

Chapter 12. Forecasts and Predictions

12.1. Main Technology Trends

Some of the main technology trends in industrial automation are discussed in this section.

Technology Shifts: The industrial automation market periodically undergoes major shifts as new technologies improve the functionality and economics of industrial monitoring and control systems. The introduction of wireless sensor networking (WSN) represents just such a sea change. While proprietary P2P and P2MP wireless technologies have been used in a limited fashion since the 1980s to integrate a few hard-to-wire field devices into an overall wired control system, standards-based WSN promises to dramatically expand the number of devices in a plant that can be connected wirelessly. In contrast to P2P and P2MP connections, WSN utilizes self-forming, self-healing mesh networking to enable field devices to be deployed cost effectively without the need for site surveys or specially trained field technicians to manually configure directional antennas. Emerson Process Management estimates that WSN enables cost savings of up to 90% compared to the deployment of wired field devices.

However, WSN will not be appropriate for all industrial automation applications. The capabilities need to be carefully assessed before selecting it.

Productivity: The fundamental purpose of industrial automation is to improve productivity – generate increased output with reduced costs and facilitate increased output by reducing the costs. The intrinsic value of each and every piece of automation equipment has the ability to provide increased productivity for the customer as well as to the users.

Productivity has now become a global race, an international competition between regions and nations for the single reason that it results in wealth and is the key to improvements in living standards. Increased productivity means things are made more cheaply and more quickly.

Knowledge workers: When reliable information is not readily available, it can lead to duplicated efforts between multiple business units, loss of sales or productivity, and poor decision making based on faulty information. All of these effects, from a lack of information, cost money.

In many situations, workers are unable to find the information they need because of inadequate, inaccurate, or delayed information. In today's information age, data needed to make decisions should be made available to all workers in an effortless fashion. Often workers waste time trying to find data by waiting on faxes or printed reports, searching through paper filing systems, or re-entering data from existing sources to create customized reports in a spreadsheet application. Data important to decision making should be easily accessible to workers through database driven, dynamic web portals or other centralized corporate applications.

A number of domain specific software is available to resolve this issue and bring significant value to productivity. These applications can be implemented either using off-the-shelf software or with specific customisation for the industry. Over the years, the automation engineers have kept pace with the changing technologies and software in particular to be able to define the specifications as desired.

Offshore Outsourcing: In this era of globalization, entrepreneurs are always looking ahead to beat competition. The new trend is - offshore outsourcing. The concept involves taking internal company functions and paying an outside firm to handle them, which enables the entrepreneurs to divert their full attention towards core competencies. Thus they can focus on their primary business.

Although Software outsourcing is the buzzword in the industry, outsourcing of all kind of business is now happening. Though the most visible benefit of this is cost savings, there are a number of other factors that influence the decision to outsource to an offshore partner. Some of them are discussed below:

12.2. The China Challenge

In today's global environment whoever manufactures products better, cheaper and faster, wins. Every country in the world is competing. In consumer products, China is grabbing a lot of the prizes. And they're moving strongly into high-tech.

Some of the facts about manufacturing in China today:

- It is continually increasing its manufacturing prowess
- There are significant cost advantages (beyond just labor cost)
- It involves a good, repetitive quality which facilitates productivity
- It has a worldwide market-share – 50% of cameras, 30% of air conditioners and televisions, 25% of washing machines, 20% of refrigerators
- One private Chinese company makes 40% of all microwave ovens sold in Europe
- The city of Wenzhou, Eastern China produces 70% of the world's metal cigarette lighters
- Walmart – Buys \$18 billion from China, providing a direct link to the US consumer

12.3. Market Predictions

- Nano technology and nano scale assembly systems
- Machine to machine networking
- Bio-electronic devices
- Complex adaptive systems
- Wireless everything
- Fully automated factories

12.3.1. Nano Technology

The commercial interest in nanotechnology is being driven by visions of a stream of new nanotech commercial products and applications that will lead to a new industrial revolution - a revolution in which almost every industry is likely to be affected.

It will be possible to produce new materials with desired properties: smaller, stronger, tougher, lighter and more resilient than anything that has ever been made. Molecule-size components are being assembled into complex composites and "smart" materials. For example, nano structured membranes are being developed for efficient filtering of pollutants from water or air.

With nanotech, today's supercomputer could become tomorrow's wristwatch PDA.

12.3.2. Machine to machine networking

The convergence of smart devices with the internet is creating a new inflection point. Manufacturers can use their connected products to develop customer service relationships that can ultimately recreate the basis of customer management and generate new revenue streams in an information economy.

This will far surpass human communications in scope, value, and sheer numbers. Within the next few years, more machines will be connected via the internet than humans. Eventually reaching tens of billions of connections, machines will communicate with each other, as well as with data mining and processing systems that will automate the communication and interpretation of the mass of data they gather. This will add significant value for businesses and consumers.

12.3.3. Complex adaptive systems

Complex adaptive systems yield significant advances through reduced software, faster and easier installation, robust performance, vastly improved flexibility, capability to handle very much larger I/O point-counts. Traditional concepts of fault-tolerance become obsolete, because redundancy is provided directly at the I/O level. Complex adaptive systems are robust because the behavior is not dependent on single, or even multiple failure points. Failure of any single part of the system is accommodated. CAS has the ability to achieve much higher levels of performance through emergent behavior and self-organizing capabilities.

12.3.4. Wireless Connections

The connectivity infrastructure is moving very quickly to connect everyone and everything to the Internet, not only through high-speed DSL and cable-modems, but soon through wireless.

The impact on industrial controls will be significant. Connecting automation products with conventional wire beyond the confines of a typical system enclosure is still a major hindrance in the typical factory. This inevitably gave rise to what was previously called islands of automation.

Wireless mobility and information services already bring voice, entertainment, Internet access and safety services into cars and trucks. The automobile is quickly becoming the center of a complete range of connected appliances.

12.3.5. Fully automated factories

Automated factories and processes are too expensive to be rebuilt for every design change - so they have to be highly configurable and flexible. To successfully reconfigure an entire production line or process requires direct access to most of its control elements-switches, valves, motors and drives-down to a fine level of detail.

With technology available today, fully automated factories - in a truly realistic sense - are quickly becoming an accepted fact.