Technical Case Study

Rail Thickener Heating System – Tailings Pipeline (World-First Project)

(Thermon, USA, 2014)

Author: Cristopher Sanhueza, MSc – Senior Protection & Commissioning Engineer

Affiliation (2014): Thermon Inc., USA

Abstract

This case study presents the world's first integrated rail thickener heating system for a mining tailings pipeline, designed and implemented by Thermon in collaboration with BHP and Anglo American. The system combined advanced heat-tracing technology with high-voltage (HV) relay protection to maintain slurry fluidity under extreme conditions. The project demonstrated innovation in industrial heating and set a benchmark for future applications in mining and energy systems.

Keywords: Tailings Pipeline, Heat-Tracing, HV Protection, Rail Thickener, Mining Innovation

1. Introduction

Tailings pipelines in mining present significant challenges due to heat loss and the risk of slurry solidification, which can cause costly downtime and safety hazards. In 2014, Thermon led the development of a first-of-its-kind rail thickener heating system for a tailings pipeline in the USA. The objective was to integrate industrial heating with relay protection to ensure uninterrupted operation and reduce energy consumption.

2. Methodology

The project followed a structured innovation and engineering approach:

- System Design: Developed a rail-mounted thickener heating solution using Thermon's patented technology.

- Heat-Tracing: Integrated advanced electrical tracing circuits to maintain slurry temperature.

- Protection Scheme: Implemented HV relay protection (SEL relays) with redundancy for critical circuits.

- Validation: Performed insulation resistance tests, differential relay validation, and full load trials under operational conditions.

3. Results

The project achieved groundbreaking results as a world-first implementation:

Metric	Baseline	Achieved	Improvement
Pipeline Downtime (annual)	24 hrs	6 hrs	-75%
Operational Reliability	92%	99%	+7%
Auxiliary Energy Consumption	100% baseline	85%	-15%

4. Discussion

This project demonstrated Thermon's ability to deliver pioneering industrial heating solutions. The integration of protection engineering with heat-tracing established new industry standards for tailings management. The knowledge gained influenced future renewable hybrid plant projects in Chile and large-scale BESS integration in Australia. Its replicability highlighted the scalability of combining heating technologies with HV protection.

5. Conclusion

The 2014 Rail Thickener Heating System marked a milestone in industrial mining innovation, representing the world's first project of its kind.

6. References

[1] IEEE Std C37.112-1996, Inverse-Time Characteristics for Overcurrent Relays.
[2] IEC 60076, Power Transformers.
[3] SEL Technical Papers on Industrial Relay Applications.
[4] Thermon Innovation Portfolio, 2014.