Reducing operations & maintenance costs

with PlantWeb® digital plant architecture

Whether you're trying to make the most of an ever-dwindling staff and budget, or looking for even more ways to trim operations and maintenance costs, Emerson's PlantWeb® digital plant architecture has proven it can help.

PlantWeb's *predictive intelligence* increases maintenance productivity by detecting and diagnosing potential equipment problems before they grow – reducing the frequency, severity, and cost of repairs while enabling your team to avoid unnecessary and unproductive tasks.

Its *information integration* and easy-to-use *control and optimization* capabilities also increase productivity by enabling operators to expand their span of control and run the process at the most economical operating points.

The challenge: Doing even more with even less

Industry consolidation and worldwide competition are putting today's plants under intense financial pressure, and operations and maintenance budgets are among the first to be cut. Fewer personnel working fewer hours are expected to operate and maintain more equipment at lower cost, while also delivering higher throughput, higher availability, and higher profits with aging assets.

It's a trend that shows no sign of changing. Plants must therefore **increase the productivity** of their existing maintenance and operations teams, while continuing to look for ways to **reduce costs even more**.

Benchmarking the opportunity

Fortunately, there are still opportunities for improvement in almost every operation. Industry benchmarks can help you estimate the potential in your own plant.

%RAV. One frequent benchmark of maintenance productivity is annual maintenance cost as a percentage of replacement asset value (RAV). For example, a plant spending $5,000,000 annually to maintain assets that could be replaced for $100,000,000 has a 5% RAV.

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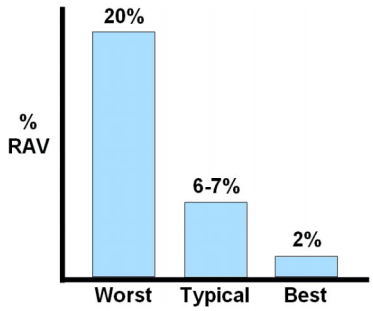
The graph below shows typical as well as worst- and best-in-class %RAV.[1] For a plant with $250,000,000 in assets to maintain, moving from typical to best-in-class status could mean **over $10,000,000** in annual savings.

One benchmark of maintenance productivity is annual spending as a percentage of Replacement Asset Value.



Of course, you still have to keep the plant running smoothly and safely. The goal is to use your maintenance budget and personnel **more efficiently** – so you can spend less *and* maintain or even improve plant performance.

Recent data shows that 86% of maintenance is reactive (too late) or preventive (unnecessary).[2] In fact, typical maintenance practices for reactive, preventive, and predictive maintenance have not changed in over 15 years.[1] This is primarily due to a lack of tools powerful enough to fundamentally improve maintenance practices.

Span of control. For operations, one measure of productivity is the number of loops each operator manages.

A typical plant might have 125 loops per operator, so managing 1500 loops would require 48 operators to staff four shifts. In a best-in-class plant, on the other hand, each operator might handle 250 loops – requiring only 24 operators over the same number of shifts. At a fully burdened cost of $80,000 per year for each operator, the savings would approach **$2,000,000** annually.

Even greater productivity and economic benefits are possible when operators also have the tools and information to continuously optimize energy use, feedstocks, and other economic factors for the loops they control, as well as to reduce costs in related areas such as safety, health, and environment; utilities; and waste and rework.

So why aren't more plants getting these savings and productivity gains today?

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Misdirected maintenance

Too much of the work done by maintenance teams is **unnecessary**, **unproductive**, or even ***counter*productive**.

Unnecessary work. Over half of typical maintenance activities are unnecessary. This includes routine equipment checks as well as preventive maintenance on equipment that doesn't need it.

- One analysis showed that 63% of all instrument work orders did not result in corrective action, because there was nothing wrong with the equipment.
- A study of 230 valves scheduled for rebuilding during a shutdown found than only 31% needed such extensive service.
- Many plants re-calibrate transmitters before installation and then once or twice a year after that, even when the original factory calibration is more accurate and (for some transmitters) stable for 5-10 years.

