Remote Management
Best Practices
How Leading Companies Utilize
New Automation Strategies

MAVERICK Technologies, LLC

MAVERICK®
TECHNOLOGIES

A Rockwell Automation Company

Introduction

Manufacturing firms have used remote management of automation tasks for a number of years and for a variety of reasons. But due to recent changes in technology and strategy, remote management has recently jumped to the forefront.

On the technology front, remote management is much easier to implement due to the proliferation of open systems, standard protocols and high-speed broadband connections. In terms of strategy, many manufacturers are refocusing their efforts on core activities such as uptime and safety, and relying on off-site assistance for remote management.

Remote management tasks can be grouped into five main categories: incident management, backup and recovery, software updates and patch management, real-time monitoring, and online edits (Table 1). Each of these tasks can be performed in-house or remotely, with manufacturers making decisions based on their specific circumstances.

A recent study shows that most companies managing activities in these five areas in-house with no remote support are likely to expand the workforce performing these tasks over the next year. Conversely, companies that have embraced remote management are not likely to expand their workforce in these areas.

These findings indicate that companies relying on remote support are generally better equipped to handle automation and IT tasks. This finding is critical, as many plants find it hard to justify, recruit and train automation and IT personnel. See Table 2 for additional benefits of off-site automation.

Specifically, many companies, particularly those in the process industries, have difficulty finding and retaining professionals with the requisite automation and IT experience. And while companies need these resources to be available 24 / 7 / 365, most plants don't have enough automation and IT work to justify full-time employment. In many cases, this makes in-house execution of these tasks problematic. Even when manufacturers have the required expertise in-house, these experts may not be available when needed.

As a solution, the majority of these survey responders indicated that they use off-site automation and IT service providers, either as a stand-alone solution or in combination with on-site staff. While the remaining manufacturers may already have an existing working internal plan, remote management can often improve these plans, as the costs of these off-site services are typically greatly exceeded by benefits.

For example, providing faster response time to an incident through remote management has been proven to reduce downtime and repair costs — and the cost of just one avoided incident has been shown to completely offset the service price by a significant margin.

This article will discuss best practices in this area, and show the value of remote management by detailing specific, real-world examples.

Real-world Remote Management

In this article, remote management will be defined as the off-site execution of certain automation and IT tasks in the five main categories listed in Table 1. These tasks originate at manufacturing plants, and the off-site execution is supplied by a range of service providers.

All five of these remote management activities have certain aspects in common. All are at the convergence of automation and IT, a fast-growing area that can deliver great benefits to manufacturers — but also an area where many plants find it hard to recruit, retain and justify the required personnel.

Due to fairly recent advancements in communications and other technologies, all of these remote management services can be easily and safely supplied by off-site providers, often at much lower costs than in-house alternatives.

Finally, all of these remote management activities are exhibiting fast growth as software and related services continue to proliferate at manufacturing plants — largely due to specific benefits, as discussed below and in the Remote Management in Action section.

Incident Management

Many manufacturing companies experience incidents with their automation and IT systems that can usually be handled by in-house personnel, but occasionally require assistance. Problems may occur at times of short staffing — typically evenings, holidays and weekends. In other cases, personnel simply need supplemental staff on a short-term basis, a situation that can often be best addressed by remote management.

The operations and maintenance staff at a modern large process plant is often charged with keeping the facility operating smoothly on a 24 / 7 / 365 basis, a task that can be eased by engaging an outside service provider to furnish automation and IT sevices.

Whatever the reason, delayed response to incidents can cause plants to lose valuable production time and, in some instances, lead to damaged equipment or even personnel injury.

Remote management can be an effective means for dealing with incidents by:

■ Remotely diagnosing and debugging automation and IT problems that are causing, or may soon cause, interruptions or reductions in production

■ Helping plant personnel diagnose automation and IT system issues by interpreting and communicating the current state of the system code

■ Providing faster response time to incidents, particularly when in-house personnel aren't readily available

The right outside service provider can give valuable third-party perspective from the experts at their remote operations center, while a single plant or company may find it difficult to maintain such specialized expertise. Even if a plant does have this expertise, it is unlikely to be available 24 / 7 / 365, as it is with an off-site provider.

Troubleshooting is another specialized activity — one that is often best addressed by combining the expertise of both in-house and off-site personnel. This synergy will lead to a more expedited solution. Plant personnel are experts with their particular processes, while off-site professionals can often provide specific, in-depth automation technology insight.

Backup and Recovery

The immediate focus of manufacturing plant personnel is on core activities such as up-time and safety. As such, other necessary activities relating to back up and recovery may not get the discipline and focus that they deserve.

Because of the hierarchy of critical plant operations tasks, backup activities can easily fall to the bottom of the priority list. These tasks can be indefinitely postponed and, as long as there are no failures, there will be no harmful effects. But when a failure does occur, it's critical to have all pertinent information recently backed up and ready for restoration.

