Subsea Cathodic Protection Survey From Data Collection to Meaningful Interpretation

Ben McGinnis and **Ross Burgoyne**

5th March 2026

A Joint Event with BINDT

BINDT Joint Event Programme – 5th March 2026

- 15:00 – 15:15 Networking & Registration
- 15:15 – 15:30 Introductions - ICorr & BINDT
- 15:30 – 16:00 Technical Presentation
- 16:00 – 16:10 Q&A Session
- 16:10 – 16:30 Closing Remarks - ICorr & BINDT

About the Aberdeen ICorr Branch

Operating for nearly 50 years supporting the Local Energy Sector

ICorr was first established in 1959 in London.

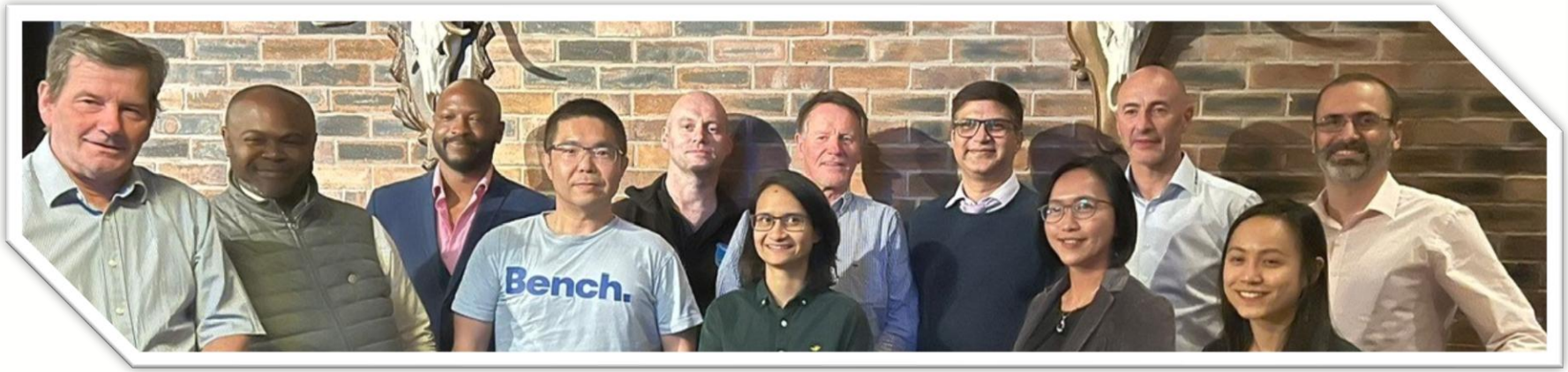
- 8 UK Branch Locations – Aberdeen, Grangemouth, Newcastle, Manchester, Leeds, Swansea, Cambridge and London.

- 2 Overseas – India and UAE

- Approx 1500 members
- ICorr offers - Training, Certification and Chartership Opportunities.

INSTITUTE OF CORROSION

2025-2026 Aberdeen Branch Committee



Branch Position	Committee member		Branch Position	Committee member
Chair	**Stephanie Okoye, (as of Jan 2026)**		Website Officer	Dr. Yunnan Gao [National President] 24-26
Vice Chair	**Eilidh MacDonald, (retiring June 2026)**		University Liaison	Dr. Steve Paterson
External Secretary	**Dr. Nigel Owen, (newly retired)**		Event Co-Ordinator and CPD Officer	Fatemeh Faraji
Internal Secretary	**Dr. Priscilla Ogunlude (New)**		Observer	Stephen Tate [National Past President] 22-24
Financial Officer	Johhny Morton		Observer	Adesiji Anjorin [Past Chair]
Sponsorship Officer	Dr. Olubayo Latinwo		Observer	Dr. Bryn Roberts [Past Financial Officer]

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Our Next ICorr Events

ICorr Events are held on the last Tuesday of the Month.

Upcoming are:

- Apr.26 - A Presentation by One Garnet, (Abrasive Blasting)
- May.26 - A Presentation by Sandy Tweddle of Zerust, (Vapour Inhibitors)
- Jun.26 - A Presentation by Tony Rizk, Chair of ICorr, (Corrosion in the Home)
- Aug.26 - CAD Event (full day). Annual Training Event

Please continue to provide your ongoing support to the local branches of your professional institutions.

It is the only way to safeguard events of this nature continuing to be made available on your doorstep.

ICorr Aberdeen Branch Sponsors – Thank You

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INSTITUTE OF CORROSION

Together, Advancing NDT, Corrosion Science & Engineering

BINDT
THE BRITISH INSTITUTE OF NON-DESTRUCTIVE TESTING

Institute of Corrosion
Corrosion House, 5 St Peters Gardens,
Marefair, Northampton, NN1 1SX
www.icorr.org

Aberdeen ICorr Branch - 2026

Agenda

- Safety Moment/Fire Escapes
- Speaker Introductions
- Altrad – What We Do
- Introduction to Cathodic Protection
- What is a Subsea CP Survey
- Survey Method and Data Acquisition
- Limitations of Subsea Surveys
- How CP Data is Used
- Case Study
- Future of CP Surveys
- Attracting New Talent to CP
- Closing and Questions

Cathodic Protection

Inspection NDT

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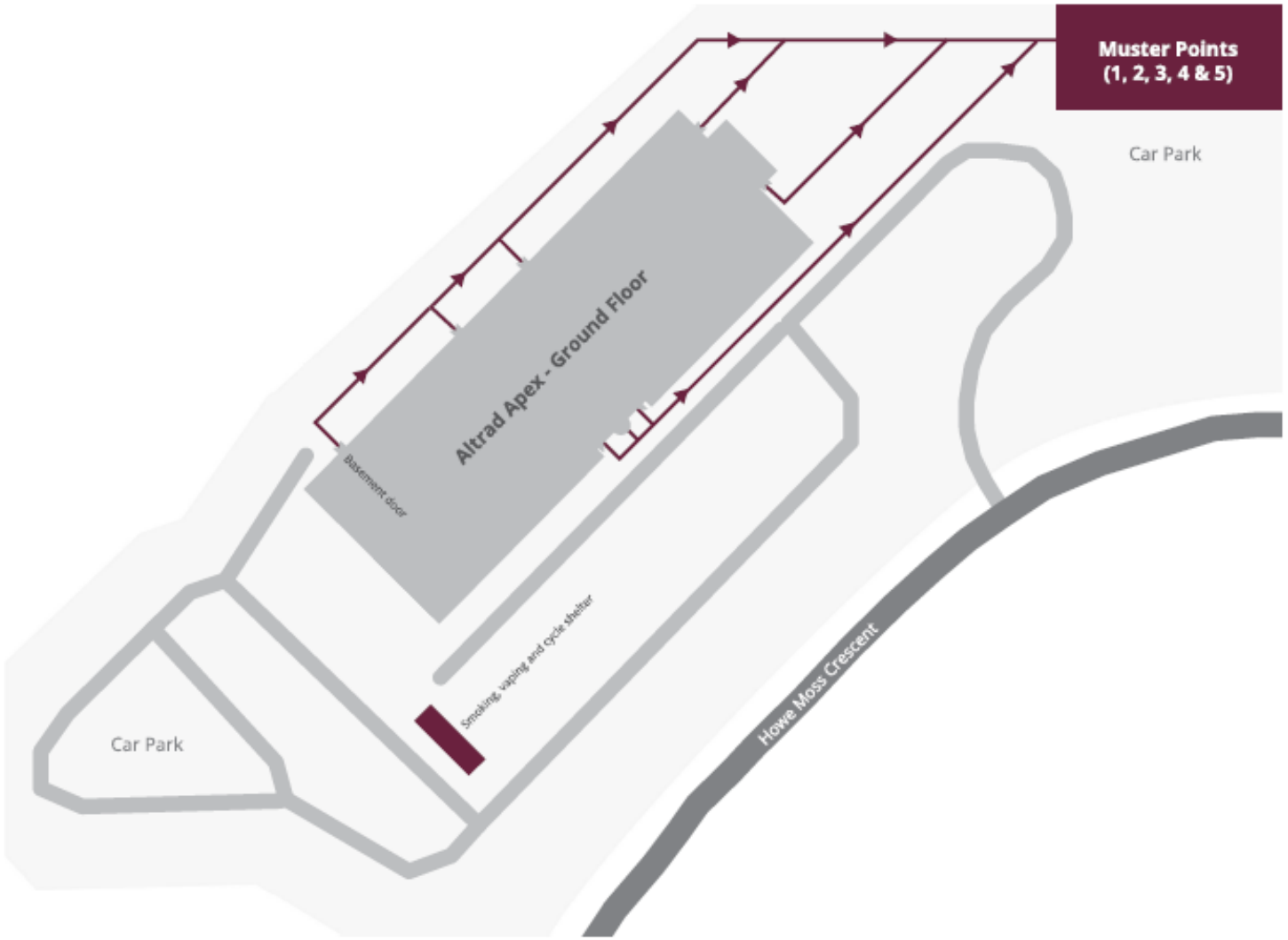
Muster Points



- Muster point 1 - Ground Floor (including reception)
- Muster point 2 - First Floor West Wing
- Muster point 3 - First Floor East Wing
- Muster point 4 - Second Floor West Wing
- Muster point 5 - Second Floor East Wing

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Safety Moment

#BikeSafety

Speaker Introductions

Ben McGinnis

Operations Manager – Cathodic Protection

- Over 12 years’ experience in corrosion monitoring and cathodic protection services
- Experience across data analysis, field operations, project engineering, project management, and operational leadership.
- Worked across oil and gas, renewables, maritime, and defence sectors, supporting subsea and topside integrity programmes and CP survey delivery in complex operational environments.

