

## How new technologies are helping to reduce installation and operating costs of CP in large structures

- Rethinking how ICCP is implemented

David Celine  
Managing Director  
Omniflex

A stylized graphic of an eye, composed of overlapping green and purple shapes, positioned behind the title bar.

## What we will talk about...

- Traditional Architectures
- What if we could...
- Switchmode Transformer/Rectifiers
- Distributed Control
- Add the benefits of the web
- Hybrid Anodes
- How this all reduces life cycle costs
- Some Case Studies

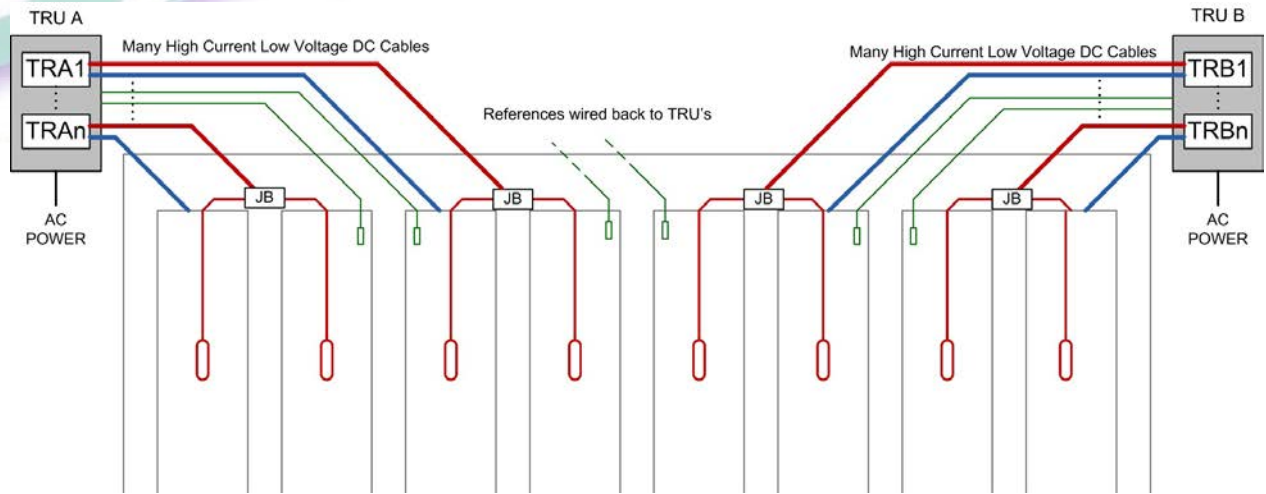
## Webb Dock East Berths 4 & 5



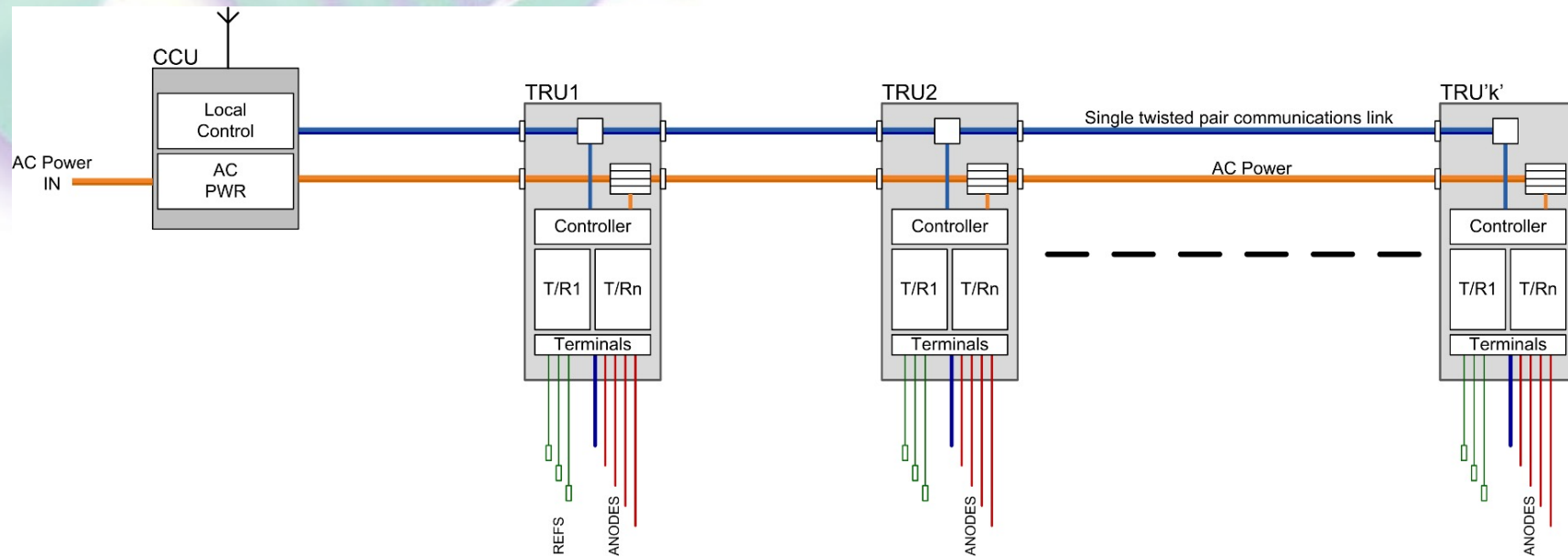
Port of Melbourne - Webb Dock Berths 4 and 5  
The largest container handling berths in Australasia



