

THOUGHT PIECE

i20TM
Intelligent water networks

Condition Based Maintenance



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Continuous Condition Monitoring is soon going to be the mainstay of everyone's approach to maintenance.

MONITORING ASSETS

In the beginning, there weren't many options when it came to scheduling maintenance of assets. You had to wait until they broke or you maintained them based on elapsed time or run-time. The time interval was intended to be shorter than the mean time to failure.

Risk assessment came to play a part: an asset that would affect a large number of customers would be prioritised and the elapsed time intervals between maintenance shortened.

It was still a very hit and miss approach.

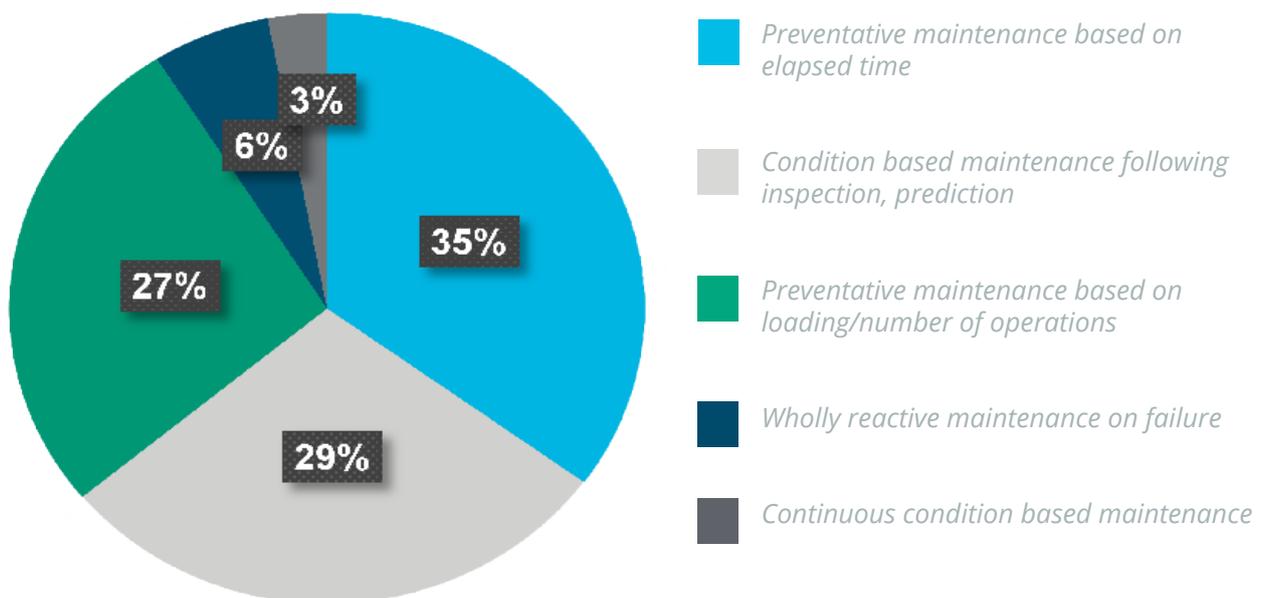
As time has gone by, inspection equipment has allowed condition to be assessed and predictions made based on those results. There are still huge inefficiencies in this approach: assets need to be visited and inspected, models run, and results analysed in order to determine maintenance requirements.

Key advances in technology have created the opportunity for a major development in condition based maintenance:

- Cheap sensors
- Low powered electronics
- Pervasive mobile communications
- Low cost data storage
- Low cost data processing
- Data analytics

Continuous Condition Monitoring works by having 1) permanently deployed sensors communicating data, 2) software storing and analysing that data to infer condition, and 3) software recommending maintenance.

6 years ago, a survey of utilities by ABB¹ showed that Continuous Condition Monitoring was gaining a toehold:



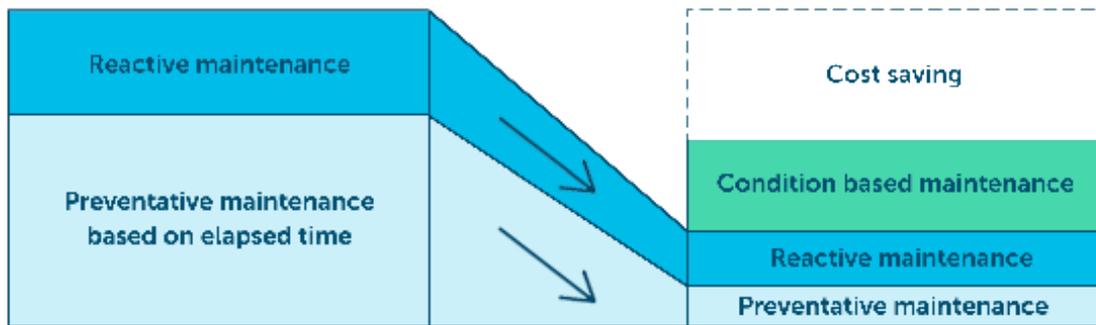
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CONDITION BASED MAINTENANCE



CONTINUOUS CONDITION MONITORING

Maintenance based on Continuous Condition Monitoring has a number of benefits. It reduces the cost of maintenance, and delivers a host of other benefits.

- Reduces the chances of collateral damage to the system
- Reduces risk of escalation to catastrophic failure
- Extends asset life

Many of these directly affect losses/leakage, customer service (outages and service quality) and customer satisfaction.

There aren't many downsides. Of course there is a cost to deploying the condition monitoring equipment, and to the service which identifies maintenance required. But this is significantly outweighed by the benefits. Continuous Condition Monitoring does create unpredictable maintenance periods and it is more difficult to manage these efficiently. Ironically, it's more difficult to schedule fewer people doing less maintenance than many people doing lots of maintenance!

Continuous Condition Monitoring is now well established in other industries. Take aircraft engines for example. Once upon a time Rolls Royce sold engines; then it leased them; now it offers them as a service. This is underpinned by a product called Engine Health Management (EHM)². EHM uses

sensors on the aircraft and live satellite feeds to track the health of thousands of engines operating worldwide.



EHM predicts when something might go wrong and seeks to avert a potential issue before it has a chance to develop into a real problem. EHM has significantly reduced costs by preventing or delaying maintenance, as well as flagging potentially costly technical problems. The data also gives insight into individual components which allows engineers to create more thorough and cost-effective maintenance schedules, and designers to make engines ever more reliable.

i2O has developed Continuous Condition Monitoring for PRVs. Its iNet advanced module - PRV condition monitoring - uses an i2O logger to take 3 pressure readings from the PRV (upstream, downstream and control space pressure), analyses the data to infer condition, and flags it for maintenance when it's required. It's already deployed on around 300 PRVs worldwide and the number is growing rapidly.

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