Ross Burgoyne

Project Manager – Cathodic Protection

- Bachelor’s degree in Earth Science;
- Over 6 years' experience in cathodic protection
- Transitioned into Product Supply in 2023 and currently works as a Project Manager in CP Products.
- ICorr Young Engineer Program Graduate

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Altrad - What We Do

Provider of Support Services

Our Mission

We combine engineering expertise with practical field experience to support integrity management activities. Our work ranges from complete integrity management programmes to specialist, project-specific applications.

- Asset Integrity
- Heat Exchange
- Insulation
- Linings
- Crane Inspection & Maintenance
- Rope Access
- Engineering
- Renewables
- Environmental Cleaning
- Tanks
- Coating
- Access
- Asbestos
- Mechanical
- Painting
- Fabrication

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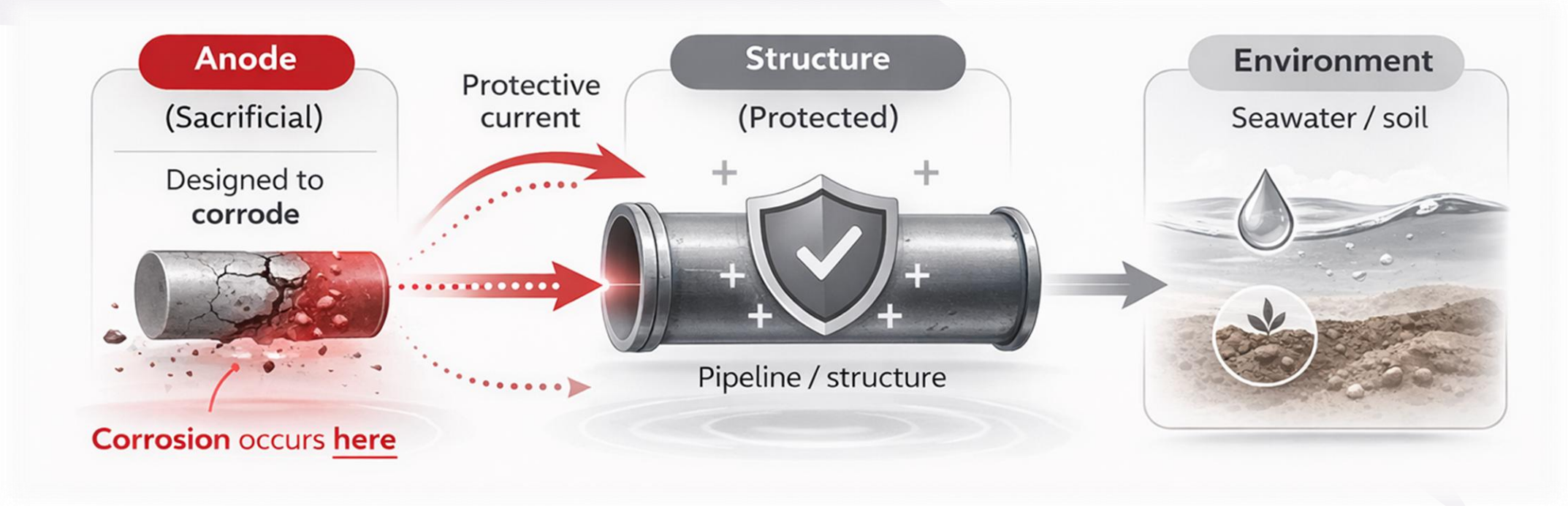
Introduction to Cathodic Protection

Cathodic protection is a method used to control corrosion on metal structures by reducing the electrochemical reactions that cause metal loss. This can be achieved using either sacrificial anodes (galvanic systems) or impressed current systems, depending on the asset and environment.



Illustrated example shows a galvanic (sacrificial anode) system.

Corrosion is redirected from the structure to the anode, helping protect the asset.

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What is a Subsea CP Survey?

Assessing CP Performance to Support Integrity Decisions

What is a subsea survey?

- Periodic assessment of cathodic protection performance on subsea assets
- Measures CP response at selected locations along the asset

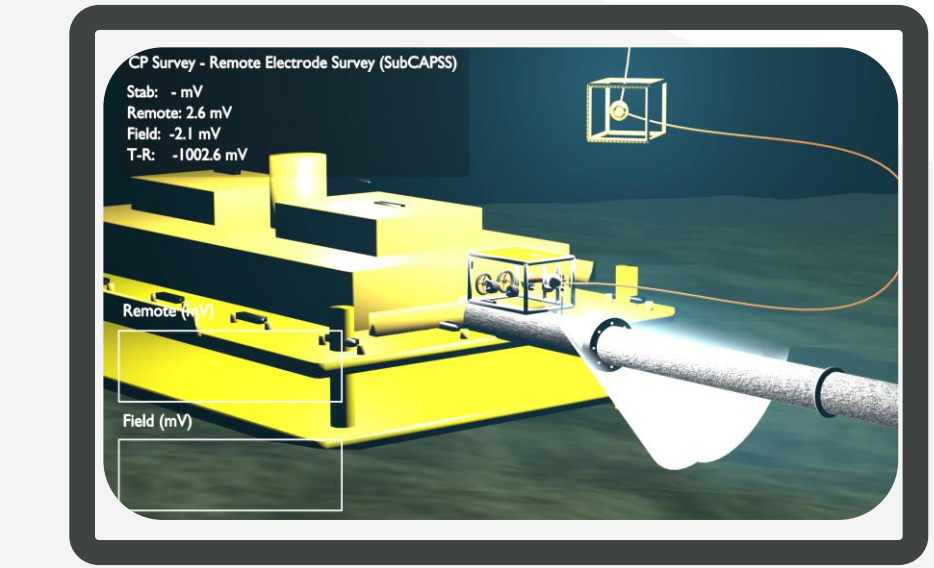
How is it carried out?

- Typically conducted using ROV-based survey equipment

Why does it matter?

- Forms part of a wider integrity and corrosion management programme
- Supports condition assessment, maintenance planning, and long-term asset management

Subsea CP Survey Representation



Example ROV-based CP survey data acquisition

The purpose is not just data collection but supporting informed engineering decisions on asset condition and integrity.

