

PHI-EDGE

Physics-Informed AI Intelligence for Industrial systems

Industrial IoT connects the factory. Physics-informed AI makes the data useful for optimisation.

The manufacturer's problem

Manufacturers have sensors, meters and SCADA, but still rely on manual interpretation and bespoke integration

- ❖ Factory data is fragmented across sensors, PLCs, SCADA, historians, MES and ERP
- ❖ Cloud only analytics introduce latency, bandwidth and privacy constraints on the plant floor
- ❖ Conventional machine learning finds correlations but does not understand physical operating constraints

Benefits for manufacturers

Factory-wide energy, material and throughput optimisation from existing industrial IoT data

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|-------------------|---|
| CONNECT | Existing sensor, SCADA, MES and energy data, connected once |
| UNDERSTAND | Physics-informed models describe how the process actually behaves |
| OPTIMISE | Recommended operating conditions for energy, materials, throughput and assets |

What PHI-EDGE will build

Physics informed optimisation layer

Engineering physics

Process constraints, kinetics, thermodynamics, equipment limits, product specification

Hybrid model

Engineering and physics constraining ML for accurate predictions

Optimisation

Live optimisation actions to maximise energy and throughput efficiency and minimise waste

operating set-points

industrial data

Industrial IoT, edge and secure connectivity

Interoperability OPC UA, historian, MES, ERP **Edge processing** normalisation, features, local inference

Physical factory machines, processes, sensors, meters, PLCs

Demonstrated industrial impact

- 8–12%** reduction in industrial energy intensity
- up to 9%** improvement in production throughput
- up to 8%** reduction in material and stock waste

Partners we are looking for

Manufacturers with existing sensor, SCADA, MES, ERP or energy data and a clear optimisation challenge around energy, materials, throughput or asset performance

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