Unproductive work. In a typical plant, the maintenance department averages about 30% "wrench time." The rest of the time they're doing data entry and retrieval, work-order reporting, and other paperwork. Best-practices plants use automated tools to manage this information more efficiently – increasing wrench time to 50% or more.[3]

Counterproductive work. Some maintenance actually *reduces* equipment reliability. Problems can result from incorrect re-assembly, incorrect tightening, misalignment, or other errors. In fact, as many as 70% of equipment failures happen shortly after initial installation or major preventive maintenance.[1]

Inefficient maintenance strategies

Many of these problems could be reduced by adjusting the mix of **reactive**, **preventive**, **predictive**, and **proactive** maintenance strategies so workers can focus on doing the *right things* at the *right time*.

1. Reactive maintenance. Also described as "fix it when it breaks," this is the most basic maintenance strategy. Its major drawback is obvious: the cost to repair (or replace) equipment that's run to failure is typically much higher than if the problem were detected and fixed earlier – not to mention the cost of lost production during extended downtime.

2. Preventive maintenance. A preventive strategy assumes equipment is relatively reliable until, after some period of time, it enters a "wear-out" zone where failures increase. To postpone this wear-out, equipment is serviced on a calendar- or run-time basis − whether it needs it or not. On average, this "fix it just in case" approach is about 30% less expensive than reactive maintenance.

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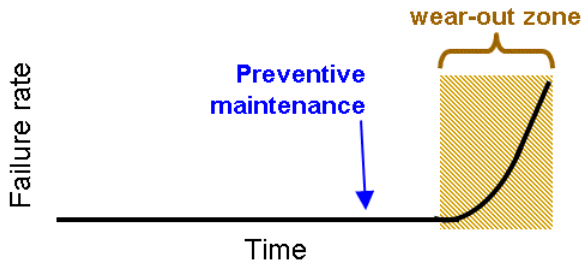
A preventive maintenance strategy attempts to service equipment before it enters an assumed "wear-out zone"-- but most equipment doesn't follow this failure pattern.

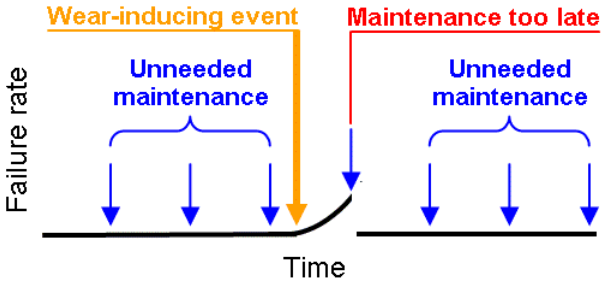


However, determining when the wear-out zone might begin has traditionally been an inexact science, relying on estimates and averages rather than actual equipment condition. Because of this uncertainty, preventive maintenance schedules are usually very conservative.

As a result, **maintenance often takes place too soon**, when there's nothing wrong – and service can actually **create new problems**. In fact, about 30% of preventive maintenance effort is wasted, and another 30% is actually harmful.[1]

But there's an even bigger problem: **only about 6% of equipment follows a time-based "wear-out" pattern**. For most other equipment – over 90% − failures typically result from the cumulative effects of events or conditions that can occur at *any* time.[1] That means schedule-based preventive maintenance can also come too late, after the damage has begun.

Because it's time-based instead of condition-based, preventive maintenance often takes place before there's a problem, or after the damage has grown.

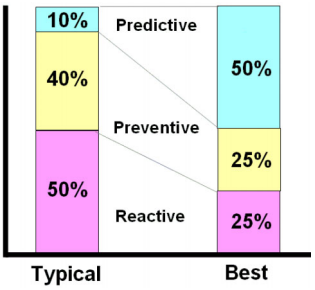


3. Predictive maintenance. The third strategy overcomes these drawbacks by constantly **monitoring actual equipment condition** and using the information to **predict when a problem is likely to occur**. With that insight, you can schedule maintenance for the equipment that needs it – and *only* what needs it − before the problem affects process or equipment performance. That's a great way to improve maintenance productivity, as well as reduce costs for repairs and unexpected downtime.

A best-practices plant uses predictive maintenance for most equipment where condition-monitoring is practical, limiting reactive and preventive strategies to equipment that's not process-critical and will cause little or no collateral damage if run to failure.

