



What is Wrong with a World-Class Maintenance Strategy for Process Industries?

Today, there are three most often used maintenance strategies:

- Run-to-failure
- Preventive (scheduled) maintenance
- Predictive maintenance
- Reliability centered maintenance

But wait, our list contains four bullets! Well, the first bullet does not represent a strategy. It represents a failure to (or a conscious decision not to) adopt a strategy. The remaining three bullets are legitimate strategies, and although different, they have one thing in common: they all work only partially.

Preventive maintenance requires some serious scheduling, supply-chain coordination, outsourcing lot of services and is generally quite expensive. It is not just expensive to execute, it has expensive consequences if not a correct piece of equipment has been overhauled during one of the scheduled shutdowns (not everything can be overhauled every time).

Predictive maintenance is a condition-based maintenance strategy, and although probably the best strategy today, it is also far from perfect. It requires a lot of data acquisition, implementation of very sophisticated analytics, etc. Although complex, it offers significant cost savings over preventive maintenance strategy, so it is a significantly better option than the previous approach.

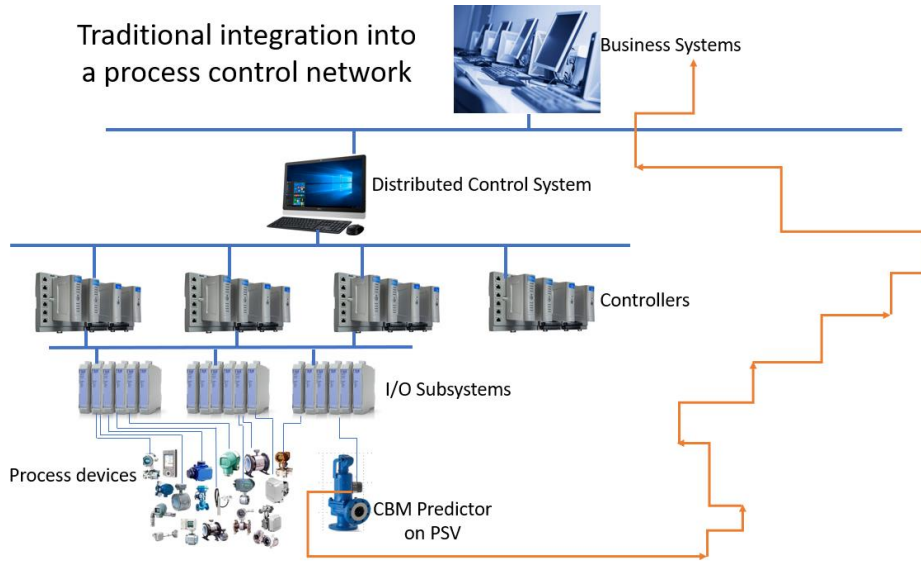
Reliability-centered maintenance is based around the notion that equipment failure probability is not linear, but it is also relying on intense analytical capability. It is considered the most complex and the most sophisticated, almost to the point where it is not practical. This leaves us with the previous two strategies as the only two reasonable options today.

So, the two most dominant today's strategies are the preventive and the predictive strategy. Between the two, the predictive one is far more superior, although it still falls short of the world-class maintenance strategy standards. The results somehow never meet the desired objectives. The costs are still too high, the reliability of the equipment is not satisfactory and unplanned shutdowns still happen too often. Why?

The simple answer is: because even the predictive maintenance strategy, or the condition-based maintenance strategy as it is often called, has lots of "holes" in the implementation process. In other words, this strategy has a capacity to be the world class maintenance strategy but requires further improvements. Let's focus on one of the key features that seems to be a common denominator throughout the process industries. If we can deal with this particular shortcoming, we might be a step closer towards a world-class maintenance strategy.

