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Meeting business goals with autonomous agents

Mike Brooks, senior director, APM Consulting at AspenTech discusses the benefits of autonomous agents for early risk detection.

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The APM 4.0 approach aligns the availability of assets to a business's production and financial goals.

THE WORLD IS much smaller today than it was even 10 years ago. Products can be developed in many locations and delivered anywhere. That has led to pressures on margins across the asset-intensive industries, and businesses have responded by seeking lower costs and greater productivity.

Production processes have become more complex and volatile, suffering greater uncertainty and ambiguity from any changes or deviations along a total product supply chain. We call this a VUCA (volatile, uncertain, complex and ambiguous) marketplace. Under such circumstances, manufacturers must rapidly understand the impact of impending disruptions and act quickly to seize business opportunities and minimise safety, environmental, and profit risks.

The good news is that digitalisation has now continued its trajectory beyond reactive, preventative, predictive and reliability-centred maintenance to a new asset performance management (APM) 4.0 approach that utilises autonomous agents to monitor and detect precise risks much earlier. This aligns the availability of assets to a business's ever-evolving production and financial goals.

The advent of autonomous agents

At the plant, the APM 4.0 approach is focused around three key areas; the asset, the process and random events that are unexpected or out of the norm. In oil and gas, for instance, a typical asset problem might be a pressure anomaly where the plant has abnormal increasing pressure in a reciprocating compressor. A process issue, however, may manifest itself as a compressor efficiency problem where an engineer identifies that a compressor is not operating optimally, and the plant needs to make an adjustment to fix the problem.

Random events by their nature cover many unexpected occurrences in the plant. One example might be erratic discharge from the plant when feed and intake pressures are out of the norm. The keynote here is these events are unknown or unfamiliar but need to be quickly diagnosed and fixed.

> "Digitalistion has continued its trajectory to a new asset process management (APM) 4.0 approach."

Rolling out the agents

The process of distributing autonomous agents across the plant starts with AI-powered, role-based applications. Applications looking at asset risks can be targeted at reliability engineers. Those addressing process risks can be steered towards process engineers, and event analytics tools focus on frontline operators. Data scientists can also be brought in to evaluate unique scenarios and risks. The use of these applications helps rapidly create thousands of autonomous agents which can be used to blanket the plant and continuously monitor for and detect precise risks.

These agents are effectively digital twins that learn normal and degradation behaviours and keep watching and warning. Agents process real-time data across time and multiple dimensions, combined with asset management system data. Failure agents can alert on root causes of degradation and provide prescriptive guidance on exactly when to service and repair or how to adjust the

process to avoid the damage altogether.

Anomaly agents learn the precise patterns that declare normal behaviour and alert when there is a deviation. The deviation could be a signature of degradation or a normal change in process behaviour. The anomaly agent reacts by embedding the new pattern of normal behaviour so that no false alarms occur. Additionally, agents can work on any asset in any industry for any failure mode.

The key benefit of this approach for asset-intensive plants, however, is that it enables the earliest possible risk detection, thereby maximising mitigation options and minimising negative impacts on production. That is because the intelligence generated by these autonomous agents can potentially then flow into collaborative alert assessment and mitigation workflows.

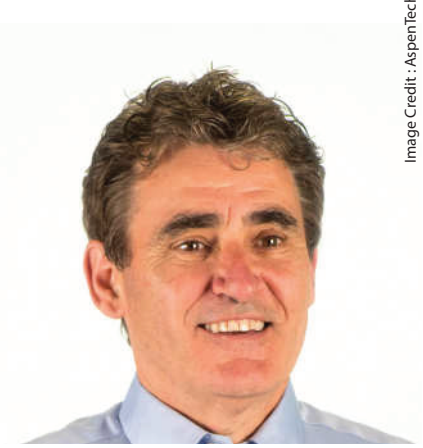
Typically, when it comes to reliability and process engineers and frontline operators, the consequent actions will involve the mitigation of specific issues in their domains. However, the information delivered by agents can also help higher level business functions take a plant-wide look and consider what the impact would be if they make a specific change. Sometimes it might be better to run an asset failure than to jump in and make a make a maintenance mitigation decision, but autonomous agents will help these senior staff make the right decisions.

> “The best of these approaches can also scale easily.”

Scaling up

An approach based on autonomous agents has the potential therefore to bring far-reaching benefits to asset-intensive plant operations. It can ensure early planning to minimise maintenance time and cost and reduce impact on production. It can guard against process-induced damage to equipmen t and reduce financial impact and risk.

The best of these approaches, however, can also scale easily, especially when they are using off-the-shelf applications. That enables them to build agents quickly and apply them to an asset, an approach that can then be quickly replicated with other similar assets across the plant. At enterprise level, learnings derived at one plant can then be taken and applied at other similar plants across the operator’s estate. Once again, it is a compelling example of how autonomous agents can help businesses across the asset-intensive industries to meet their production and broader business goals. ■



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