Via one or more high-speed connections to the automation and IT systems, a remote management solution can make periodic backups of any device configuration residing on the automation / IT network, and of the data resident in these devices. These devices typically include server-level, PC-based applications, and controllers such as DCSs and PLCs. Modern manufacturing plants also have programming and data residents in lower-level devices such as smart instruments, intelligent valves and variable frequency drives — and this information can also require backup.

In the event of a failure of one or more devices, remote management personnel can work with the plant to systematically and rapidly restore programming and data to each affected device. This could involve directly loading information from the remote site to the plant devices, remotely sending the files to plant personnel for local loading, or a combination of both.

The cost-benefit ratio of remote backup and recovery can be calculated by looking at the potential downtime avoided in the event of a failure. Another favorable factor is that remote backups will be performed on a regular schedule, at a frequency predetermined to be optimal for each device. For example, a device with programming and data that change frequently, such as an HMI, might require daily backup, whereas a smart instrument might only need annual backup.

The cost of not having current programming and data ready for restoration after a failure can be very high; continuous improvements and other changes made between the time of backup and restoration will be lost. For example, if your latest backup is six months old and you lose your primary application, you will also lose six months of continuous improvements.

Remote management of backup and recovery can avoid the diversion of scarce on-site resources from other important tasks, and minimize downtime.

Software Updates and Patch Management

Software updates are another issue that's often hard for plant personnel to properly address when dealing with the pressures of another item or issue. A modern manufacturing plant will typically have scores of software programs that require frequent vendor-recommended updates to address known bugs, improving security and performance.

To ignore these updates can cause serious problems, often leading to less-than-optimal performance, failures and / or security breaches. If updates are not implemented for a long period of time, the plant may lose software vendor support, because vendors only support older versions of their products for a limited amount of time.

On the other hand, simply accepting all updates may also cause problems, as updating one device can often lead to problems with communications and operations among other connected devices — a growing problem in increasingly networked process plants.

Via remote connections to automation and IT systems, the remote management solution can:

■ Monitor the release schedules of software vendors for major and minor updates

■ Test updates and patches on automation and IT system mockups (Image 2)

An automation solutions provider can test software updates and upgrades at their off-site operations centers, assuring process plant personnel that software changes won't adversely affect ongoing operations.

■ Analyze the benefits of upgrading, along with the risk of maintaining the current version

■ Explain the risks and rewards in plain English to plant personnel via a periodic report

■ Update the automation and IT systems remotely at a prescheduled time, upon approval by plant personnel

Remote management is often the best method to keep current with software updates, as either a primary or a supplemental solution.

Real-time Monitoring

Real-time monitoring of automation systems, related information systems and plant operating equipment is a must for optimal operation of manufacturing facilities.

Failures seldom occur without prior warning, but these warnings are often subtle, requiring careful analysis of data by experienced personnel for early detection. Unfortunately, many manufacturing companies don't have the personnel available to perform this analysis, so key indicators of impending failures are ignored. The end result is often a breakdown, followed by downtime and unscheduled maintenance.

In much the same way that individuals monitor their weight and blood pressure for signs of heart problems, manufacturing companies can monitor the data in their automation and information systems for signs of potential failures. Not doing so is the equivalent of waiting for a heart attack to happen and hoping to get to the emergency room in time.

Via remote connection to the control systems, a remote management company can:

- Identify and monitor the critical parameters that typically indicate most failures. Examples include hard disk usage, percentage of utilized memory, warnings generated by the automation system, network data and information related to equipment operation such as vibration parameters, temperature readings, etc.

- Monitor these parameters remotely on a 24 / 7 basis, using sophisticated statistical data analysis techniques when necessary, along with expert judgment

Continuous improvements to plant processes and equipment, such as this distillation column, can often be performed more efficiently by a third-party service provider specialist at an off-site operations center.

- Make remote corrections when abnormal conditions occur and / or notify plant personnel to take action

- Recommend proactive maintenance, avoid breakdowns and consequent downtime

In each of these instances, remote personnel can be particularly effective by detecting many problems before they occur, and quickly troubleshooting and debugging other issues after they occur.

MAVERICK Technologies

For example, proactive maintenance can be a very complex task, as it often requires the examination of large amounts of plant operating data to detect specific patterns known to predict failure. Proactive maintenance is the practice of detecting problems before they occur by analyzing data provided by the automation system.

For most manufacturing operations, the cost-benefit ratio of real-time monitoring is compelling if only because the cost of a single incident of unplanned downtime can be astronomical.

Online Automation and Information System Edits

In many cases, plant personnel at manufacturing facilities have the required basic knowledge of their automation system programming to monitor and control operations, but not to make significant programming changes. In other cases, plant personnel have the required expertise, but not the time.

Either way, remote management can provide resources to make and test the required changes, and work with plant personnel to remotely implement these changes.

