Rapid Deployment of Assembly Lines Using the Smart Distributed System

Updated: 05/2025

Support Document

Implement Automated Assembly Lines Faster with SDS, PC-Based Controls

The Smart Distributed System (SDS) offers companies that implement automated assembly lines the opportunity to cost-effectively respond to high-growth opportunities and quickly changing market conditions. Companies in dynamic businesses are continuously faced with changing capacity, and with ensuring that their existing facilities are flexible and cost-effective. These companies need to continually improve the information available from their assembly lines, and have pertinent data available throughout their business systems. Once a system is installed it also becomes critical to detect and remedy problems quickly.

This white paper describes how “Smart” control systems based on SDS and personal computers (PC) decrease design and installation costs, reduce operating costs and allow the use of an assembly line sooner than was previously possible. It explains the SDS architecture and describes some of the components that make up a Smart System. The paper closes with real-world examples

Why use a Smart System?

A Smart System, as described herein, is one that uses a personal computer (PC) and the SDS as the control architecture. This is in contrast to using a programmable logic controller (PLC) and wiring the components to input and output cards on the PLC. Figure 1 below depicts the change that is occurring in the market for automation systems.

Smart Systems provide a number of benefits, including lower design costs, reduced installation costs and easier trouble-shooting.

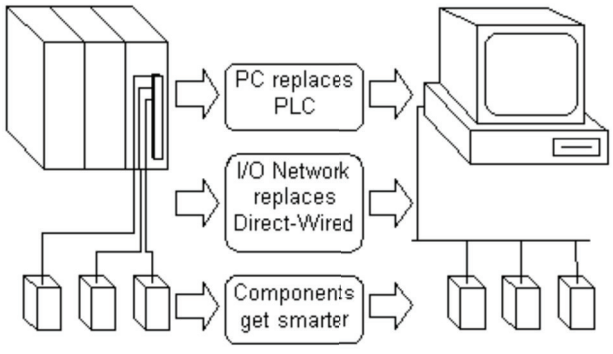
While smart components cost more than standard ones, the savings gained during installation outweigh the increased hardware cost. The total installed cost of Smart Systems is often 20%-30% less than traditional PLC-based systems. The majority of the savings are a result of the speed in which a Smart System can be commissioned, resulting in significantly lower installation costs.

Using a PC running the Windows NT operating system also makes it easier to connect an assembly line to a plant-wide network using industry standard protocols and interfaces, such as Ethernet and Microsoft networking. Design costs are reduced because the documentation requirements are less for a Smart System. In a PLC-based system each wire must be documented as to its wire number and termination, resulting in several pages of wiring diagrams. Smart System documentation typically includes a layout drawing for each bus in a system. These drawings show the location of each device on the bus. In many cases, the documentation requirements are cut in half.

Rapid deployment results in two more benefits: use of the assembly line and a faster return on the investment. In most businesses, being able to use an assembly line a few weeks earlier can have a notable impact on financial results, particularly if a company is in need of capacity. Anytime an investment can generate cash flow sooner it has a positive financial effect.

After a Smart System is installed it continues to provide benefits to the user. The savings incurred during installation apply when changing and/or adding to a line. Adding workstations, reconfiguring a transfer or extending the line take less time with a Smart System.

When a problem does occur during operation, Smart Systems make it easier to locate the problem. Smart components are equipped with diagnostics, and the PC controller has the ability to report them, including whether a device is missing. Knowing the exact location of a component that is having a problem can reduce troubleshooting to a quick glance at a monitor.



Fit. 1 - Summary of Market Trends

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SDS…The Basis for Smart Systems

SDS is a robust component-level network that allows industrial devices to be connected on a single cable instead of running individual control wires to each device.

The SDS specification was created in 1992 by Honeywell's Sensing and Control division, a leading supplier of sensors and switches in the industrial market, and is open to anyone who wishes to develop SDS-compatible products. Because the SDS specification is open it has been widely applied.

The definition of a component in SDS is flexible. It can be as simple as a limit switch, and as complex as an adjustable frequency drive or bar code scanner. There are even companies using SDS to communicate with distributed embedded computers doing dedicated control tasks.

Using Smart components—instead of wiring standard control devices to an I/O block or card—provides a number of important benefits, both during installation and after a line has been commissioned.

Reduced Design Costs

One objective when implementing a Smart System is to eliminate terminations of wires. Documentation of the electrical system can be reduced to a single-line drawing that shows where a bus runs and the component locations. The volume of documentation is roughly half of a typical PLC-based system, and the time required to generate the electrical drawings is one-third.

Installation Savings

The most obvious savings during installation is the reduced wiring cost, including labor and the wire itself. In comparison, an installation of 64 sensors in a PLC-based system means the 64 sensors would require 66 wires (2 for power and 64 signal lines) of varying run lengths Each wire needs to land on a terminal block, requiring someone to strip the wire, label it and insert it in a terminal. This also requires each termination to be documented.

Installing Smart sensors requires giving a device an address and attaching it to the bus. Since quick-connect cables are typically used, there are not be any wiring connections required, depending on the components used. Each cable is typically labeled with its address on the bus.

Financial Benefits

Not as obvious, yet potentially much more financially rewarding, is the speed in which a Smart System can be installed. If a manufacturer is in need of capacity, getting to use a line quickly can result in millions of dollars in shipped product. This benefit often far outweighs the cost savings incurred during the actual installation.

Rapid deployment also means a company's investment can begin generating positive cash flows sooner.

Productivity Enhancements

The benefits of a Smart System don't end at installation. Reduced downtime, changes and additions to the line, and the ease which real-time production information can be communicated throughout the facility improve the value of a Smart System.

Downtime is reduced through a set of easy-to-use diagnostics. When using a PC with Think & Do Software, the health of the SDS network and the components on the network can be presented in an easy-to-understand format. If a component is missing from the bus, or has an internal error, the HMI can be configured to display the error. This eliminates endless hours of identifying where a problem resides, allowing a system to be brought back online quickly.

The design and installation savings apply when making changes to the system. It is just as simple to add components to a system as it is to initially install them.

Because Smart Systems are based on a PC, connecting the control system to the plant information system is straightforward. Think & Do Software includes servers for OLE for Process Control (OPC) and Dynamic Data Exchange (DDE). Think & Do also conforms with the Microsoft Distributed Component Object Modeling (DCOM) specification. By following several standards, Think & Do provides one of the simplest platforms for connectivity available on the market today.