Best-practices plants improve productivity and reduce costs by emphasizing a predictive maintenance strategy.

Despite the benefits of predictive maintenance, typical practices have not changed in over 15 years.



4. Proactive maintenance. The next strategy is *proactive* maintenance, which analyzes **why** performance is degrading and then corrects the **source** of problems. The goal is not just to avoid a "hard failure," but to restore or even improve equipment performance.

For example, a valve failure might be caused by excess packing wear, which in turn was caused by poor loop tuning that caused the valve to cycle continuously. Retuning the loop will prevent further failures while also improving process performance.

The best-practices plant of the future will actually spend more on maintenance to include this proactive approach in their arsenal – and more than regain the investment in increased plant efficiency.

Overwhelmed operators

Operators typically have extensive "real-world" knowledge of the plant and the process. But instead of using this know-how to improve operations, they spend much of their time and talent **reacting to unexpected situations** – a productivity drain that limits the number of loops they can manage effectively.

This productivity problem often begins with instruments, valves, and process equipment – or entire loops − that don't perform as they should, requiring **intense operator intervention** to maintain control.

When something does go wrong, the flood of data and alarms that operators have to deal with can make it harder for them to find and fix the problem, or even obscure other process conditions and events that need their attention. Better **alarm and alert management** is needed to ensure that the right people get the right information at the right time to guide their actions.

Some plants rely on abnormal situation management programs to provide this guidance. But greater productivity gains are possible by focusing on **abnormal situation *prevention*** – using predictive maintenance and

similar strategies to correct or avoid potential problems *before* they require operator intervention.

Operators on the run

Many facilities have remote areas, ranging from tank farms and water and waste treatment to well heads, remote platforms, and pipelines. In the ideal world, operators can run remote areas from a central location. If a remote area experiences a condition that requires a temporary onsite operator, **predictive intelligence and diagnostics** should provide the operator with all the information needed to have proper supplies, equipment, and procedures on hand to address the situation.

If remote areas require onsite operators, operator span of control is significantly reduced and operations expense significantly increased. The increase in cost includes the operator, but it also includes control room space suitable for continuous operations and transportation costs to potentially distant sites.

In addition to cost, transportation to and from the remote site may bring the operator through potentially hazardous or remote areas affecting personnel safety. Effective remote operations can reduce direct operations cost, reduce capital cost for remote operating areas, reduce logistics cost, and increase operator safety.

Missed opportunities for economic optimization

Many of the factors that affect plant economics change frequently – from raw material costs to market demand for process outputs. In an ideal world, operators would constantly adjust energy and feedstock sources, product mix, equipment used, and other variables to **optimize the economic performance** of the plant.

In the real world, however, operators seldom get any real-time feedback on the economic effect of their actions. They could be unaware that they're losing millions of dollars by running the plant at sub-optimal operating points.

Even if they have the information, they may not have the tools needed to evaluate complex interactions between variables, or to determine the best operating points before conditions change again.

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A limited view

Predictive maintenance, abnormal situation prevention, economic optimization, and similar strategies offer clear productivity and cost benefits. But predicting potential problems and the effect of changing conditions requires a constant flow of **real-time information** − not just about the **process**, but also about the myriad pieces of **equipment** that make it work.

That's something traditional automation architectures can't easily provide. The control system can't show you much more than the process variable and any associated trends or alarms. There's no way to monitor equipment health, and thus no way to detect the early-warning signals of potential problems.

For example, any analog instrument signal between 4 and 20 mA is assumed to be good, when in fact there could be any number of problems. The signal could have drifted, a sensor could be fouled, or a valve may be sticking. Unless an experienced operator notices that something "doesn't look right," the problem could grow until it causes a process upset or equipment failure.

What's needed is a way to detect (or predict) such problems before they increase operational and maintenance costs, and the tools to leverage that information so you can do more with the resources you have – or with even less.

The answer: predictive intelligence

Emerson's PlantWeb digital plant architecture can meet these needs. The architecture's **predictive intelligence** boosts productivity for both operations and maintenance by enabling you to

- see what's happening in your process *and* your equipment,
- detect and identify conditions that could lead to problems, and
- deliver the right information to the right people at the right time …

so they can take action to keep things running smoothly, efficiently, and profitably.

