

WHITE PAPER

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How Remote Monitoring of existing CP Systems can improve safety, offer better protection and reduce operating costs

How available new technologies can dramatically improve your ability to manage corrosion in existing assets while lowering operating costs.

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Abstract

Impressed Current Cathodic Protection systems are a common technology used to prevent corrosion in steel and reinforced concrete structures.

These systems are designed to operate for decades, in line with the expected life of the asset.

But keeping the assurance that your valuable assets are indeed protected from corrosion over the long term is an expensive exercise.

This paper explores the benefits and savings that can be achieved with modern remote monitoring technologies.

The Challenge

If we are to rely upon Impressed Current Cathodic Protection systems to prevent corrosion of valuable infrastructure over the long term, it is vital that we have assurance that this protection is being achieved.

The adjustments, measurements and checks required to keep these systems operating to protect the structures from corrosion requires the use of specialist corrosion experts.

In the absence of any means to remotely monitor these systems, the conventional method is to send a corrosion expert out to visit each and every one of these assets at least twice a year.

Due to the complex nature of the testing required to assure compliance to the corrosion standards, the corrosion expert must often spend days on site performing the necessary tests.

The moment the expert leaves site, you are completely blind to any incidents such as mechanical damage, lightning strike or system failure that may render the cathodic protection inoperable, and the first time that you find out that the system is not working would be at the next scheduled inspection.

And without knowing what to expect when he/she gets to site, the corrosion expert will not be equipped to deal with the abnormal situation, which then requires a second visit to address the issue.

Often these assets are in remote locations, where travel time and cost is a significant portion of the corrosion expert's fees.

And if these assets are in dangerous locations, such as within operating mine precincts or under wharves, there is the requirement for safety induction training, and the need to have more than one person in attendance at any time for safety reasons.

All these factors add up to a significant ongoing cost of assuring compliance of the Cathodic Protection System.

The Opportunity

If we could effectively remotely monitor and control these systems, we would gain some immediate advantages:

- We could reduce the number of visits to the site, which saves costs, and reduces the potential of safety related incidents.
- Time on site could be reduced because long duration tests could be initiated or conducted remotely, limiting the

actions required on site to the essential activities such as visual inspections.

- We would get immediate notification of exceptions or failures, which would improve protection over the long term.

This is not a new idea. CP system vendors have for years tried to introduce solutions for remote monitoring and control of CP systems, but mostly with limited success due the constraints of the available technology.

Traditional Methods

SCADA

Traditional methods of remote monitoring and control using SCADA (Supervisory Control and Data Acquisition) systems are well entrenched in industrial sectors such as the mining and petrochemical industries, and in the utilities sectors such as the water industry.

However monitoring and controlling these CP systems presents some specialised challenges:

- These systems are often remotely located making traditional SCADA communications methods costly.
- The corrosion expert capable of interpreting data and results is almost always not in the same location as the SCADA computer.
- Using traditional industrial instrumentation to measure and control these systems is also costly.
- The life-cycle of these systems is completely different to process plant. While process plants are designed for a typical 7 years life span, CP systems are designed for 25 years and above. This presents challenges, for example, in the obsolescence of dedicated computer equipment, and the security of data over the long time frame.
- These CP systems are not being actively monitored 24/7 like a process plant, and can go months between any activity on the system. The corrosion expert would only interact with the system on a scheduled remote inspection, or on being notified by the system of some abnormal event.
- SCADA systems are very capital intensive, with up front engineering, computer hardware and software licences.

Some CP systems have been connected to conventional SCADA software – generally when the SCADA system is already installed.

Experience has shown that this rarely achieves the benefits expected for the following reasons:

- The personnel monitoring the SCADA system have other duties and responsibilities, and are not trained to operate or monitor the CP system.
- Alarms from the CP system are sent in real time to the SCADA software, but the people required to respond to these alarms and interact with the CP system are generally not on site.
- Based upon experience, the operational cost of SCADA systems is extremely capital intensive and requires significant in-house engineering expertise to specify, procure, manage and maintain.
- The cost of a fully functional remote monitoring and control CP capability custom designed for a SCADA system is prohibitively expensive, and so functionality on these systems is limited to the basics such as power monitoring.

Dial up

In order to get around these limitations, some cathodic protection vendors have employed conventional telephone technology to allow the corrosion expert to dial up the cathodic system from a remote computer.