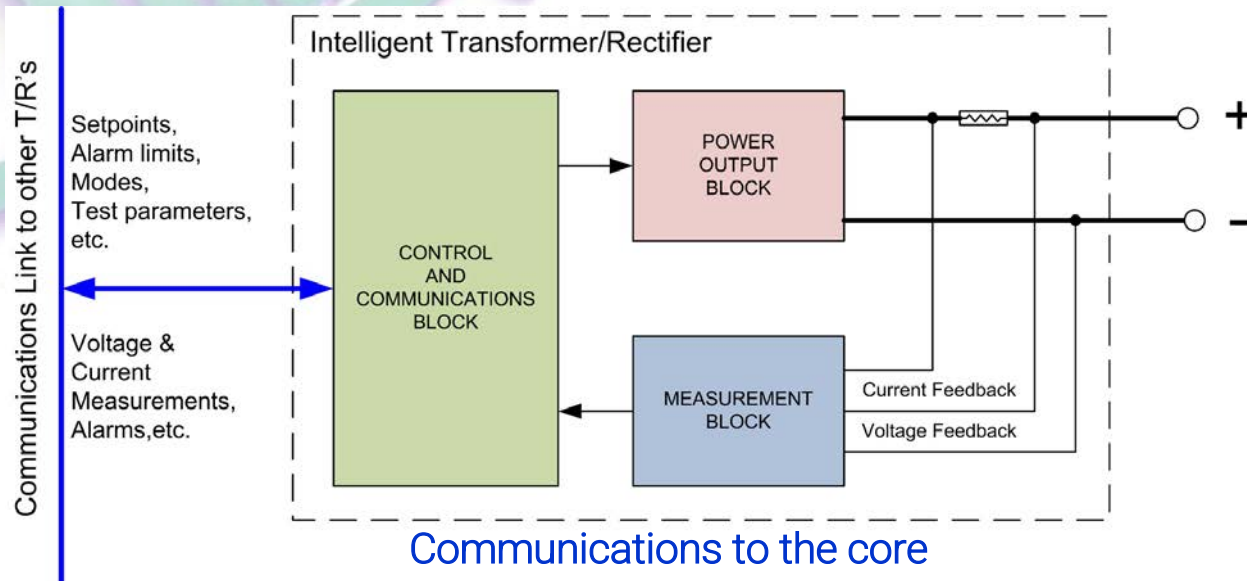
# Traditional Architectures



# Distributed Architecture



# The 'SMART' Transformer/Rectifier



# Switch Mode Power Supplies



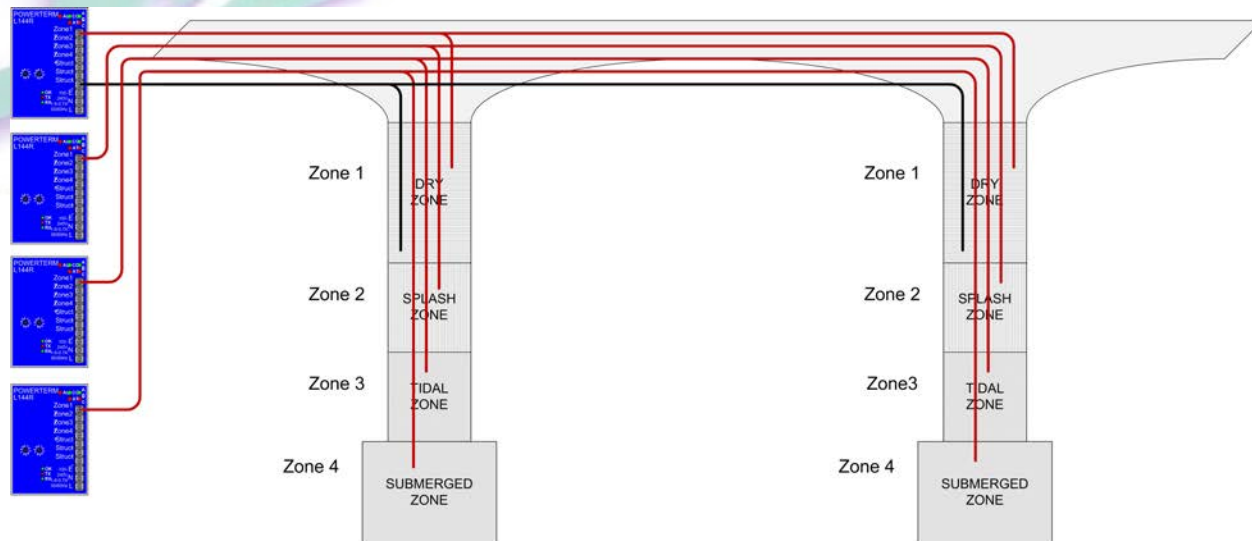
Phase Control TR

Switch mode TR

- Higher Efficiency
- Smaller Size
- Lighter weight
- Better Power Factor
- Optimum for smaller zones



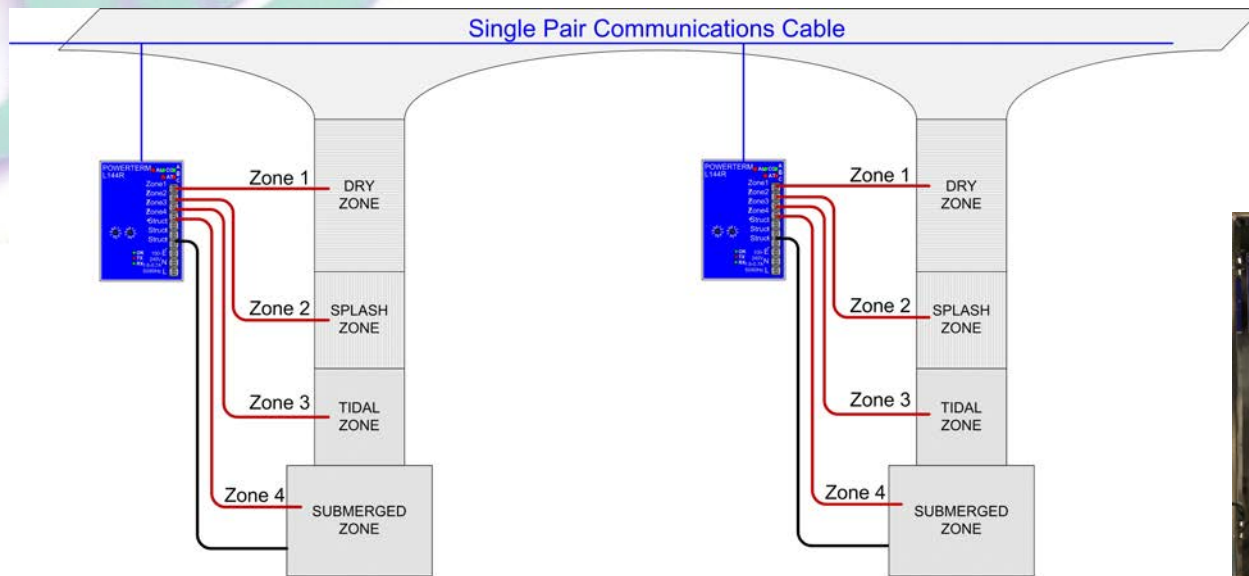
# Conventional Concrete CP Zoning



Four shared zones across piers with uncertain current splitting



# Less Cabling - Better control



Four Independently adjustable zones on each pier give better protection



## Remote Monitoring and Control

- The Objectives
  - Reduce Site Visits
  - Increase Surveillance
  - Improve Protection
  - All Data in one place
- The Challenges
  - Must last 15 years
  - Intermittent Use
  - Long Term Data Storage

