



INSTITUTE OF
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**VECTOR
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TECHNOLOGIES**

Welcome to the ICorr –
Institute of Corrosion
2021 March Webinar.



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CORROSION**



**VECTOR
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Institute of Corrosion partnering
with:

- **Dr George Sergi - Vector Corrosion**





“Galvanic Corrosion / CP Control of Reinforced Concrete; Lessons learnt from 20 years of Site Trials”

Dr George Sergi, Technical Director Vector Corrosion

About Me

- **Dr George Sergi** is Technical Director at Vector Corrosion Technologies heading the Research and Development Department which develops products for durability of concrete and steel reinforcement protection and offers corrosion mitigation techniques for the Civil Engineering and Construction Industries. He is author of several international patents and has developed noble products for corrosion protection of steel reinforcement.
- Dr Sergi holds a PhD in Corrosion of Steel in Concrete and was formerly Technical Director and Head of Corrosion at the Building Research Establishment, UK and Technical Director at Aston Material Services Ltd. He had originally spent 20 years researching the fundamentals of concrete durability and corrosion as applied to steel reinforced concrete at Aston University.
- He is Editor of the Construction and Building Materials Journal. He is a member of Cathodic Protection Committee GEL/603 assisting in the editing and publication of BSI and EN Standards.



About Vector

- **Vector Corrosion Technologies** is a leading full-service supplier of corrosion mitigation products and services for reinforced concrete and masonry structures including bridges, parking garages, buildings, marine structures and industrial facilities.
- Vector currently has offices in Canada, the UK and the United States through which it services its clients worldwide.





Q&A

- Selection of Questions to Dr George Sergi - Vector Corrosion
Post-Presentation 30/03/2021

Questions and Answers –ICorr Technical Event Aberdeen – Mar.2021

- Q1. Would the location of the Site to carry out the trial have influences on the results? Apparently, Leicester is fairly inland, and the environment there is mild compared with the coastal places.
- A1. Expansion Joint over X-Beam leaked onto Beam below corroding and chloride build up exceeded 2% locally. Yes location certainly an influence, as will be the frequency of de-icing treatments by different local councils around the UK and temperature and moisture. Must suit CP to specific Chloride situation. A Scottish site coastal project is ongoing. Take up is slow, initially Engineers suspicious.

Questions and Answers – ICorr Technical Event Aberdeen – Mar. 2021

- Q2. Can you please elaborate on the aging factor (does it represent the time to halve the anode current density)?
- A2. Yes, it is the time required for the current output to be halved. Best not to push Anodes to the limit and to use lower outputs for a lower aging factor and longest life.

Questions and Answers – ICorr Technical Event Aberdeen – Mar. 2021

- Q3. What criterion (and standard) was used to assess the performance of the CP system?
- A3. European standard of CP. ISO 12696' refer Polarization Standards. Once achieved passivation, Corrosion prevention mode should take over / be applied.

Questions and Answers –ICorr Technical Event Aberdeen – Mar. 2021

- Q4. Please can you list the initial visible indications of corrosion occurrence?
- A4. Cracking and staining in vicinity of reinforcement.

Questions and Answers – ICorr Technical Event Aberdeen – Mar. 2021

- Q5. What are the non-destructive methods to detect corrosion in concrete?
- A5. A grid / potential map is best used to plot an equipotential map from the data achieved with Cu/CuSo₄ ref. More – (ve) than 350mV corrosion very likely.

Questions and Answers – ICorr Technical Event Aberdeen – Mar. 2021

- Q6. You talked of a 'New minimum steel CD for steel in concrete' What value is this? You then proceeded to talk of cathodic prevention CD; is this 20mA/m²?
- A6. Applied at Stage 1, ICCP is at least 20mA/m² and preferably 30 mA/m². Need to constantly drive chloride ions away and re-alkalise the corrosion pits.

Questions and Answers – ICorr Technical Event Aberdeen – Mar. 2021

- Q7. In your impressed current use, showing effects of polarisation, before the graph showing CD from 0 to 1000mA/m², what steel CD did you use?
- A7. 50mA/m² initially. Essential to adopt a prevention mode
- For ongoing prevention 1-1.5mA/m² best.

Questions and Answers – ICorr Technical Event Aberdeen – Mar. 2021

- Q8. Could we use your data on this to inform minimum charge for chloride extraction?
- A8. Yes data is available to support this. The fact that chlorides can diffuse back to the steel without subsequent cathodic prevention should, however, be taken into account.

Questions and Answers –ICorr Technical Event Aberdeen – Mar. 2021

- Q9. Do you have data on Potential Decay over 24 hours or longer *the ISO 12696' criteria?
- A9. Not shown in presentation but can offer info. privately if contacted on George Sergi georges@vector-corrosion.com.
- Over Stage-1, depolarisation levels were 150-200 mV.

Questions and Answers –ICorr Technical Event Aberdeen – Mar. 2021

- Q10. I am wondering whether your Fusion Systems are being specified now for New Build Projects.
- A10. Yes they are, but not necessarily Fusion model; simple galvanic anode systems have been very popular in Australia for new construction as cathodic prevention. 6 jobs in UK. Sim. in US.

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- Q11. Why do you need the battery to carry out the initial passivation by ICCP? Would it not be cheaper to carry this out externally and make this good afterwards?
- A11. Batteries are convenient and robust and require no further intervention once installed. External Current sources are open to vandalism, overall would be a more expensive method as access will be required at a later date.

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- Q12. For your disc shaped Zn anodes -can you change the shape of your sacrificial anodes to a slender wired rod to increase the current output so that this may increase the initial current output. Would the shape of your Fusion anode benefit also from this?
- A12. Yes this is certainly being looked at but presently with Covid restrictions on Laboratory type work, this is difficult. Various modelling projects are ongoing that will utilise Data that has been collected over the last 20 yrs. A early finding suggests that shape of anode can affect the Aging Factor. The Aging factor is not affected if the increase in early current is because of a higher temperature as the other mechanisms, e.g. diffusion of corrosion products are equally speeded up. For every 10 Deg. Temp inc. doubles output. Anode spacings need to be adjusted for different climate conditions.

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- **Thanks everyone.**
- Please note that this ICorr recording will be available on our YouTube channel.
- <https://www.youtube.com/channel/UCNW-HoZVEMA79-4Y6k5E0ow>

THANK YOU FOR ATTENDING

This Webinar was brought to you by ICorr Aberdeen, working in partnership with
VECTOR CORROSION.

https://www.vector-corrosion.com/galvanic-anodes?gclid=EAIaIQobChMIgMGRzfXa7wIVk4ODBx2acQVuEAAYASAAEgJR8fD_BwE