IDEATION
CBM for all

How to Integrate a New Generation of Devices to Achieve a World-Class Maintenance Strategy

In today's world an operator will take a walk down through the processing plant and make sure that everything is working. What often prompts this walk down is a piece of data that has been conveyed to him after it went through a process control system. The data and information travel through many obstacles, they are often redundant or incomplete, and most of the time ignored because they are passed on to wrong people. There must be a better way to maintain your plant! We certainly think so, and this paper explains how to achieve greater effectiveness and efficiency if we introduce a new generation of devices and integrate them into our business systems in a better way.

Our experience compels us to believe that a new generation of products (devices) that will support a world-class maintenance strategy should **not** be integrated into process networks. We think that the new generation products should be designed to operate completely independently of process networks and that they should be, in fact, "exiled" from these process networks. The natural and the optimal environment for such a product should be a common IT infrastructure, and not a process network.

We also believe that, unlike transmitters that continuously flood operators with data, this new generation of products that support a world-class maintenance strategy, should stay silent until they have something to say. Reporting by exception, and reporting actionable information rather than data, must be the new mantra of a world-class maintenance strategy. To narrow it down even more, we believe in Abnormal Situation Detection as a precursor to the condition-based maintenance approach.

If we advocate these devices to be installed outside of process networks and to speak only when needed, but by communicating only actionable information, then at least two appropriate questions need to be tackled. The first one is related to a greater understanding of what kind of devices do we talk about, and the second one is how do we propose the integration should be implemented.

Let's take a look at traditional ways of integrating process devices into a network. If a vibration transmitter, for example, was attached to a process safety valve (PSV) and then integrated into an existing process network, the flow of information would be similar to the depiction in the picture in Fig. 1.

As we can see from the picture in Fig. 1, the data is continuously broadcast to a Distributed Control System (DCS), which passes the stream through to a dedicated maintenance console, or a maintenance application station attached to a DCS. When certain conditions are met, this station sends data through a firewall to a business system, for example a SAP system or maintenance system, such as IBM's Maximo. The work order is issued to an operator, who then must extract further relevant data from the maintenance station before the field trip and a walk down through the plant.

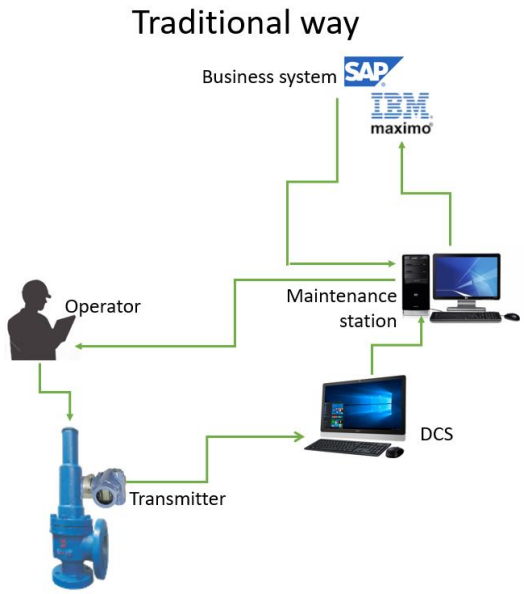

Fig 1: A traditional way of integrating process devices into process network

A long journey, with multiple steps and a potential data overload that can easily lead us to the point where we do not even see what the problem is. There must be a better way!

We do think that there is a better way. It requires a new generation of affordable IoT (Internet of Things) devices and a different integration method, coupled with a simplification of the standard operating processes for maintenance.

Let's first remind ourselves of the IoT concept. The Internet of Things is the network of physical devices enabled to be connected and exchange data. These physical devices have traditionally not been able to network, nor they were in the position to exchange meaningful data. Today, many IoT devices come with sophisticated MEMS sensors (Micro Electro Mechanical Systems), which are capable of collecting input signals (vibration, sound, direction, impact, acceleration, etc.) and converting these inputs into data. Furthermore, because the processing power has increased so much and the size of these devices is almost infinitesimally small (for all practical purposes), every device is effectively a field server that can run sophisticated algorithms and convert data into information.

