Kevin Howlette

As Projects Director at EHS International, Kevin works globally with industry, maritime, recycling, and emergency services, providing training, consultancy, and incident response solutions that address the evolving dangers of lithium-ion battery technology and associated toxins.

Kevin is an experienced safety professional with a unique combination of frontline firefighting expertise, chemical knowledge, and specialist rescue leadership.

A former firefighter with 17 years of service, his early career also included work as a QC Lab Technician and Hazmat Officer, giving him a deep understanding of chemical processes, hazardous materials, and their real-world risks.

For the past 15 years, Kevin has served as a Specialist Search and Rescue Director, leading high-stakes operations and multi-agency coordination across a range of emergency scenarios.

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Founded by Chris Mee

Through the Gear: The Hidden Threats Firefighters Face from Toxins and Evolving Hazards

Focus on Lithium-Ion Battery Fires and Evolving Risks to the Emergency Services

Who is EHS International?

We are Global Lithium-ion Fire Team and solution innovators.

Let's go beyond safety, together.

EHS International –Battery Energy, Our Experience.

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- In **2018** a Fire on a Ferry from Belfast to Scotland – K Howlette asked to Investigate firefighting strategies for PO Ferries.

- **2020 BESS** Incident in Power Station in Northern Ireland – Extensive water damage to £10 million worth of LG 48.0 KWH Batteries, the incident lasted 14 weeks, our team managed the incident to a successful conclusion.

- **2023 Kells BESS-Site** inspection lead to 140 x LG 48.0 KWH moving into pre thermal runaway, 7 in critical state.

- **2025 Major Recycling** site with 6 x 78.0 KWH batteries were on fire on the clients site, EHS completely de-energised them and they are now recycled.

- Advisor's to the XeroTech incident in Galway **January 2025**

- **2025-26 Currently,** 180 tons of stock-piled batteries from as old as 2001 from Valance technologies, information in the boxes indicated all the battery were damaged in production

The Growing Threat of Li-Ion Battery Fire

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I'm going to focus on a recent event,

- This year we had a major incident, which had a huge knock on effect is a deeply concerning incident — and sadly not surprising — and underscores a critical gap in post-incident contamination control, especially involving, Lithium-ion BESS (Battery Energy Storage Systems), Lithium-Ion Battery recycling and EV fires.

- In this Incident 5 firefighters wore contaminated tunics to hospital — and in doing so, unintentionally exposed 4 medical and ambulance staff to toxic by-products from a Major Lithium-ion fire — and reflects a serious breakdown in de-contamination protocol and highlights the urgent need for systemic reform.

PPE as a Contamination Vector:

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Firefighter PPE, especially after an major Lithium-ion Battery Fire, can be heavily saturated with toxic compounds — including and the big one is:

- **Hydrofluoric acid fluoride (HF)** – a highly corrosive and penetrative gas **and up to 300-500ppm, 50ppm can be fatal when inhaled between 30-60 minutes**

- **Hydrocarbons are present in lithium-ion batteries**, both as components of the electrolyte and as products of battery degradation or failure. Specifically, they can be found in the off-gas emitted during normal operation, charging, and especially during abusive conditions like thermal runaway.

- **Heavy Metals:** Lithium batteries also contain heavy metals like cobalt, nickel, manganese, copper, and potentially lead, mercury, and cadmium, which are toxic and can leach into the environment if batteries are not recycled properly.

- **Combustion byproducts of plastics and synthetic materials**

These toxins do not just remain on the surface; they can off-gas and transfer onto skin, surfaces, and other people — leading to secondary contamination.

Lets have a look at Firefighter PPE through the years

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"This is a range of my personal PPE from 1978 through to 2025"

- Clearly PPE has changed for the good, but has it kept up with the evolving issues with modern day chemicals and toxins

What happens at a hazmat incident, must stay at the Hazmat incident and not be transferred to –

- The cab of the fire engine-PPE is currently being taken off at major lithium-ion battery incidents and then put into hazmat bags for cleaning, then the firefighters will then don a new set of gear.

