PLCs AND / OR SCADA

The primary difference between a PLC (or Programmable Logic Controller) and SCADA (Supervisory Control and Data Acquisition) is the fact that a PLC is hardware and SCADA is (generally) software. SCADA is a plant's overall control system using hardware and software elements.

Both are used in industrial settings, and they are typically used together, but they are still two very distinct systems.

PLCs are designed to control complex industrial processes, such as running machines and motors. They are simple to program and fully scalable to an operation's requirements. They're also used to collect data from the systems they control.

They're an upgrade over the old relays and timers previously used to control industrial machinery since PLCs are capable of performing much more complex tasks.

The PLC's CPU stores and processes program data, but input and output modules connect the PLC to the rest of the machine; these I/O modules are what provide information to the CPU and trigger specific results. I/O can be either analog or digital; input devices might include sensors, switches, and meters, while outputs might include relays, lights, valves, and drives. Users can mix and match a PLC's I/O in order to get the right configuration for their application.

SCADA is a central system used to monitor and run plant processes. It's typically software installed on a computer, and one of its major functions is to act as an interface with industrial machines (or Human-Machine Interface, or HMI). In other words, it allows users to track information coming in from equipment, enter commands, make changes to their programming, etc.

SCADA systems are often used in conjunction with PLCs and other devices (in fact, some would say that a PLC would be part of a SCADA system). Data from PLCs and Remote Terminal Units (RTUs) are relayed to the system, and commands are entered into the HMI to make adjustments to the processes they control.

SCADA system architecture has been categorized in four type or generations:

1.First generation – early (monolithic) SCADA
2.Second generation – distributed SCADA
3.Third generation – networked SCADA
4.Fourth generation – "internet of things" SCADA.

Using a SCADA system, industrial organizations can:

- Control industrial processes locally or at remote locations
- Monitor, gather, and process real-time data
- Directly interact with devices such as sensors, valves, pumps, motors, and more through human-machine interface (HMI) software
- Record events into a log file

SCADA systems are crucial for industrial organizations since they help to maintain efficiency, process data for smarter decisions, and communicate system issues to help mitigate downtime.

THE RELATIONSHIP BETWEEN PLCs AND SCADA

Used together, SCADA software and PLCs form an automatic system for prescribing maintenance tasks, forming the core of a predictive maintenance program. It works like this:

- Data from sensors on individual assets is transmitted to the PLC
- The PLC translates that data into a format that can be used by the software
- Users access the data through the HMI on the software
- If the data crosses certain thresholds, a maintenance work order is created

For instance: If a turbine is showing too much vibration, sensors transmit that data through the system, and the readouts on the user end would trigger a work order. In this application, SCADA software controls the entire system, while PLCs act as relay points and controllers for specific assets.