**TECHNOLOGY REQUIREMENTS [7]**

1. **Control architecture**
   *Does the solution provide an integrated automation platform?*
   New systems should manage process knowledge through a combination of advanced technologies, industrial domain expertise, and Six Sigma methodologies. Choose an open, scalable control system that is fully redundant, includes robust control algorithms and provides on-process upgrades to minimize plant downtime. The system should be embedded with best-in-class applications for advanced control, asset management and control monitoring, and include a human interface integrating plantwide information and delivering realtime process data. Additionally, the system should comply with open industry standards.

2. **Field instrumentation**
   *Does the solution integrate “smart” devices?*
   Control solutions should support digital integration of field instruments, allowing processes to be linked with monitoring and control equipment, and providing the platform needed to operate plants more profitably. An automation provider should offer a maintenance-management program incorporating all of field assets — traditional and fieldbuses alike — and providing tools for integrating all device information in a single database.

3. **User interface**
   *Does the solution support complex human-machine interface (HMI) requirements?*
   Instead of requiring customers to support an outdated HMI platform or abandon it entirely, control-system suppliers should provide the means to leverage existing investments and intellectual property, and at the same time migrate plant control rooms and engineering stations to newer, more robust technology. This can include field upgrade “kits” allowing users to retain their existing hardware and industrial-class furniture, while expediting the transition to the latest operator environment.

4. **Networks**
   *Does the solution employ open or proprietary protocols?*
   Control systems employing open network protocols provide process plants with new levels of connectivity. Users have the freedom to select the best control and instrumentation solutions for a given task. Be sure the control system you choose makes full use of recognized open standards, and is equipped to integrate the industry-leading field network protocols such as Foundation Fieldbus, Profinbus, HART, DeviceNet, and ControlNet, among others.

5. **Optimization**
   *Does the solution support redesigned work processes?*
   When selecting a new control system, it is important that the vendor offer a solution tightly integrating optimization, multi-variable control and advanced process control (APC). Moreover, these tools should be embedded in a system architecture that captures and leverages process knowledge over time. A methodology will also be in place for continuous improvement.

### DISTRIBUTED CONTROL SYSTEM (DCS)

**Should be used when:**
- A fair amount of continuous control is required — DCS systems typically have more built-in capability in this area, such as selectors, calculators, stepped outputs and initialization.
- The application will be changing frequently (several times a year or more — adding new feed lines, tanks, and so on).
- Tools in the DCS are fool-proof and make changes quickly.
- You have a batch process — sequence capability and handling is built into the DCS.
- You want to assign specific areas of the process to operators. Again, this is built-in.
- The system must be integrated with other applications and/or systems. DCS systems have a number of open protocols built-in for integration.
- Loss of control or operational view during production is unacceptable. DCS systems are robust due to their refinery heritage, and robustness is built-in because it is expected.
- You anticipate having multiple controllers that need to “talk” to each other in a peer-to-peer fashion (sharing a lot of data throughout the application). This is built-in to a DCS system.
- You need a highly available production system (controller, HMI, server, network, etc.). A DCS system is pre-built ready to go out of the box.
- Historical data about your application is important to your company. History collection is built-in and very robust.

### PROGRAMMABLE LOGIC CONTROLLER (PLC)

**Should be used when/for:**
- High speed processing (faster than 1 ms). This is the hallmark of PLC systems.
- 90%+ discrete application (digital inputs/outputs). PLCs are optimized for discrete applications, due to their packing line heritage.
- Your application is predominantly machine/motion control. The nature of ladder-logic processing is ideal for machine/motion control applications.
- The application will not change frequently, or if so, the changes are small. PLCs are very flexible for making small changes, but lack integrity checks and built-in functionality for making large-scale changes to an automation strategy.
- You need to control single pieces of equipment or single workstations that are loosely integrated at a higher level. Many end users deploy SCADA architectures with PLCs that are effective for capturing data across the systems, while preserving autonomy for each controller.
- Operators of the application have responsibility over a piece of equipment only. PLCs offer many options for closely coupled operator touch panels.
- You anticipate that the controllers for various pieces of equipment have minimal communication between them, and the communication will not change much. Building messaging in the PLC system is costly and must be maintained.
- You will require valve line-up logic for numerous (close to 100), multi-position valves. Ladder logic is a very clean, effective way to handle this requirement.
- Your application has many areas, separated by distance, that each require only a small amount of I/O (less than 100). PLCs can be scaled to cost-effectively handle tens of I/O at multiple locations.

### CHOOSEING A DCS OR A PLC [2]

When choosing a control system for a particular process application, there are many considerations that can help influence the decision. Remember that a DCS is optimally designed for process control with refinery control origins and a PLC is optimally designed for machine or motion control with car factory relay panel origins. While PLCs are sometimes used for process-control applications, there are some trade-offs in terms of degree of programming, robustness and operational suitability. This is most often attempted with small or non-hazardous processes where the loss of benefits is less visible. Below, each type of system and those areas where it typically performs best are listed.

**References**