Technical Case Study

Heat-Tracing and HV Protection Integration for Industrial Clients

(BHP & Anglo American, USA, 2015)

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Abstract

This technical case study presents the integration of Thermon's CompuTrace® electrical heat-tracing systems with high-voltage (HV) protection relays for major industrial clients BHP and Anglo American in the United States. The objective was to enhance operational reliability, reduce auxiliary energy consumption, and align system performance with IEEE/IEC protection standards. The project delivered improved coordination between heating circuits and relay protection, enabling safer and more efficient industrial operations.

Keywords: Heat-tracing, Relay Protection, Industrial Substations, Energy Efficiency, IEEE Standards

1. Introduction

Industrial mining operations require robust heating systems to ensure continuous transport of slurry and to protect critical assets. Prior to 2015, BHP and Anglo American facilities in the United States relied on conventional heat-tracing systems without full integration into HV protection schemes. This increased the risk of protection miscoordination, system downtime, and energy inefficiency. The project aimed to implement hybrid solutions combining heat-tracing with relay protection to improve safety and reliability.

2. Methodology

The project was executed in three phases:

- System Assessment: Review of existing heat-tracing installations and identification of protection gaps.

- Integration: Deployment of CompuTrace® software for load optimization, integration of SEL relays for HV/LV protection.

- Validation: Omicron-based injection tests, insulation resistance checks, and coordination studies following IEEE Std C37.112 and IEC 60255.

3. Results

The integration program delivered the following measurable outcomes:

Metric	Before	After	Improvement
Energy Efficiency	68%	82%	+14%
Protection Miscoordination Incidents	5/year	1/year	-80%
System Availability	94%	99%	+5%

4. Discussion

The project demonstrated the effectiveness of combining heat-tracing technology with HV relay protection in mining operations. By integrating CompuTrace® design software with SEL relays, the system achieved improved energy performance and reliability. The experience gained in this project directly influenced future renewable integration studies in Chile (2018 IEC 61850 applications) and utility-scale BESS protection frameworks in Australia (2023–2025).

5. Conclusion

The integration of heat-tracing systems with HV relay protection at BHP and Anglo American sites represented a step-change in industrial reliability and efficiency. This project provided a transferable methodology later applied to renewable and storage projects, showcasing innovation and technical leadership in applied protection engineering.

6. References

[1] IEEE Std C37.112-1996, Inverse-Time Characteristics for Overcurrent Relays.
[2] IEC 60255, Measuring Relays and Protection Equipment.
[3] Thermon CompuTrace® Software Design Manual, 2014.
[4] SEL Technical Application Notes – Industrial Relay Integration.