

CATEGORY 3: THE 'HYBRID SPECIALIST' (AUDITOR + HANDS-ON ENGINEER)

Case Study 5: Post-Incident Investigation & Electrical Safety Verification

AUTHOR & CONSULTANCY OVERVIEW

Lead Consultant: Principal H&S & Compliance Specialist (GradIOSH, MIIRSM, NEBOSH Dip, ISO Lead Auditor)

Practice: St George Consultancy Services | **Web:** <https://stgeorgeconsultancy.co.uk>

1. The Client & Challenge

An industrial processing site experienced persistent, unpredictable tripping of main residual current devices and circuit breakers across major production lines. This caused recurring unprogrammed machinery shutdowns, severe product batch waste, and safety concerns among machine operators.

- **Sector:** Industrial Processing & Automated Manufacturing.
- **Problem:** Frequent random protective device operation causing emergency halts.
- **Previous Attempts:** General health and safety auditors and general maintenance staff failed to diagnose the intermittent fault.

2. The Risk & Problem

Unplanned emergency halts on automated production machinery create catastrophic risk of mechanical jams, worker crush injuries during clearing, and severe commercial losses due to lost production time (costing over £3,000 per hour of downtime). Furthermore, repeatedly resetting protective devices without identifying root cause risks catastrophic insulation flashover or electrical fire.

- **Severe Financial Losses:** Operational downtime exceeding £25,000 per week in wasted batch production.
- **Worker Safety Hazards:** Operators exposed to unexpected mechanical restarting and manual un-jamming hazards.
- **Catastrophic Equipment Damage:** Risk of permanent motor winding burnout due to unaddressed harmonic or neutral-earth leakage.

3. The Technical Solution

Combining CMIOSH-level root-cause investigation methodologies with hands-on diagnostic engineering, St George Consultancy conducted a deep-dive forensic investigation.

- **Forensic Root-Cause Analysis:** Applied 5-Why and Fishbone frameworks to analyze machine operator logs, environmental parameters, and fault timing.
- **Diagnostic MFT Testing:** Utilized specialized Multi-Function Testers (MFT) and high-accuracy earth leakage current clamps to trace micro-milliamp leakages across active circuits.
- **Neutral-Earth Fault Identification:** Pinpointed a pinched internal neutral conductor within a high-vibration conveyor motor casing that intermittently touched chassis ground under thermal expansion.
- **System Balancing:** Conducted phase current load balancing and harmonic assessments across the primary distribution board.

4. The Results & Business Value

Identified and permanently rectified a complex physical fault while strengthening the client's operational safety culture and preventive maintenance regime.

- **100% Fault Elimination:** Zero unprogrammed electrical tripping events recorded post-remediation.

- **Immediate Payback:** Saved the client an estimated £120,000 annually in avoided downtime and batch spoilage.
- **Safety Policy Overhaul:** Updated the site's Safe Isolation, Lock-Out Tag-Out (LOTO), and dynamic machinery safety inspection policies.
- **Executive Leadership Report:** Delivered a formal root-cause investigation report suitable for board review and insurer submission.