# Why you can't use PC Software

## ■ History of MS Window

- 1990 Windows 3.0 released
- 1992 Windows 3.1 released
- 1995 Windows 95 released
- 1996 Windows CE released
- 1998 Windows 98 released
- 2000 Windows 2000 released
- 2001 Windows XP released
- 2006 Windows Vista released
- 2009 Windows 7 released
- 2012 Windows 8 released
- 2015 Windows 10 released

30 Years ago



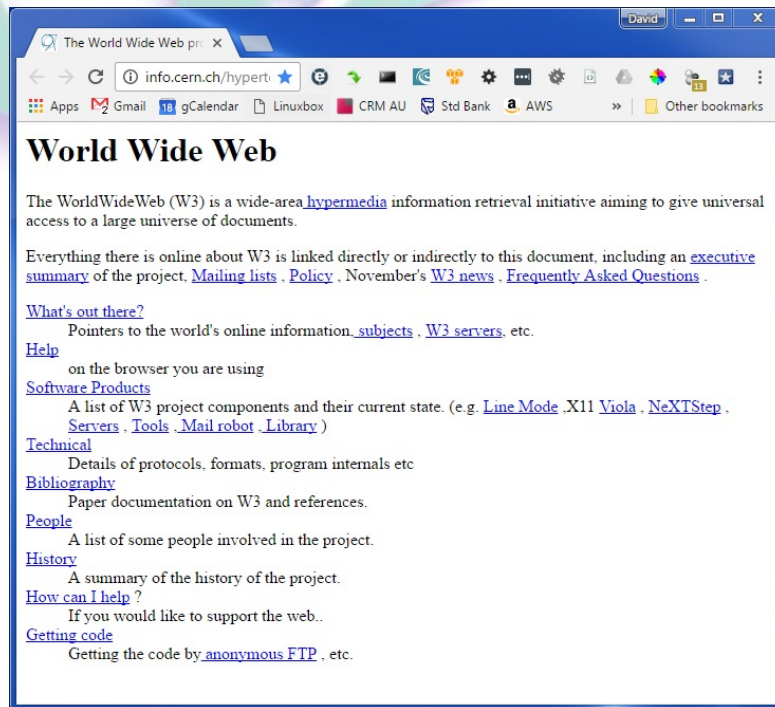
15 Years ago



# The world's first web page in 1991

Still viewable today from any device!

[info.cern.ch/hypertext/WWW/TheProject.html](http://info.cern.ch/hypertext/WWW/TheProject.html)



- Internet Standards fixed since 1991
  - 876 million websites live today
- Infrequent access from any device
  - No dedicated hardware/software
- Regular logging to Cloud Storage
  - More reliable and longer term
- Email or SMS Alerts
  - No need to remember to check

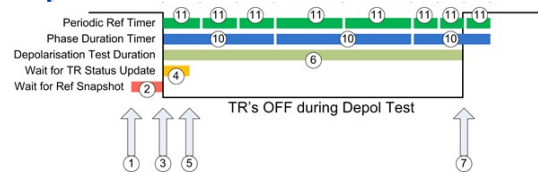
# Automated Testing

- Run any Test remotely from the website

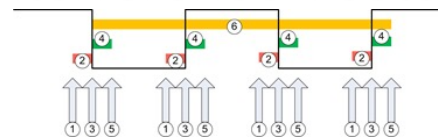
- Instant Off Tests



- Depolarisation Tests



- Interference Tests



## Status of All CP Tests

Refresh Last update at 2016-11-14 22:31:42

Description	Value
Periodic Reference Snapshot	Enabled
Reference Snapshot	Idle
Periodic Zone Snapshot	Enabled
Zone Snapshot	Idle
Periodic Instant Off Test	Enabled
Instant Off Test	Idle
Manual Instant Off Test	Idle
Depolarisation Test	Idle
Interference Test	Idle
Berth 4 Status	On
Berth 5 Status	On

