HOW MINIMISING UNPLANNED DOWNTIME CAN BOOST PLANT SAFETY

These are tough times for the oil and gas sector. Research company GlobalData projects the energy sector overall will face downward earnings revisions of 208% in 2020. Activity levels have reduced significantly since the global lockdown started, and demand has fallen spectacularly.

In this difficult environment, the industry, including the vendors and technology providers supplying it, needs to be especially understanding of the issues around unplanned shutdowns. This phenomenon impacts operators' profitability. But the effects also have a major impact on plant and personnel safety in addition to greenhouse gas emissions and environmental compliance.

From a safety perspective, forced shutdowns represent one of the most dangerous conditions a plant can experience. A refinery typically spends less than 10% of its time in transient operations (shutdown, start-ups or maintenance) — but a staggering 50% of all process safety incidents occur under those conditions. To make improvements in safety, it's critical to minimise these transient operations, especially those that occur unexpectedly.

If there is a single plant process that most clearly expresses both the environmental and safety challenges associated with unplanned shutdowns, it is gas flaring, or the combustion of excess product typically released when a plant experiences over-pressuring operation — such as during an unplanned shutdown. Flaring is a significant source of greenhouse gas emissions and a waste of fuel, with the World Bank estimating that about US $20 billion of gases are flared or vented every year. Critically too, excessive flaring is a visual sign that something is outside of normal parameters in the facility, which means the safety risk is increased.

This paints a grim picture, but there is good news from the industrial technology front. By tapping into the power of machine learning and predictive analytics, companies can understand which pieces of equipment are going to fail, and when, so repairs can be performed as part of a managed shutdown. Benefits include improvements in safety levels, reduced emissions and enhanced profitability.

Today's asset performance management technology can deliver advanced warning of failures through a combination of predictive and prescriptive analytics, enabled by integrated software that incorporates AI and machine learning. This type of solution provides a detailed view of all equipment, systems, facilities and networks.

This means that, with the time to plan around predicted downtime and a holistic view of the operation, plant personnel can see how a decision that changes any business process also affects the entire organisation. They'll immediately know how it impacts planning and scheduling, how it determines which feedstocks are purchased, and critically too how it affects safety.

The right technology can simulate how any event will impact the system, the process and the asset. When the outcome is known in advance, operators and engineers can collaborate to make the safest and most profitable decisions. The technology can even be scaled to cover multiple plants to better understand their co-dependencies. So, when there is an issue in one location, the software can show how it will affect the pipeline coming in, the ships going out and whether the facility is at risk of defaulting on contracts.

Putting it Into Practice

Achieving this level of integration starts with ramping up the organisation's digital capabilities. Companies in every sector now have access to technologies such as high performance computing, artificial intelligence and advanced analytics to generate deeper insights from data.

Fuelled by these insights, leading-edge simulation programs enable operators to quantify the value or cost of any renovation or improvement project, maintenance change, operations improvement or supply chain constraint. This technology utilises statistical sampling techniques to predict the future performance of a system, analysing equipment behaviour to derive a "time to failure" estimate.

With the broad view of operations that simulation programmes provide, plant personnel can be alerted to impending failures and understand the potential impacts to wider systems. Operators can also model flow through pipes and tank levels, as well as the utilised and available capacities of all units.

This is how it's possible to discover exactly which events are negatively impacting performance in ways that can lead to safety issues, for example. With a prioritised list of every event in the business that's impacting performance, the company can apportion budgets and put people where needed.

If the software is in place at a refinery, for example, it might alert to a likely failure of a fluid catalytic cracker or cooling tower, which would cause disruption and potentially impact safety. But with the advance notice provided by the software and time to plan before the failure happens, personnel can then use scheduling models to find the best time to take that part of the plant offline, and even insert additional maintenance activities to optimise planned downtime. And if the alert comes further in advance, this may enable staff to load the information into a longer-term planning model that can account for impacts on sales or operations planning or integrative business planning.

Through those models, not only is the organisation protecting itself from unplanned events, it's accounting for economic impacts and safety-related issues. Personnel are making informed decisions to take the best possible action in a multi-network supply chain. In short, management can always know when the best downtime is, as well as what activities should be completed during that time, in order to preserve orders and maintain customer commitments as well as minimising emissions.

Scoping the Results

An investment in the right advanced technologies not only delivers a significant RoI by reducing unplanned downtime, but also supports the ability to maintain safe operations and meet environmental goals.

As we have highlighted, unplanned downtime and transient conditions lead to flaring, which means product is released into the atmosphere. This is an area where predictive analytics can have a major impact. It seems clear that a large proportion of emissions caused by gas flaring could be avoided by eliminating unplanned shutdowns.

What if we could see a pending problem on a piece of mining equipment before it starts degrading or be alerted to a failure on an offshore oil platform before it became serious? All this is possible and allows unplanned downtime to be turned into planned downtime. This technology can also be integrated with planning models that will provide recommendations and advice on what actions to take to ensure optimum levels of safety.

In the current climate, with the ongoing disruption that the COVID-19 pandemic is bringing, using software solutions that enable remote access is also increasingly key to ensuring the health and safety of the workforce. Today, operators not only increasingly need teams of workers who can predict likely downtime and prevent it from happening, they also need to allow those employees to work offsite away from the plant, without lessening the effectiveness of their work. Technologies that support remote access can enable this to happen

The Time is Now

The companies that implement this technology first can put themselves at a distinct competitive advantage, driving efficiencies but also maintaining their "social licence to operate" with improved safety and sustainability performance. Many are already putting the solutions in place to help them avoid the most dangerous conditions, reduce greenhouse gas emissions and maintain the most efficient operations.

As companies face growing pressures from shareholders, regulators and consumers alike, the need for agility may well be greater than ever but so too is the need for environmental efficiency and enhanced safety. The current crisis has only served to underline that need. Operators must make certain they are reducing risk and uncertainty through the implementation of the advanced technology solutions available today, but also enabling remote access to ensure these technologies can be used safely and securely by operator staff. Those that do both will put themselves in the best position to achieve optimum levels of safety through the COVID-19 crisis and beyond.

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