Tuning in to customer controls

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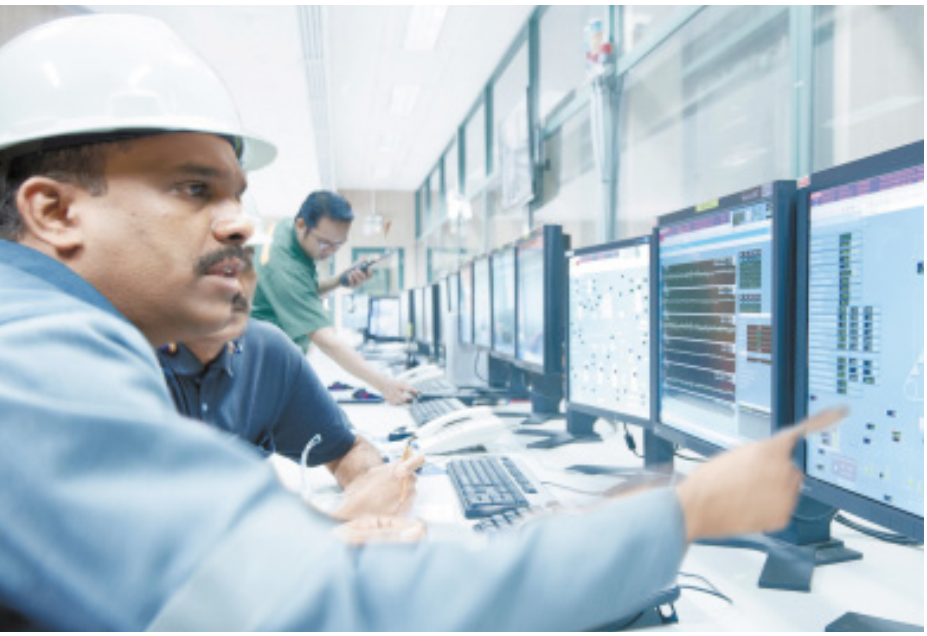

Every day, plant managers rely on industrial control systems to help them achieve the best possible productivity and efficiency. But just because a company has invested in automation doesn't mean they can sit back and relax. Operators must monitor and maintain this automation to ensure it operates at maximum potential. When they don't, systems do not perform as they should, leading many plant managers to give up on automation entirely.

01 To increase productivity and efficiency, producers must maximize utilization of their process control investments. A regular regimen of control loop tuning as part of a well-planned preventive maintenance program is key to ensuring maximum value from their production assets.

If managers want to increase productivity and efficiency, they must ensure that they use their industrial control systems effectively. The best way to do this is to ensure that automatic control is turned on and tightly tuned.

An ABB analysis of control systems worldwide revealed that up to 75 percent of a typical plant's automation investment is not providing benefits. In other words, the systems are not operating as designed or intended. The main cause was a lack of ongoing and regular control loop tuning. The result? Instead of solving problems, these control systems were actually introducing them.

Ensuring that PID[1] control loops are tuned and optimized regularly enables customers to use less raw material, reduce energy consumption, increase production, enhance product quality and troubleshoot more rapidly and effectively.

Whether it's cement, chemicals, food, gas, manufacturing, metals, mining, oil, paper, or utilities, industrial processes have one thing in common: they all rely on significant capital equipment that requires constant care to run. Because of this, proactive equipment service has long been a priority at industrial plants. And, while proactively servicing control loops is just as important, it is more difficult than checking physical attributes of a piece of hardware such as a motor. But that is rapidly changing.

In automation's early days, data collection was difficult, control was limited and the number of controllers in a plant was often determined by available physical space. Troubleshooting was a lengthy, hands-on process.

Today, service is more sophisticated both in how it is delivered (e.g., remotely) and how it delivers value. Data is voluminous and easily accessible, the range of digital controllers is extensive, sites can add as many digital controllers as will fit on computer hard drives, and digital troubleshooting tools abound. Plants that do not take advantage of these developments will be less successful.

[1] Proportional Integral Derivative

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02 Recent ABB analysis has found that in many industrial production sites, control performance distribution is 30% manual operation, 30% increasing variation, 25% improving process and 15% output out of actuation range. This indicates that many control system owners are under-utilizing their automation investments.

Out of tune, out of commission

Modern plant control systems integrate tightly with industrial equipment. As a result, control systems include far more components than ever before. If any component falls short or fails, a site will experience production or quality variability that has a direct impact on plant performance. This makes it even more critical that automation control loops are checked and calibrated regularly.