If this does not happen then secondary contamination will occur and those exposed to it now have a major problem

Secondary Exposure of Medical Personnel:

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The recent incident resulted in healthcare workers becoming casualties of a chemical incident they weren't even at the scene for. That should be a wake-up call.

Secondary exposure of nurses, paramedics, or even fellow firefighters can result in:

- Chemical burns

- Respiratory injuries

- Systemic toxicity

And — those affected have yet to recover and remain off duty, indicating the serious, lasting effects of these toxins.

Failure of Post-Fire Decontamination Protocols:

- We are seeing s trend at lithium-ion Fires of, **No proper on-scene decontamination,** no **change-out of PPE** before boarding emergency services transport, and **No containment of contaminated gear**, which is a significant procedural failure.

This highlights:

- A lack of **training or awareness** around toxic exposures from Lithium-ion fires
- Possibly **No established SOPs for Lithium-ion fires**, post-incident decontamination
- An **inadequate response plan for firefighter** and patient transport from hazmat scenes

Operational Challenges at Lithium-Ion Fire Scenes

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- **Extinguishing is difficult**: fires burn hotter and longer, often requiring much more water and longer duration to suppress

- Firefighter are therefore **exposed for longer periods** and the firefighters PPE are drawing in toxins all the time they are exposed ABC+2C 2

- Risk of reignition, structural collapse, and secondary explosions complicate response are all secondary issues that compound the period of time spent at Hazmat incidents U.S. Fire Administrationfsri.org

Institutional Liability and Occupational Health Risks:

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This is now not just a fire service issue — it's a public health, occupational safety, and legal liability concern.

- Fire departments,
- Ambulance service, paramedics, hospitals,
- Recovery of vehicles after fires
- Recycling plants
- Lithium-ion battery storage facilities for distribution

And all first responders globally, must treat these incidents as hazardous materials incidents with full PPE protocol enforcement, decontamination zones, and protective measures for all staff downstream of the incident.

This also applies to EV Fire Blankets which harbour all those toxins as well

Moving Forward – Urgent Actions Required:

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Mandatory Decontamination Before Hospital Transfer

- **No contaminated PPE** should be worn during an EV incident should ever be worn into a **clean zone, ambulance, or hospital.**
- Disposable overalls or clean gear must be used post-decontamination.

Education and Training

- All frontline personnel (fire, ambulance, hospital) must be briefed on secondary contamination risks from EV fires, especially lithium-ion battery-related incidents

Total Innovations form EHSI.

Lithium-ion fires are here to stay;

EHS INTERNATIONAL HAVE THE SOLUTIONS.

The Avenger and drones are becoming common place globally and stopping firefighters from getting complex injuries and contamination

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EHS INTERNATIONAL
Drone and Robotics Team

Firefighter 2nd

AVENGER 1ST

This has become the norm in Irish Fire brigades and UK fire Brigades, protecting FF as we can repair the Avenger

