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Originally appeared as an Online Exclusive Sept. 13, 2022
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Empower decision makers with a proactive analyzer plan

For most refinery facility managers, the demands of running plants efficiently, meeting environmental regulations and maximizing returns on product specifications challenge even the most disciplined of professionals. Managers whose schedules are consumed with urgent matters needing immediate attention are challenged to find time for proactive preventive maintenance, especially for necessary and mandated analyzers.

Despite their vital role in plant operations and protecting health and safety, most analyzer systems do not receive the resources they deserve. Decisionmakers may be hesitant to make large-scale investments in the operations, maintenance and upgrades of analyzers; poor (or no) business cases showing long-term returns on investment or lack of defined risks connecting analyzer failure to financial cost are usually the underlying culprits. As a result, complex analyzer systems often run deep into obsolescence with multitudes of band-aid fixes and are upgraded only at last resort. Projects are then executed with rushed schedules and shoestring budgets because they were never part of the master plan. Ironically, these installations end up costing the plant more money than if the system upgrade had been scheduled and planned. Reactive maintenance always costs more than proactive maintenance. Any plant manager can probably relate to the ever-present threat of being snake-bit by an emergency analyzer upgrade project with limited options, high cost and high visibility, such as an emergency replacement of continuous emissions monitoring systems replacement.

If your plant has numerous process and regulatory analyzers, there is a better way. If decision makers can be convinced of the value in an up-front effort to perform holistic surveys on analyzers and related equipment and establish a long-term upgrade schedule, facility managers can reverse the cyclical pattern of putting out fires and begin to reap the long-term benefits of a carefully calibrated maintenance plan.

Developing a solid maintenance master plan can be challenging when competing for priority with smaller, less costly projects that can be considered quick wins. So how can you effectively create a sustainable, long-term plan that pays dividends and keeps your plant analyzer systems out of the dreaded reactive maintenance cycle? Perform a holistic system survey, develop a master evergreen maintenance list (and assign ownership early on) and make sure to pitch your projects by translating your technical findings into financial terms your leadership will understand and act upon.

Consider a holistic survey. Holistic surveys may be done on many systems, but for analyzers, the process becomes more complex because of unique regulatory variables. Unlike electrical substations, for instance, the regulatory rules for analyzers change almost annually because they are monitoring and reporting on emissions from the refinery. These emissions are highly scrutinized by regulatory bodies and the public, which may present a risk to overall reputation and cause highly visible violations that impact regulatory decisions and environmental justice considerations.

Highlighting that regulatory component strengthens the case for why a holistic survey is especially important for analyzers: if there is a failure and it is difficult to get parts, it has a direct impact on operations because safety/regulatory issues immediately rise to the very top of the most urgent priority list for regulators. As a compliance issue, stakeholders have no choice but to address it immediately, no matter the cost.

Consider a facility has a critical emissions monitoring analyzer that is about to fail. Operational, financial and public-relations risks are high. If the analyzer is obsolete, spare parts are no longer available. In such a case, decision makers must immediately spend whatever it costs to upgrade the analyzer, even if such a project was not planned or budgeted. Sometimes, a short-term rental system is a viable option, but often turns into a long-term rental with costs quickly exceeding the costs of an upgraded system.

Beyond the bottom-line impacts of unbudgeted expenditures, organizations could face a public relations crisis and

risk their relationship with governmental authorities because of faulty or absent regulatory equipment. While less critical equipment can be taken offline or bypassed during an upgrade or repair, this is not an option for a regulatory component. Regulatory bodies often require a notification of analyzer malfunction with primacy, expedited costs and shipping considerations, extended downtime, etc. Additionally, the newly installed analyzer will require initial certification testing that will have to be contracted by third-party services that may not have the resources to support the project without significant unplanned cost.

In the cost-benefit analyses of holistic surveys vs. just-in-time crisis response, it is important for decision makers to understand this will happen again, resulting in a cycle of focusing on the latest emergency and never addressing root causes. However, no plant manager will approve expenditure of resources on a system study if it is not directly tied to an actionable plan.

Pitfall 1: Asking for a site survey without a defined action plan. Before asking for funds to hire experts to produce and expensive report, ensure the team understands what you will do with that data: create a master, evergreen maintenance plan.

Develop an evergreen list. Evergreen lists (or maintenance plans) provide managers a tool they can use to paint a holistic, realistic picture of upcoming analyzer projects for leaders to understand and assess in the budgeting cycle. Although the cost of developing and maintaining such a list can create sticker shock, translating analyzer failures into financial risk can provide the justification for such a plan and make it easier to convince leadership of its importance.

Analyzers are complex, with sophisticated sampling and calibration systems. Many are housed in their own shelters in the field and have HVAC systems to keep the surrounding environment clean and stable. As a result, it can be time consuming to get a full picture of model numbers, obsolescence and parts availability. The picture gets very complicated and costly if systems reside in hazardous classified areas.

This is where a planning team can balance the insights of the facility manager's technical counterpart—who may want to go into more detail than necessary—with what is financially feasible to decisionmakers. Managers should also factor the ongoing maintenance of the list. Paying the money for a holistic study makes no sense if the resulting upgrade plan/list is not maintained long term.

Pitfall 2: Performing a survey without identifying a long-term owner. Once decision makers agree to the initial study, assigning an internal expert responsible to maintain the data insures the initial investment. The person who will be responsible should also be involved in developing the evaluation plan. This step is crucial—without an assigned owner, who also must be personally bought-in to the concept, any money spent on this effort will be wasted.

An internal evergreen expert can be trained to efficiently manage the evergreen spreadsheet or database as such a system is intuitive to whoever has helped create it. The feeling of ownership that comes from the development encourages that expert to be more invested in maintaining it.

