AUGMENTED REALITY SET TO TAKE MAINTENANCE TO NEW HEIGHTS

Augmented Reality promises a step change in the way process industries think about maintenance. With real time help from human experts or automated systems, AR supercharges the already formidable power of Predictive Maintenance.

In the realm of digital technologies, Augmented Reality (AR) certainly stands out. Overlaying digital data on what you are seeing in the real world, rather like the head up display in a combat aircraft, has uses that really jump out – as well as the obvious ones in gaming and entertainment, it is finding applications from surgery and healthcare, to fashion and retail outlets.

Closer to home, industrial applications are not being left out either – one of its biggest uses is expected to be in Predictive Maintenance (PM).

Using data from devices or processes to detect trends or analyse patterns, to predict when an asset will need servicing, is the cleverer alternative to just waiting for it to fail and then replacing it – for example, you might discover a change in pressure that could point to a build-up of some contaminant or deposit in a duct or line. Analysis of the changing pressure could indicate that in six months' time, you'll need to clean a particular filter to stop it from becoming blocked.

The result is better, more planned use of your maintenance staff, a minimum of lost production and lower costs.

Compared to today's situation, PM is already a game changer. Many processes still rely on disconnected devices, offering no monitoring of diagnostics at all. The most operators can expect is an alarm to indicate that something has gone outside its normal range – depending on the severity of the problem, the device might just stop communicating or cease working altogether.

When the operator realises that the device is not working, they will call a field service centre, who spend further time to identify the device and provide details of it. The result is that someone is sent into the repair with no knowledge of what the problem is and whether they have the right parts to do the fix, which could either be very simple or more complicated than envisaged – either may cause delays in fixing the problem.

Next level maintenance

So, with its power to identify when you need to do something, PM is increasingly essential - either manually using people's expertise to define a problem and when it will occur, or automatically using analysis of data.

AR in the context of Predictive Maintenance is part of the growing move towards autonomous systems, such as self-driving cars and the lights off factory - a device being monitored and a problem being detected within or around the device automatically. The root cause of the problem is automatically worked out, the timeframe within which a problem would occur is calculated and the way to perform the fix automatically provided.

For the filter example, artificial intelligence would be used to assess the data and would conclude that, based on this set of parameters, we need to replace the filter. As we have seen, this is very beneficial, but AR takes it to the next level – you not only want to predict when something is going to happen, but also know what to do when it does. What information is needed, who needs it and when, what form will it take, how portable will it be and how is it presented? Can it be interactive, and can the field engineer get real-time support from a solution expert at the vendor?

AR can be operated in two ways, in either a manual system or a fully automated system. A manual system would involve an expert, who guides the engineer through the process via a remote channel and describes how to make the fix.

In a fully automated system, the AR would be driven by the AI prescribing what the problem is – it would then provide the user with the procedure and process, presenting instructions and maintenance information graphically via an iPad or some type of projecting lens.

The system may also automatically despatch a spare part if required.

Options for the fix

When it comes to fixing a problem, there are essentially two scenarios. The first is where the customer carries out the work. In this scenario, the spare part is automatically despatched, and the customer is informed how to do the fix.

Alternatively, the PM solution creates a case which is automatically filled by say, an ABB service engineer, who is provided with the part and goes to the site with an AR app and performs the task.

To make this work requires numerous systems running in the back end – first, there is the secure connection to the device, together with the database in which data is stored. We then need the application that's doing the condition monitoring, as well as the app that handles the predictive algorithms.

ABB has already put many of the pieces into place, including ServIS, a system for storage and management of installed base information. This is connected to the contract management system, as well as to the ABB field service system to deploy an engineer to the job. This in turn is connected to an AR application, connected to the field service application to provide information about what the job is and how to carry it out.

Another option is for all maintenance and servicing work to be carried out by contractors, in a model similar to Uber. For example, with the device connected to the Cloud, applications connected through the cloud to ABB's IT systems and factory allow case handling and tracking, account management, stock management and control, logistics and customer support. This automation ensures that tasks are assigned and supported efficiently, removing many of the manual steps that can lead to delays and errors.

Using AR and its supporting applications and systems has two major benefits. The first is that it brings about a transformation in the way of doing things in factories, reducing the number of touch points that can potentially go wrong. This way of working also moves the plant from a situation where events are uncontrolled or unscheduled, to one where we have a plan based on the knowledge that certain components will need to be repaired or replaced at a particular time. The PM approach reduces the time needed to get a plant back into operation and improves safety by not putting the plant into an unknown condition.

AR also has the benefits of enabling remote working. With the COVID pandemic, the ability for technicians or engineers to work on their own, supported by a remote live expert or fully digitized teaching tools, is a major advantage and contributes to getting systems back online as quickly as possible.

Surmounting the barriers to AR

As issues such as skills shortages, remote locations and staff absence affect the ability of companies to keep their systems up and running, AR is set to become increasingly common. Many countries have plants that are difficult to get to and even well-populated countries have their share of remote locations.

Although the technology is achievable today, it still remains not quite economical for widespread use – it is still cheaper to create YouTube style videos. We also need a broader use of digital

instrumentation and the ability to use the data they provide, abilities which are still not as widespread as they need to be.

Despite this, things are changing very quickly. Costs are coming down, driven by user friendly systems such as platforms that you insert your models into, so the technology is rapidly getting to a point where it is mature enough to become widely used.

There are still companies who are particularly security minded and won't allow connected devices on site, while many others are fully onboard with the concepts. Still, it remains at an early adopter stage for the present. Though Google glasses and HoloLens technology are the public face of AR, these are still not as intuitive to use as people would like. For the moment, using more familiar technology such as iPads, phones and industrial tablets is a better bet, as everyone knows how to use them.

As well as the technology aspects and the willingness or otherwise of companies and their staff to use it, there is all the time and investment needed to get your devices integrated with an AR system. With today's technology, it may take two weeks to create all the material for a single device, a significant amount of time – as a typical plant can have hundreds of devices installed, the time and investment needed to do this for every one of them can be prohibitive.

In the near future, tighter integration with other systems like CAD software will allow the user to press a single button to automatically generate and populate content in an app platform. This speed and ease of use significantly lowers the barrier in terms of investment.

There will most likely be a combination of factors that will drive the adoption of AR - the way that different generations access information and use devices, shifts in behaviour and technology will all contribute. We have seen technology go from disconnected devices to connected, then move from monitoring to condition monitoring, then to predictive maintenance as people understand what the data is showing them.

The most recent development has been prescriptive. This is a fundamental part of the AR concept, with applications explaining what you need to do - ultimately, we may well see a move to autonomous maintenance, with the fix itself even being automatic, possibly even self-fixing devices. In some respects, SIL safety protocols are about looking at failure mechanisms within systems and having built in redundancy, so you can deal with unplanned errors.

Eventually, redundancy may well be virtualised, with software based virtual flow measurement that allows you to infer flow even when your flow installation stops working you, in a similar way to digital twinning.

Once we overcome the barriers to its adoption, making it easy to use and widely accepted by industry, AR is bound for a big future as part of the maintenance landscape of process plants – with its promise of faster, easier fixes, saving time, money and effort, it can't fail to play a significant role in improving efficiency and safety.

Unleashing the true power of prediction

Developments in technology are offering greatly expanded potential for predictive maintenance to help transform the performance of production processes. By providing operators with advance warning about issues and problems before they occur, together with the information needed to fix them, the combination of predictive maintenance and tools such as Augmented Reality provide a winning formula for achieving improved efficiency with greatly reduced downtime.

For more information, including how to download our Remote Insights AR app, visit https://bit.ly/ABB_ARapp.

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