

BROADSWORD  
CORROSION ENGINEERING LTD.

# Enhancing the Power of Prevention

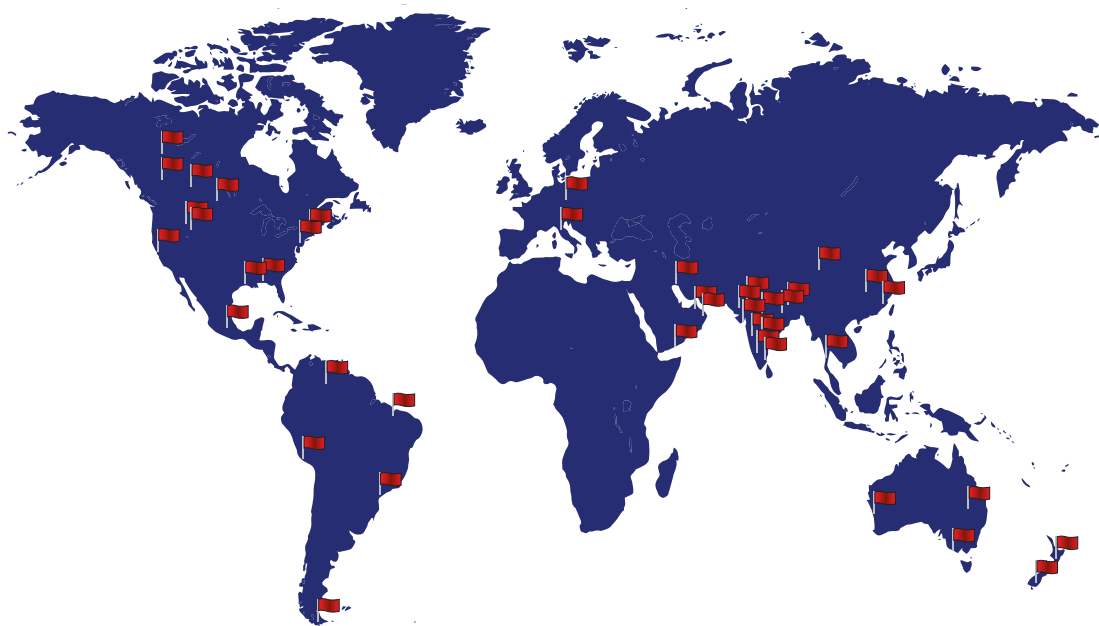


**PATRICK J. TEEVENS**  
**CD, P.ENG., FNACE, MCIC**  
**PRESIDENT**

## **SUBJECT MATTER EXPERT (SME)**

- 40+ years of Corrosion Engineering Experience
- Certified Professional Engineer in Alberta, BC, and Ontario
- NACE International Certified (Cert #: 2842):
  - Corrosion Specialist, P
  - Internal Corrosion Specialist
  - Cathodic Protection Specialist
- API 510 - Pressure Vessel Inspector (Cert #: 1340)
- NACE International Technical Achievement Award 2018

**Broadsword solving corrosion issues around the globe**



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# **Advancing Corrosion Mitigation**

## **Cost Effective Solutions**

Maintaining safe and reliable facilities while protecting the environment. Preventing failures and finding new ways to prolong asset life to promote clients' long term economic gain after applying our recommendations.

## **Quality Service**

Designing innovative solutions based on operational data to solve corrosion problems while enhancing the remaining life of assets. Assuring exceptional deliverables with clear application and practicality using 40+ years of ongoing knowledge development.

## **Performance**

Enhancing the power of prevention through engineering assessments, testing and advanced monitoring techniques to consistently deliver quality recommendations and results using modeling and 40+ years of expertise.

# Corrosion Engineering Services

## Direct Assessment (DA) of Pipelines

- Using our in-house, reliable and proven proprietary software *enpICDA™* or “Teevens Model”

## CMP and PCIM Program Development

- Evaluating corrosion and improving mitigation plans
- CMP (Corrosion Management Plan)
- PCIM (Pipeline Corrosion Integrity Management)

## Oil and Gas Pipelines and Facilities System Wide Corrosion Audits

- Corrosion engineering due-diligence audits and/or surveys for potential acquisition

## Process and Facilities Design - Corrosion Review

- Pre-FEED, FEED and In-Service

## Pressure Equipment Integrity and Inspection

- Pressure Vessel, Piping and Boiler Investigations (API 510)
- ASME Code Compliant Repair and Alterations Design



# Corrosion Engineering Services

## State-of-the-art corrosion rate detection and monitoring solutions

- Real-time, on-line electrochemical corrosion surveillance protocols

## Chemical Treatment Program Development, Testing and Review

- Corrosion Inhibitors, Biocides and other specialty chemicals
- MIC Assessment, Assays and remediation

## Quality Control: Regulatory Compliance

- Alberta Energy Regulator (AER)
- CSA Z662
- USDOT, PHMSA CFR 49 Part 192 and 195
- ASME B31.3, B31.4, B31.8

## Corrosion Training for Technical Staff and Senior Management

- Corrosion Design, Monitoring, Competency and Economics



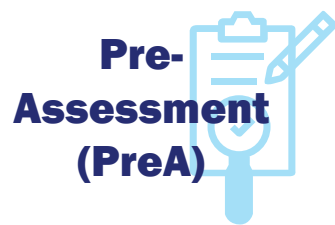
ISO 9001:2015 – Quality Management Systems (Certificate No. CAN1730)  
ISO/IEC 27001:2013 – Information Security Management Systems (Certificate No. CIT1013)  
APEGA Permit Holder – The Association of Professional Engineers and Geoscientists of Alberta

# ICDA - The Key to Corrosion Mitigation

Internal Corrosion Direct Assessment (ICDA) is a specialized service offered by Broadsword to assess internal corrosion and improve pipeline integrity.

**Establish accurate corrosion mechanisms in pipelines and receive innovative recommendations for mitigation and improvement.**

ICDA involves four (4) steps. A separate report is issued for each step.



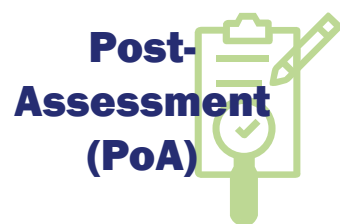
Compile and validate data received from clients, determine ICDA input parameters, select ICDA regions and time-periods



Perform modeling using Broadsword's *enpICDA™*, analyze results, predict corrosion rate and wall loss, and choose DEx sites



“Digs” are performed by clients at the DEx sites to compare the predicted and actual material losses



ICDA results summary, root-cause analysis, remaining life, remaining strength, and reassessment interval determination



# Legal and Quasi-Judicial Services

Broadsword provides subject matter expert (SME) litigation services for corrosion related failures using our extensive wealth of knowledge and experience of our engineering team.

## Expert Witness Services

Deliver informed testimony using  
40+ years of corrosion expertise

## Failure Investigations

Perform quality investigations to  
determine root-cause

## Insurance Claim Resolution

Resolve insurance disputes by  
dissecting crucial coverage clauses  
pertaining to corrosion coverage

## HSE Compliance Issues

Solve HSE issues by thorough  
problem investigation

## Forensic Accident Investigations

Investigate accident site and/or  
evidence to establish root-cause

## Non-Compliant Material Tracing

Identify the problem material  
and why it was used

## **CONTACT US**

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