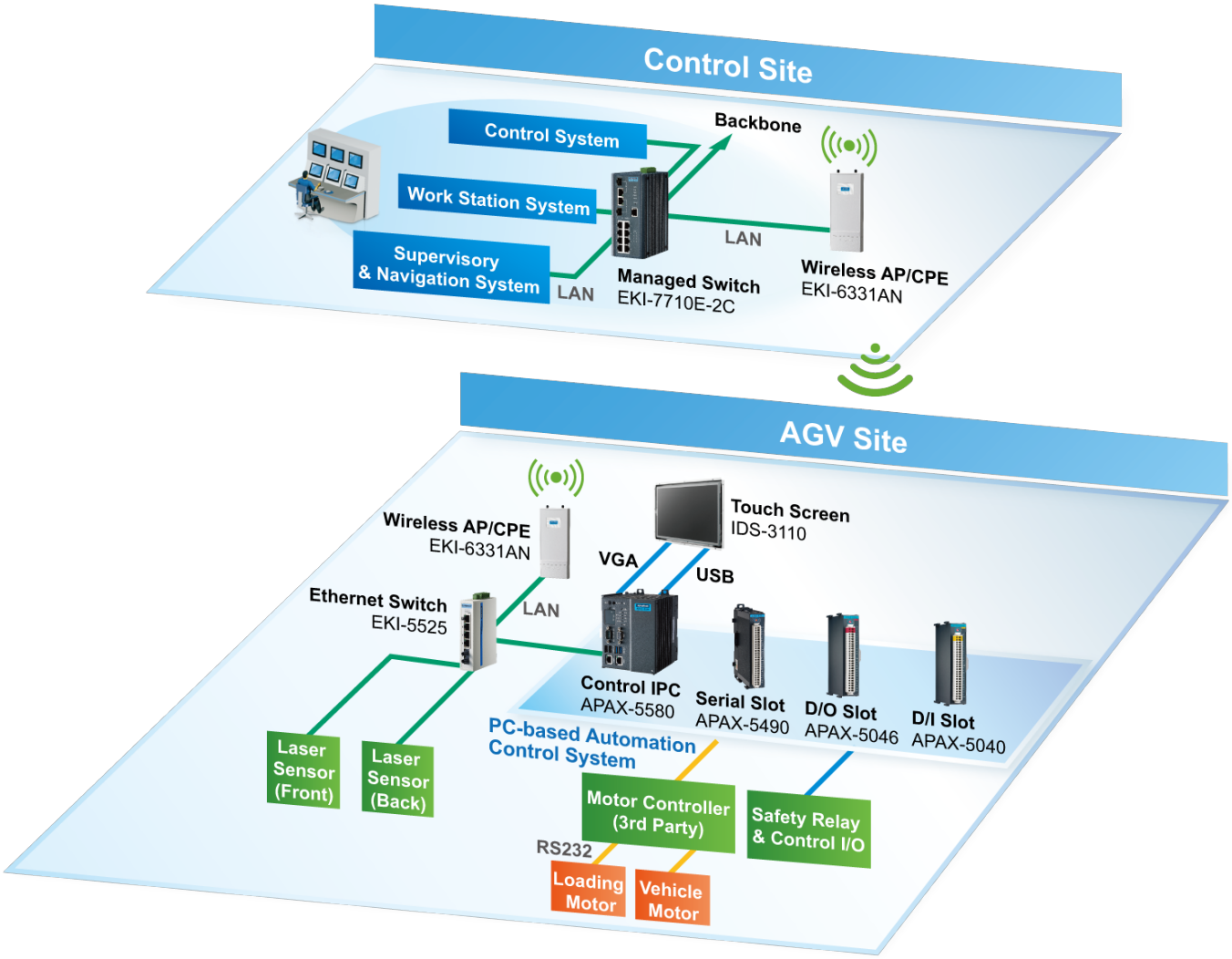
PC-based PAC solution for material handling AGV optimization

Widely used across many industries, Automated Guided Vehicles (AGV) have been scooting around factory floors for decades.



Project Introduction:

Thanks to evolving technologies like sensors, wireless networks and automatic control technologies, theirguidance methods and physical dimensions continue to evolve and now small lightweight trackless AGV are being rolled out.

An American AGV System Integrator (SI) was designing a Laser Guided Vehicle (LGV) for a material handling system in an automotive assembly plant. Since the plant?s existing AGV system used an expensive PLC-based control system there weren?t enough functions to meet the new control requirements, the company decided to upgrade and shift to a compact PC-based PAC control system ideal for the new compact vehicle design, capable of integrating with upper management systems using a single software application to replace the original two software applications.

System Requirements:

The client had several requirements for this project. Not only did the new hardware have to be small enough and robust enough to survive in the harsh factory conditions, it was also essential that there wouldn?t be any breakdown in communication between the LGV and the control room.

To ensure this stability, the SI used industrial grade wireless devices with wider network coverage andhigher power output. It was also required that any system provided to the SI would be able to support their bespoke version of Linux (Debian Wheezy X64).

System Implementation:

Inside the LGV, an APAX-5580Control IPC with three modules (APAX-5490, APAX-5046, APAX-5040) was connected to the motion controller and safety relay. To wirelessly communicate to the control site and EKI-5525 and EKI-6331AN were connected to the APAX-5580. An IDS-3110 touchscreen monitor was attached to the exterior of the LGV.