Many plants purchase automation believing it can run indefinitely without intervention. But this is not the case. Control systems are made up of computers, controllers, monitors, firmware, software and hardware. As sophisticated as it is, in a physical environment, especially a plant environment which may be more environmentally challenging, these physical assets have the potential to go bad and therefore must be maintained.

Increasing sophistication of automation is part of the problem. Often, when the control system does not appear to be operating in the way operators want it to, they will turn them off and perform functions manually. This negates the purpose of the control system investment in the first place. We will see degraded productivity and quality. This is precisely what happened at one of ABB's customer sites: the control system that was intended to improve production was actually impeding it. Because of this, plant operators switched to manual mode.

This plant's control system was failing because no service had ever been performed on the system.

Regular tune ups

A typical control loop has a half-life of just six months. To think about it another way, if 100 PID control loops were all tuned at the same time, in six months, the performance of half those loops would be degraded. This would result in degraded productivity and quality.

Poorly controlled processes can become unstable, leading to inefficient production, ineffective use of capital and significant product quality problems that can lead to lost customers and lower profits. At worst, unstable processes can lead to equipment damage, and even pose a danger to employees, the public and the environment.

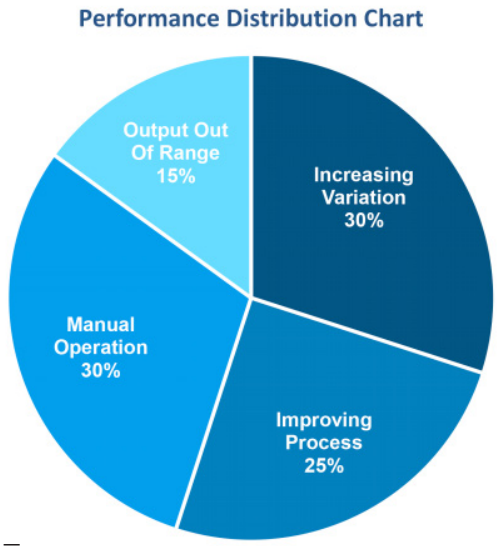

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ABB has discovered that at many plants, control performance distribution is 30 percent manual operation, 15 percent out of actuation range, 30 percent increasing variation and 25 percent improving process.

Given this distribution, it's obvious more work must be done to keep control loops in tune. In one instance, an ABB customer who was losing money on their operation asked ABB to examine their automation system to figure out why.

The customer's control performance distribution generally followed the pattern described above with the plant frequently running in manual mode. So, when ABB turned on the plant's control system to figure out what was going on, plant production became unstable. After investigating further, ABB technicians fixed the actuation, recalibrated the instrumentation, upgraded the application, made the user interface easier to navigate and updated the tuning parameters. As a result, the customer improved its financial performance by $10 million per year.

While that may sound impressive, this level of improvement is not uncommon. The results experienced by this plant accurately reflect what automation systems are designed to do. Because of these results, the customer implemented an ongoing service program to ensure their results would not erode over time.

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03 Industrial producers get more value from their automation assets by regularly updating their control software and tuning their PID controllers. As shown in these charts, which display real-world data obtained from a customer, after tuning the customer's stock flow, basis weight experienced a 22% reduction in standard deviation of control error.

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04 The ABB ServicePro Service Management system uses built-in and continuously updated best practices for ABB automation and ABB automated processes to help customers become proactive. This chart of data from an ABB metals customer shows that as more planned preventive maintenance work-orders are completed, more unplanned and planned repair hours decrease. This reduces maintenance costs and improves system and process availability.

Keeping in tune
Maintaining control loops requires a service program that can be broken down into two basic types: preventive and corrective.

Corrective maintenance occurs after equipment fails. Because it's unplanned, it can lead to lost production, time and profits.

Preventive maintenance is designed to reduce these risks through planned maintenance. Plant managers often worry that preventive maintenance will add cost without value, but this has proven to be untrue when preventive maintenance is effectively distributed and tracked. Preventive maintenance leads to less unscheduled, reactive and expensive downtime – both scheduled and unscheduled.