Depending on the degree of expertise at the plant level, these programming changes can be made by the service provider from a simple verbal description of required modifications, or from detailed written documentation. Remote personnel can also remotely analyze particular operational issues, and recommend specific programming changes to resolve these issues.

Conclusion

The five main remote management tasks are incident management, backup and recovery, software updates and patch management, real-time monitoring, and online automation and information system edits. Remote management can often be a less expensive and more effective way to accomplish these tasks as compared to solely relying on in-house resources.

Once the decision has been made to use remote management, the next step is to pick a partner. Although many firms purport to offer remote management services, most have very limited automation expertise, and are instead strictly IT experts. These IT experts include the Big Four accounting/ auditing/ management consulting firms, and other smaller firms in this same arena.

Manufacturing companies in need of automation expertise should instead look for a qualified automation solutions provider (ASP). The right ASP will have a deep understanding of automation and related information systems, and of manufacturing processes in general. This will allow the ASP to provide the required expertise at a reasonable price without unduly burdening plant personnel with basic questions related to automation.

An ASP will have platform independence, not preferring any particular product, but instead focusing on providing a solution. Unlike an OEM, a platform independent ASP will often recommend solutions that aren't product-based, but that instead require software changes or adjustments to work practices. The advantage of this is a one stop solution for a company that uses many different technologies

The ASP should have the ability to work on site when needed. For U.S.-based manufacturers, this is best accomplished by engaging a partner who can be on site quickly, and avoiding the barriers of time and language that come with overseas outsourcing.

One such ASP is MAVERICK Technologies. Their PlantFloor24® solution is a collection of remote management services specifically designed to support the needs of manufacturing companies, focusing on their automation systems.

Since 1999 MAVERICK has been designing, installing and commissioning automation and related information systems worldwide for manufacturing companies. This specific and extensive experience allows MAVERICK to effectively provide remote management services, and is unique among large service providers for platform independence.

MAVERICK has invested significantly in their PlantFloor24 operations center, a facility that's staffed 24 / 7 / 365 by automation experts. Located near St. Louis, Mo., the operations center can provide a wide range of remote management services, tailoring each support contract to the client's specific needs. And with more than 500 automation professionals on staff, and locations through the country, they can send support directly to the client when it's needed on site.

Upon request, the operations center can replicate critical portions of a client's automation and information system, installing and maintaining hardware and software similar to the plant's on-site systems. This allows the operations center to test software updates and changes in order to ensure that these modifications don't cause unintended outcomes.

Remote management of automation and related information systems is a fast-growing trend for manufacturing companies. Careful selection of the right partner will allow manufacturers to improve operations in a very cost-effective manner, increasing competitiveness by establishing and implementing best practices.

REMOTE MANAGEMENT IN ACTION

Remote management of automation and related information systems for manufacturing companies is a leading trend due to its effectiveness in action as demonstrated by the following two incidents, both implemented for clients by MAVERICK Technologies.

Incident 1

The first incident demonstrates network monitoring and incident management. MAVERICK was remotely monitoring an automation system at a plant in Germany from their St. Louis-based PlantFloor24˙ operations center, and noticed that several new devices had been added to the network. The new devices were transmitting such large amounts of data that other devices on the network began to slow down. This was evident to the operators in charge of the plant due to the very slow response times between inputs to the HMI, and responses to affected plant processes and equipment.

MAVERICK remote management personnel called the control room and verified that the operators were indeed experiencing problems. They then notified the local plant automation technician that new devices had been added to the network, and told the technician which Ethernet switch these devices were plugged into, allowing the technician to quickly address the problem.

The automation technician investigated and found the new devices to be IP-enabled cameras. Cameras broadcast large amounts of data, and both operations center personnel and the plant technician agreed that these devices should instead be installed on the plant's business network, as opposed to the automation system network. The technician moved the cameras to a business network switch, and operations returned to normal.

Incident 2

The second incident demonstrates network monitoring, incident management, and backup and recovery. MAVERICK received an urgent call from a corn wet-milling facility that produces ethanol, saying that their automation system was no longer responding to operator commands via the HMI. The plant was apparently running normally, but the operators were no longer in control of the process — a potentially very dangerous situation.

The plant needed to quickly regain control of their automation system, but they had no idea what was causing the problem as there were many interrelated subsystems that could have been at fault — including the HMI application, the network or the controllers.

In short order, MAVERICK remote management personnel activated their network monitoring tools and were able to ascertain the root cause of the problem, which was found to be a failure of the network switch that allowed the HMI system to communicate to the main PLC.

MAVERICK contacted the local automation technician and informed him of the failure of the specific switch. Fortunately, the technician had a spare in storage, but he didn't know how to restore the switch configuration. As planned, MAVERICK had backed up the switch configuration information, so they had the data on hand that was needed to restore these critical settings.

MAVERICK talked the technician through the process of installing the switch. Once this task was complete, MAVERICK remotely loaded the switch configuration and control was restored to the operators, averting what could have been a very costly and dangerous incident.