programming structures and naming schemes. The customer's maintenance crew only has to know one platform for system troubleshooting and modification.

Consistency throughout the hangar was also maintained in the off-the-shelf Allen-Bradley PowerFlex drives used in the various sub-systems. Even if drives serve very different purposes, they were programmed in a similar manner. Maintenance personnel again benefit greatly from Concept's standardization practices.

Another major system improvement in the paint hangar involved the encoder systems. Linear encoders chosen for the cranes provide tremendous accuracy and repeatability. Absolute encoders, also used on the cranes, do not require time-consuming re-homing/re-calibrating after a power loss or maintenance downtime like in the old system. Inexpensive, explosion-proof, encoders on the wingstands (in a Class 1, Div 1 area) provided precise platform heights and angles. All the hangar's encoders delivered the tight tolerances, high accuracy, and repeatability required for their critical operations.

This complex paint hangar upgrade project involved several Concept engineers working on very different sub-systems. Their consistent, expert programming resulted in a dramatically more accurate, efficient, and maintenance-friendly aircraft painting control system than existed before.

Services Provided:

- Control Engineering and Design
- PLC/HMI Programming
- O & M and AutoCAD Documentation
- Start-up & Commissioning



Results:

- Extremely precise crane (platform) and wingstand movements with collision avoidance greatly improved productivity
- More flexible collision avoidance system reduced costly delays of having to repark aircraft
- Improved air handling system enhanced efficiency of painting and curing processes
- Consistent programming and common device usage simplified maintenance
- Complete documentation improved system maintenance and troubleshooting
- Integration with existing network provided common login and efficient alarm notifications

Technologies/Platforms Used:

- Allen-Bradley ControlLogix PLCs
- Allen-Bradley RSView SE (Operator Interface/HMI)
- Allen-Bradley PowerFlex 70 & 700 Drives
- Allen-Bradley Motor Control Centers with DeviceNet
- Allen-Bradley Flex Ex I/O with Intrinsically Safe Devices
- Microsoft Visual Studio 2005 with C++

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