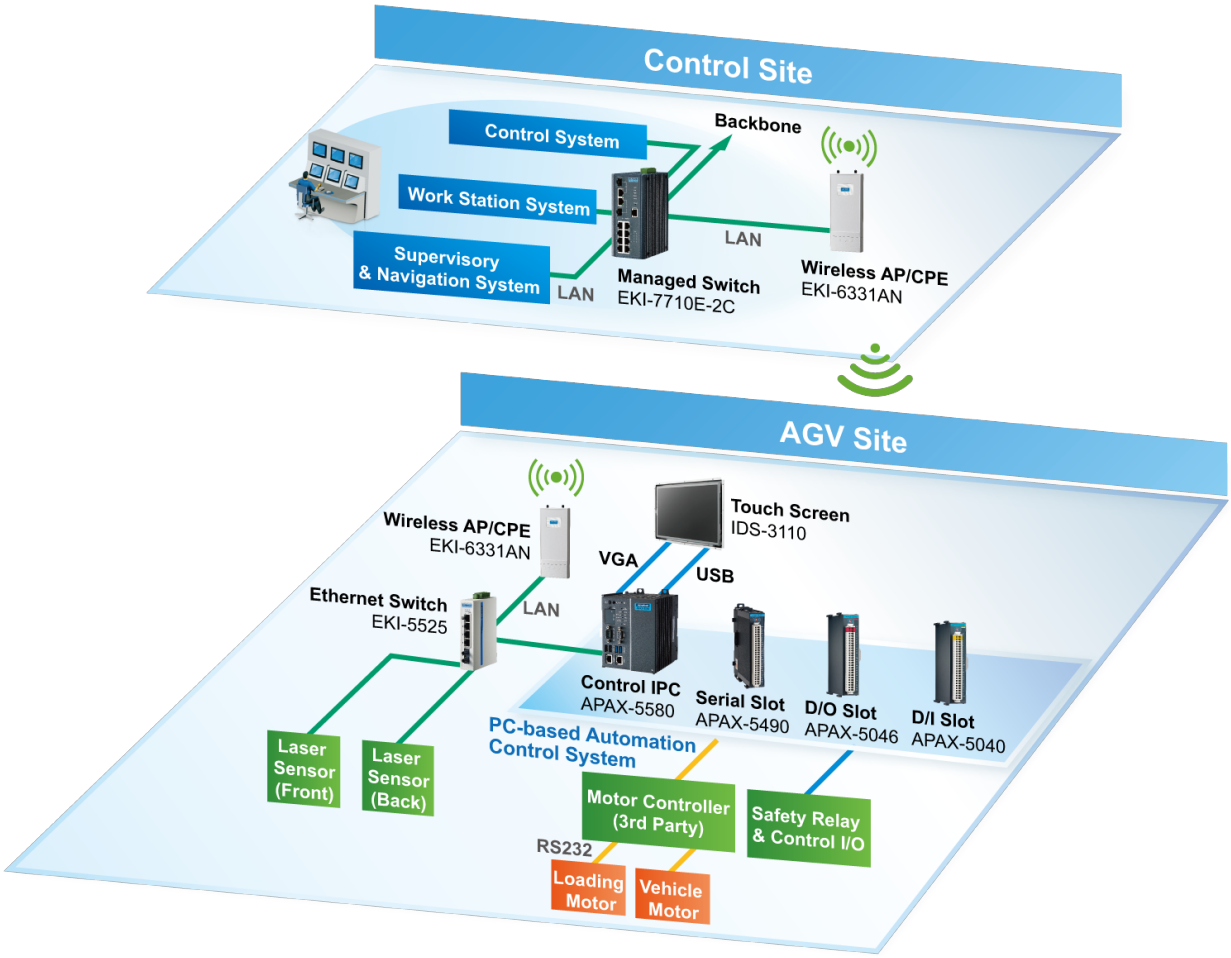
The APAX-5580 combines the capabilities of PLC and PC but also is a PC-based open control platform to provide industrial computing performance and integrate a variety of I/O modules with ease. Featuring a fanless, low power, ultra-compact and cable-free connection makes it be particularly suitable for the AGV automation control applications which require high stability in limited space. To protect the operating system and its data, the APAX-5580 also includes an industrial-grade mSATA SSD with excellent anti-shock and anti-vibration properties. In the event of system problem the PAC also includes a SD card one key recovery function which lets users quickly return the system to the default factory settings. It?s also an application ready platform for embedded applications. Regardless of what the customers? applications require, users can fully utilize itsrich I/O interfaces to connect a wide range of peripheral devices such as digital/analog signals, Ethernet

network, computer monitor, memory card, etc. Plus, it can support multiple operating systems and drivers to shorten the development time of System Integrators.

To communicate with the control station the LGV also includes a small EKI-5525 5-port Fast Ethernet ProView Switch and an EKI-6331AN IEEE 802.11 a/n Wi-Fi AP/CPE wireless module. For users to help communicate directly with the LGV an IDS-3110 10.4? industrial-grade TFT LCD touch screen. By adopting ultra-thin and non-frame design, the monitor perfectly fits with the compact AGV embedded applications.

In the Control Site, an EKI-7710E Managed switch is responsible for sending signals to EKI-6311?s spread throughout the site. The EKI-7710 is an All-in-One managed redundant switch not only provides network redundancy in the car assembly factory but also has high output power for the reliable coverage and data throughput and 2x2 MIMO (Multiple Input Multiple Output) to optimize data transmission, as well as supporting wide temperature range (-20~70°C) with IP55 protection.

System Description



Conclusion:

Compared to a PLC-based control system, the PC-based PAC control system is an upgraded version of the former. Advantech´s PAC open control platform provides many advanced features for System Integrators to quickly and conveniently develop their applications. Our one-stop hardware supply and professional software design reduces developmentrisk and can get rid of cumbersome compatibility testing. It only took two weeks to plan the customer?s solution and provide testing samples to satisfy the System Integrator of Advantech´s services while helping it speedily design a highly stable and reliable LGV for material handling operation in the car assembly plant.