Familiarize with automation simulation software & DCS/SCADA/HMI

Week-6 , Day-1

Programmable Automation Controller (PAC)

6.1.0 Introduction to PAC

The programmable automation controller can be described as an improved version of PLC. Programmable automation controllers (PAC) are compact industrial controllers used in motion control, machine control, machine vision, and general-purpose industrial control applications. They are functionally similar to programmable logic controllers (PLC), but provide the advanced software features of personal computers (PC).

A PAC is capable to do everything that the PLC can. The PAC has advanced capabilities and it is already built into its design.

The PAC has an open architecture it can be connected to any devices which are present today. A PAC can be described as a process controller with a flexible configuration and enterprise integration strengths of a PC-based system. This device consists of certain modules and all of these modules can do specific functions such as machine control, motion control, and it can also do many industrial control applications.

6.1.1 What are the characteristics of PAC?

- It operates by using a single platform and it will be the same for the single and multiple domains and also in drives motions and process control.
- It only employs a single development platform, which means it would use a single database for different tasks in all the disciplines.
- Because of its good integration of software and hardware control system performance would be improved
- It can do complex functions without any usage of additional components
- The control systems can be easily upgraded because of the compact size of the PAC

- The PAC only needs one software to cover all the existing automation needs

6.1.2 Role of PAC in modern industry

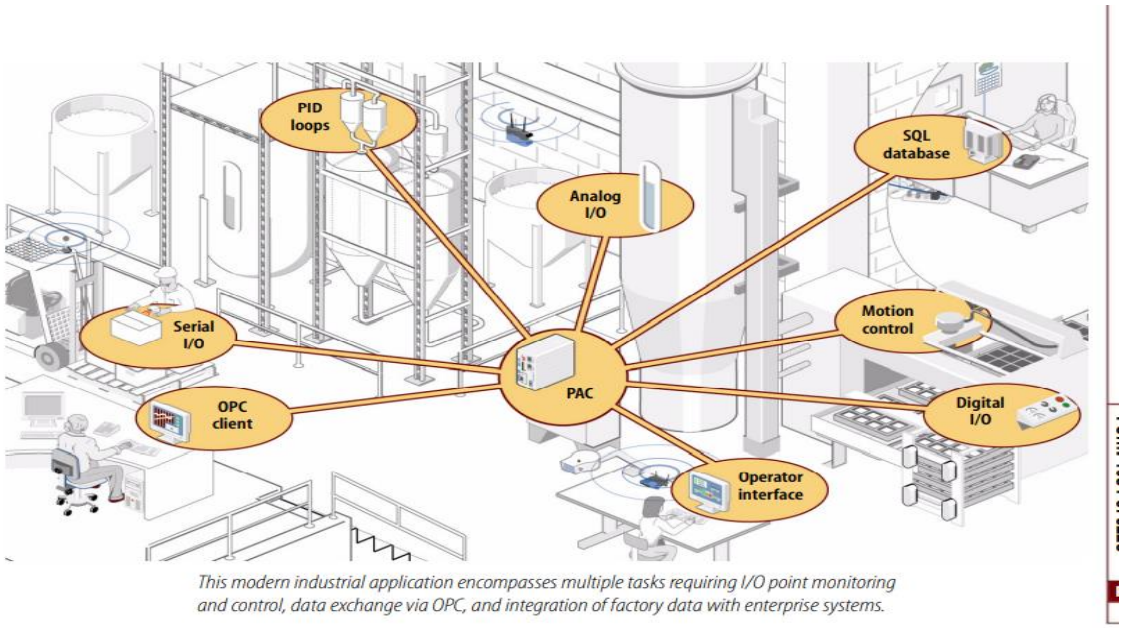
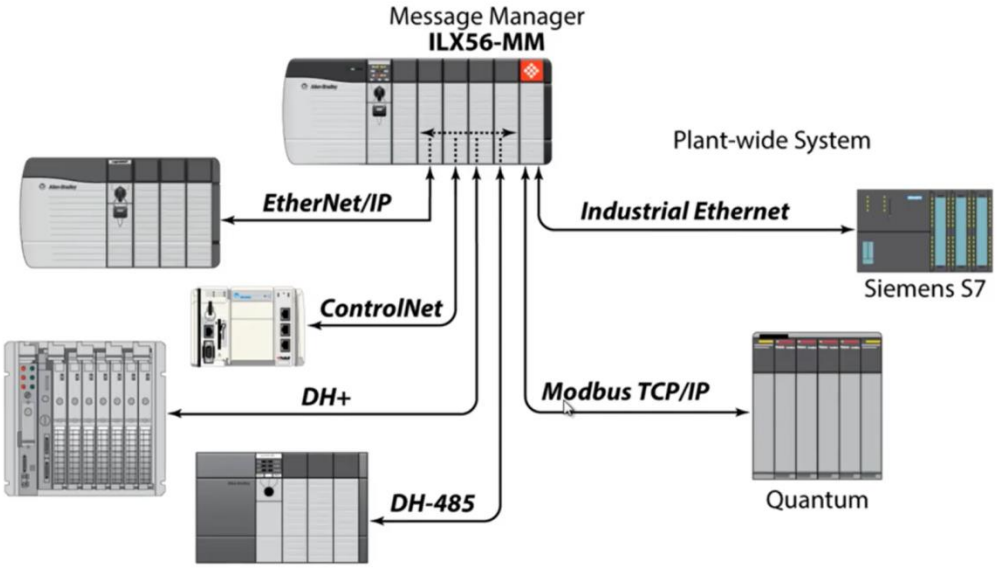


