Mitigating Pipeline Corrosion Using a Smart Thermal Spraying Coating System

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Main Objective

This project was awarded to "Fardad Azarmi-Ying Huang" in order to develop an ultimate and affordable corrosion mitigation solution for onshore pipelines through the advancements of a smart coating system. The coating will be deposited using thermal spraying technology. This new approach not only protects pipelines against corrosion but also provides sufficient quantitative corrosion assessment data to support its future corrosion management strategies.

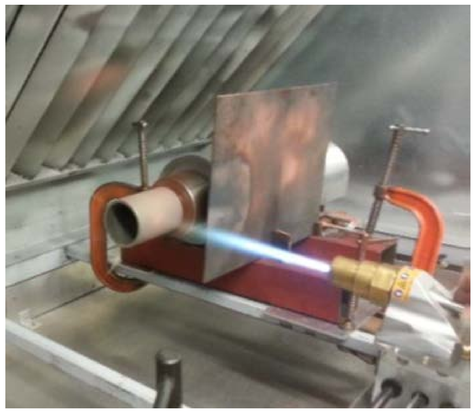


Figure 1. Thermal spraying of a pipe sample using a rotational fixture.

Figure 2. Accelerated corrosion test setup.

Project Approach/Scope

In an effort to accomplish the specific objectives, this study has focused on the following main research tasks:

1- Deposition of the Optimum Coatings using Thermal Spraying Technology.
2- Pipeline Corrosion Risk Management Using an In-line Assessment System.
3- Experimental Characterization of Optimum Coating.
4- Numerical Validation using Finite Element Analysis (FEA) of the Coating System.

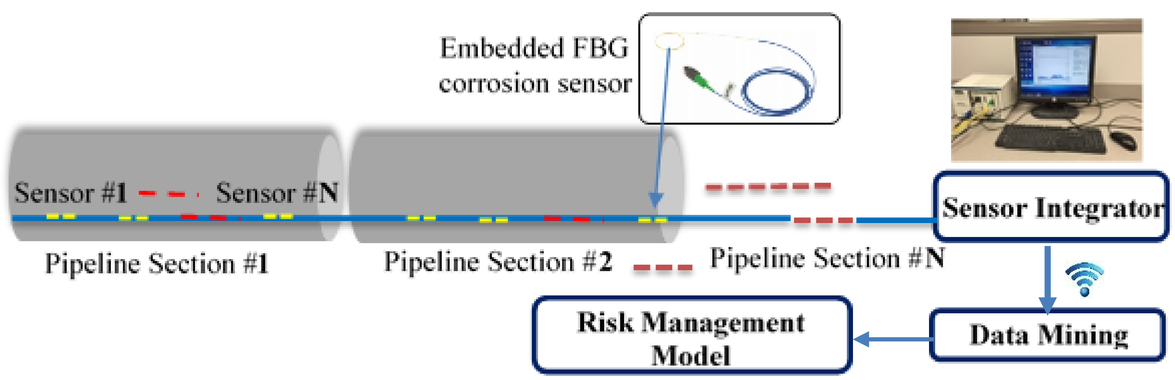
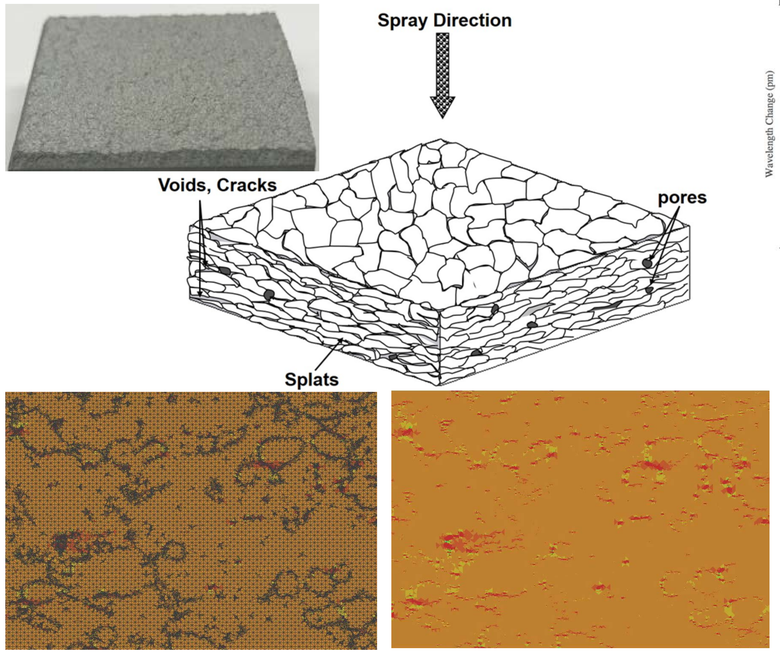
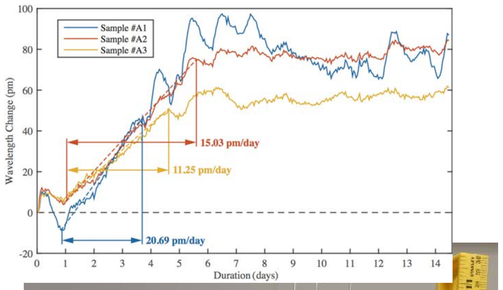


Figure 3. Schematic layout of the in-line corrosion detection system.

Expected Results or Results to Date

Materials selection of optimal coating material *(Completed)*; Examine different coating technologies to find the best deposition process *(Completed)*; Utilization of a coating-sensor system for quantitative measurement of corrosion mitigation performance *(Completed)*; Assessment of the coating performance using full-size laboratory experiments and numerical simulation in various soil conditions *(In-progress)*.





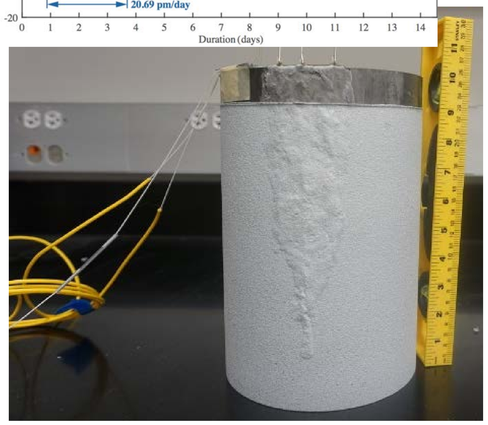


Figure 4. Top image: Free standing *Cold Sprayed* Al-Zn coating, Middle image: Schematic of coating microstructure, Bottom Image: FEA analysis of coating strength.

Figure 5. Wire Arc Sprayed pipe ready for corrosion test. Inset top graph: Resulted corrosion rate of three coated samples.

Acknowledgments

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References

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- *NAICS 23712, "Oil and Gas Pipeline Construction in the US: Market Research Report," IBISWorld, 2012.*

Public Project Page

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