AMPD ENERGY

Ampd Energy is driven by its vision for an emission-free future for construction. Ampd Energy pioneered the use of battery energy storage systems (BESS) in urban construction with its flagship product, the "Enertainer". The Enertainer electrifies construction sites and provides clean, quiet and fully automated energy delivery, allowing construction to transition away from fossil fuels.

Compared to fossil fuel generators, the Enertainer:

- reduces carbon footprint by up to 85%;
- is 32x quieter;
- emits zero diesel fumes;
- eliminates diesel handling and usage risks;
- has zero maintenance and refuelling downtime;
- and is economically justified for operational cost savings.

As an IoT enabled device, the Enertainer can be remotely monitored anytime and anywhere, providing a deep level of data-transparency for data-driven decision making.

To date, Ampd Energy has eliminated 15,000 tonnes of CO_2/year and removed an equivalent of 35,000 cars worth of air pollution from our city's streets.

For more information or a no-obligations consultation on how the Enertainer could benefit your project, **please contact us at +852 3705 9441 or at sales@ampd.energy**

Ampd Enertainer

The Ampd Enertainer is an advanced energy storage system which provides diesel-free power for the next-generation of construction projects. Available in various configurations, the Ampd Enertainer is designed for the tough, dynamic and space-constrained needs of construction sites, without compromise.

Significant Cost Savings

Up to 75% lower all-inclusive OPEX[1] & lower total cost of ownership

Ultra Low Noise Footprint

32 times quieter[1], enabling use during noise sensitive hours

Minimise Carbon Footprint

Up to 85% carbon reduction[1] & zero direct NO_X, PM & SO_2 fumes

Enhance On-Site Safety

Eliminate diesel fire hazards & reduce on-site diesel storage quantity

Maximise Productivity

Zero recharging downtime and near-zero annual maintenance downtime

Internet Connected, 24/7

Connect to the Enertainer's IoT platform, anywhere & anytime

[1]Compared to generators of a similar capacity

110+ units
Delivered + on order

1,000,000+ hrs
Fleet-wide operational time

90+ projects
Powered by Enertainers

15,000 tonnes
CO_2 eliminated per year, to date

35,000 cars
Air pollution impact

34
Unique customers

Select Job References

Advanced Manufacturing Centre
Client: Science Park
Contractor: Gammon Construction
Contract sum: US$610m
Application: Tower Crane, 24h, Semi-indoor

Murray Road 2
Client: Henderson Land
Contractor: Hip Hing Construction
Contract sum: US$180m
Application: 64 Ton Tower Crane

Multi-welfare Complex (SS F506)
Client: ArchSD
Contractor: Shui On
Contract sum: US$242m
Application: Tower Crane, Hybrid recharge, MiC project

Lamma HKE Gas & Steam Turbine Power Station Extension
Client: HKE
Contractor: Paul Y
Contract sum: Undisclosed
Application: Tower Crane

Kai Tak 6565 Residential
Client: Henderson
Contractor: Paul Y
Contract sum: Undisclosed
Application: Tower Crane + Hoist

Tin Wing Station residential
Client: MTR, SHKP
Contractor: Sanfield
Contract sum: Undisclosed
Application: Tower Crane

Select Job References

Sky City
Client: New World, Airport
Contractor: NWC (Hip Seng)
Contract sum: Undisclosed
Application: Auto on/off, Tower Crane

TaiKoo Place Two
Client: Swire Properties
Contractor: Hip Hing Construction
Contract sum: Undisclosed
Application: Tower Crane + Welder

Kai Tak Sports Park
Client: New World Development
Contractor: Hip Hing Construction
Contract sum: US$3,800m
Application: Tower Crane

Shek Wu Hui Treatment Plant
Client: Drainage Services Department
Contractor: Chun Wo
Contract sum: US$170m
Application: Welders

United Christian Hospital
Client: Hospital Authority
Contractor: Build King - Hyundai JV
Contract sum: US$1,200m
Application: Tower Crane, Welder

Siu Hong Residential Development
Client: SHKP
Contractor: Sanfield
Contract sum: Undisclosed
Application: Tower Crane

Case Study

Introduction & Project Information

Gammon Construction deployed two Ampd Enertainers to power four tower cranes to build the Advanced Manufacturing Centre ("AMC"), a new flagship manufacturing facility by the Hong Kong Science and Technology Parks Corporation (HKSTP) in Hong Kong. The first unit was deployed in October 2019 with the second being added in May 2020, with both units replacing a total of four generators. Using only 70A of grid power to power four cranes, the Enertainers have enabled a significant cost and environmental reduction. In addition due to its quieter operation, the Enertainer improves noise levels in the local community while allowing for quiet operations at the site beyond normal working hours.

Site Setup

Figure 1. 'Block' diagram of the connection between the utility mains, Enertainers and the loads.

Results

- 78% lower OPEX costs[1]
- 85% CO_2 footprint reduction[2] **–almost 500 tonnes per year**
- **Zero direct PM emissions (99.99% less indirect)**[3]
- **Over 30 times quieter than a diesel generator**

"The Enertainer worked perfectly from the very beginning. Not only did we vastly reduce our CO_2 emissions–a key focus for Gammon–but we did so with a lower OPEX. Even though this was the first time we deployed this technology, the performance data reporting system of the Enertainer gave us confidence. We are very excited about using this technology at other sites in future."

