There is a growing number of CLPM solutions on the market that offer a range of capabilities. Understanding which product suits your unique monitoring and diagnostic needs can present challenges. As with other automation technologies there are numerous aspects of CLPM that should be considered prior to writing your request for proposal and making an investment. This article offers basic guidelines for evaluating and selecting an appropriate CLPM solution.
Headcount is down, but expectations are up. Shareholders assume another year of improved financial performance is in the works. Management’s targets for output, quality, downtime, and assorted other ‘lucky charms’ rose another couple percentage points. Meeting last year’s objectives seemed a miracle.

Looking around – same infrastructure, same processes, same short-handed staff – you’re wondering where those opportunities for improvement can be found. Fortunately they truly are there if you have the tools with which to find them.
Control loop performance monitoring (CLPM) solutions are among the technologies helping process manufacturers to realize steady improvements in production and profitability. These technologies keep a constant watch on the performance of a facility's regulatory control layer – the extensive network of PID controllers that manage individual control loops. CLPM solutions have proven to be a reliable tool for uncovering the negative trends that ultimately lead to poor control and equipment failure.

PID remains the most common and widespread form of control applied at production facilities around the globe and across the process industries. PID controllers reliably respond in real-time to the ever changing dynamics of production processes. They adjust to fluctuations in flow, pressure, temperature, among other process types. By manipulating valves, dampers, etc. PIDs help to maintain safe, efficient, and profitable control of highly dynamic, interacting systems. As integral as PID controllers are to a facility's regulatory control layer and production, their value is infrequently quantified and often misunderstood. As a result, their performance has historically been overlooked as a source of financial gain.

The economic benefits of improved regulatory control are widely published. Studies have quantified the impact on plant profitability in clear financial terms, ranging from increases to throughput and quality to decreases in energy consumption and the use of production inputs. There is also an increasingly clear connection between control loop performance and asset reliability. By using a control loop's process data to assess the performance of a facility's abundant mechanical devices such as valves and dampers, CLPM solutions offer valuable insight into their health that can be used to avoid costly unplanned downtime.

With more and more CLPM solutions on the market its essential to find a product that suits your unique monitoring and diagnostic needs. When drafting a request for proposal (RFP) there are numerous aspects of CLPM that should be taken into consideration. This article offers basic guidelines for developing your RFP and for selecting a CLPM solution that is ideal for you and your facility.

Production goals vary from facility to facility as do staffing levels, process complexity, standards for control, etc. What's more, it can be expected that staffing will churn, infrastructure will evolve, and standards will grow over time. Since virtually every aspect of a facility will change, a fundamental question to consider when developing an RFP for a CLPM solution is: What monitoring capabilities best suit the facility's current and future needs?

Like other technologies used in the control and optimization of production, a CLPM solution should align with your facility's capabilities and goals for performance improvement. Following are an array of functional requirements and solution features that are worth taking into consideration.
Opportunities for improvement start and end with good process data. That data may be stored and readily available from your facility’s existing data historian or it may come live from the process via OPC. Either way it’s essential that your data is timely and complete, enabling accurate assessments of performance trends. Important considerations for the data processed by your CLPM solution include:

- Real-Time Data Access
- Historical Data Access
- Data Resolution Constraints
- Data Processing Speed
- Enabled/Disabled Process Data

Your facility may have numerous sources of process data so access should be possible whether via live OPC-HDA connections, stored access using the SDKs of major suppliers such as OSIsoft, or even through open database queries (e.g. SQL, OLEDB, ODBC).

Principal Analytics

The typical production facility has a wealth of untapped information that’s ready to be mined. Hidden in the data is insight into the performance of business-critical production loops along with essential details concerning the health of costly mechanical assets. The wrong metrics can waste time and provide little-to-no value. In contrast the right metrics can both uncover troublesome trends and facilitate optimization. Core KPIs should include the following:

- General Loop/Unit/Plant Health
- Mechanical Health
- Mode Changes
- Noise and Oscillation
- Controller Tuning

Less isn’t always more and more isn’t always better. Be sure to consider which metrics are right both for your facility’s needs and suitable for your staff’s use. What’s more make sure the metrics from your chose CLPM solution make sense as they’re presented.
Advanced Forensics

With 100s if not 1,000s of PID control loops it can be difficult to distinguish the symptoms from their root-causes. Advanced forensic tools reveal the true source of performance-related issues. They enable users to quickly sort through loop interactions and to isolate the actual problem areas. They also leverage everyday output changes to assess the relative effectiveness of each regulatory layer control loop on a plant-wide basis. The following are essential tools within any CLPM solution:

» Correlation Analysis
» Power Spectrum Analysis
» Process Modeling Analysis
» Tuning Analysis

Daily changes to Controller Output in the form of Set Point changes, manual bump tests, etc. represent obvious opportunities to optimize. But don’t be fooled - those opportunities should apply equally to your integrating and non-integrating processes alike and they shouldn’t be limited to loops that are operating at a steady-state.