A broader view. Digital technology makes it possible to access and use new types of information that go far beyond the process-variable signals available through traditional automation architectures. With PlantWeb, both the breadth and depth of this information are unprecedented.

It starts with intelligent **HART and FOUNDATION fieldbus instruments** – including transmitters, analyzers, digital valve controllers, and other devices – that use onboard microprocessors and diagnostic software to

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What makes PlantWeb different from other automation architectures?

- It's engineered to efficiently gather and manage a new wealth of information – including equipment health and diagnostics – from a broad range of field devices and other process equipment.
- It provides not only process control, but also asset optimization and integration with other plant and business systems.
- It's networked, not centralized, for greater reliability and scalability.
- It uses standards at every level of the architecture − including taking full advantage of FOUNDATION fieldbus.
- It's the only digital plant architecture with proven success in thousands of projects across all industries.

For more about the architecture and what it can do for you, visit **www.PlantWeb.com.**

monitor their own health and performance, as well as the process, and signal when there's a potential problem or maintenance is needed.

But PlantWeb doesn't stop with instruments and valves. It also captures information on the condition of rotating equipment, such as motors and pumps. And it monitors the performance and efficiency of a broad range of plant equipment, from compressors and turbines to heat exchangers, distillation columns, and boilers.

Information integration. PlantWeb uses communication standards like HART, FOUNDATION fieldbus, and OPC, as well as our **AMS™ Suite** of integrated software, to make this information available in the control room, the maintenance shop, or wherever else it's needed for analysis and action.

The equipment information is also integrated into PlantWeb's **DeltaV™** and **Ovation®** automation systems, which combine it with process data to deliver accurate, reliable control and optimization, and to manage alarms and alerts.

The power to predict – and improve. With the ability to see what's actually happening – and *about* to happen – in your process and equipment, your team no longer has to spend as much of their time reacting to unexpected events (caused by problems they didn't know about), or trying to find and fix problems that may not even exist.

Instead, they can focus on more productive tasks, like heading off problems they *know* are on the way, and finding new ways to reduce costs and improve performance.

Let's take a closer look at some examples of how PlantWeb makes this possible – both for maintenance and for operations.

More productive maintenance

PlantWeb's predictive intelligence enables you to gain the benefits of predictive and proactive maintenance across the thousands of pieces of equipment in your operation – from **instruments and valves** to **mechanica**l and **process equipment**.

Instruments and valves. The proven reliability of Emerson's Fisher valves and Rosemount, Rosemount Analytical, and Micro Motion transmitters reduces maintenance needs right from the start. But process conditions and events can lead to problems in even the best equipment. That's when these devices' built-in performance monitoring and diagnostics help focus your maintenance efforts where they're most productive.

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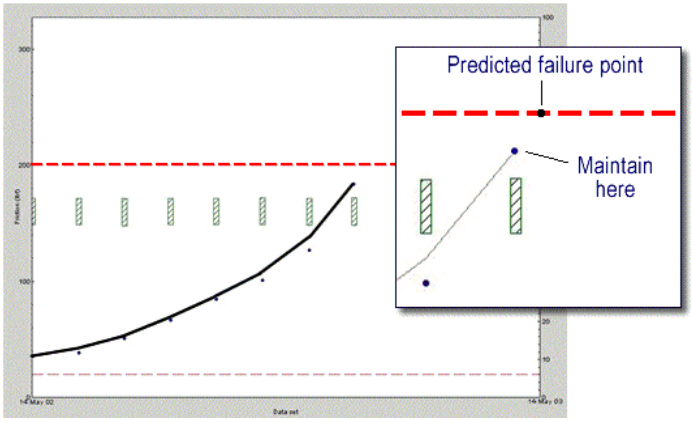
For example, transmitters can fail if the electronics are exposed to excessive temperatures. But **built-in temperature-monitoring and alarming** in PlantWeb instruments can alert you to the problem in time to find and remedy the cause.

Similarly, the **sensor fouling detection** diagnostic in our pH transmitters can trigger a maintenance request before fouling causes process problems – or even automatically initiate cleaning of the sensor.