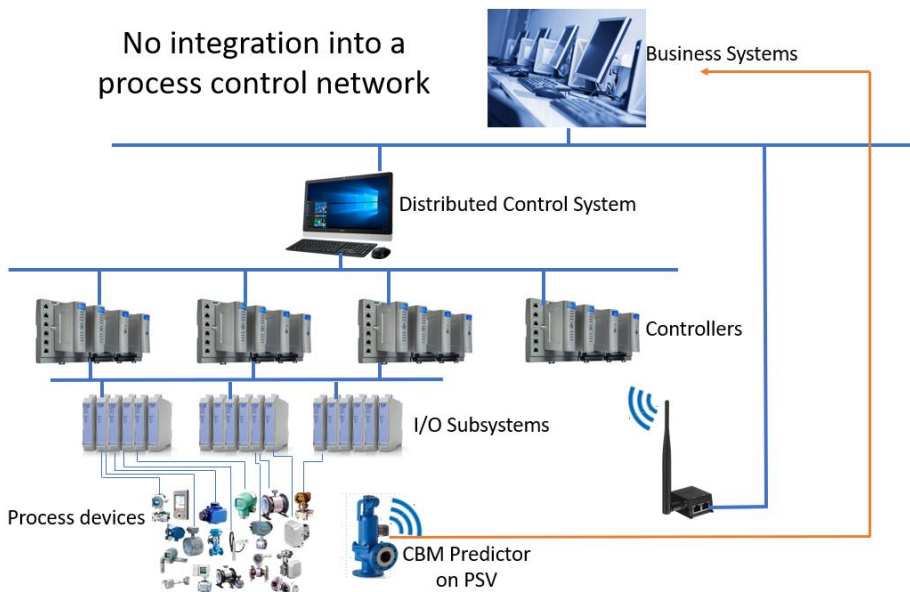
Over the last twenty years the process industries have crammed more and more functionality inside the process network. The net result is that the amount of information is vast, it is complex, and it is difficult to access and share the way we share common IT resources. A great deal of diagnostic and

maintenance-relevant pieces of data are stranded in various Distributed Control System (DCS) and SCADA systems. This is wrong!



A traditional, tortuous, way of integrating process devices into a network

Maintenance should be taken out of process network. It should be separated from these DCS and SCADA systems. It should be given directly to operators and maintenance staff, but in the simplest possible way. It should utilize the common IT infrastructure (rather than process networks) and be integrated directly into business systems to process work orders. It should be simple, on a “need to know” basis and executed only when the conditions require action.



“Exile” the maintenance-relevant devices and information from a process network

So, what are we saying? Essentially, that both the preventive and predictive maintenance strategies are acceptable, although the predictive maintenance strategy is significantly better aligned with the world-class approach. However, in both cases, and in particular with the predictive maintenance strategy, we are saying that they should be “set-free” from process networks and allowed to operate on common IT networks. The rest of the devices that are process-relevant, stay inside their respective proprietary networks.

We’ll take a look at what people in general consider a world-class maintenance approach, regardless of what specific strategy they are using. Some web articles summarize well various industry opinions (<http://www.danielpenn.com/how-do-you-define-world-class-maintenance/>) on what criteria define a world class maintenance:

- Maintenance Schedule Compliance > 90%
- Maintenance Overtime < 5%
- Maintenance Direct Work >75%
- Planned Maintenance Work > 90%
- PM schedule compliance is 100%.
- Percent of work covered by a work order =100%
- Work order actual hours / work order hours planned = 90 – 110%
- Equipment Availability =90%+
- Equipment Productivity =95%+
- Overall equipment effectiveness =77%+

Interestingly enough, the list above is really a list of key-performance indicators. This is fine, but it does not tell you how to execute your maintenance strategy to reach these world-class numbers. Effectively, we are back to our hypothesis that predictive maintenance combined with the removal of the “shackles” that process networks bring, is probably the best approach and can be called a world-class maintenance strategy.

If we do agree with this statement, what should we do to get there? First of all, we need products (devices) that are **not** integrated into process networks. A variety of transmitters will just not do. They are designed to be easily integrated into a process network, which are most of the time proprietary solutions. We do not think that this is right. The product should be designed to operate completely free of process network and should be, in fact, “exiled” from the process network. The natural environment for such a product should be a common IT infrastructure, and not a process network.

The second point is that, unlike transmitters that continuously flood operators with data, this new product that supports a world-class maintenance strategy should stay silent until it has something to say. Reporting by exception, and reporting actionable information rather than data, should be the mantra of a world-class maintenance strategy.

The third point is that if this device needs to be integrated with anything, it should be integrated with business systems via the common IT infrastructure. It should be able to raise work orders through business systems to initiate quick and effective validation of the problem, by pinpointing where the actual problem is.

The last point should be related to simplicity, which is where the previous three points were leading us to. Any complex device, in particular if it is a part of complex networks (such as process network), cannot be trusted to provide the most effective way of delivering a world-class maintenance strategy. To be accepted, trusted and used properly, this product(s) have to be simple (fit-and-forget type) devices. Only then maintenance becomes intuitive, less expensive and capable to maximize plant availability.

The device developed by Ideation AS, called 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 the cloud via the Bluetooth 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 the potential subsequent leak, in case of failure to reseal. It is a pure bred Abnormal Situation Detection device that fits naturally into the condition-based maintenance strategy.



Ideation AS