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# Optimizing Routine & Complex Maintenance Operations to Reduce Operating Costs

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# Executive Overview

The impact of maintenance on the bottom line has never been greater. Millions of dollars and the success or failure of critical projects are on the line every time a skilled craftsman lays a wrench on an important piece of machinery. An enterprise project portfolio management (EPPM) solution can help improve key financial and operational metrics like return on assets (ROA), operating margins and maintenance costs by helping to keep vital equipment operating, reducing shutdown/ turnaround time, matching resources to the workload and increasing wrench time. Making sure that qualified resources are available to the project in the right numbers and at the right time can help keep maintenance projects on track while avoiding unnecessary expenses for rework and overtime. Company-wide visibility of project level information enables effective management of enterprise-level metrics as well as the development of best practices across divisions and groups both for executives and project teams alike.

## Global Challenges Impact Maintenance

The combination of an aging infrastructure and large number of new plants coming online are creating severe challenges for a diminishing maintenance workforce. Maintenance is tasked with keeping equipment running longer and more efficiently. Skimping on maintenance runs the risk of increased downtime and less revenue generation. Not to mention the health and safety implications. But maintenance represents a significant expense that can have a major impact on the bottom line. Individual tasks comprise projects which roll up to programs which roll up to portfolios which ultimately impact the enterprise's financial statements.

As a result, maintenance and reliability teams are being asked to do more with less. Labor represents the lion's share of maintenance expenses and is naturally a target for efficiency improvements. A published study says that in an emergency or reactive type of maintenance organization, craft workers are usually only 20% to 40% productive.[1] The basic problem is too little wrench time and too much time spent waiting for instructions, traveling to the job, waiting for parts to be delivered or finding the right tools. A large proportion of the skilled workforce is scheduled for retirement over the next decade so asset-intensive companies – like oil and gas, chemicals, utilities, metals and mining – must adapt to a future where it will be harder to find, keep and leverage critical skilled resources.

## Routine Maintenance Challenges

Maintenance challenges typically arise in two main areas, routine maintenance and more complex plant and facility shutdowns/turnarounds/outages. Daily, or routine, maintenance involves large numbers of tasks that are typically not very complex but can present issues in scheduling, allocation and tracking of resources. Typically, there might be a 4-8 week maintenance cycle that covers everything from performing routine maintenance on machinery to trimming vegetation around power lines. The challenge is ensuring that qualified resources are available and allocating them to the right job at the right time to ensure more productive, efficient and safer use of human resources.

Generating the necessary work orders is also a vital routine maintenance function and is well suited to enterprise asset management (EAM) solutions. Yet, EAM solutions typically fall short in the areas of management and visibility of resources. For example, schedulers can easily assign jobs to crews but often do not have an easy way to determine whether the crew will have the capacity to complete the job in the required period of time. Balancing and leveling resources – across multiple plants or divisions – becomes a challenge. As a result, companies that rely exclusively on EAM tools often have difficulty forecasting and managing resources resulting in

[1] Howard Penrose, Ph.D., *Physical Asset Management for the Executive*, 2008.

increased costs and delayed projects.

A leading producer of oil and natural gas in the United States faced the challenge of planning and scheduling for routine maintenance and turnarounds at four North American refining sites, as well as several chemical and pipeline locations. An additional challenge was provided by capital projects such as a $3.8 billion refinery revamp. The company upgraded to Oracle's Primavera P6 Enterprise Project Portfolio Management solution to standardize scheduling and planning and increase collaboration across the company. The new software met the needs of diverse projects from short work order cycles for routine maintenance to complex, lengthy turnaround projects with both Web-based and client-based tools. This solution has supported 2.2 million activities while providing an estimated cost savings of $3.5 million per year.

## Complex Maintenance Challenges

On the other hand, large turnaround or shutdown projects often involve thousands, and sometimes tens of thousands, of activities that must be completed within a very tight, fixed window of time. For example, thousands of internal and external/contractor workers might come together to overhaul a boiler and retrofit a scrubber in a power plant. Every day that the plant is off-line millions of dollars of revenue are lost.
Each of these jobs requires specific direct labor resources, such as pipefitters and boilermakers, at certain times. Resource utilization needs to be leveled out so that the number of people in each specialty remains optimized. But resource leveling alone doesn't even begin to address the enterprise scheduling challenge.