Experience has shown that these systems inevitably soon fall into disuse for the following reasons:

- The remote computer and its operating system become obsolete within a few of years, adding to the costs of ongoing system maintenance.
- The remote computer is used so seldom that it is not practical to keep a computer dedicated to the role, and this computer often gets used for other tasks, which reduces the reliability of the system and the software, and often renders it inoperable when required.
- These dial up computer systems are not able to report by exception, and so the issue of remote monitoring of the system has still not been addressed.

- Downloading of large amounts of historical data over a dial-up link is very slow, tedious and prone to link failure.

The New Technologies

There is a wave of new technologies available today that have dramatically changed the way we think and act in remote asset management.

The key components of this new technology infrastructure are the internet combined with the mobile phone infrastructure. Both have now been proven in use for over twenty years, and continue to get faster and more reliable, and more ubiquitous as time passes.

This infrastructure is reaching critical mass. The first wave of users for this technology has been human. The second wave of users, predicted to be bigger than the first, will be machines.

Examples of industries that are already benefitting from this technology are vehicle tracking, and vendor managed inventory (e.g. remote tank level monitoring).

These technologies are providing a platform for the completely re-engineering of many business models in many other industries.

Analysis of the features of the new infrastructure has shown that it is very well suited to the remote monitoring and control of Cathodic Protection Systems:

The World Wide Web

It is surprising to many, but the facts are that the technology of the internet is one of the most stable and enduring communications infrastructures available today. And it is not new. The internet was invented in the 1970's, and the world wide web was invented by Tim Berners-Lee at CERN in Switzerland in 1989. That first web page is still available on the internet today (at <http://info.cern.ch>) and what is more remarkable, is that this web page is still viewable from your most modern tablet computer.

No communications technology has stood the test of time like this, and due to the massive investment in the internet, is mostly likely to be the only communications technology to continue to be available well into the future.

This makes the world wide web an ideal platform on which to build systems for the long term.

Wireless Data

The mobile phone network was built around person to person communications, but all the development today is centred around data. Making is faster, cheaper with better coverage.

And when the mobile phone networks run out of coverage, there are satellite systems making data accessible in every corner of the globe.

CP Monitoring and Control

The New Paradigm

It turns out at these technologies are ideally suited for implementing Remote Monitoring and Control of CP Systems.

Some of the important features for this application are:

- The stable world-wide-web provides a reliable infrastructure on which to commit data systems for the long term. No more dedicated communications equipment to maintain and go obsolete.
- The availability of cloud based storage for data means that you can keep long term records on the performance of your assets safe, while your in-house computers systems get upgraded, enhanced and made obsolete.
- The convenience of the web browser makes accessing these systems easy from any location, and on any internet enabled device. No more bespoke computer hardware or software required.
- The availability of the public wireless infrastructure makes connecting to your remote assets very cost effective, wherever they may be located.
- The corrosion expert can log into his browser and validate the performance of your Cathodic Protection System without leaving his office.
- Any alarms generated by the CP system, such as power failures and anode deterioration can be reported when they occur by text message or email direct to the person responsible.
- Time on site can be kept to a minimum, both in terms of frequency and duration.

Web based remote monitoring services such as the Data2Desktop service from Omniflex make remote monitoring of CP system a viable alternative to traditional means, and can reduce operating costs and improve surety of compliance.

Enterprise Wide CP Monitoring

The Data2Desktop remote Monitoring Service has specially developed web pages for CP remote monitoring and control that makes the system for multiple asset monitoring easy to manage and very scalable.

Multiple sites can be accessed through the single web portal, making enterprise wide remote monitoring and control of CP assets practical and cost effective.

Retrofitting existing Systems

The PowerView CP system has variants specifically designed for retrofitting onto

existing CP systems, making the addition of remote monitoring and control to your existing CP assets viable.