The first step in building this internal skill set is to identify the primary internal content expert and ensure that person understands the goals of the project and their role. Alignment is vital. The expert must see the evergreen list as a smart strategic investment.

For example, maintenance/reliability personnel, despite their extensive knowledge on the subject, may not be ideal candidates for maintaining the evergreen list because they are often dealing with emergencies, which naturally interfere with long-term maintenance projects. A successful creation and maintenance of the evergreen list takes time and planning.

The task is well-suited to a project leader or project engineer who has the bandwidth and organizational skills to manage and maintain the list reliably. Technical input could be provided by field technicians who are in the plant or the field every day working on the analyzers and know their operational states.

The internal evergreen list expert must take the input provided by the technical and maintenance staff and drive the tasks, keeping staff on schedule, managing the budget and acting as the intermediary to translate technical language into dollars-and-cents proposals that can be understood and accepted by leadership. When these types of efforts fail, it is often because the technical needs are not fully converted into financial costs and risks. In addition to maintenance plans for monitoring equipment and analyzers, upgrades and ongoing support to data acquisition systems must be included to maintain streamlined compliance reporting and data reviews.

Pitfall 3: Failing to translate and quantify risk into financial terms. Having a sense of the reliability of analyzers is valuable to decision makers not only for safety and regulatory reasons but also for general planning of maintenance and replacement.

Reliability—or the absence of it, in the form of equipment failure—is one piece of the risk analysis puzzle. Risk is a combination of the likelihood that a failure will occur with the consequences of that failure. Many technicians and maintenance engineers excel at describing scenarios and predicting their likelihood, but they may need help balancing that information against other competing interests to determine where that risk fits in terms of priority for capital expenditures.

That balance is a key piece of any meaningful discussion with leaders about what deserves budgetary priority. The underlying issue in many cases is an inability to convey what is most important—breakdowns, equipment failures and/or the inability to make repairs because of obsolescence. Technicians and planning professionals must take that a step further and balance the identified risk—a combination of the consequences and the likelihood of a failure—against the cost and effort that will be required to mitigate that risk.

Experts with a technical background know these things are important but they often struggle to communicate them using the language of risk analysis that will resonate with decision makers. An experienced project leader or project engineer brings the skills to translate such vital analysis.

Consider the scenario where an analyzer is old and will break down. A leader may ask what the risk would be if it fails. The risk may be fines to the organization from regulatory agencies when the boiler needs to be taken offline because an analyzer breakdown inhibits emissions monitoring.

This is an accurate description of the consequences when an analyzer fails. However, risk analysis is a multi-faceted examination of consequences and likelihood of failure in concert. A project team expert can ask the right questions to understand

the full spectrum of risk—both the likelihood and how to plan for it.

A holistic survey helps organizations go beyond planning for failure. For example, a particular analyzer is obsolete, which means spare parts are hard to procure, but the facility has one set of spare parts on hand. Historically, spare parts have been needed, on average, once a year, but that has been increasing. In the next 5 yr, it is reasonable to expect one failure that will use up the spare parts, and a second failure that would result in a shutdown. In this case, the internal expert can forecast a high chance of being out of commission within 2 yr–3 yr and certainly within the next 5 yr.

Equipped with a reasonable timeframe, a facility manager can devise a plan that balances the consequences with the likelihood the analyzer will reach the end of its lifecycle by a certain date. The manager can then determine an acceptable level of risk and isolate the point in time at which that risk becomes unacceptable, allowing the organization to set priorities. This contrasts with operating in crisis mode that demands addressing whatever emergency is most pressing at a given time.

Finally, with the likelihood and consequences defined and quantified, the last step is to translate that data into financials. Consequences like regulatory fines and/or lost opportunity during shutdowns can be translated into monetary costs. Talk with key plant stakeholders to help define those costs so managers do not have to. Get an accurate estimate of the total installed costs of the project to replace the analyzer system. In addition, always be prepared to give a cost for the "do nothing" option, in this case, short maintenance outages and costly spare parts. Armed with your risk (likelihood and consequences) quantified into financial terms, you are ready to present a strong case to management to replace those problematic systems. Remember, the goal is not necessarily to win project approval but to provide leaders with as accurate a picture as possible and a defined plan that they can decide upon. Sometimes the correct answer is to accept the risk for a time. Do not become so invested in the project proposal that you lose site of the overall facility.

The long game. With this template, let's return to the evergreen list model. After compiling the data analysis into a compelling case to replace a system, apply the principles of holistic planning—in the appropriate level of detail—to all the analyzer systems on the evergreen list.

Pitfall 4: Drowned in detail. Performing the in-depth analysis as outlined for every analyzer in your plant could range from daunting to despair-inducing. Do not drop the ball at this point! Prioritize your systems, give the full treatment only to those that need thorough evaluation. For the systems that are in good shape, use your judgment: define the framework for the risks and costs, but if risks are low, give a rough order of magnitude estimate. Your list should be ordered from immediate to long-term needs, ideally with each upgraded system moving to the bottom of the list as it is addressed. The data collected to identify risk scenarios and costs move with the items on the list and will only need review and updates in the future. At this point, the hard work is done, and you are left with a maintainable, long-term action plan that can readily convey status and risk of any analyzer within the plant.

With a dedicated analyzer maintenance plan or a group devoted to managing such plans once developed, plants that utilize key performance indicators (KPIs) to communicate performance and reliability will have better data. It is to be expected that KPIs that track downtime will most likely increase (or perform lower) in the short-term. However, the long-term health of your analyzer programs will increase and should begin to improve, and that improvement will be reflected in the KPIs for the program. HP

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