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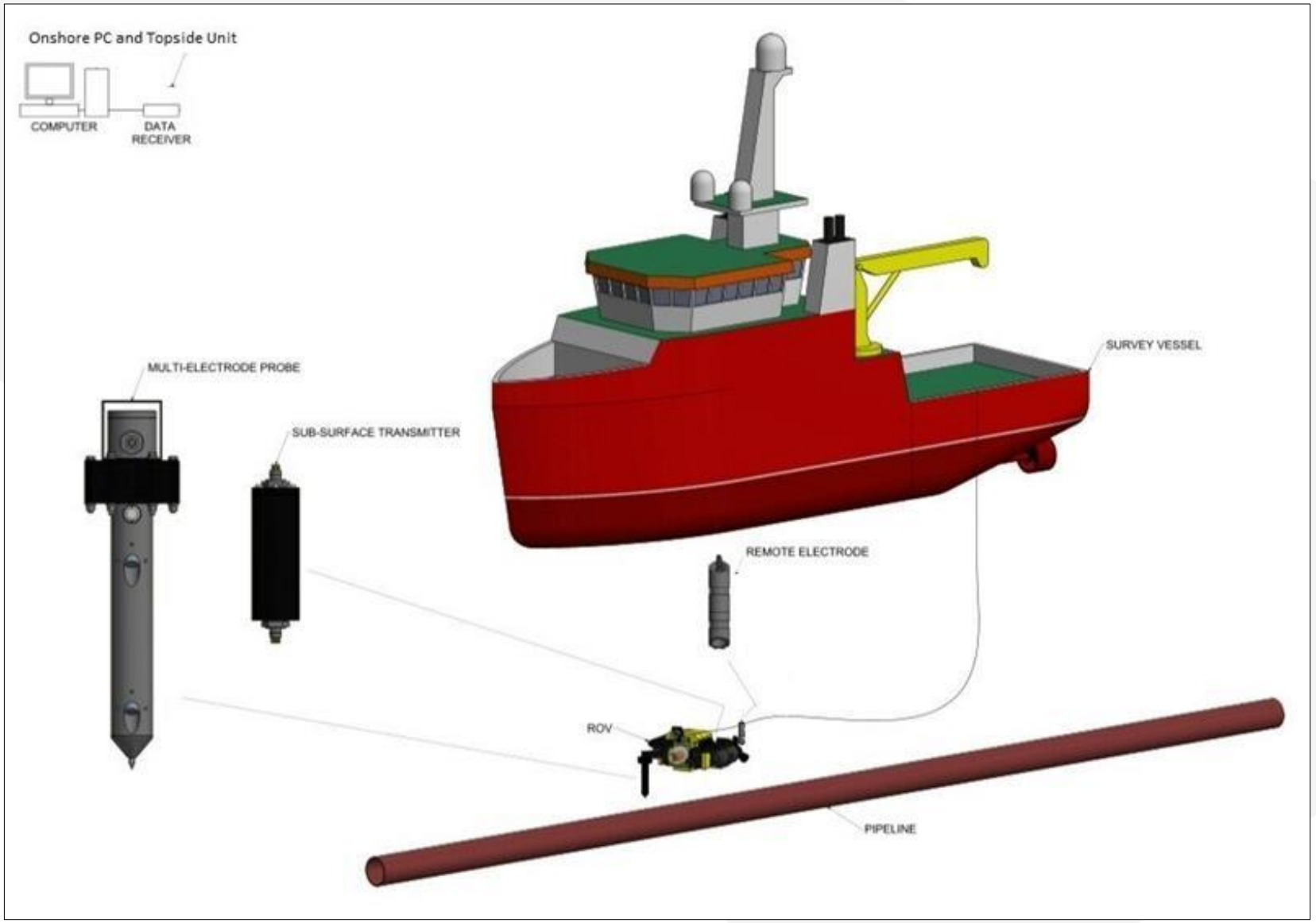
Typical Subsea CP Survey Setup



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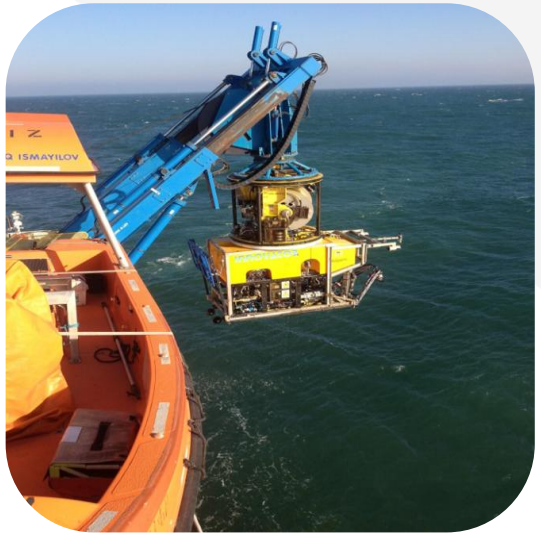
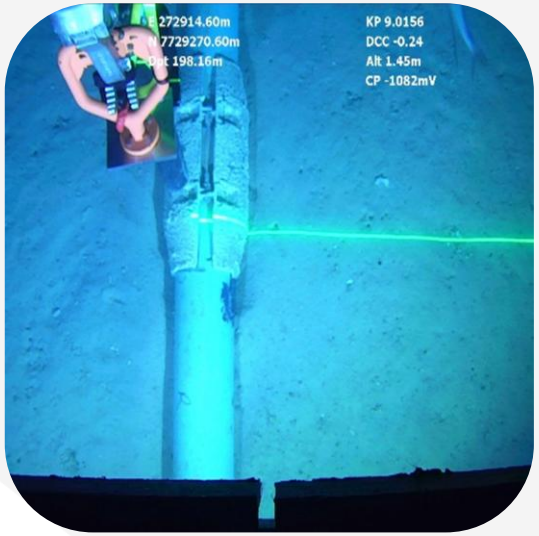
What is Subsea CP Survey

CP systems are not simply fit and forget solutions. The importance of regular monitoring and surveying of these systems cannot be underestimated.

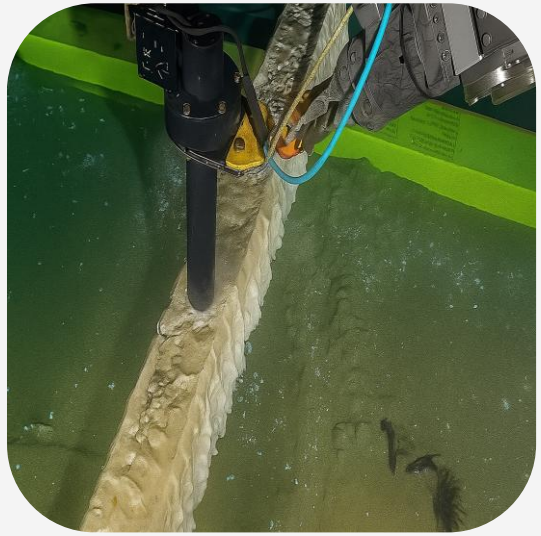
Periodic survey's enable an assessment to be undertaken on the coating system and measurements to be undertaken to establish the effectiveness of the CP system.



ROV Over side of Vessel



Subsea Pipeline CP Survey



Subsea Structure CP Survey

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How Subsea CP Survey Data Is Collected

01

Method Selection Aligned with Survey Objectives

Chosen based on asset type, survey goals and operational constraints

02

Survey Technique Defines the Information Obtained

Different CP survey techniques provide varying levels of coverage, resolution and confidence

03

Data Collected using ROV-mounted CP Survey Equipment

Measurements taken at defined locations along the asset to assess CP performance

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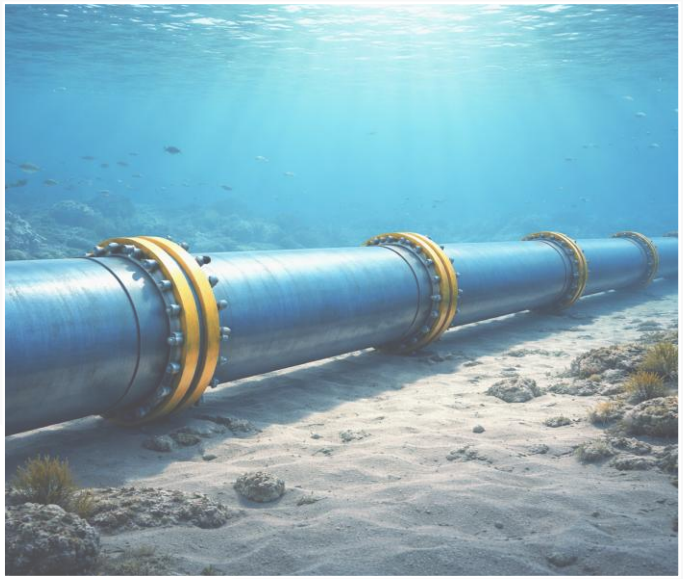
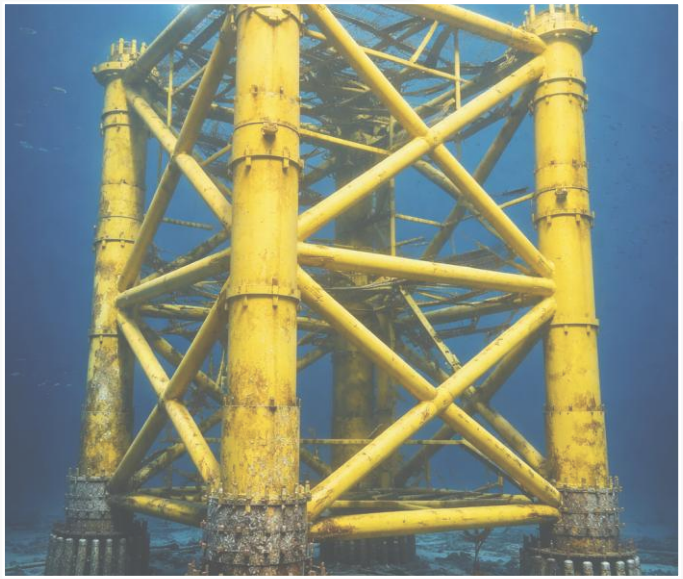
Typical Methods by Asset Type