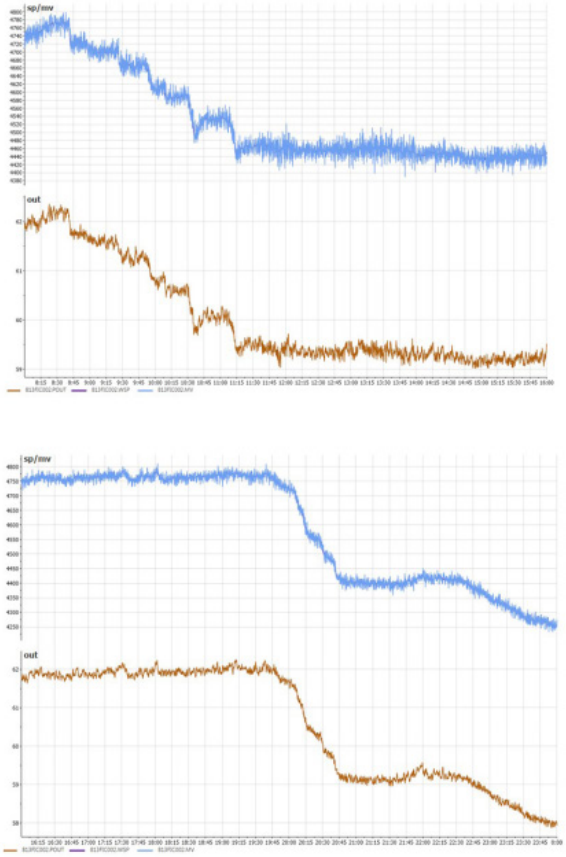
For a successful preventive service program, plants must address three important service areas: service distribution, service skills and service tools.

Service distribution: The key is knowing the right distribution of service activity and managing for activity that should include preventive, support, administrative, scheduled corrective, optimization and unscheduled corrective.

Service skills: Employees of plants that practice preventive service have more than three times the training of people in plants that practice reactive service.

Service tools: The volume of information processed in today's automation systems requires high-power technical tools to manage data and quickly arrive at actionable conclusions.

ABB tuning tools
ABB offers advanced control loop tuning service tools built upon extensive service experience. ABB Ability™ Performance Optimization for control loops identifies and corrects loop performance issues to improve control performance and restore optimum results from automation. Tools supporting this service include a data logger, loop analyzer, loop tuner, and signal analyzer.



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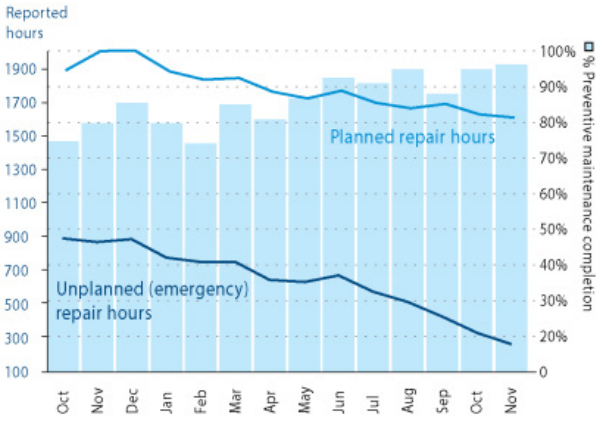

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05 Control loop key performance indicators can be monitored at the customer site or remotely through the ABB ServicePort Service Delivery Platform (seen here in tablet view). ABB service personnel can then help the customer tune their control loops to ensure maximum control utilization, which leads to higher plant productivity.

These tools provide data collection, loop setup and calibration, data analysis, standard reports, tuning, simulation and identification. Industrial companies rely on these tools to maximize use of their control systems by ensuring the control loops are optimized for every production situation.

For maximum availability and flexibility, ABB Ability™ Performance Optimization for control loops is designed for both on-site and remote use. Any in-production facility can quickly eliminate travel time and significantly reduce troubleshooting time and mean-time-to-repair (MTTR) by using these tools and services through the secure ABB ServicePort™ remote service delivery and diagnostic platform.

To assist with important preventive maintenance activities such as control loop tuning, ABB also offers the ServicePro Service Management Platform. ServicePro enables planning and scheduling of all maintenance, as well as analysis and reporting of completed work to ensure maximum manpower utilization, parts availability and analysis of equipment and process problems for operational and capital planning. With ServicePro, plants can keep maintenance on track by facilitating preventive service activities.

Quick identification of emerging PID control loop issues, before they can have a negative impact on system usage, is an ongoing challenge for most plants. The ABB Ability™ Performance Optimization for control loop tuning, an enhancement to ABB Ability™ Performance Optimization for control loops, is designed to reduce the time between diagnosing potential PID control loop problems and the necessary corrective tuning.

The Performance Optimization for control loop tuning service provides process engineers with data gathered and analyzed by the ABB Performance Optimization for control loops service to use as the basis for accurate process models for testing tuning parameters without affecting the running process. This shortens process modeling time, which usually requires time-consuming and disruptive bump tests, thus speeding identification and correction of control loop issues.

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Conclusion

To ensure optimal system and process availability, today's control systems require advanced services based on the latest technology coupled with proven methodologies and expert advice. With a proactive and well-balanced service program in place, plant managers can achieve significant performance, productivity and financial gains.

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