

Managing corrosion on the internet

Corrosion has, to a greater or lesser degree, affected the majority of civil engineering and building structures, creating a mammoth task for asset managers everywhere.

Steve Davis, Paul Filkin and Graeme Jones, C-Probe Technologies Limited, discuss the role technology is playing to address these issues and how the internet in particular is proving to be an essential management tool for expansive infrastructure rehabilitation programmes.

Corrosion has for decades cost Britain (and almost certainly other countries) more than 4% of its GDP.

Whilst investment has not been insignificant, we have probably only touched the surface of the problems caused by such a prevalent phenomenon. In addition, we rarely embrace direct corrosion protection methods for new construction, apparently learning no lessons from the past.

In 1998, Sir John Egan reported to the Department of the Environment, Transport and the Regions (DETR) recommending radical change to "rethink construction". In this report, he states that IT will play a significant role in achieving change, but in parallel, long term relationships and supplier partnerships should be encouraged in order to make a difference in terms of quality and efficiency.

This principle has been adopted by several of C-Probe's clients who have commissioned rehabilitation projects for highways, buildings, nuclear facilities and water facilities, to name a few, with the objective of managing the designed solution using automated functions through secure internet access.

Contractual relationships

This approach is, in itself, beginning to embrace the radical changes espoused by Egan, where the end goal has justified rethinking the contractual relationship between client, consultant, contractor and supplier.

In all cases, the client desired an end management system to justify his

investment, which in turn was innovated by the supplier and not the consultant or contractor. He therefore needed to nurture a client-supplier partnership.

Normal routes for contracting such a system within the rehabilitation project and the associated corrosion monitoring, protection and usually concrete repairs, would be to tender the complete package competitively. However, this is fraught with difficulties given the pressures:



Highway bridge undergoing extensive repair due to corrosion.

- On the consultant to specify technology which is new and innovative.
- On the contractor to be competitive which can lead to lesser technology being offered in spite of even the most detailed specification.
- On the client to take the lowest financial offer.

This has been viewed as the best way to keep the cost down whilst being fair to market participants. A high quality of job and avoidance of dispute have often been sacrificed for the principle of competitive tendering. However, it is arguable that the most important thing that is sacrificed is the innovation itself.

When new technology or new uses of existing technology arrive, they are often swamped by this tendering process due to:

- Lack of understanding of the advantages.
- Limited time to consider attributes during a tender or approval process.
- Lack of training of the parties considering its use.

Partnership between the client and the supplier of the innovation, however, overcomes these problems. This often results in team discussions between all participating parties, during which pre-tender 'wrinkles' can be ironed out. More often than not, this approach engenders a more contented working environment and less claims-conscious participants.

Technology

With C-Probe systems, this has led to holistic infrastructure management systems for clients which are accessed by secure internet facilities. This allows the client or his representative (usually a consulting engineer) to account for the future performance and workability of the system investment using online automated reporting features derived from a specialist database.

It is also a predictive tool for the identification of problems early in the process so achieving a more cost effective solution.

These are accessed from a 'Virtual Private Network' of the clients' structures on the Achilles interactive Management System (AiMS), which hosts web-ready CAD functions. This allows the user to investigate the entire structure, a structural element or to zoom in on a problematic area represented by a single monitoring point.

The 'Bricks' that allow these 'Clicks' to function are key to the present day system but, more crucially, to the future maintenance requirements. To achieve this, C-Probe has developed a range of neural electronic packaged solutions (the Achilles Suite of Systems), which can be interconnected on a simple network in almost limitless configurations.

It is possible with a bridge structure, for example, to cathodically protect one element, add surface-applied corrosion inhibitors to another element, some early detection corrosion monitoring, and an impact system for collision damage and post-tensioning structural sensing all interoperable on a single network and managed simultaneously from a single remote location on the internet.

The important feature here is that the client is in control of both engineering intent as well as the budget to build up the management system for the structure in question and at the pace that the micro-economy allows.

Education

Moreover, with neural systems, they can 'learn' relative performance with time from similar structures. In the future, this will lend itself to a further reduction in the maintenance bill by predicting problems before they arise and cause structural damage with the usual escalating cost.

The internet also provides a platform for a global learning process for such systems in that a bridge in, say, Nottinghamshire can learn from one in Cumbria or even the USA or Europe and vice versa. The enhancements to the management abilities of the consulting engineer are not difficult to imagine under such circumstances. The learning process,



From county to country, the virtual private network on AiMS.

however, starts with the changing face of the construction and repair industry.