The Avenger in Action

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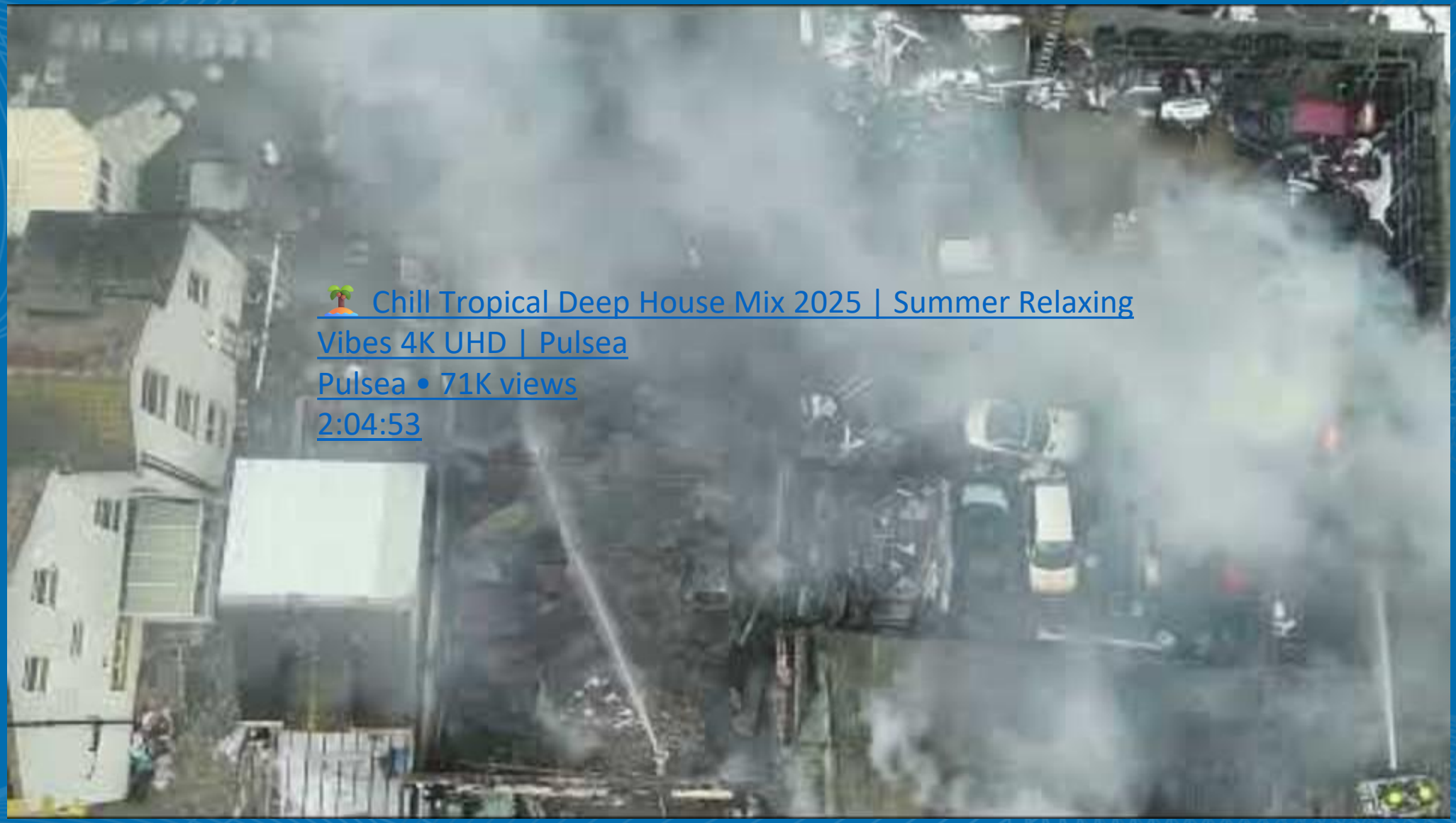

Currently operating in Irish & UK Fire Brigades

EHS International
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The Avenger^{FIRE} FFR

The Avenger continues to evolve, following End User requirements the successful Avenger UGV has evolved into a Fire Fighting Robot (FFR). The Avenger^{FIRE} is a medium weight, robust portable robot both capable and rugged.

The Avenger^{FIRE} features a Force 50 Robotic Nozzle which has a flow rate of 2000 lpm. In addition, this FFR features a cooling system which effectively addresses the build-up of thermal radiation.