A large refinery, for example, may have multiple major maintenance projects underway at any time, not to mention potentially thousands of day-to-day preventive maintenance activities and maybe several new construction projects or plant expansions as well. Profitability depends to a large degree on being able to schedule and deploy resources in the most efficient manner throughout all these various activities, between different turnaround projects, between preventive maintenance and turnarounds, from plant to plant, product line to product line or division to division.

If a turnaround in one plant is completed ahead of schedule at the cost of diverting resources that force a shutdown in production of a highly profitable product, then profitability as a whole will suffer. The problem is that traditional project management tools that address the problem of scheduling individual projects don't effectively handle the problem of management and visibility efficiently – like allocating resources throughout the enterprise.

For example, taking a generating unit out of service for major maintenance means lost revenue for a power generating company. As a result the company decided to standardize on Primavera Enterprise Project Portfolio Management to minimize risk and financial exposure during the outage process as well as plan 3,000 different tasks and coordinate 900 workers, mostly contractors. The company created an enterprise project management process that enables both internal and contract resources to better coordinate and execute major maintenance progress.

The results include a 10% reduction in outage time which drops straight to the bottom line. Integration of contractor schedules helps to reduce errors, delays and cost. And visibility of project status extends from the field to the boardroom.

## Enterprise Project Portfolio Management Addresses Maintenance Challenges

EPPM provides a complete solution for improving the efficiency of both routine and shutdown/turnaround maintenance operations and also for managing the risk of maintenance activities. EPPM makes it possible to view the entire resource base of a large organization within a single database. Managers can obtain a view of the entire enterprise from a workload and resource commitment standpoint. In many cases, managers may spot an imbalance of work between different areas and reassign other crews to compensate. Managers can also track resources on an enterprise-wide basis to determine the overall balance between the workload and available staff in order to meet project deliverable goals.

EPPM provides the visibility and tools needed to manage both projects and resources at the crew, area, division and enterprise levels in an integrated manner, making it easy to see relationships that weren't visible in the past.

In addition, EPPM solutions integrate resource, scheduling, materials and financial information between ERP and EAM solutions. The result: easier and more accurate project, portfolio, materials and resource management across the enterprise. By leveraging user-friendly EPPM applications integrated with ERP, plant asset, maintenance and materials management solutions, organizations reduce project risks and meet critical delivery dates by effectively forecasting and managing costs, schedules, materials and resources across the enterprise or at a single site.

Risk is inherent in maintenance projects, especially turnaround/shutdown operations where delays generate revenue shortfalls. Traditional information approaches to risk management put managers into the role of firefighters who race around responding to problems. A new generation of risk management solutions integrates with EPPM solutions to fully analyze the risk sensitivity of the project so that the impact of risks is fully understood. The effects of alternate mitigation strategies can be evaluated at any state of the project, ensuring that the project is proactively managed to avoid the most damaging risks.

## An Enterprise View of Maintenance Projects

An enterprise view of resources provides a command center for coordinating teams around the globe, making it possible, for example, to spot an imbalance of work between different areas so that crews can be reassigned from one project to another. At the same time, managers can track resource requirements on an enterprise-wide basis to determine the overall balance between the workload and the available staff. This all drives toward a heightened ability to deliver better

financial results for the company.

Projects in all areas of the company can be measured against each other to determine which ones are delivering the anticipated results and which ones are falling short. Resource needs, time and cost estimates, cash flow requirements and organizational constraints can all be measured and forecasted on an enterprise-wide basis while retaining the ability to drill down to any required level of detail. Cost, schedule and earned value thresholds can be set to automatically generate issues when projects exceed specified limits. Negative trends can be identified early so that the necessary course corrections can be made. Managers can plan for the unexpected by performing what-if simulations to determine the schedule and cost exposure of project risks.

This big-picture view combined with the ability to drill down to the details when needed provides management with the tools they need to optimize maintenance activities to deliver the highest possible levels of availability and reliability at the lowest possible cost.

## Conclusion

EPPM software can dramatically improve scheduling and resource allocation for asset-intensive companies by providing a clear high-level picture of the project status as well as the ability to drill down to any desired level of detail to zero in on scheduling problems. The software can scale to handle anything from the smallest projects to the entire preventive maintenance and shutdown/turnaround requirements of large multinational corporations. All in all, EPPM solutions provide the tools needed by management to maximize the positive impact of the maintenance function on the enterprise's bottom line.

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