OAK FORENSIC ENGINEERING

Neil Anderson, M.Sc., P.Eng.

Materials Engineer

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PROFESSIONAL PROFILE

Neil is a materials engineer with a passion for understanding materials performance and failure. His experience has focused on failure analysis involving ferrous alloys, particularly in micro- and low-alloy steel products and their manufacture. These undertakings have had up to multimillion-dollar implications, including manufacturing loss events of up to ~$28M. He is skilled in applying materials principles and critical thinking to process optimization, product development, and forensic investigations.

Neil's expertise includes:

- Material failure analysis
- Materials characterization
- Mechanical properties testing
- Fractography
- Physical and welding metallurgy
  - ERW, fusion welding (DSAW, GMAW, SMAW, GTAW)
  - Weld failure analysis
- Line Pipe, OCTG (casing), and plate manufacturing
  - Thermo-mechanical controlled processing (TMCP)
  - Rolled skelp/plate, continuous forming, UOE, longitudinal seam, helical seam
  - Heat treatment (normalizing, Q&T)
- Priority and resource coordination
- Laboratory safety and management

EDUCATION

M. Sc. Materials Engineering, University of Alberta, Edmonton, AB 2018

- Thesis: *Influence of the Post-Weld Heat Treatment on the Low-Temperature Toughness of ERW API X70 Line Pipe*
- Relevant Courses:
  - Advanced Materials Thermodynamics
  - Welding Metallurgy
  - Microalloyed Steels
  - Contract Law

B.Sc. Materials Engineering Cooperative Program (Honours) University of Alberta, Edmonton, AB 2016

PROFESSIONAL AFFILIATIONS

Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS)

ASM International and affiliated Failure Analysis Society (FAS) and Heat Treating Society (HTS)

WORK HISTORY

2021 – Present: Materials Engineer, Oak Forensic Engineering Ltd., Calgary, AB

Founded in 2020, Oak Forensic Engineering is a failure analysis and prevention engineering firm. The firm's focus is on mechanical failure analysis, materials failure analysis, and structural engineering.

2018 – 2021: Failure Analysis Engineering Specialist, Research and Development, EVRAZ North America, Regina, SK

Served as a primary technical resource for manufacturing support, failure analysis, and customer complaint resolution at EVRAZ locations across North America. This encompassed characterization, mechanical property testing, and investigative undertakings. Coordinated, mentored, led working groups of peers, and supervised technical staff for products involving primary steelmaking, manufacture of plate, line pipe, oil country tubular goods (OCTG), and rail products, and welding. Project scopes routinely had up to multimillion-dollar implications.

In addition, designed and conducted research projects for product and process development across multiple ferrous product manufacturing lines. Led and assisted with initiatives for facility operation, CAPEX, Safety and Quality (ISO 9001).

Failure investigations included:

- Welded joints (ERW, DSAW, GMAW, and SMAW)
- Heat treatment (Q&T, PWHT normalizing)
- Rolled products
- Continuous slab castings
- Equipment failure (shafts, tooling, rails)

2016-2018: Research Assistant, Leijun Li Group, University of Alberta, Edmonton, AB

Developed, implemented, and oversaw the laboratory management program. Supervised team of 2-3 graduate students and 1-2 undergraduate students conducting research activities on high-frequency electric resistance welding (ERW) used in the production of microalloyed steel line pipe.

Assisted with metallurgical research projects and metallurgical consulting.

2016: Research/Teaching Assistant, Engineer Safety & Risk Management Program, University of Alberta, Edmonton, AB

Developed course content and structure to transition to a blended learning format. Guided student team projects and taught risk management leadership, tools, and methodology.

2015: Co-op Student, Research and Development, EVRAZ North America. Regina, SK

2014: Co-op Student, LP PL Integrity Crack Group, Enbridge Pipelines Inc. Edmonton, AB

2013: Co-op Student, City of Camrose. Camrose, AB

SAMPLE OF PAST INVESTIGATIONS

Materials and Mechanical Investigations

- Structural Steel pile weldment cold cracking susceptibility and damage assessment
- FRP lift station tank material selection/process incompatibility
- Downhole coiled tubing rupture during service
- Various plumbing component failures
- Fire suppression line failures
- Surface cracking near ERW seam in line pipe during manufacture
- Bend test failures/cracking in heavy wall line pipe DSAW seams
- Leveller shaft excessive wear
- Generator shaft failure
- Steckel mill roll failure
- Lifting saddle failure
- Cracks during forming of OCTG products
- Materials characterization for the identification of alloys
- Various defect identifications for manufacturing and customer complaint support
    - Quality assurance mechanical property failures
        - Hardness, CVN Impact, DWTT, Tensile Testing, Bend Tests
    - Welded joints failures during line pipe construction
    - Non-destructive testing indications (ultrasonic, radiography)
    - Hydrotesting pipe and casing bursts
    - Laminations
    - Surface pitting
    - Forming marks

Process Investigations

- High incidence of ERW line pipe bond line defects during manufacturing period
- Improving low-temperature Charpy V-Notch (CVN) impact testing performance of ERW pipe
- Reducing variability in Quench and Tempered (Q&T) casing strength manufacture

CONTINUING EDUCATION / ADDITIONAL TRAINING

Decoding Failures – Introduction to metallurgical failure analysis and fractography (Steel Image)

Minitab for Quality Improvement in Manufacturing (Essentials, Quality Analysis, and Factorial Designs)

PUBLICATIONS

Sharma, N., Kannan, R., Li, L., Anderson, N., Rashid, M., Collins, L., Poplawsky, J., & Unocic, R.. "A Mechanism for Carbon Depletion at Bondline of High-Frequency Electric-Resistance-Welded X70 Pipeline Steel". *Metallurgical and Materials Transactions A.* 2021. Online. https://doi.org/10.1007/s11661-021-06339-w

Kannan, R., Li, L., Anderson, N., Rashid, M., Collins, L., and Arafin, M.. "Bond Formation Mechanism for Resistance Welding of X70 Pipeline Steel". *Welding Journal: 99.* August. 2020.

- Received the 2020 AWS W. H. Hobart Memorial Award

Liu, D., Li, L., Wu M., Long, W., Wei, P., Anderson, N., & Kannan, R.. "Development of Nickel-Added, Iron-Based, Slag-Free, Self Shielded Metal Cored Wire". *Welding Journal: 97.* September 2018.

- Received 2019 AWS A. F. Davis Silver Medal Award - Maintenance and Surfacing

Anderson, N., Watson, E., Cocchio, J., Li, L., & Lefsrud, L.. "Fostering "Soft-Skill" Graduate Attribute Development using Multifaceted Instructional Strategies in an Undergraduate Course". Journal of Online Engineering Education: 9, No. 1, Article 2. June, 2018.

Wu,. M., Liu, F., Pu, J., Anderson, N., Li, L., & Liu, D.. "The Microstructure and Pitting Resistance of Weld Joints of 2205 Duplex Stainless Steel". Journal of Materials Engineering and Performance: 26. November, 2017.