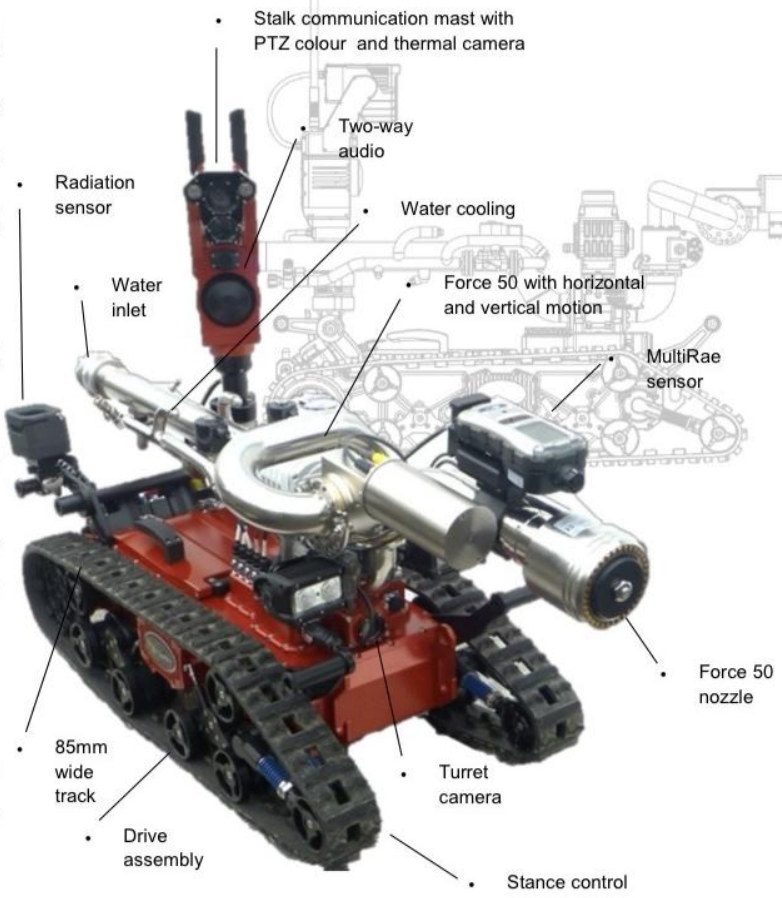
The Command Console is built around a ruggedized laptop and features a touch-screen display showing three camera images, system telemetry, status information and allows menu access to associated control functions.

The Command Console is supplemented with a PlayStation® controller providing precise and effective control of this FFR. In addition, the Avenger^{FIRE} is also supported by an independent Hand Control providing limited function working on Bluetooth.

The level of computer interface allows the system to be upgraded without change to the hardware: it also provides the digital architecture for the inclusion of CBR Sensors.

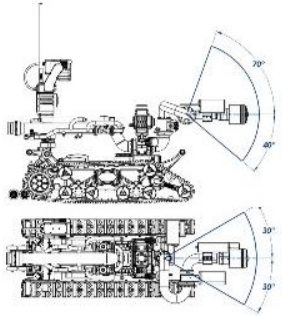
Key Features

- Anodized aluminium chassis and stalk construction.
- Stainless steel Force 50 water cannon nozzle.
- Water cooling system.
- Drive speed of up to 8 kmh.
- Wide tracks with stance control feature.
- Ascends / descends stairs up to 40°.
- Variable speed control.
- Outstanding capabilities for mobility and mounting CBRN Sensors.
- Four I/O Ports for additional payloads such as sensors, detection devices and cameras.
- Three cameras as standard.
- Two-way directional cameras.



