Fire protection **breakthrough**

As lithium-ion battery fires surge across waste and recycling facilities, Magnum's Therminator system is redefining fire protection in modern waste management.

Fire risk is the most acute and costly challenge facing the waste and recycling sector today. Exponentially increasing waste volumes are converging daily with lithium-ion thermal battery incidents, while tighter regulatory scrutiny is challenging operators, insurers and policymakers in their efforts to establish reliable solutions.

Geoff Haviland, Magnum Chief Operating Officer, says it's against this backdrop that Therminator® represents a benchmark breakthrough – Australia's first, fully closed-loop, autonomous system designed to detect, assess, suppress and verify extinguishment of fire threats before they escalate.

"Therminator signifies a paradigm shift in existing fire protection systems," Geoff says.

"Magnum's patented design combines mechanical robustness, precision electronics and artificial intelligence (AI)-enabled robotics, interfacing with the highest resolution thermal imaging to create an integrated, autonomous waste environment solution."

Fire risk in the waste industry has changed fundamentally. Thermal runaway events – often invisible, unpredictable, energetic, self-sustaining, and difficult to extinguish – are increasing.

These events are mostly triggered by damaged or discarded lithium-ion batteries entering via heterogeneous waste streams.

HIGH-RISK ENVIRONMENTS

Static sprinklers, infra red (IR) and flame detectors, and thermal cameras often struggle in waste facilities due to fixed positions, slow response, and limited contextual awareness.

Geoff says the industrial-grade mechanical, electrical and intelligence architecture of Therminator is engineered to withstand extreme industrial environments including vermin, dust, vibration, moisture and temperature fluctuations. The platform integrates seamlessly into existing infrastructure, whether in transfer stations, materials recovery facilities (MRF), waste depots, or recycling plants.

Therminator integrates seamlessly into existing infrastructure. Images: Magnum

ELIMINATING RISK

Augmented thermolocation intelligence underpins Therminator's advanced detection capabilities. Magnum's AI-driven decision-making combines with a best-in-class FLIR camera to deliver continuous, high-resolution thermal monitoring, dynamically assessing temperature anomalies against environmental baselines.

"With pinpoint accuracy to detect a five-centimetre square thermal threat at 50 metres, Therminator can identify, diagnose and differentiate between risk heat signatures such as overheating materials, smouldering waste, or embedded battery fires long before visible flames or smoke appear," Geoff says. "The advantage for operators is profound; early detection lowers incident severity, reduces downtime, and improves safety outcomes. For insurers, it represents a measurable reduction in catastrophic loss risk."

PREDICTIVE RISK EVALUATION

What differentiates Therminator from existing systems is its AI-driven, predictive decision-making intelligence.

"Therminator's algorithmic logic and continuous self-learning capability enable full recognition, analysis and precision response to a myriad of fire risk patterns; including Li-ion battery ignition signatures," says Geoff.

Once a potential threat is identified, the AI evaluates extensive contextual variables to determine the most appropriate response. This can range from targeted suppression to alert escalation or facility shutdown protocols. Therminator will monitor and evaluate until extinguishment is verified.

"Therminator's autonomous, thermal threat decision-making and extinguishment verification logic offers proactive, closed-loop fire protection, aligned with Industry 4.0 (digital transformation of manufacturing and industrial processes)," Geoff says.

WHERE IT MATTERS MOST

Unlike fixed systems that activate blanket suppression across broad zones, Therminator's intelligent robotic cannon delivers millimetre-perfect, pressurised water intervention.

Where space is constrained and waste streams are constantly moving, this precision creates operational benefits – deploying suppression only where needed; faster extinguishment via direct application; and minimising personnel exposure to hazardous conditions.

FROM UNCERTAINTY TO CONTROL

Therminator's unified electronic platform and centralised architecture of sensors, cameras, control units and robotic actuators enable real-time data processing and communication.

This integration allows for continuous monitoring and reporting, remote access and control, data logging for compliance and analysis and seamless integration with existing site systems.

"For regulators and insurers, this level of transparency is particularly important," says Geoff. "Detailed incident logs and system performance data provide verifiable evidence of risk management practices, supporting compliance with safety standards and underwriting requirements, making fire risk insurable."

Suitable for diverse facility types, Therminator can be deployed across new and existing sites with minimal infrastructure changes. Magnum's authorised sales and service partner Ogtec manages installations, spare parts and customer support.

REAL-WORLD VALIDATION

After a decade of prototype development, Magnum partnered with industry to trial Therminator units under real-world conditions in the harshest environments.

Geoff says that after two years of continuous ongoing operation across multiple waste management sites, Therminator results verified conclusively:

- Zero recorded system failures
- Zero human intervention required
- Zero mechanical failures
- Zero offline incidents
- 5 confirmed extinguishments before ignition incidents within 15 seconds
- 100 per cent elimination of reignition cycles
- 70 per cent reduction in water consumption
- 100 per cent data recording, every second
- Alignment with best-practice risk mitigation strategies

He says Magnum's Therminator system is already delivering transformational solutions for the waste industry, with Australia's leading operators installing the technology across their facilities to achieve enhanced fire security and greater peace of mind.

"For waste operators, Therminator helps reduce fire incidents and associated downtime, while mitigating environmental contamination and cleanup impacts. Its targeted suppression approach minimises collateral water damage and reduces operational disruption, while also strengthening worker safety, confidence and overall asset protection.

"For insurers and underwriters, the system contributes to a lower frequency and severity of claims, provides enhanced risk visibility through detailed data and reporting, and increases confidence in the resilience of insured sites.

"For regulators, Therminator supports improved compliance with fire safety standards, enables transparent and auditable system performance, and aligns with best-practice risk mitigation strategies."

He adds that Magnum's Therminator is officially certified as a Fire Engineered Performance Solution, compliant with guidelines set by the Australasian Fire and Emergency Service Authorities Council (AFAC), Environment Protection Authority (EPA) Victoria, Country Fire Authority and Fire Rescue Victoria.

A SAFER, SMARTER FUTURE

"Fire prevention can no longer rely solely on reactive measures or isolated technologies," says Geoff.

"It requires integrated, intelligent systems capable of adapting to complex and dynamic environments; Therminator embodies this next-generation approach. Combining mechanical durability, advanced electronics, AI intelligence, robotics, and thermal imaging, it sets a new benchmark for fire protection in high-risk settings.

"In an industry where the cost of inaction can be catastrophic, Therminator is not just an innovation – it is an essential evolution."

Proudly Australian-owned and operated since 1972, Magnum established a reputation throughout the global mining community for engineering excellence, uncompromising product quality and industry solutions that eliminate operator risk, optimise performance and extended lifecycle in the world's harshest environments. WMR

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Robotic precision enhances system effectiveness, reaction speed and target suppression accuracy.