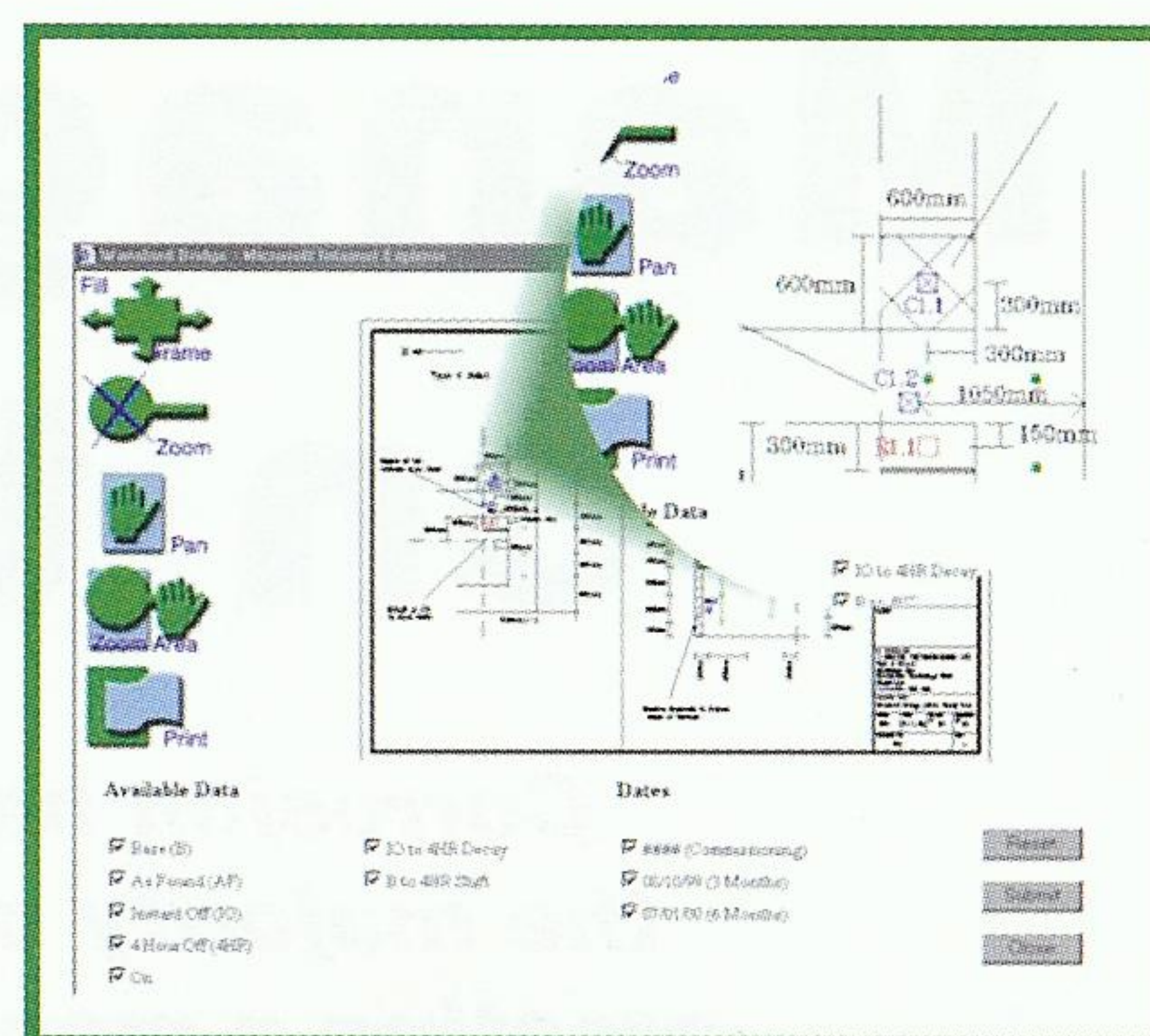
For too long the processes by which corrosion can be tackled have been seen as unimportant to the civil or building engineer or considered entirely the domain of the corrosion specialist. However, this educational process is changing even these diametric perceptions.

"C-Probe has developed a range of neural electronic packaged solutions (the Achilles Suite of Systems) which can be interconnected on a simple network in almost limitless configurations."

AiMS is backed up by a raft of supporting information services. These take the form of Systems Bulletins geared towards specific solutions, datasheets, links to supporting products, case histories showing solutions in practice and discussion forums to encourage dialogue between users with the hope of further improving design and education.

In the near future, we see the use of wireless technology (WAP) playing a significant part in the way engineers decide the use of technology on-site and improving the performance of projects by having information at his or her fingertips. It is intended that the educational information services and discussion forums will be accessible from WAP mobile phones. These will be utilised more and more to train the consultant and client-user in the attributes of existing and new systems.

Even the contractor can utilise the systems to ensure product or health and safety information is at



Zooming in from whole structure to local monitoring point using interactive CAD.

hand to satisfy the needs of a contract. Once again the opportunity for a claims-cultured environment to develop is stifled by virtue of the internet providing global information and previous experience at the click of a mouse without the dependency on the supplier to provide it in a limited time period. A situation that will almost certainly suit all right-minded participants in the process to keep structures healthy for longer than previously imagined.

Conclusion

The ability to operate a smoothly run contract can undoubtedly be enhanced by the use of the internet. Those participants who are reluctant to accept the inevitable culture change that is occurring through technological innovation may find themselves excluded from the benefits that follow. This was eloquently stated in Sir John Egan's report 'Rethinking Construction' in 1998. In parallel, C-Probe has made significant advances in embracing neural and internet-ready technology to achieve efficient and quality driven solutions to corrosion and structural problems.

These advances are continuing apace and on a global basis, and it is hoped that the requirements of many clients in the near and distant future will be satisfied. With these steps, we need the contractor to see that more business is necessarily developed because of the technology and they have nothing to fear from the client-supplier partnership. Similarly, and probably more importantly, the consulting engineer is in the process of a sea-change in the method of management on behalf of a very wide ranging structural asset management client base.

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