ROV-Based Subsea CP Survey



Pipeline/Spool/Tie-In

Potential Variation
Field Gradient/Current Density
Local Contacts



Jacket/Structure

Local Contacts
(Potential, Field Gradient & Current Density)

Method selection follows the asset type and survey objective, not a preference for one measurement over another

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Understanding CP Data – Why Interpretation Matters

Local CP Measurements

Point Measurement

Direct Electrochemical Potential at the Structure Surface

What its good for:

- High confidence at contact points
- Direct surface potential

Limitations:

- Limited spatial coverage
- Contact/coating dependent

Potential Variation

Trend & Context

Relative Change in Potential along the Asset

What its good for:

- Identifies relative protection trends
- Understanding how protection changes along the asset

Limitations:

- Relative, not absolute potential
- Influenced by geometry and spacing

Field Gradient

System Behaviour

Electric Field and Current Flow in Seawater Around the Asset

What its good for:

- System-level CP behaviour
- Efficient coverage over long assets

Limitations:

- Indicates direction and relative magnitude of CP current
- Strongly environment and geometry dependent

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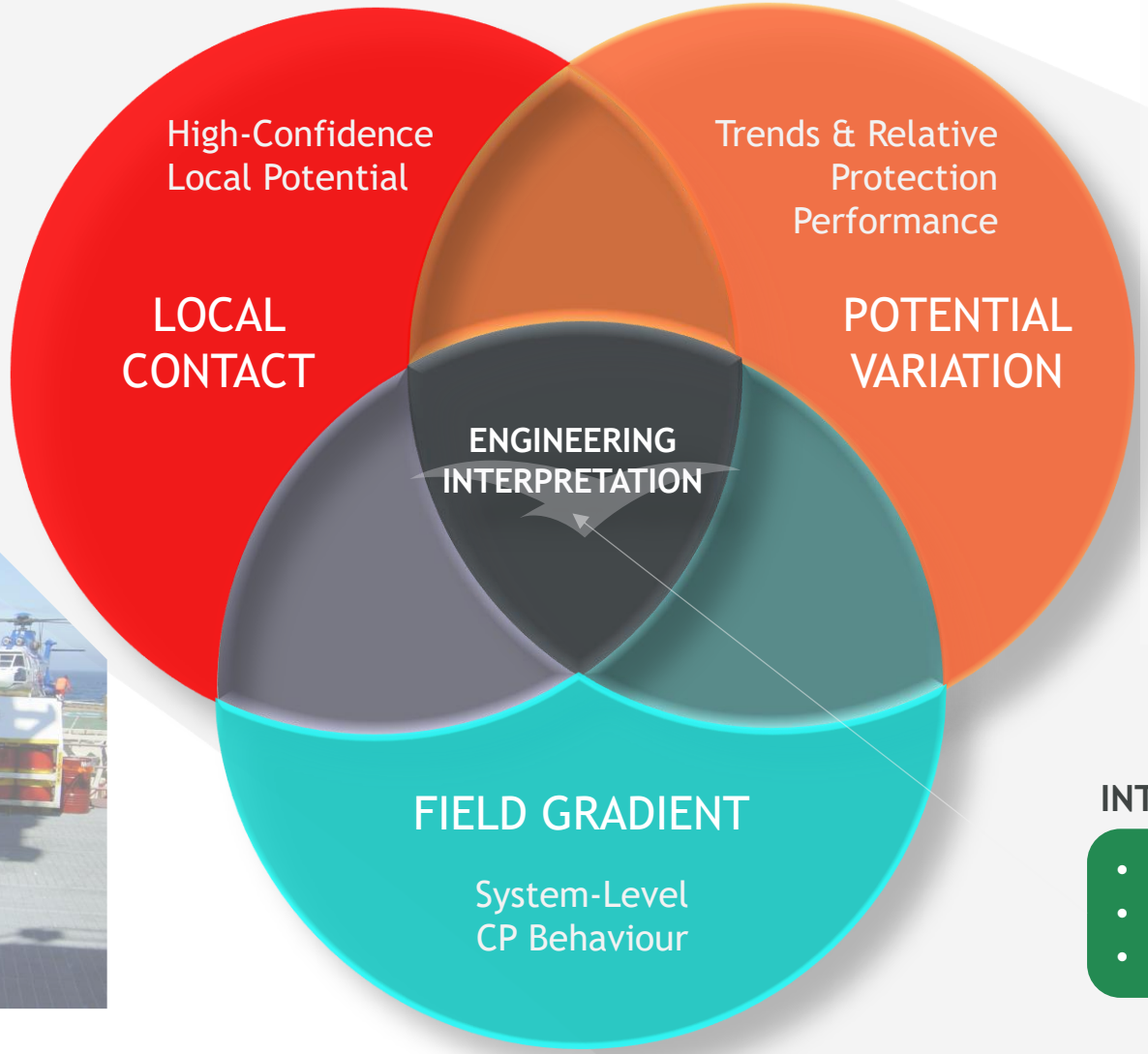
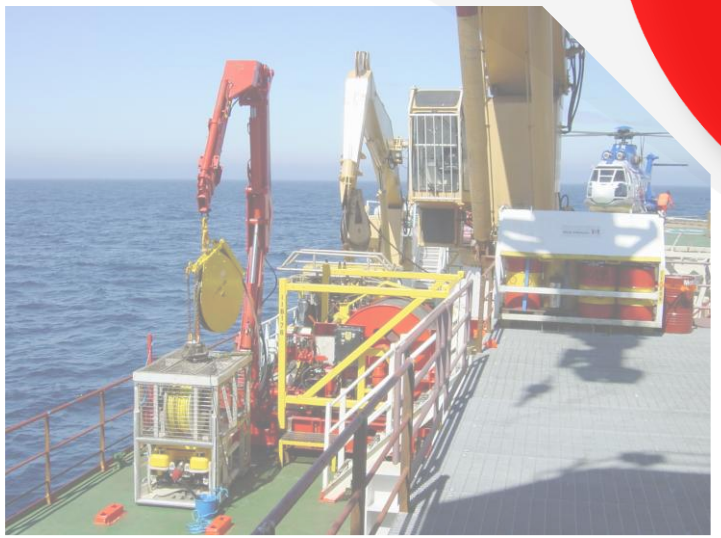
Contact vs Potential vs Field Gradient

A Holistic Interpretation Approach





INTERPRETATION OUTCOMES

- Reduced Uncertainty
- Increased Confidence
- Informed Engineering Decisions

Reliable CP assessment comes from combining datasets, not any single measurement!

Understanding Limitations in Subsea CP Surveys

Survey Coverage

ROV Operations

Snapshot In Time

01

02

Measurement Tolerance

03

04

External Influences

05

06

Judgement & Experience Required

Understanding Limitations in Subsea CP Surveys

01

Survey Coverage

- Access Constraints
- Certain Locations not Measurable
- Environmental Conditions Preventing Visual Inspection

Understanding Limitations in Subsea CP Surveys

02

Measurement Tolerance

- Equipment & Reference Cells
- Calibration & Maintenance

Understanding Limitations in Subsea CP Surveys

03

ROV Operations

ROV Manoeuvrability

- Pilot Skill & Competence
- Environment (Visibility, Currents)
- Consistent Positioning

Understanding Limitations in Subsea CP Surveys

04

External Influences

- Distance & Position
- Nearby Assets
- (Electric Fields)
- ROV Interference/Noise
- Temperature/Marine Growth