Fig 6.1 Role of PAC in modern industry

1. Single development tool for multiple applications.: A PAC does tasks like counting, latching, PID loop control, and data acquisition and delivery without additional hardware
2. Provides single platform operating in Multiple Domains: The single PAC is capable of operating in multiple domains to monitor and manage a production line, a chemical process, a test bench, and shipping activities
3. It provides expandability and interconnection with other devices and business systems as it has open architecture and modular design
4. Support for Standard Communication Protocols:The PAC can control, monitor, and exchange data with this wide variety of devices and systems because it uses the same standard network technologies and protocols that they use.



6.1.3 Comparison between PLCs and PACs:

PLCs and PACs are more or less similar to one another as they both are powered by common features and functionality. With the interference of modern technology, the capabilities of these devices have changed. PLC's were invented in the late 1960s whereas PACs are new to the automation industry in controlling machinery coined in 2001.

Following differences can be noted between PLCs and PACs:

Sl No	PLCs	PACs
1)	PLC is a single microprocessor device which is used to control manufacturing, infrastructure, transportation and machine/station control automation equipment operation.	Programmable Automation Controller (PAC) is a multiprocessor device which is built with two or more number of processor like any other personal computers.
2)	PLCs are programmed through ladder logic diagrams	PACs are programmed through structured text. Functional block diagrams and ladder logic diagrams
3)	Programmable Logic Controllers (PLC) has built-in networks which enable them to	Programmable Automation Controllers (PAC) is incorporated

	communicate between multiple PLCs, I/Os, HMIs (human-machine interfaces) and SCADA (supervisory-control and data-acquisition) systems.	with modular design open architecture use for communicating, monitoring, and controlling equipment covering multiple networks and devices.
4.	PLCs comprise high-level program execution speed, but have limited memory and separate I/O device.	PACs have huge memory size for larger projects and systems.
5.	Programmable Logic Controllers (PLC) uses Ladder Logic Diagram Programming	PAC programming is done through structured text, function block diagrams, ladder logic diagram and also other programming languages like C or C++ etc.
6.	PLCs are the perfect model for simple and high-speed machinery controlling, such as automated spray equipment, assembly equipment, dispensing systems and motion control systems to name few.	Programmable Automation Controllers (PACs) are ideal for large-scale automation projects and operations.
7.	PLC support around 3000 I/O devices	PACs support around 128000 analog and digital I/O devices

6.1.4 A report to compare different brands of PLC hardware and software

Today competition in the industrial automation industry is fierce with companies being driven to become PLC manufactures and develop their own PLC brands. Below is the list of some top brands of PLC manufacturers and software to be used for programming.

Sl No	PLC Brand name	PLC software
1	Siemens PLC	Step 5- Micro wins Step 7- Simatic Manager
2	AB PLC	RS Logix (RS Logix 5, RS Logix 500 and RS Logix 5000)
3	Mitsubishi PLC	Gx Developer Gx Works 2 MELSOFT series
4	ABB PLC	Automation Builder AC010 AC500
5	Delta PLC	WPL Soft ISP Soft
6	Schneider PLC	PL7 TwidoSuite ProWORX 32
7	Omron PLC	CX-One CX programmer

Reference:

[1] What is PAC - Javatpoint[
[2] Top 22 Different PLC Software Brands and Manufacturers [Comparison] (dipslab.com)
[3]https://rbtautomate.com/7-benefits-of-an-industrial-automation-system/