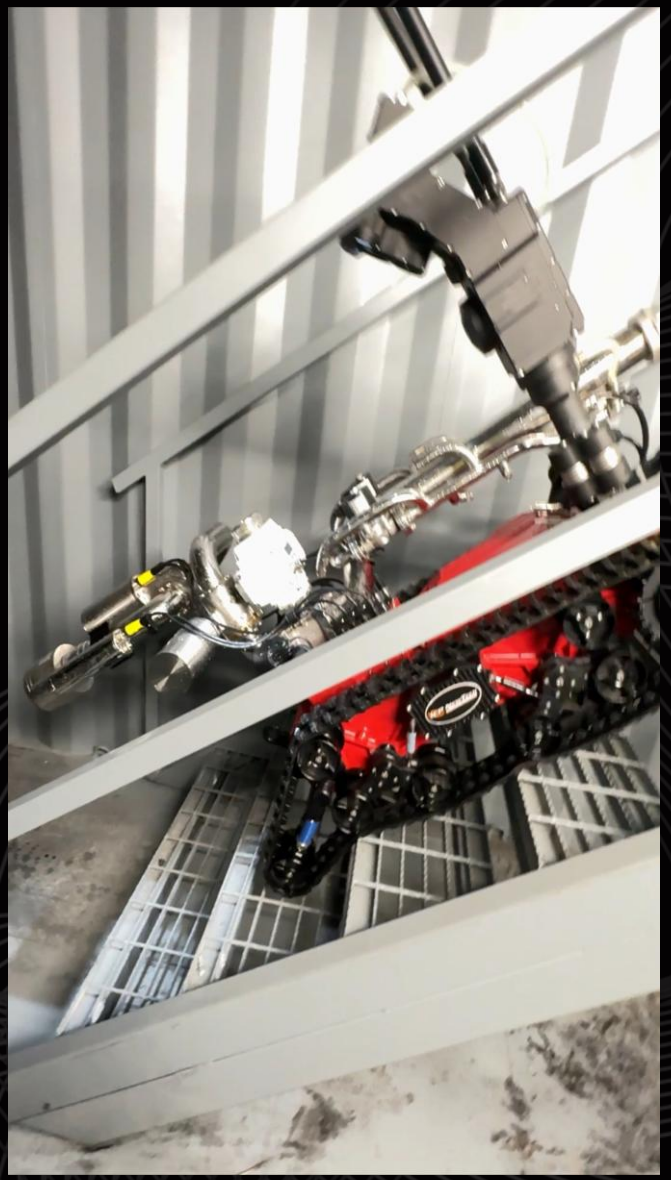
PLATFORM

Dimensions (LxWxH):	1400mm x 450mm x 840mm
Weight:	122kg (Chassis & Nozzle)
Speed:	8km/h
Environmental protection:	IP66
Vertical obstacle:	300mm
Stair climb:	40°
Cameras:	3 built-in cameras
Illumination:	Spotlights, LEDs, IR LEDs and Thermal
Communication:	Point to Multi Point MIMO
Operating range:	500m LOS & 200m NLOS
Power Supply:	Set of three SLA batteries 36V
Working time:	4 hours (mission dependent)



FORCE 50 ROBOTIC NOZZLE

Degrees of Freedom:	110° vertical range of motion. 60° horizontal range of motion.
Material:	316 Stainless Steel
Inlet:	2" ANSI Flange
Maximum Flow:	2000 LPM
Maximum Throw:	Up to 65m
Normal Operating Pressure:	10 bar
Max Working Pressure:	12 bar



Industrial fluids – MPF Multi Purpose Fluid

EHS International Founded by Chris Mee

The Multi-Purpose Fluid designed to tackle multiple fire types and lithium batteries.

Along with dealing with Lithium-ion battery fires our MPF product can also deal with Class **A**, **B** and **F** and **NTA8133** approved for lithium fires

1. **EndoShield Performance - MPF** fluid creates an endothermic reaction, absorbing the energy that is given off from a fire as heat, effectively acting as a super coolant.

2. **Exo-Suppression - MPF** fluid supresses the oxygen at a molecular level to prevent reignition.

3. **600wh A,B,F and electrical all in one**

Industrial fluids – WildFire Pro

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Conclusion

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So in just **4 decades**, we've gone from wool and leather to high-tech, multilayered PPE designed to fight both **flames and chemicals**.

But the fight isn't over. The threats are evolving – from **cancer-causing smoke**, to **battery explosions**, to **HF gas and toxic soot**. PPE must keep evolving with it.

And while the gear protects us, **awareness, training, and clean practices** must be at the forefront to protect our future emergency response organisations.

EHS International

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