And **valve diagnostics** can tell you (while the valve is still in service) if conditions like seat wear, packing friction, or air-supply leakage are approaching the point where maintenance is needed.

This valve diagnostic indicates that friction will exceed the recommended limit in one month – enabling you to schedule replacement of the valve packing before process quality, availability, or throughput is affected.



The ability to forecast service needs can reduce the need for a large in-house spare-parts inventory. One PlantWeb user has reported **cutting valve and instrument parts inventories 70%**, saving over $500,000.

Knowing exactly which devices need work, and what kind of work, also lets maintenance technicians **plan their work more efficiently** – taking the right tools and parts into the field, for example.

Just as important, PlantWeb diagnostics can **tell you which devices *don't* need maintenance** – reducing unnecessary equipment checks, shortening shutdowns, and avoiding the cost and risk of unneeded preventive maintenance. Experience has shown that monitoring the performance and condition of critical valves with PlantWeb's ValveLink diagnostic software can **reduce their maintenance costs by 50%**.

AMS Suite: Intelligent Device Manager software consolidates valve and instrument information for easy access, as well as providing a robust but user-friendly tool for many maintenance tasks – from initial device configuration through troubleshooting and recordkeeping.

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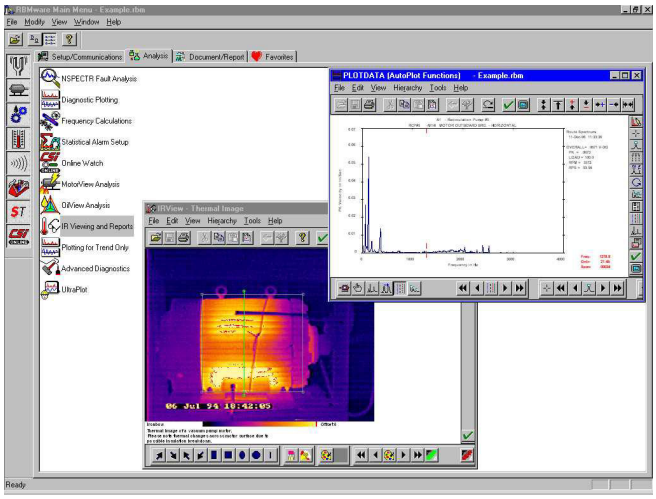
For example, the software's **remote monitoring and diagnostic** capabilities dramatically speed equipment checks. What might have been a 25-minute check in the field becomes a 2-minute task done online from the maintenance shop or control room – without exposing workers to hazardous environments.

AMS Device Manager software also helps cut instrument **calibration** time almost in half, from an average of 47 to 25 minutes. And its **automatic documentation** of maintenance tasks virtually eliminates the manual data entry that eats up so much "wrench time."

Combined with new work practices to reduce unproductive work, taking full advantage of these tools over a broad spectrum of tasks can on average **reduce maintenance time 65%** over traditional methods.

Mechanical equipment. Half of equipment failures that cause downtime typically involve mechanical equipment such as pumps, motors, compressors, and turbines. PlantWeb can help here, too.

Our **AMS Suite: Machinery Health Manager** software combines online monitoring information with data from a wide range of analytical tools, so you can see which equipment will need service soon, and which won't.



The AMS Machinery Manager uses vibration monitoring, IR thermography, oil analysis, ultrasonics, and motor diagnostics to give you a better view of actual equipment condition.

Bearing failure, for example, is a common problem with rotating equipment. But the PeakVue technology in AMS Machinery Manager software can detect and identify the very high-frequency noise associated with the earliest stages of bearing wear. You get maximum warning of future problems, before increasing damage significantly increases the cost (and possibly the time) for repairs.

Tools for laser alignment and equipment balancing also play an important role in *proactive* maintenance of rotating equipment. Used to ensure that shafts are coupled center-to-center and that vibration levels are low at operating speeds and loads, they can substantially extend equipment life – and reduce maintenance costs.

Process equipment. Performance of larger process equipment such as boilers, compressors, heat exchangers, and distillation towers often degrades gradually. Repairs or overhauls can restore the lost efficiency, but at the cost of lost production while the equipment is out of service.