# Lifecycle Costs

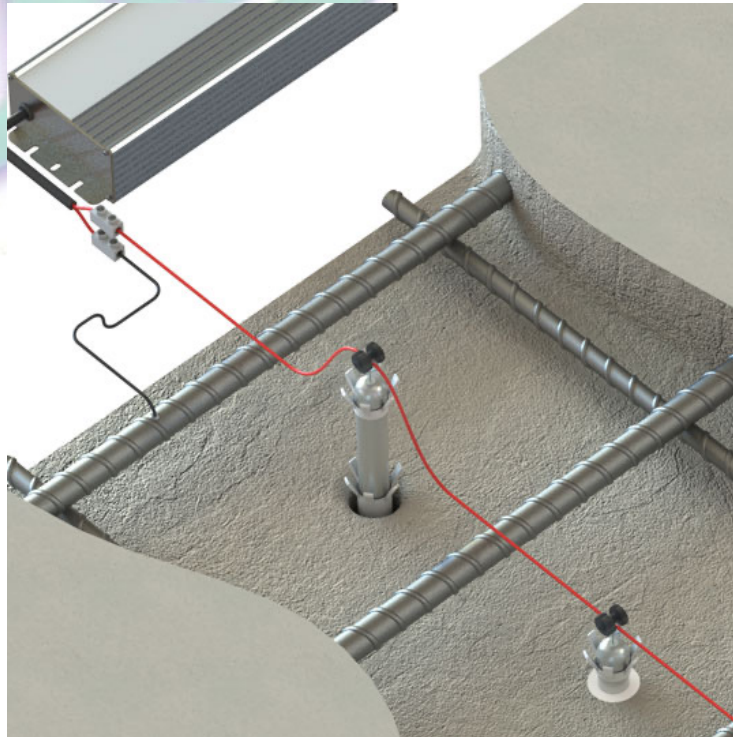
## ICCP Installation of 6 zones (2 x 0.5 days travelling per visit)

	Manual Testing	Remote Testing
Commissioning	3	2
After 1 month	2	0
After 3 months	2	0
After 6 months	2	0
After 12 months	3	2
After 18 months	2	0
After 24 months	3	2
After 30 months	2	0
After 36 months	3	2
TOTAL DAYS	22	8
Day Rate	\$900	\$900
On-Site Cost	\$19,800	\$7,200
SAVING IN 3 YEARS		\$12,600





## Hybrid Anodes

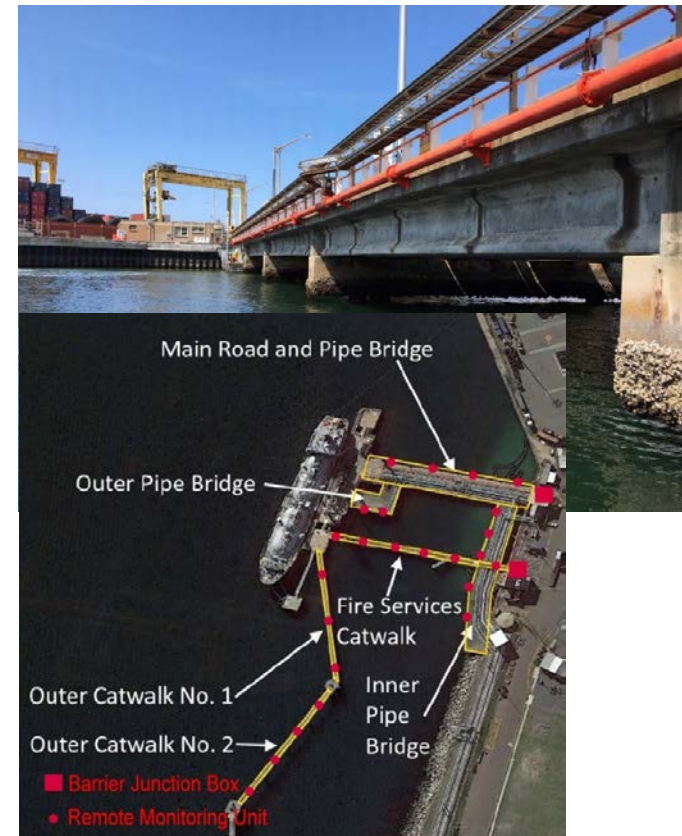


- Sacrificial anodes used as both impressed current and galvanic anode.
- Impressed current for 1-2 weeks
- Then galvanic for the life of the structure.
- No maintenance