Understanding Limitations in Subsea CP Surveys

05

Snapshot In Time

- CP Performance Varies over time due to Electrochemical Changes

- As-found condition only
- Not a predictor of future behaviour

Understanding Limitations in Subsea CP Surveys

06

Judgement & Experience is Required

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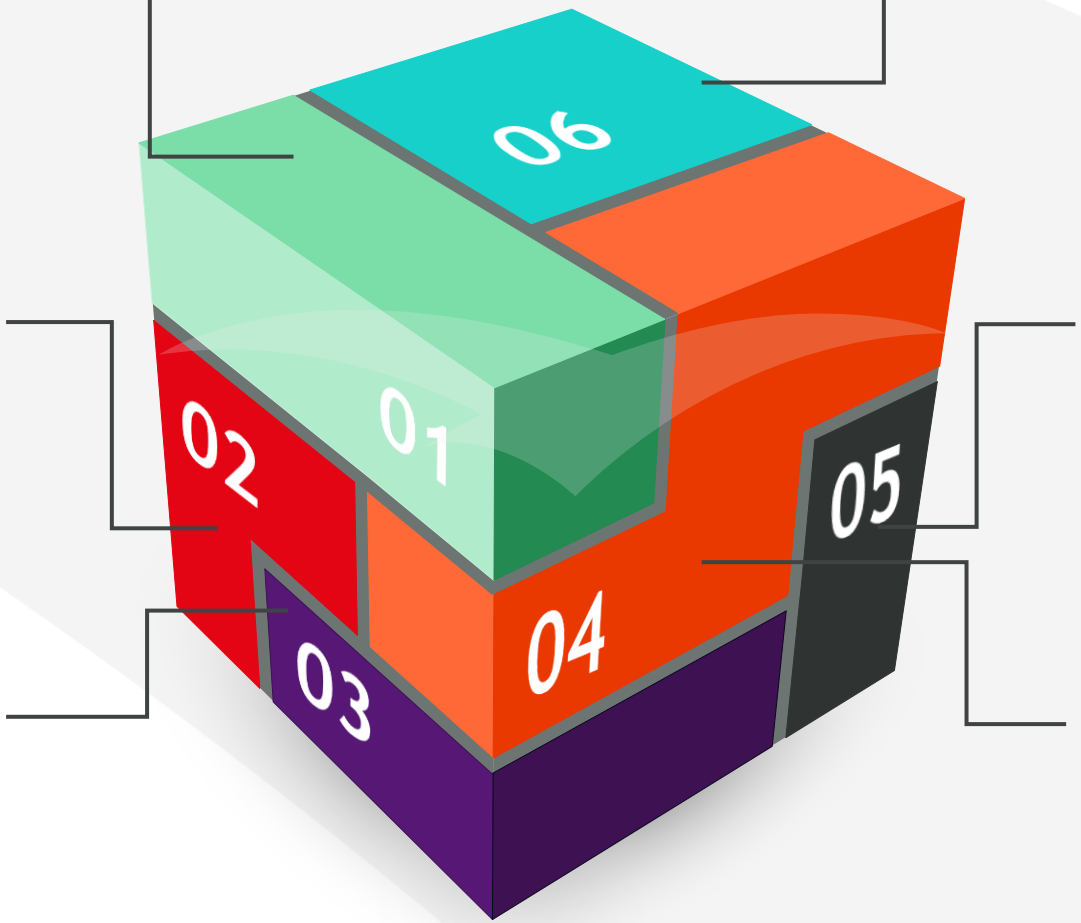
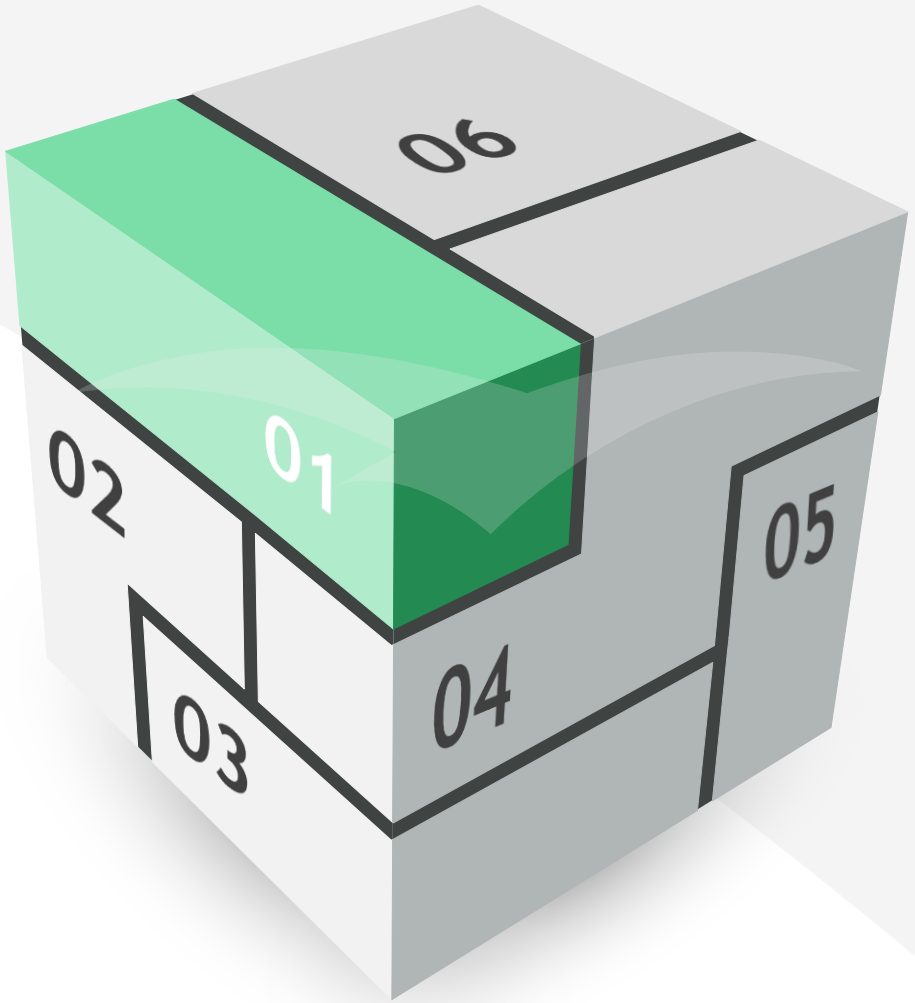
How CP Data is Used

- Anomaly & Degradation Identification
- Prioritised Remedial Action
- Verification of Remedial Effectiveness



- Regulatory Compliance & Assurance
- Long-Term Trending & Asset Integrity Management
- Input to Integrity & Life Extension