Once these IoT devices, that act as field servers, have collected and processed data, and if the information is relevant, they easily connect with the cloud, through a common IT infrastructure. In other words, IoT devices are uniquely identified through the embedded computing system and they use the existing Internet technology to communicate with apps on either the cloud or dedicated app stations. This is a major shift if philosophy.

IoT is a broad concept, but the industrial context is the application area that we are referring to. A particular area of interest for us is the so-called Intelligent Maintenance Systems (IMS). IMS is effectively a concept that deals with aggregation of data collection, storage, transformation, analysis and decision making for smart maintenance. As the concept embeds prognostic capabilities, IMS can be considered as the future best-class maintenance strategy.

The goal of IMS is to achieve and sustain near-zero breakdown. This turns the current fail and fix practices into a predict and prevent strategies. The pillars of such a predict and prevent strategy (as per Wikipedia) are:

- Self-assessment – new generation of IoT devices have embedded intelligent agents for non-stop monitoring (MEMS sensors)
- Only Handle Information Once (OHIO) – refers to flow of information from the field and avoids brokering of information via bridges (such as DCS system, for example)
- All-time Readiness – the information (not data!) has predictive, optimizing and planning maintenance scheduling capabilities to achieve near-zero breakdown

To meet the above conditions, we are convinced that DCS is not a natural environment for fostering the desired strategy. The devices must be free of the process control environment, and directly integrated into business systems.

To re-draw the above picture and use one of the new generation devices, CBM Predictor from Ideation AS, the picture below in Fig. 2 demonstrates this new solution.

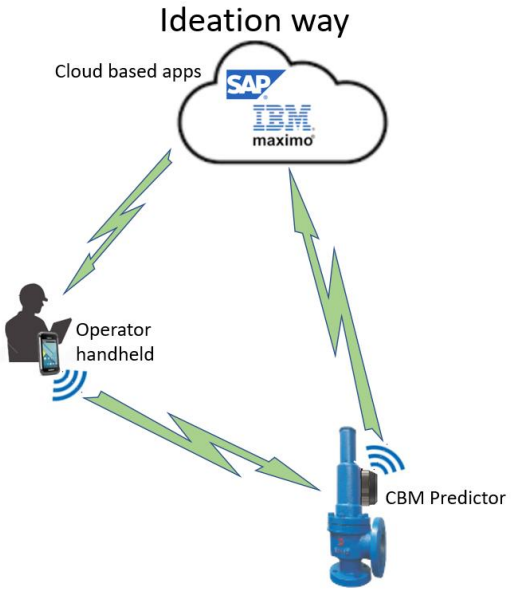

Fig. 2: Integration of a CBM Predictor on a safety valve into the corporate network

The difference from the previous picture is obvious. No more volumes of data and no more tortuous paths for every piece of information to reach the state of action. What we have now is a presentation of actionable information to the people that are actually in need of it. Needless to say, CBM Predictor offers some other advantages, but we will tackle them in a separate white paper.

As we can see from the picture above, the communication is wireless, directly into the business system. The communication does not transmit data, it transmits only actionable information, when needed. This communication triggers instant work order, clearly indicating what has happened, where and when. The operator can go directly to the faulty device to validate the information. No more lengthy walkdowns that often turn into detective investigations.

The device that we are referring to as CBM Predictor has been designed with the above points in mind. It is simple, easy to install, it requires no knowledge of the embedded algorithms, it communicates with your cloud via the Bluetooth and/or WIFI network, and it reports only actionable information when appropriate. It is designed to monitor Process Safety Valves (PSV) and notify customers of the popping action and potential leaks as a consequence of a failure to re-seat.

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