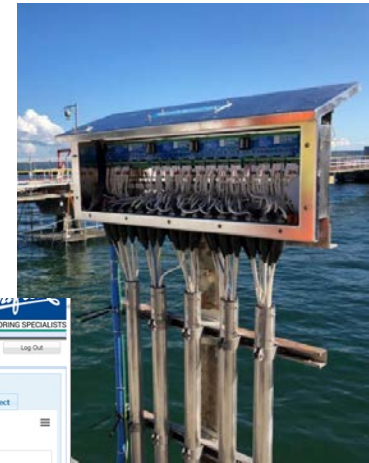
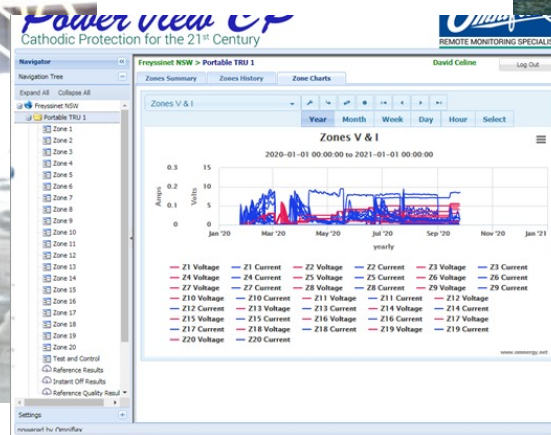


## Case Study 1 – Bulk Liquid Berth 1 (I.S.)

- 24 Concrete structures
- 122 pre-stressed beams
- 30,000 Hybrid Anodes
- Full Remote Management
- 2 year refurbishment
- Zone 1 and 2 Area



# Case Study 1 – Bulk Liquid Berth 1



## Case Study 2 – Webb Dock East



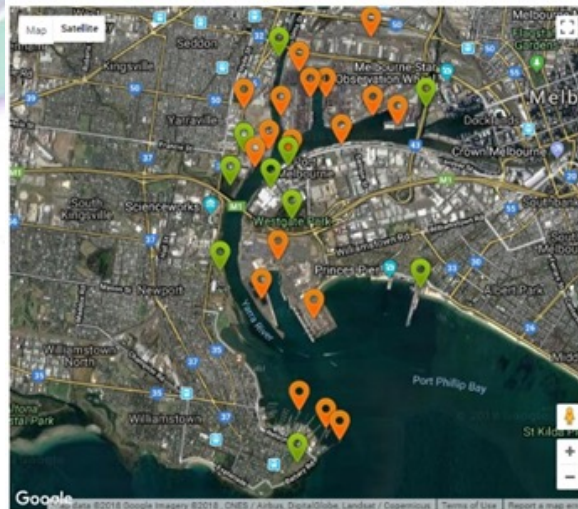
Date of Installation	2016
Structure Protected	Steel Piling + Concrete Beams
Length of structure	700m
Number of distributed CP cabinets	68 for steel + 46 for concrete
Number of zones of protection	136 steel + 552 concrete
Number of references monitored	1080
Web based monitoring and control	Yes



