

# Critical control loop optimization essay example

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**Question 1:**

Valve sticktion refers to the condition where the valve's stem is resistant to small changes in its input. The main cause of this is when the static friction of the valve at rest is greater than the dynamic friction resulting from the force acting on the valve. However, even under sticktion, once enough force has been applied the valve stem will move easily. This makes the movement of the valve to be unpredictable and inconsistent (Michel, n. d).

**Question 2:**

Sticktion contributes to poor loop performance since if there is sticktion and an input is present the valve may overshoot leading to the entire process overshooting the set point. Furthermore, it also reduces the sensitivity of the entire control process therefore reducing loop performance (Michel, n. d).

**Question 3:**

Loop stability is a major factor in process performance for two reasons. The first is that stability helps in eliminating unscheduled stoppages and interruptions in the system. Second, a stable region is an excellent region to operate (Tim & Neal, 2007).

**Question 4:**

In order to determine if process control optimization is required one will have to examine problems within the loop that affect its cycle by reviewing all the loop equipment. Second, one needs to examine and audit historical and real time data of the system looking for errors. Performance benchmarks can also

be utilized to determine if process control optimization is required (Tim & Neal, 2007).

**Question 5:**

Loop performance declines by about 50% every 5-12 months (Michel, n. d).

**Question 6:**

Loop performance degrades mainly because there lacks performance monitoring and evaluation, the quality of raw materials used in the system may vary, procedures of operation within the system also change, wear and tear of the equipment, modification of the entire process and lack of proper care and maintenance. The reasons stated above directly affect the equipment in a loop therefore leading to performance losses (Michel, n. d).

**Question 7:**

OPC refers to OLE (Object Linking and Embedding) for Process Control. This standard dictates the sharing of data between industrial systems (Michel, n. d).

**Question 8:**

OPC DA (Data Access) allows for the access of real time data where the data is captured in real-time from the system. On the other hand, OPC HDA allows for the access of historical data that is stored in archives (Michel, n. d).

**Question 9:**

Asset management software works by monitoring all the digital equipment that is in a system. The software has an alarm that is set off once an equipment exceeds a certain set threshold. This helps in ensuring that all the

equipment works as required. For example, asset management software can be used to detect valves that have sticktion if they do not respond to inputs. The system can then set off an alarm that ensures that maintenance is carried out on the faulty valve (Michel, n. d).

### **Question 10:**

Performance monitoring systems work by examining both the input signals and the output signals. This is done in order to determine whether based on the input and output of a system the required performance has been achieved. The performance monitoring system reads these signals from the control system and determines whether set performance benchmarks have been attained (Michel, n. d).

### **Question 11:**

Some of the problems that can be identified through performance monitoring systems are issues that lead to loss of performance within the system, for example, faulty equipment that does not respond as required. Performance monitoring systems can also be used to identify whether all the resources within the system are being utilized as required (Michel, n. d).

## **References**

Michel R. (n. d) Managing Assets Using Performance Supervision. Top Control Inc.

Tim O. & Neal R. (2007) Process Performance through Critical Control Loop Optimization. Emerson Process Management