Andy Wong (Senior Innovation Manager), Gammon Construction

"From a site perspective, the Enertainer was a great fit for AMC. We put it through its paces and it responded to everything we threw at it. It was very simple to set up and operate with almost no downtime to site operations. We're particularly excited about the lower noise levels which will really help us get government approval to continue working at noise sensitive hours."

Sammy Lai (Director, Building Projects), Gammon Construction

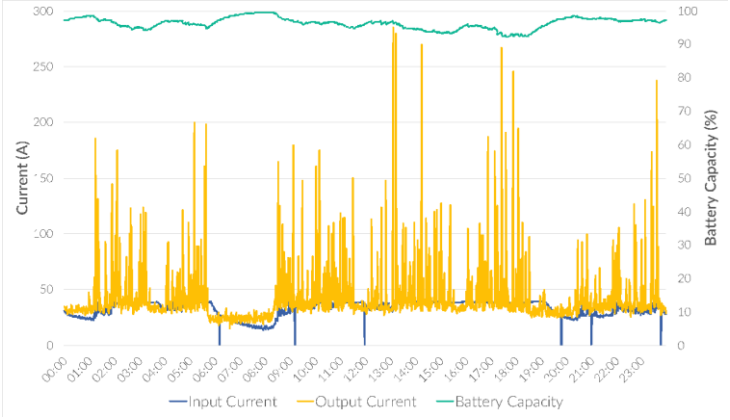

Figure 2. Performance metrics for the Enertainer at the AMC project on 8 July 2020, one of the busiest days for the tower crane on the project.

[1] Assuming a wholesale market diesel price of HK$5.50 (US$0.71 per litre).

[2] Assuming an energy intensity of 0.51 kg_{CO2} per kWh (Source: Response to the Long-Term Decarbonisation Strategy Public Engagement, CLP (September 2019).

[3] Assuming a Tier III generator and using Hong Kong's electricity grid

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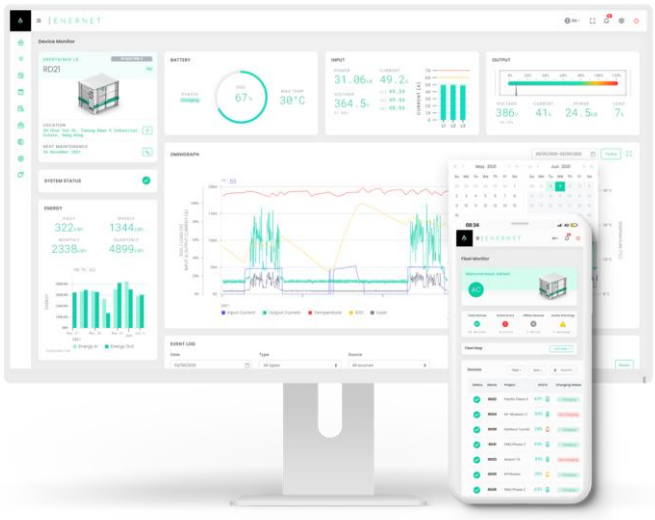
Ampd Enertainer

Key Specifications[1]

Parameter		Specification		
Model		**Enertainer F**	**Enertainer M**	**Enertainer L**
On CITF Pre Approved List		Yes (PA20-045)		
Maximum output current per phase	Peak (<1 minute)	340 A	570 A	795 A
	Continuous	285 A	475 A	665 A
Energy storage subsystem chemistry		Lithium-ion NMC		
Power conversion subsystem	Type	Heavy-duty, modular power conversion system		
	Input voltage range	320 – 440 VAC (3Ph + N + PE)		
	Maximum input current	90 A (for optional upgraded models)		
		55 A (with optional input leakage current reduction device)		
	Output voltage	380 – 415 VAC ± 1% (3Ph + N + PE)		
	Output frequency range	50/60 Hz ± 0.5 Hz		
Thermal management subsystem	Type	Industrial, wall-mounted recirculating air-conditioning system		
	Number of cooling units	2 units		
	Refrigerant type	R134a		
Mechanical	Dimensions (L x W x H)[2]	3.2m (L) x 2.4m (W) x 2.6m (H) (10' container)		
	Net weight	7.0 tons	7.4 tons	8.1 tons
	Fire extinguishing subsystem	Aerosol based, triggered by heat and/or smoke sensors		
	Ingress protection	IP54* (rain and typhoon proof)		
	Operating temperature range	0 to +45 °C external ambient temperature		
	Sound power level[3] at full load	85-89 dB(A) (32 times quieter vs. comparable diesel generator)		
	Sound pressure level at full load	57-61dB(A) (at 7 meters)		
Connectivity		Cellular data (4G)		
Expected Lifetime[4]		10+ years		

* For DC room



Enernet

The Enernet is an all-in-one online portal connecting directly to all Enertainers. Enernet provides a deep level of data transparency on the operations of Enertainers and the equipment attached to it anytime, anywhere.

This level of data transparency allows better understanding of the operations and condition of construction equipment while ensuring the uninterrupted provision of energy to construction sites, enabling better, faster, and more informed decisions, improving the productivity and operational efficiency of sites.

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[1]In the interests of continual product improvement, specifications are subject to change without notice. Please contact us for the latest specifications.

[2]An additional 0.9 m clearance on all sides of the Enertainer should be provided for maintenance access.

[3]ISO 3746:2010 measurement methodology.

[4]Provided for guidance purpose. Life is defined as the ability of the Enertainer to provide the specified rated power. Actual life may vary and will depend on factors such as (but not limited to): (i) operating temperature; (ii) quality of maintenance of the system; (iii) frequency of use; and (iv) time duration spent at different battery states.