PlantWeb helps you pinpoint the right time to service such equipment. **AMS Suite: Equipment Performance Monitor** software uses thermodynamic models to show you changes in equipment efficiency over time. It then calculates the financial impact of these changes, so you can weigh the cost of sub-optimal performance against the cost of shutting down for maintenance.

AMS Performance Monitor alerts you to long-term changes in equipment performance – and their economic impact.

You can also use AMS Performance Monitor to **measure maintenance effectiveness**, verifying that the equipment is again delivering the needed performance – or even comparing the economic impact of different maintenance methods, such as in-place cleaning or complete equipment overhaul.

Enabling operators to do more

PlantWeb increases **operator productivity** by reducing the time operators spend in reactive mode, scrambling to deal with unexpected situations and problem loops that threaten process stability and safety. With fewer abnormal situations – and better tools and guidance for dealing with those that do occur – operators can manage more loops in both local and remote locations, and focus on improving production.

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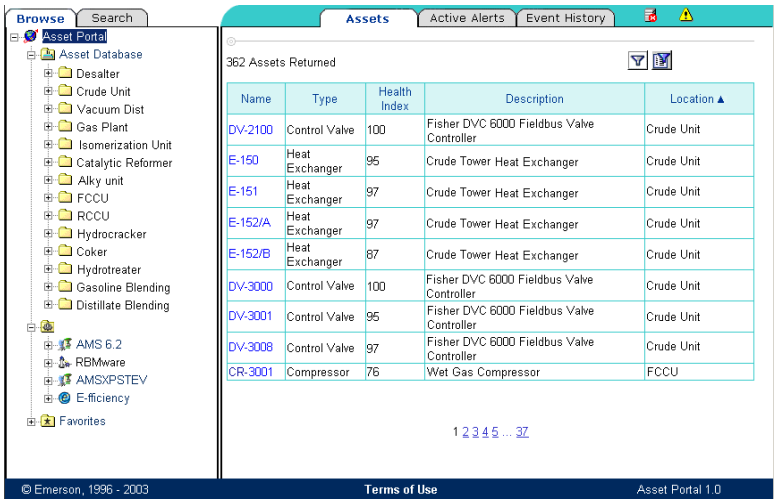
Abnormal situation prevention and management. Much of the gain comes from the maintenance improvements discussed above. Because many potential problems can be **predictively sensed** (and the maintenance team notified) before they affect process performance, they never even hit the operator's "dashboard."

PlantWeb's integration of equipment and process information helps keep things running smoothly in situations like these. As our intelligent FOUNDATION fieldbus instruments constantly check for problems, they use what they learn to label the data they send as good, bad, or uncertain. PlantWeb's **DeltaV** and **Ovation** automation systems monitor this signal status (something not every system can do) to constantly verify that the data is valid for use in control algorithms. If it's not, the systems can automatically modify control actions as appropriate.

Operators can also easily check equipment condition to anticipate and adjust for potential problems. The **AMS Suite: Asset Portal™** provides an integrated, high-level view of information from valves and instruments, rotating equipment, and process equipment in a single browser-based interface. This access to predictive diagnostics and other asset data also enables operators to determine when equipment health is (or, more likely, *isn't*) causing process problems.



AMS Asset Portal provides a consolidated view of instrument and valve, rotating equipment, and process equipment health.

When process or equipment problems do occur, **PlantWeb Alerts** notify the right people without flooding operators with nuisance alarms. This capability relies on powerful software in our field devices, AMS Suite software, and DeltaV and Ovation systems to immediately analyze the incoming information, categorize it by who should be told, prioritize it by severity and time-criticality, and then not only tell the recipients what's wrong but also advise them what to do about it − in clear, everyday language.

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With the advanced warning provided by **predictive intelligence**, combined with effective **information integration** for both control and asset health information, operators and maintenance personnel have more information and more lead time to deal with potential problems. This reduces overall operations and maintenance cost and may reduce or eliminate staffing requirements at remote locations.

Simulation software such as **DeltaV Simulate** can also improve operator efficiency by providing a safe but realistic environment where they can practice dealing with both normal and abnormal process events.