How CP Data is Used

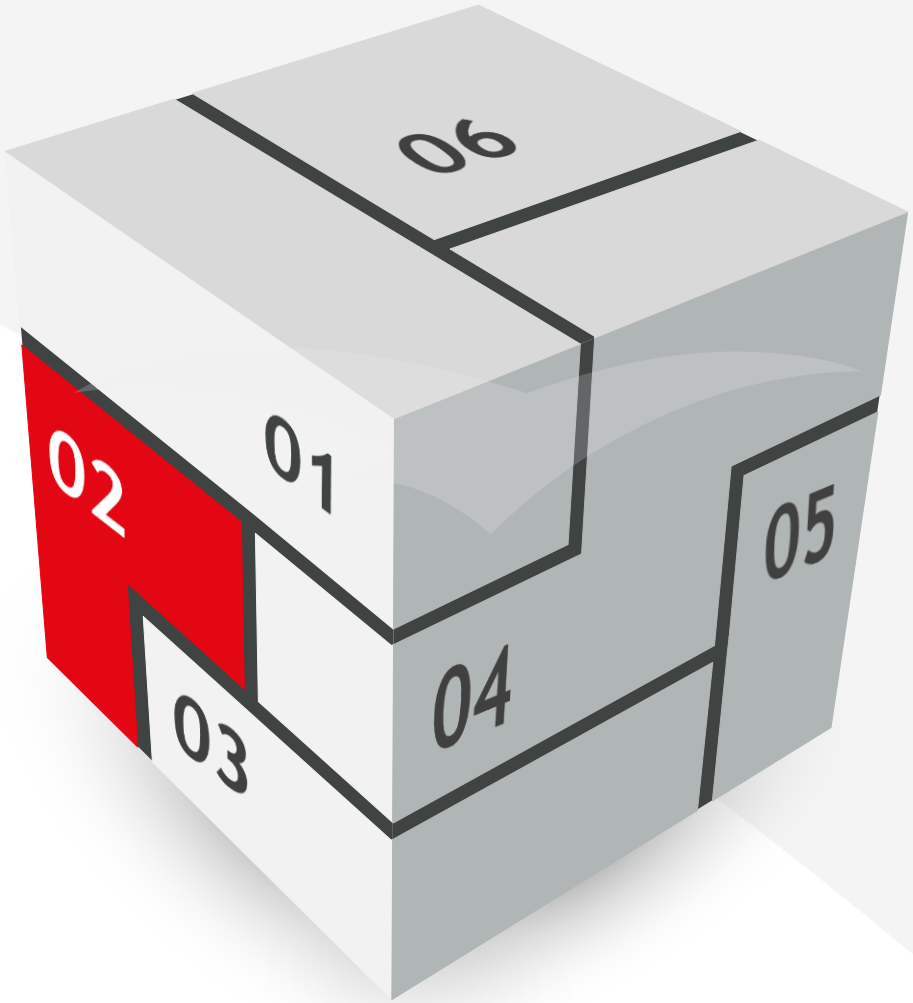


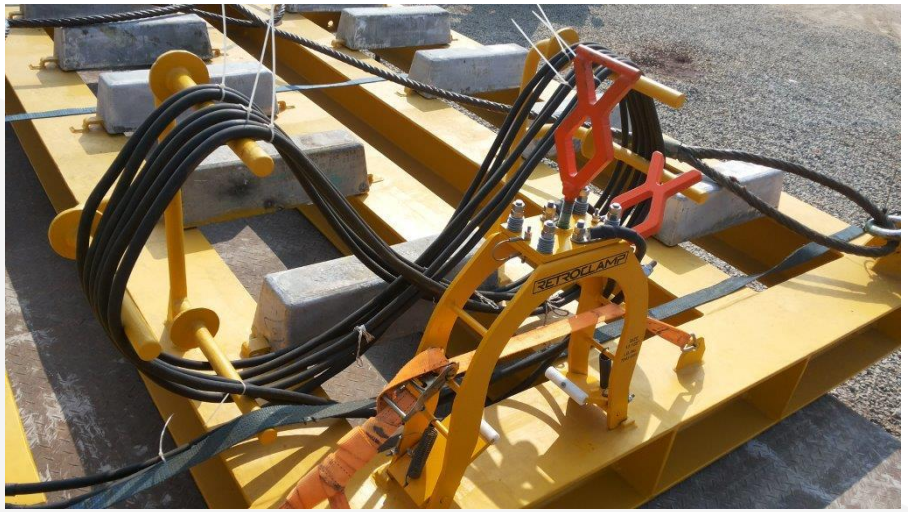
Anomaly & Degradation Identification

Identification of CP anomalies and degradation mechanisms, including:

- Anode depletion
- Shielding effects
- Coating breakdown or mechanical damage
- Electrical continuity issues
- Interference from nearby assets
- Establishing root cause enables targeted and proportionate intervention

How CP Data is Used





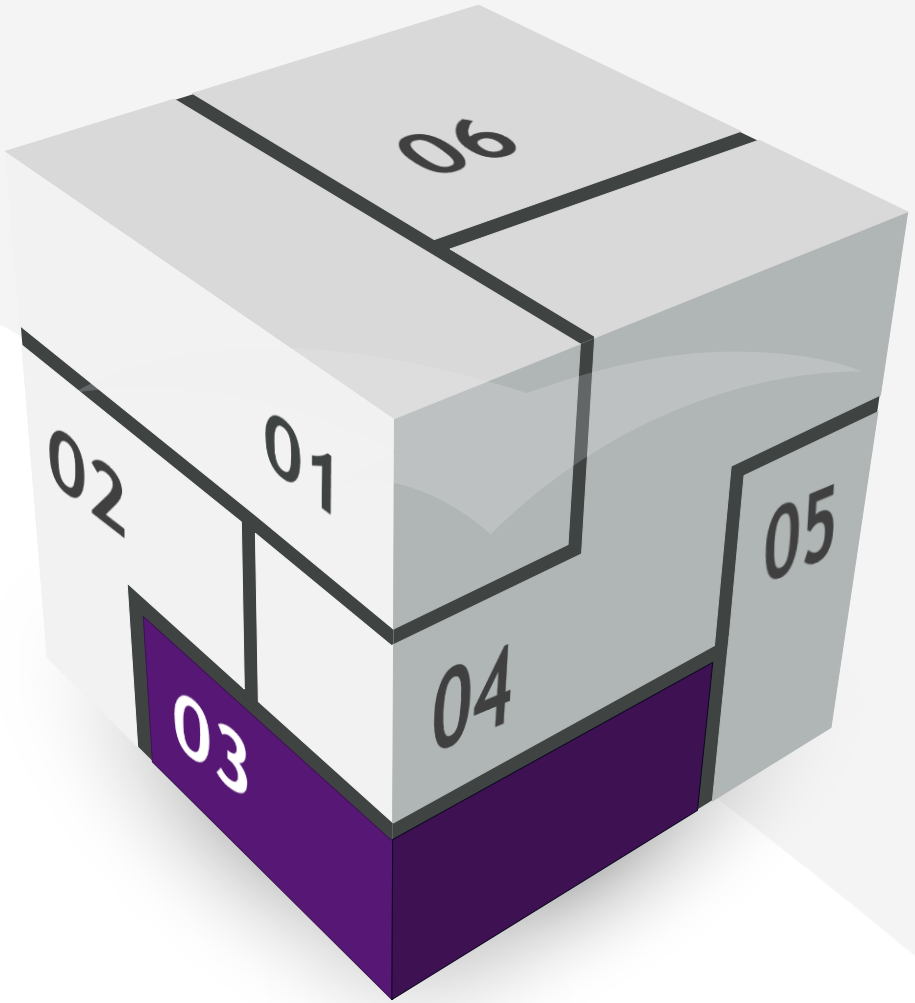
Prioritised Remedial Action

Data-driven decision making to prioritise remedial works, such as:

- Retrofit anode skids
- Clamp-on anodes
- Modification or extension of existing CP systems

Ensures interventions are risk-based and cost-effective

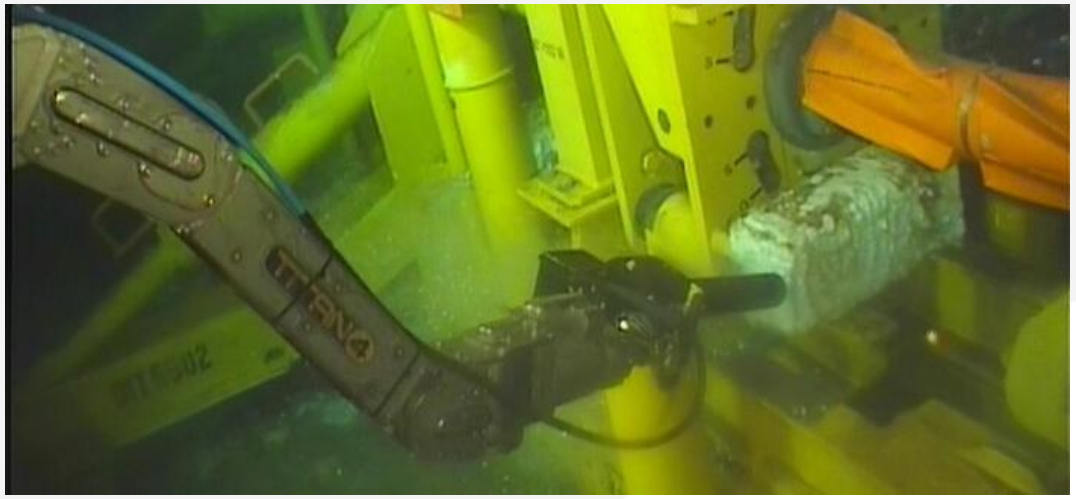
How CP Data is Used



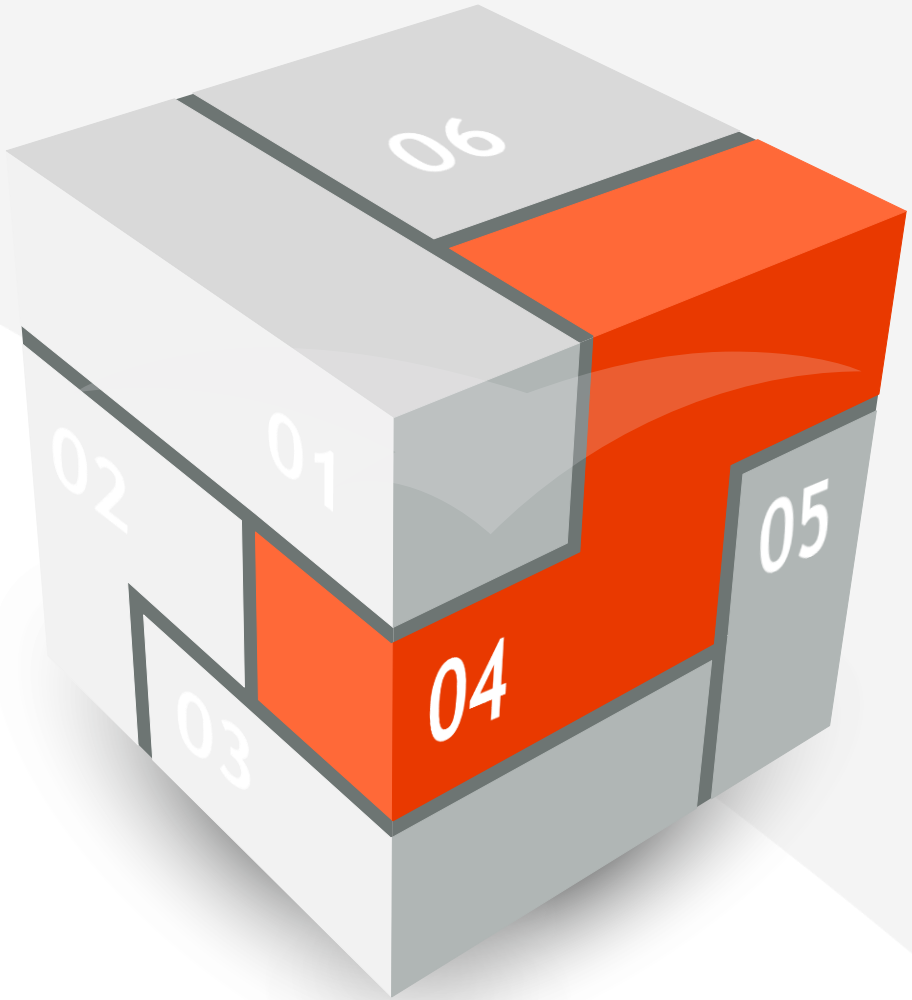
Verification of Remedial Effectiveness

Post-installation surveys used to:

- Confirm restoration of adequate protection
- Validate design assumptions
- Demonstrate effectiveness of remedial works



How CP Data is Used

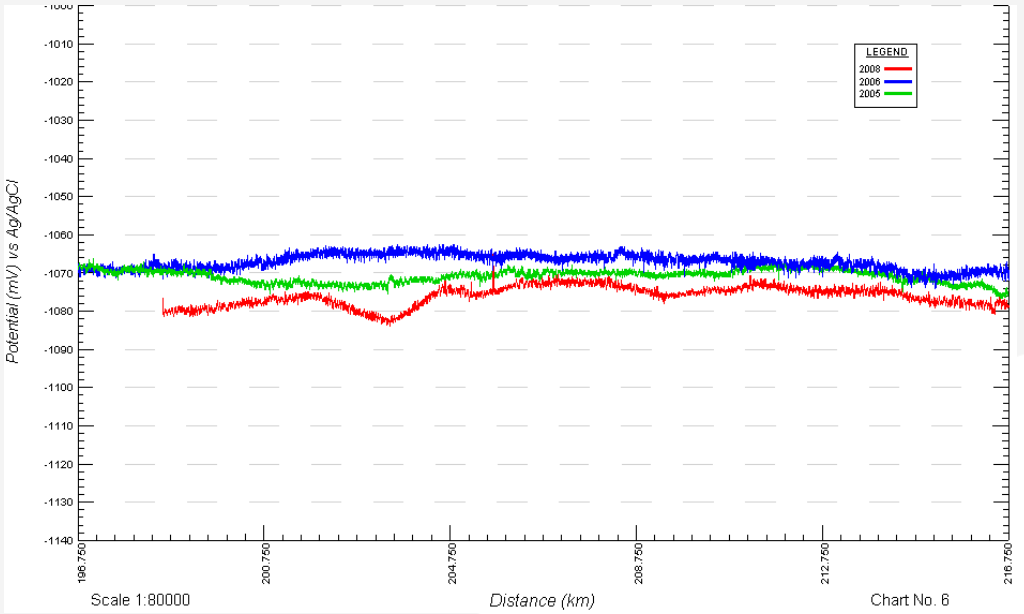


Input to Integrity & Life Extension

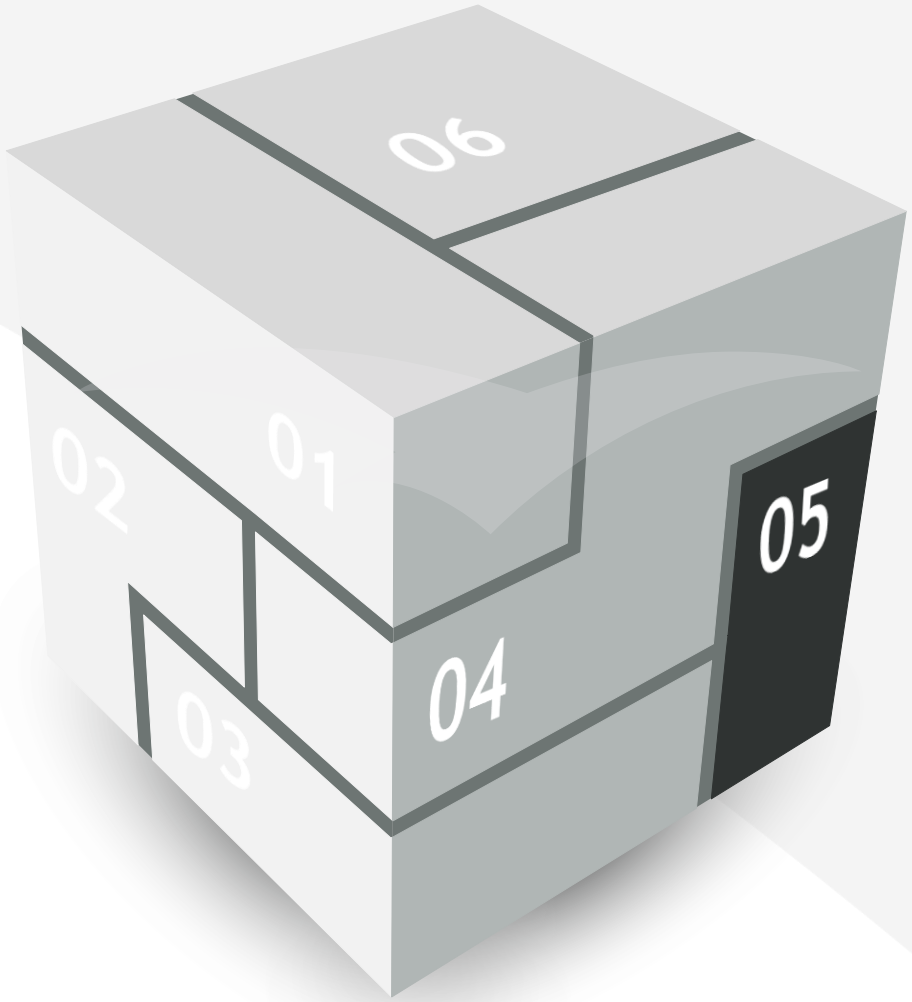
CP data forms a key input to asset integrity management systems, alongside:

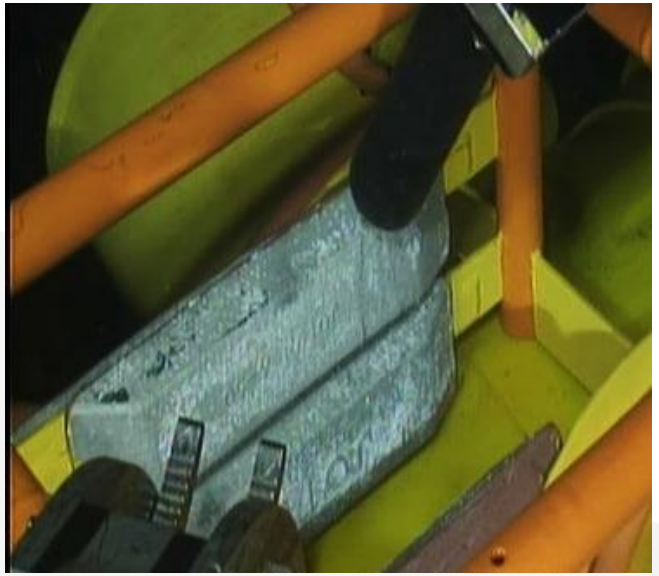
- Inspection findings
- Corrosion monitoring data
- Structural assessment data