Taking Advantage of the Connected World

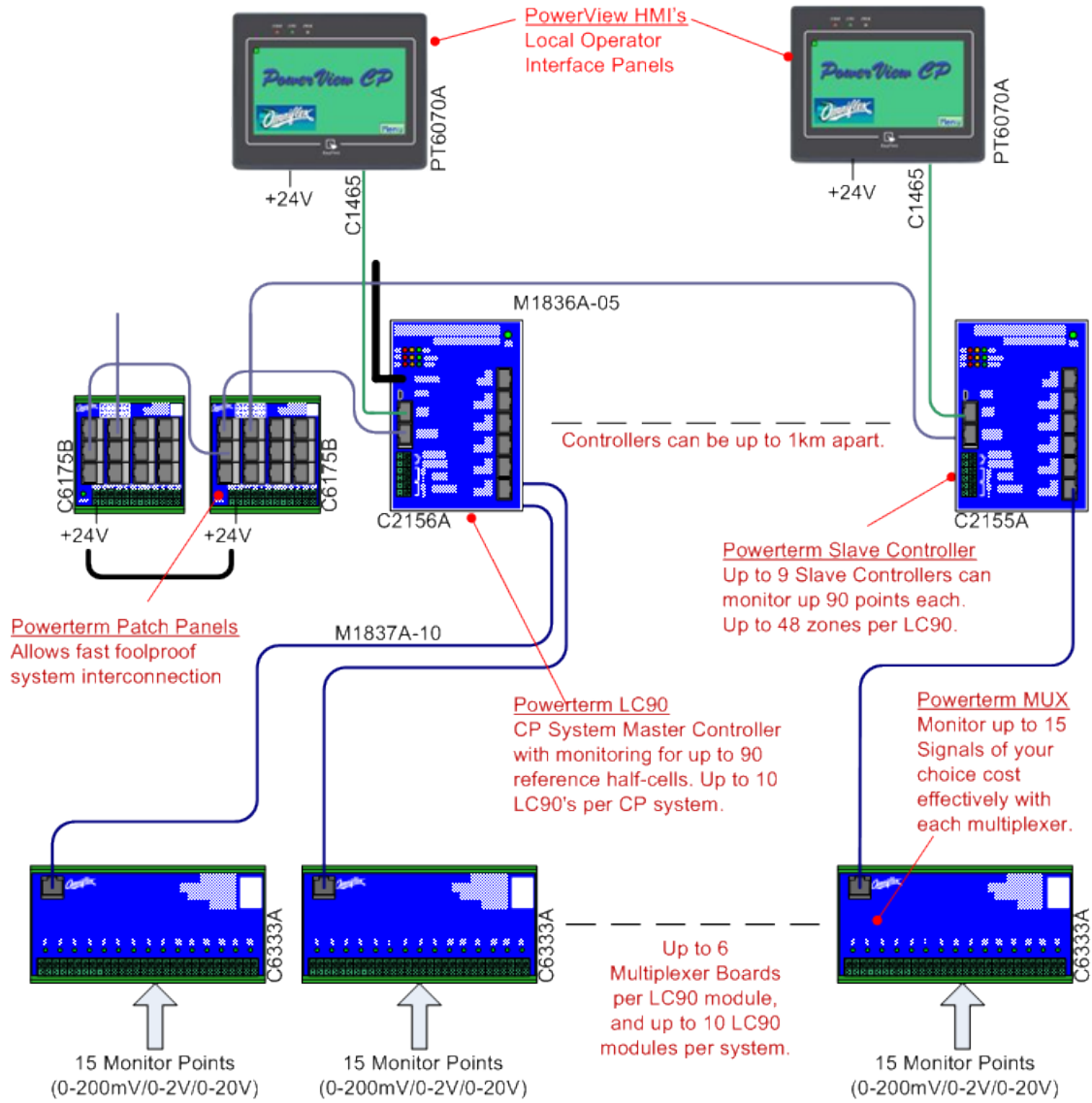
Fortunately we are living in a connected world. Communications is becoming ubiquitous. Power is a bigger challenge today than communications in many of these applications.

Because of the economies of scale, it is impossible for any organisation to replicate the communications infrastructure available through the publicly accessible networks.

The ongoing investment in these networks for data communications cannot be matched by private networks.

CP Remote Monitoring is an ideal target application for integrating into the new communications world.

Typical Remote Monitoring additions to an existing CP System



Conclusion

Remote Monitoring using the world wide web and wireless data public infrastructure is transforming business models in many industries.

These technologies are available today for remotely monitoring and controlling Impressed Current CP systems to reduce operating costs, and improve assurance of protection.

Systems such as the PowerView CP system combined with the Data2Desktop Remote Monitoring Service, specifically tailored for remote CP monitoring and control, offer appealing savings in operating costs that have a surprisingly short payback.

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