Better control. PlantWeb also improves productivity by **reducing process variability**, so operators don't have to spend time managing problem loops manually.

This better control begins with the intelligent **instruments and valves** that form the foundation of PlantWeb architecture. They include transmitters with fast dynamic response, digital valves that respond to signals of 1% or less, and the world's most accurate Coriolis flowmeters.

DeltaV and Ovation systems integrate equipment and process information to add rock-solid **regulatory and advanced control**. And because advanced controls such as Model Predictive Control are embedded in the system controllers, they're easier to configure and use, and have better availability than traditional host-based systems.

When the problem is a poorly tuned loop, it's easy to get back on track with **DeltaV Tune** software, which uses patented relay oscillation principles that minimize process disturbances and tuning time. **OvationTune**, a system-wide tuning package, also smoothes out variability by monitoring and adaptively tuning loops for optimal performance.

(For more on how PlantWeb reduces variability, visit **www.PlantWeb.com** and click the "Quality" link under "Operational Benefits.")

Process optimization. As your operators shift their focus to improving process performance, PlantWeb provides the tools that help them make it happen.

AMS Suite: Real-Time Optimizer software identifies optimum setpoints to achieve best performance without violating constraints. Like PlantWeb's other advanced controls, AMS Optimizer is an integral part of the architecture, making implementation of optimum setpoints easy.

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For power applications, **SmartProcess®** plant optimization software improves throughput and efficiencies by maximizing boiler performance, improving heat rate, and minimizing steam temperature variations.

These applications allow operators to better optimize each loop or unit, without violating interacting constraints that can cause process upsets or downtime.

Extending the savings

Many of the PlantWeb capabilities that enhance maintenance and operator productivity also help reduce other operational costs. Although a full discussion of these other benefits is beyond the scope of this paper, here are a few highlights:

Safety, health, and environment. With PlantWeb's predictive intelligence and information integration, you can:

- Maintain mechanical integrity by detecting, predicting, and **preventing** equipment failures or unsafe process conditions
- Use remote monitoring to **reduce personnel exposure** to hazardous environments.
- Streamline **regulatory compliance** through automatic documentation of maintenance and engineering activities.

Utilities. PlantWeb helps reduce **energy** use that can be a major contributor to operating costs.

- Tight, consistent control helps improve **conversion of fuels to energy** by 6-10%.
- AMS Optimizer and SmartProcess software can **optimize the mix of fuels and energy-producing assets**.
- AMS Performance Monitor helps you identify when and where maintenance will most **reduce energy use**.
- AMS Machinery Manager can alert you when corrective action is needed to **restore motor efficiency**.

Waste and rework. Costs rise when you must reprocess or dispose of off-spec product. PlantWeb can help here, too.

- Predictive intelligence **alerts you** to conditions that lead to waste, while superior control **smoothes out variability** so you meet specs even at higher production rates.
- DeltaV and Ovation can **automate startups and grade changes,** bringing the process to full production faster.

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- AMS Optimizer can constantly **find the best operating points** for minimizing waste and rework.

For more on each of these areas, see the "Operational Benefits" section of **www.PlantWeb.com**.

Maximizing and sustaining the gains

Gaining the full benefits of a new architecture means adopting new technologies and work practices, but finding the time and resources to make improvements can be challenging in today's short-staffed plants. With Emerson you can maximize the gains – and sustain them – for improved financial performance over the life of your plant.

Emerson makes it easy. Experience shows that customers gain the full value from their technology investments by complementing these technologies with **PlantWeb Services**. Whether you're using PlantWeb in a new facility or adding it to your current operation, our expertise helps ensure a successful implementation.

Best-practices consultation. Emerson service experts will conduct assessment and benchmarking program design so you know where your plant is compared to goal and best practices.

Expert implementation. We will apply AMS Suite technology to your plant needs. To help ensure the success of your project, our service experts will define and document modified work practices, integrate real-time process and equipment health information with your enterprise applications, and provide education and certification for your plant personnel.

We offer a full range of training – at your location or ours, or in video, PC-, and web-based courses − to help your operations and maintenance staffs come up to speed quickly. Courses include condition-monitoring and predictive-maintenance techniques, as well as product-specific classes for predictive maintenance across all assets.