Long-term datasets directly support life-extension assessments and decisions



How CP Data is Used





Long-Term Trending & Asset Integrity Management

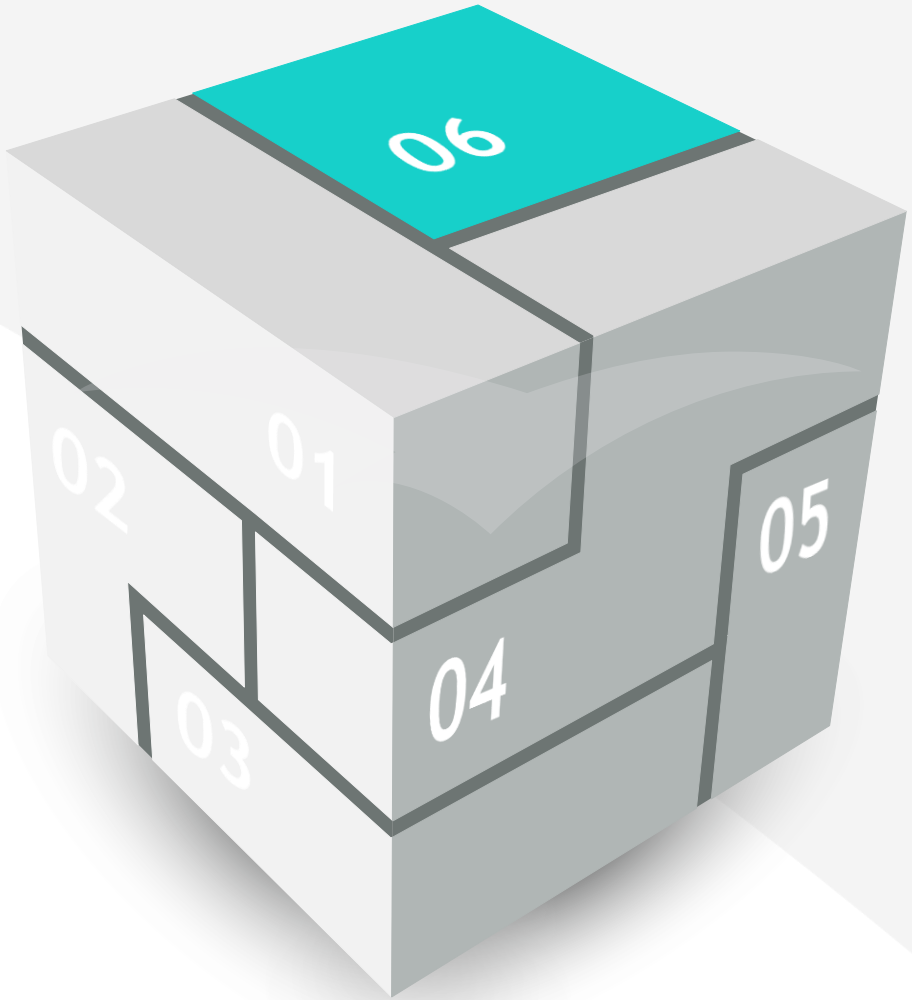
Assessment of:

- Anode consumption rates
- Coating degradation trends

Early identification of emerging issues before compliance limits are breached

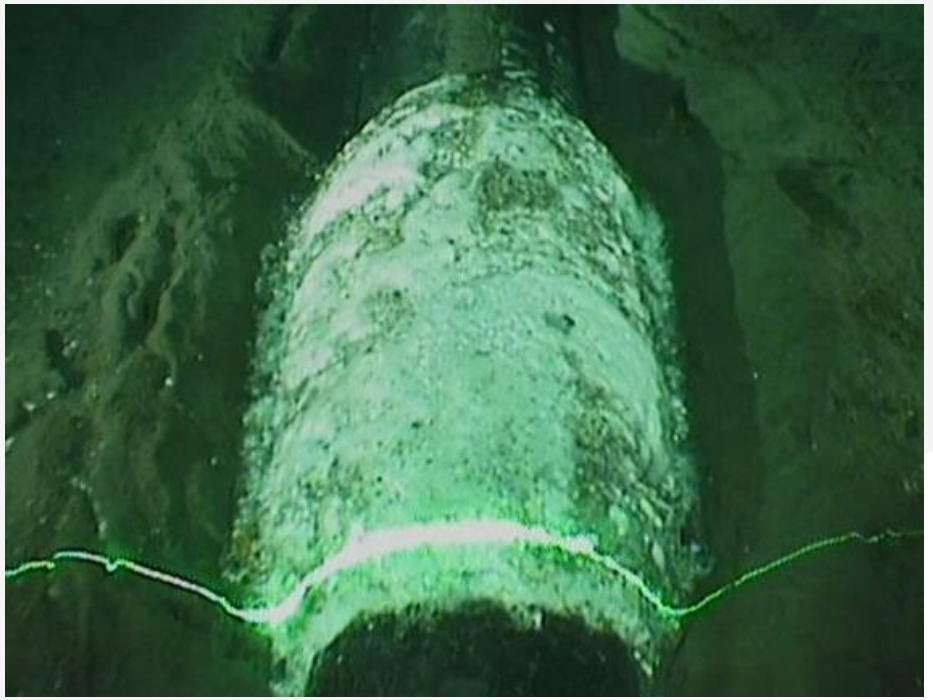
Enables a shift from reactive maintenance to condition-based and risk-informed integrity management

How CP Data is Used



Regulatory Compliance & Assurance

- Demonstrates compliance with CP design criteria and regulatory requirements
- Provides auditable evidence for regulators, certifying authorities, and stakeholders
- Builds confidence in asset condition through defensible, data-driven reporting



How CP Data is Used

Summary

Identifies anomalies and degradation affecting cathodic protection performance

Enables targeted, prioritised remedial action and verifies the effectiveness of repairs and system modifications

Supports long-term trending and asset integrity management

Feeds into integrity and life-extension assessments alongside other inspection data

Provides regulatory, assurance, and decision support through auditable, defensible evidence

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Case Study - Subsea CP Survey

Issue Identified During As-Laid CP Survey

Project Context

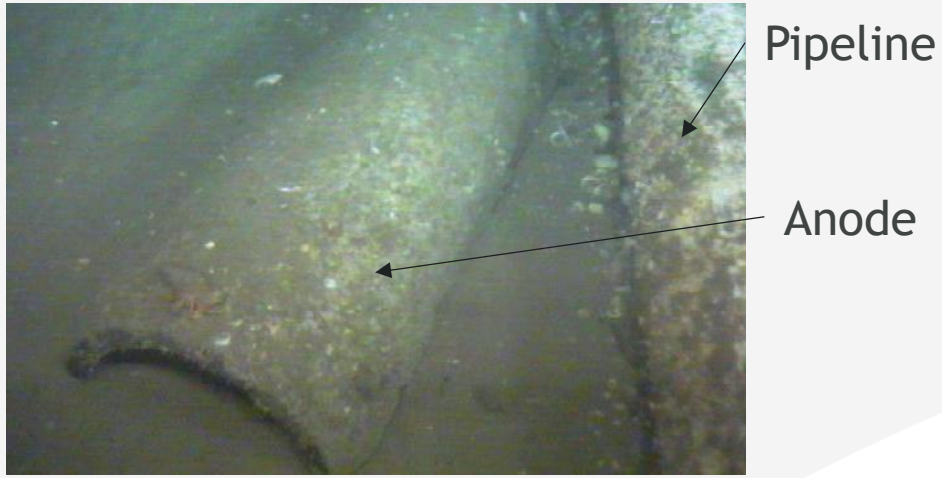
- As-laid subsea pipeline CP survey
- Objective: Verify CP system integrity prior to commissioning

Survey Methods:

- ROV Visual Inspection
- CP Measurements on Anodes (Potential and Current Output)
- Pipeline Potential and Field Gradient Data

Key Findings

- Multiple anodes electrically disconnected
- Reduced CP protection observed
- Minimal anode current output



These findings strongly indicated that one or more anodes had become disconnected, most likely due to handling or installation stresses during lay operations.

Case Study - Subsea CP Survey
Resolution & Client Value Corrective Action

Resolution

- Disconnected anodes were identified during the survey and formally reported to the Client.
- The client was enabled to take remedial action as required to correct the issues identified

Outcome

- Survey data enabled the Client to understand CP system performance and make informed decisions regarding remedial works.

Client Advantages

- Early detection before commissioning
- Avoided long-term corrosion risk
- Prevented costly future intervention

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The Future of Subsea CP Survey

01 Digitalisation & Automation

Automated data capture, processing and reporting

02 Smarter Tools

AI-assisted data review and anomaly detection

03 Remote Operations

Unmanned CP Surveys at distance

Engineering Judgement

Experienced CP Engineers Remain Key To Interpretation And Decisions.

Attracting New Talent to CP - Challenges & Opportunities

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Challenges to Entry

Industry Perception

- Oil & gas-associated roles are often viewed as outdated or environmentally misaligned
- Younger engineers increasingly favour renewables, digital, and software-led careers
- Limited awareness of how CP underpins asset integrity, safety, and life extension

- Gaining offshore experience is restricted by POB (Persons on Board) limitations
- High vessel, mobilisation and offshore costs mean priority is given experienced personnel, reducing opportunities for trainees to gain supervised field exposure

Field Experience Bottleneck

Subsea Survey Reality

- Subsea CP survey work is often ad hoc and campaign based.
- Mobilisation can be at short notice and involve extended time away from home.
- Best suited to candidates who value flexibility and responsibility

Opportunities

Skills & Certification Route

- Recognised technical profession
- Clear progression via ICorr and AMPP
- Transferable skills (data, engineering judgement, inspection)

Investment in People

- Mentoring
- Supervised experience opportunities
- Support for development & certification

Q&A

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