Alerts & Reports

Your goal is to gain actionable information that can be used to maximize output and avoid costly downtime. Metric-driven information should be delivered electronically to keep you aware of any deviations that are capable of undermining performance. So too reports should offer a range of perspectives, reflecting important plant-wide trends as well as more narrow and loop-specific insights. CLPM information should take the following into consideration:

» Performance-Based
» Functional Groups & Shifts
» Area(s) of Responsibility
» Dynamic, Sortable Details

Alerts need to be timely and link directly to details that provide appropriate context. Whether based on functional roles, shift schedules, or other organizational methods, reports should be tailored to each user’s unique information needs.
Recommendations

The fundamental purpose of technology is to transform dizzying amounts of data into succinct and actionable information. A technology’s ability to recommend appropriate corrective action and to guide users through an intuitive process for resolution is essential. Basic capabilities related to Recommendations should include the following:

» Mechanical, Tuning, Process
» Advanced Heuristics
» Step-by-Step Instructions

A goal of CLPM technology is to simplify the identification, isolation and correction of performance issues. Recommendations for corrective action need to align with that purpose by providing guidance that is accurate and easy-to-follow.

Prioritization

The typical production facility has a seemingly endless supply of To-Do’s and establishing day-to-day priorities is not always an obvious task. Those decisions are often simplified with access to accurate and up-to-date information, especially when plant-wide economics are factored into the equation. It should be expected that your CLPM solution includes the following methods for weighting and prioritizing:

» Economic Importance
» Degree of Change
» Low Hanging Fruit

Every plant has its ‘Troublemakers’ — those control loops that exhibit a spike in variability. Those loops in particular signal changes to control that put plant-wide performance at risk. Find your Troublemakers and you’ll often find your priorities.

Security & Administration

Digital security is a critical consideration at any production facility, and it rightfully takes precedence over administrative ease. Even so, your choice of monitoring technology must be readily available and intuitive for end-users and administrators alike. Like production processes a facility’s infrastructure can be dynamic and, whether due to changes in loop architecture or staff responsibilities, your technology should be easily adapted to meet those changing needs. Keep the following administrative attributes in mind when choosing a CLPM solution:
Some CLPM solutions can utilize historical data to quickly establish benchmarks based on when a facility was running at its best. Those auto-benchmarking capabilities tighten as gains are realized and they facilitate continuous process improvement.

Aligning Technology With the Different Stages of Control

Whether your goal is focused on uptime, throughput, or quality, CLPM solutions provide meaningful insight into a facility’s performance. Still a question remains: How should a facility prioritize its control loop issues? As with most engineering questions, the answer depends. It can differ from one location to the next based on the maturity of the facility’s automation practices and the experience of its staff. Some CLPM solutions include tools that support a variety of prioritization methods, aligning with the facility’s stage of control—both current and future.

» **Economics** — Not all loops are created equal. There’s the “bottleneck” loop that can restrict throughput, the “start-up” loop that can slow batch cycle time, among countless others. Although a precise value may not be known for each of them, these PID control loops drive a facility’s profitability. Some CLPM solutions assign an economic value to each loop, allowing those loops with the greatest impact on profit to rise to the top when their performance slips. It’s assumed that all manufacturers are mindful of their bottom line. That said, this approach lends itself to facilities with limited resources and basic automation practices in place.
Variability — The negative effects of oscillatory behavior unfailingly infiltrate downstream processes and undermine control. The effects touch on production in terms of both output and quality, and they unnecessarily accelerate wear and tear on costly process instrumentation. Correcting the performance of excessively dynamic loops is often a quick win for process manufacturers. For that reason this approach is ideal for facilities with basic automation practices, but those with moderate and advanced practices also benefit from timely corrections associated with sudden increases in variability.

Automation — The core value proposition of automation is that it allows for more effective and efficient control of complex production processes. When automation investments are not being fully utilized, production is presumably less effective and efficient. Identifying loops that are not operated in their ‘normal’ mode is another approach for manufacturers. Those facilities that are in transitioning – either from basic to moderate or moderate to advanced automation practices – tend to benefit most from this approach.

Change — Change at a production facility is rarely a good thing. It indicates that something is no longer performing as intended. Whether relative to the previous day, week or month, identifying control loops that demonstrate the greatest degree of change allows practitioners to isolate the source of change as time progresses. Correcting those ‘Troublemakers’ is often a good approach for facilities that have advanced automation and optimization practices.

General — Loop monitoring solutions typically base their overall health metrics on a composite of KPIs. It incorporates performance attributes associated with control loop tuning and the relative health of the loop’s final control element as well as reflects relevant economic attributes and the process strategy in general. This approach to prioritization often results in the identification of loops with a variety of issues and no clear culprit. Although this method is suitable for all types of automation practices those facilities with advanced capabilities tend to benefit most – they have the resources to address more subtle changes in process dynamics and to benefit from their correction.

Processes are highly dynamic and so is your production facility. When choosing a CLPM solution consider how it aligns with your facility’s monitoring and optimization needs — both today’s and tomorrow's.
Most production processes are highly dynamic and constantly changing, so much so that it’s not hard to stumble upon issues that hamper performance. The real challenge for practitioners is prioritizing limited time around their facility’s most pressing issues. To optimize their effectiveness practitioners need access to information that is both accurate and insightful. That applies equally to their facility’s PID controllers as it does to process instrumentation. If you require improved awareness of your facility's production performance issues, look no further than PlantESP!

- Plant-Wide Control Loop Monitoring
- Timely Alerts and Detailed Reports
- Targeted KPIs and Advanced Forensic Tools
- Actionable Recommendations for Corrective Action

Contact us today to learn how PlantESP is enabling manufacturers across the process industries to accurately diagnose complex control loop performance issues and to quickly correct them for increased production and enhanced efficiency.