Sustain the gain. If you choose, we can also provide PlantWeb-enabled expert services to supplement your in-house resources. Emerson ongoing services include monitoring and analysis, diagnostic services, and program management to help ensure long-term results.

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Real projects, real results

PlantWeb has proven its value in thousands of installations, in all industries, and around the world. Users are seeing the benefits every day. Here are just a few examples:

- "We are saving $300,000 in labor costs alone, and are running more efficiently than ever." ***- Power plant***
- "The diagnostics are fast and precise when identifying what is generating a malfunction." - ***Electric service utility***
- "Automated documentation of instrument tests saves us an average of 40%." - ***Pharmaceutical maker***
- "The time it takes to troubleshoot problems has been reduced nearly 50%, and predictive diagnostics tell us when our valves are starting to deteriorate so we can plan our maintenance activities instead of reacting to process problems and failures." - ***Chemical producer***
- "We used to go to the field, hook up to the device, and look to see what was wrong. Now we can see immediately from the DeltaV what is wrong with the instrument. What used to take 40 to 45 minutes now takes 5 to 10 minutes." ***- Tank-farm operator***
- "We have eliminated 25% of our maintenance time since PlantWeb was installed two years ago. We have kept the same number of people, but those people are now able to do other things to make our plant more productive." - ***Food processor***
- "We were able to keep the same number of personnel in spite of doubling our size." - ***Regulated-waste treatment facility***

For case histories and additional proofs of PlantWeb architecture's capabilities, visit **www.PlantWeb.com** and click on "Customer Proven."

Taking the next steps

PlantWeb can help you meet the ever-increasing demand for lower costs by increasing operations and maintenance productivity. But with such a wide range of opportunities for improvement, how do you get started?

1. Decide where you want to go. What are your goals for operations and maintenance cost? What are your goals for uptime? How do you want your operators and maintenance departments to work together?

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How would you *like* your plant to run? Establish your vision and goals, and then get ready to achieve them.

2. Assess where you are. How have your costs changed over the last two or three years? What is your maintenance budget as a percent of replacement asset value (%RAV)? What is your current mix of maintenance strategies? How many loops does each of your operators manage? How do these figures compare to industry benchmarks?

3. Look for specific "pain points" or opportunities. Do some units or equipment types have more problems than others – especially unexpected ones? Is equipment-health information from HART and fieldbus devices available to operators and maintenance technicians? Do you have automated maintenance management or process optimization tools? Are they being used?

4. Plan the changes that offer the most benefit. Usually, this involves greater use of predictive maintenance to avoid problems that affect both maintenance and operations productivity. Consider changes in work practices as well as technology, and be sure to involve management and engineering as well as operations and maintenance teams in the planning process.

5. Work with your local Emerson team. We'll help you identify which PlantWeb technologies and related services will meet your goals, and how we can put them to work for you. If you want, we can even help you with the assessment and planning phases of this process, as well as providing implementation services and ongoing support.

References

1. Dennis Berlanger and Saxon Smith, MRG Inc., “The Business Case for Reliability,” as published at **www.reliabilityweb.com/rcm1**.

2. *Reliability* magazine, 2002.

3. Richard L. Dunn, "Composite Maintenance Benchmark Metrics," *Plant Engineering*, January 1999.

Other resources

- Reducing operations and maintenance costs is just one of the ways PlantWeb architecture helps improve process and plant performance. The PlantWeb web site offers a wealth of information – including additional white papers – on reducing costs while also improving process quality, throughput, and availability.
  www.PlantWeb.com − click on "Operational Benefits."

- Emerson Process Management’s free online learning environment, PlantWeb University, offers several courses on improving maintenance effectiveness. Additional courses on reducing operations and maintenance costs by increasing productivity are in development and will be available soon.
  www.PlantWebUniversity.com

- The AMS Suite: Intelligent Device Manager Work Processes Guide outlines maintenance-practice changes to maximize the benefits outlined in this white paper.
  www.emersonprocess.com/ams/solutions − click on "Saving Money" and then on "AMS Suite: Intelligent Device Manager Work Processes Guide"

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