## Case Study 2 – Webb Dock East



## Case Study 3 – Port of Melbourne



Australia's largest maritime hub

500 hectares of port land

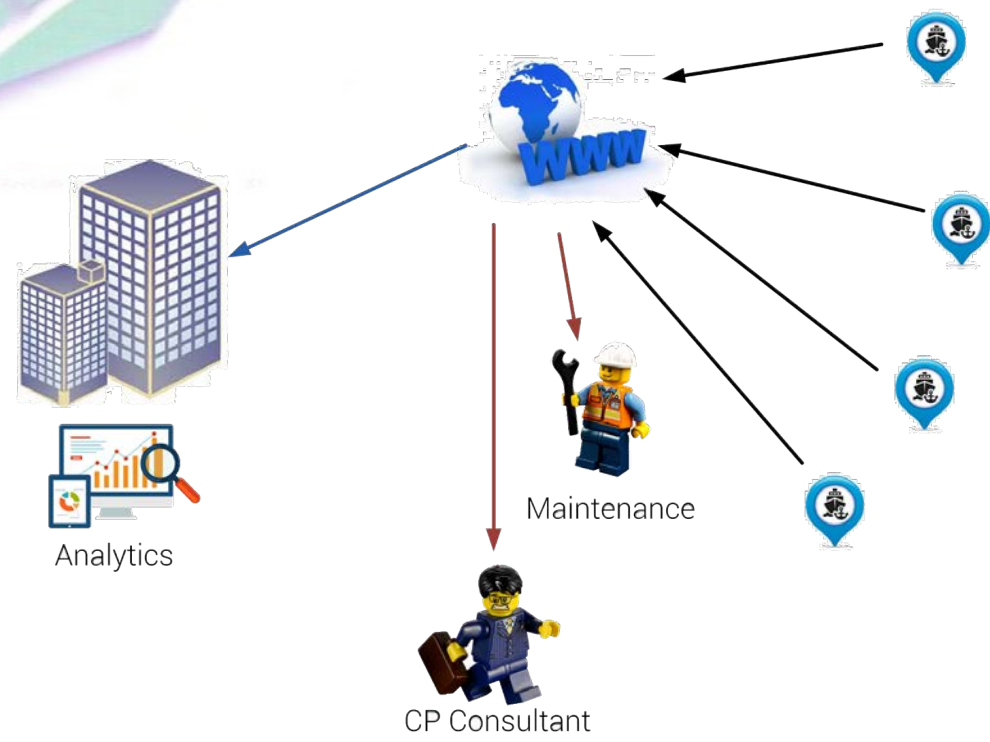
Spread over 25 square kilometres



## Case Study 3 - Port of Melbourne

- >20 Impressed Current CP Systems
- 3 Manufacturers
- 6 Legacy Systems
- Installed over a period of 13 years
- 390kW power (\$500k per annum energy bill)
- 1100 remotely controllable zones
- 2100 Reference Electrodes to read

# Integration with Business Systems

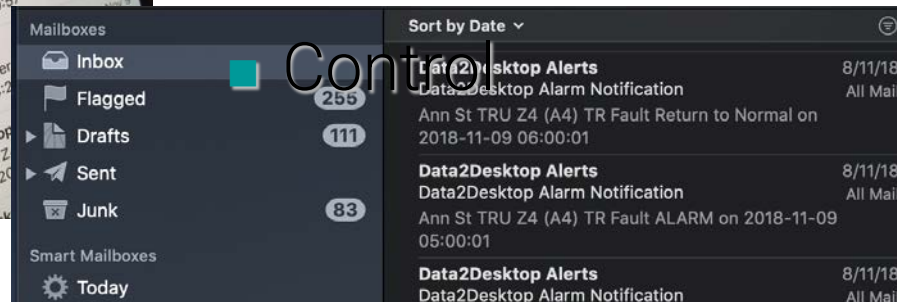




# Port of Melbourne - Alarms



- Emails
- Notifications
- Regular Email Reports





## Conclusions

- T/R's can move closer to the anodes
- Control point can move further away
- Increased system life using the web
- Fully automated testing is possible
  
- Reduced installation & operating costs

# “COMBINING DISRUPTIVE TECHNOLOGIES AND PROVEN ENGINEERING CAPABILITIES”

## MY MALAYSIA

**IEV (MALAYSIA) SDN. BHD.**  
LEVEL 5, BLOCK A, MENARA  
PKNS, NO 17 JALAN YONG  
SHOOK LIN, 46050 PETALING  
JAYA, SELANGOR

**WEBSITE:**  
[WWW.IEVGROUP.COM](http://WWW.IEVGROUP.COM)

**LINKEDIN:**  
[WWW.LINKEDIN.COM/  
COMPANY/IEVGROUP](http://WWW.LINKEDIN.COM/COMPANY/IEVGROUP)

**T:** +6(03) 7931 9921  
**E:** [INFO@IEV-GROUP.COM](mailto:INFO@IEV-GROUP.COM)

## IN INDIA

**IEV ENGINEERING(INDIA) PVT LTD**

**ADD:** 201, LAVLESHCOURT,  
F/1412, W.P. VARDEROAD,  
BANDRA (WEST),  
MUMBAI – 400 050INDIA

**ADD:** F-04 & 05, TRIVENI  
COMMERCIAL COMPLEX,  
SHEIKH SARAI PHASE-1,  
NEW DELHI – 110 017INDIA

**T:** +91 11 26014949

## VT VIETNAM

**IEV TECHNOLOGIES  
VIETNAM LLC**

D39 FOSCO  
40 BA HUYEN THANH  
QUAN STREET  
VO THI SAU WARD  
DISTRICT 03, HCMC, VIETNAM

**T:** +84 28 3997 0196  
**F:** +84 28 3997 0197  
**E:** [INFO@IEV-GROUP.COM](mailto:INFO@IEV-GROUP.COM)



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